CITY OF VENICE, FLORIDA

Purchasing Department

401 W. Venice Avenue
Venice, FL 34285

Invitation to Bid

ITB Number 2985-14

Date of Issue: April 9, 2014

Submission Deadline: May 9, 2014 at 2:00 PM

Title and Purpose of ITB:

Eastside WRF Reclaimed Water Filtration Project

INVITATION TO BID

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

Bid No.: **2985-14**

Bid Title: **Eastside WRF Reclaimed Water Filtration Project**

PROJECT DESCRIPTION: This project includes the construction of the Reclaimed Water Filtration System Improvements Project at the City of Venice Eastside WRF site, inclusive of all equipment, materials and work required for a complete, tested, and operational system.

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

BID SUBMITTAL DEADLINE and BID OPENING DATE & TIME: May 9, 2014 at 2:00 PM

A pre-bid meeting will be held on April 21, 2014 at 2:00 p.m., at the Eastside WRF, 3510 Laurel Road East, Venice, FL 34275. Representatives from the City will be present to discuss the overall project and the Invitation to Bid. Interested Firms are encouraged to attend.

All questions, comments, or concerns about this ITB must be submitted in writing to Mr. Peter Boers, Procurement Manager, for the City of Venice, Room 204, 401 West Venice Avenue, Venice, FL 34285 or e-mail at pboers@venicegov.com. Mr. Boers is the only designated representative of the City authorized to respond to comments, questions, and concerns. The City will not respond to comments, questions or concerns addressed to any person other than Mr. Boers. If the City determines that a particular comment, question or concern necessitates a global response to all Proposers, the City will issue a clarifying memorandum or addendum. **The final day that the City will accept questions will be April 30, 2014 by 1:00 p.m.**

Specifications and Bid documents are available by calling Onvia DemandStar at (800) 711-1712 or by their Internet address at http://www.demandstar.com. Proposers may also pick up Bid documents at the City of Venice Purchasing Department, Room 204, 401 West Venice Ave., Venice Florida 34285, **(941) 486-2626 Ext. 26017** at no charge.

Bids must be submitted in **four sets** and at least one set must bear an original signature, in a sealed envelope marked **"INVITATION TO BID # 2985-14: "Eastside WRF Reclaimed Water Filtration Project"** and mailed or delivered to the City of Venice- Purchasing Department, 401 W. Venice Ave. Room # 204, Venice, FL 34285, no later than the deadline specified. The City assumes no responsibility for bids received after the bid submittal time or at any location other than that specified, no matter what the reason. Late bids will be held unopened and will not be considered for award.

Bid Security in the amount of five (5%) percent of the bid is required.

Performance and Payment Bonds are required in the amount of One Hundred (100%) percent of the contract price once a contract is awarded.

No bid will be received after the specified time for acceptance and no bidder may withdraw his bid within a period of one-hundred and eighty (180) days after the actual date of opening thereof.

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

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

CITY OF VENICE, FLORIDA

Publish: Wednesday, April 9, 2014
Saturday, April 12, 2014

INVITATION TO BID

CITY OF VENICE, FLORIDA

ITB# 2985-14

Eastside WRF Reclaimed Water Filtration Project

SECTION 1: GENERAL CONDITIONS & INSTRUCTIONS TO OFFERORS

DEFINED TERMS

Terms used in this solicitation are defined and have the meaning assigned to them. The term "Offeror" means one that submits a proposal directly to CITY as distinct from a Sub-Offeror, who submits a Proposal to the Offeror. The term "Successful Offeror" means the qualified, responsible and responsive Offeror to whom the City of Venice (on the basis of CITY'S evaluation as hereinafter provided) makes an award. The term "CITY" refers to the City of Venice, a municipal corporation of the State of Florida. The term "ITB" refers to this Sealed INVITATION TO BID. The term "solicitation" refers to the entire ITB package and the Offeror's submittal as a response to this ITB. The term "submittal" refers to all documentation and information as submitted by the Offeror in response to this solicitation. The term "Department" refers to the State of Florida Department of Transportation.

1. OFFEROR REGISTRATION

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

2. CONTACT

All prospective Offerors are hereby instructed not to contact any member of the City of Venice City Council, City Manager, or City of Venice staff member other than the contact person indicated in this ITB regarding this solicitation or their submittal at any time prior to the final evaluation and recommended ranking by the City staff for this project. Any such contact shall be cause for rejection of your submittal.

3. ADDENDA AND INQUIRIES

3.1 If there is any doubt as to the true meaning of the specifications and information provided, Offerors may submit written or faxed inquiries regarding this solicitation to the Procurement- Finance Department, 401 West Venice Avenue, Room # 204 Venice, FL 34285, Fax No. (941) 486-2790. The City will respond to written or faxed inquiries received by the posted deadline for questions. Inquiries must reference the date and time of opening, and the solicitation number. Failure to comply with this condition shall result in the Offeror waiving their right to dispute the specifications and information provided in the solicitation document.

3.2 Any change to this solicitation shall be made by addenda duly issued to each registered Offeror. Receipt of such addenda must be so noted on or within your response. It is the Offeror's responsibility to make contact through the Internet or phone to determine if Addenda have been issued.

3.3 Oral Inquiries: The City will not respond to oral inquiries.

4. PUBLIC OPENING

Submittals shall be received in the Procurement- Finance Department, 401 W. Venice Ave, Venice, FL 34285 by the date and time indicated on these documents. As soon as possible thereafter, the names of the Offerors and their proposed bid amount shall be read off at the specified location.

5. DELAYS

The City, at its sole discretion, may delay the scheduled due dates indicated above if it is to the advantage of the

City to do so. The City will notify Offerors of all changes in scheduled due dates by written addenda.

6. PROPOSAL SUBMISSION AND WITHDRAWAL

6.1 **Address to send submittal:**

Procurement- Finance Department
City of Venice
401 W. Venice Ave, Room # 204.
Venice, FL 34285

6.2 The outside of the envelope/container must be identified with the solicitation number and title as stated above. The envelope/container must also include the Offeror's name and return address.

6.3 Submittals may be withdrawn by an appropriate document duly executed (in the manner that a Submittal must be executed) and delivered to the place where Submittals are to be submitted at any time prior to the deadline for submission. A request for withdrawal or a modification must be in writing and signed by a person duly authorized to do so. Evidence of such authority must accompany the request for withdrawal or modification. Withdrawal of a Submittal will not prejudice the rights of an Offeror to submit a new Submittal prior to the opening date and time. After expiration of the period for receiving Submittals, no Submittal may be withdrawn or modified.

6.4 Withdrawal of Submittals after Opening Date: Submittals, once opened, become the property of the City and will not be returned to the Offerors. Submittals not so withdrawn before the opening constitute an irrevocable offer for a period of one-hundred-eighty (180) days to provide the City the services set forth in these specifications until one or more of the proposals have been accepted by City staff. No Offeror may withdraw their proposal during this one-hundred-eighty (180) day period.

6.5 Number of Submittal Copies: Offerors shall submit four (4) complete sets (one original and three copies) of the submittal complete with all supporting documentation (i.e. photographs, drawings, and exhibits) in a sealed envelope/container marked as noted above.

6.6 Proposal Is Not Binding: The Offeror understands that responding to this solicitation does not constitute an agreement or contract with the Offeror. A submittal is not binding until submittal is reviewed and accepted by the appropriate level of authority and both parties execute a contract.

6.7 Responsibility for getting a submittal to the City on or before the specified date and time is solely and strictly that of the Offeror. The City will not be responsible for any delay, for any reason whatsoever. Submittals by telephone, telegram, facsimile machines, and Internet, will not be acceptable. Submittals must be received and stamped on the outside of the envelope with the time and date, in the Purchasing Department by the date and time specified for opening.

6.8 LATE SUBMITTALS – Submittals received after the date and time of the opening will not be considered and will not be opened. It will be the Offeror's responsibility to make arrangements for the return of their submittal at their expense.

7. PRICES, TERMS AND PAYMENT:

Firm prices shall be bid F.O.B. requesting agency and include packing, handling and shipping charges fully prepaid by the vendor.

7.1 BID PRICE/MISTAKES: The bidder shall show in the proposal both the unit price and the total amount on items when indicated. In the event of discrepancy between the unit price and the extension, THE UNIT PRICE SHALL PREVAIL. Prices shall be extended in decimals.

7.2 INVOICING AND PAYMENT: The vendor shall be paid upon submission of proper certified invoices to the ordering agency at the prices stipulated on the contract. Invoices shall contain the purchase order number. THE VENDOR SHALL ACCEPT NO ORDER WITHOUT A PURCHASE ORDER NUMBER FROM THE CONTRACTING ENTITY. The City reserves the right to pay for purchases made under any agreement resulting from a solicitation through its Purchasing Card Program which utilizes VISA credit cards, check or the ACH (Automated Clearing House) process. When payment is received utilizing the City credit card, an original invoice should not be mailed to the Finance Department. Only the credit card receipt is issued for this charge with the original receipt being provided with the delivery to the individual cardholder placing the order. No surcharges will be accepted for the use of purchasing cards.

7.3 TAXES: The purchase of certain items by the Contracting Entity are exempt from the payment of excise, transportation and sales tax imposed by the Federal, State and/or City governments. Such taxes must not be included in proposal prices. Upon request, applicable Federal Excise Exemption certificates will be furnished.

8. CONDITION AND PRICING:

It is understood and agreed that any item offered or shipped as a result of this bid shall be new (current model at the time of this bid). All containers shall be suitable for storage or shipment and all prices shall include standard commercial

packaging.

9. SAFETY STANDARDS:

Unless otherwise stipulated in the bid, all manufactured items or fabricated assemblies shall comply with applicable requirements of occupational Safety and Health Act and any standards

10. MANUFACTURER'S NAME AND APPROVED EQUIVALENTS:

Any manufacturer's names, trade names, brand names, information and/or catalog numbers listed in a specification are for information and not intended to limit competition unless otherwise indicated. The bidder may offer any brand for which he/she is an authorized representative, which meets or exceeds the bid specification for any item(s). If bids are based on equivalent products, indicate on the bid form the manufacturer's product name and reference number. Bidder shall submit with his/her proposal, cuts, sketches, and descriptive literature, and/or complete specifications. Reference to literature submitted with a previous bid will not satisfy this provision. The bidder shall explain in detail the reason(s) why the proposed equivalent will meet the specifications and not be considered an exception thereto. Bids that do not comply with these requirements, are subject to rejection. Bids lacking any written indication of intent to quote an alternate brand will be received and considered in complete compliance with the specifications as listed on the bid form. The City's Purchasing Office is to be notified of any proposed changes in (a) materials used, (b) manufacturing process, or (c) construction. However, changes shall not be binding upon the City unless evidenced by a Change Notice issued and signed by the Purchasing Director or designated representative.

11. DELIVERY:

All prices shall be F.O.B. Destination, Venice, Florida. Delivery date and warranties must be written out and submitted with bids. Delivery dates, as specified, must be met.

12. ADDITIONAL PURCHASES ("PIGGY-BACK") BY OTHER PUBLIC AGENCIES:

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

13. SUBMITTAL PREPARATION COST

The City shall not be liable for any expense incurred in connection with preparation of a submittal to this document. Offerors should prepare a straightforward and concise description of the Offeror's ability to meet the requirements of this document.

14. ACCURACY OF SUBMITTAL INFORMATION

Any Offeror, who states in their submittal any information that is determined to be substantially inaccurate, misleading, exaggerated, or incorrect, shall be disqualified from consideration.

15. LICENSES

Licensed and Certified: Offeror's, both corporate and individual, must be fully licensed and certified for the type of work to be performed in the state of Florida at the time of submittal and during the entire Contract time.

16. LOCAL PREFERENCE

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

16.2 "Local business" means the vendor has paid a local business tax to either Sarasota, Manatee, DeSoto or Charlotte County, whichever county the vendor is located, if applicable prior to bid submission that authorizes the vendor to provide the commodities or services to be purchased, and maintains a permanent physical business address located within the limits of either Sarasota, Manatee, DeSoto or Charlotte County from which the vendor operates or performs business, and at which at least one full time employee is located.

16.3 In addition, fifty percent (50%) or more of the employees based at the local business location must reside within Sarasota, Manatee, DeSoto or Charlotte County.

16.4 In the event the local office is not the primary location of the vendor, at least ten percent (10%) of the vendor's entire full-time employees must be based at the local office location. Alternatively, this requirement may be satisfied if at least one corporate officer, managing partner or principal owner of the vendor resides in Sarasota, Manatee, DeSoto or Charlotte County.

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

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

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

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

17. POSTING OF NOTICE OF INTENT

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

18. PUBLIC RECORDS/TABULATION

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

19. RESERVED RIGHTS

19.1 The City reserves the right to waive formalities in any submittal, and to reject any or all submittals in whole or in part, with or without cause and/or to accept the submittal that in the City's judgment will be in the best interest of the City. The City specifically reserves the right to reject any conditional submittal.

19.2 To the extent permitted by applicable state and federal laws and regulations, City reserves the right to reject any and all submittals, to waive any and all informalities not involving price, time or changes in the work with the Successful Offeror, and the right to disregard all nonconforming, non-responsive, unbalanced or conditional submittals. Submittals will be considered irregular and may be rejected, if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alterations, or irregularities of any kind.

19.3 City reserves the right to reject the submittal of any Offeror if the City believes that it would not be in the best interest of the City to make an award to that Offeror, whether because the submittal is not responsive or the Offeror is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by City.

19.4 The City reserves the right to terminate the contract with any vendor who fails to meet a deadline or shows incompetency.

20. INDEMNIFICATION/HOLD HARMLESS

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

21. PUBLIC ENTITY CRIMES/NON-COLLUSIVE AFFIDAVIT

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

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

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

22. GRATUITIES AND KICKBACKS

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

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

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

23. EQUAL EMPLOYMENT OPPORTUNITY

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

24. CONFLICT OF INTEREST

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

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

25. DRUG FREE WORKPLACE:

The City of Venice has adopted a policy in observation of the Drug Free Work Place Act of 1988. Therefore, it is unlawful to manufacture, distribute, disperse, possess, or use any controlled substance in the City of Venice workplace.

The City of Venice requests the attached Drug Free Workplace Affidavit to accompany your response. This form has been adopted by the City in accordance with the Drug Free Workplace Act. The City will not disqualify any respondent who does not concur with the affidavit. The Drug Free Workplace Affidavit is primarily used as tiebreaker when two or more separate entities have submitted proposals at the same price, terms and conditions.

26. APPLICABLE LAWS

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

27. COMPETENT PERSONNEL

All interested firms are to warrant that services shall be performed by skilled and competent personnel to the highest professional standards in this scope of work.

28. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

28.1 Before delivering a submittal, each Offeror must (a) consider federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, or performance of the work, (b) study and carefully correlate the Offeror's observations with the solicitation documents; and notify the Purchasing Manager of all conflicts, errors and discrepancies, if any, in the solicitation documents.

28.2 The Offeror, by and through delivering a submittal, agrees that they shall be held responsible for having familiarized themselves with the nature and extent of any local conditions that may affect the services.

29. SPECIFICATIONS

29.1 The apparent silence of the specification as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used. All interpretations of the Specifications shall be made on the basis of this statement.

29.2 For the purpose of evaluation, the Offeror must indicate any variance or exceptions to the stated Specifications, no matter how slight. Deviations should be explained in detail. Absence of variations and/or corrections will be interpreted to mean that the Offeror meets all the Specifications in every respect.

30. CANCELLATION CLAUSE

Failure to comply with any of the terms, conditions, specifications and/or service requirements will be just cause for termination of this contract by a thirty (30) day written notice of intent forwarded to the successful Offeror.

31. ACCEPTING CONTENT OF PROPOSAL

By delivering a submittal in response to this solicitation document, the Offeror certifies that they have fully read and understand the context of the solicitation document and have full knowledge of the scope, nature, and detailed requirements of services and/or commodities to be provided and performed. Submittals shall be returned in the sequential manner as requested in the "Submittal Format and Requirements" section of this solicitation.

32. TAXES

The negotiated cost shall include all freight, handling, delivery, surcharges or other incidental charges that may be required to provide the services or deliver the commodities. The City of Venice is exempt from the payment of Federal and State taxes, including sales tax. Your cost proposal shall not include sales tax to be collected from the City. The City's sales tax exemption is not available to you for items you purchase, regardless of whether these items will be transferred to the City.

33. ASSIGNMENT

33.1 Successful Offeror shall not assign, transfer or subject the Contract or its rights, title or interests or obligations therein without CITY'S prior written approval.

33.2 Violation of the terms of this paragraph shall constitute a breach of the Contract by Successful Offeror and CITY may, at its discretion, cancel the Contract and all rights, title and interest of Successful Offeror shall thereupon cease and terminate.

34. SOLICITATION FORMS

34.1 If the Proposer cannot meet a service or equipment requirement, then the phrase "not available" should be entered on the Proposal Form for that service requirement. In the case of a "not available" remark, the Offeror may offer an alternative service. Alternate submittals may be submitted for consideration. It will be at the City's sole discretion to accept or reject any and all alternate submittals received.

34.2 This solicitation presents the City's minimum requirements under present methods of operation. Responses to this request should address these requirements, but Offerors are encouraged to suggest any additional services or commodities, which in their opinion, would be in the best interest of the City.

34.3 Submittals may be delivered, which deviate from the requirements herein, providing that they are clearly identified as alternate submittals and providing further that it can be demonstrated that stated requirements are substantially improved or are not compromised or prejudiced by such deviations; and, that it would be clearly in the interest of the City that an alternative proposal be considered. Such alternative proposals will be provisionally accepted for consideration, subject to the reserved right of the City to make the determination whether the above stated conditions for alternate proposals have been satisfied and subject further to the reserved right of the City to accept or reject these proposals upon the basis of the determination.

35. DISCLOSURE – PUBLIC OFFICER, PUBLIC EMPLOYEE OR ADVISORY BOARD MEMBER OF CITY

35.1 Sections 112.313(3) and 112.313(7), Florida Statutes, prohibit any public officer, employee, or advisory board member of the City from holding any employment or contractual relationship with any business entity doing business with the City.

Section 112.313(12) provides that a public officer, employee, or advisory board member will not be in violation of the prohibition if all three of the following conditions are met. The filing of the disclosure form with the Supervisor of Elections is the sole responsibility of the Proposer and must be filed prior to or at the time of submission of the proposal. A copy of the filed disclosure form shall be submitted as part of the proposal.

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

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

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

36. BID PROTESTS

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

36.1 File a written notice to the City Manager of the bidder's intention to protest within one (1) business day of the bid opening or the City's declaration of intent with regard to the disposition. Upon receipt of a protest, the bid process shall be suspended until the protest procedure herein described has been completed.

36.2 Within five (5) days of filing the written notice of intent to protest, the protester shall file a formal written protest with the City Manager, acting as the bid protest officer, explaining in detail the nature of the protest and the grounds on which it is based. During this five-day period, the protester is encouraged to attempt to resolve the issue with the City's Finance Department.

36.3 The protester must include with the formal written protest a bid protest bond in the form of a certified check, cashier's check or money order made payable to the city in an amount equal to five percent (5%) of the lowest acceptable bid. The bond will be deposited with the Cashier's Office where it will be put into an account and the protester will receive a receipt.

36.4 Upon timely receipt of the formal written protest and protest bond, the City must:
(1) Issue formal findings of fact and a written decision with regard to the validity or non-validity of the formal written protest within ten (10) business days of the City's receipt of the protest.

(2) Within two (2) business days of receipt of the formal findings of fact and written decision, the City shall notify the protester of the decision of the bid protest officer. Such notification shall be transmitted via certified return receipt mail.

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

37. SCRUTINIZED COMPANIES

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

END OF SECTION

SECTION 2: INSURANCE INFORMATION

"ATTACHMENT A"

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

1. The City of Venice is to be specifically included as an ***ADDITIONAL INSURED***.

2. The City of Venice shall be named as Certificate Holder. ***Please Note that the Certificate Holder should read as follows:***

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

No City Division, Department, or individual name should appear on the certificate. ***NO OTHER FORMAT WILL BE ACCEPTABLE.***

3. The "Acord" certification of insurance form should be used.

4. Required Coverage

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

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

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

d) **Installation Floater/Installation Builders' Risk–Property Coverage:** Policy to cover direct physical loss or damage to materials, supplies, machinery, and equipment being installed, constructed or rigged by the contractor in conjunction with its installation or construction. All items involved in the water main project including drainage/water sewer pipes,

etc. (as included in description of project) need to be insured for the total completed replacement value. Coverage should include perils of fire, theft, vandalism, windstorm/hail, collapse and transit, sewer backup, testing, equipment breakdown, waterborne property. Coverage shall start when the items to be installed are transported to City premises and remain in place until the interest of the contractors ceases or the City accepts possession whichever comes first Coverage should apply to owned property and non-owned property in the contractor's care, custody and control. The installation coverage forms shall provide coverage for building materials and supplies at the construction site, in transit to the site and similar property intended for the construction project at other locations as necessary or because of lack of storage space at the construction site. Coverage should apply on a Primary basis and should include a Waiver of Subrogation. Contractor should be responsible for any deductibles.

5. Policy Form:

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

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

c) Each insurance policy required by this Contract shall:

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

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

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

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

f) The Contractor shall be solely responsible for payment of all premiums for insurance contributing to the satisfaction of this Contract and shall be solely

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

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

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

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

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

END OF SECTION

SECTION 3: SCOPE OF WORK

1. The Work to be performed under these Contract Documents consists of the construction of the Reclaimed Water Filtration System Improvements Project at the City of Venice Eastside WRF site, inclusive of all equipment, materials and work required for a complete, tested, and operational system.

2. A general description of the work includes, but is not limited to the following:

a. Provide all equipment and materials needed for excavation, dewatering, bypass pumping, backfilling, compaction, grading, replacement of paved and unpaved roadways, replacement of grass (sod), cleanup, clearing and grubbing, structural fill, erosion control, and painting.

b. Provide all equipment and materials needed and construct one (1) Gravity Filter including, but not limited to: all gravity disk filter equipment, concrete foundations, coatings, concrete pipe encasement(s), concrete structures, access stairs, grating, walkways, process piping, valves, electric power, control panels, instrumentation system components, signal wiring, and all other equipment needed, as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

c. Provide all equipment and materials needed and construct one (1) Backwash Pump Station, including, but not limited to: concrete foundation, fiberglass wet well, two (2) grinder pumps, grinder pump valves, concrete pipe ballast, access hatch, pipe connections, pipe supports, valves, concrete structure, coatings, level sensor, floats, piping, 4-inch piping to existing 6-inch WAS line, electric power, control panels, instrumentation system components, signal wiring, and all other components needed, as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

d. Provide all equipment and materials needed and install two (2) Lake Return Submersible Pumps, including, but not limited to: submersible pumps, piping, valves, electrical system modifications, instrumentation and control system modification, wet well dewatering and all other equipment specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

e. Provide all equipment and materials needed and install one (1) Filter Effluent Transfer Pump Station including, but not limited to: concrete pad, precast wetwell, piping, pipe connections, pipe supports, valves, level sensors, equipment pads, two (2) vertical turbine transfer pumps, valves, electrical system, controls, tank level sensors, electric power, control panels, instrumentation system components, signal wiring, and all other components needed, as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

f. Provide all equipment and materials needed and install Chemical Feed Systems, including, but not limited to: chemical analyzer, chemical feed pumps, chemical skids, valves, chemical piping, valves, electrical systems, control system and control system wiring, control panels, electric power wiring, interconnecting control system wiring, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

g. Furnish and install all electric power equipment, including, but not limited to: motor control centers, variable-frequency drives, electric valve actuators, above and below ground conduit, raceways, electrical duct banks, electric manholes, power wiring, site lighting, building wiring and lighting, electrical panels, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

h. Furnish and install all controls and instrumentation including, but not limited to: SCADA (supervisory control and data acquisition) system, upgrades to the facility's existing programmable logic controller (PLC), above and below ground conduit, signal wiring, control panels, PLCs, controls and instrumentation for lake filtration process equipment and system integration, conduit and signal wiring to connect the lake filtration SCADA system to the existing WRF SCADA System, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

i. The Contractor shall furnish all materials needed and install site improvements, including clearing and grubbing, demolition, relocations, grading, drainage, tree removal, asphalt and concrete paving, concrete sidewalks, concrete equipment pads, stormwater pond, plantings, roof drains and conveyance system, drainage swales, removal and disposal of any chemicals that may be within chemical pipes designated for removal or replacement, stormwater inlets, storm drain piping, fencing, landscaping, sodding, restoration, and all other components as specified herein and as shown on the Drawings.

j. The Contractor shall provide all equipment and materials and install a 12-inch lake return pipeline from the existing 10-inch to the proposed Gravity Filter, including piping, valves, etc. In addition provide all piping and connections to the proposed Gravity Filter.

k. The Contractor shall be responsible for startup, testing and training associated with all equipment provided.

l. The Owner shall provide up to 200 gallons of sodium hypochlorite to the Contractor for start-up and testing of the Eastside WRF Reclaimed Water Filtration System Improvement Project. Any additional sodium hypochlorite needed for start-up and testing shall be furnished by the Contractor. The

Contractor shall provide all other chemicals needed for startup and testing and shall be responsible for providing temporary or permanent piping, barrels, or tank trucks to convey the chemicals to their usage points.

The list above is not, and does not purport to be, a complete listing and is provided only as a general summary of work included. The work is further described within these Specifications or as shown on the Drawings. The Contractor is responsible for providing a complete and fully operational system with all of its associated components, whether or not specified herein or shown on the Drawings.

3. The project site for the Eastside WRF Reclaimed Water Filtration System Improvements is located in the City of Venice, Florida at the address below:

3510 Laurel Road East
North Venice, FL 34275

4. Contractor is responsible for collection of samples, coordination for laboratory testing, testing fees and all other work needed for bacteriological testing required to place new or modified facilities into service. If testing fails, the Contractor shall take any and all necessary means of flushing, disinfecting or other means necessary to obtain clearance. No payment shall be made for any work, materials, lab fees or any other costs associated with re-testing that may be needed for clearance due to failed tests initially.

5. Specifications: See the appropriate Technical Sections of these Specifications for detailed information on materials, equipment, and installation.

SECTION 4: SPECIAL CONDITIONS

1. **Payment:** Retainage of 10 percent of each progress payment made to the contractor shall be withheld until final completion and acceptance of the project by the City of Venice for all construction services contracts exceeding $200,000. Retainage shall not be withheld for construction services contracts of $200,000 or less.

2. **Stored Materials:** The City of Venice, at its discretion, will pay for stored materials which are safely stored on the project site in accordance with the manufacturer's or supplier's recommendations and in accordance with these Contract Documents. All requests for payment of stored materials shall be accompanied by a paid receipt indicating that the contractor has paid for the materials.

3. **Permits:** Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. City shall assist Contractor, when possible, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the work.

   The following City permits are required for this project:

   Site Preparation Permit (Application fee is waived)
   Building Permit – Permit Allowance used for payment

4. **Warranty:** All work, materials and equipment furnished as defined herein shall be guaranteed and warranted by the Contractor for a minimum period of one (1) year, unless otherwise specified, from final acceptance by the City to be free from defects due either to faulty materials or equipment or faulty workmanship. If within one (1) year after the date of final completion or such longer period of time as may be prescribed by laws or regulation or by the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective, Contractor shall promptly, without cost to the City and in accordance with the City's written instructions, either correct such defective work or remove it from the site and replace it with non-defective work. If Contractor does not promptly comply with the terms of such instruction, City may have the defective work corrected/removed and all direct, indirect and consequential costs of such removal and replacement will be paid by the Contractor.

5. **Stipulated Damages:** In the event that the work is not completed within the required time, then from the compensation otherwise to be paid to the Contractor, the City may retain the sum of one thousand five hundred thirty-two dollars ($1,532.00) per day for each calendar day that the work remains uncompleted beyond the time limit, which sum shall represent the actual damage which the City will have sustained per day by failure of the Contractor to complete the work within the required time, said sum not being a penalty but being the stipulated damages the City will have sustained in the event of such default by the Contractor.

6. **Construction Time:** The Contractor shall diligently prosecute the work to completion within 270 days from receipt of a Notice to Proceed.

SECTION 5: BID INFORMATION

BID INFORMATION:

Bids are mailed or delivered to the following address:

Procurement- Finance Department
Room # 204
401 W. Venice Avenue
Venice, FL 34285

BID OPENING:

There will be a public bid opening at the date and time stated in the Invitation to Bid.

QUESTIONS AND ANSWERS:

Any and all questions must be submitted in writing and addressed to:

Peter Boers
Procurement Manager- Finance Department
City of Venice
401 W. Venice Avenue
Venice, FL 34285
Tel: 941-486-2626 ext. 26017
Fax: 941-486-2790
E-mail: pboers@venicegov.com

All questions submitted will be answered in writing and an Addendum will be sent to all prospective bidders.

THE DEADLINE FOR QUESTIONS CONCERNING THIS ITB IS:

April 30, 2014 at 1:00 PM

END OF SECTION

APPENDIX

REQUIRED FORMS LIST

Each respondent shall return the required information forms as attached:

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

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

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

PROPOSAL BOND

Not to be completed if a certified check is submitted.

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

_____ as Principal,

and _____ as Surety

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

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

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

_____

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

Signed this _____ day of _____, 2014.

_____ _____

Principal Surety

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

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

HOW DO I DETERMINE "LOCAL PREFERENCE"

The following questions will help you determine local preference for your company.
Please answer questions 1 through 4 **FIRST**. If you answer **NO** to any questions 1 through 4, local preference does **NOT** apply.
ONLY if you answer **YES** to questions 1 through 4, may you proceed to question 5.
If you answer **YES** to any questions 5 through 7, local preference applies.
If you are unsure of how to answer any questions, please contact the City of Venice's Purchasing Department at 941-486-2626.

Questions 1 – 4

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

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

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

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

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

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

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

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

Questions 5 – 7

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

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

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

6. If the local business office (identified in question 2) is not the primary location of your company, are at least ten percent (10%) of your company's entire full-time employees based at the local office location ?

   YES ____ If "yes", STOP, local preference applies
   NO ____ If "no", proceed to question 7

7. If your local business office is not the primary location of your company, does at least one corporate officer, managing partner or principal owner of the company reside in Sarasota, Manatee, DeSoto or Charlotte County ?

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

THIS PAGE MUST BE COMPLETED & SUBMITTED WITH OFFER

QUALIFICATIONS STATEMENT

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

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

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

SUBMITTED BY:

NAME: _____
ADDRESS: _____
PRINCIPLE OFFICE: _____

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

The correct name of the Offeror is: _____

The address of the principal place of business is: _____

If the Offeror is a corporation, answer the following:

a. Date of Incorporation: _____

b. State of Incorporation: _____

c. President's Name: _____

d. Vice President's Name: _____

e. Secretary's Name: _____

f. Treasurer's Name: _____

g. Name and address of Resident Agent: _____

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

a. Date of Organization: _____

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

_____

_____

_____

c. State whether general or limited partnership: _____

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

_____

_____

_____

_____

_____

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

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

_____

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

_____

_____

_____

_____

ACKNOWLEDGEMENT

State of _____

County of _____ } SS.

On this the _____ day of _____, 2014, before me, the undersigned Notary Public of the State of _____, personally appeared _____ and (Name(s) of individual(s) who appeared before notary) whose name(s) is/are Subscribed to the within instrument, and he/she/they acknowledge that he/she/they executed it.

_____

NOTARY PUBLIC, STATE OF _____

NOTARY PUBLIC
SEAL OF OFFICE:

_____

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

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

COOPERATIVE PROCUREMENT WITH OTHER JURISDICTIONS

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

Yes_____ No_____

. **AUTHORIZED SIGNATURE**

By submission of the ITB, the undersigned certifies that:

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

Authorized Representative: _____

Signature: _____

Title: _____

Company Name: _____

Address: _____

City, State, ZIP: _____

Telephone Number: _____

Fax Number: _____

E-mail address: _____

FORM 3A INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS

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

WHO MUST FILE THIS STATEMENT

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

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

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

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

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

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

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

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

   _____

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

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

6. Additional comments:

7. SIGNATURE	DATE SIGNED	DATE FILED

FILING INSTRUCTIONS

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

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

CE FORM 3A — REV. 1-95

INDEMNIFICATION/HOLD HARMLESS

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

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

_____ located at City

_____, State _____, Zip Code _____ Phone:

_____ Fax: _____. Having read and

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

_____, 2014.

_____
Please Print Name

_____
Signature

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

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

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

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

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

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

Bidder (Company): _____

Name and Title: _____

Address: _____

_____

Telephone: _____

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

Signature:_____
Date:_____
Printed name/title:

ORDINANCE 95-12

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

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

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

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

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

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

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

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

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

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

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

ARTICLE VI. STORMWATER QUALITY

Sec. 19-141. Definitions.

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

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

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

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

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

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

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

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

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

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

stormwater retention facilities to be designed by a Florida registered engineer. The design is to meet the City of Venice EPA/NPDES Permit requirements for quantity and quality of treatment.
(e) The property owner's engineer will be required to certify to the City Engineer that construction was completed in accordance with the certified plans, prior to issuance of a Certificate of Occupancy.

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

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

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

Sec. 19-146. Inspections.
It shall be the duty of the city engineer or designee to carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance with this article.
SECTION 4. Chapter 15, Streets and Sidewalks, Article IV, Excavations, Section 15-53, Storm Drainage and Pollution, is deleted in its entirety.
SECTION 5. To the extent of any conflict between the provisions of this Ordinance, and any other Ordinance, Resolution, or Agreement of the City of Venice, Florida, the provisions of this Ordinance shall prevail.
SECTION 6. Severability. If for any reason a provision of this Ordinance or the application thereof to any person, group of persons, or circumstances is held invalid, the invalidity shall not effect other provisions or applications of the Ordinance which can be given effect without the invalid provision or application, and to this end the provisions of the Ordinance are severable.
SECTION 7. Effective Date. This Ordinance shall take effect immediately upon its adoption, as required by law.

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

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

WITNESS my hand and the official seal of said City this 24th day of May, 1995.
/S/ LORI STELZER, CMC, CITY CLERK Approved as to form: /S/ ROBERT C. ANDERSON, CITY ATTORNEY

ORDINANCE 96-09

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

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

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

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

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

Sec. 19-141. Definitions.

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

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

Sec. 19-146. Inspections.

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

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

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

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

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

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

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

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

6th day of March, 1996, a quorum being present.
WITNESS my hand and the official seal of said City this 27th day of March, 1996.
/S/ LORI STELZER, CMC, CITY CLERK Approved as to form: /S/ ROBERT C. ANDERSON, CITY ATTORNEY.

STATEMENT OF REFERENCES
FOR CONTRACTOR

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

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

List previous business experience: _____

_____

List at least three construction references:

(1) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(2) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(3) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

(4) Person to contact: _____

Company Name: _____

Address: _____

Telephone: _____ Date work performed: _____

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

NAME OF CONTRACTOR: _____

BUSINESS ADDRESS: _____

LIST SUBCONTRACTORS TO BE USED IN THE PROJECT:

(1) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(2) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(3) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

(4) Company Name: _____

Address: _____

Telephone: _____ Phase of Work Sublet:_____

DRUG FREE WORKPLACE CERTIFICATION

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

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

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

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

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

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

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

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

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

_____

Contractor's Name Signature

NON-COLLUSIVE AFFIDAVIT

State of _____

County of _____ } SS.

_____ being first duly sworn, deposes and says that:

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

Signed, sealed and delivered
in the presence of:

_____ By:_____

_____ _____
(Printed Name)

_____
(Title)

ACKNOWLEDGEMENT

State of _____

County of _____

On this _____ day of _____, 2014, before me, the undersigned Notary Public of the State of _____, personally appeared _____ and (Name(s) of Individual(s) who appeared before notary) whose name(s) in/are Subscribed to the written instrument, and he/she/they acknowledge that he/she/they executed it.

_____
NOTARY PUBLIC, STATE OF _____

NOTARY PUBLIC
SEAL OF OFFICE:

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

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

PUBLIC ENTITY CRIME INFORMATION

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

I, _____, being an authorized representative of the firm of _____, located at City: _____ State: _____ Zip: _____, have read and understand the contents of the Public Entity Crime Information and of this formal BID/ITB package, hereby submit our proposal accordingly.

Signature: _____ Date: _____

Phone: _____ Fax: _____

Federal ID#: _____

NO BID RESPONSE

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

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

Bid Open/Close Date: **May 9, 2014 at 2:00 PM**

Bid Number: **2985-14**

Description: **Eastside WRF Reclaimed Water Filtration Project**

Contact: Jon Mayes, Procurement- Finance Department

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

- ☐ 1. We are unable to meet the required delivery date
- ☐ 2. We cannot provide a product to meet the required specifications.
- ☐ 3. We no longer provide the requested product.
- ☐ 4. We do not represent the required brand name product.
- ☐ 5. The bid closing date does not allow adequate time to prepare a response.
- ☐ 6. The specifications are too restrictive.
- ☐ 7. We have chosen not to do business with the City
- ☐ 8. Other (feel free to provide our response on your company letterhead.)

Company Name _____ Vendor No._____

Authorized Signature_____

Print Name _____

Title _____

Date _____ Telephone No. _____

SAMPLE CONTRACT

THIS CONTRACT, pursuant to City Council approval granted on _____, is made and entered into this_____ day of _____, 2014, by and between the CITY OF VENICE, FLORIDA, hereinafter referred to as the City, and _____, of the City of _____, County of _____, and State of _____, hereinafter referred to as the Contractor.

W I T N E S S E T H:

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

(1) The contract documents consist of this contract, standard general conditions, supplemental conditions, special conditions, technical specifications, drawings, bid proposal, payment and performance bonds, all of which are hereby made a part of this agreement.

(2) The Contractor shall perform all the work required by the contract documents for the following described project; and shall include installation of the listed items, per bid specifications:

City Bid # **ITB# 2985-14: Eastside WRF Reclaimed Water Filtration Project**

(3) The work to be performed under this contract shall be completed within _____ days of the issuance of the Notice To Proceed by the City.

(4) The City shall pay the Contractor for the performance of the work, subject to the terms and conditions of the contract documents and any written change orders, the contract sum of: **_____ Dollars & 00/100.**

(5) Time is of the essence in this contract. In the event that the work is not completed within the required time, then from the compensation otherwise to be paid to the Contractor, the City may retain the sum of **one thousand five hundred thirty-two dollars ($1,532.00) per day** for each calendar day that the work remains uncompleted beyond the time limit, which sum shall represent the actual damage which the City will have sustained per day by failure of the Contractor to complete the work within the required time, said sum not being a penalty but being the stipulated damages the City will have sustained in the event of such default by the Contractor.

(6) In connection with the performance of work under this contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, sex, religion, color, or national origin. The aforesaid provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, lay-off or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post hereafter in conspicuous places, available for employees or applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause. The Contractor further agrees to insert the foregoing provisions in all contracts hereunder, including contracts or agreements with labor unions and/or workers' representatives, except subcontracts for standard commercial supplies or raw materials.

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

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

(SEAL)

ATTEST:

CITY OF VENICE
IN SARASOTA COUNTY, FLORIDA

_____

BY:_____

CITY CLERK

ATTEST:

CONTRACTOR

_____

BY:_____

_____

Signed by (typed or printed)

_____

Signed by (typed or printed)

Approved as to Form and Correctness

_____

David Persson, City Attorney

SURETY BONDS

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

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

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

GIVE THIS INFORMATION TO YOUR SURETY TO AID IN PREPARATION OF BONDS

PUBLIC WORKS PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT_____, a _____ Corporation, as Principal, hereinafter called Contractor; and _____, a corporation of the State of_____, a surety, hereinafter called Surety, are held and firmly bound unto the City of Venice as Obligee, hereinafter called the City in the amount of: _____Dollars ($_____) for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated the _____day of _____, 2014, entered into a Contract with the City for the following described project:

ITB# 2985-14: Eastside WRF Reclaimed Water Filtration Project

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

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

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

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

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

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

Signed and sealed this _____day of _____, A.D., 2014.

CONTRACTOR

By:_____

IN THE PRESENCE OF:

_____

INSURANCE COMPANY

By:_____
Agent and Attorney-in-Fact

PUBLIC WORKS PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

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

WHEREAS, Contractor has by written agreement dated the _____day of _____, 2014, entered into a Contract with the City for the following described project:

ITB# 2985-14: Eastside WRF Reclaimed Water Filtration Project

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

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

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

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

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

PROVIDED FURTHER, the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the

work to be performed thereunder or the contract documents accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Contract documents.

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

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

Signed and sealed this_____day of_____, A.D., 2014.

IN THE PRESENCE OF: CONTRACTOR

_____ By:_____

INSURANCE COMPANY

By:_____
Agent and Attorney-in-Fact

CONTRACTOR'S RELEASE OF LIEN

BEFORE ME, the undersigned authority in said County and State, appeared _____, who being first duly sworn, deposes and says that he is _____ of _____ a company and/or corporation authorized to do business under the laws of Florida, which is the contractor on Project known as City of Venice Bid # **2985-14**, located in the City of Venice, County of Sarasota, Florida, under contract with the City of Venice, dated the _____ day of_____, 2013, that the said deponent is duly authorized to make this affidavit by resolution of the Board of Directors of said company and/or corporation; that deponent knows of his own knowledge that said contract has been complied with in every particular by said contractor and that all parts of the work have been approved by the City Engineer; that there are no bills remaining unpaid for labor, material or otherwise, in connection with said contract and work, and that there are no suits pending against the undersigned as contractor or anyone in connection with the work done and materials furnished or otherwise, under said contract.

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

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

Signature:_____

Printed Name:

STATE OF FLORIDA)
COUNTY OF)

Signed before me this _____ day of _____, 2014,
by_____ who is personally known to me or has produced _____ as identification.

_____

Notary Public
My Commission Expires:
Commission Number:

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

IT IS fully understood that the granting of the right to make the payment of the final estimate to said contractor and/or his assigns, shall in no way relieve this surety company of its obligations under its bonds, as set forth in the specifications, contract, and bonds pertaining to the above project.

IN WITNESS WHEREOF, the _____has caused this instrument to be executed on its behalf by its_____, and/or its duly authorized attorney in fact, and its corporate seal to be hereunto affixed, all on this _____ day of _____, A.D., 2014.

_____
Surety Company

_____
Attorney in Fact

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

STATE OF)
COUNTY OF)
BEFORE ME, the undersigned authority, appeared_____, who is personally known to me or has produced _____ as identification, and who executed the foregoing instrument in the name of _____ _____ as its _____ and the said _____ acknowledged that he executed said instrument in the name of _____ as its _____ and/or_____, for the purpose therein expressed and that he had due and legal authority to execute the same on behalf of said _____, a corporation.
IN WITNESS WHEREOF, I have hereunto set my hand and official seal at _____ this _____ day of _____, 2014.

_____
Notary Public
My Commission Expires:

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT NO.
PROJECT:
CONTRACTOR CONTRACT DATE

CONTRACT FOR

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

TO: (Contractor)
DATE OF SUBSTANTIAL COMPLETION:
_____

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

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

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

CITY OF VENICE

_____
By:
Date: _____

The contractor accepts the foregoing Certification of Substantial Completion and agrees to complete and correct the items on the tentative list within the time indicated.

_____ _____
Contractor Authorized Representative
Date: _____
RESPONSIBILITIES:
OWNER:
CONTRACTOR:
EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:
ATTACHMENTS (Identify)

EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEMS IMPROVEMENTS					
Item No.	**Description**	**Estimated Quantity**	**Unit**	**Unit Price**	**Total Price**
1	Mobilization / Demobilization	1	LS		
2	Demolition	1	LS		
3	Return Pump Station Improvements	1	LS		
4	Gravity Disk Filter	1	LS		
5	Transfer Pump Station	1	LS		
6	Waste Backwash Pump Station	1	LS		
7	Chemical Feed Systems	1	LS		
8	Site Piping	1	LS		
9	Electrical Work and Instrumentation	1	LS		
				BID SUBTOTAL ITEMS 1 - 9	
10	Building Permit Allowance	1	LS	$ 30,000.00	$ 30,000.00
11	Owners Allowance	1	LS	$ 100,000.00	$ 100,000.00
				TOTAL BID	

TOTAL BID PRICE WRITTEN IN WORDS:

_____

NAME AND ADDRESS OF BIDDING FIRM:

_____

SIGNATURE AND TITLE OF AUTHORIZED INDIVIDUAL SIGNING BID:

_____

CITY OF VENICE PROCUREMENT-
FINANCE DEPARTMENT

401 W. VENICE AVE. - ROOM # 204
VENICE, FL. 34285
(941) 486-2626
FAX (941) 486-2790

ADDENDUM NO. 1

Date: April 24, 2014

To: All Prospective Proposers

Re: ITB# 2985-14: Eastside WRF Reclaimed Water Filtration Project

---

This addendum sets forth changes and/or information as referenced and is hereby made part of and should be attached to the subject Contract Documents. Receipt of this Addendum shall be acknowledged below and in the submitted proposal. It shall be the responsibility of each proposer, prior to submitting a proposal, to contact the City of Venice- Procurement- Finance Department to determine if addenda were issued and to make such addenda a part of their proposal.

The following is to clarify and provide additional information requested during the pre-bid meeting held April 21, 2014 at 2:00 P.M.

Summary:

Peter Boers, Procurement Manager, opened the meeting by reviewing the next important dates stating that the bids are due May 9th at 2:00 p.m. at City Hall room #204. 5% Bid Security is required and the awarded contractor will be required to provide a Performance and Payment Bond equaling 100% of the contact amount.

Mr. Boers advised the bidders to read through Section 1: *General Conditions & Instructions to Offerors*.

Mr. Boers reviewed Section 2: *Insurance Requirements*.

General Liability -$1,000,000 per occurance
Business Auto Liability - $1,000,000 combined single limit
Worker's Comp per State Statute
Builders' Risk Installation Coverage to be provided prior to Notice to Proceed

Matthew Love, the City's consultant from McKim & Creed, reviewed the scope of work and provided a brief overview of the project.

Mr. Boers advised that the stipulated damages for this project are $1532 per day, and time to completion is 270 days from NTP

Mr. Boers review the Bid Information page, stating that his contact information was listed there, and that all questions must be submitted in writing (via e-mail is preferable), and that the cut-off for questions was April 30, 2014 at 1:00 PM.

Mr. Boers reviewed the required forms that must be returned with each firm's submittal. These required forms are listed in the Appendix of the bid document. Mr. Boers advised, even if a form does not pertain to said company - to still mark it with a "N/A" and return it with each submittal. Mr. Boers also advised that the *Required Forms List* could be used as a "check off" sheet for firms to use.

Mr. Boers opened the floor for bidder's questions.

Q. Engineer's Estimate
A. $1.61 Million

Q. Is there federal funding involved? Are there any Davis Bacon or other special funding requirements?
A. No federal funding is involved. The only special funding requirement is that the City will require the Contractor to complete the form included in Section 01700 at the completion of the project.

Q. Is the system integrator sole sourced or can others be added?
A. On page 13400-19, 1.8(d) of the Contract Documents add the following:

2. Revere Control Systems: 2240 Rocky Ridge Road, Birmingham, AL, 35216; (205) 824-0004; www.reverecontrol.com.
3. DCR Engineering Services, Inc.: 502 County Road 640 East, Mulberry, FL, 33860; (863) 428-8080; www.dcreng.com.
4. Commerce Controls Inc.: 41069 Vincenti Court, Novi, MI, 48375; (248)476-1442; www.commercecontrols.com.

Q. Does the City have an anticipated start date?
A. The project does not have a specific start date.

Q. Pump Station/Pond Return? How long is the Contractor to bypass the pump station?
A. At this time of year the pumps could run 10-12 hours per day.

Q. What are the flow conditions to determine bypass pumping requirements from the pond return pump station?
A. Bypass pumping flow shall be defined per Sheet M4 of the Contract Drawings.

Q. Are the existing guiderail supports to be reused in the wet well?
A. New 316 SS guiderail supports shall be furnished and installed by the contractor.

Q. Confirm use of ½" Kynar carrier pipe with 3" Kynar containment pipe.
A. Chemical feed piping of sodium hypochlorite shall be as specified on page 15050-2, 2.1(A) of the Contract Documents.

Q. Confirm connection type for Kynar piping.
A. Chemical feed piping of sodium hypochlorite shall be as specified on page 15050-2, 2.1(A) of the Contract Documents.

Q. Would the owner consider paying for temporary electrical service to run bypass pumps?
A. Yes, it will be acceptable to use electric bypass pumps that tie into the City's electrical service at the return pump station for the return pump station modifications only.

Q. Is sheeting mentioned in bid item descriptions a matter of site construction, means and methods?
A. Yes.

Q. There is no tap boss located on the existing 90º bend located at the pond return pump station. The tap for the proposed ARV assembly will be difficult. Is there an alternate location?
A. There is a tee directly adjacent to the 90º bend as shown on Sheet M4 where the tap can be made on the run prior to the flange.

Clarifications:

Page 11313-1, 1.2(B)(1): Remove Fairbank Morse and Add Flowserve.
Page 11313-1, 1.2(B)(4): Remove Hudson Pump and Add Goulds.

The bidders on a site visit. Mr. Boers advised the bidders to coordinate any additional site visits through him at pboers@venicegov.com and not show up unannounced at the Eastside WRF.

The City anticipates that the Reclaimed Water Storage Tank currently under construction at the Eastside WRF will be completed prior to work commencing on this project.

It is likely that one or more other construction contracts will be underway on the project site during the construction period of this project. The bidders are reminded of the requirements of Section 01010, 1.20.

Peter A. Boers
Procurement Department

Acknowledgment is requested even if you have elected not to respond to this bid. A designated management representative of your firm can sign the receipt for this addendum. Please acknowledge receipt of this addendum immediately by fax to (941) 486- 2790 or mail to the above noted address, if a fax is not possible.

Receipt Acknowledged:

_____
Signature

_____
Company

_____
Date

CITY OF VENICE PROCUREMENT-
FINANCE DEPARTMENT

401 W. VENICE AVE. - ROOM # 204
VENICE, FL. 34285
(941) 486-2626
FAX (941) 486-2790

ADDENDUM NO. 2

Date: May 2, 2014

To: All Prospective Proposers

Re: ITB# 2985-14: Eastside WRF Reclaimed Water Filtration Project

---

This addendum sets forth changes and/or information as referenced and is hereby made part of and should be attached to the subject Contract Documents. Receipt of this Addendum shall be acknowledged below and in the submitted proposal. It shall be the responsibility of each proposer, prior to submitting a proposal, to contact the City of Venice- Procurement- Finance Department to determine if addenda were issued and to make such addenda a part of their proposal.

The following is to clarify and provide additional information requested prior to the cut-off for questions April 30, 2014 at 1:00 P.M.

Q. [The] drawings speak of a Geotech report, is there one available? If not, what is the sub-base under slabs?
A. The Geotechnical Report developed by Ardaman & Associates, Inc. dated 12-2-13 has been provided as an appendix to the specifications.

Q. Some [of the specifications] call out H-Tec ARVs, but have specification language that is not H-Tec. And the specific Wastewater ARVs are called out as Val-Matic.
A. Provide H-Tec air release valves of appropriate size and service as indicated in the drawings and specifications.

Q. Can you clarify the limits of new piping on drawing M4. Does the new piping stop at the note "CONNECT TO EXIST. FLANGED SPOOL" or does it stop at the 8" 90 bend w/ARV?
A. The limits of new piping include the base of the new pumps (x2) up to and including the first 90º bend above the wet well slab.

Q. 01150-3 Measurement and Payment, Bid Item No. 4 - The description calls for a 2-inch reclaimed water supply pipes for spray system, however, the plans call out 1-inch in size. Please clarify.

A. Provide a 2-inch PVC RCW supply pipe from the connection to the existing 2-inch RCW line the new gravity filter.

Q. 01150-3 Measurement and Payment, Bid Item No. 5 - The description of this bid item does not match what is shown on Drawing M5. Please clarify.

A. Remove 01150 Measurement and Payment (1.6)(Bid Item No. 5 – Transfer Pump Station)(A) and replace with the Following:

   A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to provide and install a Lake Filter Effluent Transfer Pump Station, including dewatering; sheeting; excavation; grading; crushed stone base; backfill; sod; precast concrete wet well; concrete pad; 2 vertical turbine pumps; aluminum hatches, stilling well, vent; ductile iron header, 10-inch butterfly valve; 10-inch check valve; air release valve; pipe supports; pressure gauges; level sensor; control panel; variable frequency drives; electrical work; instrumentation and SCADA; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Q. Please provide specifications for the double contained Kynar pipe and fittings.

A. Provide Kynar PVDF 3-inch containment and ½-inch carrier pipe as shown on the drawings for 12.5% sodium hypochlorite service. Kynar is a registered trademark of Arkema. All information and specifications can be found at www.kynar.com.

Q. 01150-4 Measurement and Payment, Bid Item No. 7 - The description includes a precast valve vault, aluminum hatch, and a sump pump. Where are these items located? Please clarify.

A. Remove from 01150 Measurement and Payment (1.6)(Bid Item No. 7 – Chemical Feed System)(A) precast valve vault, aluminum hatch, and a sump pump.

Q. Please clarify pipe class required for DIP. Pipe schedule on page 15050-2 requires 4-14" to be class 350. DIP spec 15062-2, B, requires class 250 for 14-20". Should 14" DIP be class 250 or 350?

A. Provide pressure class 250 as per specification 15062 Ductile Iron Pipe for all underground 14-inch pipe shown on the drawings.

Q. 15062-2, paragraph 2.1.E, requires EPDM gaskets. 15062-2, paragraph 2.1.J calls for SBR gaskets. Should all gaskets be EPDM?

A. Provide SBR gaskets.

Q. Please clarify primer required for ductile iron pipe. Spec 15062-3, paragraph 2.1.L requires Koppers 621 primer. I do not believe this primer is available. Also, 09900 requires different primers for DI piping. Please advise which section applies.
A. Section 09900 applies. Provide Tnemec Series N140 Pota-Pox-Plus or approved equal.

Q. Please clarify if C153 MJ fittings will be allowed? Pipe schedule on page 15050-2 requires C110 DI fittings. DI spec page 15062-2 allows C153 fittings.
A. ANSI/AWWA C153/A21.53 compact ductile iron fittings are allowed.

Q. Is there a Buy American or a domestic iron & steel requirement on this project?
A. There is not a Buy American or domestic iron & steel requirement.

Q. The bid form allocates bid item #9 for electrical work and instrumentation. However, bid items #3, 4, 5, 6 and 7 also have electrical and instrumentation work per the bid item descriptions indicated in spec section 01150 "Measurement and Payment". It appears there is redundancy. Please clarify how or which bid item(s) will the electrical and instrumentation work will be paid for.
A. Electrical and instrumentation work to be performed in the immediate vicinity of the unit operations associated with bid item numbers 3,4,5,6 and 7 are to be included in those items respectively. Electrical and instrumentation associated with modifications to electrical rooms, MCC, software, duct banks, etc. apart from the individual unit operations assigned to bid item numbers 3,4,5,6 and 7 are to be covered under Bid Item No. 9.

Q. Drawing C2 requires the installation of an 8" temporary plug in the tee at the connection between the existing 8" SPW and 8" RCW lines. Are we to assume that the 8" RCW connection to the 8" SPW line is no longer needed until completion of the new 12" line? Or is temporary piping required to maintain this connection per specification 01100-6 1.12 6.B.
A. The 8-inch SPW connection located at STA 2+36.85 requires a temporary plug in the tee only as shown on the drawings. No additional temporary piping is required to maintain the connection in service during construction of the 12-inch SPW. This connection may remain out of service until the new 12-inch SPW is installed and ready for service.

Q. The existing lake filters need to be removed in order to construct the new filter and pump station. Will the existing filters need to be temporary relocated to maintain service per note 1. Drawing D1.
A. Note 1 on Sheet D1 of the drawings refers to the existing 8" SPW and the connection to the ABW filters. The existing lake filters are not in operation and may be removed to facilitate the work.

Q. Drawing C4 sodium hypochlorite injector detail shows PVC piping valves and injector quill. The pipe schedule specifies Kynar PVDF piping. Do we transition to PVC at this point and could you provide a specification or model number for the injector.

A. Transition to PVC as shown on Sheet C4 of the drawings. Material and size of the injector are specified on the drawing and will be further reviewed during shop drawings. No further information is required.

Q. It is not clear what type of pipe is required/acceptable for the buried site piping. Are we to assume it to be all DIP or is PVC acceptable?

A. All pipe 4-inch in diameter and larger will be ductile iron in accordance with the specifications.

Clarification: The vertical turbine pumps provided under this contract will have a maximum speed of 1800 RPM.

Peter A. Boers
Procurement Department

Acknowledgment is requested even if you have elected not to respond to this bid. A designated management representative of your firm can sign the receipt for this addendum. Please acknowledge receipt of this addendum immediately by fax to (941) 486- 2790 or mail to the above noted address, if a fax is not possible.

Receipt Acknowledged:

_____
Signature

_____
Company

_____
Date

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

Prepared for
CITY OF VENICE, FL

"City on the Gulf"

ISSUE FOR BIDSUBMITTAL

MARCH 2014

Prepared by

McKIM & CREED

1365 Hamlet Ave
Clearwater, Florida 33756
Ph: 727/442-7196
Fax: 727/461-3827

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END TOC

APPENDIX

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FDEP – Domestic Wastewater Permit Revision – Minor Modification
Ardaman & Associates Inc. Geotechnical Engineering Services Report – 12-2-2013

SECTION 01000- CERTIFICATION PAGES

PROJECT NAME: EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

I hereby certify that the above-referenced Project Manual meets all applicable provisions of Section 471 of Florida Statutes and Chapters 61G15-18 to 37 of Florida Administrative Code. I also certify that I am a registered professional engineer/architect in the State of Florida, in good standing and that I have the necessary civil engineering knowledge and experience that enables me to make this certification statement. Finally, I certify that the drawings submitted with this Project Manual includes all necessary notes and details to ensure that the Contractor can build the **EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS** to my engineering specifications and the City Building Inspector can verify the construction.

Civil Engineer
Divisions 1, 2, 3, 6, 7, 9, 11, and 15

Professional Engineer's Seal:

_____
Signature

Matthew S. Love, P.E.
(print name)
PE # 66118

_____
Date

Address:
McKim & Creed, Inc.
3802 Ehrlich Rd, Suite306
Tampa, FL 33624

Phone Number: 813/549-3740

PROJECT NAME: EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

I hereby certify that the above-referenced Project Manual meets all applicable provisions of Section 471 of Florida Statutes and Chapters 61G15-18 to 37 of Florida Administrative Code. I also certify that I am a registered professional engineer/architect in the State of Florida, in good standing and that I have the necessary civil engineering knowledge and experience that enables me to make this certification statement. Finally, I certify that the drawings submitted with this Project Manual includes all necessary notes and details to ensure that the Contractor can build the **EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS** to my engineering specifications and the City Building Inspector can verify the construction.

Structural Engineer
Divisions 3, 4, 5, and 6

Professional Engineer's Seal:

_____
Signature

H.A.Hobi, P.E.
(print name)
PE # - 59360

_____
Date

Address:
McKim & Creed, Inc.
1365 Hamlet Avenue
Clearwater, FL 32164

Phone Number: 727/442-7196

PROJECT NAME: EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

I hereby certify that the above-referenced Project Manual meets all applicable provisions of Section 471 of Florida Statutes and Chapters 61G15-18 to 37 of Florida Administrative Code. I also certify that I am a registered professional engineer/architect in the State of Florida, in good standing and that I have the necessary civil engineering knowledge and experience that enables me to make this certification statement. Finally, I certify that the drawings submitted with this Project Manual includes all necessary notes and details to ensure that the Contractor can build the **EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS** to my engineering specifications and the City Building Inspector can verify the construction.

Instrumentation and Controls Engineer
Divisions 11 and 13

Professional Engineer's Seal:

_____
Signature

Michael D. Tweedel, P.E.
(print name)
PE # - 60940

_____
Date

Address:
McKim & Creed, Inc.
1365 Hamlet Avenue
Clearwater, FL 33756

Phone Number: 727/442-7196

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Electrical Engineer
Divisions 15 and 16

Professional Engineer's Seal:

_____
Signature

Arthur L. Anchors, P.E.
(print name)
PE # - 39804

_____
Date

Address:
McKim & Creed, Inc.
1730 Varsity Drive, Suite 500
Raleigh, NC 27606

Phone Number: 919/233-8091

END OF SECTION

SECTION 01005 – GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE AND INTENT

A. Description

The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

B. Work Included

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all incidental costs. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made.

The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.

C. Public Utility Installations and Structures

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto, whether owned or controlled by the Owner, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the

public with transportation, traffic control, gas, electricity, telephone, sewage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.

The Contractor shall protect all installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as approved by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the Owner or other governmental body, which are required by this contract to be removed, relocated, replaced or rebuilt by the Contractor not identified in any separate bid item shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made.

Where public utility installations or structures owned or controlled by the Owner or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the Engineer, for the contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the General and Supplemental General Conditions.

The Contractor shall give written notice to Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Sunshine State One-Call of Florida, Inc. Call Center ("Call Sunshine") and per all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).

The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

1.2 PLANS AND SPECIFICATIONS

A. Plans

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.

B. Copies Furnished to Contractor

The Contractor shall furnish each of the subcontractors, manufacturers, and material men such copies of the Contract Documents as may be required for their work. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

C. Supplementary Drawings

When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and five paper prints thereof will be given to the Contractor.

D. Contractor to Check Plans and Data

The Contractor shall verify all dimensions, quantities and details shown on the Plans, Supplementary Drawings, Schedules, Specifications or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

E. Specifications

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

F. Intent

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

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

1.3 MATERIALS AND EQUIPMENT

A. Manufacturer

The names of proposed manufacturers, material men, suppliers and dealers who are to furnish materials, fixtures, equipment, appliances or other fitting shall be submitted to the Engineer for approval. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance

.

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces or material or equipment of the same kind, type or classification, and being used for identical types of services, shall be made by the same manufacturer.

B. Delivery

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

D. Installation of Equipment.

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the Engineer during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the Engineer and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.

The Contractor shall, at his own expense, furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.

Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coal tar epoxy equal to Koppers 300M.

E. Service of Manufacturer's Engineer

The Contract prices for equipment shall include the cost of furnishing (as required by equipment specifications sections) a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the Owner, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

1.4 INSPECTION AND TESTING

A. General

Inspection and testing of materials will be performed by the Owner unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Three (3) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the Owner.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the Owner or duly authorized inspection engineers or inspections bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the Owner for compliance. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests on materials and equipment which are rejected for non-compliance.

C. Inspections of Materials

The Contractor shall give notice in writing to the Engineer, at least two weeks in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture of preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where

necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Shop Tests of Operating Equipment

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.

Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to be a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval. The cost of shop test and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

F. Preliminary Field Tests

As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacements required. The furnishing Contractor shall assist in the preliminary field tests as applicable.

G. Final Field Tests

Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the Owner. The Supplier shall assist in the final field tests as applicable.

H. Failure of Tests

Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the

Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees of specified requirements, the Owner, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the Owner rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the Owner may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.

I. Final Inspection

During such final inspections, the work shall be clean and free from water. In no case will the final pay application be prepared until the Contractor has complied with all requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Document.

1.5 TEMPORARY STRUCTURES

A. Temporary Fences

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the Engineer, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

1.6 TEMPORARY SERVICES

A. First Aid

The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

1.7 LINES AND GRADES

A. Grade

All work under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the Owner/Engineer.

The full responsibility for keeping alignment and grade shall rest upon the Contractor.

B. Safeguarding Marks

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

C. Datum Plane

All elevations indicated or specified refer to the Mean Sea Level Datum of the NGVD 1929 Datum and/or NAVD 1988.

1.8 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the Engineer, additional work is deemed necessary to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the Owner and to the satisfaction of the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer.

Prior to the beginning of any excavations, the Contractor shall advise the Engineer of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

B. Protection of Trees

1. All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.
2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.
3. The Owner may order the Contractor, for the convenience of the Owner, to remove trees along the line or trench excavation. If so ordered, the Owner will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

C. Lawn Areas

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod in a manner described in the Workmanship and Material Paragraph in Section 02900, Seeding and Sodding.

D. Restoration of Fences

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner

in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or items, or if no specific Item is provided therefore, as part of the overhead cost of the work, and no additional payment will be made therefore.

1.9 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.

B. Smoke Prevention

A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.

C. Noise

The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all engines or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

Except in the event of an emergency, no work shall be done between the hours of 7:00 P.M. and 7:00 A.M., or on weekends. If the proper and efficient prosecution of the work requires operations during the night or weekends, the written permission of the Owner shall be obtained before starting such items of work.

D. Access to Public Services

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

E. Dust prevention

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.10 CUTTING AND PATCHING

The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Plans and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.

1.11 CLEANING

A. During Construction

During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

B. Final Cleaning

At the conclusion of the work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

1.12 MISCELLANEOUS

A. Protection Against Siltation and Bank Erosion

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the Engineer which results from his construction operations.

B. Protection of Wetland Areas

The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection or Southwest Florida Water Management District.

C. Existing Facilities

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

D. Use of Chemicals

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01010 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Work to be performed under these Contract Documents consists of the construction of the Reclaimed Water Filtration System Improvements Project at the City of Venice Eastside WRF site, inclusive of all equipment, materials and work required for a complete, tested, and operational system.

B. A general description of the work includes, but is not limited to the following:

1. Provide all equipment and materials needed for excavation, dewatering, bypass pumping, backfilling, compaction, grading, replacement of paved and unpaved roadways, replacement of grass (sod), cleanup, clearing and grubbing, structural fill, erosion control, and painting.

2. Provide all equipment and materials needed and construct one (1) RCW Filter including, but not limited to: all gravity disk filter equipment, concrete foundations, coatings, concrete pipe encasement(s), concrete structures, access stairs, grating, walkways, process piping, valves, electric power, control panels, instrumentation system components, signal wiring, and all other equipment needed, as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

3. Provide all equipment and materials needed and construct an Backwash Pump Station, including, but not limited to: concrete foundation, fiberglass wet well, two (2) grinder pumps, grinder pump valves, concrete pipe encasement(s), access hatch, pipe connections, pipe supports, valves, concrete structure, coatings, level sensor, floats, piping, 4-inch piping to existing 6-inch WAS line, electric power, control panels, instrumentation system components, signal wiring, and all other components needed, as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

4. Provide all equipment and materials needed and install two (2) Lake Return Submersible Pumps. Includes all ancillary equipment, including, but not limited to: submersible pump, piping, valves, electrical system, instrumentation and control system, signal wiring, and all other equipment specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

5. Provide all equipment and materials needed and install the Filter Effluent Transfer Pump Station including, but not limited to: concrete pad, piping, pipe connections, pipe supports, valves, level sensors, equipment pads, two (2) vertical turbine transfer pumps, valves, electrical system, controls, tank level sensors, electric power, control panels, instrumentation system components, signal wiring, and all other components needed, as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

6. Provide all equipment and materials needed and install Chemical Distribution and Feed Systems, including, but not limited to: chemical feed pumps, chemical skids, valves, chemical piping, valves, electrical systems, control system and control system wiring, control panels, electric power wiring, interconnecting control system wiring, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

7. Furnish and install all electric power equipment, including, but not limited to: motor control centers, variable-frequency drives, electric valve actuators, emergency generator, above and belowground conduit, raceways, electrical ductbanks, generator fuel piping, electric manholes, power wiring, site lighting, building wiring and lighting, electrical panels, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

8. Furnish and install all controls and instrumentation including, but not limited to: SCADA (supervisory control and data acquisition) system, upgrades to the facility's existing programmable logic controller (PLC), above and below ground conduit, signal wiring, instrument air piping, control panels, PLCs, controls and instrumentation for lake filtration process equipment and system integration, conduit and signal wiring to connect the lake filtration SCADA system to the existing WRF SCADA System, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system.

9. The Contractor shall furnish all materials needed and install site improvements, including clearing and grubbing, demolition, relocations, grading, drainage, tree removal, asphalt and concrete paving, concrete sidewalks, concrete equipment pads, stormwater pond, plantings, roof drains and conveyance system, drainage swales, removal and disposal of any chemicals that may be within chemical pipes designated for removal or replacement, stormwater inlets, storm drain piping, fencing, landscaping, sodding, restoration, and all other components as specified herein and as shown on the Drawings.

10. The Contractor shall provide all equipment and materials and install a 12-inch lake return pipeline from the existing 10-inch to the proposed Lake Filters, including piping, valves, etc.. In addition provide all piping and connections to the proposed Lake Filters.

11. The Contractor shall be responsible for startup, testing and training associated with all equipment provided.

12. The Owner shall provide up to 200 gallons of sodium hypochlorite to the Contractor for start-up and testing of the Eastside WRF Reclaimed Water Filtration System Improvement Project. Any additional sodium hypochlorite needed for start-up and testing shall be furnished by the Contractor. The Contractor shall provide all other chemicals needed for startup and testing and shall be responsible for providing temporary or permanent piping, barrels, or tank trucks to convey the chemicals to their usage points.

The list above is not, and does not purport to be, a complete listing and is provided only as a general summary of work included. The work is further described within these Specifications or as shown on the Drawings. The Contractor is responsible for providing a complete and fully operational system with all of its associated components, whether or not specified herein or shown on the Drawings.

C. The project site for the Eastside WRF Reclaimed Water Filtration System Improvements is located in the City of Venice, Florida at the address below:

3510 Laurel Road East
North Venice, FL 34275

D. Contractor is responsible for collection of samples, coordination for laboratory testing, testing fees and all other work needed for bacteriological testing required to place new or modified facilities into service. If testing fails, the Contractor shall take any and all necessary means of flushing, disinfecting or other means necessary to obtain clearance. No payment shall be made for any work, materials, lab fees or any other costs associated with re-testing that may be needed for clearance due to failed tests initially.

E. Specifications: See the appropriate Technical Sections of these Specifications for detailed information on materials, equipment, and installation.

F. Pressure Tests: The Contractor is responsible for pressure tests of all piping, including the reclaimed water piping up to the skids and valves, and the chemical delivery system skid piping and valves. Inspection to be performed by the Owner or Owner's Representative in conformance with the Technical Specifications.

G. Erosion Control: Erosion control during construction, including storage and staging areas, shall be the responsibility of the Contractor and shall be in accordance with the Specifications, applicable permits, and the Drawings.

H. OSHA Regulations: The Contractor shall comply with all applicable OSHA regulations regarding all trenching operations and all other work associated with this Contract.

I. Staging Areas: The Contractor shall coordinate on-site staging areas with the Owner or Owner's Representative.

J. Regular Working Hours: Regular Working hours associated with this contract is from 7:00 a.m. to 7:00 p.m. 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 indicated in the Contract Documents, all work at the site shall be performed during regular working hours and Contractor will not permit overtime work or the performance of work on Saturday, Sunday, or any legal holiday without the Owner consent given after prior notice to Engineer.

K. Overtime Work: At the discretion of the Owner, the Contractor will be allowed to perform overtime work provided the Contractor pays for all additional cost incurred by the Owner and the Owner's Representative for such overtime work. The Contractor shall request and obtain the Owner's approval for overtime work a minimum of three (3) business days prior to commencement of the overtime work.

L. Protection of Adjacent Property: If adjacent property is affected or endangered by any work performed under this Contract, it shall be the responsibility of the Contractor to take whatever steps are necessary to protect the adjacent property and to contact the Owner or Owner's Representative.

M. The Specification and Drawings are an integrated part of the Contract Documents and as such will not stand alone if used independently as individual Sections, Divisions or Drawing sheets.

N. The Drawings and Specifications establish minimum standards of quality for this project. They do not purport to cover all details entering into the design and construction of materials or equipment.

O. The Contractor is advised that the equipment arrangements shown on the Drawings may vary with different manufacturers and the Contractor is responsible for making the changes necessary to accommodate the specific equipment installed, at no additional cost to the Owner.

P. Omission of a specific item or component part of a system obviously necessary for the proper functioning of the system shall not relieve the Contractor of the responsibility of furnishing the item as part of the Work at no additional cost to the Owner.

1.2 QUALITY ASSURANCE

A. Laws and Regulations: The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations applicable to the work. If the Contractor observes that the Specifications or Drawings are at variance therewith, the Contractor shall give the Owner or Owner's Representative written notice thereof, and any necessary changes shall be adjusted by an appropriate modification. If the Contractor performs any Work knowing, or having reason to know, that it is contrary to such laws, ordinances, rules and regulations, and without such notice to Owner or Owner's Representative, the Contractor shall bear all costs arising therefrom.

B. Regulatory Requirements: The Owner has, or will obtain, a construction permit for the facility from the Florida Department of Environmental Projection, along with an Environmental Resource Permit from the Florida Department of Environmental Protection. Copies of relevant permits that may impact the Contractor's work that were obtained prior to these documents being published are contained herein. The Contractor is responsible for complying with all provisions and requirements of all construction permits for this project. The Contractor shall be responsible for obtaining all Construction and any other Permits required for the project. All labor and other expenses needed to obtain these permits shall be the responsibility of the Contractor.

1.3 JOB CONDITIONS

A. Taxes: The Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by him in accordance with the law of the place of the project.

B. Permits and Licenses:

1. The Contractor is entirely responsible for payment and for obtaining permits and licenses associated with this Project that have not previously been obtained. The Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of the opening of the bids.

2. The Contractor shall pay all charges of utility service companies for the connections to the Work. Additionally, the Contractor is responsible for coordinating with the utility service companies during construction. Other than power provided by the Owner to operate the existing water treatment facility, the Contractor is responsible for payment for electricity, water and any other utilities needed for construction, start-up, and testing.

C. Labor, Materials and Equipment:

1. The Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the

Contract Documents. The Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site, or adjacent thereto, and except as otherwise indicated within Section 01100 – Special Project Procedures, all Work at the site shall be performed during regular working hours, and the Contractor will not be permitted to perform overtime work Saturday, Sunday or any legal holiday without the Owner's written consent.

2. Unless otherwise shown, the Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the Work.

3. The Contractor shall be responsible for all materials and equipment furnished and shall replace at his own expense all such material found to be defective in manufacture or damaged in handling. This shall include the furnishing of all materials and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work.

D. Work Sequence: The Contractor shall be responsible for preparing and submitting a construction schedule and plan for the review and approval of the Owner and the Owner's Representative. The construction plan shall be predicated on the need to have the entire facility constructed, complete and in service, in the time specified within these documents. The construction plan shall keep the plant in operation at all times during construction.

E. Resisting Hydrostatic Uplifts: The Contractor shall be responsible for protecting structures and facilities from damage due to hydrostatic uplift from high water levels.

F. Contractor Use of Premises:

1. The Contractor shall confine construction equipment, storage of materials and equipment and the operations of workmen to areas permitted by law, ordinances, permits or the requirements of the Contract Documents, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

2. The Contractor shall not enter upon private property for any purpose without first securing the permission of the property owner in writing and furnishing the Owner and Owner's Representative with a copy of said permission. This requirement will be strictly enforced, particularly with regard to such vacant properties as may be utilized for materials storage.

3. The Contractor shall conduct his Work in such a manner as to avoid damage to adjacent private or public property. Any damage to existing structures or work of any kind, including permanent reference markers or property corner markers, or the interruption of a utility service, shall be repaired or restored promptly at no additional expense to the Owner.

4. The Contractor shall preserve and protect all existing vegetation such as trees, shrubs and grass on or adjacent to the site which do not reasonably interfere with the construction. The Contractor will be responsible for all unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment, stockpiling of materials or tracking on grass by equipment. The Contractor will be liable for, or will be required to replace or restore at no additional expense to the Owner, all vegetation not protected or preserved as required herein that may be destroyed or damaged.

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

1.4 OCCUPANCY

A. Owner Occupancy: The Owner will be in occupancy throughout the period of construction.

B. Maintenance of Operations:

1. Refer to Specification 01100 – Special Project Procedures.

2. The Owner will furnish operating personnel, electric power and chemicals for the continued operation of the existing facility, but it will be the Contractor's responsibility to schedule his operations, in conference and with the approval of the designated representative of the Owner and the Owner's Representative to maintain operating of the existing WRF, as required.

3. The continued operation of the existing reclaimed water system is crucial to the health and welfare of the City of Venice. The Contractor shall exercise due caution in his operations in the vicinity of all utilities, both public and private. Any damages to the existing facilities shall be immediately isolated and shall be immediately repaired to the satisfaction of the Owner and the Owner's Representative.

1.5 OWNER FURNISHED ITEMS

A. The Contractor's responsibility for materials or equipment that may be furnished by the Owner shall begin at the point of its delivery to the Contractor. Materials

already on the site shall become the Contractor's responsibility on the day of the execution of the Contract. The Contractor shall examine all materials furnished by the Owner at the time and place of delivery to him and shall call any defective material to the attention of the Owner. Any materials furnished by the Owner and installed by the Contractor without discovery of such defects will, if found defective prior to final acceptance of the Work, be replaced with sound materials by the Contractor.

1.6 OFF-SITE STORAGE

A. Off-site storage arrangements shall be acceptable to the Owner for all materials and equipment not incorporated into the Work but included in Applications for Payment. Such off-site storage arrangements shall be presented in writing, and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to the Owner and Owner's Representative.

1.7 EQUIVALENT MATERIALS AND EQUIPMENT

A. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, **and** includes "or approved equal," the specified item mentioned shall be understood as establishing the type, function, and quality desired. Other manufacturers' products may be accepted provided sufficient information is submitted by the Contractor, which clearly illustrates, and allows the Owner and Owner's Representative to determine that the products proposed are equivalent to those named. Such items shall be submitted for review in accordance with the Contract Documents. It is important to note that the Contractor is fully responsible for providing all information and supporting documentation, notes all discrepancies, and clearly illustrates how the alternative equipment meets the type, function, and quality of the named equipment manufacturer(s).

B. Requests for review of equivalency will not be accepted from anyone except Contractor, and such requests will not be considered until after the Contract has been awarded and must be approved by the Owner's Representative and the Owner. Consideration for equivalency and / or substitutions will not be considered during Bidding.

1.8 PREPARATION FOR SHIPMENT

A. All materials shall be suitably packaged to facilitate handling and protect against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Owner and Owner's Representative.

B. Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

1.9 NOTICES TO OWNERS AND AUTHORITIES

A. Contractor shall notify Owners of adjacent property and utilities when prosecution of the Work may affect them.

B. When it is necessary to temporarily deny access by Owners or tenants to their property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices will conform to any applicable local ordinance and, whether delivered orally or in writing, will include appropriate information concerning the interruption and instructions on how to limit their inconvenience.

C. Utilities and other concerned agencies shall be contacted at least 48 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

1.10 LINES AND GRADES

A. All Work shall be done to the lines, grades, and elevations shown on the Drawings.

B. Basic horizontal and vertical control points will be established by the Contractor in accordance with the Contract Documents or as designated by the Owner or Owner's Representative. These points shall be used as datum for the Work. All additional survey, layout, and measurement Work shall be performed by Contractor as a part of the Work.

C. Contractor shall provide an experienced instrument man, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout and measurement Work. In addition, Contractor shall furnish, without charge, competent men from his force and such tools, stakes, and other materials as Owner's Representative may require in establishing or designating control points, or in checking survey, layout, and measurement Work performed by Contractor.

D. Contractor shall inform Owner's Representative in advance of the times and places at which he wishes to do Work. Contractor shall then establish horizontal and vertical control points and check existing conditions prior to proceeding with the Work.

E. Contractor shall remove and reconstruct Work which is improperly located.

1.11 CONNECTIONS TO EXISTING FACILITIES

A. Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking

connections. Contractor shall protect facilities against deleterious substances and damage.

B. Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

1.12 UNFAVORABLE CONSTRUCTION CONDITIONS

A. During unfavorable weather, wet ground, or other unsuitable construction conditions, the Contractor shall confine his operations to Work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would adversely affect the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

1.13 CUTTING AND PATCHING

A. Contractor shall perform all cutting and patching required for the Work, and as may be necessary in connection with uncovering Work for inspection or for the correction of defective Work.

B. Contractor shall perform all cutting and patching required for the installation of improperly timed Work, to remove samples of installed materials for testing.

C. Except when the cutting or removal of existing construction is specified or indicated, Contractor shall not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without the Owner's or the Owner's Representative's concurrence.

D. Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations.

E. Materials shall be cut and removed to the extent indicated on the Drawings or as required to complete the Work. Materials shall be removed in a careful manner with no damage to adjacent facilities or materials. Materials which are not salvageable shall be removed from the site by Contractor.

F. All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to the Owner and Owner's Representative, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

1.14 CLEANING UP

A. During the progress of the work, the Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work, the Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by the Owner. The Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

B. Contractor shall provide adequate trash receptacles about the site, and shall promptly empty the containers when filled.

C. Construction materials, such as concrete forms and scaffolding shall be neatly stacked by Contractor when not in use. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids and cleaning solutions from surfaces to prevent marring or other damage.

D. Volatile wastes shall be properly stored in covered metal containers and removed daily.

E. Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws.

F. Adequate cleanup will be a condition for recommendation of progress payment applications.

G. Owner reserves the right to limit the movement of construction crews when an area is not acceptably cleaned. Delays caused to Contractor because of his negligence in keeping the construction areas cleared shall be absorbed by the Contractor at no additional costs to the Owner in time or money.

1.15 APPLICABLE CODES AND ORDINANCES

A. References in the Contract Documents to local codes mean the Florida Building Code.

B. Other standard codes which apply to the Work are designated in the specifications.

1.16 REFERENCE STANDARDS

A. Reference to the standards of any technical society, organization, or associate, or to codes of local or state authorities, shall mean the latest standard, code,

specification, or tentative standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

1.17 SITE ADMINISTRATION

A. Contractor shall be responsible for all areas of the site used by him, and all Subcontractors in the performance of the Work. He will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others.

1.18 CELLULAR PHONE

A. The Contractor shall provide a cellular phone for his Superintendent or foremen to carry during construction. The cellular phone shall be carried by a designated Contractor's representative 24 hours per day. The cellular phone numbers shall be given to the City's Project Representative.

1.19 OWNER'S REPRESENTATIVE

A. The Owner's Representative for this Project shall be:

McKim & Creed, Inc.
378 Interstate Court
Sarasota, Florida 34240
Telephone: (941) 379-3404

1.20 WORK BY OTHERS

A. Where two (2) or more contracts are being performed at one time on the same Site or adjacent land in such manner that Work under one contract may interfere with Work under another, the City will determine the sequence and order of the Work in either or both contracts. When the Site of one contract is the necessary or convenient means of access for performance of Work under another, the City may grant privilege of access or other reasonable privilege to the Contractor so desiring, to the extent, amount, and in manner and at a time that the City may determine. No City determination of method or time or sequence or order of the Work or access privilege shall be the basis for a claim for delay or damage except under provisions of the General Conditions for temporary suspensions of the Work. The Contractor shall conduct its operations so as to cause a minimum of interference with the Work of such other Contractor, and shall cooperate fully with such other Contractor to allow continued safe access to their respective portions of the Site, as required to perform Work under their respective contracts.

B. The Contractor shall cooperate fully with all utility forces of the City or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the Work, and

shall schedule the Work so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.21 SITE SECURITY

A. It is the City's intent to provide access control to Eastside WRF site during the construction of the Work described in these specifications.

B. Access – There is one gate located at this site off of Laurel Road East for access during permitted work hours.

C. Prior to each day, the Contractor(s) shall provide the City with a list of subcontractors, employees and delivery services expected to access the Site that day. Employees of organizations not on the list will be denied access.

END OF SECTION

SECTION 01015 – CONTROL OF WORK

PART 1 GENERAL

1.1 WORK PROGRESS

The Contractor shall furnish personnel and equipment which will be efficient, appropriate and adequately sized to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such personnel appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the personnel and equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.2 PRIVATE LAND

The Contractor shall not enter or occupy private land outside of easements, except by permission of the affected property owner.

1.3 WORK LOCATIONS

Work shall be located substantially as indicated on the drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.4 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

1.5 DISTRIBUTION SYSTEMS AND SERVICES

A. The Contractor shall avoid interruptions to water, telephone, cable TV, sewer, gas, or other related utility services. He shall notify the Engineer and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made.

B. If it appears that utility service will be interrupted for an extended period, the Engineer may order the Contractor to provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be kept to the minimum, consistent with existing conditions. The safety and integrity of the systems are of prime importance in scheduling work.

1.6 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.

B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit prices established in the Bid.

D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work as classified in the General Conditions. If relocation of a privately owned utility is required, the Owner will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sundays and legal holidays) before excavating near their utilities.

1.7 TEST PITS

Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor immediately after the utility location and the surface shall be restored in a manner equal or better than the original condition. No separate payment will be made.

1.8 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer.

B. All sidewalks which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.

C. Along the location of this work, all fences, walks, bushes, trees, shrubbery and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Engineer as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded to equal or exceed original conditions.

D. Trees close to the work which drawings do not specify to be removed, shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the Engineer. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials.

E. The protection, removal and replacement of existing physical features along the line of work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Bid.

1.9 MAINTENANCE OF TRAFFIC

A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the Engineer.

B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures which are satisfactory to the Engineer and Owner.

C. Any changes to the traffic pattern require a Traffic Control Plan as detailed in section 01570 of this specification..

1.10 WATER FOR CONSTRUCTION PURPOSES

A. In locations where public water supply is available, the Contractor may purchase water for all construction purposes.

B. The Contractor shall be responsible for paying for all water tap fees incurred for the purpose of obtaining a potable water service or temporary use meter.

1.11 MAINTENANCE OF FLOW

The Contractor shall at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer and Owner well in advance of the interruption of any flow.

1.12 CLEANUP

During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

1.13 COOPERATION WITHIN THIS CONTRACT

A. All firms or person authorized to perform any work under this Contract

shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.14 PROTECTION OF CONSTRUCTION AND EQUIPMENT

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

B. All structures shall be protected in a manner approved by the Engineer. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense and to the satisfaction of the Engineer. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period described in the Contract.

C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

1.15 CONSTRUCTION WITHIN RIGHT-OF-WAY

Where pipe lines are installed within FDOT right-of-way, all excavation backfill and compaction for the purpose of reconstructing roadways and/or adjacent slopes contiguous thereto shall be in accordance with FDOT or City of Venice Standards and Specifications, whichever is applicable. Contractor shall satisfy the authorized representative of the FDOT with respect to proper safety procedures, construction methods, required permitting, etc., within the FDOT right-of-way.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01027 - APPLICATION FOR PAYMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: Submit Application for Payment to the CITY in accordance with schedule established by Conditions of the Contract and Agreement between CITY and CONTRACTOR.

B. Related Requirements Described Elsewhere:

1. Agreement between CITY and CONTRACTOR.

2. Application for Payment Form.

3. Schedule of Values.

4. Contract Closeout.

5. Project Record Documents.

1.2 FORMAT AND DATA REQUIRED

A. Submit applications typed on forms provided by the CITY, "Application and Certificate for Progress Payment", with itemized data typed on 8-1/2 inch x 11 inch or 8-1/2 inch x 14 inch white paper continuation sheets.

B. Provide itemized data on continuation sheet of format, schedules, line items and values. Values shall be those taken from the Schedule of Values, submitted by the CONTRACTOR and approved by the ENGINEER.

1.3 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of work, with item numbers and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified for Schedule of Values.

3. List each Change Order executed prior to date of submission, at the end of the continuation sheets. List by Change Order Number, and description, as for an original component item of work.

4. To receive approval for payment on component material stored on site, submit copies of the original invoices with the Application for Payment.

5. As provided for in the "Application and Certificate for Progress Payment" form, the CONTRACTOR shall certify, for each current pay request, that all previous progress payments received from the CITY, under this Contract, have been applied by the CONTRACTOR to discharge in full all obligations of the CONTRACTOR in connection with Work covered by prior Applications for Payment, all liens, claims, security interest and encumbrances. CONTRACTOR shall attach to each Application for Payment like affidavits by all subcontractors.

1.4 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the CITY requires substantiating data, CONTRACTOR shall submit suitable information, with a cover letter identifying:

1. Project.

2. Application number and date.

3. Detailed list of enclosures.

4. For stored products:

a. Item number and identification as shown on application.
b. Description of specific material.

B. Submit one (1) copy of data and cover letter for each copy of application.

C. Submit requisite number of photographs with each application.

D. List the name and address of all Subcontractors and Suppliers who have performed work or provided supplies or material for each application.

E. Submit certified payroll sheets for CONTRACTOR'S forces and all Subcontractors for the month preceding the submitted application.

F. Submit revised monthly progress schedules with each month's Application for Payment, including cash flow projections.

G. The CONTRACTOR shall maintain an updated set of red-lined drawings. AS A PREREQUISITE FOR PAYMENT OF MONTHLY PROGRESS PAYMENTS, THE CONTRACTOR IS TO EXHIBIT THE UPDATED RED-LINED DRAWINGS FOR REVIEW AND APPROVAL BY THE CITY.

1.5 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application Form as specified for progress payments.

1.6 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the CITY at the time stipulated in the Agreement. Review the percents complete with the CITY to resolve any conflicts or discrepancies.

B. Number of copies for each Application for Payment:

1. CITY: Four (4) copies or the number agreed to at the Pre-Construction Conference.

2. CONTRACTOR: As required for his needs.

C. When the CITY finds Application properly completed and correct, the CITY will process Certificate for Payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01050 - FIELD ENGINEERING AND SURVEYING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall provide and pay for field surveying services required for the project. The engineering and surveying services may include, but may not be limited to:

1. All survey work required in execution of the Project.

2. All costs of construction layout and staking.

3. Civil, structural or other professional engineering services specified or required to execute Contractor's construction methods, including those required to provide project Record Drawings.

B. The Contractor shall furnish and set all necessary stakes to establish the lines and grades as shown on the Contract Drawings and layout each portion of the Work of the Contract.

1.2 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. All construction staking shall be conducted by or under the supervision of a Florida Registered Professional Surveyor and Mapper. The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the ENGINEER.

1.3 SURVEY REFERENCE POINTS

A. Existing basic horizontal and vertical control points are designated on Drawings. All elevations are referred to NGVD 1929, which duplicates the older surveys and plant information. Establish all vertical and horizontal controls required for construction.

B. Locate and protect control points prior to starting site work, and preserve permanent reference points during construction.

1. Make no changes or relocations of such points without prior written notice to ENGINEER.

2. Report to ENGINEER when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

3. Require surveyor to replace control points which may be lost or destroyed. Establish replacements based on original survey control.

4. ENGINEER will identify existing control points and properly line corner stakes indicated on Drawings, as required.

1.4 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of two (2) permanent bench marks on the project site, all referenced to data established by survey control points. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out, by instrument and similar appropriate means.

1. Site improvements.

2. Building foundation, column locations, floor levels and roof levels.

3. Controlling lines and levels required for mechanical and electrical trades.

C. Verify layouts by same methods from time to time.

1.5 RECORDS

A. Maintain a complete, accurate log of control and survey work as it progresses.

B. On completion of foundations and major site improvements, prepare a certified survey showing finished dimensions, locations, angles and elevations of construction.

C. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare and certify Record Drawings.

1.6 SUBMITTALS

A. Submit name and address of surveyor or professional engineer to ENGINEER.

B. On request of ENGINEER, submit documentation to verify accuracy of field survey work.

C. Submit certificate signed and sealed by a State of Florida Registered Engineer or Land Surveyor certifying that elevations and locations of improvements are in conformance with Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01065 PERMITS AND FEES

PART 1 – GENERAL

1.1 DESCRIPTION

A. Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. The City shall assist Contractor, when possible, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the work. Only building permit fees are reimbursable under Pay Item No. 10 in Section 01150 – Measurement and Payment.

1. Permits by CONTRACTOR: CONTRACTOR will apply for and CONTRACTOR will pay for the following permits:

   - City of Venice Development Services – Engineering/Stormwater Construction Permit/Site Permit
   - City of Venice Building Department – Building Permits (see Section 01150 – Measurement and Payment)
   - Florida Department of Environmental Protection (Dewatering Discharge Permit)
   - Any other miscellaneous permit applicable to complete the work.

2. Permits by OWNER: The CITY has applied, paid for, and obtained the following permits:

   Florida Department of Environmental Protection (Construction Permit)
   Florida Department of Environmental Protection (ERP)

3. Copies of the permits obtained by the OWNER are attached as an Appendix to the Project Manual or will be distributed at the Pre-Construction Conference.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01070 - CODES, REFERENCES AND ABBREVIATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

Referenced standards and abbreviations.

1.2 REFERENCED STANDARDS

A. Any reference to published specifications or standards of any organization or association shall comply with the requirements of the specification or standard which is current on the date of Advertisement for Bids. In case of a conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.

B. In case of conflict between the referenced specifications or standards and the Contract Documents, the Contract Documents shall govern.

1.3 ABBREVIATIONS

The following are definitions of abbreviations used within the Project Manual:

AA	Aluminum Association, Inc.
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMA	Acoustical Materials Association
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers

ASTM	American Society for Testing and Materials
AWMA	Aluminum Window Manufacturer's Association
AWPA	American Wood Preserves Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society, Inc.
AWWA	American Water Works Association
CPSC	U.S. Consumer Product Safety Commission
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards and National Bureau of Standards
FBC	Florida Building Code
FM	Factory Mutual Research Corp.
FS	Federal Specifications
FS	Florida Statutes
GA	Gypsum Association
HI	Hydraulic Institute
IEEE	Institute of Electrical and Electronic Engineers
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board of Fire Underwriters
NCMA	National Concrete Masonry Association
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers' Association
NFiPA	National Fire Protection Association
NFoPA	National Forest Products Association

NSF	National Sanitation Foundation
PCA	Portland Cement Association
PCI	Precast Prestressed Concrete Institute
PS	Product Standards National Institute of Standards and Technology
SDI	Steel Door Institute
SJI	Steel Joist Institute
SMACCNA	Sheet Metal and Air Conditioning Contractors' National Association, Inc.
SSPC	Structural Steel Painting Council
UL	Underwriters Laboratories, Inc.

1.4 CODES AND GOVERNMENTAL DEPARTMENTS

CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FAC	Florida Administrative Code
NEC	National Electric Code (Published by NFiPA)
OSHA	Occupational Safety and Health Act

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01100 - SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 CONNECTIONS TO EXISTING SYSTEM

A. The Contractor shall perform all work necessary to locate, excavate, and prepare for connections to the terminus of the existing systems, as shown on the Drawings or where directed by the Owner or Owner's Representative. The cost for this work and for the actual connection to the existing systems shall be included in the Base Bid for the project and shall not result in any additional cost to the Owner.

1.2 RELOCATIONS, REMOVAL, AND ABANDONMENT

A. As part of the cost included in his Bid, the Contractor shall include all work, material, equipment, labor and coordination needed for the relocation, removal, and abandonment of existing facilities that interfere with the positioning of the work as shown on the Drawings.

1.3 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of encountering underground piping, structures and utilities not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines so as to avoid damage to the existing lines. Cost for relocation of all existing piping, structures and utilities needed for the Project shall be included in the price bid for the project. Should damage occur to an existing underground utility, the Contractor shall bear the cost of all repairs to said utility.

B. The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true representation of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction in conformance with all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).

C. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Owner or Owner's Representative of the location of the pipeline or utility and shall reroute or relocate the pipeline or utility as directed.

D. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with completed work shall be carefully protected against damage. Any existing utilities damaged in any way

by the Contractor shall be restored or replaced by the Contractor at his expense.

E. Existing piping and other underground utilities – Special attention is noted for the number of, and general locations of, existing underground utilities. Contract Drawings depict, based on the information available during preparation of the Drawings, approximate locations of the known underground utilities. The Drawings do not purport to depict actual locations of all underground utilities. The Contractor shall anticipate and include in his bid, all work necessary to expose, identify, relocate, abandon, and/or remove underground utilities needed for Construction. In some locations, the Contractor may need to hand dig or utilize specialized equipment to expose underground utilities to avoid damage.

F. Caution shall be exercised while locating existing chemical feed piping, particularly in the vicinity of the proposed UF Building. The potential exists for abandoned chemical yard piping, including 93% Sulfuric Acid. If abandoned piping exists, it is unknown if the chemicals have been removed from the piping. The Contractor is responsible to dispose of any and all chemicals at his expense, and in accordance with all applicable Regulations.

1.4 SUSPENSION OF WORK

A. During inclement weather, all work which might be damaged or rendered inferior by such weather conditions shall be suspended. The orders and decisions of the CITY as to suspensions shall be final and binding. During suspension of the work from any cause, the work shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise; and, if the CITY shall so direct, rubbish and surplus materials shall be removed.

1.5 HURRICANE PREPAREDNESS PLAN

A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Owner and Owner's Representative, a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning

B. In the event of inclement weather, or whenever Owner or Owner's Representative shall direct, Contractor shall insure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the Owner's or Owner's Representative, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractors to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

1.6 POWER SUPPLY

A. Electricity as may be required for construction and permanent power supply needed for operation of all work for fully operational facility shall be coordinated with the Utility, secured, and purchased by the Contractor.

1.8 ADDITIONAL PROVISIONS

A. Connections to, and integration of new facilities that will involve the existing Water Reclamation Facility (WRF) shall be coordinated with the Owner at least 14-calendar days in advance.

B. The Contractor shall provide, at his own expense, all necessary temporary facilities to provide access to and for protection of, all existing facilities. The Owner's personnel must have ready access at all times to the existing facilities. The Contractor is responsible for all damage to existing structures, equipment and facilities caused by his construction operations and must repair all such damage when and as directed by the Owner or Owner's Representative.

C. Contractor shall provide protective matting, fuel containment and all other materials, equipment and labor during construction. Any spill of fuel, hydraulic fluid, or oil shall be contained. Any contaminated soil shall be removed and disposed of according to all applicable federal, state and local regulations, entirely at the Contractor's expense. Contractor shall, prior to beginning construction, submit a "Fueling Spill Prevention Plan" that shall clearly indicate how fuel spills will be prevented.

1.9 OPERATIONS DURING CONSTRUCTION

A. Maintenance of operations of the existing wastewater treatment plant is critical. All means and methods to maintain the operations (as specified herein) of said facility are to be included in the Contractor's bid. The following is a general list of construction activities which the Contractor will need to account for in maintaining operations of the facility:

1. Relocation of chemical piping, and electrical lines.

2. Connection of the filtration system process pipe into the existing facility.

3. Final integration of Filtration System instrumentation and SCADA system into the existing facility.

This list does not purport to be all inclusive; the Contractor is responsible for coordinating with plant staff to perform all required construction, while maintaining operations of the existing WRF as Specified herein.

B. To minimize impacts not only to WRF, but to the City's reclaimed water system, the Contractor shall be required to comply with the following requirements during construction:

1. Activities that will impact the normal operation of the facility will be limited to a maximum of 8-hours and will be completed during off-peak demand periods, unless written approval is received by the Owner. Contractor shall provide written notification at least 72-hours prior to any and all activities that impact normal operations.

2. Activities that require a temporary shutdown of any water reclamation facility shall not exceed 8-hours. Contractor shall provide written notification of proposed shutdown at least 14 calendar days prior to shutdown event. No shutdowns will be allowed without written permission of the Owner. It may be necessary to reschedule the shutdown due to unforeseen circumstances and the Owner's need to produce reclaimed water. In the event that the Owner must require rescheduling of the shutdown, the Owner will notify the Contractor of the need to reschedule.

3. Access to the site and all treatment plant facilities must be maintained at all times during construction, including access for bulk chemical delivery.

1.10 CONSTRUCTION CONDITIONS

A. The Contractor shall strictly adhere to the specific requirements of the governmental unit(s) and/or agency(ies) having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent shall apply.

1.11 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise or dust.

B. Sound levels must comply with all applicable state and local codes and ordinances. Sound levels in excess of those listed in said codes and ordinances are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Owner for excessive noise shall not relieve the Contractor of the other portions of this specification including, but not limited to contract time and contract price.

C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.12 MAINTENANCE OF OPERATIONS FOR EXISTING FACILITIES

A. Prior to beginning construction, and within 14 calendar days of the Notice to Proceed, the Contractor shall submit a Construction Sequencing and Phasing Plan. The Plan shall include sufficient detail to indicate key activities, durations of key activities, and sequencing/phasing to illustrate the following (at a minimum):

1. How operations of the existing facilities will be maintained during construction;

2. Planned shutdowns of existing treatment facility and durations of shutdowns;

Other than mobilization, no work will be allowed on the site until the Construction Sequencing and Phasing Plan is approved by the Owner or the Owner's Representative, unless writing permission is obtained from the Owner.

B. The functions of the existing water reclamation facility include screening, grit removal, primary clarification, aeration, secondary clarification, sludge recycle, sludge wasting, filtration, chlorine disinfection prior to discharge to the Reclaimed Water System, sludge digestion and sludge dewatering facilities. These functions must be maintained and shall be maintained by the contractor throughout the construction period unless otherwise specified herein, such that there is no deterioration in the quality of the treated effluent. At no time will an overflow of wastewater of a quality less than that which meets the City's discharge permit and which is not disinfected as required by State regulations, be allowed as a result of the Contractor's operations. Construction operations shall be scheduled and undertaken so that treatment of the wastewater is continuously maintained, as specified above, throughout the life of the project. The existing limitations for the facility must be met during the construction period.

C. Any power outage or any work which requires interruption of the plant flow shall be scheduled during those times of the day and/or night when reclaimed water demands are low. In such cases, the Contractor shall submit a written request at least 14-calendar days prior to the scheduled work or outage and obtain the written permission from the Owner. Such permission shall give consideration to plant flow patterns, and the Contractor's preparedness to perform the work. The Contractor shall coordinate with the electric utility, as required, regarding the scheduling of the power outages.

D. The Owner's personnel shall be responsible for the day-to-day operations of the existing WRF, including meter reading, process monitoring, and establishing control system modifications to ensure compliance with the reclaimed water quality standards. Maintenance of temporary process equipment including routine corrective repairs and maintenance shall be performed by the Contractor and included in the base bid price.

E. The Contractor shall consider the following scheduling criteria and constraints to assist with the development of the construction and phasing schedule.

1. Storage and disposal of reclaimed water used during startup is critical. General guidelines are provided herein to identify general considerations. The Contractor is fully responsible, and shall include all costs in his Base Bid, for all means and methods for storage, pumping, and disposal for reclaimed water used for startup testing. The Contractor shall be responsible for any additional costs associated with start-up and testing that could be reasonably assumed for the type of work to be performed and the type of equipment to be installed, started and tested

2. Prior to the complete Reclaimed Water Filtration System startup; all equipment required for the operation of the filtration system shall be started, tested, and be made ready for operation including but not limited to:

a. Gravity Disk Filter
b. Filter Backwash Pump Station
c. Lake Return Pump Station
d. Chemical Feed System
e. Filter Effluent Transfer Pump Station
f. SCADA system
g. Electrical system

3. Testing for the various Reclaimed Water Filtration System components cannot be performed until the Reclaimed Water Filtration System startup testing plan is approved by the Owner or the Owner's representative.

4. The Gravity Disk Filter cannot be tested until electric power and instrumentation equipment has been installed, tested, and is operational in the Electrical Room, the SCADA Room and the Control Room.

5. The Reclaimed Water Filtration System process cannot be placed into operation until all components and processes are started, tested, disinfected, and certified to be placed into operation.

Chemical Feed Facilities

a. Proposed improvements to the existing chemical storage and feed systems for sodium hypochlorite shall be accomplished without any interruption of chemical feed operations to the existing WRF. All new and/or relocated components (including storage tanks, day tanks, pumps, metering pump skids, chemical piping, and valves) shall be tested and placed into operation before existing facilities are removed or taken off line. The Contractor shall provide temporary chemical feed equipment, if necessary, to keep the existing reclaimed water treatment plant in operation.

6. Contractor shall make whatever provisions are necessary to protect existing facilities. Such provisions shall include, but not be limited to the following.

a. Protection of the structural integrity of the existing automatic backwash filters, chemical storage and feed facilities (including chemical transfer piping), and pipelines, shall be provided as necessary and required for the successful rehabilitation, modifications and new additions.

b. Installation of suitable temporary piping to replace those which must be demolished as part of the construction or as otherwise required to maintain continuous treatment.

7. All existing electrical underground services in the vicinity of the Project shall be located and identified prior to starting any new construction

8. Other work, including new construction and demolition not mentioned in the above schedule may be performed concurrently with the work as long as the performance of such work will in no way jeopardizes the continuity and quality of treatment operations at the existing facility, and as submitted and approved by the Owner and Owner's Representative. Nothing contained herein shall preclude the Contractor from suggesting improved sequences of work. The Contractor shall coordinate his work closely with the ongoing functions of the existing treatment facility, chemical and other deliveries and with the work of all subcontractors.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01150 – MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Proposal section of these specifications. Payment will be made based on the specified items supplied and delivered in the description in this section for each bid item.

1.2 GENERAL

A. All contract lump sum prices included in the Bid Proposal section will be full compensation for all labor, equipment and incidentals to construct the Lake Filter Improvements and appurtenances as specified in the Contract Documents under this contract.

1.3 WORK OUTSIDE AUTHORIZED LIMITS

A. No payment will be made for work constructed outside the authorized limits of work.

1.4 PAYMENT

A. Lump Sum Items: Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum item within the limits of work shown or specified.

1.5 COSTS INCLUDED IN PAYMENT ITEMS

A. Separate Payment: No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work.

1. Clearing and grubbing.
2. Trench excavation, including necessary pavement and rock removal, except as otherwise specified.
3. Bypass pumping
4. Dewatering and disposal of surplus water.
5. Structural fill, backfill, compaction, grading, and related transport costs.
6. Replacement of paved and unpaved roadways, grass (sod) and shrubbery plots.
7. Cleanup.
8. Foundation and borrow materials, except as hereinafter specified.
9. Testing and placing system in operation.
10. Any material and equipment required to be installed and utilized for tests.
11. Pipe, structures, pavement replacement, restoration and/or appurtenances included within the limits of lump sum work, unless otherwise shown.

12. Maintaining the existing quality of service during construction, including any required by-pass pumping.
13. Appurtenant work as required for a complete and operable system.
14. Repair of damaged irrigation piping and sprinkler heads.
15. Maintaining access to treatment plant structures with barriers, lights, signage etc.
16. Erosion Control
17. Site Restoration
18. Painting

B. Cleanup: CONTRACTOR's attention is called to the fact that cleanup is considered a part of the work of construction. No payment will be made until cleanup is essentially complete.

1.6 BID ITEMS

Bid Item No. 1 – Mobilization/Demobilization

A. Mobilization shall be the prepatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of temporary offices, storage buildings, safety equipment and first aid supplies, sanitary and other facilities, as required by the Contract Documents and applicable laws and regulations. The costs of bonds, required insurance, permits and any other preconstruction expense necessary for the start of the work, excluding the cost of construction materials, shall also be included in this item. Demobilization shall be the work of removing temporary facilities from the site.

B. Payment for the mobilization/demobilization shall not exceed 5 percent (5%) of the Bid Price. Partial payments for this item will be made in accordance with the following schedule:

Percent of Original Contract Amount Amount Earned	Allowable Percent of the Lump Sum Price for the Item
After Contract Execution	25
10	35
20	45
30	55
40	65
50	70
60	75
70	80
80	85
90	90
Substantial Completion	95
Final Payment	100

C. These payments will be subject to the standard retainage provided in the agreement. Payment of the retainage will be made after completion of the work and demobilization.

Bid Item No. 2 - Demolition

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary for the removal, demolition and disposal of structures, equipment, piping, valves and soil materials for installation of new facilities. Demolition shall include removal of the 8-inch Return Reclaimed Water pipeline, flowmeter, valves, and fittings from its connection with the 10-inch Return Reclaimed Water pipeline to the existing Lake Filters; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 3 – Return Pump Station Improvements

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to replace the existing Lake Return Pump Station Pumps with two (2) submersible pumps, pump base elbows, wet well dewatering, 20-inch knife gate valve, air-vacuum valve, 8-inch discharge pipes; electrical work; instrumentation and SCADA; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 4 – Gravity Disk Filter

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to provide and install disk filter units, including dewatering; excavation grading; crushed stone base; backfill; asphalt paving; sod; concrete pad; concrete supports; 1 disk filter; aluminum walkway stairs and railings; 16 inch inlet header, 14 inch outlet header, 14-inch overflow header; 14 inch inlet, outlet and overflow pipes; 14 inch butterfly valves; pipe supports, 2-inch reclaimed water supply pipes for spray system; 4-inch drain pipes; control panels; electrical work; instrumentation and SCADA; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 5 – Transfer Pump Station

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to provide and install a Lake Filter Effluent Transfer Pump Station, including dewatering; sheeting; excavation; grading; crushed stone base; backfill; sod; precast; concrete wetwell; concrete pad; 2 submersible pumps; pump base elbows, 8-inch stainless steel discharge pipes; 8-inch ductile iron discharge pipes, 8-inch check valves, 8-inch gate valves and 8-inch butterfly valve; aluminum hatches, stilling well, vent; 12-inch ductile iron header, 12-inch butterfly valve; air release and vacuum valve; pipe supports; pressure gauges; level sensor; control panel; variable frequency drives; electrical work;

instrumentation and SCADA; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 6 – Waste Backwash Pump Station

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor materials and equipment necessary to provide and install a Waste Backwash Pump Station, including dewatering; sheeting; excavation; crushed stone base; backfill; grading; sod; precast fiberglass wetwell, concrete pad, 2 submersible grinder pumps, pump base elbows; PVC discharge pipe; 4-inch ductile iron discharge pipe; 2-inch check valves and plug valves; aluminum hatches; air vent; air release valve; pipe supports, float switches; control panel; electrical work; instrumentation and SCADA; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 7 – Chemical Feed System

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to provide and install chemical feed system, including sodium hypochlorite chemical feed pump on a prefabricated skid with Kynar piping, ball valves, pulsation dampeners, surge relief valves, backpressure valves, pressure gauges; precast concrete valve vault, aluminum hatch, sump pump, sodium hypochlorite injection assembly, chlorine analyzer, pipe supports; 3”x1/2” double contained Kynar feed piping, ½-inch Kynar sample piping; ½-inch Kynar tap with ½-inch Kynar ball valve; electrical work; instrumentation and SCADA; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 8 – Site Piping

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to provide and install site piping, including dewatering; excavation; bedding; haunching, initial and final backfill; 14, 12, 8, 4 and 2-inch Reclaimed Water pipelines; 12-inch Reclaimed Water Return Pipelines; 14-inch RCW Disk Filter pipelines; 4 and 2-inch Waste Backwash pipelines; 3”x1” Kynar double-contained sodium hypochlorite pipelines; 1/2–inch Kynar sample lines; gate valves, butterfly valves and plug valves; concrete collars; connection to Filter No. 3 Bypass Channel; connection to 6-inch WAS pipeline to Sludge Holding; grading; sodding; asphalt paving; and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents.

Bid Item No. 9 – Electrical Work And Instrumentation

A. Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to, all plant, labor, materials and equipment necessary to construct a complete power and control system including switches, panels, switchgear, VFD’s, MCC, control panels, duct banks, lighting, power circuitry; and install, set-up, calibrate, program, integrate, and coordinate a

complete instrumentation package as specified including all instruments, PLC's, software and programming, fiber optic cable, transmitters, interface panels, programming terminal, and all appurtenances as shown on the plans and specifications.

Bid Item No. 10 – Building Permit Allowance

A. This payment item is for fees charged by the City associated with obtaining building permits from the City of Venice Building and Code Enforcement Department. Full payment shall be made based on submitted and approved receipts. This item is for the single purpose of reimbursing the Contractor for building permit fees and is not to cover preparation, reproduction or other activities associated with obtaining the building permit. The Building Permit Allowance has a maximum limit of $30,000.

Bid Item No. 11 – Owner's Allowance

A. This payment item is for the Owner's requested changes in the work pertaining to the Reclaimed Water Filtration System Improvements Work that requires authorization of the Owner prior to the work being performed. This item is not to cover work outlined in the plans and/or specifications or for work incidental to the completion of the project as outlined herein, and shall only be used when directed by the Owner.

B. Payment shall be made based on written authorization of the additional work. The authorization shall reflect the actual amounts agreed to by the Contractor and the Owner. The Owner's Allowance bid item has a maximum limit of $100,000.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310 ADMINISTRATIVE REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Meetings, construction progress documentation, submittals, record documents.

1.2 PRECONSTRUCTION MEETING

A. The OWNER will schedule a preconstruction meeting prior to beginning the Work to review shop drawing procedures, submittal requirements, and construction administration requirements (project coordination and communication). The CONTRACTOR shall bring to the preconstruction meeting the proposed construction schedule, a preliminary schedule of shop drawing submissions, and a preliminary schedule of values of work. All will be reviewed with the OWNER during the meeting.

1.3 PROGRESS SCHEDULES

A. Within 10 days after the effective date of the Agreement, the CONTRACTOR shall submit to the ENGINEER for review and acceptance, an estimated progress schedule indicating the starting and completion dates of the various stages of the work, a preliminary schedule of shop drawing submissions, and a preliminary schedule of value of the work. Include sub-schedules of related activities which are essential to its progress.

B. Revised schedules shall be submitted periodically as changes become apparent.

C. Unless other format or use of a network analysis system is required, schedules shall be prepared in the form of a horizontal bar chart. A separate horizontal bar shall be provided for each trade or operation. The first work day of each week shall be identified on the horizontal time scale. Scale and spacing will be such as to allow space for notations and revisions.

D. Schedules shall show the complete sequence of construction by activity with dates for the beginning and completion of each major element of construction. Projected percentage of completion for each item as of the first day of each month shall be shown.

1.4 SCHEDULE OF VALUES

A. At least 10 days prior to submitting the first Application for a progress payment, the CONTRACTOR shall submit to the ENGINEER a schedule of values of the work. This schedule shall be satisfactory in form and substance to the ENGINEER. The

schedule of values shall include quantities and unit prices aggregating the contract price, and shall subdivide the work into component parts in sufficient detail to serve as the basis for progress payments during construction. Upon acceptance of the schedule of values by the ENGINEER, it shall be incorporated into the form of Application for Payment shown in Section 00844.

B. Where estimated quantities and unit prices are shown in the Bid Form as the basis of payment, the quantities shown in the Bid Form are approximate and are given only as a basis of calculation upon which the award of the contract is to be made. The OWNER or ENGINEER do not assume any responsibility that the final quantities will remain in accordance with estimated quantities, nor shall the CONTRACTOR claim misunderstanding or deception because of such estimate of quantities. Final payment will be made on the basis of the actual completed quantities of each item.

1.5 DEFINITIONS

A. Shop Drawings: Shop drawings are original drawings, prepared by the CONTRACTOR, a subcontractor, supplier, or distributor, which illustrate some portion of the Work; showing fabrication, layout, setting, or erection details. Shop drawings shall be prepared by a qualified detailer and shall be identified by reference to sheet and detail numbers on the Contract Drawings.

B. Product Data: Product data are manufacturer's standard schematic drawings and manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data. Catalog sheets, brochures, etc., shall be clearly marked to identify pertinent materials, products, or models.

1. Samples: Samples are physical examples to illustrate materials, equipment, or workmanship and to establish standards by which work is to be evaluated.

2. Miscellaneous Submittals: Miscellaneous submittals related directly to the work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standard, record drawings, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the work and not processed as shop drawings, product data or samples.

C. SUBMITTAL REQUIREMENTS

1. Prior to submission, thoroughly check shop drawings, product data, and samples for completeness and for compliance with the Contract Documents. Verify all field measurements, quantities, dimensions, specified performance criteria, fabrication, shipping, handling, storage, assembly, installation, and safety requirements.

2. Coordinate the submittals with the requirements for other related work.

3. Notify the ENGINEER, in writing at the time of submission, of deviations in submittals from the requirements of the Contract Document. CONTRACTOR shall provide additional information, sufficient in detail, to allow for review for compliance with the applicable specification(s) for all said deviations. The CONTRACTOR'S responsibility for deviations in submittals from the requirements of the Contract Documents is not relieved by the ENGINEER'S review of submittals, unless the ENGINEER gives written acceptance of specific deviations.

4. Submit at least six (6) copies of each shop drawing and product data. The specific number of copies required of all submittals will be determined during the preconstruction meeting. Submit the number of samples indicated in the individual Specification Sections.

5. Shop drawings, product data, and samples shall be accompanied by a letter of transmittal referring to the name of the project and to the specification page number and/or Drawing number for identification of each item. Submittals for each type of work shall be numbered consecutively, and the numbering system shall be retained throughout all revisions.

6. Submittals shall bear the CONTRACTOR'S stamp of approval certifying that they have been checked and indicate appropriate specification section and/or drawing location. Submittals without the CONTRACTOR'S initialed or signed certification stamp and submittals which, in the ENGINEER'S opinion, are incomplete, contain numerous errors or have not been properly checked, will be returned unchecked by the ENGINEER for resubmission.

7. Begin no work which requires submittals until return of submittals with ENGINEER stamp and initials or signature indicating the submittal has been approved.

8. Systems to be submitted in the shop drawing submittal shall include but not necessarily be limited to:

    a. Each item of equipment and/or materials listed in the project equipment and material schedules.

    b. Each item of process instrumentation and control system including instrumentation system schematic diagrams.

    c. Prestressed or precast concrete members.

    d. Reinforcing steel.

    e. Miscellaneous metals.

9. In addition to the above, the manufacturer shall submit through the CONTRACTOR copies of the results of the tests performed by an independent laboratory that demonstrate compliance with the reference specification for:

a. Ductile iron pipe

b. Fiberglass material

c. Concrete pipe

d. PVC pipe

e. Steel pipe

f. Concrete aggregates

g. Asphaltic materials

D. ENGINEER'S REVIEW OF SUBMITTALS

1. ENGINEER'S review and approval of submittals will not extend to means, methods, techniques, procedures of construction, or to safety precautions.

2. The review and approval of a separate item will not indicate approval of the assembly in which the item functions. ENGINEER'S review and approval of submittals shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents.

3. The ENGINEER will review submittals within thirty (30) calendar days. The ENGINEER'S review of submittals shall not be construed as a complete check and shall not relieve the CONTRACTOR from responsibility for complete compliance with the Contract requirements.

4. No corrections, changes, or deviations indicated on submittals reviewed by the ENGINEER shall be considered as a change order.

5. Where review of submittals is required by the Owner of other agencies, the ENGINEER will forward the appropriate submittals(s) to these parties after ENGINEER review. Once review of all parties is complete, the submittal(s) will be returned to the CONTRACTOR reflecting the review of all parties.

6. If the submittal is not satisfactory, one copy of the submitted item will be retained by the ENGINEER and all other copies returned to the CONTRACTOR for appropriate action.

7. In the event a third submittal is required, due to previous submittals of incomplete or incorrect data or not in compliance with the Contract Documents, the CONTRACTOR will be charged one-half of the cost incurred by the ENGINEER for the review of the third submittal. The CONTRACTOR shall bear the total cost incurred by the ENGINEER for all subsequent reviews. The ENGINEER costs charged to the CONTRACTOR will be at the cost plus rate generally charged by the ENGINEER and will be deducted by the OWNER from payments due to the

CONTRACTOR.

8. Distribution of copies of acceptable submittals will be as mutually determined by the CONTRACTOR, OWNER, and ENGINEER on an individual item basis during or following the preconstruction conference.

E. PROGRESS MEETINGS

1. The frequency of progress meetings shall be determined during the preconstruction meeting. As a minimum, progress meetings shall be held once per month during construction.

2. The CONTRACTOR, main Subcontractors, OEM, Engineer and OWNER shall attend the progress meetings.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01340 - SHOP DRAWINGS, PROJECT DATA AND SAMPLES

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. The Contractor shall submit to the Engineer for review and approval: working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this section called data), and material samples (hereinafter in this section called samples) as are required for the proper control of work, including, but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.

B. Within thirty (30) calendar days after the effective date of the Agreement, the Contractor shall submit to the Engineer, a complete list of preliminary data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items and the date on which each Shop Drawing shall be submitted. Review of this list by the Engineer shall in no way relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawings.

C. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:

1. Submittal description and number assigned.
2. Date to Engineer.
3. Date returned to Contractor (from Engineer).
4. Status of Submittal (No exceptions taken, returned for confirmation or resubmittal, rejected).
5. Date of Resubmittal and Return (as applicable).
6. Date material released (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Projected date and required lead time so that product installation does not delay contract.
10. Status of O&M manuals submitted.

1.2 CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the

Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the contract Documents.

B. Determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Specifications and indicate all variances from the Specifications.

C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.

D. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, with No Exceptions Taken or Approved As Noted.

E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the Engineer receives them.

F. The Contractor shall submit five (5) copies of descriptive or product data submittals to complement shop drawings for the Engineer plus the additional copies if the Contractor requires more than one (1) being returned. The Engineer shall retain four (4) sets.

G. The Contractor shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by Engineer of the necessary Shop Drawings.

1.3 ENGINEER'S REVIEW OF SHOP DRAWINGS AND WORKING DRAWINGS

A. The Engineer's review of drawings, data and samples submitted by the Contractor shall cover only general conformity to the Specifications, external connections and dimensions which affect the installation.

B. The review of drawings and schedules shall be general and shall not be construed:

1. As permitting any departure from the Contract requirements.

2. As relieving the Contractor of responsibility for any errors, including details, dimensions and materials.
3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting any exception.

D. When reviewed by the Engineer, each of the Shop and Working Drawings shall be identified as having received such review being so stamped and dated. Shop Drawings stamped "REJECTED" and with required corrections shown shall be returned to the Contractor for correction and resubmittal.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.

F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

G. The Engineer shall review a submittal a maximum of three (3) times after which cost of review shall be borne by the Contractor. The cost of engineering shall be equal to the Engineer's actual payroll cost.

H. When the Shop and Working Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

I. No partial submittals shall be reviewed. Incomplete submittals shall be returned to the Contractor and shall be considered not approved until resubmitted.

1.4 SHOP DRAWINGS

A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, drawings, setting drawings, schedule drawings, manufacturer's scale drawings and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.

B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval and original signature as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval and original signature shall be returned to the Contractor for resubmission.

C. Each Shop Drawing shall have a blank area 3-1/2 inches by 3-1/2 inches, located adjacent to the title block. The title block shall display the following:

1. Number and title of the drawing.
2. Date of Drawing or revision.
3. Name of project building or facility.
4. Name of contractor and subcontractor submitting drawing.
5. Clear identification of contents and location of the work.
6. Specification title and number.

D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility of executing the work in accordance with the Contract, even though such drawings have been reviewed.

E. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.

G. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and have been in operation for a period of at least one (1) year.

H. Only the Engineer will utilize the color "red" in marking shop drawing submittals.

1.5 WORKING DRAWINGS

A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's fabrication and erection drawings for structures such as roof trusses, steelwork, precast concrete elements,

bulkheads, support of open cut excavation, support of utilities, groundwater control systems, forming and false work; underpinning; and for such other work as may be required for construction of the project.

B. Copies of working drawings as noted above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer and shall be submitted at least thirty (30) days (unless otherwise specified by the Engineer) in advance of their being required for work.

C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the Owner and Engineer shall not have responsibility therefore.

1.6 SAMPLES

A. The Contractor shall furnish, for the review of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until reviewed by the Engineer.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture and pattern.
3. A minimum of two samples of each item shall be submitted.

C. Each sample shall have a label indicating:

1. Name of product.
2. Name of Contractor and Subcontractor.
3. Material or equipment represented.
4. Place of origin.
5. Name of Producer and Brand (if any).
6. Location in project.
   (Samples of finished materials shall have additional markings that will identify them under the finished schedules.)
7. Reference specification paragraph.

D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer.

Review of a sample shall be only for the characteristics or use named in such and shall not be construed to change or modify any Contract requirements.

E. Reviewed samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Reviewed samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the reviewed samples. If requested at the time of submission, samples which failed testing or were rejected shall be returned to the Contractor at his expense.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01380 - CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. The Contractor shall employ a professional photographer to take construction record photographs or perform video recording including furnishing all labor, materials, equipment and incidentals necessary to obtain photographs and/or video recordings of all construction areas.

B. The Contractor shall coordinate with the Engineer to provide quarterly status updates to the Owner. Contractor will be responsible for providing photographs, field notes, updated construction schedules showing actual progress, upcoming key activities including but not limited to: equipment deliveries, start-up shutdown activities, training, testing and other information to assist the Owner in overseeing construction and ensuring that construction is on schedule. Contractor shall also provide qualified personal, familiar with the status of the project to coordinate and conduct quarterly meetings. Engineer will review material for quarterly status updates and will provide comments to Owner and Contractor.

C. Preconstruction record information shall consist of video recordings on digital video disks (DVD).

D. Construction progress information shall consist of photographs and digital photographs on a recordable compact disc (CD-R).

1.2 QUALIFICATIONS

A. All photography shall be done by a competent camera operator.

B. For the video recording, the audio portion should be done by a person qualified and knowledgeable in the specifics of the Contract, who shall speak with clarity and diction so as to be easily understood.

1.3 PROJECT PHOTOGRAPHS

A. Provide two prints of each photograph with each pay application.

B. Provide one recordable compact disc with digital photographs with each pay application.

C. Digital Files:

1. All digital files shall remain the property of photographer.

2. The Contractor shall require that photographer maintain protected digital files for a period of two years from date of substantial completion of the project.

3. Photographer shall agree to furnish additional prints to Owner and

Engineer at commercial rates applicable at time of purchase. Photographer shall also agree to participate as required in any litigation requiring the photographer as an expert witness.

D. The Contractor shall pay all costs associated with the required photography and prints. Any parties requiring additional photography or prints shall pay the photographer directly.

E. All project photographs shall be a single weight, color image. All finishes shall be smooth surface and glossy and all prints shall be 8 inches x 10 inches.

F. Each print shall have clearly marked on the back, the name of the project, the orientation of view, the date and time of exposure, name and address of the photographer and the photographers numbered identification of exposure.

G. All project photographs shall be taken from locations to adequately illustrate conditions prior to construction, or conditions of construction and state of progress. The Contractor shall consult with the Engineer at each period of photography for instructions concerning views required.

1.4 VIDEO RECORDINGS

A. Video recording shall be done along all routes that are scheduled for construction. Video, recording shall include full, recording of both sides of all streets and the entire width of easements plus 10 feet on each side on which construction is to be performed. All video recording shall be in full color.

B. A complete view, in sufficient detail with audio description of the exact location shall be provided.

C. The engineering plans shall be used as a reference for stationing in the audio portion of the recordings for easy location identification.

D. Two complete sets of video recordings shall be delivered to the Engineer on digital video disks (DVD) and two complete table of contents referencing the time, location and comments shall be included for the permanent and exclusive use of the Engineer prior to the start of any construction on the project.

E. All video recordings shall contain the name of the project, the date and time of the video, recording, the name and address of the photographer and any other identifying information required.

F. Construction shall not start until preconstruction video recordings are completed, submitted and accepted by the Engineer. No progress payments shall be made until the preconstruction video recordings are accepted by the Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01390 - COLOR AUDIO-VIDEO PRECONSTRUCTION RECORD

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: Prior to commencing the Work, the CONTRACTOR shall have a continuous color audio-video digital recording taken) within the confines of the treatment plant to serve as a record of pre-construction conditions.

1.2 APPROVAL

B. No construction shall begin prior to review and approval of the audio-video DVD recording covering the Project by the CITY. The CITY shall have the authority to reject all or any portion of the audio-video DVD recordings not conforming to specifications and order that it be redone at no additional charge.

C. The CONTRACTOR shall reschedule unacceptable coverage within five (5) days after being notified. The CITY shall designate those areas, if any, to be omitted from or added to the audio-video coverage.

D. The DVD recordings shall not be made more than thirty (30) days prior to construction in any area. All DVD's and written records shall become property of the CITY.

1.3 PROFESSIONAL VIDEOGRAPHERS

E. The CONTRACTOR shall engage the services of a professional videographer. The color audio-video recording shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-video documentation.

F. The videographer shall furnish to the CITY, a list of all equipment to be used for the audio-video recording, i.e., manufacturer's name, model number, specifications and other pertinent information.

G. The videographer shall furnish the CITY with additional information including the names and addresses of two references that the videographer has performed color audio-video recordings for projects of a similar nature within the last twelve (12) months.

PART 2 – PRODUCTS

2.1 DVD's: Audio-video DVD's shall be new. The DVD used for the recordings shall be professional quality 12 cm color DVD media that conforms to either DVD-R or DVD+R

recording standards using high quality DVD video and audio bitrates. Reprocessed disks will not be acceptable. The recorded DVD's shall be compatible for playback with any standard DVD-R or DVD+R player.

PART 3 – EXECUTION

3.1 EQUIPMENT

A. All equipment, accessories, materials, and labor to perform this service shall be furnished by the CONTRACTOR or professional videographer.

B. 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 as well as those more subjective requirements of high quality audio and video production. The video portion of the recording shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, or any other form of picture imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion.

C. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be more than ten feet (10'). In some instances, audio-video recording coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance approved by the CITY.

D. The color video camera used in the recording system shall record the color signal with a minimum horizontal resolution of 350 lines, a luminence signal to noise ratio of 45 dB, and a minimum illumination requirement of 25-foot candles.

3.2 RECORDED INFORMATION - AUDIO

A. Each DVD shall begin with the current date, project name and be followed by the general location, i.e., viewing side and direction of progress. The audio tract shall consist of an original live recording. The recording shall contain the narrative commentary of the videographer, recorded simultaneously with its fixed elevation video record of the zone of influence of construction.

B. The CITY reserves the right to supplement the audio portion of the recording as deemed necessary. A representative of the CITY shall be selected to provide such narrative.

3.3 RECORDED INFORMATION - VIDEO

A. All video recordings shall, by electronic means, display on the screen the time of day, the month, day and year of the recording. This time and date information must be continuously and simultaneously generated with the actual recording.

B. All DVD's and their storage cases shall be identified by DVD index number, project title, and general project location. Each DVD shall have a log of that recording's contents displayed on the storage case of each DVD. The log shall describe the various segments of coverage contained on that DVD in terms of the names of streets or easements, coverage beginning and end, directions of coverage, video unit counter numbers, engineering stationing numbers and the date.

3.4 LIGHTING

A. All recordings shall be done during times of good visibility. No recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.

3.5 SPEED OF TRAVEL

A. The rate of speed in the general direction of travel of the vehicle used during taping shall not exceed 440 feet per minute (5 mph). Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object.

3.6 AREA OF COVERAGE

A. Recordings shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing driveways, sidewalks, curbs, pavements, ditches, mailboxes, landscaping, culverts, buildings, vaults, concrete pads, fences, signs, and headwalls within the area covered.

END OF SECTION

SECTION 01400 - QUALITY CONTROL

PART 1 – GENERAL

1.1 DESCRIPTION

A. Section includes general requirements relating to responsibility for quality control involving inspections, tests, certificates, and reports.

1.2 INSPECTIONS

A. ENGINEER will provide 24 hours notice and may inspect materials and equipment at all stages of development or fabrication, and is allowed access to CONTRACTOR's and Supplier's shops.

1. Notify ENGINEER of shift and production schedules and changes by manufacturer.

2. On-site work may be subject to continual inspection.

3. Inspection by ENGINEER will not release CONTRACTOR from responsibility or liability for material or equipment.

B. When local codes or laws require approval and inspection of Work by other agencies or organizations before installation or operation, give ENGINEER 3 working days notice of readiness.

1. Obtain required certificates of inspection, testing or approval and submit 1 signed original and 3 copies to ENGINEER.

C. ENGINEER will inspect, before installation, OWNER and CONTRACTOR furnished materials delivered directly to work sites and mark:

1. Materials without inconsistencies or discrepancies with the OWNER's logo.

2. Materials not accepted “Rejected”.

3. At plant, ENGINEER witnessed and inspected CONTRACTOR furnished materials with in plant testing following above procedures.

D. ENGINEER will not mark or remove previously marked logo on material with non-correctable damages or deficiencies and deemed not suitable for work.

1. Remove or repair non-accepted and damaged materials at ENGINEER's direction.

E. The authorized representative of all applicable Federal and/or State agencies, including Environmental Protection Agency, Corps of Engineers, and Department of Environmental Protection, shall be permitted to inspect all work, materials, payrolls, records of personnel, invoice of materials, and other relevant data and records. The OWNER and his authorized representatives shall be permitted free access and every reasonable facility for the inspection of all work and materials, including the removal or uncovering of such portions of the finished work as may be directed. The OWNER and his authorized representative shall also be permitted to inspect payrolls, invoices of materials, and other relevant data and records.

1.3 TESTING SERVICES

A. Field and Laboratory:

1. Arrangements for testing laboratory services will be made by the OWNER. Payment for testing to show compliance with specified requirements will be paid for by the OWNER. The cost of retesting when materials and workmanship fail to meet specified requirements will be deducted from monies due the CONTRACTOR.

2. The testing laboratory shall conform to the applicable requirements of ASTM E329-77 (Latest Edition) STANDARD RECOMMENDED PRACTICE FOR INSPECTION AND TESTING AGENCIES FOR CONCRETE, STEEL AND BITUMINOUS MATERIALS USED IN CONSTRUCTION and shall be inspected and approved by the ELF/FC&PA Joint Technical Committee, Inc., or by an equivalent recognized national authority.

3. The agent of the testing laboratory performing field sampling and field testing of concrete shall be certified by the American Concrete Institute as a Concrete Field Testing Technician Grade 1 or by an equivalent recognized national authority for an equivalent level of competence, or shall be a licensed Professional Engineer.

4. Provide 48 hours' notice before specified testing. Cancellations of testing shall be done 24 hours before the scheduled test.

B. Shop or Factory Test: When material or equipment testing is required of manufacturer before shipment to Contract site, give ENGINEER minimum of 10 days written notice of appropriate time for required test.

1. Ensure test site is safe, accessible, dry, ventilated and well lighted.

2. Do not proceed with installation of equipment until ENGINEER approves required test results.

C. Equipment: Coordinated and demonstrated procedures specified in Contract Documents.

D. Pipeline and Other Testing: Follow test procedures and requirements specified in appropriate Specification Sections.

1.4 REPORTS

A. Certified Test Reports: Where Contract Documents require transcripts or certified test reports, meet the following requirements.

1. Before delivery of materials, submit required transcripts, certified test reports required in referenced specifications or specified in Contract Documents and obtain ENGINEER's approval of these documents.
   a. Testing: Performed in approved independent or manufacturer's laboratory, within 1 year of submittal for approval.
   b. Transcripts or test reports: Supplied with notarized letter signed by officer or authorized representative of manufacturer or supplier certifying that tested material meets specified requirements and is of specified type, quality, manufacture, and make.

2. Reference to supplier's certification is limited to its fabricated materials.

B. Certificate of Compliance:

1. At ENGINEER's option or where specified, CONTRACTOR may submit for approval, notarized (notarization date to be within 12 months of submittal date) Certificate of Compliance from manufacturer or supplier, instead of specified tests and other tests required in reference documents.

   a. Manufacturer or supplier has performed all required tests.
   b. Materials to be supplied meet all test requirements.
   c. Tests have been performed within 1 year of Certificate submittal.
   d. Tested materials are of same type, quality, manufacture, and make as those specified in Contract Documents.
   e. Identification of materials tested.

2. Certificate signed by officer or authorized representative of manufacturer or supplier.

3. Reference to supplier's certification is limited to its fabricated materials.

4. Do not deliver materials until receipt of Certificate approval.

C. Manufacturer's Certificates: Submitted for installation of items of equipment listed in Special Conditions.

1. It has been installed under either continuous or periodic supervision of manufacturer's authorized representative.

2. It has been adjusted and initially operated in presence of manufacturer's

authorized representative

3. It is operating following specified requirements.

D. Materials List Furnished by OWNER:

1. Submit completed Materials List for items to be used.

1.5 MANUFACTURER SERVICES

A. Manufacturer services, when required, are specified in appropriate Specification Sections.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01500 - TEMPOARY AND PERMANENT UTILITIES

PART 1 – GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. This section specifies the minimum requirements for temporary facilities, utilities to be brought to the site, and control required to enable the construction of the project to progress adequately. The providing of adequate facilities at every stage of performing the work is the CONTRACTOR'S sole responsibility, and is not limited by the requirements of this section.

B. Except as otherwise indicated, the CONTRACTOR may, at his option, provide stand-alone utility plants to provide needed services, in lieu of connected services from available public utilities, provided such stand-alone plant facilities comply with governing regulations. Prior to availability of temporary utility services, provide trucked-in/trucked-out containerized or unitized services for start-up of construction operations at the site.

1. Except as otherwise indicated, the costs of providing and using temporary utility services are included in the Contract Sum.

1.2 TEMPORARY FACILITIES

A. The types of utility services required for general temporary use at the project site include the following (other specific services may be required for specific construction methods or operations):

Electrical Power Service
Water Service (potable for certain uses)
Sanitary
Storm Sewer or Open Drainage/Run-off Control
Gas or diesel (fuel) Service
Telephone Service

1. Temporary Electricity: The CONTRACTOR shall make necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for proper completion of the work and during its entire progress up to time of final acceptance by the OWNER. The CONTRACTOR shall provide and pay for all temporary switches, connections and meters.

2. Temporary Electricity: The CONTRACTOR shall provide for a temporary power source for his use during construction and arrange for modification of the permanent power supply by the power company as required. The

permanent power supply service will remain as the OWNER'S account throughout the project.

3. Temporary Water: The CONTRACTOR shall make all necessary application and arrangements, and pay all fees and charges for water necessary for the proper completion of the project up to the time of final acceptance. The CONTRACTOR shall provide and pay for any temporary piping and connections.
4. Temporary Sanitary Facilities: The CONTRACTOR shall provide adequate sanitary facilities for the use of those employed on the work. Such facilities shall be made available when the first employees arrive on the site of the work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the work in suitable numbers and at such points and in such manner as may be required or approved.

5. The CONTRACTOR shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the work, on the lands of the OWNER, or on adjacent property.

6. Termination and Removal: At the time the need for temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than the time of substantial completion, promptly remove the installation unless requested by the ENGINEER to retain it for a longer period. Complete and restore work which may have been delayed or affected by the installation and use of the temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces. Replace work damaged beyond acceptable restoration.

1.3 TEMPORARY CONTROLS

A. Noise Control: The CONTRACTOR shall provide adequate protection against objectionable noise levels caused by the operation of construction equipment.

B. Dust Control: The CONTRACTOR shall provide for adequate protection against raising objectionable dust clouds caused by moving construction equipment, high winds or any other cause.

C. Water Control: The CONTRACTOR shall provide for satisfactory disposal of surplus water and shall submit a plan to the ENGINEER for his review prior to initiation and implementation of the plan. Prior approval shall be obtained from the proper authorities for the use of public or private lands or facilities for such disposal. CONTRACTOR shall be responsible for obtaining and complying with the requirements of any dewatering or consumptive use permits required by regulatory authorities.

D. Pollution Control: The CONTRACTOR shall provide for adequate protection against polluting any public or private lands, lakes, ponds, rivers, streams, creeks, and other such areas, by the disposal of surplus material in the form of solids, liquids, or gases or from any other cause.

1. The CONTRACTOR shall evaluate and assess the impact of any adverse effects on the natural environment which may result from construction operations and shall operate to minimize pollution of air, ground or surface waters vegetation, and afford the neighboring community the maximum protection during and up to completion of the construction project.

2. The CONTRACTOR shall take sufficient precautions to prevent pollution of streams, lakes and reservoirs with fuels, oils, bitumens, calcium chloride or other harmful materials. He shall conduct and schedule his operations so as to avoid or otherwise prevent pollution of siltation of streams, lakes and reservoirs and to avoid interference with movement of migratory fish.

3. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

E. Erosion Control: The CONTRACTOR shall not expose, by construction operations, a larger area of erosive land at any one time than the minimum necessary for efficient construction operations, and the duration of exposure of the uncompleted construction to the elements shall be as short as practicable. Erosion control features shall be constructed concurrently with other work and at the earliest practicable time. Refer to Section 01568: Erosion and Sedimentation Control.

F. Paint Splatter Control: The CONTRACTOR shall take precautions necessary to prevent paint splatter and wind-blown splatter from falling on adjacent buildings, vehicles and vehicular traffic and shall be solely responsible for any damage resulting from the work.

G. Sandblasting, Dust & Debris Control: The CONTRACTOR shall provide for adequate protection of the work area to prevent nuisance and damage to adjacent properties and vehicular traffic from cleaning and sandblasting debris and shall be solely responsible for any damage therefrom.

1.4 STORAGE FACILITIES

A. All products, materials and equipment shall be stored in accordance with the manufacturer's instructions, with seals and labels intact and legible. Products subject to damage by the elements shall be stored in weathertight enclosures. Temperature and humidity shall be maintained within the ranges required by the manufacturer's instructions. Fabricated products shall be stored above the ground

on blocking or skids. Products which are subject to deterioration shall be covered with impervious coatings with adequate ventilation to avoid condensation. Loose granular materials shall be stored in a well-drained area on solid surfaces to prevent mixing with foreign matter. Any products which will come in contact with potable water shall be stored off the ground so as to prevent contamination.

B. Storage shall be arranged in such a manner to provide easy access for inspection. Periodic inspections shall be made of all stored products to assure that they are maintained under specified conditions, and free from damage or deterioration.

C. After installation, CONTRACTOR shall provide substantial coverings as necessary to installed products to protect from damage from traffic and subsequent construction operations. Coverings shall be removed when no longer needed.

1.5 PRESERVATION OF PROPERTY

A. Preserve from damage all property along the line of the work, or which is in the vicinity of or in any wise affected by the work, the removal or destruction of which is not called for by the plans. Wherever such property is damaged due to the activities of the CONTRACTOR, it shall be immediately restored to its original condition by the CONTRACTOR at no cost to the OWNER.

1. In case of failure on the part of the CONTRACTOR to restore such property, or make good such damage or injury, the OWNER may, after 48 hours notice to the CONTRACTOR, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary and the cost thereof will be deducted from any monies due or which may become due the CONTRACTOR under this Contract.

2. The CONTRACTOR shall be responsible for the protection of property, in the areas in the vicinity of the project; and for the protection of his equipment, supplies, materials and work, against any damage resulting from the elements, such as flooding, by rainstorm, wind damage, or other elemental cause resulting from the project configuration. The CONTRACTOR shall take all precautions against any such damage occurrence, and shall be responsible for damage resulting from same. The CONTRACTOR shall provide adequate drainage facilities, tie-downs, or other protection, throughout the Contract period, for the protection of his, the OWNER'S, and other properties from such damage.

1.6 TRAFFIC REGULATION

A. Signs, marking barricades and procedures shall conform to the requirements of the Florida Department of Transportation Manual on Traffic Controls and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations.

B. The CONTRACTOR shall provide and maintain adequate barricades, construction signs, torches, flashers, guards and flagmen as required in pedestrian and vehicular traffic areas. Regulations of local authorities shall be complied with.

C. The CONTRACTOR shall provide suitable crossings at street intersections and driveways, and supply such aid as may be required for pedestrians and motorists, including delivery vehicles, to safely negotiate the construction areas. "Street Closed to Through Traffic" signs and "Detour" routes shall be indicated and maintained by the CONTRACTOR when the job is located in a public or private street or way.

D. The CONTRACTOR shall carry on the work in a manner that will cause the least interruption in traffic. Closing to through travel of more than two consecutive blocks, including the cross street intersected will not be permitted without specific authorization of the local street department. Where traffic must cross open trenches, the CONTRACTOR shall provide suitable bridges at street intersections and driveways and provide adequate ingress and egress to dwellings, business facilities, utilities and services. At any time that streets are required to be closed, the CONTRACTOR shall notify law enforcement agencies, fire departments, and parties operating emergency vehicles before the street is closed and again as soon as it is opened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times.

E. On completion of work, the CONTRACTOR shall remove all debris, excess materials, barricades and temporary work leaving walkways and road clear of obstructions.

F. Detour routes for the diverting of traffic from the Work Area are limited in the Project Area. The Project Area may be marked "ROAD CLOSED AHEAD - LOCAL TRAFFIC ONLY" to discourage through traffic from using the route. Short areas where work is underway may be closed to traffic, provided detour routes are marked to guide the public around the work area. Where detour routes are not available, flagmen shall be provided to direct one-way traffic through the construction area.

G. Refer to Section 01570: Traffic Regulation, for additional information.

1.7 PROJECT IDENTIFICATION AND SIGNS

A. If required, the OWNER shall erect a sign at the project site identifying the project and identifying the participants in the development of the project.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01568 - EROSION AND SEDIMENTATION CONTROL

PART 1– GENERAL

1.1 DESCRIPTION

A. In addition to the requirements of Division 1, Section 02110, and Section 02200:

1. All erosion, sedimentation and water pollution control features shall be in place or relocated as necessary prior to the start of any clearing, grading or construction. CONTRACTOR shall be responsible for the installation and maintenance of all temporary erosion control features.

2. Location of the control features shall be as required to facilitate drainage and control erosion and sedimentation within and adjacent to the site.

3. Control features are defined as, but not limited to, swales, berms, silt fences, silt barriers, and temporary fences.

1.2 QUALITY ASSURANCE

A. The provisions for prevention, control and abatement of erosion, sedimentation and water pollution shall be as stated in the FDOT Standard Specifications for Road and Bridge Construction, Section 104, latest edition.

1.3 SUBMITTALS

A. Procedures shall be in accordance with the General Conditions and Section 01310: Administrative Requirements.

B. Product data: Manufacturers' literature, application instructions and samples.

C. List of materials and their characteristics for other erosion control items.

1.4 START OF WORK

A. Do not start work until erosion control measures are in place.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Silt Barriers

1. Two (2) types of silt barriers shall be installed in accordance with the plans: silt barriers installed on the ground, and floating silt barriers.

2. Silt barriers (filter fabric) shall be synthetic and contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature range of zero degree Fahrenheit (0°F) to one hundred twenty degrees Fahrenheit (120°F). Hay bales shall not be used for silt barriers, unless specifically approved by the CITY.

3. Filter fabric shall be a pervious sheet of propylene, nylon or polyester and shall be certified by the manufacturer or supplier to conform to the following specifications:

Filter efficiency (Test VTM-51):	75%
Minimum tensile strength at 20% elongation (Test ASTM-D-1682):	120 lbs.
Tear strength (Test ASTM D2263):	50 lbs.

4. CONTRACTOR shall submit further filter fabric specifications and installation configuration prior to start of construction.

5. Silt barriers shall be maintained in place until substantial completion of the Project.

6. Filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid use of joints. When joints are necessary filter fabric shall be spliced together only at a support post, with a six-inch (6“) overlap, and securely sealed.

7. The following items shall be installed and maintained in accordance with the applicable sections of the FDOT Standard Specifications:

   a. Temporary silt fences and staked silt barriers
   b. Floating silt barrier

B. Temporary Fence

1. Brightly colored fence as manufactured by Mirafi, product Mirasafe, or approved equal.

2. Material shall be four feet (4') high, attached to six feet (6') metal posts at twelve feet (12') centers. Posts shall be driven eighteen inches (18") into ground.

C. Filter Fabric for Placement Beneath Rip-Rap

1. Filter Fabric should be Mirafi 600X or approved equal.

D. Rip-Rap

1. Rubble type rip-rap consisting of broken stone meeting the requirements of Section 530-2.3 of the FDOT Standard Specifications for Road and Bridge Construction, Latest Edition.

PART 3 – EXECUTION

3.1 GENERAL

A. Temporary erosion control features shall consist of, but not be limited to, temporary grassing, temporary sodding, temporary mulching, sandbagging, slope drains, sediment basins, artificial coverings, berms, baled hay or straw, floating silt barriers, staked silt barriers, and staked silt fences. Design details for some of these items shall be found in the Water Quality Section of the applicable edition of the FDOT Roadway and Traffic Design Standards. All of these items shall be constructed in accordance with applicable sections of the FDOT Design Standards.

B. Incorporate permanent erosion control features into the project at the earliest practical time. Correct conditions, using temporary measures, which develop during construction to control erosion prior to the time it is practical to construct permanent control features.

C. Construct temporary and permanent erosion and sediment control measures and maintain them to prevent the pollution of adjacent water ways in conformance with the laws, rules and regulations of Federal, State and local agencies.

D. Copies of approved permits shall be provided to the CONTRACTOR for his review and use. CONTRACTOR shall be required to comply with all General and Special Conditions noted within the permit by the particular permitting agency. The CONTRACTOR shall maintain copies of these permits on the job site at all times.

3.2 INSTALLATION

A. The following items shall be installed and in accordance with the FDOT Standard Specifications. The procedures are only generally described herein.

1. Temporary Grassing: This work shall consist of furnishing and placing grass seed.

2. Temporary Sod: This work shall consist of furnishing and placing sod.

3. Temporary Mulching: This work shall consist of furnishing and applying a two-inch to four-inch thick blanket of straw or hay mulch and then mixing or forcing the mulch into the top two inches of the soil in order to temporarily control erosion. Only decayed straw or hay, which can readily be cut into the soil, shall be used. Other measures for temporary erosion control such as hydro-mulching, chemical adhesive soils stabilizers, etc., shall be substituted for mulching with straw or hay with the approval of the CITY. When permanent grassing operations begin, temporary mulch materials shall be plowed under in conjunction with preparation of the ground.

4. Sandbagging: This work shall consist of furnishing and placing sandbags in configurations, so as to control erosion and siltation.

5. Slope Drains: This work shall consist of constructing slope drains, utilizing pipe, fiber mats, rubble, cement concrete, asphaltic concrete, plastic sheeting, or other acceptable materials, in accordance with the details shown in FDOT's Design Standards or as suitable to adequately perform the intended function.

6. Sediment Basins: Sediment basins shall be constructed in accordance with the details shown in FDOT's Design Standards or as suitable to adequately perform the intended function. Sediment basins shall be cleaned out as necessary.

7. Artificial Coverings: This work shall consist of furnishing and applying fiber mats, netting, plastic sheeting, or other approved covering to the earth surfaces.

8. Berms: This work shall consist of construction of temporary earth berms to divert the flow of water from an erodible surface.

    a. This work shall consist of construction of baled hay or straw dams or earth berms to protect against downstream accumulations of silt. The baled hay or straw dams shall be constructed in accordance with the details shown in FDOT's Design Standards.
    b. The berm dam shall be placed so as to effectively control silt dispersion under conditions present on this project. Alternate solutions and usage of materials shall be used if approved.

9. Filter Fabric for placement beneath rip-rap:

    a. Unroll filter fabric adequately longitudinally with the swale.
    b. Install anchoring pins in the fabric to protect the material from wind uplift.
    c. Toe filter fabric into soil a minimum of twelve inches (12") at the top and bottom of the slope.

10. Rubble Rip-Rap:

    a. Rip-rap should be placed carefully to not damage or displace the filter fabric. Filter fabric which rips or becomes displaced during rip-rap placement should be repaired. The placement of the rip-rap should proceed from the bottom up to the top of the slope. At no time should the rip-rap be dumped onto the fabric from the tip of the slope and allowed to roll down the surface of the fabric.
    b. Placement of rip-rap shall be in accordance with Section 530-3.3 of the FDOT Standard Specifications for Road and Bridge Construction Latest edition.
    c. Minimum thickness of rip-rap layer is two feet (2').

3.3 SILT BARRIERS

A. Silt barriers shall be installed and maintained at the locations shown on the Drawings. The CONTRACTOR is required to prevent the possibility of silting onto any adjacent parcel.

B. Silt barrier shall be of the staked type and stakes shall be installed as indicated in the Drawings.

C. The height of the silt barrier fabric shall be a minimum of forty-two inches (42”).

D. The stakes shall be two inch (2”) x four inch (4”) wood, five feet (5’) long and shall be spaced a maximum of ten feet (10) apart at the barrier location and driven securely into the ground.

E. A trench shall be excavated approximately four inches (4”) wide by four (4”) deep along the line of stakes. The filter fabric shall be tied or stapled to the wooden stakes and eight inches (8”) of fabric shall be extended into the trench. The staples shall be heavy duty wire and at least one-half inch (1/2”) long. The trench shall then be backfilled and the soil compacted over the filter fabric.

3.4 FLOATING SILT BARRIERS

A. Floating silt barriers shall be located as shown on the Drawing and shall be in place prior to the start of any construction or grading.

B. Floating silt barriers shall meet or exceed the Florida Department of Transportation Design Standards, Index No. 102, Floating Silt Barrier. CONTRACTOR shall submit fabric filter material specifications and installation configuration for approval prior to the start of construction.

3.5 TEMPORARY FENCE

A. Furnish, install and maintain on wetland lines, buffer lines, tree save lines and otherwise as shown on Drawings. Attach silt barrier to the temporary fence.

B. Follow manufacturer's installation recommendations.

3.6 MAINTENANCE

A. All erosion control measures (silt fence, floating silt barriers, etc.) shall be inspected on a daily basis to ensure they are in good condition. Downed or damaged barriers shall be repaired immediately.

B. Silt barriers and temporary fences shall be inspected immediately after each rainfall and at least once a day during periods of prolonged rainfall. Any repairs shall be made immediately.

C. Should the fabric on a silt barrier or temporary fence decompose or become ineffective, the installation shall be repaired or replaced immediately at no additional cost to the CITY. If the CONTRACTOR fails to repair or replace the items as above, the CITY shall have the right to stop work without additional cost to the CITY in accordance with Article 8 of Section 00800: General Conditions, until such time as the repair or replacement has been made.

D. Sediment deposits shall be removed after each storm event. The CONTRACTOR shall repair and restore the installations to a working and effective condition to the satisfaction of the CITY.

E. At the completion of all work, the silt barriers and the temporary fences shall be removed unless otherwise directed by the CITY.

F. Any sediment deposits in place after the silt fence or filter barrier is no longer required shall be dressed to conform to the existing grade and prepared for seeding or sodding.

3.7 CONTROL OF CONTRACTOR'S OPERATIONS WHICH SHALL RESULT IN WATER POLLUTION

A. Take sufficient precautions to prevent pollution of streams, canals, lakes, reservoirs, wetlands and other sensitive areas with silt, sediment, fuels, oils, bitumens, calcium chloride, or other harmful materials. Conduct and schedule operations so as to avoid or otherwise minimize pollution or siltation of such streams, etc. and to avoid interference with movement of migratory fish. Do not pump the residue from dust collectors or washers into any water body.

B. Construction operations in rivers, streams, lakes, tidal waters, reservoirs, canals, and other impoundments shall be restricted to those areas where it is necessary to perform filling or excavation to accomplish the work shown in the contract Documents and to those areas which must be entered to construct temporary or permanent structures. As soon as conditions permit, promptly clear rivers, streams, and impoundments of all obstructions placed therein or caused by construction operations.

C. Except as necessary for construction, do not deposit excavated material in rivers, streams, canals, or impoundments, or in a position close enough thereto, to be washed away by high water or run-off.

D. Where pumps are used to remove highly turbid waters from enclosed construction areas such as cofferdams or forms, treat the water prior to discharge into State or other waters. Pump the water into grassed swales, appropriately vegetated areas, or sediment basins, or confine it by an appropriate enclosure such as siltation curtains when other methods are not considered appropriate. Do not contaminate State or other waters.

E. Do not disturb lands or waters outside the limits of construction, unless approved in advance and in writing by the CITY. No operations within non-permitted wetlands or upland buffers are allowed.

3.8 PROTECTION DURING SUSPENSION OF CONTRACT TIME

A. In the event that it is necessary that the construction operations be suspended for any appreciable length of time, shape the top of the earthwork in such a manner as to permit run-off of rainwater and construct earth berms along the top edges of embankments to intercept run-off water. Provide temporary slope drains to carry run-off from cuts and embankments which are located in the vicinity of rivers, streams, canals, lakes and impoundments. Should such preventative measures fail, immediately take such other action as necessary to effectively prevent erosion and siltation.

END OF SECTION

SECTION 01570 - TRAFFIC REGULATIONS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section covers procedures for developing and implementing traffic control and regulation measures and maintenance of traffic in and around the construction area to provide for safe and efficient protection and movement of operating personnel, vehicular, and pedestrian traffic/through and adjacent to the construction site areas.

1.2 REFERENCE STANDARDS

A. General

1. Codes, specifications, and standards referred to by number or title shall form a part of this Specification to the extent required by the reference thereto. Latest revisions shall apply, unless otherwise shown or specified.

B. Florida Department of Transportation (FDOT) Standards

2. USDOT Manual on Uniform Traffic Control Devices (MUTCD)

3. FDOT Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations.

4. FDOT Standard Specifications for Road and Bridge Construction.

5. FDOT Roadway and Traffic Design Standards, latest Edition.

1.3 SUBMITTALS

A. Before closing or restricting traffic flow through any thoroughfare, the CONTRACTOR shall give written notice to and, if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction over the thoroughfare. CONTRACTOR shall also notify the applicable law enforcement, fire, and emergency services having jurisdiction in the area. Notice shall be given no less than seventy-two (72) hours in advance of the time when it may be necessary in the process of construction to close or restrict traffic to such thoroughfare, or as may be otherwise required by the governing authority.

1.4 SITE CONDITIONS

A. The CONTRACTOR shall plan construction operations such that existing local traffic access can be maintained and shall maintain during the construction such barricades, lights, flagmen, and other protective devices as appropriate, whether specified for the project or required by the local governing authority. Traffic control devices and implementation used for maintenance of traffic shall comply with the FDOT Manuals.

B. The CONTRACTOR shall conduct his work in such manner as not to unduly or unnecessarily restrict or impede normal traffic through the streets of the community and for the plant site. Insofar as it is practicable, excavated material and spoil banks shall not be located in such manner as to obstruct traffic. The traveled way of all streets, roads, entrances, and access drives shall be kept clear and unobstructed insofar as is possible and shall not be used for the storage of construction materials, equipment, supplies, or excavated earth, except when and where necessary. If required by duly constituted public authority, the Contractor shall, at his own expense, construct bridges or other temporary crossing structures over trenches so as not to unduly restrict traffic. Such structures shall be of adequate strength and proper construction and shall be maintained by the CONTRACTOR in such manner as not to constitute an undue traffic hazard. Entrances and access driveways shall not be closed except when and where necessary, and then only upon due advance notice to the CITY, property owner and applicable jurisdictional authority, and shall be for the shortest practicable period of time consistent with efficient and expeditious construction. The CONTRACTOR shall be liable for any damages to persons or property resulting from his work.

C. The CONTRACTOR shall make provisions at cross streets for the free passage of vehicles and foot passengers, either by bridging or otherwise, and shall not obstruct the sidewalks, gutters, or streets, nor prevent in any manner the flow of water in the latter, but shall use all proper and necessary means to permit the free passage of surface water along the gutters. The CONTRACTOR shall immediately cart away all offensive matter, exercising such precaution as may be directed by the CITY or applicable jurisdictional authority. All material excavated shall be so disposed of as to inconvenience the public and adjacent tenants as little as possible and to prevent injury to trees, sidewalks, fences, and adjacent property of all kinds. The CONTRACTOR may be required to erect suitable barriers to prevent such inconvenience or injury.

D. Unless otherwise required by the governing authority, maintenance of traffic in and around the construction zone shall conform to Section 102 of the FDOT Specification, and 600 Series Roadway Design Standards Drawings of the FDOT Standards, as applicable.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01580 - PROJECT IDENTIFICATION AND SIGNS

PART1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Furnish, install and maintain project identification sign.

B. Remove sign on completion of construction.

C. Allow no other signs to be displayed.

1.2 RELATED REQUIREMENTS

A. Section 01010: Project Requirements

1.3 PROJECT IDENTIFICATION SIGN

A. One painted sign, of not less than 24 square feet area, with painted graphic content to include:

1. Title of Project.

2. Name of OWNER.

3. Names and titles of authorities as per directed by OWNER.

4. Names of ENGINEER

5. Prime Contractor.

B. Graphic design, style of lettering and colors: As approved by the OWNER.

1.4 QUALITY ASSURANCE

A. Sign Painter: Professional experience in type of work required.

B. Finishes, Painting: adequate to resist weathering and fading for scheduled construction period.

PART 2 - PRODUCTS

2.1 SIGN MATERIALS

A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.

1. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

C. Rough Hardware: Galvanized.

D. Paint: Exterior quality, as specified below.

1. Wood

a. Prime: Painted trim and siding - white pigmented non-penetrating alkyd based primer appled at the rate of 3.0 mils dry film thickness.

b. Finish: Painted trim and face - apply two coats semi-gloss modified acrylic latex applied at a rate of at least 2.0 mils dry film thickness per coat.

2. Steel

a. Surface Preparation: Commercial blast according to the Steel Structures Painting Council Specifications SP-6.

b. Prime: One coat of a combination of lead chromate rust inhibitive and synthetic pigmented alkyd resins, minimum 1.5 mils dry film thickness. If shop coat is damaged, reprime base areas in field.

c. Finish: Two coats of semi-gloss medium to long oil alkyd resin coating, 1.5 mils dry film thickness per coat.

3. Use bulletin colors for graphics.

4. Colors for structures, framing, sign surface and graphics: To be furnished by OWNER.

PART 3 – EXECUTION

3.1 PROJECT IDENTIFICATION SIGN

A. Paint exposed surface or supports, framing and surface material; one coat of primer and one coat of exterior paint.

B. Paint graphics in styles, sizes and colors selected.

3.2 MAINTENANCE

A. Maintain signs and supports in a neat, clean condition; repair damages to structures, framing or sign.

3.3 REMOVAL

A. Remove signs, framings, supports and foundations at completion of project.

END OF SECTION

OVERALL SIZE 4' X 6'
FONT ARIAL
2½"
Eastside Water Reclamation Facility
Reclaimed Water Filtration
System Improvements
Construction Price $ TBD
Venice, FL
City on the Gulf
Jointly Funded 50/50
Between
City of Venice
And
Southwest Florida Water
Management District
Southwest Florida
Water Management District
WATERMATTERS.ORG · 1-800-423-1476
12" X 24"
8" X 21"
Engineer:
McKim & Creed, Inc.
Contractor:
TBD
City Council
John Holic – Mayor
Emilio Carlesimo – Vice Mayor
Jim Bennett
Bob Daniels
Jeanette Gates
Kit McKeon
David Sherman
City Manager
Edward F. Lavallee
1½"
1"
2"
1¼"

SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type and quality specified, or as specifically approved in writing by the CITY.

3. Manufactured and fabricated products:

a. Design, fabricate and assemble in accord with the best engineering and shop practices.
b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
c. Two (2) or more items of the same kind shall be identical, by the same manufacturer.
d. Products shall be suitable for service and conditions.
e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract.

2. Summary of Work: Section 01010

3. Special Project Procedures: Section 01100

4. Operating and Maintenance Data: Section 01730

1.2 APPROVAL OF MATERIALS

A. Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the CONTRACTOR shall be subject to the inspection and approval of the CITY. No material shall be delivered to the work without prior approval of the CITY.

B. Within thirty (30) days after the Effective Date of the Agreement, the CONTRACTOR shall submit to the CITY, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the CITY to identify the particular product to form an opinion as to conformity to the specifications. If Asbestos is contained in any item, the CONTRACTOR shall include a notification of this fact. This notification must include the type and percent of asbestos content. All data shall comply with Paragraph 1.06 of this Section.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the CONTRACTOR. If the CITY requires, either prior to beginning or during the progress of the work, the CONTRACTOR shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed and shipped as directed at the CONTRACTOR'S expense. Except as otherwise noted, the CONTRACTOR will make arrangements for and pay for the tests.

D. The CONTRACTOR shall submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the work. Any delay of approval resulting from the CONTRACTOR'S failure to submit samples or data promptly shall not be used as a basis of claim against the CITY.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes and surfaces, the CONTRACTOR shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.3 MANUFACTURER'S INSTRUCTION FOR INSTALLATION

A. When Contract Documents require the installation of work shall comply with manufacturer's printed instruction, obtain and distribute copies of such instruction to parties involved in the installation, including five copies to the CITY.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instruction and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instruction, consult with CITY for further instructions.

2. Do not proceed with work without clear instructions.

C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.4 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.5 SPECIAL TOOLS

A. Manufacturers of equipment and machinery shall furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The CONTRACTOR shall preserve and deliver to the CITY these tools and instruction in good order no later than upon completion of the Contract.

1.6 STORAGE AND HANDLING OF EQUIPMENT ON SITE

A. Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed:

1. Equipment shall not be shipped until approved by the CITY. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the CITY. Equipment shipped to the site shall be stored in accordance with Paragraph 1.05, herein. Operation and maintenance data as described in Paragraph 1.08 of Section 01730 shall be submitted to the CITY for review prior to shipment of equipment.

2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the CITY, until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.

4. Manufacturer's storage instructions shall be carefully studied by the

CONTRACTOR and reviewed with the CITY. These instructions shall be carefully followed and a written record of this kept by the CONTRACTOR.

5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the CONTRACTOR shall start the equipment so that it does not deteriorate from lack of use.

6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the CITY.

7. Prior to acceptance of the equipment, the CONTRACTOR shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certification by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the CONTRACTOR'S expense.

1.7 WARRANTY

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740: Warranties and Bonds. The manufacturer's warranty period shall be concurrent with the CONTRACTOR'S for two (2) years after the time of completion and acceptance.

1.8 SPARE PARTS

A. Spare parts for certain equipment provided have been specified in the pertinent sections of the Specifications. The CONTRACTOR shall collect and store all spare parts so required in an area to be designated by the CITY. In addition, the CONTRACTOR shall furnish to the CITY an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.

1.9 GREASE, OIL AND FUEL

A. All grease, oil and fuel required for testing of equipment shall be furnished with the respective equipment. The CITY shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

B. The CONTRACTOR shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial breaking in of the equipment, which in no event shall be any longer than three (3) weeks of operation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01650 – START UP

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: The work is segmented into several phases of construction in a logical order to maintain uninterrupted service to the CITY'S customers. Portions of the Work shall be utilized prior to Substantial Completion of all the Work and prior to Initiation of Operation. CONTRACTOR is fully responsible for all costs and coordination with equipment manufacturer for start-up and testing for individual components, along with entire process.

PART 2 – PRODUCTS

2.1 START-UP PLAN

A. Submit for approval to the CITY a detailed Start-Up Plan outlining the schedule and sequence of all tests and start-up activities, including training and other equipment manufacturer representative visits. Start-up and commissioning shall not begin until the plan is approved. Draft start-up plan shall be submitted at the pre-construction meeting along with the initial construction schedule; and shall be updated monthly, at a minimum.

B. Prior to start up of any system a meeting will be held either in conjunction with the scheduled monthly progress meeting or as a separate meeting with the Owner and Engineer to review the start up plan and impacts to the facility.

C. The existing WRF must remain in service during the construction of the project as outlined in these Specifications.

D. During startup, processed water and waste shall be managed by the Contractor. Only at the time of project acceptance by the regulatory agency, City and Engineer shall the treated water from the new filtration be introduced to the WRF treated reclaimed water supply.

PART 3 – EXECUTION

3.1 COMPONENT TEST AND CHECK-OUT

A. Start-up Certification: Prior to system start-up, successfully complete all the testing required of the individual components of the work. All copies of the Operation and Maintenance Manuals must be provided before start-up shall begin. These forms shall be completed and submitted before Instruction in Operation to the CITY or a request for final inspection.

B. Demonstrate to the CITY that all temporary jumpers and/or bypass have been removed and that all of the components are operating under their own controls as designated.

C. Coordinate start up activities with the CITY'S operating personnel at the site prior to commencing system start-up.

3.2 START-UP

A. Confirm that all equipment is properly energized, that the valves are set to their normal operating condition and that the flow path through the new work is unobstructed.

B. Slowly fill each structure in the process flow stream with liquid.

C. Initiate start-up in accordance with the plant operation and maintenance manual.

D. Observe the component operation and make adjustments as necessary to optimize the performance of the Work.

E. Coordinate with the CITY for any adjustments desired or operational problems requiring debugging.

F. Make adjustments as necessary.

3.3 START-UP DEMONSTRATION AND TESTING

A. After all Work components have been constructed, field tested and started-up in accordance with the individual specifications and manufacturer requirements, perform the Start-Up Demonstration and Testing in the presence of the CITY. The demonstration shall be held upon completion of all systems at a date to be agreed upon in writing by the CITY.

B. Acceptability of the Work's performance shall be based on the Work performing as specified, under these actual and simulated operating conditions and producing a product as defined in the Contract Documents. The intent of the start-up demonstration and testing is for the CONTRACTOR to demonstrate to the CITY that the work shall function as a complete and operable system under normal as well as emergency operating conditions and is ready for acceptance.

C. Demonstrate the essential features of all mechanical systems as they apply to the work. Each system shall be demonstrated once only, after completion of testing.

D. Demonstrate the essential features of all electrical systems as they apply to the work.

END OF SECTION

SECTION 01660 – SYSTEMS TESTING, ADJUSTING AND BALANCING

PART 1 – GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. The Contractor shall be responsible for the testing, adjusting and balancing of all systems prior to placing them into service.

B. The operation, testing, adjustment, and balancing shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

1.2 TESTING PRIOR TO SHIPMENT

A. Where individual sections require certain items of equipment to be tested prior to shipment from the manufacturer's plant, these items shall be operated to the extent necessary to generate certified performance data over the entire operating range of the equipment. The testing shall be conducted on the units which will be shipped to and installed at the construction site.

1.3 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The CONTRACTOR shall arrange for a qualified service representative from each company manufacturing or supplying certain equipment, as listed on the Drawings, or in the Specifications, to perform the duties described.

B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before it is operated by others, the representative shall inspect, operate, test, adjust and balance the equipment. The inspection shall include, but shall not be limited to, the following points as applicable:

1. Soundness (without cracked or otherwise damaged parts).
2. Completeness in all details, as specified.
3. Correctness of setting, alignment, and relative arrangement of various parts.
4. Adequacy and correctness of packing, sealing and lubricants.

C. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Owner, a complete signed report of the results of the inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a certificate that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.

D. After the Owner and Owner's Representative have reviewed the reports from the manufacturer's representatives, the Contractor shall make arrangements to have the manufacturer's representatives present when the field acceptance tests are made.

E. The manufacturer's representative shall remain on the job to instruct the Owner's personnel in proper operation and maintenance and shall remain until the equipment is operating in a satisfactory manner.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PRESSURE AND LEAKAGE TESTS

A. Tests shall be conducted in the presence of and to the satisfaction of the Owner or Owner's Representative and of authorities having jurisdiction over the work. Not less than three (3) days' notice shall be given prior to start of tests.

B. Field pressure and leakage tests shall be conducted on the following:

1. Process, instrumentation, sampling, chemical, fuel, plumbing, and vacuum piping.
2. Pressure pipelines: Refer to Section 15044: Pressure Testing of Piping.
3. Gravity pipelines: Refer to Section 15044: Pressure Testing of Piping.
4. Valves: Refer to Section 15044: Pressure Testing of Piping.

3.2 TESTING ELECTRICAL SYSTEMS

A. After completion and prior to being energized, all electrical systems shall be tested as specified in Division 16 to the extent necessary to demonstrate that all systems are complete and ready for operation. Motors shall be checked for proper direction of rotation. Circuits shall be checked for proper voltages and current.

3.3 TESTING PROCESS SYSTEMS

A. Hydraulic and Leakage Testing: Field leakage tests shall be conducted on tanks, channels, and miscellaneous structures. They shall be leak tested by filling with water to the operating level. The water shall remain standing in the structure for a period of 24 hours. The structure shall be carefully examined for leaks at three-hour intervals during the working day. Water level shall be measured at these intervals and at the end of the test interval.

3.4 ENGINEER'S RIGHT TO RETESTING

A. Should the Contractor refuse or neglect to make any tests necessary to demonstrate the integrity of the completed system, the ENGINEER may retain the

services of an outside consultant to make all such tests and their resulting adjustments and balance.

B. The costs for such tests shall be deducted from amounts owing to the Contractor and shall not be borne by the Owner.

END OF SECTION

SECTION 01700 – CONTRACT CLOSEOUT

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: Comply with requirement stated in Conditions of the Contract and in specifications for administrative procedures in closing out the Work.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract, Fiscal provisions, legal submittals and additional administrative requirements.

2. Project Record Documents: Section 01720.

3. Operation and Maintenance Data: Section 01730

4. Warranties and Bonds: Section 01740.

5. The respective section of specifications: Closeout Submittals Required of Trades.

1.2 SUBSTANTIAL COMPLETION

A. When CONTRACTOR considers the Work as substantially complete, the CONTRACTOR shall submit to the CITY:

1. A written notice that the Work, or designated portion thereof, is substantially complete.

2. A list of items to be competed or corrected.

B. Within 10 days after receipt of such notice, the CITY shall make an inspection to determine the status of completion.

C. Should the CITY determine that the Work is not substantially complete:

1. The CITY shall promptly notify the CONTRACTOR in writing, giving the reasons thereof.

2. CONTRACTOR shall remedy the deficiencies in the Work and send a second written notice of substantial completion to the CITY.

3. The CITY shall re-inspect the Work.

D. When the CITY finds that the Work is substantially complete, the CONTRACTOR shall:

1. Prepare and deliver to CITY a tentative Certificate of Substantial Completion on form provided herein, with a tentative list of items to be completed or corrected before final payment.

1.3 FINAL INSPECTION

A. When CONTRACTOR considers the Work is complete, they shall submit written certification that:

1. Contract Documents have been reviewed.

2. Work has been inspected for compliance with Contract Documents.

3. Work has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of the CITY and are operational.

5. Work is completed and ready for final inspection.

B. The CITY shall make an inspection to verify the status of completion within 10 days after receipt of such certification.

C. Should the CITY consider that the Work is incomplete or defective:

1. The CITY shall promptly notify the CONTRACTOR in writing, listing the incomplete or defective work.

2. CONTRACTOR shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the CITY that the Work is complete.

3. The CITY shall re-inspect the Work.

1.4 REINSPECTION FEES

A. Should the CITY perform re-inspections due to failure of the Work to comply with the claims of status of completion made by the CONTRACTOR:

1. The CITY shall compensate the Engineer / Architect / Consultants, etc., for such additional services.

2. The CITY shall deduct the amount of such compensation from the final payment to the CONTRACTOR.

1.5 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Evidence of compliance with requirements of governing authorities. Certificates of Completed Demonstration: Section 01650.

B. Project Record Documents: To requirements of Section 01720.

C. Operation and Maintenance Data, Instructions to CITY'S Personnel: To requirements of Section 01730

D. Warranties and Bonds: To requirements of Section 01740.

E. Keys and Keying Schedule.

F. Spare Parts and Maintenance Materials: To requirements of Section 01730.

G. Evidence of Payment and Release of Liens: To requirements of the General Conditions and Supplementary Conditions.

H. Certificate of Insurance for Products and Completed Operations.

1.6 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the CITY.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous change orders or written amendment
b. Allowances
c. Unit prices
d. Deductions for uncorrected work
e. Penalties and bonuses
f. Deductions for liquidated damages
g. Deductions for re-inspection payments
h. Other adjustments

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. The CITY shall prepare a Final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.7 FINAL APPLICATION FOR PAYMENT

A. CONTRACTOR shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

1.8 PROJECT RECORD DOCUMENTS

A. Record work with minority/women owned businesses as required in Southwest Florida Water Management District Contract Form Exhibit B as follows:

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

EXHIBIT "B"
MINORITY/WOMEN OWNED AND SMALL BUSINESS UTILIZATION REPORT

Projects receiving $100,000 or more in cooperative funding from the Southwest Florida Water Management District require the submission of the following information within 30 days of any amendment increasing project funding and with the final invoice. Questions regarding use of this form should be directed to Contracts Administration, Phone (352) 796-7211 ext. 4132.

COOPERATOR: _____

AGREEMENT NO.: _____

PROJECT NAME: _____

TOTAL PROJECT COST: _____

NAMES OF CONTRACTORS AND SUBCONTRACTORS UTILIZED	TOTAL AMOUNT PAID	INDICATE THE ONE CATEGORY THAT BEST DESCRIBES EACH ORGANIZATION LISTED*												
		BUSINESS CLASSIFICATION		CERTIFIED MBE					NON-CERTIFIED MBE					UNKNOWN
		NON-MINORITY	SMALL BUSINESS Section 288.703(1) F.S.	AFRICAN AMERICAN	HISPANIC AMERICAN	ASIAN/HAWAIIAN AMERICAN	NATIVE AMERICAN	AMERICAN WOMAN	AFRICAN AMERICAN	HISPANIC AMERICAN	ASIAN/HAWAIIAN AMERICAN	NATIVE AMERICAN	AMERICAN WOMAN	

* ☐ Our organization does not collect minority status data.

Signature _____ Date _____ Print Name and Title _____

SECTION 01720 – PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: Maintain at the site for the CITY one (1) record copy, at a minimum, of the following:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other modifications of the Contract
5. Field Orders or written instructions
6. Approved Shop Drawings, Working Drawings and Samples
7. Field Test records
8. Construction photographs
9. Change Requests
10. CONTRACTOR'S Daily Reports
11. Written Interpretations and Clarifications

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in CONTRACTOR'S field office apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with CSI format with section numbers as provided herein.

C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the CITY.

E. As a prerequisite for monthly progress payments, the CONTRACTOR is to exhibit the currently updated red-lined drawing and other applicable Record Documents for review and approval by the CITY.

F. CONTRACTOR shall submit on a daily basis two (2) copies of the preceding day's daily report to the CITY.

1.3 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by the CITY.

1.4 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with construction progress.

C. Do not conceal any work until required information is recorded.

D. Drawings - Legibly mark to record actual construction:

1. All underground piping with elevations and dimensions; Changes to piping location; Horizontal and vertical locations of underground utilities and appurtenances (referenced to permanent surface improvements. Actual installed pipe material, class, etc.). Locations of drainage ditches, swales, water lines and force mains shall be shown every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer. Dimensions at these locations shall indicate distance from centerline of right-of-way to the facility.

2. Field changes of dimension and detail.

3. Changes made by Field Order or by Change Order.

4. The record drawings shall be the same drawings in number and kind as the approved construction permit set.

5. Record drawings shall include all conflicts and crossings, top of pipe elevations every one hundred (100) feet, location and elevations on all underground appurtenances, and two-point swing-ties (maximum distance of 200 feet). Swing ties shall be shown on each applicable sheet of the record drawings and shall be presented in a tabular format.

6. Swing ties shall be measured from permanent reference points, i.e., power or telephone poles, manholes, storm structures, building corners, fire hydrant bonnets, and other objects not likely to be relocated at a later time.

7. Unacceptable reference points shall include valve boxes, fence posts, driveway corners, trees, etc.

8. Witness posts shall be installed and used to obtain swing-ties in areas where acceptable reference points are not available.

9. Any references to “proposed” shall not show on the record drawings. Items not installed or that are for future phases and shown on the drawings, shall be noted "not installed" or removed from the drawing set.

10. Details not on original contract drawings.

11. Equipment and piping relocations.

12. Locations of all valves, fire hydrants, manholes, water and sewer services, water and force main fittings, underdrain cleanouts, catch basins, junction boxes and any other structures located in the right-of-way or easement, shall be located by elevation and by station and offset based on intersection P.I.'s and centerline of right-of-way. For facilities located on private roads, the dimensioning shall be from centerline of paving or another readily visible baseline.

13. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the PVI's and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Bench marks and elevation datum shall be indicated.

14. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances, elevations, pipe sizes, and type shown. Cross section of drainage ditches and swales shall be verified.

15. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVI's and at all intersections.

16. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.

17. Sidewalks, fences and walls, if installed at the time of initial record drawing submittal, shall be located every 200 feet or alternate lot lines, whichever is closer. Dimensions shall include distance from the right-of-way line and the back of curb and lot line or easement line.

18. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televiewing of the sewer following installation.

19. Elevations shall be provided on the top of operating nuts for all water and force main valves.

20. Allowable tolerance shall be ± 6.0 inches for horizontal dimensions. Vertical dimensions such as the difference in elevations between manhole inverts shall have an allowable tolerance of ± 1/8inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.

21. Properly prepared record drawings on mylar, together with two copies, shall be certified by a design professional (Engineer and/or Surveyor registered in the State of Florida), employed by the Contractor, and submitted to the Owner/Engineer.

E. Specifications and Addenda: legibly mark each Section to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.

2. Changes made by field order or by change order.

F. Shop Drawings (After final review and approval):

1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

G. Failure to deliver any of the above items shall be considered justification for assessing additional retainage.

1.5 "AS-BUILT" DRAWINGS

A. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings. Record drawings shall be certified by the professional Engineer or Surveyor licensed in Florida, employed by the Contractor.

B. The surveyor must comply with all requirements of Chapter 21 HH-6.05 of the Florida Administrative Code.

C. The surveyor shall use the locational requirements of the State of Florida.

D. The surveyor shall provide on-site survey while construction is in progress and at such other times as required to fulfill all professional obligations and as listed below.

E. At the conclusion of the work, the CONTRACTOR shall provide the CITY one (1) Vellum, three (3) approved, certified "As-Builts" and one (1) "As-Built" Survey Drawing file in AutoCAD format (latest release) on a compact disk(s). The AutoCAD drawing files shall comply with the following standards:

1. The compact disk(s) shall be formatted for AutoCAD type DWG files or self-extracting compressed data file to a DWG format.

2. The drawing format shall not contain any “X-REFS” (cross references) to other files.

3. The drawing format shall contain only AutoCAD Standard Font Files and Acad.mnu type menu references only.

4. Text from different layers shall not overlap. Colors and line types shall be “BY-LAYER”. Only AutoCAD standard fonts and line types shall be used.

5. All coordinate and elevation numbers shall be limited to three (3) decimal places.

6. Text height shall be entered such that when the drawing is plotted to scale, the actual text height is no less than one-eighth inch (1/8”). The plotting scale for the drawings shall be the same scale as the construction drawings.

7. Drawings shall be plotted on twenty-four inch (24”) x thirty-six inch (36”) sheets. The areas on each sheet shall match the areas shown on the construction drawings.

1.6 SUBMITTALS

A. The CONTRACTOR shall deliver the following documentation, drawing(s), data, and compact disk(s) to the CITY no later than two (2) weeks after the declared date of Substantial Completion.

1. Two (2) sets of contract drawings marked in red to reflect the final “As-Built” conditions.

2. Two (2) sets of signed and sealed plots of the “As-Built” drawings(s) provided by the surveyor together with one (1) Mylar reproducible and a CDs of the “As-Built” drawing file(s).

3. One (1) set of Specifications with Addenda marked in red to reflect the final “As-Built” conditions.

B. Such other documents as shall be required by the regulations of the State of Florida shall be supplied in accordance with the provisions of law.

C. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date, Project title and number.

2. CONTRACTOR’S name and address.

3. Title and number of each record document.

4. Certification that each document as submitted is complete and accurate, and contains signature of CONTRACTOR, or its authorized representative.

D. Failure to deliver any of the above items shall be considered justification for assessing additional retainage.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01730 – OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. Compile product data and related information appropriate for CITY'S maintenance and operation of products furnished under Contract.

a. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.

2. Instruct CITY'S personnel in maintenance of products and in operation of equipment and systems.

B. Related Requirements Described Elsewhere:

1. General Conditions: Section 00800

2. Special Project Procedures: Section 01100

3. Contract Closeout: Section 01700

4. Project Record Documents: Section 01720

5. Warranties and Bonds: Section 01740

1.2 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.

2. Familiar with requirements of the Section.

3. Skilled as technical writer to the extent required to communicate essential data.

4. Skilled as draftsman competent to prepare required drawings.

1.3 FORM OF SUBMITTALS

A. Prepare data in form of an instructional manual for use by CITY'S personnel.

B. Format:

1. Size: Eight and one-half inches x eleven inches (8-1/2” x 11”).

2. Paper: Twenty (20) pound minimum, white, for typed pages.

3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings:

a. Provide reinforced punched binder tab, bind in with text.
b. Reduce larger drawings and fold to size of text pages but not larger than
eleven inches x seventeen inches (11” x 17”).

5. Provide fly-leaf for each separate product, or each piece of operating equipment.

a. Provide typed description of products and major component parts of equipment.
b. Provide identify tabs.

6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:

a. Title of Project.
b. Identity of separate structure as applicable.
c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three-post binders with durable and cleanable plastic covers.

2. Minimum post width: Three inches (3”). ‘

3. When multiple binders are used, correlate the data into related consistent groups.

1.4 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in systematic order.

1. CONTRACTOR, name of responsible principal, address and telephone number.

2. A list of each product required to be included, indexed to content of the

volume.

3. List, with each product, name, address and telephone number of:

    a. Subcontractor or installer.
    b. A list of each product required to be included, indexed to content of the volume.
    c. Identify area of responsibility of each.
    d. Local source of supply for parts and replacement.

4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Data:

1. Include only those sheets which are pertinent to the specific product.

2. Annotate each sheet to:

    a. Clearly identify specific product or part installed.
    b. Clearly identify data applicable to installation.
    c. Delete references to inapplicable information.

C. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:

    a. Relations of component parts of equipment and systems.
    b. Control and flow diagrams.

2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

3. Do not use Project Record Documents as maintenance drawings.

D. Written test, as required to supplement product data for the particular installation:

1. Organize in consistent format under separate headings for different procedures.

2. Provide logical sequence of instruction of each procedure.

E. Copy of each warranty, bond and service contract issued.

1. Provide information sheet for CITY'S personnel, give:

    a. Proper procedures in event of failure.
    b. Instances which might affect validity of warranties or bonds.

1.5 MANUAL FOR MATERIALS AND FINISHES

A. Submit five copies of complete manual in final form.

B. Content: for architectural products, applied materials and finishes:

1. Manufacturer's data, giving full information on products:

a. Catalog number, size, composition.
b. Color and texture designations.
c. Information required for reordering special manufacturing products.

2. Instructions for care and maintenance:

a. Manufacturer's recommendation for types of cleaning agents and methods.
b. Cautions against cleaning agents and methods which are detrimental to product.
c. Recommend schedule for cleaning and maintenance.

C. Content, for moisture protection and weather-exposed products:

1. Manufacturer's data, giving full information on products:

a. Applicable standards.
b. Chemical composition.
c. Details of installation.

2. Instructions for inspection, maintenance and repair.

D. Additional requirements for maintenance data: Respective sections of Specifications.

1.6 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit five (5) copies of complete manual in final form.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts:

a. Function, normal operating characteristics, and limiting conditions.
b. Performance curves, engineering data and tests.
c. Complete nomenclature and commercial number of replaceable parts.

2. Operating procedures:

a. Start-up, break-in, routine and normal operating instructions.
b. Regulation, control, stopping, shut-down and emergency instructions.
c. Summer and winter operating instructions.
d. Special operating instructions.

3. Maintenance procedures:

a. Routine operations.
b. Guide to "trouble-shooting".
c. Disassembly, repair and re-assembly.
d. Alignment, adjusting and checking.

4. Servicing and lubrication required.

5. Manufacturer's printed operating and maintenance instructions.

6. Description of sequence of operation by control manufacturer.

7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

a. Predicted life of parts subject to wear.
b. Items recommended to be stocked as spare parts.

8. As-installed control diagrams by controls manufacturer.

9. Each contractor's coordination drawings.

a. As-installed color coded piping diagrams.

10. Charts of valve tag numbers, with location and function of each valve.

11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

12. Other data as required under pertinent sections of specifications.

C. Content, for each electric and electronic systems, as appropriate:

1. Description of system and component parts:

a. Function, normal operating characteristics, and limiting conditions.
b. Performance curves, engineering data and tests.
c. Complete nomenclature and commercial number of replaceable parts.

2. Circuit directories and panel boards:

   a. Electrical service.
   b. Controls.
   c. Communications.

3. As installed color coded wiring diagrams.

4. Operating procedures:

   a. Routine and normal operating instructions.
   b. Sequences required.
   c. Special operating instructions.

5. Maintenance procedures:

   a. Routine operations.
   b. Guide to "trouble-shooting".
   c. Disassembly, repair and re-assembly.

6. Manufacturer's printed operating and maintenance instructions.

7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

8. Other data as required under pertinent sections of specifications.

D. Prepare and include additional data when the need for such data becomes apparent during instruction of CITY'S personnel.

E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.7 SUBMITTAL SCHEDULE

A. Submit two (2) copies of completed data in final form no later than thirty (30) days following the CITY'S review of the last shop drawing and/or other submittal specified within the General Conditions.

   1. One (1) copy shall be returned with comments to be incorporated into final copies.

B. Submit five (5) copies of approved manual (paper and digital on CD-ROM) in final form directly to the CITY, within thirty (30) calendar days of product shipment to the project site and preferably within thirty (30) days after the reviewed copy is received.

C. Append six (6) copies of addendum to the operation and maintenance manuals as

applicable and certificates as specified within thirty (30) days after final inspection and plant start-up test.

1.8 INSTRUCTION OF CITY'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct CITY'S designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01740 – WARRANTIES AND BONDS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. Compile specified warranties and bonds, as in Sections 5 and 13 of the General Conditions and as specified in these Specifications.

2. Co-execute submittals when so specified.

3. Review submittals to verify compliance with Contract Documents.

4. Submit to the ENGINEER for review and transmittal to CITY.

B. Related to Work Described Elsewhere:

1. General Conditions: Section 00800

2. Conditions of the Contract: Performance Bond, Payment Bond, Material and Workmanship Bond.

3. Special Project Procedures: Section 01100

4. Contract Closeout: Section 01700

1.2 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two (2) each

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product of work item.

2. Firm, with name of principal, address and telephone number.

3. Scope.

4. Date of beginning of warranty, bond or service and maintenance contract.

5. Duration of warranty, bond or service maintenance contract.

6. Provide information for CITY'S personnel:

   a. Proper procedure in case of failure.
   b. Instances which might affect the validity of the warranty or bond.

7. CONTRACTOR, name of responsible principal, address and telephone number.

1.3 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size: eight and one-half inches x eleven inches (8-1/2” x 11”), punch sheets for standard three (3) post binder.

   a. Title of Project
   b. Name of CONTRACTOR

C. Binders: Commercial quality, three (3) post binder, with durable and cleanable plastic covers and maximum post width of two inches (2”).

D. Provide (2) two CD-ROMs of Warranty and Bond materials.

1.4 WARRANTY SUBMITTALS REQUIREMENTS

A. For all major pieces of equipment, the CONTRACTOR shall obtain and submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the CONTRACTOR'S for one (1) year plus time equipment is not functional to the CITY unless otherwise specified, commencing at the time of final acceptance by the CITY.

B. The CONTRACTOR shall be responsible for obtaining certificates for equipment warranty for all major equipment specified herein; equipment which has at least a one (1) horsepower motor; or equipment which has a verifiable list price of more than $5000.00. The CITY reserves the right to request warranties for equipment not classified as major. The CONTRACTOR shall still warrant equipment not considered to be "major" in the CONTRACTOR'S one-year warranty period even though certificates of warranty shall not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide the warranty described above, the CONTRACTOR shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two (2) year warranty from the manufacturer shall not relieve the CONTRACTOR of the one (1) year warranty starting at the time of final acceptance of the equipment by the CITY.

D. The CITY shall incur no labor or equipment cost during the warranty period.

E. Warranty shall cover all necessary labor, equipment and replacement parts resulting from faulty or inadequate design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 02050 - DEMOLITION

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes demolition, debris removal and items to be salvaged as indicated on the Drawings and as specified herein.

B. Demolition items consist of the following:

1. Removal of: pipes, valves, grating, concrete caps, concrete, asphalt, sidewalk, various sizes and lengths of yard piping, and other items as shown on the drawings and as specified herein.

C. Items to be salvaged and turned over to the Owner shall be identified by the Owner during the preconstruction meeting.

1.2 QUALITY ASSURANCE

A. Accomplish all demolition work so there is no injury to any persons and no damage to adjacent structures or property. All demolition methods shall be in full compliance with municipal, county, state, and federal ordinances. Demolition work shall comply with the requirements of the Occupational Safety and Health Administration (OSHA).

B. The Contractor shall comply with all municipal, county, state and federal ordinances regarding the disposal of rubble, scrap metal, and refuse.

C. Demolition procedures shall provide for safe conduct of the work, protection of property which is to remain undisturbed, and coordination with other work in progress.

1.3 JOB CONDITIONS

A. It shall be the responsibility of the Contractor to visit the site and inspect the nature and condition of the items to be removed and salvaged before submitting his bid.

B. Dust Control: Control the amount of dust resulting from demolition to prevent the spread of dust to occupied portions of buildings and to avoid creation of a nuisance in the surrounding area. Do not use water when it will result in, or create, hazardous or objectionable conditions such as flooding and pollution.

C. Protection of Existing Work: Protect existing work. Work damaged by the Contractor shall be repaired to match existing work.

D. No interference with plant operations: Demolition work shall be scheduled and conducted so there is no interference with normal plant operations or deliveries.

PART 2 PRODUCTS

2.1 REPAIR AND REPLACEMENT MATERIALS

A. Materials used in the repair or replacement of existing work to remain shall be identical or equal to the materials used in existing work when new.

PART 3 EXECUTION

3.1 STRUCTURES AND BUILDINGS

A. Remove all parts of existing structures to be demolished to a minimum depth of 3-ft below grade unless otherwise shown on the drawings. Structures left below grade shall be punctured to allow water to pass through and prevent flotation.

3.2 EQUIPMENT

A. Completely remove equipment which is designated to be removed.

B. Remove concrete equipment bases if the existing bases are not to be used for new equipment.

C. Completely remove isolated equipment bases.

3.3 PIPING

A. Completely remove piping, conduit, and wiring in structures and buildings which are to be demolished, partially demolished, and where otherwise designated to be removed as shown on the Drawings. When not indicated on the Drawings, the removal of said piping, conduit and wiring shall be a minimum of 5-feet from the outside of the structure or building. The Contractor shall schedule underground pipe removal and new pipe installation in order to minimize disruption of the existing piping system and reduce bypass pumping.

B. Underground piping, conduit, and wiring which are to be abandoned and do not interfere with new work may be left in place, unless otherwise shown on the Drawings. Plug and seal ends of underground piping to be abandoned. Grout fill abandoned pipes in accordance with plans. Do not leave abandoned branches of piping and wiring “live”. Isolate abandoned branches by closing branch valve at main or by disconnecting branch at main. Plug, cap, and seal active branch at isolating valve or point of disconnection.

C. Properly disconnect, seal and plug utility services to structures and buildings which are completely demolished. Properly disconnect, seal, and plug utility lines within structures and buildings which are partially demolished.

3.4 STORAGE AND REMOVAL OF EXCAVATED MATERIAL

A. Suitable excavated material required for filling and backfilling operations may be stockpiled on the job site.

B. Excavated material shall be separated into at least 2 stockpiles:

1. Acceptable topsoil that can be used for the growth of vegetation, including planted grass, sod, flowers, bushes, trees, etc.

2. Unsuitable excavation material.

C. Remove unsuitable materials from the job site as soon as unsuitable materials are excavated.

D. Excavated suitable surplus materials shall remain the Owner's property and shall be stockpiled at the location (s) on the treatment plant site designated by the Owner.

3.5 DISPOSAL

E. Equipment, piping, and materials which are designated to remain the property of the Owner shall be moved to a location within the project site designated by the Owner.

F. All removed equipment, piping, and materials not specifically designated to remain the property of the Owner shall become the property of the Contractor and shall be removed from the site.

G. Do not allow debris and rubbish to accumulate on the site. Remove debris and rubbish from the site.

H. If the Contractor uses the Sarasota County Sanitary Landfill for disposal, the Contractor shall be required to pay a tipping fee when crossing the landfill weighing scales.

3.6 FILLING

A. Backfill excavations resulting from demolition.

B. Backfill excavations which will not be beneath new structures, buildings, piping, or other new work as specified in this paragraph.

C. Backfill excavations more than three feet deep or more than five cubic yards in volume as specified in Section 02200 - Earthwork.

D. Place and compact backfill in other excavations to produce an adequate foundation for grassing.

3.7 CLEAN-UP

A. Clean-up in areas where other work is to be done following demolition shall be as specified in the applicable Sections.

B. Clean-up the job site in areas where no other work is to be done under this Contract following demolition. Remove all debris and rubbish, temporary facilities, and equipment. Level surface irregularities to eliminate depressions. Leave the work in a neat and presentable condition.

END OF SECTION

SECTION 02110 – CLEARING AND GRUBBING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without written permission from the Owner.

B. Protection: Provide temporary fences, barricades, coverings, or other protection to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Provide protection for adjacent properties as required.

C. Restore or replace damaged work to existing or better condition than prior to start of Work.

D. Protect existing trees and vegetation from physical damage. Do not store materials or equipment within tree drip lines. Use licensed arborist for tree damage repair. Replace damaged trees that cannot be restored to full growth, as determined by arborist, unless otherwise acceptable to the Owner.

E. Existing Services: Locations indicated are approximate; determine exact location before commencing Work. Coordinate with local utility service requirements and comply with their instructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Site Clearing: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions as indicated or that interfere with new construction. Removal includes digging out stumps and roots, together with subsequent off-site disposal.

B. Strip and stockpile topsoil that will be reused in the Work.

C. Remove existing improvements, both above-grade and below-grade, to extent indicated on the drawings or as otherwise required to permit new construction.

D. Salvageable Items: Carefully remove items indicated to be salvaged and store on premises where indicated or directed by the Owner.

E. Control air pollution caused by dust and dirt; comply with governing regulations.

F. Fill depressions and voids resulting from site-clearing operations. Using satisfactory soil materials, place in maximum 6-inch-deep horizontal layers and compact each layer to density of surrounding original ground.

G. Grade ground surface to conform to required contours and to provide surface drainage.

H. Dispose of waste materials, including trash, debris, and excess topsoil, off property.

I. Burning of any waste materials on site is not permitted.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes digging of excavations for structures, piping, ponds and roadways; backfilling around structures and piping; shaping and contouring the ground surface to conform to established grades and elevations; compacting of earth or rock materials to specified densities; bracing, sheeting and shoring; dewatering; removal of surplus excavated materials; and related work as shown on the Drawings and as specified herein.

1.2 DEFINITIONS

A. Excavation: Removal of earth and rock to form cavities for the construction of foundations and structures and to form trenches for the installation of piping or conduits.

B. Cavity: Formed by the removal of earth and rock.

C. Earth: Unconsolidated material in the crust of the earth derived by weathering and erosion. Earth includes:

1. Materials of both inorganic and organic origin

2. Boulders less than 1/3 cubic yard in volume, gravel, sand, silt, and clay

3. Materials which can be excavated with a backhoe, trenching machine, drag line, clam shell, bulldozer, highlift, or similar excavating equipment without the use of explosives, rock rippers, rock hammers, or jack hammers

D. Rock: A natural aggregate of mineral particles connected by strong and permanent cohesive forces. Rock includes:

1. Limestone, sandstone, dolomite, granite, marble, and lava

2. Boulders 1/3 cubic yard or more in volume
3. Materials which cannot be excavated by equipment which is used to remove earth overburden without the use of explosives, rock rippers, rock hammers, or jack hammers.

E. Undercutting: Excavation of rock and unsuitable earth below the bottom of a foundation, structure, pipe or conduit to be constructed or installed.

F. Subgrade: Undisturbed bottom of an excavation

G. Bedding: Earth placed in trench to support pipe and conduit.

H. Backfill and Fill: Earth placed around structures from the bottom of an excavation to finished grade, or to the subbase of pavement. Earth placed in a trench from the top of bedding to finished grade, or to subbase of pavement.

I. Structural Compact Fill: Required to establish the finished grade should consist of clean cohesionless fill comprising the SP to SP-SM unified soil classification or AASHTO A-3 Classification. Each lift, which should not exceed 12 inches, should be uniformly compacted to not less that 95% of the modified proctor maximum density.

J. Topsoil: Earth containing sufficient organic materials to support the growth of grass.

1.3 JOB CONDITIONS

A. Carefully maintain bench marks, monuments and other reference points, and if disturbed or destroyed, replace as directed.

B. Should the Contractor encounter unusual subsurface and/or latent conditions at the site, he shall immediately give notice to the Owner and Engineer of such conditions before they are disturbed.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation and landfill work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service: The Owner will retain a Soils Engineer to perform soil testing and inspection service for quality control testing of earthwork operations. Tests revealing satisfactory results will be paid for by the Owner. The cost of tests revealing unsatisfactory results will be deducted from monies due to the Contractor.

PART 2 PRODUCTS

2.1 MATERIALS

A. Earth for General Fill and Backfill: Earth used for fill or backfill shall be of such gradation and moisture content that it will compact to the specified density and remain stable.

B. Pipe Bedding: Pipe bedding material for Type A-2 trenches shall be No. 57 crushed stone with gradation as noted in Table 1 of Section 901 of the FDOT Standard Specifications.

C. Pipe Cover Material: Pipe cover material shall consist of durable particles ranging in size from fine to coarse (No. 200 to 1-inch) in size, in a substantially uniform combination. Unwashed bank run sand and crushed bank-run gravel will be considered generally acceptable. Bedding material may be used for cover material.

D. Special Backfill: Special backfill shall be the following soils, classified by the Unified Soil Classification System, ASTM D-2487:

Group Symbols	Typical Name
GW	Well-graded gravels and gravel-sand mixtures, little or no fines
GP	Poorly graded gravels and gravel- sand mixtures, little or no fines
SW	Well-graded sands and gravelly sands, little or no fines
SP	Poorly graded sands and gravelly sands, little or no fines

E. Suitable Backfill: Suitable backfill shall be the following soils, classified by the Unified Soil Classification System, ASTM D-2487:

Group Symbols	Typical Name
GW	Well-graded gravels and gravel- sand mixtures, little or no fines
GP	Poorly graded gravels and gravel- sand mixtures, little or no fines
GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures
SW	Well-graded sands and gravelly sands, little or no fines
SP	Poorly graded sands and gravelly sands, little or no fines
SM	Silty sands, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures

ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays

F. Unsuitable Materials: Materials which are unsuitable for backfill include stones greater than 6-inches in their largest dimension, pavement, rubbish, debris, wood, metal, plastic, and the following soils, classified by the Unified Soil Classification System, ASTM D-2487:

Group Symbols	Typical Name
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity
PT	Peat, muck, and other highly organic soils

PART 3 EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

A. Support and protect all poles, fences, utility pipes, wire, conduits, buildings and structures.

B. Proceed with caution during excavation so the exact location of underground utilities and structures, both known and unknown, may be determined. Contractor shall be responsible for the repair of utilities and structures when broken or otherwise damaged.

C. Wherever water, or other pipes or conduits cross the excavation, the Contractor shall support said pipes and conduits without damage to them and without interrupting this Contract. The manner of supporting such pipes, or similar items, shall be subject to the approval of the Engineer.

D. When utilities that have to be removed or relocated are encountered within the areas of operations, the Contractor shall notify the Owner in ample time for the necessary measure to be taken to prevent interruption of the service.

E. The Contractor shall so conduct the work that no equipment, material, or debris will be placed or allowed to fall upon private property in the vicinity of the work,

unless he shall have first obtained the property Owner's written consent to do so and shall have shown said written consent to the Owner.

F. All excavated material shall be piled in a manner that will not obstruct driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Drainageways shall be kept clear or other satisfactory provisions made for drainage.

G. Natural watercourses shall not be obstructed, except where specifically permitted for the construction of outfall and subaqueous crossings.

3.2 CLEARING AND GRUBBING

A. Before excavating, clear and remove logs, stumps, brush, vegetation, rubbish, and other perishable matter from the project site. Clearing and grubbing shall be in accordance with FDOT "Standard Specification for Road and Bridge Construction" Sections 110 and 120.

B. Do not remove or damage trees that do not interfere with the finished work. Completely remove trees required to be removed, including stumps and roots. Replace trees removed unnecessarily. Properly treat damaged trees which can be saved.

3.3 STRIPPING AND STOCKPILING TOPSOIL

A. Strip topsoil and vegetation from the areas to be excavated. Clean topsoil may be stockpiled for reuse; the Contractor shall coordinate with the Owner for location of excavated stockpiled materials.

3.4 EXCAVATING

A. Make excavations to elevations and dimensions necessary to permit bracing, sheeting, erection of forms, inspection of foundation and installation of piping or conduits. Excavate trenches to the required alignment, depth and width. Excavate trenches in advance of pipe and conduit installation only as far as necessary to provide proper alignment and grade. Plan trenching operations to cause a minimum of danger to adjacent property and a minimum of inconvenience to the public.

B. The width of trenches at the top of the pipe shall be ample to permit the pipe to be laid and joined properly and to allow the backfill to be placed and compacted as specified. Maximum trench width shall be such that design loadings on pipe will not be exceeded. Trenches shall be of such extra width, when required, to permit the placement of supports, sheeting, bracing, and appurtenances.

C. Depth of trenches shall be such as to allow installation of pipelines at the grades or elevations shown.

D. Trees, boulders, and other surface encumbrances, located so as to create a hazard to anyone involved in the excavation work or who is in the vicinity of the work at anytime during operations, shall be removed or made safe before excavating is begun.

E. Contractor shall be responsible for the determination of the angle of repose of the soil in which the excavating is to be done. Excavate all slopes to at least the angle of repose except for areas where solid rock allows for line drilling or presplitting.

F. Sides, slopes, and faces of all excavations shall meet accepted engineering requirements by scaling, benching, barricading, rock bolting, wire meshing, or other equally effective means. Give special attention to slopes which may be adversely affected by weather or moisture content.

G. Flatten the excavation sides when an excavation has water conditions, silty materials, loose boulders, and areas where erosion and slide planes appear.

H. Shore or otherwise support sides of excavations in hard or compact soil when the excavation is more than five feet in depth. In lieu of shoring, the sides of the excavation above the five-foot level may be sloped to preclude collapse, but shall not be steeper than a one-foot rise to each 1/2-foot horizontal.

I. Use diversion ditches, dikes, or other suitable means to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Do not allow water to accumulate in an excavation. If possible, the grade should be away from the excavation.

J. Excavations shall be inspected by a competent Contractor's representative after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins shall be increased if necessary.

K. Do not store excavated or other material nearer than four feet from the edge of any excavation. Store and retain materials to prevent them from falling or sliding back into the excavation. Install substantial stop logs or barricades when mobile equipment is utilized or allowed adjacent to excavations.

3.5 DEWATERING

A. Keep excavations free from water until foundations, structures, and piping are completed and will safely withstand forces generated by water. Provide sufficient dewatering equipment and make proper arrangements for the disposal of water from dewatering operation. Dewatering shall not damage property, create nuisances, or interfere with other work. Do not use sanitary sewers for the disposal of water from dewatering operations.

3.6 SHEETING

A. The Contractor has the option of sheeting excavations.

B. Supporting systems, such as piling, cribbing, shoring, and bracing shall be designed by a qualified Contractor's representative and meet accepted engineering requirements. When tie rods are used to restrain the top of sheeting or other retaining systems, securely anchor the tie rods well back of the angle of repose. When tight sheeting or sheet piling is used, assume full loading due to groundwater table, unless prevented by weep holes or drains or other means. Provide additional stringers, ties, and bracing to allow for any necessary temporary removal of individual supports.

C. Materials used for sheeting, sheet piling, cribbing, bracing, shoring and underpinning shall be in good, serviceable condition. Timbers shall be sound, free from large or loose knots, and of proper dimensions.

D. Take special precautions in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation or a fill, particularly when the separation is less than the depth of the excavation. Pay particular attention to joints and seams of material comprising a face and to the slope of such seams and joints.

E. If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above or near an excavation, sheet-pile, shore, and brace the side of the excavation as necessary to resist the extra pressure due to such superimposed loads.

F. If the stability of adjoining buildings or walls is endangered by excavations, provide shoring, bracing, or underpinning as necessary to ensure the safety of adjoining buildings or walls. Such shoring, bracing or underpinning shall be inspected daily or more often, as conditions warrant, by a competent Contractor's representative and the protection effectively maintained.

G. The Contractor shall be held responsible for the sufficiency of all sheeting and bracing used, and for all damage to persons or property resulting from the improper quality, strength, placing, maintaining, or removing of the same. This includes damage to trees, sidewalks, and other property on the project site as well as on the private grounds.

H. Drive sheeting ahead of excavation. Do not remove sheeting until the excavation backfill has reached within two feet of the top of the excavation, except that the lower course of sheeting may be removed from a double sheeted excavation. When sheeting is drawn, completely fill all cavities remaining in or adjoining the excavation. When sheeting is left in place, completely fill all cavities behind such sheeting.

3.7 ROCK REMOVAL

A. Rock, boulders or other hard, lumpy or unyielding materials encountered in trench bottoms shall be removed to a depth at least 12-inches below the bottom of any pipes to be installed. All rock and other hard foundation material under structures shall be freed of all loose material, cleaned, and cut to a firm surface;

either level, stepped vertically and horizontally or serrated, as may be directed. All seams shall be cleaned out and filled with concrete or mortar.

B. Blasting of rock or other hard to remove materials will not be permitted on this project.

3.8 SUBGRADES

A. Do not construct foundations, footings, slabs, or piping on loose soil, mud, or other unstable or unsuitable soil.

B. Fill excess cuts under foundations, footings, and slabs with concrete.

C. Fill excess cuts under piping with compacted bedding as specified in this Section.

3.9 FOUNDATION SOILS REMOVAL AND COMPACTION

A. In areas where buildings, structure foundations, and precast concrete tanks are located just below the surface, the site shall be proofrolled using a large vibratory roller (Dynapac CA-25 or equivalent). Proofrolling shall consist of at least ten overlapping passes. Water shall be added in order to achieve moisture content near optimum to facilitate compaction. Purpose of the proofrolling is to detect any areas of unstable or unsuitable soils as well as to density the near-surface soils. Materials which yield excessively during the proofrolling shall be undercut and replaced with well-compacted structural fill.

B. The Owner will retain a Soils Engineer to be present during proofrolling operations to observe the proofrolling and recommend the nature and extent of any remedial work.

C. In areas where foundations and storage ponds are located, preparation of the subgrade prior to pond backfilling will necessitate removal and replacement of pond bottom silts as well as the very loose silty soils on the flanks of the pond (see the Geotechnical Report for further requirements). The entire pond footprint, plus a margin of at least 5 feet outside the perimeter shall be stripped down to the existing pond bottom elevation, including over-excavation of any accumulated sediments, followed by proof-rolling with heavy vibratory compaction equipment. The contractor shall anticipate the excavation will extend to approximately EL 10.00 feet. Compaction should consist of no less than ten (10) complete coverages throughout the entire pond area plus a margin of not less than 5 feet beyond the pond perimeters. Compaction shall continue so as to develop a uniform density of not less than 95% of the modified proctor maximum dry density per ASTM D-1557. Compaction tests shall be conducted at intervals of no less than 1 test for each 2500 square feet at a depth of 1 foot and at the compacted subgrade elevation.

D. Any fill required to achieve finished grade in structural areas or used as structural compact fill shall be inorganic, non-plastic granular soil containing less than 10% material passing a No. 200 sieve. Fill shall be placed in level lifts not to exceed 12-inches loose thickness and compacted to a minimum of 95% of the modified Proctor maximum dry density as determined by ASTM Specification D-1557. In-place density tests will be performed on each lift to verify that the specified degree of compaction has been achieved.

3.10 BACKFILLING FOUNDATION AND STRUCTURE EXCAVATIONS

A. Remove debris and other unstable or unsuitable materials from excavations before backfilling is started.

B. Backfill excavations in areas to be paved with Special Backfill. Place Special Backfill in 12-inch lifts. Compact each lift of backfill to not less than 100% of the maximum dry density as determined in accordance with AASHTO T99, Method A. Compaction shall be by hand tamping or approved mechanical tamping devices, or in larger excavations by approved rollers. Do not compact backfill by puddling, unless permitted by the Engineer.

C. Backfill excavations not requiring Special Backfill with Suitable Material. Place backfill and fill materials in lifts no greater than 12-inches in loose depth. Place backfill and fill materials in lifts no greater than four inches in loose depth where hand tampers are used. Backfill and fill shall be within 2% of optimum moisture content. For soils containing less than 5% material passing a No. 200 sieve, moisture content may be increased to within 3% of optimum. Compact backfill and fill to not less than 95% of the maximum dry density. Compact backfill and fill for restoration of dirt driveways shall be not less than 100% of the maximum dry density for the last lift. Tests for determination of maximum dry density shall meet the requirements of ASTM D698 Method C. Use compaction equipment which is suited to the soil being compacted.

D. If suitable, use stored excavated material for backfill and fill. Provide additional material, if required, to complete backfill and fill. Additional backfill and fill material shall be provided at no additional cost to the Owner.

E. Do not use the following materials for backfill:

1. Unsuitable materials

2. Materials which are too wet or too dry to be compacted to the densities specified in this Section.

F. Place the backfill and fill in a manner which will not overload foundations or structures. Place backfill and fill evenly on all sides of foundations and structures. Do not use equipment that will overload foundations or structures during filling or backfilling.

G. Do all cutting, filling, and grading necessary to bring the entire area around foundations and outside of structures to the following subgrade levels:

1. To the underside of the respective surfacing for walks and pavement

2. To finished grade for lawns and planted areas within the project site.

3.11 BACKFILLING PIPING TRENCHES

A. Do not backfill trenches and excavations until all utilities have been inspected by the Owner's representative and until all underground utilities and piping systems are installed in accordance with the requirements of the specifications and the drawings.

B. Remove debris and other unsuitable materials from excavations before backfilling is started.

C. Place and tamp bedding and backfilling in a manner which will not damage pipe coating, wrapping, or encasement.

D. Bedding procedures shall be as specified in the particular Section for the applicable pipe material.

E. If bedding does not cover the pipe, place pipe cover material from the top of bedding to 12-inches over the pipe. Compact pipe cover material to the density required to allow backfill over the pipe cover material to be compacted to the density specified.

F. Do not use the following materials for backfilling:

1. Unsuitable Materials

2. Materials which are too wet or too dry to be compacted to the densities specified in this Section.

G. If suitable, use stored excavated material for backfill and fill. Provide additional material, if required, to complete backfill and fill. Additional backfill and fill material shall be provided at no additional cost to the Owner. Backfill excavations in areas to be paved with Special Backfill. Place Special Backfill in 12-inch lifts. Compact each lift of backfill to not less than 100% of the maximum dry density as determined in accordance with AASHTO T99, Method A. Compaction shall be by hand tamping or approved mechanical tamping devices, or in larger excavations by approved rollers. Backfill and fill materials shall be within 2% of optimum moisture content. Do not compact backfill by puddling, unless permitted by the Engineer.

H. Backfill trenches not requiring Special Backfill with Suitable Material. Place backfill and fill materials in lifts no greater than 12-inches in loose depth and compact to produce an adequate foundation for seeding. The top 4-inches of

backfill shall not contain stones or other objects larger than 1-inch in maximum dimension. Mound backfill above finish grade to allow for settlement. Fill and restore any settlement of the backfill. Grade area to be restored to finish grade after settlement of backfill and immediately before restoration of vegetated areas.

3.12 SHELL BASE

A. Construction of a base course composed of shell shall be as specified in Section 250 of the FDOT Standard Specifications.

3.13 FINISH GRADING

A. Shape the surface of all earthwork to conform to the lines, grades, contours and cross-sections shown on the drawings. Hand dressing may be required in certain areas or in confined areas where equipment operation is restricted.

B. In final shaping of the surface of the earthwork a tolerance of 0.1 foot above or below the plan elevation will be allowed with the following exceptions:

1. Earthwork shall be shaped to slope away from all buildings and structures.

2. Earthwork shall be shaped to match adjacent pavement, curb, sidewalks, and similar appurtenances.

3. Ditch bottoms and swales shall be shaped so that no water will be impounded except in areas designated for impoundment.

3.14 CLEANUP AND MAINTENANCE

A. Cleanup the job site as grading is completed. Remove excess earth, rock, bedding, materials, and backfill materials. Remove unused piping materials, structure components, and appurtenances. Restore items moved, damaged, or destroyed during construction.

B. Maintain the job site until the work has been completed and accepted. Fill excavations which settle when settlement is visible. Restore items damaged by construction or improper restorations. Keep dust conditions to a minimum.

3.15 STORAGE AND REMOVAL OF EXCAVATED MATERIAL

A. Suitable excavated material required for filling and backfilling operations may be stockpiled on the job site.

B. Remove unsuitable materials from the job site as unsuitable materials are excavated. Remove surplus suitable materials from the job site as excavations are backfilled.

C. Excavated suitable surplus materials shall remain the Owner's property and shall be stockpiled at the location(s) on the treatment plant site designated by the Owner.

3.16 DUST CONTROL

A. The Contractor shall take all steps possible to prevent and reduce dust arising from the construction activity. The Contractor shall have adequate water trucks on the site at all times and water, as necessary, the areas where dust may arise. He shall cooperate fully with the Owner's Representative and water immediately when instructed to do so.

END OF SECTION

SECTION 02211 – STEEL SHEET PILES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish and install steel sheet piles to brace and shore open excavations for workers' safety and/or protection of adjacent facilities, or as required by these specifications or as shown on the Drawings.

1.2 SUBMITTALS

A. Submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples and shall include details of the construction and erection of the steel sheet piling, shoring and bracing and the procedure the Contractor intends to follow in performing the work.

B. Submit complete erection drawings showing bolt locations and details of openings, etc. Erection drawings shall show all necessary secondary steel framing members required to support the steel pilings.

C. Drawings of the sheeting and bracing and design computations shall be submitted to the Owner and construction shall not be started until such drawings are received. The drawings and computations shall be prepared and sealed by a Florida registered Engineer employed by the contractor and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the substructures.

PART 2 PRODUCTS

2.1 MATERIAL

A. Steel Sheet Piles

1. Steel Sheet Piles shall conform to ASTM A328. Steel pile sections shall be the continuously interlocking deep arch equal to PLZ23. The section modulus per linear foot shall not be less than 30.2 cubic inches and the weight shall be not less than 22.6 pounds per square foot of wall. Sheet pile sections shall be not less than 3/8-inch thick.

2. All sheet piles shall be furnished with standard pulling holes located approximately four inches below the top of the pile, unless specified otherwise.

B. Wales and Caps: Structural steel shapes and plates shall conform to ASTM A36. Bolts shall conform to ASTM A307.

PART 3 EXECUTION

3.1 INSTALLATION

A. The Contractor shall furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures or roadways from undermining or other damage. If the City's Representative is of the opinion that sufficient or proper supports have not been provided, the City's Representative may order additional supports put in at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

B. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.

C. The City shall have the right to order sheeting and bracing left in place and this right shall not be construed as creating any obligation on the City's part to issue such orders, and the City's failure to exercise its right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

D. Prior to setting, the sheet piles shall be thoroughly cleaned and inspected for defects and for proper interlock dimensions. The Contractor shall provide a tool for checking the interlock dimensions.

E. Each sheet pile shall have sufficient clearance in the interlocks to slide, under its own weight, in the interlock of the sheet pile previously placed during the setting operation until the top of existing ground is reached by the tip of the sliding pile. In no case during the setting operation shall a vibratory or drive hammer be used to force the interlock of a pile into the interlock of an adjacent pile.

F. Before driving is started, check the sheet piles for position and alignment. Vertical alignment of each sheet pile shall be not more than 1/8 inch per foot from the vertical in all directions. Provide a plumb line or other device for checking vertical alignment.

G. Excavation shall not be carried in advance of the steel sheet piling.

H. Drive sheet piles in rotating stages such that the tip of any sheet pile is not more than 5 feet below the tip of any adjacent sheet pile nor more than 8 feet below the tip of any other sheet pile in the bulkhead.

I. Use a suitable driving head to keep deformation of the driving end to a minimum. If any sheet pile is driven out of interlock, it shall be removed and replaced at the Contractor's sole expense.

J. Piles shall be driven with air, steam, or diesel hammer having sufficient energy to achieve the required penetration. However, the means and methods selected by the Contractor shall be to prevent damage to any nearby structures.

K. Obstructions encountered before the specified penetration for the piles is obtained shall be removed. Damaged piling or one with faulty alignment shall be withdrawn and new piling driven properly in its place. The cost of such additional work shall be considered as part of the pile driving and shall be borne by the Contractor.

L. Cut the tops of the sheet piles on a true horizontal line with a tolerance of plus or minus 1/2 inch by burning or other suitable method that will not damage the pile. For trench sheeting of pipes, no sheeting is to be withdrawn if driven below mid-diameter of pipe.

END OF SECTION

SECTION 02212 – WOOD SHEETING LEFT IN PLACE

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish and install shoring and sheeting to brace and shore open excavating for workers safety and/or protection of adjacent facilities or as required by these specifications or as shown on the Drawings.

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wood for shoring and sheeting shall be 3-inches maximum thickness and green, rough cut hardwood planking, square edges of tongue and groove.

PART 3 EXECUTION

3.1 INSTALLATION

A. The Contractor shall furnish, install, and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that which is necessary for proper construction, and to protect adjacent structures from undermining or other damage. If the Owner's Representative is of the opinion that sufficient or proper supports have not been provided, he may order additional supports installed at the expense of the Contractor. Compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

B. The Contractor shall leave in place to be embedded in the backfill all sheeting, bracing, and other related items as shown on the Drawings. For trench sheeting of pipes, no wood sheeting shall be cut off at a level lower than 1 foot above the top of the pipe, unless otherwise directed by the Owner's Representative.

C. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property.

D. The right of the Owner to order sheeting and bracing left in place shall not be construed as creating any obligation on the Owner's part to issue such orders, and the Owner's failure to exercise its right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

E. The Contractor shall receive no payment other than that included in the lump sum price for the project for any timber used for sheeting, bracing, or other related items. The Contractor shall receive no payment for such timber which has actually been left in the trench for the convenience of the Contractor.

END OF SECTION

SECTION 02221 – TRENCHING, BEDDING AND BACKFILL FOR PIPE

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, grading, trench protection or other related work required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not be limited to: vaults; duct conduit; pipe; roadways and paving; backfilling; required fill or borrow operations; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and dewatering.

B. Prior to commencing work, the Contractor shall examine the site and review test borings if available, or undertake his own subsurface investigations and take into consideration all conditions that may affect his work.

C. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the City. This includes, but is not limited to protecting the root systems and adjusting grades as necessary for tree/root protection.

1.2 PROTECTION

A. Sheeting and Bracing in Excavations

1. In connection with construction of underground structures, the Contractor shall properly construct and maintain cofferdams. These shall consist of: sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures, existing yard pipe and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

2. Trench sheeting for pipes: no sheeting is to be withdrawn if driven below, mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by the Engineer. During the progress of the work, the Engineer may direct the Contractor in writing to leave additional wood sheeting in place. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.

3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specifications, all sheeting and bracing shall be removed after completion of the piping or structure, care being taken not to disturb or otherwise injure the pipeline or finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools specifically made for that purpose, by watering, or as may otherwise be directed.

4. The Contractor shall construct, to the extent he deems is necessary for his method of operation, the cofferdams and sheeting outside the neat lines of the pipeline trench or foundation unless otherwise indicated on the Drawings or directed by the Owner. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the pipeline or structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction of the pipeline or the enclosed masonry. Any movement or bulging which may occur shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.

5. Drawings of the cofferdams and design computations shall be submitted to the Owner's Representative and approved prior to any construction. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdams. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the pipeline and substructures.

B. Dewatering, Drainage and Flotation

1. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding rock and limerock base course, in-the-dry. In addition, the Contractor shall make the final 24" of excavation for this work in-the-dry and not until the water level is a minimum of 6" below proposed bottom of excavation.

2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavation and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed

bottom of excavation.

4. Wellpoints may be required for dewatering the soil prior to final excavation for deeper in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed to avoid the structure, pipeline, or fill from becoming floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.

5. The Contractor shall furnish all materials and equipment to perform all work required to install and maintain the proposed drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.

6. Where required, the Contractor shall provide a minimum of two operating groundwater observation wells at each structure to determine the water level during construction of the pipeline or structure. Locations of the observation wells shall be at structures and along pipelines as approved by the Owner's Representative prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete bases and left in place at the completion of this Project.

7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the Owner's Representative for approval. Such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils for damage to pipeline or structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

8. As part of his request for approval of a dewatering system, the Contractor shall demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one quart sample. Discharge water shall not flow directly into wetlands or Waters of the State as defined by FDEP and SWFWMD.

9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.

10. Continuous pumping will be required as long as water levels are required to be below natural levels.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. Materials for use as fill and backfill shall be as described below. For each material, the Contractor shall notify the Owner's Representative of the source of the material and shall furnish to the Owner's Representative, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.

2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

B. Structural Fill

1. Structural fill shall be used below spread footing foundations, slab-on-grade floors and other structures as backfill within three feet of the below grade portions of structures.

2. Structural fill material shall be a minimum of 60 percent clean sand, free of organic, deleterious and/or compressible material. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180. Rock in excess of 2-1/2" in diameter shall not be used in the fill material. If the moisture content is improper for attaining the specified density, either water shall be added or material shall be permitted to dry until the proper moisture content for compaction is reached.

C. Base Course

1. Asphalt, crushed concrete, soil cement or approved equal, shall be used as base course for bituminous paved roads and parking areas.

D. Common Fill

1. Common fill material shall be free from organic matter, muck or marl and rock exceeding 2-1/2" in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials. Existing soil may be used to adjust grades over the site with the exception of the construction area.

2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoil as specified herein for disposal of unsuitable materials by the Contractor.

3. Crushed stone may be used for pipe bedding, manhole bases, as a drainage layer below structures with underdrains and at other locations indicated on the Drawings.

4. Crushed stone shall be size No. 57 with gradation as noted in Table 1 of Section 901 of the Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition.

PART 3 EXECUTION

3.1 FILL PLACEMENT

A. General

1. Material placed in fill areas under and around pipelines and structures shall be deposited within the lines and to the grades shown on the Drawings or as directed by the Owner's Representative, making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by the Owner's Representative. If sufficient common fill material is not available from excavation on site, the Contractor shall provide borrow as may be required.

2. Limerock base course material, structural fill and screened limerock, may be provided as borrow.

3. Fill shall be brought up in substantially level lifts throughout the site, starting in the deepest portion of the fill. The entire surface of the work shall be maintained free from ruts and in such condition that construction equipment can readily travel over any section. Fill shall not be placed against concrete structures until they have attained sufficient strength.

4. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the process of dumping and spreading, all roots, debris and stones greater in size than specified under Materials, shall be removed from the fill areas. The Contractor shall assign a sufficient number of men to this work to insure satisfactory compliance with these requirements.

5. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.

6. All fill materials shall be placed and compacted "in-the-dry". The Contractor shall dewater excavated areas and is required to perform the work in such manner as to preserve the undisturbed state of the natural inorganic soil.

3.2 COMPACTION

A. Structural fill, limerock base course and screened limerock in open areas, shall be

placed in layers not to exceed nine inches in depth as measured before compaction. Each layer shall be compacted by a minimum of six coverages (3 passes each way) with the equipment described below, to at least 98 percent of the maximum density, as determined by AASHTO T-180. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum six coverages.

B. Common fill shall be placed and compacted in a manner similar to that described above for structural fill, with the following exceptions: layer thickness prior to compaction may be increased to 12-inches in open areas; and common fill except dike fill, required below water level in peat excavation areas may be placed as one lift, in-the-wet, to an elevation one foot above the water level at the time of filling.

C. Compaction equipment in open areas shall consist of a medium-heavy vibrator roller (minimum static weight of 10 tons) operated at resonant frequency and at a speed of 2 fps or less or other compaction equipment approved by the Engineer.

D. Areas adjacent to pipelines, structures and other confined areas inaccessible to the vibrator roller shall be compacted with a manually operated sled-type vibratory compactor. The Contractor shall also conform to additional backfill requirements at pipelines and structures as specified in the Contract Documents. Compaction of the fill by such means shall be to the same degree of compaction as obtained by the rubber-tired equipment, and the Owner's Representative may make the necessary tests to determine the amount of compactive effort necessary to obtain equal compaction. Unless such tests indicate that modifications may be made, the fill compacted by mechanical compactors shall be placed in 6-inch layers and thoroughly tamped over the entire surface.

Compaction equipment is subject to approval by the Owner's Representative.

E. It is the intention that the fill materials with respect to moisture be used in the condition they are excavated insofar as this is practicable. Material which is too wet shall be spread on the fill area and permitted to dry, assisted by harrowing if necessary, until the moisture content is reduced to allowable limits.

F. If the Engineer determines that added moisture is required, water shall be applied by sprinkler tanks or other sprinkler systems, which will insure uniform distribution of the water over the area to be treated and give complete and accurate control of the amount of water to be used. If too much water is added, the area shall be permitted to dry before compaction is continued.

G. The Contractor shall supply all hose, piping, valves, sprinklers, pumps, sprinkler tanks, hauling equipment and all other materials and equipment necessary to place the water in the fill in the manner specified.

3.3 TRENCH EXCAVATION AND BACKFILLING

A. Excavation for all trenches required for the installation of pipes and electrical ducts

shall be made to the depths indicated on the Drawings and in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches.

B. Rock shall be removed to a minimum 6" clearance around the bottom and sides of all the pipe or ducts being laid.

C. Where pipes or ducts are to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

D. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated manually, shall be done in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly supported on undisturbed material. Bell holes shall be made as required.

E. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.

F. Backfilling over ducts shall begin not less than three days after placing concrete encasement.

G. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.

H. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2" and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe.

I. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.

J. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted by rolling, ramming, or puddling, as the Engineer may direct, sufficiently to prevent subsequent settling.

3.4 BEDDING AND BACKFILL FOR INSTALLATION OF HDPE AND PVC PIPE BY OPEN CUT

A. Excavate trench to 6-inches below the bottom of the pipe and provide and compact 6-inches of bedding, consisting of Class I material. Excavate bedding to match bells. Place and Compact haunching material to the springline of the pipe. Haunching material shall consist of Class I or II, SM or SC soils. Place and compact initial backfill to 12-inches over the top of the pipe using Class II or III and SM or SC soils. All soils shall be compacted to 98% maximum density in accordance with AASHTO T-180

3.5 GRADING

A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.

B. If at the time of excavation it is not possible to place any material in its proper section of the permanent pipeline structure, it shall be stockpiled in approved areas for later use.

C. Minute adjustments in lines or grades may be made if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.

D. Stones or rock fragments larger than 2-1/2" in their greatest dimensions shall not be permitted in the top 6" of the subgrade line of all dikes, fills or embankments.

E. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Owner's Representative.

F. In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings or as directed by the Engineer.

G. No grading is to be done in areas where there are existing pipelines that may be uncovered or damaged until such lines which must be maintained are relocated, or where lines are to be abandoned and removed, all required valves are closed and drains plugged at manholes.

END OF SECTION

SECTION 02260 – FINISH GRADING

PART 1 GENERAL

1.1 WORK INCLUDED

A. The Contractor shall finish grade sub-soil.

B. The Contractor shall cut out areas to receive stabilizing base course materials for paving and sidewalks.

C. The Contractor shall place, finish grade and compact top soil.

1.2 PROTECTION

A. Prevent damage to existing, facilities, fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Correct damage at no cost to the Owner.

PART 2 PRODUCTS

2.1 GENERAL

A. Topsoil: Friable loam free from subsoil, roots, grass, excessive amount of weeds, stones, and foreign matter; pH of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. Use topsoil stockpiles on site if conforming to these requirements.

PART 3 EXECUTION

3.1 SUB-SOIL PREPARATION

A. Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc. Remove sub-soil which has been contaminated with petroleum products.

B. Cut out areas to sub-grade elevation, which are to receive stabilizing base for paving and sidewalks.

C. Bring sub-soil to required levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

D. Slope grade away from building minimum 2 inches in 10 feet unless indicated otherwise on the Drawings.

E. Cultivate sub-grade to a depth of 3 inches, where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

F. The Contractor shall not change grades to cause water to flow onto adjacent property.

3.2 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding and planting are to be performed. Place to the following minimum depths, up to finished grade elevations.

1. 6 inches for seeded areas.
2. 4-1/2 inches for sodded areas.
3. 24 inches for shrub beds.
4. 18 inches for flower beds.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of sub-grades.

D. Remove stone, roots, grass, weeds, debris, and other foreign material while spreading.

E. Manually spread topsoil around trees, plants, building, to prevent damage which may be caused by grading equipment.

F. Lightly compact placed topsoil.

3.3 SURPLUS MATERIAL

A. Remove surplus sub-soil and topsoil from site.

B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 02513 – ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment necessary to complete all asphalt concrete paving as shown on the Drawings.

1.2 QUALITY ASSURANCE

A. Qualifications of Asphalt Concrete Producer: Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.

B. Qualification of Testing Agency: The Owner will employ commercial testing laboratories to conduct tests and evaluations of asphalt concrete materials and design.

1. Provide asphalt concrete testing and inspection service acceptable to Engineer.

2. Include sampling and testing asphalt concrete materials proposed, and tests and calculations for asphalt concrete mixtures.

3. Provide field testing facilities for quality control testing during paving operations.

C. Requirements of Regulatory Agencies: Comply with applicable requirements of:

1. Sarasota County Public Works Deptartment

2. Florida Deptartment of Transportation

1.3 PAVING QUALITY REQUIREMENTS

A. General: In addition to other specified conditions, comply with following minimum requirements:

1. Test in-place asphalt concrete courses for compliance with requirements for density, thickness and surface smoothness.
2. Provide final surfaces of uniform texture, conforming to required grades and cross sections.

3. Take not less than four inch diameter pavement specimens for each completed course, from locations as directed by the Engineer.

4. Repair holes from test specimens as specified for patching defective work.

B. Density

1. Compare density of in-place material against laboratory specimen of same asphalt concrete mixture, when subjected to 50 blows of standard Marshall hammer on each side of specimen.

2. Minimum acceptable density of in-place course material is 98% of the recorded laboratory specimen density.

C. Thickness: In-place compacted thicknesses will not be acceptable if less than the thicknesses shown on the Drawings.

D. Surface Smoothness:

1. Test finished surface of each asphalt concrete course for smoothness, using a 10 ft. straightedge applied parallel to and at right angles to centerline of paved areas.

2. Check surfaced areas at intervals directed by Engineer.

3. Surfaces will not be acceptable if exceeding the following:

a) Base Course: 1/4 in. in 10 ft.

b) Surface Course: 3/16 in. in 10 ft.

c) Crowned Surfaces:

1) Test crowned surfaces with a crown template, centered and at right angles to the crown.

2) Surfaces will not be acceptable if varying more than 1/4 in. from the template.

1.4 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Samples: Provide samples of materials for laboratory testing and job-mix design.

C. Test Reports: Submit laboratory reports for following materials tests:

1. Coarse and fine aggregates from each material source and each required grading:

    a. Sieve Analysis: ASTM C 136 (AASHTO T 27)

    b. Unit Weight of Slag: ASTM C29 (AASHTO T 19)

    c. Soundness: ASTM C 88 (AASHTO T 104) for surface course aggregates only.

    d. Sand Equivalent: ASTM D 2419 (AASHTO T 176)

    e. Abrasion of Coarse Aggregate: ASTM C131 (AASHTO T 96), for surface course aggregates only.

2. Asphalt cement for each penetration grade:

    a. Penetration: ASTM D5 (AASHTO T49)

    b. Viscosity (Kinematic): ASTM D2170 (AASHTO T 201)

    c. Flash Point: ASTM D92 (AASHTO T 48)

    d. Ductility: ASTM D 113 (AASHTO T 51)

    e. Solubility: ASTM D 4 (AASHTO T 44)

    f. Specific Gravity: ASTM D 70 (AASHTO T 43).

3. Job-mix design mixtures for each material or grade:

    a. Bulk Specific Gravity for Coarse Aggregate: ASTM C 117 (AASHTO T 85)

    b. Bulk Specific Gravity for Fine Aggregate: ASTM C 128 (AASHTO T 84)

4. Uncompacted asphalt concrete mix: Maximum Specific Gravity: ASTM D 2041 (AASHTO T 209).

5. Compacted asphalt concrete mix:

    a. Bulk Density: ASTM D 1188 (AASHTO T 166)

    b. Marshall Stability and Flow: ASTM D 1559

6. Density and voids analysis:

a. Provide each series of asphalt concrete mixture text specimens, in accordance with A.I. MS-2 "Mix Design Methods for Asphalt Concrete".

b. Use Marshall method of mix design unless otherwise directed or acceptable to the Engineer.

c. Report the quantity of absorbed asphalt cement in pounds of dry aggregate, percent air voids, and percent voids in mineral aggregate.

7. Sampling and testing of asphalt concrete mixtures for quality control during paving operations:

a. Uncompacted asphalt concrete mix.

1) Asphalt Cement Content: ASTM D 2172 (AASHTO T 164)

2) Penetration of Recovered Asphalt Cement: ASTM D 5 (AASHTO T 49)

3) Ductibility of Recovered Asphalt Cement: ASTM D 113 (AASHTO T 51)

b. Compacted asphalt concrete mix:

1) Bulk Density: ASTM D 1188 (AASHTO T 166)

2) Marshall Stability and Flow: ASTM D 1559)

c. Perform at least one test for each day's paving.

8. Asphalt plant inspection: ASTM D 290.

9. Additional testing:

a. Perform as may be required if any of the previous tests indicate insufficient values, or if directed by the Engineer.

b. Continue testing until specified values have been attained.

10. Asphalt concrete materials not complying with specified requirements will not be permitted in the work.

1.5 JOB CONDITIONS

A. Weather Limitations:

1. Apply bituminous prime and tack coats only when the ambient temperature in the shade is above 50 degrees F. and when the temperature has not been below 35 degrees F. for 12 hours immediately prior to application.

2. Do not apply when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.

3. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F., when the underlying base is dry, and when weather is not rainy.

4. Base course may be placed when air temperature is not below 30 degrees F. and rising, when acceptable to the Engineer.

B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.

C. Traffic Control: Maintain vehicular and pedestrian traffic during paving operations, as required for other construction activities.

PART 2 PRODUCTS

2.1 MATERIALS

A. Shell Marl Stabilized Sub-Base: as specified in FDOT Section 260, “Shell tabilized Base,” and on the plans.

B. Limerock Base Course: as specified in FDOT Section 200, “Limerock Base,” and on the plans.

C. Aggregate for Asphalt Concrete, General:

1. Sound, angular crushed stone, crushed gravel, or crushed slag: ASTM D 692.

2. Sand, stone, or slag screening: ASTM D 1073.

3. Provide aggregate in gradations for various courses to comply with local highway standards.

D. Surface Course Aggregates: Provide natural sand, unless sand prepared from stone, slag, or gravel or combinations are required to suit local conditions.

E. Asphalt Cement: Comply with ASTM D 946 for 85-100 penetration grade.

F. Prime Coat:

1. Cut-back liquid asphalt.

2. Medium-Curing type: ASTM D 2027, Grade MC-70.

2.2 ASPHALT-AGGREGATE MIXTURES

A. Job-mix criteria:

1. Provide job-mix formulas for each required asphalt-aggregate mixture. Provide FDOT Section 333 Type III asphaltic concrete.

2. Establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to aggregate, and a single temperature at which asphalt concrete is to be produced.

3. Comply with the mix requirements of local governing highway standards.

4. Maintain material quantities within allowable tolerances of the governing standards.

2.3 TRAFFIC AND PARKING MARKING MATERIALS

A. Traffic lane marking paint with chlorinated rubber base.

B. Factory mixed, quick drying and non bleeding, FS TT-P-115C, Type III.

C. Color: Driving Lane Dividers - White

D. No Parking Zone – Yellow

E. Parking Dividers - White

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Subbase Preparation:

1. The Contractor shall remove from the area all organic substance encountered to a depth of six or eight inches (6" or 8"), or to such depth and width as directed by the Engineer. The entire area shall be plowed and dragged prior to placing a stabilizing additive, if required to meet minimum bearing value.

2. Subbase shall be compacted to a minimum density of 98 percent of the maximum as determined by the Modified Proctor Density AASHTO T180, and shall have a minimum bearing value of 40 pounds per square inch as determined by the Florida Bearing Test.

B. Base Course:

1. Check subgrade for conformity with elevations and section immediately before placing base material.

2. Place base material in compacted layers not more than 6 inches thick, unless continuing tests indicate the required results are being obtained with thicker layers.

3. In no case will more than 8-inches of compacted base be placed in one lift.

4. Spread, shape, and compact all base material deposited on the subgrade during the same day.

5. Compact base course material to be not less than 95% of maximum density: ASTM D 1557, Method D (98 percent maximum density: AASHTO T-180).

6. Test density of compacted base course: ASTM D 2167.

7. Conduct one test for each 250 sq. yds. of in-place material, but in no case not less than one daily for each layer.

C. Loose and Foreign Material:

1. Remove loose and foreign material from compacted subbase surface immediately before application of paving.

2. Use power brooms or blowers, and brooming as required.

3. Do not displace subbase material.

D. Prime Coat:

1. Uniformly apply at rate of 0.20 to 0.5 gal. per sq. yd. over compacted and cleaned subbase surface.

2. Apply enough material to penetrate and seal, but not flood the surface.

3. Allow to cure and dry as long as required to attain penetration and evaporation of volatile, and in no case less than 24 hours unless otherwise acceptable to the Engineer.

4. Blot excess asphalt with just enough sand to prevent pick-up under traffic.

5. Remove loose sand before paving.

E. Tack Coat:

1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or portland cement concrete and similar surfaces.

2. Apply at rate of 0.05 to 0.15 gal. per sq. yd. of surface.

3. Apply tack coat by brush to contact surfaces of structures projecting into or abutting asphalt concrete pavement.

4. Allow surfaces to dry until material is at condition of tackiness to receive pavement.

3.2 FRAME ADJUSTMENTS (IF APPLICABLE)

A. Placing frames:

1. Surround frames set to elevation with a ring of compacted asphalt concrete base prior to paving.

2. Place asphalt concrete mixture up to 1 in. below top of frame, slope to grade, and compact by hand tamping.

B. Adjust frames to proper position to meet paving.

C. If permanent covers are not in place, provide temporary covers over openings until completion of rolling operations.

D. Set cover frames to grade, flush with surface of adjacent pavement.

3.3 PREPARING THE MIXTURE

A. Comply with ASTM D 995 for material storage, control, and mixing, and for plant equipment and operation.

B. Stockpiles:

1. Keep each component of the various-sized combined aggregates in separate stockpiles.

2. Maintain stockpiles so that separate aggregate sizes will not be intermixed and to prevent segregation.

C. Heating:

1. Heat the asphalt cement at the mixing plant to viscosity at which it can be uniformly distributed throughout mixture.

2. Use lowest possible temperature to suit temperature-viscosity characteristics of asphalt.

3. Do not exceed 350 degrees F. (176.6 degrees C.).

D. Aggregate:

1. Heat-dry aggregates to reduce moisture content to not more than 2.0%.

2. Deliver dry aggregate to mixer at recommended temperature to suit penetration grade and viscosity characteristics of asphalt cement, ambient temperature, and workability of mixture.

3. Accurately weigh or measure dry aggregates and weigh or meter asphalt cement to comply with job-mix formula requirements.

F. Mix aggregate and asphalt cement to achieve 90-95% of coated particles for base mixtures and 85-90% of coated particles for surface mixture, when tested in accordance with ASTM D 2489.

G. Transporting:

1. Transport asphalt concrete mixtures from mixing site in trucks having tight, clean compartments.

2. Coat hauling compartments with a lime-water mixture to prevent asphalt concrete mixture from sticking.

3. Elevate and drain compartment of excess solution before loading mix.

4. Provide covers over asphalt concrete mixture when transporting to protect from weather and to prevent loss of heat.

5. During periods of cold weather or for long-distance deliveries, provide insulation around entire truck bed surfaces.

3.4 EQUIPMENT

A. Provide size and quantity of equipment to complete the work specified within project time schedule.

B. Bituminous Pavers: Self-propelled that spread hot asphalt concrete mixtures without tearing, shoving or gouging surfaces, and control pavement edges to true lines without use of stationary forms.

C. Rolling Equipment:

1. Self-propelled, steel-wheeled and pneumatic-tired rollers that can reverse direction without backlash.

2. Other type rollers may be used if acceptable to the Engineer.

D. Hand Tools: Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools to complete the work specified.

3.5 PLACING THE MIX

A. Place asphalt concrete mixture on prepared surface, spread and strike-off using paving machine.

B. Spread mixture at a minimum temperature of 225 degrees F. (107.2 degrees C.).

C. Inaccessible and small areas may be placed by hand.

D. Place each course at thickness so that when compacted, it will conform to the indicated grade, cross-section, finish thickness, and density indicated.

E. Paver Placing:

1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section, and at high side of sections on one-way slope, and in direction of traffic flow.

2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

3. Complete base courses for a section before placing surface courses.

4. Place mixture in continuous operation as practicable.

F. Hand Placing:

1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to Engineer.

2. Place mixture at a rate that will insure handling and compaction before mixture becomes cooler than acceptable working temperature.

G. Joints:

1. Carefully make joints between old and new pavements, or between successive days' work, to ensure a continuous bond between adjoining work.

2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.

3. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.

4. Offset transverse joints in succeeding courses not less than 24 inches.

5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.

6. Offset longitudinal joints in succeeding courses not less than 6 inches.

7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

3.6 COMPACTING THE MIX

A. Provide sufficient rollers to obtain the required pavement density.

B. Begin rolling operations as soon after placing when the mixture will bear weight of roller without excessive displacement.

C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.

D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.

F. Do not roll centers of sections first under any circumstances.

G. Breakdown Rolling:

1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.

2. Operate rollers as close as possible to paver without causing pavement displacement.

3. Check crown, grade, and smoothness after breakdown rolling.

4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.

H. Second Rolling:

1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.

2. Continue second rolling until mixture has been thoroughly compacted.

I. Finish Rolling:

1. Perform finish rolling while mixture is still warm enough for removal of roller marks.

2. Continue rolling until roller marks are eliminated and course has attained specified density.

J. Patching:

1. Remove and replace defective areas.

2. Cut-out and fill with fresh, hot asphalt concrete.

3. Compact by rolling to specified surface density and smoothness.

4. Remove deficient areas for full depth of course.

5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.

6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.7 MARKING ASPHALT CONCRETE PAVEMENT

A. Cleaning:

1. Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.

2. Do not begin marking asphalt concrete pavement until acceptable to the Engineer.

B. Apply paint with mechanical equipment.

1. Provide uniform straight edges.

2. Not less than two separate coats in accordance with manufacturer's recommended rates (min. wet film thickness of 15 mils).

3. Width of Stripe: Width shall be 4-inches unless shown otherwise.

3.8 CLEANING AND PROTECTION

A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of the Engineer.

B. Protection:

1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than 6 hours.

2. Provide barricades and warning devices as required to protect pavement.

3. Cover openings of structures in the area of paving until permanent coverings are placed (if applicable).

END OF SECTION

SECTION 02900 – SEEDING AND SODDING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.

B. Work shall include furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance by Owner.

1.2 RELATED WORK NOT INCLUDED

A. Excavation, filling and grading required to establish elevation shown on the Drawings are included under other sections of these Specifications.

1.3 QUALITY ASSURANCE

A. Requirements

1. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the Owner until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.

2. All previously grassed areas where pipelines are laid shall be sodded. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the Owner's Representative.

1.4 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fertilizer

1. The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 8 percent phosphorus, 8 percent

potassium; 40 percent other available materials derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.

B. Seeding/Grassing

1. The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

C. Sodding

1. Sod shall be provided as required on the construction drawings or at locations as directed by the Owner's Representative in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish Bahia grass sod or match existing sod whichever is more stringent. Placement and watering requirements shall be in accordance with FDOT Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the Contract lump sum prices bid for the treatment plant improvements.

D. Topsoil

1. Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the Owner. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.

E. Water

1. It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life. The Owner shall provide reclaimed water at no cost to the Contractor for irrigation of grass, plants and

trees planted or installed during construction. The Contractor shall provide all conveyance equipment (tank trucks, pumps, pipes) and irrigation equipment to irrigate the vegetation.

PART 3 EXECUTION

3.1 INSTALLATION

A. When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the Owner's Representative.

B. Finish Grading

1. Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated.

C. Protection

1. Seeded and sodded areas shall be protected against traffic or other use by placing warning signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the Owner shall be repaired by the Contractor as directed by the Owner's Representative.

3.2 CLEANUP

A. Soil or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

3.3 MAINTENANCE

A. Any existing seeded or sodded areas damaged or altered during construction by the Contractor shall be restored or replaced.

B. Maintain new seeded or sodded areas for a period of 90 days immediately following complete installation of work or until Owner accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the Owner.

3.4 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATORS

A. Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing, sodding, and watering in accordance with these Specifications.

END OF SECTION

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Specification.

B. Related Specification Sections:

1. Section 03900 - Hydraulic Structures Testing.

2. Section 09900 – Painting and Coatings.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

1. Cast-in-place concrete includes the following:

a) Foundations and footings.

b) Slabs-on-grade.

c) Tank & trench walls.

d) Elevated slabs.

e) Equipment pads and bases.

1.3 SUBMITTALS

A. General: All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

1. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials and others if requested by Engineer.

2. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Shop drawings to show proposed location of all construction joints. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing

bar schedules, stirrup spacing, bent bar diagrams and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures. Engineer's review is for general compliance only. The Contractor will be responsible for size, number and lengths of reinforcing.

3. Shop drawings for formwork indicating fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually. Engineer's review is for general applications and features only. Designing formwork for structural stability and efficiency is Contractor's responsibility.

4. The testing laboratory shall submit three (3) copies of results of concrete cylinder tests to Engineer together with one (1) copy each to Owner, Contractor, and Concrete Supplier.

5. Ready-mixed concrete delivered shall be accompanied by delivery tickets showing the following:

   a) Date and time leaving the plant.

   b) Type of cement and weight.

   c) Quantity of water and time added.

   d) Aggregate moisture correction factor.

   e) Admixtures and weight.

   f) Site arrival time.

   g) Site leaving time.

   h) Type of fly ash and weight.

6. Laboratory test reports for concrete materials and mix design test. Contractor shall submit three (3) copies.

7. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

8. Hot weather and cold weather concreting plan shall include curing method and specific curing plan, ready mixed supplier plan, contingency plans and materials list as a minimum. All hot weather plans shall meet

requirements of ACI 305. All cold weather plans shall meet requirements of ACI 306.

9. A pouring plan will be submitted by the Contractor to the Engineer for approval showing the location of all construction joints and sawed contraction joints.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the latest revision of the following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) 211 “Proportions for Normal, Heavyweight and Mass Concrete.”

2. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."

3. ACI 318, "Building Code Requirements for Reinforced Concrete."

4. ACI 347 “Recommended Practice for Concrete Formwork.”

5. ACI 350 “Code Requirements for Environmental Engineering Concrete Structures.”

6. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

7. ASTM C 94 Standard Specifications for Ready-Mix Concrete.

8. Florida Building Code 2007 edition.

9. ACI 305 “Specification for Hot Weather Concreting” and 306 “Standard Specification for Cold Weather Concreting.”

B. Concrete Testing Service: Owner will engage a testing agency to perform material evaluation tests.

C. Materials and installed work may require testing and retesting at any time during progress of Work. Any retesting of rejected materials for installed Work, shall be done at Contractor's expense.

D. Review requirements for submittals, status of coordinating work and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:

1. Contractor's superintendent.

2. Agency responsible for concrete design mixes.

3. Agency responsible for field quality control.

4. Ready-mix concrete producer.

5. Concrete subcontractor.

6. Primary admixture manufacturers.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

B. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

C. Forms for Unexposed Finish Concrete: Plywood, lumber, metal or another acceptable material. Provide lumber dressed on at least two (2) edges and one (1) side for tight fit.

D. Forms for Cylindrical Columns and Supports: Metal, glass-fiber-reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

E. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

F. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.

G. Provide ties that, when removed, will leave holes not larger than 1 inch and no smaller than ½ inch in diameter in the concrete surface. Form ties for exposed concrete shall be of the cone-washer type. The cones shall be made of approved wood or plastic. Ties for liquid containment structures shall have an integral waterstop that is tightly welded to the tie. Common wire will not be allowed for form ties.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615 Grade 60 deformed.

B. Steel Wire: ASTM A 82, plain, cold-drawn steel.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

D. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.

E. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

F. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150

1. Type I/II.

B. Fly Ash: ASTM C 618, Class F

1. Use one brand of cement and fly ash throughout Project unless otherwise acceptable to Engineer.

C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.

2.4 WATER

A. Mixing water shall meet specified requirements of ASTM C 94, Section 5.

2.5 ADMIXTURES, GENERAL

Provide concrete admixtures that contain not more than one tenth of one percent (0.1%) chloride ions.

A. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

    a) Conair, Cormix Construction Chemicals.

    b) Air-Mix or Perma-Air, Euclid Chemical Co.

    c) Darex AEA or Daravair, W.R. Grace & Co.

    d) MB-VR or Micro-Air, Master Builders, Inc.

    e) Sealtight AEA, W.R. Meadows, Inc.

    f) Sika AER, Sika Corp.

B. Water-Reducing Admixture: ASTM C 494, Type A or D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

    a) Chemtard, ChemMasters Corp.

    b) PSI N, Cormix Construction Chemicals.

    c) Eucon WR-75, Euclid Chemical Co.

    d) WRDA, W.R. Grace & Co.

    e) Pozzolith Normal or Polyheed, Master Builders, Inc.

    f) Metco W.R., Metalcrete Industries.

    g) Plastocrete 161, Sika Corp.

C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

    a) Super P, Anti-Hydro Company, Inc.

    b) Eucon 37, Euclid Chemical Company.

    c) WRDA or Daracem, W.R. Grace and Company.

d) Rheobuild or Polyheed, Master Builders, Inc.

e) Superslump, Metalcrete Industries.

f) Sikament, Sika Corp.

2.6 CALCIUM CHLORIDE

A. The use of calcium chloride will not be permitted.

2.7 RELATED MATERIALS

A. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217- inch-thick galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.

C. Waterstops: Provide ribbed-type waterstops at construction joints exposed to water pressure, including groundwater pressure, and other joints as indicated. Provide ribbed type with centerbulb waterstops at expansion joints. In general waterstops shall be 9” wide. Install 6” wide waterstops at intersections with reinforced sections with 3” of clear cover. All waterstops shall be a minimum of 3/8” thick. All waterstops shall be provided with either metal grommets or integral tie wires located along the top and bottom of the waterstop spaced at 12”. Other styles or sizes of waterstops may be considered based on their specific application.

D. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

a) BoMetals, Inc.

b) The Burke Co.

c) Greenstreak Plastic Products Co.

d) Meadows, Inc.

e) Progress Unlimited.

f) Schlegel Corp.

g) Vinylex Corp.

E. Sand Cushion: Clean, manufactured or natural sand.

F. Vapor Retarder: Provide vapor retarder that is resistant to deterioration when tested according to ASTM E 154, as follows:

1. Polyethylene sheet not less than 6 mils thick.

G. Water-resistant barrier consisting of heavy kraft papers laminated together with glass-fiber reinforcement and overcoated with black polyethylene on each side.

H. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd., complying with AASHTO M 182, Class 2.

I. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

J. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade and class to suit Project requirements.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a) Burke Epoxy M.V., The Burke Co.

b) Spec-Bond 100, Conspec Marketing and Mfg. Co.

c) Resi-Bond (J-58), Dayton Superior.

d) Euco Epoxy System #452 or #620, Euclid Chemical Co.

e) Epoxtite Binder 2390, A.C. Horn, Inc.

f) Epabond, L&M Construction Chemicals, Inc.

g) Concresive Standard Liquid, Master Builders, Inc.

h) Rezi-Weld 1000, W.R. Meadows, Inc.

i) Metco Hi-Mod Epoxy, Metalcrete Industries.

j) Sikadur 32 Hi-Mod, Sika Corp.

k) Stonset LV5, Stonhard, Inc.

l) Series, Symons Corp.

2.8 PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301, ACI 211, and ACI 350. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

B. Do not use the same testing agency for field quality control testing.

C. Limit use of fly ash to not exceed twenty-five percent (25%) of the total cementitious content by weight. Fly ash shall be used either as an admixture or as a partial cement replacement. Fly ash may be used in all structural concrete.

D. Submit written reports to Engineer of each proposed mix for each class of concrete at least fifteen (15) days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Engineer.

2.9 COMPRESSIVE STRENGTHS

A. Design mixes to provide concrete with the following properties as indicated on schedules:

CLASS	7 DAY	28 DAY	MAXIMUM WATER - CEMENTITIOUS RATIO	MINIMUM CEMENTITIOUS MATERIAL (LBS/CY)
Structural	2670	4000	0.44	564
Non-Structural	2000	3000	0.50	470
Structural, High Density	3000	4500	0.40	650

2.10 STRUCTURAL HIGH DENSITY CONCRETE

A. Structural, High Density Concrete shall be used in all structures where concrete is intended to be watertight in service.

2.11 SLUMP LIMITS

A. Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs and sloping surfaces: Not more than 3 inches.

B. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.

C. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2 - 3 inch slump concrete.

2.12 CONCRETE MIX ADJUSTMENTS

A. Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in Work.

2.13 ADMIXTURES

A. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.

B. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of five percent (5%) with a tolerance of plus or minus one percent (1%).

2.14 READY-MIXED CONCRETE

A. Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85 °F and 90 °F, reduce mixing and delivery time from one and a half (1-1/2) hours to seventy-five (75) minutes, and when air temperature is above 90 °F, reduce mixing and delivery time to sixty (60) minutes.

2.15 WATERPROOFING

A. Provide above and below-grade surface applied coatings in accordance with Project Specification Section 09900.

2.16 CRACK INJECTION MATERIALS

A. Hydrophilic Resin:

1. Shall be a low viscosity, expanding polyurethane resin. It shall cure into a flexible rubber-like material that has the potential for unrestrained increase in volume in excess of 100 percent in the presence of water.

2. Prepare substrate and install in accordance with the manufacturers recommendations.

3. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

   a) Sika Injection 29, by Sika Corporation.

   b) Duroseal Inject, as manufactured by BBZ USA, Inc.

   c) Or equal.

PART 3 EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, vapor retarder/barrier and other related materials with placement of forms and reinforcing steel.

B. Forms

1. General: Design, erect, support, brace and maintain formwork to support vertical, lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

   a) Provide Class A tolerances for concrete surfaces exposed to view.

   b) Provide Class C tolerances for other concrete surfaces.

C. Construct forms to sizes, shapes, lines and dimensions shown and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is

too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

E. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

F. Chamfer all exposed corners and edges, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints. Chamfer edges to be ¾" unless otherwise approved by Engineer, or noted on the construction drawings.

G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.2 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

B. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

C. Clean reinforcement of loose rust and mill scale, earth, ice and other materials that reduce or destroy bond with concrete.

D. Accurately position, support and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as approved by Engineer.

E. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one (1) full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.3 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Engineer.

B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

D. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.

E. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

F. Joint fillers and sealants shall be as follows:

1. Joint Fillers

a) Self-expanding Cork Joint Filler: Preformed strips complying with ASTM D 1752 for Type III.

b) Cork Joint Filler: Preformed strips complying with ASTM D 1752 for Type II.

c) Sponge Rubber Joint Filler: Preformed strips complying with ASTM D 1752 for Type I.

d) Bituminous Fiber Joint Filler: Preformed strips complying with ASTM D 1751: Granulated cork with asphalt binder encased between two (2) layers of saturated felt of glass-fiber felt of width and thickness indicated.

2. Joint Sealers shall be appropriate for their intended use and installations. Follow manufactures instruction for use and installation. All joint sealants shall be in accordance with ACI 504R.

3.4 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.5 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

C. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

E. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.

F. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of

reinforcement and other embedded items without causing mix to segregate. A spare vibrator will be on-site for emergency use at all times.

G. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints or expansion joints, until completing placement of a panel or section.

H. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.

I. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

J. Maintain reinforcing in proper position on chairs during concrete placement.

K. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

L. When air temperature has fallen to or is expected to fall below 40 °F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 °F and not more than 80 °F at point of placement.

M. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

N. Do not use salt, other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs. Calcium chloride will not be allowed.

O. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

P. Cool ingredients before mixing to maintain concrete temperature at time of placement to be in accordance with ACI. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Ice can not be used to replace more than half of the design total water content. Using liquid nitrogen to cool concrete is Contractor's option.

Q. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

R. Fog spray forms, reinforcing steel and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

S. Use water-reducing retarding admixture when required by high temperatures, low humidity or other adverse placing conditions, as acceptable to Engineer.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off. Finish shall be a Class C in accordance with ACI 347.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed. Finish shall be a Class A in accordance with ACI 347.

C. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.

1. Combine one part Portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland cement and white Portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.

2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least thirty-six (36) hours after rubbing.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

E. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.

1. After screeding, consolidating and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 20 (floor levelness) measured according to ASTM E 1155 (ASTM E 1155M). Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Class of surface shall be a class C surface in accordance with 347 R.

F. Non-slip Broom Finish: Apply a non-slip light broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

G. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work. All grout shall be non-shrinking.

H. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

I. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

J. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp and non-slip broom concrete surfaces.

K. Below Grade Concrete: Waterproof the exterior (grade) side of tank and building walls. Prepare surface based upon manufacturers recommendations. Material may be spray, brush or roller applied. Conform to manufacturers recommendations for chosen application.

3.8 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry and windy weather protect concrete from

rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than fourteen (14) days as required due to weather.

C. Curing Methods: Cure concrete by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.

1. Provide moisture curing by the following methods:

a) Keep concrete surface continuously wet by covering with water.

b) Use continuous water-fog spray.

c) Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4 inch lap over adjacent absorptive covers.

2. Provide moisture-retaining cover curing as follows:

a) Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. As soon as initial set has occurred, place a soil soaker hose along the tops of all walls to keep concrete forms wet during the curing period. If forms are removed, continue curing by methods specified above, as applicable, for the remainder of the curing period. If forms are removed before the end of the curing period, then the concrete shall be continuously moist for the remainder of the curing period by fog spraying or covering with moist burlap.

4. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping and other flat surfaces, by applying the appropriate curing method.

5. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.9 SHORES AND SUPPORTS

A. General: Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.

B. Extend shoring from ground to roof for structures four (4) stories or less, unless otherwise permitted.

C. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to support work without excessive stress or deflection.

D. Keep reshores in place a minimum of fifteen (15) days after placing upper tier, or longer, if required, until concrete has attained its required twenty-eight (28) day strength and heavy loads due to construction operations have been removed.

3.10 REMOVING FORMS

A. Formwork, such as columns, beam soffits, elevated slabs, joists, walls and other structural elements, may not be removed until concrete has attained at least seventy percent (70%) of design minimum compressive strength at twenty-eight (28) days. No earth loads or live loads will be structurally placed against or on any poured structurally reinforced concrete until the concrete has reached its twenty-eight (28) day compressive strength or otherwise approved by the Engineer. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

B. Form-facing material may be removed four (4) days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.11 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Engineer.

3.12 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Engineer.

B. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

C. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

E. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets and other objectionable conditions.

F. Correct high areas in unformed surfaces by grinding after concrete has cured at least fourteen (14) days.

G. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer.

H. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

I. Additional repair of concrete cracks in formed and unformed surfaces: All concrete for liquid retaining structures, elevated slabs subject to rainfall and washdown, below grade members and all concrete in contact with earth, water or exposed directly to the elements shall be watertight. All leaks through concrete that exhibit any dampness or flowing water and any cracks, holes or other defective concrete in areas of potential leakage, shall be repaired and made watertight by CONTRACTOR. Where it is not possible to verify that a crack is not leaking, it shall be repaired. Determination of leakage and / or dampness

shall be made by Engineer. Repair, removal, and replacement of defective concrete as directed by ENGINEER shall be at no additional cost to the OWNER.

1. Method of Repair: Cracks shall be pressure grouted using hydrophilic resin. Apply in accordance with the manufacturer's directions and recommendations.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Contractor will employ a testing agency to perform tests and to submit test reports. The testing agency shall be approved by the Engineer. Any retesting due to non-acceptable work or materials shall be at the Contractors expense.

B. Sampling and testing for quality control during concrete placement may include the following, as directed by Engineer.

C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

D. Slump: ASTM C 143; one (1) test at point of discharge for each compressive strength test; additional tests when concrete consistency seems to have changed or as directed by the Engineer.

E. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one (1) for each compressive strength test.

F. Concrete Temperature: ASTM C 1064; one (1) test hourly when air temperature is 40 °F and below, when 90 °F and above, and one (1) test for each set of compressive-strength specimens.

G. Compression Test Specimen: ASTM C 31; one (1) set of four (4) standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

H. Compressive-Strength Tests: ASTM C 39; one (1) set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one (1) day; one (1) specimen tested at seven (7) days, two (2) specimens tested at twenty-eight (28) days, and one (1) specimen retained in reserve for later testing if required.

I. When frequency of testing will provide fewer than five (5) strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.

J. When strength of field-cured cylinders is less than eighty-five percent (85%) of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

K. Strength level of concrete will be considered satisfactory if averages of sets of three (3) consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

L. Test results will be reported in writing to Engineer, ready-mix producer, and Owner within twenty-four (24) hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at twenty-eight (28) days, concrete mix proportions and materials, compressive breaking strength, and type of break for both seven (7) day tests and twenty-eight (28) day tests.

M. Nondestructive Testing: Impact hammer, sonoscope or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

N. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. These additional tests shall be at the Contractor's expense.

3.14 TEST FOR WATERTIGHTNESS (HYDRAULIC STRUCTURES)

I. All concrete tanks and structures designed to contain liquid shall be tested for watertightness in accordance with Section 03900 – Hydraulic Structures Testing

END OF SECTION

SECTION 03456 – PRECAST CONCRETE WETWELL

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all materials, labor and equipment and construct precast concrete cylindrical wetwells for the Reclaimed Water Return Pump Station for the storage pond and for the Waste Backwash Pump Station at the Disk Filters, consisting of precast sections as shown on the Drawings and as specified herein. The Transfer Pump Station shall have an inside diameter of 10 feet, and the Backwash Pump Station an inside diameter of 4 feet.

B. The wetwells shall have sloping sides shaped to drain towards the suction inlets of the pumps. Every effort shall be made by the Contractor to construct a watertight structure. Structures that are not watertight or do not meet the requirements of ASTM C-433 are unacceptable.

C. The forms, dimensions, concrete and construction methods shall be available for inspection by the Owner's Representative in advance of construction. The Owner's Representative shall reserve the right to inspect the facilities of the manufacturer.

D. Lifting devices shall not penetrate the walls of the precast concrete wetwells.

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Submit shop drawings showing details of construction, reinforcing, joints, buoyancy calculations, openings and all other specified details.

1.3 INSPECTION

A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the Owner's Representative. Such inspection may be made at the place of manufacture, and/or at the site. Wherever possible, the precast sections shall be inspected prior to unloading from the delivery truck and marked by the inspector showing acceptance or rejection. However, discovery at any time of failure to meet requirements of these Specifications is cause for rejection.

B. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job site at once. All sections which are damaged after delivery, will be rejected and if already installed, shall be acceptably repaired, if

permitted, or removed and replaced entirely at the Contractor's expense, as determined by the Owner's Representative.

C. All sections shall meet the manufacturing tolerance requirements of ASTM C-478 or the following casting tolerances, whichever are more severe:

Wall Thickness ± 3/8"

Inside Diameter ± 3/8"

Outside Diameter + 1/2"

Height or Length + 3/8"

D. Pipe openings shall meet the recommended tolerances of the individual manufactured pipe to wetwell connectors; however, the horizontal location shall be within ± 2 degrees of arc of that detailed on shop drawings.

E. At the time of inspection, the sections will be carefully examined for compliance with ASTM C478 latest revision, these Specifications and the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

F. Imperfections may be repaired subject to the approval of the Owner's Representative after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at 7 days and 5,000 psi at 28 days. Epoxy mortar may be utilized for repairs subject to the approval of the Owner's Representative.

PART 2 PRODUCTS

2.1 PRECAST CONCRETE SECTIONS

A. General

1. Except as modified in the Specifications, the wetwells shall meet the requirements of ASTM C478, most recent revision, Specification for Precast Reinforced Concrete Wetwell Sections. Cement shall meet the requirements of ASTM C150, or most recent revision, Specification for Portland Cement, Type II. Concrete shall have a compressive strength of 4,000 psi. Minimum wall thickness for the 10–foot diameter wetwell shall be 12 inches, and for the 4-foot diameter wet well shall be 8 inches. Sections shall be custom made with openings to meet indicated pipe alignment conditions and invert elevations. Contractor shall submit shop drawings,

consisting of manufacturer's standard details of various sections, for approval prior to manufacture. Drawings of the wetwells showing invert elevations, pipe sizes and similar details are required. Manufacturer shall submit concrete mix designs together with certified test results for the Owner's Representative's review prior to commencing manufacture.

2. The Manufacturer shall design the wetwells with sufficient volumes of concrete to keep the wetwells from floating, assuming that groundwater is at the surface of the ground. The Manufacturer shall provide design calculations to the Owner that prove that the wetwells cannot float.

3. Manufacturer shall make a minimum of four standard test cylinders for each 100 cubic yards of concrete (or part thereof) that is cast each day. These test cylinders, along with sections cast that day, shall be marked in such a way that the test results can be matched with the appropriate castings. Two cylinders shall be cured with the product until the forms are stripped. At this time, one cylinder shall be broken to ascertain that a minimum strength of 2,000 psi has been reached prior to moving the product from the forming location. The remaining two cylinders shall be cured and tested in accordance with ASTM C192-81 and C39-84. The average compressive strength for each day's production shall be greater than 4,000 psi with no more than 10% of the tested cylinders falling below 4,000 psi. In no case shall any cylinder strength fall below 3,500 psi. All cylinder strengths shall be certified by a Florida Licensed Professional Engineer. Failure to meet these requirements for any day's production is cause for rejection of all sections cast that day.

B. Joints

1. Form joint contact surfaces with machined castings. Surfaces shall be parallel and the tongue equipped with a proper recess for the installation of a rubber gasket. Gaskets shall meet the requirements of Specifications for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (ASTM C-443). In addition to this rubber gasket joint, the installation contractor may, at his own choice, add an exterior seal such as "Waterstop Rx", "Adeka Ultra Seal" or "Cadilloc Sealing Bands".

C. Bottom Base Internal Construction

1. Use grout to construct sloping sides in the wetwells that channel the water flow to the suction inlets of the submersible pumps. Use grout to construct benches to support the discharge elbows for the pumps.

D. Aluminum Access Hatches

1. The Contractor shall provide an aluminum access hatch for each pump in the top slab of the concrete wetwells. Each access hatch shall have dimensions recommended by the pump manufacturer. Each aluminum access hatch and frame shall be fabricated as specified in Section 05531. Each access hatch and frame shall be designed to support a loading of 300 pounds per square foot.

E. Protective Coatings

1. Interior shall be lined with HDPE Agru Sure-Grip and welded by and Agru certified welder, or equal. Exterior shall be coated with coal-tar based sealant as manufactured by Concrete Sealants, New Carlisle, Ohio or equal, including the bottom slab. All exterior joints shall be wrapped with rubberneck tape.

PART 3 WETWELL CONSTRUCTION

3.1 PRECAST CONCRETE WETWELL INSTALLATION

A. Precast concrete sections shall be set vertical and in true alignment. Rubber gaskets shall be installed in the previously set sections. The wetwell shall meet the following installation tolerances:

1. The finished wetwell shall not be out of plumb by more than 3/8" per 10 feet of height.

2. Any jog or offset of wall surface each side of a joint shall not exceed 1/2".

3. Variation in the joint width around the circumference of the wetwell shall not exceed 3/8".

4. Lifting holes in the concrete sections required for handling or other purposes shall be plugged with a non-shrink grout or by grout in combination with concrete plugs.

3.2 TESTING

A. After construction to their finished heights and before being backfilled, the wetwells shall be tested for water tightness in one of the following manners:

1. Plug holes and fill the wetwell with clean water. After eight hours, the water level shall be checked for loss of water. This loss shall not exceed 0.05 gals/hr/ft.dia/ft. head.

2. Plug pipe lines and perform vacuum test. Observing all recommended safety measures, induce a backpressure of 5.0 p.s.i. equivalent to 10" Hg (mercury). The wetwell assembly is considered satisfactory if the vacuum loss is less than 1" Hg for a 60 second length of time.

B. Failure to pass one of these tests requires the contractor to correct the problems and retest. The Contractor shall replace leaking gaskets and/or concrete sections and retest the completed wetwell. The wetwell will not be accepted without successfully passing one of these tests.

3.3 CONNECTION TO EXISTING MANHOLES

A. The Contractor shall connect, where shown on the Drawings or directed by the Owner's Representative, new lines into existing manholes. Unless existing stubs of correct size and location are found to exist, he shall remove a portion of the manhole wall masonry. All new piping entering existing manholes shall be accomplished by mechanical rotary core boring of the manhole riser. After installation of piping, the annular space between piping and concrete shall be sealed with "Link-Seal" or, approved equal.

END OF SECTION

SECTION 03600 - GROUTING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes grouting of equipment bases and such locations as shown on the Drawings and as specified.

B. The types of grouting include the following:

1. Portland Cement Grout

2. Non-shrink, Non-expanding Grout

1.2 DELIVERY AND STORAGE

A. Prevent damage to or contamination of grouting materials during delivery, handling and storage.

B. Store all grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.1 PREMIXED GROUTS

A. Portland Cement Grout

B. (For grouting CMU cells and similar items – f'c=3000 psi minimum)

1. Portland Cement: ASTM C150, Type I

2. Sand: ASTM C33, Fine Aggregate

3. Water: Potable

4. Pea Gravel: ASTM C33. Coarse aggregate, graded so that at least 90% passes 3/8-inch sieve and 90% is retained by a number 4 sieve.

C. (Grout Mortar for use as fillets and leveling)

1. Portland Cement: ASTM C150, Type I

2. Sand: ASTM C33, Fine Aggregate (Marson's sand)

3. Water: Potable

4. Mix 1-part Portland cement to 3-parts sand.

D. Pre-Mixed non-shrink, Non-expanding Grout (Nonmetallic). Non-shrink grout as shown on the Drawings shall be a mixture of selected silica sands, Portland cement, water reducing agents, plasticizing and shrinkage compensating agents. Grout shall be nonmetallic non-corrosive, non-staining and comply with CRD-C-588, Type D.

E. The grout shall be non-shrink in accordance with ASTM C827, ASTM C191, and ASTM C109. The water-grout ratio shall be approximately 8 to 10 quarts of water per cubic foot of grout adjustable for varying job conditions.

F. Grout shall not contain calcium chloride or other salt; aluminum or other metals; chemical additives, gypsum or expansive cements. Grout shall not expand after set.

G. Grout shall be used and applied in accordance with the manufacturer's written instructions.

H. Subject to compliance with requirements provide from the following:

1. L&M Construction Chemicals, Inc. – Crystex

2. Grout Corp. - Five Star Non-shrink Grout or equivalent

2.2 NONSHRINK GROUT

A. Non-shrink grout shall conform to the following requirements:

1. Manufactured under rigid quality control specifically for grout used in transferring heavy loads.

2. Contain nonmetallic aggregates specially graded to minimize bleeding.

3. Have an initial setting time of approximately one hour at 70°F.

4. Produce no settlement or drying shrinkage at 3 days or later.

5. Have higher strength at all ages than plain cement grout of the same flowability.

6. Resist attack by oil and water and have lower absorption than plain cement grout of the same flowability.

7. Minimum compressive strength, in accordance with ASTM C-109, shall be 2500 psi after 1 day and 7000 psi after 28 days.

2.3 MIXES

A. For less than 2-inch clearance, or where size or shape of space makes grouting difficult, grout mix shall consist of Portland cement, fine aggregate and water.

B. For greater than 2-inch clearances where coarse aggregate will not obstruct free passage of the grout, extend grout by adding 50 pounds of pea gravel per 100 pounds grout material.

C. Use minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.

D. Portland cement mortar for raked-out edges of non-shrink grout: one part Portland cement, two parts sand and 0.50 part water by weight.

2.4 MIXING

A. Mix grout in accordance with manufacturer's printed specifications.

B. Mix grouting materials and water in a mechanical mixer for no less than 3-minutes.

C. Mix grout as close to the work area as possible and transport the mixture quickly and in a manner that does not permit segregation of materials.

D. After the grout has been mixed, do not add more water for any reason.

PART 3 EXECUTION

3.1 PROCEDURES

A. Installation methods and procedures shall be approved by Engineer and shall be in accordance with manufacturer's printed specifications before work is begun.

3.2 SURFACE PREPARATION

A. Surface preparation shall be in accordance with manufacturer's printed specifications.

B. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by bush-hammering, chipping, or other similar means, until a sound, clean concrete surface is achieved.

C. Lightly roughen the concrete, but not enough to interfere with the proper placement of grout. Cover concrete areas with waterproof membrane until ready

to grout. Immediately before grouting remove waterproof membranes and clean any contaminated surfaces.

D. Remove foreign materials from metal surfaces in contact with grout. Align, level and maintain final positioning of all components to be grouted.

E. Saturate concrete surfaces with clean water; remove excess water and leave none standing.

3.3 PLACING

A. Placing shall be in accordance with manufacturer's printed specifications.

B. Place non-shrink grouting material quickly and continuously by the most practical means permissible; pouring, pumping or under gravity pressure.

C. Do not use either pneumatic-pressure or dry packing methods without written permission of the Engineer.

D. Apply grout from one side only to avoid entrapping air.

E. Final installation shall be thoroughly compacted and free from air pockets.

F. Do not vibrate the placed grout mixture or allow it to be placed if the area is being vibrated by nearby equipment.

G. Do not remove leveling shims for at least 480 hours after grout has been placed. After shims have been removed, fill voids with plain cement-sand grout.

H. After non-shrink grout has reached initial set, rake out exposed edges approximately 1-inch into the grouted area and paint with Portland cement mortar.

3.4 CURING

A. Cure grout for 3-days after placing by keeping wet and covering with curing paper or by another approved method.

END OF SECTION

SECTION 03900 – HYDRAULIC STRUCTURES TESTING

PART 1 GENERAL

1.1 DESCRIPTION

A. Scope

1. The Contractor shall perform cleaning, flushing and testing for all hydraulic structures in accordance with the requirements of the Contract Documents.

2. The Work shall include all labor and materials required to prepare a structure for testing and to convey reclaimed water to the point of use from the source designated by Owner, and all labor and materials required to drain, and dispose of reclaimed water used for testing.

B. Related Divisions and Sections

1. Section 03300 – Cast-In-Place Concrete.
2. Section 03456 – Precast Concrete Wetwell.

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with the applicable provisions and recommendations of the following unless otherwise shown or specified.

1. ACI 350, “Code Requirements for Environmental Engineering Concrete Structures and Commentary (ACI 350R).”

1.3 CONTRACTOR SUBMITTALS

A. All submittals. The Contractor shall submit a minimum fourteen (14) day advance written notice of the proposed testing schedule for a given structure for review and concurrence of the Engineer and Owner. The Contractor's proposed plans for water conveyance, control and disposal shall also be submitted in writing.

B. Contractor shall submit all testing data collected for each structure/cell tested in accordance with ACI 350 for approval.

C. All submittals for this Specification shall be in accordance with Section 01340 – Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.1 MATERIALS REQUIREMENTS

A. Temporary valves, bulkheads or other water control equipment and materials, shall be as determined by the Contractor subject to the Owner's Representative review. Cost of all materials required for testing, supply and discharge of testing water shall be included in the Base Bid.

PART 3 EXECUTION

3.1 GENERAL

A. Reclaimed water for testing will be furnished by the Owner. The Contractor shall make all necessary provisions for conveying the reclaimed water from the source to the points of use.

B. All hydraulic structures and appurtenant pressure piping connections shall be tested.

C. Concrete coatings, paint and/or liners shall not be applied until all leak testing operations have been completed and the structure is accepted.

D. Release of water from structures, after testing has been completed, shall be as approved by the Owner's Representative. Discharge location shall be approved by Owner.

E. Clean structures after testing and prepare substrates for coating installation in accordance with relevant specification sections.

3.2 LEAKAGE TESTING OF HYDRAULIC STRUCTURES

A. Analysis of data from leakage tests of hydraulic structures will be performed by the Contractor following the requirements of ACI 350, ACI 350R and as specified herein. The Contractor shall supply all materials and labor as needed to assist the Owner's Representative in obtaining data from the test.

B. Prior to the start of leakage testing, the following requirements shall be met.

1. All elements of the structure that resist any portion of the retained liquid pressure shall be in place and at specified strength levels. All concrete shall be fully cured.

2. Structure walls shall not be backfilled prior to leakage testing.

3. All valves, gates, blind flanges and other non-concrete items that control the flow of, or otherwise retain the liquid contents of the structure, shall be checked for water-tightness. If not watertight, means shall be taken to assure water-tightness during the period of the leakage test.

4. The portions of the structure to be tested shall be cleaned of all construction debris and other foreign materials.

5. Defective concrete shall be repaired.

6. Standing water, soil, construction materials and any other material that interferes with the exposed concrete surfaces of the structure shall be removed.

7. The Contractor shall notify the Owner's Representative and Owner a minimum of seventy-two (72) hours prior to start of filling of structure for leakage testing. Leakage testing shall not start until the structure is inspected by the Owner's Representative.

8. The structure shall be tested prior to the application of all coating systems and the installation of masonry block veneer, if applicable.

C. The following special requirements apply:

1. All structures which contain basins, channels and/or chambers that are independent or are separated by a common wall shall be tested independently unless otherwise agreed to by Engineer. All leakage occurring between/through common walls shall be repaired in addition to all other repair requirements.

2. Each influent, effluent or overflow trough shall be tested independently.

D. Filling Structure with Reclaimed Water:

1. The portion of the structure to be tested shall be filled at a rate not to exceed 2 feet per hour.

2. Structure shall be filled to the normal operating depth of the structure as indicated on the Contract Drawings. Where no operating depth is indicated or where operating depth is controlled by flowing over a weir, the structure shall be filled to a depth 6 inches below the weir or top of wall elevation, whichever is lower.

3. Reclaimed water in the structure shall be maintained at the specified test elevation for a minimum of three (3) days.

E. After reclaimed water has been brought to the test elevation, the exposed elements of the structure shall be inspected for leakage. All locations that exhibit any amount of leakage flow or dampness shall be repaired prior to the start of leakage testing. Dampness is defined as any visible water staining the following:

1. At Exterior Walls – the exterior sides of the walls.

2. At Interior Walls – the opposite sides of the walls containing the water.

F. Leakage test duration shall be determined by the Owner's Representative based on ACI 350.1R but shall not be less than three (3) days.

G. Leakage Allowance:

1. For concrete structures, the maximum allowable leakage rate shall be 0.075 percent of the volume per twenty-four (24) hour period.

H. Test Locations:

1. Structure cells which are less than 1000 square feet in area shall have measurements of water level taken at two (2) locations that are located approximately 180 degrees apart.

2. Structure calls which are greater than 1000 square feet in area shall have measurements of water level taken at four (4) locations that are located approximately 90 degrees apart.

3. Each test location shall be marked and given a reference number. A reference point shall be marked on the face of the wall above the test water surface in a manner that will prevent its movement or deterioration during the period of the test.

I. Evaporation and Precipitation Measuring:

1. In open structures, a clear plastic calibrated open top container not less than 18 inches in diameter and depth shall be partially filled, floated in the tank, and held in position near each measurement location.

2. The container shall be located so as to not be shaded by tank walls and away from any items passing over it such as beams or pipes.

J. Test Measurements:

1. Leakage tests shall not be started when periods of severe weather conditions or major changes in average daily temperature are predicted.

2. The following measurements shall be recorded at each test location at the start of the test period and at twenty-four (24) hour intervals thereafter.

a) Distance from reference point to test water surface.
b) Depth of reclaimed water in the floating container.

c) Temperature of the test reclaimed water at 18 inches below water surface.

d) Temperature of the reclaimed water in the evaporation-precipitation container at mid-depth.

K. Leakage Determination:

1. The change in water surface elevation at each test location shall be averaged and adjusted as follows:

   a) The total change in test water surface elevation shall be adjusted by the average change in water surface elevation in the evaporation-precipitation containers.

   b) Where averaged water temperature measurements vary by more than 3 degrees from start to completion of the test period, adjustment in tank volume shall be determined by change of water density resulting from the change in the average water temperature.

L. Retesting:

1. The leakage test shall be considered as failed if the specified leakage allowance is exceeded or if any leakage or dampness is observed.

2. If the test becomes unreliable due to excessive precipitation or other external factors, it shall be restarted.

3. If a leakage test fails, it may be retested immediately without repairs if approved by the Owner's Representative. If subsequent leakage tests fail, the Contractor shall repair all probable areas of leakage and the leakage test shall be repeated until it meets the specified leakage criteria.

END OF SECTION

SECTION 05500 – METAL FABRICATIONS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Metal fabrications include items made from iron, steel or aluminum shapes, plates, bars, strips, tubes, pipes and castings which are not specified elsewhere.

B. Extent of metal fabrications is indicated on the drawings or as required to complete the work.

1.2 RELATED SECTIONS

A. Painting metal items is specified in Section 09900 – Painting and Coatings.

1.3 TYPES OF WORK

A. Types of work in this section include metal fabrication for:

1. Miscellaneous framing and supports.

2. Miscellaneous castings.

3. Fasteners.

1.4 SHOP ASSEMBLY

A. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.5 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

C. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications including but not limited to rain diverters and prefabricated steel tank cradles. Include plans, elevations and details of

sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

PART 2 PRODUCTS

2.1 ALUMINUM STAIRS

A. Stairs shall be of aluminum construction with stringers and treads as shown. Treads shall have non-skid surface with abrasive nosing.

2.2 FERROUS METALS

A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled names and roughness.

B. Steel Plates, angles, channels and Bars: ASTM A 36 with minimum yield strength (Fy=36ksi). Item requiring to be galvanized to be Hot Dipped Galvanized - 2 Oz. per SF.

C. Wide Flange Sections: ASTM A 572 (Fy=50ksi).

D. Steel Tubing: Cold-formed, ASTM A 500, Grade B (Fy=46 ksi).

E. Steel Pipe: Standard weight Schedule 40, ASTM A53, Grade B (Fy=35 ksi).

F. Gray Iron Castings: ASTM A 48, Class 30.

2.3 ALUMINUM METALS AND FABRICATIONS

A. Miscellaneous Aluminum: ASTM B 221, Alloy 6063.
Plate and Sheet ASTM B209 6061-T6 T651 Alloy
Structural Shapes ASTM B308 6061-T6 Alloy
Extruded Shapes ASTM B221 6061-T6
Castings ASTM B108 14 Alloy

2.4 FASTENERS

A. Provide Type 316 stainless steel fasteners for all exterior and interior work unless otherwise shown or specified.

B. Bolting

1. Either

a) Bolts - ASTM A193 Grade B8

b) Nuts - ASTM A194 Grade M

2. Or

a) Bolts - ASTM 276 Type 316 Stainless Steel

b) Nuts - ASTM 276 Type 316 Stainless Steel

2.5 GALVANIZING

A. Galvanizing

1. Shapes ASTM A-123 2.0 OZ/SF

2. Hardware ASTM A-153 2.0 OZ/SF

2.6 STAINLESS STEEL METALS AND FABRICATIONS

A. STAINLESS SHAPES ASTM A276 TYPE 316

B. STAINLESS PLATE ASTM A240 TYPE 316

PART 3 EXECUTION

3.1 FABRICATION, GENERAL

A. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.

B. Aluminum fabrication shall be in conformance with the Aluminum Association, Inc. "Specifications for Aluminum Structures"

C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners whenever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.

E. Provide for anchorage of type indicated, coordinated with supported structure. Fabricate and space anchoring devices to provide adequate support for intended use.

F. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

G. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

H. Surface Preparation: Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications, unless otherwise specified.

1. Exterior (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning".

2. Interior (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".

I. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.

3.2 FIELD MEASUREMENTS

A. Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.3 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paints, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. All aluminum surfaces to come in contact with concrete or dissimilar metals shall be coated with two coats of aluminum pigmented bituminous paint.

END OF SECTION

SECTION 05520 – HANDRAILS AND GUARD RAILS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes providing handrails and guard rails as shown on the Drawings and includes miscellaneous handrails and guard rails not included in other metal systems in other sections of these specifications.

B. Height for stair rails, handrails, and guard rails shall conform to all applicable codes.

C. Handrails and guard rails used to extend existing facilities shall match the existing as closely as possible unless noted otherwise.

1.2 QUALITY ASSURANCE

A. Codes and Standards:

1. Florida Building Code, latest version.

2. ANSI A117.1.

3. OSHA Part 1920.23 and 1910.24.

4. Life Safety Code 101.

5. AWS "Structural Welding Code".

B. Qualification for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job process; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

D. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinate installation.

1.3 SUBMITTALS

A. Submit Certificates of Compliance with specified requirements. Obtain shop drawings for fabrication and erection. After verifying details and dimensions provide three sets of final drawings and installation instructions to Engineer for use in observing installation and for Record Drawings.

B. All submittals for this Specification shall be in accordance with Section 01340 – Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B221; alloy 6061-T6, T6510; except alloy 6061-T6 for pipe; unless otherwise indicated.

B. Aluminum Castings: ASTM B108; alloy 214 unless otherwise indicated.

C. Aluminum Sheet or Plate: ASTM B209; alloy 6061-T6, unless otherwise indicated.

D. Finish: Clear anodized finish AA C22A41R1X, medium matte, nondirectional, minimum 0.7 mil clear anodized, clear lacquer coating, unless otherwise indicated.

E. Nonshrink, Nonferrous Grout: CE CRD C588.

2.2 FABRICATION

A. The Contractor shall provide a "manufacturer's system" using welded connections. System to include layout of joints that allow movement for thermal expansion/contraction.

B. Exposed work shall be formed true to line and level with accurate angles and surfaces and straight sharp edges.

C. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise shown.

D. Use bent-metal corners formed to the smallest radius possible without causing grain separation or otherwise impairing the work.

E. Welded Connections: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railings or use welding connectors, at fabricator's option.

F. Weld corners and seams continuously and in accordance with the recommendations of AWS. Grind exposed welds smooth and flush to match and blend with adjoining surfaces. Discoloration of finished surfaces will not be acceptable.

G. Form exposed connections with flush, smooth, hairline joints, using concealed fasteners wherever possible. Use exposed fasteners of the type shown, or if not shown, use Phillips flathead (countersunk) screws or bolts.

H. Provide anchorage of the type shown, coordinated with the supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support.

I. Toe Boards: Fabricate toe boards to the dimensions and details shown. If not shown, use 1/4-inch thick x 4-inch plate secured to each post of railing.

J. Brackets, Flanges and Anchors: Provide brackets, flanges, and anchors for railing posts and for handrail supports. Furnish inserts and sleeves as required for anchorage masonry work.

K. Furnish cast metal brackets, flanges, and exposed anchors of the same material and finish as rail supports, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which handrails and guard rails are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors which are to be embedded in concrete or masonry construction. Coordinate the delivery of such items to the project site.

3.3 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing handrails and guard rail items to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as required.

B. Use railing manufacturer's standard methods of installation when acceptable to the Engineer.

C. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation. Set the work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.

D. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Grind joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surface of units which have been coated or finished after fabrication, and are intended for field connections. Adjust railings prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than 6-feet on centers, unless otherwise shown. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

E. Anchor posts in concrete by means of pipe sleeves set and anchored into the concrete. Provide sleeves of galvanized, steel pipe, not less than 6-inches long and having an inside diameter not less than 1/2-inch greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to the bottom of the sleeve and of width and length not less than 1-inch greater than the outside diameter of the sleeve. After the posts have been inserted into the sleeves, fill the annular space between post and sleeve solid with nonshrink, nonferrous grout. Cover anchorage joint with a round metal flange finished to match post.

F. Anchor rail ends into concrete and masonry with round flanges welded to rail ends and anchored into the wall construction with lead expansion shields and bolts.

G. Field Welding: Comply with AWS Code for the procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting the work.

H. Dissimilar Materials: Where dissimilar metals contact each other or there is a condition such as aluminum against concrete, they shall be protected from each other with a pressure sensitive tape, bitumastic coating or other protective method.

I. Toe Boards: Provide toe boards where shown and as required by code.

J. Toe boards shall be provided wherever people can pass or work beneath the open sides or wherever falling material could create a hazard to moving machinery or equipment.

END OF SECTION

SECTION 05531 – ACCESS HATCHES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, equipment and incidentals required and install access hatches as shown on the Drawings and specified herein. Prefabricated access hatches and frames shall be sized as shown on the drawings and be included but are not limited to the following:

1. Waste Backwash Pump Station for the Gravity Disk Filters.
2. Transfer Pump Station.

1.2 COORDINATION

A. The work in this Section shall be completely coordinated with the work of other Sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.

B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.3 SHOP DRAWINGS AND SAMPLES

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Detailed drawings, as provided for in the Contract Documents, showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the Owner's Representative for approval before fabrication.

C. Samples shall be submitted at the request of the Owner's Representative for concurrent review with Shop Drawings.

1.4 FIELD MEASUREMENTS

A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

1.5 REFERENCED SPECIFICATIONS

A. Unless otherwise specified, materials shall conform to the following:

Structural Steel	ASTM A36
Welded & Seamless Steel Pipe	ASTM A53

Gray Iron Castings	ASTM A48,Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum(Extruded Shapes)	6061-T6(Alum. alloy)
Aluminum (Extruded Pipe)	6061-T6 (Alum. alloy)
Aluminum Bar Structural	6061-T6 (Alum. alloy)
Bolts and Nuts	ASTM,A307-316 SS
Fasteners	AISI, Type 316 SS
Steel Plate and Sheet Wire	AISI, Type 316 SS
Welding Rods for Steel	AWS Spec. for Arc Welding

1.6 LOAD REQUIREMENTS

A. For Waste Backwash Pump Stations:

1. H20 Loading.

B. For the Transfer Pump Station :

1. H2O Loading.

1.7 WARRANTY

A. Per General Conditions Article 9, the Contractor shall provide a 3 year warranty from substantial completion.

PART 2 PRODUCTS

2.1 ANCHORS, BOLTS AND FASTENING DEVICES

A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this Section.

B. Compound masonry anchors shall be of the type shown or required and shall be equal to Star Slug in compounded masonry anchors manufactured by Star Expansion Industries, equal by Phillips Drill Co., Rawlplug, or equal. Anchors shall be minimum "two unit" type.

C. The bolts used to attach the various members to the anchors shall be the sizes shown or required. Stainless steel shall be attached to concrete or masonry by means of 316 stainless steel machine bolts, and iron or 316 stainless steel shall be attached with 316 stainless steel machine bolts unless otherwise specifically noted.

D. For structural purposes, unless otherwise noted, expansion bolts shall be Wej-it "Ankr-Tite", Phillips Drill Co. "Wedge Anchors", or Hilti "Kwik-Bolt". When length of bolt is not called for on the Drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt

a minimum of 1-inch behind the reinforcing steel within the concrete. Material shall be as noted on the Drawings. If not listed, all materials shall be 316 stainless steel.

2.2 ALUMINUM ITEMS

A. Prefabricated checker-plate aluminum floor hatches shall be designed for 300 pounds per square foot loading or for H2O loading as described in Paragraph 1.06, and manufactured by Bilco, Halliday, US Foundry or approved equal. Hatches with either dimension over 3 feet-6 inches shall be double leaf type unless otherwise shown on the drawings.

B. Aluminum Hatches. Hatches shall be flush aluminum pit access doors, Halliday Type W1S, or approved equal. Frames shall be 1/4" aluminum with continuous anchor flange. Cover shall be 1/4" aluminum diamond pattern plate reinforced for a 300 pounds per square foot live load or H2O live load with 316 SS heavy duty hinges and hinge pins and 316 SS spring assists for ease of operation. The maximum allowable deflection shall be 1/150 of the span. The cover shall open to 90 degrees and lock automatically in the position with a 316 SS hold-open arm. A vinyl grip aluminum handle shall be provided to release the cover for closing. A 316SS slam lock and removable handle shall be provided. Also provide locking hasp. Hardware shall be 316 stainlesssteel. Factory finish shall be a mill finish with bituminous coating applied to exterior of the frame. Access covers shall carry a lifetime guarantee against defects in material and/or workmanship.

C. Checkerplate aluminum cover plates shall be fabricated to the details shown and installed at the locations shown.

D. Entrance Hatches: The pumping station wet wells shall be equipped with aluminum access covers of adequate size to permit easy removal and installation of submersible sewage pumps and equipment.

E. Structural aluminum channel door frames shall be provided as shown on the Drawings.

F. Miscellaneous aluminum shapes and plates shall be fabricated as shown. Angle frames for hatches shall be furnished complete with welded strap anchors attached. Furnish all miscellaneous aluminum shown, but not otherwise detailed.

2.3 STEEL ITEMS

A. Steel items shall be fabricated and installed in accordance with the Drawings and shall include: support brackets, splice plates, anchor bolts, and any other miscellaneous steel called for on the Drawings and not otherwise specified.

PART 3 EXECUTION

3.1 FABRICATION

A. All metal work for access hatches shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.

B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connection to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.

C. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.

D. Welding of parts shall be in accordance with the Standard Code of Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the Engineer. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.

E. Welding of aluminum work shall be on the unexposed side as much as possible in order to prevent pitting or discoloration.

F. All aluminum finish exposed surfaces, except as specified below, shall have manufacturer's standard mill finish. Aluminum handrails shall be given an anodic oxide treatment in accordance with the Aluminum Association Specification AA-C22-A41. A coating of methacrylate lacquer shall be applied to all aluminum shipment from the factory.

3.2 INSTALLATION

A. Install all furnished items embedded in concrete or other masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted. All dimensions shall be verified at the site before fabrication is started.

B. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.

C. Where aluminum is embedded in concrete, apply a heavy coat of

approved bitumastic troweling mastic in accordance with the manufacturer's instructions prior to installation.

D. Where aluminum contacts masonry or concrete, provide a 1/32-inch neoprene gasket between the aluminum and the concrete or masonry.

E. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer and provide a 1/32-inch neoprene gasket between the aluminum and the dissimilar metal.

F. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

END OF SECTION

SECTION 05532 – ALUMINUM GRATING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of aluminum grating shall include all necessary fasteners and accessory items to make a complete system.

1.2 QUALITY ASSURANCE

A. Codes and Standards: Provide the aluminum grating to conform to the following codes and standards per current edition:

1. ASTM B 221: Specification for Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.

2. ANSI/NAAMM MBG 531: Metal Bar Grating Manual.

3. ASTM E-448: Test Method for Strength of Anchors in Concrete and Masonry Elements.

4. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

5. AWS D1.2: Structural Welding Code – Aluminum.

1.3 SUBMITTALS

A. Submit manufacturer's specifications, load tables, dimensions, diagrams, anchor details and installation instructions in accordance with Section 01340 – Shop Drawings, Project Data and Samples.

B. On request, furnish reports of load versus deflection tests conducted on assembled grating panels. Such tests shall be certified by an independent, nationally recognized testing laboratory.

C. Shop Drawings: Submit shop drawings for the fabrication and erection of all assemblies of work which are not completely shown by the manufacturer's data sheets. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items.

1. Include setting drawings and templates for location and installation of accessory items and anchorage devices.

1.4 JOB CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, don't delay job progress; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

B. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.5 WARRANTY/GUARANTEE

A. Manufacturer's Standard Warranty: The grating sections shall be free of defects in material and workmanship for one year from date of shipment. If the materials are defective, the manufacturer shall repair or replace them at no additional cost.

PART 2 PRODUCTS

2.1 ALUMINUM GRATING

A. The Aluminum Grating design shall be manufactured with alloy 6063-T6.

B. The bar grating size shall be as noted on the construction drawings.

C. Walking Surface Finish: The grating surface shall have a plain fluted pattern surface.

D. Color: The grating color shall be natural aluminum.

2.2 ACCESSORIES

A. Fastener: Provide stainless steel fasteners with hold down clips for sectional and frame attachment with stainless steel Allen wrench screw type by the manufacturer.

B. Frame: Provide where required extruded aluminum alloy 6063-T6 frame by the grating manufacturer. The frame finish shall match that of the specified grating.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that the grating installation will not disrupt other trades and verify that the substrate is clean and free of foreign matter. Correct all defects prior to installation.

3.2 INSTALLATION

A. General: Install the grating in accordance with the project drawings, specifications, approved shop drawings, and manufacturer's installation standards.

B. Grating panels shall be fabricated to be square within manufacturer's tolerances and free from warping and any defect that may affect serviceability and reliability.

C. Install the grating with a min. 1-1/2 inch bearing surface at the frame or support ends. The grating shall be fastened to the frame or support substrate using fasteners and clips supplied by the grating manufacturer. Fastening shall be consistent with the manufacturer's instructions.

D. Tolerances between sections shall not exceed the dimensional spacing of the grating style type. Adjacent sections shall line up to form an uninterrupted straight line, where possible.

E. Grating sections shall be installed to be removable unless indicated otherwise.

F. Openings may be field cut by the installer where indicated to permit field installation of wiring, equipment, piping, etc. All rectangular cutouts shall be made to the next bearing section past the obstruction. The cutout clearance to obstruction from the edge of the grating shall be no larger than 2 inches. Cutouts may be done in the field (unless otherwise requested), however weld a rectangular band bar of the same material and height of the bearing bars along the edge of the cut out.

END OF SECTION

SECTION 05533 – STAINLESS STEEL GRATING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of stainless steel grating shall include all necessary fasteners and accessory items to make a complete system.

1.2 QUALITY ASSURANCE

A. Codes and Standards: Provide the stainless steel grating to conform to the following codes and standards per current edition:

1. ASTM A-276: Standard specification for stainless and heat resisting steel bars and shapes.

2. ANSI/NAAMM MBG 531: Metal Bar Grating Manual.

3. ASTM E-448: Test Method for Strength of Anchors in Concrete and Masonry Elements.

4. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

5. AWS: Structural Welding Code – Stainless Steel.

1.3 SUBMITTALS

A. Submit manufacturer's specifications, load tables, dimensions, diagrams, anchor details and installation instructions in accordance with Section 01340 – Shop Drawings, Project Data and Samples.

B. On request, furnish reports of load versus deflection tests conducted on assembled grating panels. Such tests shall be certified by an independent, nationally recognized testing laboratory.

C. Shop Drawings: Submit shop drawings for the fabrication and erection of all assemblies of work which are not completely shown by the manufacturer's data sheets. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items.

1. Include setting drawings and templates for location and installation of accessory items and anchorage devices.

1.4 JOB CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, don't delay job progress; allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

B. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the project site Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.5 WARRANTY/GUARANTEE

A. Manufacturer's Standard Warranty: The grating sections shall be free of defects in material and workmanship for one year from date of shipment. If the materials are defective, the manufacturer shall repair or replace them at no additional cost.

PART 2 PRODUCTS

2.1 GRATING

A. The Stainless Steel Grating design shall be manufactured with 304 stainless steel in accordance with ASTM A-276.

B. The rectangular bearing bar grating size shall be 1-1/2 inches depth by 3/16-inch width with a clear span of 5.5 feet. The rectangular bar grating shall be spaced 1-3/16 inches apart with cross bars spaced 4-inches apart unless noted otherwise by the construction drawings.

C. The type of grating shall be welded or swage locked. The grating shall have a minimum uniform load capacity of 300 pounds per square foot and a minimum safe concentrated load capacity of 850 pounds per foot.

D. Stainless Steel grating shall have a commercial clean finish provided by the manufacturer consisting of abrasive blast and passivation.

2.2 ACCESSORIES

A. Fasteners: Provide stainless steel fasteners with hold down clips for sectional and frame attachment with stainless steel Allen wrench screw type by the manufacturer.

B. Frame: Provide 304 stainless steel frames for each 304 stainless steel grating unit fabricated by the grating manufacturer. The frame finish shall match that of the specified grating.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that the grating installation will not disrupt other trades and verify that the substrate is clean and free of foreign matter. Correct all defects prior to installation.

3.2 INSTALLATION

A. General: Install the grating in accordance with the project drawings, specifications, approved shop drawings, and manufacturer's installation standards.

B. Grating panels shall be fabricated to be square within manufacturer's tolerances and free from warping and any defect that may affect serviceability and reliability.

C. Install the grating with a min. 1-1/2 inch bearing surface at the frame or support ends. The grating shall be fastened to the frame or support substrate using fasteners and clips supplied by the grating manufacturer. Fastening shall be consistent with the manufacturer's instructions.

D. Tolerances between sections shall not exceed the dimensional spacing of the grating style type. Adjacent sections shall line up to form an uninterrupted straight line, where possible.

E. Grating sections shall be installed to be removable unless indicated otherwise.

F. Openings may be field cut by the installer where indicated to permit field installation of wiring, equipment, piping, etc. All rectangular cutouts shall be made to the next bearing section past the obstruction. The cutout clearance to obstruction from the edge of the grating shall be no larger than 2 inches. Cutouts may be done in the field (unless otherwise requested), however weld a rectangular band bar of the same material and height of the bearing bars along the edge of the cut out.

END OF SECTION

SECTION 09900 – PAINTING AND COATINGS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. The work includes furnishing all labor, materials and equipment required to complete the painting and coatings as indicated on the Drawings and in these specifications.

B. Surface preparation, paint and coatings materials, and their application shall be as recommended by the coating manufacturer and approved by the OWNER'S Representative. The CONTRACTOR shall take all health and safety precautions necessary to prevent accidents during the storage, handling, application, and drying of any of the coatings described.

C. Paints and coatings used to furnish the surfaces of structures or vessels which come into contact with potable water shall meet the applicable requirements of the City Health Department and the State Department of Environmental Protection or other regulatory agencies having jurisdiction.

D. Related Work Specified Elsewhere:

1. Section 09905: Piping and Equipment Identification System.

1.2 QUALITY ASSURANCE

A. The CONTRACTOR is responsible for a satisfactory paint application which will adhere without peeling, flaking, blistering or discoloration. Before application of any painting materials, the CONTRACTOR shall submit a letter of Certification from the manufacturer of the materials selected for the application proposed.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work are limited to the following:

1. Tnemec Company, Inc. - Basis of Design
2. Carboline Company
3. Induron Coatings
4. Dudick Inc.

1.3 SUBMITTALS

A. Data Sheets and Color Charts:

1. The full name of each product and descriptive literature shall be submitted along with a list of water and wastewater plants in Florida where the product has been used.

2. Within a minimum of 30 days prior to application of paints and coatings, the CONTRACTOR shall submit six sets of color charts and data sheets for selection by the OWNER. Before work is commenced, the CONTRACTOR shall prepare samples as required until the color and textures are satisfactory to the OWNER.

3. Resubmit samples as requested until required sheen, color and texture is achieved.

    a. On 12-inch x 12-inch hardboard, provide two samples of each color and material, with texture to simulate finish conditions. On actual wood surfaces, provide two 4-inch x 8-inch samples for stained wood finish. On concrete Masonry, provide two 4-inch square samples of masonry for each type of finish and color, defining filler, prime and finish coats. On actual wall surfaces and other building components, duplicate painted finish of acceptable samples, as directed by the OWNER'S Representative.

1.4 DELIVERY AND STORAGE

A. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name, trade name, and label analysis. Store where directed in accordance with manufacturer's instructions. All paint materials used on the job shall be kept in a single place which shall be kept neat and clean. All oily rags, waste or debris shall be removed every night and all precautions taken to avoid the danger of fire. NOTE: Materials may be flammable, and the area should be marked accordingly. Keep coatings out of the weather.

B. Extra Stock: At the conclusion of the project, the CONTRACTOR shall provide the OWNER with a minimum of one quart from each 50 gallons or fraction thereof for each paint system used on the project. The paint or coating container shall indicate the applicable paint system as indicated in these specifications.

1.5 JOB CONDITIONS

A. Painting or coating and finishing of interior and exterior items and surfaces, unless otherwise indicated:

1. Paint all new construction and portions of existing facilities disturbed by new construction.

2. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated. If not designated, colors will be selected by the

OWNER'S Representative from standard colors available for the coatings required.

3. Includes field painting of bare and covered pipes and ducts (including color coding), and hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work.

4. Painting shall be done at such times as the CONTRACTOR and OWNER'S Representative may agree upon in order that dust-free and neat work is obtained. Painting shall be done strictly in accordance with the manufacturer's instructions and shall be performed in a manner satisfactory to the OWNER'S Representative.

5. "Shop" painting as referred to defines the paint coat which shall be applied in the shop or plant immediately after manufacture, fabrication or assembly and prior to shipment to the site of installation. "Field" painting defines the paint coats to be applied at the project site where the structure or equipment is completed, erected, or installed in place as specified.

B. Materials and Application:

1. Obtain painting materials from one manufacturer. Painting materials not obtainable from the prime manufacturer shall be obtained from a second source recommended by the prime manufacturer. All solvents for thinning shall be obtained from the coating manufacturer. Only use solvents as listed on the manufacturer's product literature.

2. There shall be a perceptible difference in shades of successive coats of paint so that the application of successive coats of paint can be properly and uniformly spread and inspected. Pipes, sheet metal ducts and other metal items which are to be installed in inaccessible locations shall be painted prior to installation.

3. Each coat shall be allowed to dry for the period of time recommended by the manufacturer before the next coat is applied.

4. Proceeding to apply the coatings indicates that the coating contractor has accepted the condition of the existing coating. If questions arise, they should be brought to the attention of the OWNER or OWNER'S REPRESENTATIVE. Do not proceed until resolved.

C. Equipment, Machinery, and Shop Fabricated Items:

1. Pumps, motors, machinery, equipment and other manufactured items shall have surfaces prepared, primed and finish-coated in accordance with the standard practice of the manufacturer. Finish coat colors shall be as approved by the OWNER'S Representative.

2. Shop-fabricated items and components for field assembly shall have surfaces prepared and shop-primed. Finish coat colors shall be as approved by the OWNER'S Representative. Items for submerged service shall be field sandblasted and primed per Paint System B-4.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS - ALL SYSTEMS

A. The film thickness designated and/or the number of coats to be applied shall not be decreased and shall be increased where required to meet other manufacturer's recommendations.

B. Manufacturer's recommendations as to which finish coat should be used with a particular primer shall be observed. In all cases, the prime coat, intermediate coat, finish coat, and all solvents and thinners shall be from the same manufacturer. All paint shall be mildew resistant.

C. Tnemec products are given as examples of painting and coating systems identified in the following paragraphs. The products of other manufacturer's (listed in Paragraph 1.02.B.) may be used as long as they are of the same quality and meet the performance criteria.

D. Substitution requests must be considered provided they are submitted ten (10) days prior to bid opening and follow the criteria specified in Section 01640.

2.2 GROUP A - CONCRETE AND MASONRY (NOT IN CONTACT WITH POTABLE WATER)

A. System A-1: For use on above grade interior walls, ceilings, and architectural surfaces not subject to high moisture, corrosion, splashing, or fumes. Typical areas would include control rooms and electrical rooms.

Surface Preparation: Level protrusions and remove mortar splatter from all surfaces. Allow new concrete to cure 28 days prior to coating. All surfaces shall be clean and dry before proceeding.

1. Interior Concrete Surfaces Excluding CMU (Non-Immersion):

   a. Prime: Apply 1 coat of Tnemec Series 54 Masonry Filler at 80 - 100 sq.ft. per gallon.
   b. Intermediate: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.
   c. Finish: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.

2. Interior CMU or Porous Block (Non-Immersion):

a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at approximately 75 - 100 sq.ft. per gallon.
b. Intermediate: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.
c. Finish: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.

B. System A-2: For use on above grade interior walls, ceilings, and non-traffic slabs that are subject to high moisture, physical abuse, mild chemical fumes, splashing and spillage of water or wastewater byproducts, etc. Typical areas would include filter press building walls, UF Building process area walls, etc.

Surface Preparation: Level protrusions and remove mortar splatter from all surfaces. Allow new concrete to cure 28 days. All surfaces shall be clean and dry before proceeding. Pressure washing may assist in removing loose dirt and contamination.

1. Interior Concrete Surfaces Excluding CMU (Non-Immersion):

a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at 125 - 150 sq.ft. per gallon.
b. Intermediate: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.
c. Finish: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.

2. Interior CMU or Porous Block (Non-Immersion):

a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at approximately 120 - 130 sq.ft. per gallon.
b. Intermediate: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.
c. Finish: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.

3. Interior CMU or Porous Block For Locker Rooms, Bathrooms:

Surface Preparation: Clean and dry, level protrusions, and remove mortar splatter from all surfaces. Allow mortar to cure 14 days before proceeding with coating.

a. Prime/Surfacer: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at 120 - 130 sq.ft. per gallon.
b. Intermediate: Apply 1 coat of Tnemec Series 113 H.B. Tneme-Tufcoat at 4.0 - 6.0 mils dft.
c. Finish: Apply 1 coat of Tnemec Series 113 H.B. at 4.0 - 6.0 mils dft.

C. System A-3: For use on exterior concrete walls above grade to a point at least 6" below finish grade (extend to depth where nearest course ends, if applicable). Applicable to all buildings.

Surface Preparation: Fill all voids with grout; remove loose mortar, mortar splatter, protrusions, etc. Allow all concrete or grout to cure a minimum 28 days before proceeding. Remove all dirt or contamination before proceeding.

1. Exterior Concrete Buildings: Poured or cast-in-place.

    a. Prime: Apply 1 coat of Tnemec Series 6 Tneme-Cryl at 2.0 - 3.0 mils dft.
    b. Intermediate: Apply 1 coat of Tnemec Series 6 Tneme-Cryl at 2.0 - 3.0 mils dft.
    c. Finish: Apply 1 coat of Tnemec Series 6 Tneme-Cryl at 2.0 - 3.0 mils dft.

2. Exterior Concrete Buildings: CMU

    a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at a spreading rate of between 120 - 130 sq.ft. per gallon.
    b. Intermediate: Apply 1 coat of Tnemec Series 6 Tneme-Cryl at 2.0 - 3.0 mils dft.
    c. Finish: Apply 1 coat of Tnemec Series 6 Tneme-Cryl at 2.0 – 3.0 mils dft.

Or, if an elastomer is preferred, use the following:

3. Exterior Concrete Buildings: CMU or PIP - Elastomeric

    a. Prime: Apply 1 coat of Tnemec Series 156 Enviro-Crete at 4.0 - 6.0 mils dft.
    b. Finish: Apply 1 coat of Tnemec Series 156 Enviro-Crete at 4.0 - 6.0 mils dft.

D. System A-4: For use on all exterior concrete walls below a point six inches below finish grade.

Surface Preparation: Remove all loose dirt and contamination. Clean and dry before proceeding.

1. Exterior Concrete Walls: Poured or Cast-in-Place

    a. Prime: Apply 1 coat of Tnemec Series 46H-413 Tneme-Tar at 8.0 - 10.0 mils dft.
    b. Finish: Apply 1 coat of Tnemec Series 46H-413 Tneme-Tar at 8.0 - 10.0 mils dft.

E. System A-5: For use on interior concrete floors.

Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic film tape-down test" (reference ASTM D

4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed three pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13).

1. Interior Concrete Floors: Control Rooms, Offices, similar.

    a. Surface Profile: Abrade to ICRI CSP 2-3.
    b. Prime: Apply 1 coat of Tnemec Series 287 Enviro-Pox 6 at 3.0 - 4.0 mils dft.
    c. Intermediate: Apply 1 coat of Tnemec Series 287 Enviro-Pox 6 at 3.0 - 4.0 mils dft.
    d. Finish: Apply 1 coat of Tnemec Series 291 Clear CRU at 2.0 - 3.0 mils dft.

2.3 GROUP B - STRUCTURAL STEEL; STEEL TANKS; EQUIPMENT AND PIPING (NOT IN CONTACT WITH POTABLE WATER)

A. System B-1: For all new steel or site fabricated steel: Exterior or interior and moderate immersion exposure.

1. Surface Preparation: Non-immersion – For exposed steel, excluding immersion service, abrasive blast per SSPC SP6 to a Commercial Grade finish to obtain a 1.5 mil blast profile. For immersion exposure - abrasive blast per SSPC SP10 to a Near White finish to obtain a minimum 1.5 mil blast profile.

2. Shop or field apply 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft. As an option, apply 1 coat of Tnemec Series 90G-1K97 Tneme-Zinc at 2.5 - 3.5 mils dft.

B. System B-2: For use on exterior exposed structural and miscellaneous steel; interior and exterior - non immersion exposure. Typical items include steel piping, exterior of steel tanks, structural support steel, etc. This system can be exposed to a corrosive atmosphere; not in contact with wastewater or where a color finish is desired.

1. Surface Preparation: Remove all grease and dirt per SSPC SP1 before proceeding. Commercial blast clean per SSPC SP-6 to achieve a minimum 1.5 mil blast profile.

2. Shop Prime: Apply 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft.

3. Prime Coat: For steel that has been shop primed, clean damaged areas by Power Tool Cleaning SSPC SP3 and spot prime using Tnemec Series 27WB at 3.0 - 5.0 mils dft before applying the "Primer". For steel that has not been shop primed, apply 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft.

4. Intermediate: Apply 1 coat of Tnemec Series 27WB Typoxy at 4.0 - 6.0 mils dft.

5. Finish: Apply 1 coat of Tnemec Series 750 UVX at 3.0 - 5.0 mils dft.

C. System B-3: For use on bituminous coated cast iron or steel pipe.

1. Surface Preparation for bituminous pipe: Wash to remove all grease and dirt before coating. Sweep blast per SSPC SP7 or Power Tool Clean per SSPC SP-3.

2. Prime: Spot prime all bare and damaged areas with one coat of Tnemec Series 135 Chembuild at 3.0 - 5.0 mils dft.

3. Intermediate: Apply 1 coat overall of Tnemec Series 135 Chembuild at 3.0 - 5.0 mils dft.

4. Finish: Apply 1 coat of Tnemec Series 750 UVX at 3.0 - 5.0 mils dft.

D. System B-4: For use on exterior steel tanks, piping and equipment, submerged in moderate corrosive service, excluding chains, sprockets and similar items. This system shall be used for all materials submerged in wastewater. For use in splash and spillage and where a color stable topcoat is required, use System B-2.

1. Surface Preparation: For a shop application, see System B-1. For field applications, abrasive blast all steel to a Near White finish per SSPC SP10 to achieve a minimum 1.5 mil blast profile.

2. Prime: All steel shall be primed with 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft, whether shop or field applied.

3. Intermediate: Apply 1 coat of Tnemec Series 446 Perma-Shield MCU at 6.0 - 8.0 mils dft.

4. Finish: Apply 1 coat of Tnemec Series 446 Perma-Shield MCU at 6.0 - 8.0 mils dft. Use alternating colors between coats.

E. System B-5: For all submerged metals in severe wastewater service. Typical areas would include headworks, grit chambers, and other areas of severe H_2S exposures. Severe abrasion exposure.

1. Surface Preparation: Field abrasive blast to a White Metal finish per SSPC-SP5 to achieve a minimum 3.0 mil blast profile. Prime before any rust bloom.

2. Prime: Apply 1 coat of Tnemec Series 435 Perma-Glaze at 15.0 - 20.0 mils dft.

3. Finish: Apply 1 coat of Tnemec Series 435 Perma-Glaze at 15.0 - 20.0 mils dft. Alternating colors should be used.

F. System B-6: For use on hollow metal (steel) doors and frames, steel embedments, and steel lintels: Pre-primed with alkyd primer, shop or unknown primer, or bare metal. Interior or exterior exposure.

1. Surface Preparation: Remove all grease and oil before proceeding by SSPC SP1. Abrade per SSPC-SP3 before proceeding.

2. Prime (touch-up only): Prime bare or damaged areas with 1 coat of Tnemec Series 27WB Typoxy at 2.0 - 5.0 mils dft.

3. Intermediate: Apply 1 coat of Tnemec Series 27WB Typoxy at 3.0 - 5.0 mils dft.

4. Finish: Apply 1 coat of Tnemec Series 750 UVX at 3.0 - 5.0 mils dft.

2.4 GROUP C - GALVANIZED AND NON-FERROUS METALS

A. System C-1: For galvanized steel in interior (buildings) or exterior substrates in corrosive areas, non-submerged surfaces, non-potable water applications, including ductwork.

1. Surface Preparation: Remove all grease and oil before proceeding by SSPC SP1. Abrade all surfaces to be coated by Brush-Off blasting per SSP SP7 to achieve a minimum 1.5 mil blast profile.

2. Prime: Spot prime all bare or rusted areas with 1 coat of Tnemec Series 27WB Typoxy at 2.0 - 5.0 mils dft.

3. Intermediate: Apply 1 coat of Tnemec Series 27WB Typoxy at 3.0 - 5.0 mils dft.

4. Finish: Apply 1 coat of Tnemec Series 750 UVX at 3.0 - 5.0 mils dft.

B. System C-2: For use on (in interior dry) all aluminum, including ductwork.

1. Surface Preparation: Solvent clean per SSPC-SP1 and abrade the surface to provide a mechanical bond.

2. Prime: Apply 1 coat of Tnemec Series 66 Hi-Build Epoxoline at 2.0 - 3.0 mils dft.

3. Finish: Apply 1 coat of Tnemec Series 740 UVX at 2.5 - 4.0 mils dft.

C. System C-3: For use in exterior non-corrosive areas, galvanized steel and aluminum materials, including ductwork. Refer to System C-1 or C-2.

2.5 GROUP D - EXPOSED HOT METAL SURFACES

A. System D-1: For use on un-insulated surfaces at temperatures between 250° and 1000°.

1. Surface Preparation: Solvent clean per SSPC-SP1 before proceeding. Abrasive blast all ferrous metal to be coated to an SSPC SP10 Near White Finish with a 1.5 mil blast profile.

2. Prime: Apply 1 coat of Dampney Thurmalox 245 High Heat primer at 1.5 - 2.0 mils dft.

3. Finish: Apply 1 coat of Dampney Thurmalox 230 High Heat coating at 1.5 - 2.0 mils dft. For an aluminum finish, use Dampney Thermalox 280 at the same thickness.

2.6 GROUP J – WATER TANKS AND SURFACES IN CONTACT WITH POTABLE WATER

The interior tank paint system shall meet USEPA, National Sanitation Foundation (NSF), and Florida Department of Environmental Protection (FDEP) health standards for use in potable water service. A letter of acceptance by the FDEP shall be furnished to the ENGINEER for the system selected prior to paint application. Disinfection of tank shall be in accordance with Section 15400: Disinfection of Water Storage Facilities.

A. System J-1: For poured or cast-in-place concrete in immersion service of potable water requiring an NSF 61 approved lining. All concrete surfaces must be allowed to cure for a minimum of 28 days at 75°F.

1. Surface Preparation: Remove all dirt and debris before proceeding. Abrasive blast the surface per SSPC SP13/NACE 6 to achieve a surface profile per ICRI CSP 5. Fill all holes, voids, cracks, and pits with Tnemec Series 218 Mortarclad as required. Apply one (1) coat of Tnemec Series 218 Mortarclad at an average of 1/16” dft.

Choose the preference for a liner. Both materials are NSF 61 tested and listed.

2. Immersion Service: Epoxy

a. Prime: Surface all walls and underside of roof with 1 coat of Tnemec Series 218 Mortarclad at a minimum 1/16" dft.
b. Finish: Apply 1 coat of Tnemec Series FC 22 Epoxoline at 20 - 25 mils dft.

3. Immersion Service: Elastomeric flexible liner

a. Prime: Apply 1 coat of Tnemec Series N140 @ 4 – 6 mils dft.
b. Finish: Apply 1 coat of Tnemec Series 264 Elasto-Shield at 50 - 60 mils dft.

B. System J-2: For steel tanks in immersion service for potable water when the lining is required to meet NSF 61 standards.

1. Surface Preparation: Abrasive blast all surfaces to a minimum Near White Finish in accordance with SSPC SP10 to achieve a minimum 3.0 mil blast profile.

2. Prime: Apply 1 coat of Tnemec Series N140 Pota-Pox Plus at 3.0 - 5.0 mls dft.

3. Intermediate: Stripe by brush all welds, edges, corners, etc. with 1 coat of Tnemec Series N140 Pota-Pox Plus.

4. Finish: Apply 1 coat of Tnemec Series FC 22 Epoxoline at 20 - 25 mils dft.

2.7 GROUP K - METAL EXPOSED TO CORROSIVE ATMOSPHERE (EXTERIOR OF NEW STEEL TANKS); EXPOSED INTERIOR OF OPEN TOP STEEL TANKS; STRUCTURAL STEEL, EQUIPMENT AND PIPING

A. System K-1: For use on the exterior of new steel tanks and support structures; steel catwalks, and other exposed structural steel, equipment, and piping subject to a corrosive atmosphere. Refer to System B-2.

2.8 GROUP L - CONCRETE TANKS - IMMERSION SERVICE

A. System L-1: For use on exterior of concrete tank walls below a point 6 inches below finish grade. Refer to System A-4.

B. System L-2: For use on the interior of open top concrete tanks. Exposed concrete or masonry surfaces in a corrosive immersion environment. Typical areas would include headworks, grit chambers and areas of high H_2S environments.

1. Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic firm tape-down test" (reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using

Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed 3 pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13). Abrasive blast the surface per SSPC SP13/NACE 6 to achieve a surface profile of ICRI CSP 5. Fill all holes, voids, cracks and pits with Tnemec Series 218 Mortarclad as required.

2. Surfacer: Surface all walls with 1 coat of Tnemec Series 218 Mortarclad at a minimum 1/16" dft. For floors, Tnemec Series 215 may be used.

3. Intermediate: Apply 1 coat of Tnemec Series 434 Perma-Shield H2S at a minimum 125 mils dft.

4. Finish: Apply 1 coat of Tnemec Series 435 Perma-Glaze at 15 - 20 mils dft.

C. System L-3: For use on the interior of open top concrete tanks. Exposed concrete or masonry surfaces in a corrosive immersion environment. Typical areas would include clarifiers, digesters, etc.

1. Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic firm tape-down test" (reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed 3 pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13). Abrasive blast the surface per SSPC SP13/NACE 6 to achieve a surface profile of ICRI CSP 5. Fill all holes, voids, cracks and pits with Tnemec Series 218 Mortarclad as required.

2. Surfacer: Surface all walls with 1 coat of Tnemec Series 218 Mortarclad at a minimum 1/16" dft. For floors, Tnemec Series 215 may be used.

3. Prime: Apply 1 coat of Tnemec Series N69-1211 Hi-Built Epoxoline II at 4.0 - 6.0 mils dft.

4. Intermediate and Finish: Apply 2 coats of Tnemec Series 446 Perma-Shield MCU at 5.0 - 7.0 mils dft. Alternating colors may be used.

D. System L-4: For use on the exterior of concrete tanks.

1. Surface Preparation: Remove all loose dirt, debris and contamination. Clean and dry.

2. Intermediate and Finish: Apply 2 coats of Tnemec Series 156 Enviro-Crete at 4.0 - 8.0 mils dft. A minimum of 10 mils dft shall be applied.

2.9 GROUP M - SPECIAL COATINGS

A. System M-1: For use as barrier between dissimilar materials and metals; i.e., such as aluminum and concrete connections.

1. Surface Preparation: Clean and dry.

2. Prime: None

3. Finish: Apply 2 coats of Tnemec Series 46-465 H.B. Tnemecol at 8.0 - 12.0 mils per coat.

B. System M-2: For use as a primer - sealer for coloring asphaltic and tar surfaces.

1. Prime: Apply 1 coat of Tnemec Series 66HS Epoxoline at 4.0 – 6.0 mils, dft.

2. Finish: Coat primer with paint appropriate to location and environment.

C. System M-3: For sealing concrete floors where concrete is shown as natural in the Finish Schedules and on all exposed concrete floors where no finish has been shown.

1. Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a “plastic firm tape-down test” (reference ASTM D 4263). Should moisture be detected, perform “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride” (reference ASTM F 1869). Moisture content not to exceed 3 pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid’s ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13).

2. Prime: Apply 1 coat of Tnemec Series 287 Enviro-Pox clear at 3.0 - 5.0 mils dft.

3. Finish: Apply 1 coat of Tnemec Series 294 Clear CRU at 2.0 - 3.0 mils dft. Both products are available in a pigmented version if a solid color floor is preferred.

D. System M-4: For coating of PVC piping, interior or exterior.

1. Surface Preparation: Degrease and clean per SSPC-SP-1 first, then scarify surface.
2. Prime: Apply 1 coat of Tnemec Series 66 Hi-Build Expoxoline at 2.0 - 3.0 mils dft.

3. Finish: Apply 1 coat of Tnemec Series 740 UVX at 2.5 - 5.0 mils dft.

E. System M-5: For coating of FRP piping, interior or exterior.

1. Surface Preparation: SSPC-SP-1 first, then abrade the surface to be coated. Remove any dust, dirt or contamination before proceeding. Clean and dry.

2. Prime: Apply 1 coat of Tnemec Series 66 Hi-Build Expoxoline at 2.0 - 3.0 mils dft.

3. Finish: Apply 1 coat of Tnemec Series 740 UVX at 2.5 - 4.0 mils dft.

2.10 GROUP N - COATINGS FOR DUCTILE IRON PIPE IN WASTEWATER ENVIRONMENTS

This section covers the specification for lining ductile iron pipe for wastewater environments, both interior and exterior of pipe. The system shall also be specified for all fittings and flanges.

A. System N-1: Exterior coating system for above ground exposed DIP where a color is required. Non-immersion service. Pipe should be ordered as shop primed.

1. Surface Preparation: Ductile iron pipe is cleaned per NAPF Standards 500-03 for Commercial Grade abrasive blast cleaning.

2. Shop Primed: Apply 1 coat of Tnemec Series N140 Pota-Pox Plus at 4.0 - 6.0 mils dft. The following is for pipe in the field:

a. Power tool clean all bare and damaged areas by SSPC SP3.
b. Prime: Apply 1 coat of Tnemec Series 27WB Typoxy at 3.0 - 5.0 mils dft.
c. Intermediate: Apply 1 coat of Tnemec Series 27WB at 4.0 - 6.0 mils dft.
d. Finish: Apply 1 coat of Tnemec Series 740 UVX at 3.0 - 5.0 mils dft.

B. System N-2: For the exterior of ductile iron pipe in immersion service or exposed to a severe H_2S environment.

1. Surface Preparation: Ductile iron pipe is cleaned per NAPF Standards 500-03 for Commercial Grade abrasive blast cleaning to obtain a 3 mil blast profile.

2. Finish: Apply Tnemec Series 435 Perma-Shield Glaze at 35.0 - 40.0 mils dft.

C. System N-3: Lining ductile iron pipe for severe wastewater environments. Order pipe lined from the factory.

1. Surface Preparation: Abrasive blast and grind pipe to SSPC SP5 White Metal Finish with a minimum 3.0 mil blast profile.

2. Finish: Apply Tnemec Series 431 Perma-Shield PL at a nominal 40 mil thickness or Induron's Protecto 401 at a nominal 40 mil thickness.

D. System N-4: Lining ductile iron pipe and fittings conveying aggressive potable water in the water treatment plant. Order pipe lined from the factory.

1. Surface Preparation: Abrasive blast and grind pipe to SSPC SP5 white metal finish with a minimum 3.0 mil blast profile.

2. Finish: Apply Induron's Ceramapure at a nominal 30 mil thickness. The Ceramapure shall be NSF 61 approved.

2.11 FINISH COAT OVER EXISTING FINISH

A. The required painting shall consist of one coat of the system "Finish Coat" to provide continuity of texture and color over previously painted surface
.

2.12 THINNING

A. Where thinning is necessary, only the products for the particular purpose and by the manufacturer furnishing the paint shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions and with the full knowledge and approval of the OWNER'S Representative.

PART 3 – EXECUTION

3.1 GENERAL

A. All painting shall be done in strict accordance with the recommendations of the manufacturer and shall be performed in a manner satisfactory to the Owner/Engineer.

B. All recommendations of the paint manufacturer in regard to mixing, applying, thinning and curing, as well as the health and safety of the workers, shall be followed.

C. Dry film thickness for masonry is approximate for application to a smooth surface.

D. Sequence painting to ensure work area is dust free.

3.2 SHOP PAINTING

A. All ferrous and non-ferrous surfaces shall be solvent cleaned before priming. Primer shall be applied in the shop to protect surfaces from rust during shipment and storage.

B. Apply two coats of paint to surfaces which are inaccessible after assembly or erection.

3.3 FIELD PREPARATION

A. All surfaces to be painted shall be prepared in a workmanlike manner with the objective of obtaining a smooth, clean and dry surface. No painting shall be done before the prepared surfaces are approved by the OWNER'S Representative.

B. Surface preparation for miscellaneous surfaces to be painted, not specifically covered in these specifications, shall be as recommended by the manufacturer of the paint selected for use and as approved by the OWNER'S Representative.

C. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.

D. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be finish-painted, or provide surface-applied protection. Reinstall removed items after painting is completed. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes to masonry walls unless moisture content of surfaces are below 12 percent.

3.4 MIXING

A. Exercise care to keep fire hazards to a minimum. Provide an approved hand fire extinguisher near each paint storage and mixing area. No oily waste, rags, or painting equipment shall be left scattered throughout the premises.

B. Mix coatings in accordance with manufacturer's instructions. Colors shall be thoroughly mixed with no streaks or separation of color. Do not add thinners, driers or other additives except as recommended by the coating manufacturer.

Do not incorporate in the coating any thinners or solvents used for cleaning brushes or equipment.

C. Protect all adjacent areas against damage and leave storage and mixing areas clean at the completion of painting.

3.5 PROTECTION OF ADJACENT SURFACES

A. Provide necessary protection for completed work and all adjoining surfaces. Provide temporary closures as required to prevent circulation of dust from adjacent areas where other work is in progress. Where it is necessary to remove existing protection of work of others, such protection shall be fully replaced.

B. Locate and protect all existing utilities, structures, or appurtenances.

3.6 APPLICATION

A. Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

B. Apply painting and finishing materials in accordance with the manufacturer's directions. Use applicators and techniques best suited for the material and surfaces to which applied.

C. Workmanship for applying paint shall be of professional quality. The painter shall apply each coat at the rate recommended by the manufacturer smoothly without runs, sags, or holidays. If the material has thickened or must be diluted for use with a spray gun, the coating shall be built up to the same thickness as achieved with undiluted materials. In other words, one gallon of paint as originally furnished by the manufacturer shall not cover a great square foot area when applied by spray gun than when applied by brush. Deficiencies in film thickness shall be corrected by the application of an additional coat or coats of paint. On masonry, application rates will vary according to the surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint. Before succeeding coats are applied to a surface, the preceding coat shall have been approved by the OWNER'S Representative.

D. Drying time shall be construed to mean "under normal conditions". Where conditions are other than normal because of the weather or because painting must be done in confined spaces, longer drying times will be necessary. Additional coats of paint shall not be applied, nor shall units be placed in service, until paints are thoroughly dry.

3.7 VENTILATION

A. Provide adequate ventilation for safe application and for proper drying of coatings on interior surfaces. Ensure solvent vapors are released during and after application of coatings. Remove vapors by exhausting air from the lowest portions of tanks or enclosed spaces and keep tops open and clear. During coating application in enclosed areas, the capacity of ventilating fans shall be at least 300 cfm per gallon of coating applied per hour. Provide continuous forced ventilation at a rate of at least one complete air change per 4 hours for at least 7 days after coating application is completed.

3.8 CLEAN UP

A. At completion of the painting work, clean off all paint spots and other paint materials from surfaces where they are not intended to be. Remove from the premises all rubbish and accumulated material and leave the work in clean orderly condition, acceptable to the ENGINEER and OWNER. All cloths and waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site and/or destroyed in an approved and legal manner.

3.9 DAMAGED COATINGS

A. Damaged coatings, pinholes, and holidays shall have edges feathered and repaired in accordance with the recommendations of the manufacturer, as approved by the ENGINEER.

B. All finish coats, including touch-up and damage-repair coats, shall be applied in a manner which will present a uniform texture and color-match appearance.

3.10 UNSATISFACTORY APPLICATION

A. If the item has an improper finish, color, or insufficient dry film thickness, the surface shall be cleaned and top coated with the specified material to obtain the specified color and coverage. Specific surface preparation information to be secured from the coatings' manufacturer and the ENGINEER.

B. All visible areas of chipped, peeled, or abraded paint shall be hand or power sanded, feathering the edges. The areas shall then be primed and finish coated in accordance with the specifications.

C. Work shall be free of runs, bridges, shiners, laps, or other imperfections. Evidence of these conditions shall be cause for rejection.

D. Any defects in the coating system shall be repaired by the CONTRACTOR per written recommendations of the coating manufacturer.

E. Any repairs made on steel surfaces for immersion service shall be holiday detected in accordance with ASTM G 62 low voltage holiday detection. Areas found to have holidays shall be marked and repaired in accordance with the paint manufacturer's instructions. The ENGINEER shall be notified of time of testing so that he might be present to witness testing.

3.11 GUARANTEE AND ANNIVERSARY INSPECTION

A. All work shall be warranted in accordance with the General Conditions and Specification 01740.

B. The OWNER will notify the CONTRACTOR at least 30 days prior to the anniversary date and shall establish a date for the inspection. Any defects in the coating system shall be repaired by the CONTRACTOR at no additional cost to the OWNER. Should a failure occur to 25% of the painted surface, either interior or exterior, the entire surface shall be cleaned and painted in accordance with these specifications.

END OF SECTION

SECTION 09902 – PIPE AND EQUIPMENT PAINTING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes pipe painting and identification as required for this project.

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.1 PAINTING AND IDENTIFICATION

A. Exposed piping (except stainless steel) shall be painted. Metal pipe shall be painted B-3 or B-4 depending on location. Seal coats shall be used over bitumen coated surfaces as applicable utilizing System B-2. Plastic pipe shall be painted in accordance with pipe manufacturer's recommendations utilizing System M-3.

B. General Notes and Guidelines:

1. All color numbers and names herein refer to Tnemec master color card. Colors of specified equal manufacturers may be substituted with approval of the Owner's Representative.

2. Pipe lines, equipment, or other items which are not listed here shall be assigned a color by the Engineer and shall be treated as an integral part of the Contract.

3. When color coding is specified or directed by the Engineer, it shall consist of color code painting and identification of all exposed conduits, through lines and pipelines for the transport of gases, liquids, or semi-liquids including all accessories such as valves, insulated pipe coverings, fittings, junction boxes, bus bars, connectors and any operating accessories which are integral to a whole functional mechanical pipe and electrical conduit systems.

4. Description on titles (Abbreviated Code on Pipe/Equipment), to be lettered on pipes or equipment will be black or white to contrast with color of pipes and equipment, and shall be stencil applied, as approved by the Owner's Representative.

5. All moving parts, drive assemblies, and covers for moving parts which are potential hazards shall be Safety Orange 04SF.

6. All safety equipment shall be painted in accordance with OSHA standards.

7. All inline equipment and appurtenances not assigned another color shall be painted the same base color as the piping. The pipe system shall be painted with the pipe color up to but not including the flanges attached to pumps and mechanical equipment assigned another color.

8. All pipe hangers and pipe support floor standards shall be painted.

9. All conduit shall be painted to match its background surface.

10. Building surface colors shall be painted as scheduled in the Finish Schedule or as selected by the Owner's Representative.

11. Doors and frames shall be painted as scheduled in the Finish Schedule or as selected by the Owner's Representative.

12. Wood casework, frames, doors, etc. shall be finished with urethane as specified except as specifically noted otherwise.

2.2 PAINT COLOR CODE SCHEDULE

C. In situations where two colors do not have sufficient contrast to easily differentiate between them, a six-inch band of contrasting color should be painted on one of the pipes at approximately 30-inch intervals. The name of the liquid or gas should also be painted (stenciled) on the pipe in a contrasting color. In some cases, it may be advantageous to paint arrows indicating the direction of flow.

Description of Title to be Lettered on Pipes and Equipment	Color of Title Letters	Pipe and Equipment Color	
		Color Name	Color Number
EQUIPMENT			
Conveyors, Sludge Hoppers, & Related Equip.	White	Safety Orange	04SF
Bar Screens	White	Safety Orange	04SF
Grit Collector Housing and Screw Conveyors	White	Safety Orange	04SF
Sump Pumps	White	Light Gray	A0385
Bridge Cranes, Monorails and Track	White	Safety Orange	04SF
Blowers	Black	Cypress Green	G0383
Sluice Gate Operators	White	Safety Orange	04SF
Scum Pumps	White	April Green	J8187
Pneumatic Ejectors	White	April Green	J8187
Air Compressors	White	Palm Green	G3102
Waste Sludge Pumps	White	Tan Bark	J6512
Air Filter Housings	White	Cypress Green	G0383
Sodium Hypochlorite Pumps	Black	Safety Yellow	02SF

Effluent Reuse Pumps	White	Pantone Purple	522-C
Filter and Effluent Sample Pumps	White	Aquamarine	G0427
Flash Mixers	White	Safety Orange	04SF
Flocculator Drives	White	Safety Orange	04SF
Clarifier Bridges and Pumps	White	Safety Orange	04SF
Odor Control System and Blowers	Black	Egg Shell	J6963
Alum Feed System	Black	Safety Orange	04SF
Polymer Feed System	Black	Oriental Yellow	D0852

Description of Title to be Lettered on Pipes and Equipment	Color of Title Letters	Pipe and Equipment Color	
		Color Name	Color Number
Polymer Tanks and Mixers	Black	Oriental Yellow	D0852
Polymer Pumps	Black	Oriental Yellow	D0852
Grit Screw Conveyor	White	Safety Orange	04SF
Sludge Pumps	White	Antique Brown	L9398
Conduit	White	Cypress Green	G0383
Conduit Trays	White	Cypress Green	G0383
Fans	White	Egg Shell	J6963
PIPES			
Raw Wastewater Pipe	White	Light Gray	A0385
Stainless Steel Air Pipe and Appurtenances	Black	Silver	Match S. Steel
Scum Pipe	White	April Green	J8187
Waste Sludge Pipe	White	Tan Bark	J6512
Sump Pump Pipe	White	Light Gray	A0385
Chlorine Pipe and Header	Black	Safety Yellow	02SF
Effluent Reuse Pipe	White	Pantone Purple	522-C
Chlorine Sample Pipe	Black	Safety Yellow	02SF
Polymer Pipe	Black	Oriental Yellow	D0852
Thickened Waste Sludge Pipe	White	Antique Brown	L9398
Cold Water	Black	Azure	J8162
Hot Water	Black	Azure	J8162
Soil Pipes	White	Light Gray	A0385
Fuel Pipe	White	Safety Red	06SF
Waste and Vent Pipes (Interior)	White	Match Background	
Waste Backwash from Disk Filters (BWW)	White	Tan Bark	J6512
Sodium Hypochlorite (NaOCL)	Black	Safety Yellow	02SF
Reclaimed Water Return (RCWR)	White	Pantone Purple	522-C

Reclaimed Water Recirculation (RECIRC)	White	Pantone Purple	522-C
Reject (REJ)	White	Light Gray	A0385

2.3PAINTING OF EXISTING STRUCTURES, PIPING, VALVING AND EQUIPMENT

A. Touch up existing structures and equipment where finish has been damaged by new construction.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 11001 – EQUIPMENT – BASIC REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION

A. Provisions: Requirements specified in Division 1 form a part of this Section.

B. Work Included in this Section. The Contractor shall provide all the required labor, project equipment and materials, tools, construction equipment, safety equipment, transportation, and test equipment for furnishing, installation, adjustment, and full test loading of all the mechanical work shown on the Contract Drawings and included in these Specifications.

C. Unless otherwise specified, the work of this division is also subject to the requirements of all other divisions of these specifications including, but not limited to: Divisions 9, 13, 15 and 16. Unless otherwise specified, all other sections of this division are subject to the requirements of this section.

1.2 QUALITY ASSURANCE

A. Incorporated Documents: Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to work of these Specifications where cited below. In every situation, the latest specifications, standards, tests, etc., shall apply unless otherwise noted.

B. Variances: In instances where two codes are at variance, the more restrictive requirements shall apply.

C. Contractor's Expense: The Contractor shall obtain and pay for the required bonds, insurance, licenses, permits, and inspections (unless otherwise specified), and pay all taxes, fees and utility charges that shall be required for the construction work.

D. Extra Work: Work that is not included in the Contract Documents shall not be performed, except when approved in writing by the Owner.

E. Standard of Quality: Items of equipment are specified herein by the name of a manufacturer for the purpose of establishing a standard of quality and acceptable experience. Alternate equipment will be given consideration, per Section 01600 – Material and Equipment.

F. Data: Unless otherwise specified, all equipment furnished shall have a data plate fabricated of 316 stainless steel with a minimum thickness of 1/16 inch and embossed or preprinted lettering, and fastened to the frame with corrosion-resisting pins. Nameplates shall have stamped on them the manufacturer, serial

number, model number, type, operating and performance data, and other pertinent data. Letters and numerals shall not be smaller than 3/16 inch high.

G. Taggings: Where the size of the equipment prevents the fastening of data plates, name tags shall be provided and attached to the equipment and device item to identify it. The name tags shall have a rectangular configuration with square corners and shall be approximately 1-1/2 inches by 3 inches in size. They shall be made from brass or stainless steel sheet metal and have a minimum thickness of 0.032-inch. Letters and numerals shall be engraved or etched in the name tags by a professional engraver and shall not be smaller than 3/16 inch high in size. The name and number for each item of equipment, as designated on the Contract Drawings, shall appear on the name tag for the item. Valve tag information shall conform to Section 15100 – Valves and Appurtenances. A 3/16-inch diameter hole shall be provided in the upper left-hand corner of each name tag and shall be used to attach the name tags to the equipment and device items with 1/8-inch stainless steel cable.

1.3 DRAWINGS

A. Project Drawings: The Drawings are diagrammatic and show the general layout of the complete construction work.

1. Locations of equipment, inserts, anchors, motors, panels, conduits, stub-ups, fittings, fixtures, air, water, power and process inlets, unless specifically dimensioned on the Contract Drawings, shall be determined to suit field conditions encountered, and the Contractor shall be responsible for ensuring clearance between pipes, equipment, and similar appurtenances, without extra cost to the Owner.

2. The Contractor shall review the Contract Drawings and Specifications of other trades and shall include the mechanical work shown thereon that will be required for the installations.

3. Should there be a need to deviate from the Contract Drawings and Specifications, the Contractor shall submit written details and reasons for all changes to the Engineer for approval before making such changes. All extra costs to make the changes will be borne by the Contractor.

4. In the event of varying interpretations of the Contract Documents, the Engineer's interpretation shall govern.

B. Shop Drawings

1. Prior to fabrication, the Contractor shall obtain, from the manufacturer, shop drawings for all equipment. Shop drawings shall include fabrication, assembly, unit support drawings, installation drawings, and wiring diagrams together with detailed specifications and data covering materials

used, power drive assembly, parts, devices, and other accessories forming a part of the equipment to be furnished.

2. The Contractor shall submit Certified performance or Certified test curves, as specified for all pumps furnished under this Contract. The Contractor shall notify the Engineer three weeks prior to all testing should the Engineer elect to witness the tests.

3. Submit shop drawings and material lists for approval as specified in applicable Sections and in conformance with the requirements of Section 01340 – Shop Drawings, Project Data and Samples.

1.4 ADAPTATION OF EQUIPMENT

A. Should any alternate equipment selected require any revision to the structure, piping, electrical, or other work shown on the Contract Drawings, the Contractor shall include the cost of such revisions in his bid for the equipment and no extra payment shall be made for such revision. All such revisions shall be subject to the approval of the Engineer.

1.5 UTILITY SERVICE AND PROCESS INTERRUPTION

A. All utility service and/or process interruptions initiated by the Contractor in the prosecution of his work shall be scheduled in advance and approved in writing by the appropriate Utility Company and the Owner.

1.6 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit to the Engineer operation and maintenance manuals on all mechanical equipment in accordance with Specification 01730 – Operation and Maintenance Data. Two (2) copies of draft manuals shall be submitted for approval not later than the date of shipment of the equipment. Five (5) final conformed copies shall be submitted and available to Owner's personnel at least two weeks prior to start-up and instruction for each piece of equipment. Refer to Division 1.

1.7 INSTALLATION MANUALS

A. In addition to operation and maintenance manuals, the Contractor shall submit to the Engineer three (3) copies of all installation manuals for each piece of equipment. This manual shall be submitted at the same time as the operation and maintenance manual. Installation of equipment shall not be performed until installation manuals are received.

1.8 EQUIPMENT GUARANTEE

A. The Contractor shall furnish and replace, without cost to Owner, all equipment parts that are defective or show undue wear within 3 years from the date of

substantial completion of the work by the Owner unless extended periods of warranty for specific pieces of equipment are specified elsewhere. In addition to performance guarantees, all processes or systems shall comply with the requirements of applicable portions of the Sections of these Specifications describing those systems.

PART 2 PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

A. All equipment furnished under this Division shall be new and guaranteed free from defects in materials, design, and workmanship. These Specifications, to the extent possible, identify service conditions and requirements for all equipment; however, it shall be the manufacturer's responsibility to ascertain, to his satisfaction, the conditions and service under which the equipment will operate and to warrant that operation under those conditions will be successful. All parts of the equipment shall be amply proportioned for all stresses that may occur during fabrication, erection, and intermittent or continuous operation.

B. All equipment shall be designed, fabricated, and assembled in accordance with the best modern engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests. Materials shall be suitable for service conditions.

C. Except where otherwise specified, structural and miscellaneous fabricated steel used in items of equipment shall conform to the Standards of the American Institute of Steel Construction. All structural members shall be considered as subject to shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment, shall have a minimum nominal thickness of 1/4 inch. The location of the fabricator and his shop schedule shall be furnished to the Engineer prior to the beginning of fabrication so that the Engineer can schedule shop inspection if so desired.

2.2 EQUIPMENT BASES AND BEDPLATES

A. Unless otherwise indicated, a 316 Stainless Steel (SS) base shall be provided for each item of equipment which is to be installed on a concrete foundation. Equipment assemblies, unless otherwise specified, or shown on the Contract Drawings, shall be mounted on a single, heavy, 316 SS bedplate. Bases and bedplates shall be provided with machined support pads, tapered dowels for alignment or mating of adjacent items, adequate openings to facilitate grouting, and openings for electrical conduits. All seams and contact edges between SS plates and shapes shall be continuously welded and ground smooth. The plates shall have a minimum thickness of 1/4 inch. All pump bedplates must include a

drip lip and provision for directing accumulated gland leakage to a single disposal drain point.

2.3 JACKING SCREWS AND ANCHOR BOLTS

A. Jacking screws shall be provided in the equipment bases and bedplates to aid in leveling prior to grouting.

B. Equipment suppliers shall furnish anchor bolts, nuts, washers, and sleeves of adequate design as required for proper anchorage of the bases and bedplates to the concrete bases. Sleeves shall be a minimum of 1-1/2 times the diameter of the anchor bolts. Unless otherwise shown or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-inch of grout beneath the baseplate and to provide adequate anchorage into structural concrete. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Anchor bolts shall be 316 stainless steel which conforms to ASTM A-167 and ASTM A-267.

2.4 LUBRICATION

A. Lubrication of equipment shall ensure constant presence of lubricant on all wearing surfaces. Lubricant fill and drain openings shall be readily accessible. Easy means for checking the lubricant level shall be provided. Prior to testing and/or operation, the equipment shall receive the prescribed amount and type of lubricant as required by the equipment manufacturer. The Contractor shall provide to the Owner a 1-year supply of lubricants for each piece of equipment installed. All lubricants shall be properly packaged, labeled, and delivered to the Owner concurrent with equipment installation. An inventory listing of lubricant types by equipment and quantities shall be provided.

PART 3 EXECUTION

3.1 COORDINATION

A. The Contract Drawings show, in a diagrammatic form, the arrangements desired for the principal apparatus, piping, and similar appurtenances, and shall be followed as closely as possible. Proper judgment must be exercised in carrying out the work to secure the best possible headroom and space conditions throughout, to secure neat arrangement of piping, valves, fixtures, hangers, and similar appurtenances, and to overcome local difficulties and interference of structural conditions wherever encountered.

B. The Contractor shall take all measurement for his work at the installation sites, verify all subcontractor Drawings prior to required submittal and be responsible for the proper installation, within the available space, of the apparatus specified and shown on the Drawings. The Contractor must secure the approval of the Engineer for all variations and/or substitutions before making any changes.

3.2 PROTECTION

A. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry and clean at all times. Pumps, blowers, motors, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather tight storage facilities such as warehouses. All materials and equipment showing evidence of rust, dirt contamination, or other surface or subsurface deterioration shall be cleaned and restored to the Engineer's satisfaction prior to installation.

B. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted in accordance with the requirements of Section 09900 – Painting and Coatings to the satisfaction of the Engineer.

C. Electrical equipment, controls, and insulation shall be protected against moisture or water damage.

D. The Contractor shall maintain equipment storage facilities in accordance with the provisions of Division 1.

E. All equipment shall be stored in the designated storage facilities from delivery until installation.

F. All mechanical equipment, whether in the Contractor's designated storage facility prior to final installation, or whether installed, but not yet placed into service or accepted by the Owner, shall be periodically exercised at intervals, and in accordance with procedures prescribed by each manufacturer, if such a recommendation is included in the manufacturer's installation, operation and maintenance instructions.

3.3 INSTALLATION CHECK

A. The Contractor shall have an experienced, competent, and authorized representative of the manufacturer or supplier of each major item of equipment visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The Contractor shall have the equipment supplier's representative revisit the job site as often as necessary until all problems are corrected and the equipment installation and operation is satisfactory to the Engineer.

B. Each equipment supplier's representative shall furnish to the Owner, through the Contractor, a written report certifying that the equipment: (1) has been properly installed and lubricated; (2) is in accurate alignment; (3) is free from all stress imposed by connecting piping or anchor bolts; and, (4) has been operated successfully under full load conditions.

C. Equipment manufacturers shall furnish the services of competent, factory-trained personnel during the warranty period specified to inspect, service, and repair the equipment where required. Service requests shall be answered and acted upon promptly. This requirement shall not include normal maintenance and service of equipment, which will be the responsibility of the Owner.

D. All costs for this work shall be included in the price bid by the Contractor.

3.4 EQUIPMENT INSTALLATION

A. All equipment shall be installed in full accordance with the equipment manufacturer's recommendations and good practice. Where specified in other parts of this Division, factory-trained service personnel shall be on-site to supervise the installation. Sufficient notice shall be given to the Engineer prior to equipment installation in order that the Engineer or his representative may be present during installation. In general, the following installation practices shall be followed:

1. Examine equipment for damage in shipping and handling. The examination shall include checking for corrosion, poor workmanship, dirt or deleterious substances, and poor fits.

2. Level the base plate or bedplate

3. Install equipment

4. Check alignment of couplings

5. If grout has been used, check alignment and levelness after the grout has set.

6. Check direction of rotation and correct, if necessary, to insure proper operation.

7. Ensure that all submerged or intermittently submerged powered equipment does not have power and control cable splices of any kind inside wells or pits.

3.5 PLACING IN OPERATION

A. Prior to being placed in operation, equipment shall be inspected by the manufacturer's factory-trained personnel. All defects discovered during this inspection shall be corrected prior to initial equipment start-up. Internal coatings applied at the factory shall be removed if required. Lubricant shall be applied in the proper places and levels shall conform to the manufacturer's recommendations. In the presence of the Engineer, full-load operational testing shall be performed and the results of such tests shall be recorded. Unsatisfactory performance shall be corrected and tests shall be repeated until

the equipment performance meets the Specifications. The Contractor shall furnish all power, materials, services, test equipment and labor required to successfully complete all full load equipment testing specified. The Contractor shall certify in writing to the Engineer, in triplicate, that all tests were conducted in accordance with these Specifications and that all components within each system successfully function as required. The Contractor shall notify the Engineer ten (10) calendar days in advance of the time when the equipment will be placed into operation. During the course of initial operation, the Contractor shall instruct Owner's personnel in the proper operation and maintenance of the equipment, as specified herein.

3.6 INSTRUCTION

A. After the equipment specified in Divisions 11, 13, 15 and 16 has been installed, tested, adjusted, and placed in satisfactory operating condition, services of representatives of each equipment manufacturer shall be provided to instruct the operating personnel in the use and maintenance of the equipment. The instruction period shall be scheduled at a time mutually agreed upon with the Owner, prior to final acceptance. The manufacturer's representatives shall fully instruct the Owner's personnel regarding use and maintenance of the equipment. During this instruction period, it shall be the responsibility of the manufacturer to answer all questions from the Owner's operating personnel. Manufacturer shall also demonstrate lubrication, disassembly, adjusting, routine parts replacement, and other "hands-on" activities related to maintenance of the equipment. Provide a minimum of not less than eight (8) hours for this instruction for each piece of equipment or set of identical pieces of equipment provided unless otherwise specified. More days shall be provided if called for in the individual equipment specification. Each manufacturer shall include the service in the price of his equipment. Training session schedules shall be coordinated with the Owner and Engineer and under no circumstances shall more than two training sessions be scheduled for the same day. The Contractor shall designate an individual through whom manufacturer's training will be coordinated. This individual will coordinate all training sessions through Owner's designated training coordinator.

3.7 SPECIAL TOOLS AND ACCESSORIES

A. All special tools, special tool lists, equipment, or accessories required for the installation and maintenance of equipment specified in Division 11, as well as three (3) copies each of instruction manuals necessary for the proper use of such tools, equipment, or accessories shall be provided by the equipment manufacturer. Special tools shall be defined as those items manufactured by the equipment supplier specifically for performing maintenance and installation of their respective equipment, including knocker wrenches for gearboxes.

3.8 SHOP PAINTING

A. Except as specifically supplemented or superseded by requirements herein, shop painting shall conform to requirements in Section 09900 – Painting and Coatings. Electric motors, gears, starters, and other similar self-contained or enclosed components shall be shop primed and finished with a high-grade oil-resistant acrylic enamel. Surfaces which will be inaccessible after assembly shall be painted or otherwise protected before assembly by a method which provides protection for the life of the equipment.

B. Surfaces to be painted at the project site shall be shop painted with one or more coats of a primer which will adequately protect the equipment until finishes are applied at the project site. Primers shall be as specified in Section 09900 – Painting and Coatings. All equipment shall be primed with primer compatible with the coating system selected by the Contractor, and if not, the Contractor shall reprime the equipment such that it is compatible and in conformance with Section 09900 – Painting and Coatings.

C. Machined and polished metallic surfaces which are not to be painted shall be coated with a rust preventive compound as specified in Section 09900 – Painting and Coatings.

3.9 DAMAGED PRODUCTS

A. The Contractor shall notify the Engineer in the event that any equipment or material is damaged subsequent to receipt at the job site, and prior to acceptance of the installation by the Owner.

B. Repairs to damaged products in lieu of replacement shall not be made without prior approval by the Engineer.

END OF SECTION

SECTION 11100 – PUMPS GENERAL

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide all pumps and pumping appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all pumps and pumping equipment except where otherwise indicated in the Contract Documents.

C. The requirements of Section 11001 – Equipment Basic Requirements apply to this Section.

D. Unit Responsibility: The CONTRACTOR shall be made responsible for furnishing the WORK. The Pump Manufacturer shall be responsible for the coordination of design, assembly and factory testing of the Pumps, if required. The Contractor shall be responsible to the OWNER for compliance with the requirements of each pump.

E. Single Manufacturer: Where 2 or more pump systems of the same type or size are required, the pumps shall all be produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01310 – Shop Drawings, Project Data and Samples.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Pump name, identification number, and specification Section number.
2. Performance data curves showing head, capacity, horsepower demand, NPSH required, and pump efficiency over the entire operating range of the pump. The equipment manufacturer shall indicate separately the head, capacity, horsepower demand, overall efficiency, and minimum submergence required at the design flow conditions and the maximum and minimum flow conditions. Performance curves at intervals of 100 rpm from minimum speed to maximum speed shall be furnished for each centrifugal pump equipped with a variable speed drive.
3. The CONTRACTOR shall require the manufacturer to indicate the limits on the performance curves recommended for stable operation without surge, cavitation, or excessive vibration. The stable operating range shall be as wide as possible based on actual hydraulic and mechanical tests.
4. Assembly and installation drawings including shaft size, seal, coupling, bearings, anchor bolt plan, part nomenclature, material list, outline dimensions, and shipping weights.

5. Elevation of proposed local control panel showing panel-mounted devices, details of enclosure type, single line diagram of power distribution, and current draw of panel, and list of all terminals required to receive inputs or to transmit outputs from the local control panel.
6. Wiring diagram of field connections with identification of terminations between local control panels, junction terminal boxes, and equipment items.
7. Complete electrical schematic diagram.

C. Technical Manual: The Technical Manual shall contain the required information for each pump Section.

D. Spare Parts List: A spare parts list shall contain the required information for each pump Section.

E. Factory Test Data: Signed, dated, and certified factory test data for each pump system which requires factory testing, submitted before shipment of equipment.

F. Certifications
1. Manufacturer or manufacturer's representative certification of proper installation.
2. CONTRACTOR'S certification of satisfactory field testing.

PART 2 – PRODUCTS

2.1 GENERAL

A. Compliance with the requirements of the individual pump Sections may necessitate modifications to the manufacturer's standard equipment.

B. Performance Curves: All centrifugal pumps shall have a continuously rising curve or the system operating range shall not cross the pump curve at two different capacities or "dip region." Unless indicated otherwise, the required pump shaft horsepower at any point on the performance curve shall not exceed the rated horsepower of the motor or engine or encroach on the service factor.

C. All components of each pump system provided under the pump Sections shall be entirely compatible. Each unit of pumping equipment shall incorporate all basic mechanisms, couplings, electric motors or engine drives, variable speed controls, necessary mountings, and appurtenances.

2.2 MATERIALS

A. All materials shall be suitable for the intended application; materials not indicated shall be high-grade, standard commercial quality, free from all defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements:

1. Cast iron pump casings and bowls or volutes shall be of close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or equal.
2. Bronze pump impellers shall conform to ASTM B 62 - Composition Bronze or Ounce Metal Castings, or B 584 - Copper Alloy Sand Castings for General Applications, where dezincification does not occur.
3. Stainless steel pump shafts shall be Type 416 or 316. Miscellaneous stainless steel parts shall be Type 316.

4. Anchor bolts, washers, and nuts in Standard Service (Non-Corrosive Application) shall be galvanized steel in accordance with the requirements of Section 05500 - Miscellaneous Metalwork. Anchor bolts, washers, and nuts in Corrosive Service as defined in Section 05500 shall be stainless steel in accordance with that Section.

B. Materials in contact with potable water shall be listed as compliant with NSF Standard 61.

2.3 PUMP COMPONENTS – GENERAL

A. Flanges and Bolts: Suction and discharge flanges shall conform to ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 or ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings dimensions. Bolts shall be in accordance with Section 05500.

B. Lubrication: Vertical pump shafts of clean water pumps shall be product water lubricated, unless otherwise indicated. Deep-well pumps and pumps with dry barrels shall have water- or oil-lubricated bearings and seals and enclosed line shafts. Pumps for sewage, sludge, and other process fluids shall be lubricated as indicated.

C. Handholes: Handholes on pump casings shall be shaped to follow the contours of the casing to avoid any obstructions in the water passage.

D. Drains: All gland seals, air valves, cooling water drains, and drains from variable speed drive equipment shall be piped to the nearest floor sink or drain, with galvanized steel pipe or copper tube, properly supported with brackets.

E. Grease Lubrication: For all vertical propeller, mixed-flow, and turbine pumps, other than deep well pumps, of bowl sizes 10-inches and larger, the CONTRACTOR shall provide a stainless steel tube attached to the column for grease lubrication of the bottom bearing.

F. Stuffing Boxes: Where stuffing boxes are indicated for the pump seal, they shall be of the best quality, using the manufacturer's suggested materials best suited for the specific application. For sewage, sludge, drainage, and liquids containing sediments, the seals shall be fresh-water flushed, using lantern rings. If fresh water is not available, the seal shall be flushed with product water

cleaned by a solids separator as manufactured by John Crane Co., Lakos (Claude Laval Corp.), or equal.

1. Conventional Packing Gland Type Seal: Unless otherwise indicated, the packing material shall be interlaced Teflon braiding, containing 50 percent ultrafine graphite impregnation to satisfy the following. Acceptable ring materials are asbestos-free die-molded packing rings of braided graphite material free of PTFE, Chesterton 1400R, or equal for non-potable water service and braided PTFE material, Chesterton 1725 or equal that is listed under NSF Standard 61 for potable water service.

Shaft speeds	up to 2500 fpm
Temperature	up to 500 degrees F
pH range	0-14

2. Mechanical Seals (Conventional Non-Split Type): Mechanical seals shall be fresh water-flushed unless indicated otherwise; in which case product water cleaned by a solids separator as above shall be used. Mechanical seals shall be as manufactured by the following, or equal:

Sewage, Sludge, or Wastewater Pumps	Double seals	John Crane Type 88, Flowserve Type ISCPP, Chesterton Type GDS or 255
Water Pumps (hot and cold)	Single seals	John Crane Type 88SRS, Flowserve Type ISCPX, Chesterton Type UV, GSS, or 155

3. Mechanical Seals (Split Type): Split type mechanical seals shall be fresh water flushed unless indicated otherwise; in which case product water cleaned by a solids separator as above shall be used. Mechanical seals shall be as manufactured by the following or equal

Sewage, Sludge, or Wastewater Pumps	Double seals	John Crane Type 3710, Flowserve Type PSS2, Chesterton Type 442
Abrasives, Grit, or Lime Slurry Pumps	Double seals	Split seals are not recommended.
Chemicals or Corrosive Liquid Pumps	Single seals	Split seals are not recommended because of leakage.
Water Pumps (hot and cold)	Single seals	John Crane Type 3710, Flowserve Type PSS II, Chesterton Type 442

4. Mechanical Seals (Tandem Type): Tandem type mechanical seals shall have an oil chamber between the seals. The seals shall be used with the rotating seal faces being carbon and the stationary seal faces to be ceramic. The lower seal shall be replaceable without disassembly of the

seal chamber and without the use of special tools. Pump-out vanes shall be present at the back of the impeller to keep contaminants out of the seal area. Tandem Type Mechanical Seals shall be John Crane type 21, BF1C1.

G. Where indicated, a buffer fluid must be circulated a minimum 20 psi above discharge pressure, or as required by the manufacturer, in order to maintain reliable seal performance.

H. Mechanical seals for all services shall be equipped with non-clogging, flexible–mounted seats with elastomer secondary seals. Wetted metal parts shall be Type 316 stainless steel, Alloy 20, or Hastelloy B or C, whichever has the best corrosion resistance to the pumped fluid.

Dual cartridge seals shall be double balanced to allow for seal integrity in case of flush water pressure reversal. All single and double seals shall have springs in the non-wetted end of the seal.

I. Fresh water shall be delivered to the seals through appropriate size piping with plug valves, strainers, pressure regulators, electrically operated solenoid valves, and rotameters. Wiring shall comply with Division 16 and solenoid control shall comply with Division 17.

2.4 PUMP APPURTENANCES

A. Nameplates: Each pump shall be equipped with a stainless steel nameplate indicating serial numbers, rated head and flow, impeller size, pump speed, and manufacturer's name and model number.

B. Solenoid Valves: The pump manufacturer shall provide solenoid valves on the water or oil lubrication lines and on all cooling water lines if seal water flush is required. Solenoid valve electrical ratings shall be compatible with the motor control voltage.

C. Gauges

1. All pumps (except sample pumps, sump pumps, and hot water circulating pumps) shall be equipped with pressure gauges installed at pump discharge lines. Pump suction lines shall be provided with compound gauges. Gauges shall be located in a representative location, where not subject to shock or vibrations, in order to achieve true and accurate readings.
2. Where subject to shock or vibrations, the gauges shall be wall-mounted or attached to galvanized channel floor stands and connected by means of flexible connectors.

2.5 FACTORY TESTING

A. The following tests shall be conducted on each indicated pump system:

1. Pump Systems: All centrifugal pump systems with drives 10 hp up to and including 150 hp shall be tested at the pump factory in accordance with the American National Standard for Centrifugal Pump Tests (ANSI/HI 1.6) acceptance Level "A" or the American National Standard for Vertical Pump Tests (ANSI/HI 2.6) as approved by ANSI and published by the Hydraulic Institute. For sump pumps, acceptance shall be in accordance with Level "B" of ANSI/HI 1.6 unless indicated otherwise. For pumps with motors of 100 hp or less, the manufacturer's certified test motor shall be acceptable. Testing of prototype models will not be acceptable. The following minimum test results shall be submitted:
   a. Hydrostatic test results
   b. At maximum speed, a minimum of five hydraulic test readings between shutoff head and 25 percent beyond the maximum indicated capacity, recorded on data sheets as defined by the Hydraulic Institute.
      For variable speed driven pumps, each pump shall be tested between maximum and minimum speed at 100 rpm increments.
   c. Pump curves showing head, flow, bhp, and efficiency requirements.
   d. NPSH required test curve if required by the pump specification. Otherwise, a calculated NPSH required curve may be submitted.
   e. Certification that the pump shaft horsepower demand did not exceed the rated motor horsepower of 1.0 service rating at any point on the curve.
2. Factory Witnessed Tests: All pumps, and motors, 150 hp and larger shall be factory-tested as complete assembled systems and may be witnessed by the OWNER and ENGINEER. The CONTRACTOR shall give the ENGINEER a minimum of 2 weeks notification prior to the test. All costs for OWNER and ENGINEER shall be borne by the CONTRACTOR and shall be included in the bid price. Such costs shall include travel and subsistence for two people excluding salaries. Test results shall be submitted to the ENGINEER. No equipment shall be shipped until the test data have been approved by the ENGINEER.
3. Acceptance: In the event of failure of any pump to meet any of the requirements, the CONTRACTOR shall make all necessary modifications, repairs, or replacements to conform to the requirements of the Contract Documents and the pump shall be re-tested until found satisfactory.

PART 3 – EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Inspection, Startup, and Field Adjustment: Where required by the individual pump Sections, an authorized service representative of the manufacturer shall visit the Site for the number of days indicated in those sections to witness the

following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Installation of the equipment
2. Inspection, checking, and adjusting the equipment
3. Startup and field testing for proper operation
4. Performing field adjustments to ensure that the equipment installation and operation comply with requirements

B. Instruction of the Owner's Personnel

1. Where required by the individual pump Sections, an authorized training representative of the manufacturer shall visit the Site for the number of days indicated in those Sections to instruct the OWNER'S personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.
2. The representative shall have at least 2 years experience in training. A resume for the representative shall be submitted.
3. Training shall be scheduled a minimum of 3 weeks in advance of the first session.
4. Proposed training material and a detailed outline of each lesson shall be submitted for review. Comments shall be incorporated into the material.
5. The training materials shall remain with the trainees.
6. The OWNER may videotape the training for later use with the OWNER'S personnel.

3.2 INSTALLATION

A. General: Pumping equipment shall be installed in accordance with the manufacturer's written recommendations.

B. Alignment: All equipment shall be field tested to verify proper alignment and freedom from binding, scraping, shaft runout, or other defects. Pump drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure in position and neat in appearance.

C. Lubricants: The CONTRACTOR shall provide the necessary oil and grease for initial operation.

3.3 PROTECTIVE COATING

A. Materials and equipment shall be painted as required in Section 09900 – Painting and Coatings.

3.4 FIELD TESTS

A. Each pump system shall be field tested after installation to demonstrate:

1. Satisfactory operation without excessive noise and vibration.

2. No material loss caused by cavitation.
3. No overheating of bearings.
4. Indicated head, flow, and efficiency at design point.

B. The following field testing shall be conducted:

1. Start up, check, and operate the pump system over its entire speed range. If the pump is driven by a variable speed drive, the pump and motor shall be tested at 100 RPM increments. If the pump is driven at constant speed, the pump and motor shall be tested at max RPM. Unless otherwise indicated, vibration shall be within the amplitude limits recommended by the Hydraulic Institute Standards at a minimum of four pumping conditions defined by the ENGINEER.
2. Obtain concurrent readings of motor voltage, amperage, pump suction head, and pump discharge head for at least 4 pumping conditions at each pump rotational speed if variable speed at 100 RPM increment or at max RPM if constant speed. Check each power lead to the motor for proper current balance.
3. Determine bearing temperatures by contact type thermometer. A run time until bearing temperatures have stabilized shall precede this test, unless insufficient liquid volume is available.
4. Electrical and instrumentation tests shall conform to the requirements of the sections under which that equipment is specified.

C. Field testing will be witnessed by the ENGINEER. The CONTRACTOR shall furnish 3 days advance notice of field testing.

D. In the event any pumping system fails to meet the indicated requirements, the pump shall be modified or replaced and re-tested as above until it satisfies the requirements.

E. After each pumping system has satisfied the requirements, the CONTRACTOR shall certify in writing that it has been satisfactorily tested and that all final adjustments have been made. Certification shall include the date of the field tests, a listing of all persons present during the tests, and the test data.

F. The CONTRACTOR shall be responsible for all costs of field tests, including related services of the manufacturer's representative, except for power and water, which the OWNER will bear. If available, the OWNER'S operating personnel will provide assistance in field testing.

END OF SECTION

SECTION 11304 – NON-CLOG SUBMERSIBLE SEWAGE PUMPS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. The Work includes providing and installing a Reclaimed Water Return Pump Station with duplex pumps. The pump operating characteristics for each pump station shall conform to the requirements shown in Tables 11304-1 at the end of this Section.

2. Furnish, install, and test submersible sewage pumps, motors, and related equipment necessary to complete work shown or specified.

3. Equipment shall include pump(s), motor(s), pump base(s), guide rail systems, electric and control modifications and appurtenances. Provide all components of the pumping units by one manufacturer.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Division 13 – Instrumentation and Controls

B. Division 16 - Electrical

1.3 REFERENCES

A. Codes, Specifications, and Standards: Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the references thereto.

1.4 SUBMITTALS

A. Submittals shall be as specified in the General Conditions and Section 01310 – Construction Schedule and Project Restraints.

B. Submit the following:

1. Manufacturer's Certificate of Compliance certifying compliance with the referenced specifications and standards.

2. Shop drawings with performance data and physical characteristics.

3. Manufacturer's installation instructions.

4. Manufacturer's operation and maintenance material and manuals (see Section 01730).

5. Certified copies of test reports.

1.5 QUALITY ASSURANCE

A. The pumping unit manufacturer shall test each pump for mechanical and electrical correctness.

B. The Contractor shall perform field tests specified in this Section.

C. The Contractor shall provide certification of the wet well H-20 load rating with the wet well submittals. The H-20 certifications must be signed and sealed by an Engineer registered in the State of Florida. After the wet wells have been installed, the ASTM certification number and serial tracking numbers must be visible.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall be responsible for the delivery, storage, and handling of products.

B. The Contractor shall load and unload all pumps, motors, precast concrete and wet wells and appurtenances by hoists or skidding. Products shall not be dropped or skidded on or against other products. Slings and hooks shall be padded in such a manner as to prevent damage to products.

C. The Manufacturer shall package the pumping units furnished in such a manner as to provide ample protection from damage during handling, shipment, and outdoor storage at the project site. The Manufacturer shall cap all openings with dustproof closures and seal or tape all edges to provide a dust-tight closure.

D. Promptly remove damaged products from the job site. Replace damaged products with undamaged products.

1.7 WARRANTY

A. Provide warranties from the pump manufacturer warranting the complete units being supplied to the OWNER against defects in workmanship and material for a period of five (5) years or 10,000 hours under normal use, operation and service. The Contractor shall provide the warranties in printed form and submit them with the shop drawing submittals.

B. Warranties and guarantees by the suppliers of various components in lieu of a single source responsibility by the manufacturer will not be accepted. The manufacturer shall be solely responsible for the warranty of the submersible pumps and all components.

C. In the event a component fails to perform as specified or is proven defective in service during the warranty period, the manufacturer shall provide and install a replacement part without cost to the Owner.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURER and MODEL

A. Reclaimed Water Return Pump Station: Hydromatic Model S8L Non-Clog Submersible Pump.

2.2 NON-CLOG SUBMERSIBLE CENTRIFUGAL PUMPS, GUIDE RAIL BASE AND GUIDE RAIL DESIGN

A. The pumps shall be capable of handling raw unscreened sewage, storm water, reclaimed water from open storage ponds, and other similar solids-laden fluids without clogging. The pumps shall be installed in the H-20 precast concrete wet wells utilizing dual guide rail systems. Each discharge base and elbow shall be permanently installed in the wet wells and connected to the discharge piping. In order to prevent binding or separation of each pump from its guide rail system, the pump shall connect to the guide rail base automatically and firmly, guided by the 316 stainless steel guide rail extending from the top of the station to the discharge connection. Cable guide systems shall not be considered acceptable. Each pump shall be fitted with a 316 stainless cable of adequate strength to permit raising the pump for inspection. The working load of each lifting system shall be 50 percent greater than the pump unit weight. There shall be no need for personnel to enter the wet well to remove or reinstall each pump. Positive sealing of each pump to the discharge elbow shall be accomplished by metal to metal contact between the pump and discharge elbow. No portion of each pump shall bear directly on the floor of the sump. Each pump with its appurtenances and cable shall be capable of continuous submergence to a depth of 65 feet.

2.3 PUMP CONSTRUCTION

A. Major pump components shall be of gray cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of porosity or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts, bolts and fasteners shall be AISI type 316 stainless steel construction. All exterior metal surfaces of the pump coming into contact with the pumped media (other than the stainless steel or brass components) shall be protected by a factory applied spray coating of dark green, water reducible enamel.

B. Sealing design for the pump/motor assembly shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where a watertight seal is required shall be machined and fitted with Buna-N rubber O-rings sealed on a beveled edge. Sealing will be the result of controlled compression of a rubber O-ring in two planes and O-ring contact of four sides without requiring a specific torque limit. No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.

C. The pump casing or volute shall be single piece gray cast iron, ASTM A48, Class 30, non-concentric design with smooth passages large enough to pass any solids, which may enter the impeller. Minimum discharge size shall be as specified. The casing shall be of the end suction volute type having sufficient strength and thickness to withstand all stress and strain from service at full operating pressure and load. The casing shall be of the centerline discharge type equipped with an automatic pipe coupling arrangement for ease of installation and piping alignment. The design shall be such that the pumps will be automatically connected to the discharge piping when lowered into position with the guide rails. The casing shall be accurately machined and bored for register fits with the suction and casing covers.

D. A volute case wearing ring shall be provided to minimize impeller wear. The wear ring shall be alloy 230 brass, ASTMB-43 and held by 300 series stainless steel fasteners. The wear ring shall be easily replaceable in the field.

E. The impeller shall be of gray cast iron, ASTM A48, Class 30, dynamically balanced, 2-vane non-clogging design having a long throughlet without acute turns. The impeller shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater. The impeller shall be threaded shaft or tapered shaft and key driven. A 300 Series stainless steel washer and impeller bolt shall be used to fasten the impeller to the shaft. Impeller shall have pump-out vanes on the front and backside of the impeller to prevent grit and other materials from collecting in the seal area. Single vane design impellers which cannot be easily trimmed and which do not maintain balance with wear causing shaft deflections that reduce seal and bearing life, are not acceptable. Impeller shall not require coating. Because most impeller coatings do not remain beyond the very early life of the impeller, efficiency and other performance data submitted shall be based on performance with an uncoated impeller. Attempts to improve efficiency by coating impeller shall not be acceptable.

F. The pump shaft and motor shaft shall be an integral unit. Each shaft shall be of 303 stainless steel material and adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system. The shaft shall be machined from solid 303 stainless steel stock to produce a shaft with a large diameter and minimum overhang to reduce deflection and prolong bearing life.

G. An upper radial bearing and a lower thrust bearing shall be required. These shall be heavy-duty single row ball bearings which are permanently lubricated by the dielectric oil which fills the motor housing. Double row, sealed grease packed bearings shall not be acceptable. Bearings which require lubrication according to a prescribed schedule shall not be acceptable. The upper radial bearing shall have a minimum B-10 life at the specified condition of 50,000 hours and the lower thrust bearing shall have a minimum B-10 life at the specified condition of 50,000 hours. Bearings shall be locally available.

H. The pump shall have two mechanical seals, mounted in tandem, with an oil chamber between the seals. John Crane Type 21, seals shall be used with the rotating seal faces being carbon and the stationary seal faces ceramic. The lower seal shall be replaceable without disassembly of the seal chamber and without the use of special tools. Pump-out vanes shall be present on the backside of the impeller to keep contaminants out of the seal area. Units which require the use of tungsten-carbide seals or foreign manufactured seals shall not be acceptable. Seals shall be locally available.

The pump shall be equipped with a seal leak detection probe and warning system. This shall be designed to alert maintenance personnel of lower seal failure without having to take the unit out of service for inspection or requiring access for checking seal chamber oil level and consistency.

There shall be an electric probe or seal failure sensor installed in the seal chamber between the two tandem mechanical seals. If the lower seal fails, contaminants which enter the seal chamber shall be detected by the sensor and send a signal to operate the specified warning device.

Units equipped with opposed mechanical seals shall not be acceptable.

2.4 MOTORS

A. The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation, (155ºC, or 311ºF.), and a dielectric oil filled motor, NEMA B design (3 phase).

B. The pump and motor shall be specifically designed so that they may be operated partially dry or completely submerged in the liquid being pumped. The pump shall not require cooling water jackets. Dependence upon, or use of, water jackets for supplemental cooling shall not be acceptable.

C. Stators shall be securely held in place with a removable end ring and threaded fasteners so they may be easily removed in the field without the use of heat or a press. Stators held by a heat shrink fit shall not be acceptable. Stators shall be capable of being repaired or rewound by a local motor service station. Units which require service only by the factory shall not be acceptable. No special tools shall be required for pump and motor disassembly.

D. Pump shall be equipped with heat sensors. The heat sensors, (two on three phase), shall be low resistance, bi-metal disc that is temperature sensitive. They shall be mounted directly in the stator and sized to open at 120ºC or 130º C, and automatically reset at 30-35ºC differential. The sensor shall be connected in series with the motor starter coil so that the starter is tripped if a heat sensor opens. The motor starter shall be equipped with overload heaters 3-leg on three phase) so all normal overloads are protected by an external heater block.

E. Each motor for the Reclaimed Water Return Pump Station shall be inverter duty rated in accordance with NEMA MG1, Part 31.

F. The motor shall be designed for continuous duty handling pumped media of 40ºC (104ºF) and shall be capable of no less than 15 evenly spaced starts per hour.

G. The pump shall be triple protected with a compression fitting and two epoxy potted areas at the power cord entry to the pump. A separation between the junction box areas of the pump and the motor by a stator lead sealing gland or terminal board shall not be acceptable.

H. The power cable entry into the cord cap assembly shall first be made with a compression fitting. Each individual lead shall be stripped down to bare wire at staggered intervals, and each strand shall be individually separated. This area of the cord cap shall then be filled with an epoxy compound potting which will prevent water contamination to gain entry even in the event of wicking or capillary attraction.

I. The power cord leads shall then be connected to the motor leads with extra heavy connectors having brass inserts with a screwed wire to wire connection, rather than a terminal board.

J. The connection box wiring shall be separated from the motor housing wiring by stripping each lead down to bare wire, at staggered intervals, and separating each strand. This area shall be filled with an epoxy compound potting. Fiberglass terminal boards which are subject to heat fatigue and cracking, and which may lead to possible leaks shall not be acceptable.

K. The cord cap assembly where bolted to the connection box assembly, and the connection box assembly, where bolted to the motor housing, shall each be sealed with a Buna N Rubber O-ring on a beveled edge to assure proper sealing.

L. The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40ºC (104ºF) ambient and with a temperature rise not to exceed 80ºC. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

M. The power cable shall be minimum 600 volts, 60ºC, sized according to the NEC and ICEA standards, and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil and water resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence under water without loss of watertight integrity to a depth of 65 feet or greater.

N. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

O. The motors shall be sufficiently cooled by their oil-filled casing. A water jacket is not required.

2.5 PUMP STATION CONTROL PANELS AND COMPONENTS

A. See electrical drawings and specifications for modifications.

2.6 PUMP STATION CONTROL SYSTEMS

A. See instrumentation and controls drawings and specifications for modifications.

2.7 METAL – TO – METAL GUIDE RAIL SYSTEM AND ACCESSORIES

A. General – The Contractor shall furnish guide rail systems and accessories for each pump station. The guide rail system and accessories shall include discharge base elbows, sealing flanges with rail guides, guide rails, upper guide brackets, intermediate guide bar brackets, lifting chains or cables, cable brackets, and access hatches and frames.

B. Discharge Base Elbow

1. A discharge base elbow, designed to mount directly on the sump floor, shall be supplied for each pump. It shall have a standard 125 pound flange faced and drilled on the outlet side, with a machined mating inlet connection. The design shall be such that the pump to discharge connection is made without the need for any nuts, bolts, or gaskets. The base elbow shall also anchor and align the pair of 2" for each pump for the Reclaimed Water Return Pump Station.

C. Sealing Flange with Rail Guide

1. A sealing flange/rail guide bracket shall be mounted on each pump discharge. It shall have a machined mating flange which matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by a simple linear downward motion of the pump culminating with the entire weight of the pumping unit supported entirely by the base elbow.

D. Guide Rail

1. The dual rail guide design shall keep each pump in proper alignment with its stationary discharge piping. These rails shall be 2"-316 stainless steel pipe which bolt directly to the base elbow and to the access frame at the top of the wet-well by using an upper guide rail bracket for the Reclaimed Water Return Pump Station.

E. Upper Guide Bracket

1. The upper guide bracket shall align and support the two guide rails for each pump at the top of the wetwell. It shall bolt directly to the hatch frame and incorporate an expandable rubber grommet for secure rail installation. The upper guide rail bracket shall be fabricated from 316 stainless steel.

F. Intermediate Guide Bracket

1. The intermediate guide bracket shall align and support the pair of guide rails for each pump about halfway between the top and bottom of the wetwell for the Reclaimed Water Return Pump Station. The intermediate guide bracket shall be supported by the discharge pipe and by bracing connected to the wetwell wall. The intermediate guide bar bracket shall be fabricated from 316 stainless steel.

G. Lifting Chain/Cable

1. Each pumping unit shall be provided with a 316 stainless steel lifting chain or cable of sufficient length to extend from the pump to the top of the wetwell. The access frame shall provide a hook to attach the chain or cable when not in use. The lifting chain or cable shall be sized according to the pump weight.

H. Cable Mounting Bracket

1. A cable bracket shall be provided with strain reliefs that support and hold the float switch cables, power cables, etc. Continuous cables shall run from pumps and level controls to a control panel or junction box. No splices shall be made in the wiring. The bracket shall be fabricated from 316 stainless steel and attached to the access frame with 316 stainless steel fasteners. A dielectric spacer shall be installed when bolting to an aluminum access frame.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine the pump to be sure all passages are clean and clear of obstruction and that the impeller rotates freely. Examine the pump mounting surface, and make certain that bolts are properly located. Correct any irregularities prior to installation.

3.2 INSTALLATION

A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the drawings. Installation

shall include furnishing the required oil and grease or initial operation. See Section 01700 – Contract Closeout.

B. The Contractor shall submit a certification from the equipment manufacturer stating that the installation of the equipment is satisfactory, that the equipment is ready for operation and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

3.3 TESTING

A. Pumps: After all pumps have been completely installed and working under the direction of the manufacturer, conduct in the presence of the Engineer tests necessary to indicate that pump operation conforms to these specifications. Field tests shall include all pumps under this section. Supply all water or wastewater, labor, equipment and incidentals required to complete the field tests.

B. If the pump performance does not meet these specifications, corrective measures shall be taken or pumps shall be removed and replaced with pumps which satisfy the conditions specified.

C. Motors: The Contractor shall megger each motor winding before energizing the motor and, if insulation resistance is found to be low, shall notify the Engineer and shall not energize the motor.

D. The Contractor shall check all motors for correct clearances and alignment and for correct lubrication in accordance with the manufacturer's instructions. The Contractor shall check direction of rotation of all motors and reverse connections if necessary.

3.4 MANUFACTURER'S REPRESENTATIVE

A. Provide the services of a qualified manufacturer's service representative for 2 days to inspect equipment and installation, perform required field tests, and provide operation and maintenance instructions to the plant operators. Refer to Section 11001 - Equipment, Basic Requirements.

3.5 TOOLS AND SPARE PARTS

A. Contractor shall provide:
   1. One spare phase monitor
   2. One spare starter for each motor of the size and capacity

B. One set of all special tools for required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys. See Section 01700 – Contractor Closeout.

TABLE 11304-1

RECLAIMED WATER LAKE RETURN PUMP STATION
PUMP OPERATING CONDITIONS AND DATA

Manufacturer: Hydromatic
Model: S8L Non-Clog, 1,150 RPM, 14.25-inch x 13.25-inch diameter impeller, 8" discharge, 4" Solids, 15 HP

PUMP CHARACTERISTICS (EACH PUMP)

DESCRIPTION	UNIT	DESIGN POINT
Quantity	Each	2
Capacity	GPM	1389
Total Dynamic Head	Feet	30
Shut Off Head at No Flow	Feet	48
Minimum Size Solid Sphere Passed	Inches	4
Motor Horsepower	HP	15
Maximum Speed	RPM	1,150
Minimum Pump Efficiency at Design Point	Percent	75
Pump Outlet Diameter	Inches	8
316 SS Guide Bar Diameter	Inches	2
Depth of Wet Well	Feet	18
Electric Power	Volts	460
	Phase	3
	Hertz	60
Variable Frequency Drive	No	

END OF SECTION

SECTION 11312 – LAKE GRAVITY DISK FILTER

PART 1 GENERAL

1.1 DESCRIPTION

A. Furnish, install and test one (1) lake gravity disk filter.

B. The filter shall have all stainless steel media disks that operate in pairs. The filtration flow pattern shall be from inside the disks to outside the disks with filtrate leaving the filter by gravity. The filter shall be fed by gravity or by pumping.

C. The Contractor shall furnish all labor, materials, equipment and incidentals required for installation of the filter assembly. The filter itself will be a completely self-contained unit including the drive assembly, bottom sediment discharge valve, and electrical junction box with emergency stop push button. The filter will not require field component assembly. In addition to the rear panel access via elevated platform shown on the drawings, the Contractor shall provide a means to access the front panels either by additional platform construction or rolling platform ladder.

D. All motors, pumps, and bearings shall be designed for continuous duty and long operating life in a high humidity atmosphere. All electric motors and pumps shall be TEFC, 480 volt/60 hertz, 3 phase.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Division 13 – Instrumentation and Controls

B. Section 15062 – Ductile Iron Pipe and Fittings

C. Division 16 – Electrical

D. Section 16150 – Motors

E. Section 16483 – Variable Frequency Drives

1.3 QUALITY ASSURANCE

A. The equipment Manufacturer shall have no less than twenty-five (25) installations of similar applications, and at least one (1) installation in the state of Florida on treating reuse storage pond effluent for reuse distribution.

B. All the equipment specified under this Section shall be furnished by a single Manufacturer (the Disk Filter Equipment Manufacturer) fully experienced, reputable, and qualified in the manufacture of the equipment specified.

C. Available Manufacturer Subject to compliance with requirements, Manufacturer's offering products which may be incorporated in the Work are limited to Nova Water Technologies, LLC, Tampa, Florida or Preapproved Equal. Contractor shall be responsible for all redesign work associated with Approved Equals.

D. All finish assembled equipment shall be factory wet-tested prior to delivery. Manufacturer shall provide a complete wet-testing report included within the final operations and maintenance manual. Wet testing report shall include recorded measurement of motor amp draws, wash pressure verification, testing of project specific control panel with project specific equipment, and photographs of finished assembled equipment during wet testing. Wet testing report shall have certification signature and date in which project equipment has been tested and is ready for delivery.

E. The equipment Manufacturer shall furnish the services of a factory trained representative for a maximum of two (2) trips and four (4) days at the jobsite to inspect the Contractor's equipment installation, supervise the initial operation of the equipment, instruct the plant operating personnel in proper operation and maintenance, and provide process assistance.

F. The equipment Manufacturer shall reserve a minimum of one (1) day on site to work with the SCADA software programmer for verification of filter system operation and monitoring of signals by the SCADA system. This will be scheduled after all equipment is installed and operational and all field wiring completed.

G. The equipment Manufacturer shall have a service center and parts warehouse within the state of Florida.

H. The equipment Manufacturer shall provide on-site servicing of the installation once a month for the duration of the Manufacturer's warranty. Field service reports summarizing monthly on-site servicing shall be written for project documentation. Field service reports shall be chronologically sorted and delivered to the Owner at the conclusion of warranty duration.

1.4 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples

B. Submit Manufacturer's Certificate of Compliance certifying compliance with the referenced specifications and standards.

C. Shop Drawing Submittals shall include at least the following:

1. Certified shop and erection drawings showing all important details of construction, dimensions, anchor bolt locations, and field connections.

2. Certified shop drawings and cut sheets showing compliance with the performance requirements of this specification.

3. Descriptive literature, bulletins, and catalogs of the equipment, including lubrication points.

4. Installation, operation, and start-up procedures, including lubrication requirements.

5. Complete motor data

6. Total weight of the equipment including the weight of the single largest item, both empty and operating full of water.

7. A complete bill of materials for all equipment with the O&M manual. No samples will be required.

8. A list of spare parts that are supplied with the project.

1.5 DELIVERY, STORAGE AND HANDLING

A. After hydrostatic or other factory tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.

B. Each box or package shall be properly marked to show its net weight in addition to its contents.

C. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

D. Finished surfaces of all exposed pump openings shall be protected by wooden blanks, strongly built and securely bolted.

E. The Contractor shall store and temporarily support equipment prior to installation in strict accordance with the Manufacturer's recommendations and instructions. Protect all exposed surfaces. Keep records of the storage parameters and the dates that storage procedures were performed. The Contractor shall be responsible for work, equipment, and materials until inspected, tested and finally accepted.

F. Temporarily connect equipment with built in space heaters
to a power source and keep heaters in operation. Rotate all shafts that have bearings on at least a monthly basis.

G. Fabricated assemblies shall be shipped in the largest sections permitted by carrier regulations and shall be properly match-marked for ease of field erection. The units shall be erected and lubricated in strict accordance with the instructions

of the Manufacturer's field Engineer.

1.6 OPERATION AND MAINTENANCE MANUALS

A. Submit operations and maintenance manuals for the equipment in compliance with the Contract documents, 30 days prior to shipment. Manuals shall include:

1. Name, address, and telephone number of the nearest competent service representative who can furnish parts and technical service.

2. Descriptive literature, including illustrations, covering the operational features of the equipment, specific for the particular installation, with all inapplicable information omitted or marked out.

3. Operating, maintenance and troubleshooting information.

4. Complete maintenance parts list.

5. Complete connection, interconnecting and assembly diagrams.

6. Approved Shop Drawings.

1.7 WARRANTY

A. Per General Condition Article 9, the Contractor shall provide a 1 year warranty from substantial completion. The equipment supplier shall warrant that its equipment shall be free from defects in material and workmanship; and that it will replace or repair, F.O.B. its factory, any part or parts returned to it which examination shall show to have failed under normal use and service by the user.

B. Warranties and guarantees by the suppliers of various components in lieu of single source responsibility by the Manufacturer will not be accepted. The Manufacturer shall be solely responsible for the warranty of all components.

PART 2 PRODUCTS

2.1 GENERAL

A. Each of one (1) disk filter shall be the NOVA Disk Filter Model UL1604CS as supplied by Nova Water Technologies, LLC. Tampa, Florida or approved equal. The unit shall be complete, factory tested and ready for operation. The filter will be a totally self-contained functional unit. Field wiring and field piping will be by the Contractor.

B. All materials used shall be new, high grade, with properties best suited for the working environment. All stainless steel shall be grade 304 minimum. All stainless steel filtration mesh shall be precision grade, 316L stainless steel, minimum.

2.2 PERFORMANCE AND DESIGN PARAMETERS

A. The disk filter shall be capable of filtering water from the reclaimed water storage ponds, and shall be able to filter the water at the following flow rates:

Average Daily Flow (ADF):		1.25	MGD
Peak Hourly Flow:		2.00	MGD
Average Daily Backwash Reject:	≤	≤ 1%	of ADF

B. The filter shall operate continuously, always presenting new filtering media surfaces to the incoming flow at all times. Backwash shall be initiated when the differential level indicator reaches a preset limit.

2.3 FILTER TANK

A. The filter tank shall be constructed of all AISI Type 304 stainless steel and shall have a minimum thickness of 4 mm.

B. The tank shall be completely covered with light weight covers that allow easy access for maintenance and inspection. Covers shall have two handles per section and be made from all Type 304 stainless steel. The Cover retaining frame shall be manufactured from Type 304 Stainless Steel. Non-metallic material for cover fabrication shall be deemed unacceptable.

2.4 DRIVE ASSEMBLY

A. The drive assembly shall be of the Chain & Sprocket type for energy efficiency, equipped with a maximum 3.0 HP adjustable speed motor SEW MOVIMOT or equal. Speed control shall be accomplished by an integral VFD offering local or remote RS-485 communications.

B. The drive Manufacturer shall be ISO 9001 certified. The motor shall be of the “energy efficient” type with a minimum service factor of 1.11, F class insulation, capable of operation with a temperature rise of minus 2 to plus 40 degrees Celsius and with an IP 55 or higher rated enclosure.

C. The drive shall have an adjustable carrier frequency to 16 kHz for quiet operation, and shall provide overload, overvoltage, and phase failure as protective functions.

D. The drive motor shall be inverter duty rated and be Totally Enclosed Fan Cooled (TEFC) with a pressed-steel fan guard.

2.5 CENTER AXLE ASSEMBLY

A. The center axle on which the disks are mounted shall be made of AISI 304 stainless steel. The axle assembly, including the disks, is to be designed so it can be removed from the tank. All internal hardware is to be AISI 304 stainless

steel.

2.6 FILTER DISK ASSEMBLIES

A. Each disk frame shall be constructed entirely of AISI Type 304 stainless steel. Non-metallic material for disk frame fabrication shall not be acceptable.

B. The mesh panel mounting shall allow panel replacement from outside the filter by a single plant operator. The filtration mesh shall be a Type 304 Stainless Steel wire weave with nominal 25 micron apertures. The use of non-metallic filtration mesh shall not be approved.

C. There shall be simple shoulder seals at the edges of each disk and the wall of the filtrate zone. These seals shall be made of industrial grade EPDM rubber for long life.

D. Each disk shall have a minimum filtration area of 22 square feet and shall be able to support a layer of biological accumulation. This disk filter model shall have 8 disks and a total filtration area of 176 square feet.

E. The effluent outlet for the filtered water shall be 14-inches in diameter. The outlet shall connect to the plant through isolation valves supplied by the Contractor.

2.7 BACKWASH ASSEMBLY

A. The backwash piping integral to the filter shall be constructed of 2-inch diameter 304L stainless steel pipe, and shall include 14 flat-jet quick release nozzles per spray header. All hardware shall be 304 stainless steel. Each spray header shall deliver 7.6 gpm of spray water at 60 psi. Reclaimed water shall be used as spray water which shall be controlled by a slow-closing solenoid valve. The outlet from the wash water concentrate collection trough shall be 3-inches diameter. The total wash water volume shall be approximately 58 GPM per disk filter unit on an intermittent basis based on backwash frequency.

B. Actuated Valve

1. The filter shall come equipped with one (1) electrically actuated, 3.0 inch diameter valve for draining accumulated solids from the bottom of the influent well. The Electric actuator assembly shall include an electric motor, reduction gearing, valve stem, drive nut/bushing, position limit switches, mechanical overload torque switches, ductile iron gear case and an automatic declutchable hand wheel.

2. Motor speed reduction shall be by means of a gear train consisting of hardened steel spur gears and self-locking worm and worm gear sets. The worm shall be heat treated alloy steel and shall have rolled or ground worm thread surfaces. The worm gear material shall be bronze. Non-metallic gears in the power train shall not be acceptable.

3. All gearing and shafting shall be supported on anti-friction bearings. All thrust components shall be supported by use of tapered roller bearings.

4. The actuator shall be furnished with a hand wheel located in a 90 degree plane from the actuator output drive, and designed to produce the specified torque with a maximum rim pull requirement of 60 pounds. An external manual declutch lever shall be included to place the actuator in the manual mode. The lever shall not require more than a 10 pound force to engage even when the valve has been tightly seated. The lever shall be padlockable in either hand wheel or motor mode. Operation by the motor shall not cause the hand wheel to rotate, and manual operation of the hand wheel shall not cause the motor to rotate. The hand wheel shall operate in the counter-clockwise direction to open, and in the clockwise direction to close.

5. All gearing and bearings shall be grease lubricated and suitable for year-round service based on prevailing ambient temperature conditions.

6. Electric motors shall be specifically designed for valve actuator service, and shall be totally enclosed, non-ventilated. The enclosure shall meet NEMA 4 (weatherproof) requirements as required by the project. The motor shall be capable of operation under maximum specified loads when voltage to the motor is +/- 10% of the nominal voltage. Motor shall have Class F insulation with thermal overload sensors imbedded in the motor windings.

7. Limit switches shall be geared to the drive mechanism and shall indicate actual valve position at all times, whether operation is by electric power or manual mode. Limit switches shall be activated by a rotor type design. Contact shall be silver and have a rating of 10 amps at 120VAC. A minimum of (3) N.O. and (3) N.C. contacts shall be present to prevent entrance of foreign matter or wire entanglement. Use of cams or screws to set switches, or designs requiring battery back-up methods to ensure position control in the event of a power failure are unacceptable.

8. The actuator shall include an adjustable torque switch to interrupt the motor power circuit when an obstruction is encountered in either direction of travel or when torque seating of valves is required for tight shut off. The torque switch shall have a calibrated dial for adjustment, and shall have means to ensure that the maximum actuator rating is not exceeded. Contacts shall be same construction and rating as limit switches. Mechanical torque springs for load control shall be field replaceable without need of actuator dismantling or removal of the worm assembly.

2.8 FILTER INLET AND EFFLUENT VALVES

A. The disk filter inlet pipe and effluent pipe shall require isolation valves in the yard piping. These valves shall be supplied and installed by the Contractor as part of the plant yard piping

2.9 LEVEL SENSING DEVICE

A. A set of (5) conductivity probes shall be used to operate the filter while in “AUTO” mode. Four (4) of the probes shall control the start/stop of the filter gear drive and backwash pump cycles. The fifth probe shall be used as a high level (overflow) indicator. An overflow event shall energize a beacon light at the control panel and an audible alarm. A remote “dry” contact shall be available for alarm indication to plant SCADA.

2.10 CONTROLS

A. The disk filter unit shall be supplied with a separate, local control panel in a NEMA 4X, Type 304 stainless steel enclosure. The control panel shall be UL listed and designed for outdoor use in corrosive environments in Florida. All operator components shall be mounted on a dead-front swing-out hinged inner door. Motor breakers and starters shall be NEMA type. The control panel shall include engraved, descriptive labels that are attached using permanent adhesive. The control panel shall be factory tested before installation on site. Field wiring shall be provided and installed by the Contractor. The control panel shall include, but not be limited to the following:

1. Circuit Breakers: main, control power, filter gear drive, backwash pump

2. Motor Starters: filter gear drive, backwash pump. Adjustable, solid state overloads are included.

3. Pilot Lights: “”RUN”, “OVERLOAD”” and “”FAIL”” for gear drive and backwash pump; main power ”ON”; ”High Level Overflow”, “Emergency Stop” depressed.

4. Pushbuttons: “Emergency Stop””, “Alarm Silence”, Motor Fail “RESET”, Emergency Stop “RESET”.”

5. H-O-A selectors: filter gear drive, backwash pump, sludge discharge valve, plant wash water solenoid.

6. Elapsed Time Meters: filter gear drive and backwash pump.

7. Dry Contacts for Plant SCADA: “OVERLOAD”, “RUN”, “FAIL” for filter gear drive and backwash pump, ”HIGH LEVEL OVERFLOW” and ”COMMON ALARM”” for filter.

B. The filter shall be supplied with an equipment mounted Emergency Stop/Junction box in a NEMA 4X, Type 304 stainless steel enclosure. The junction box shall be UL listed and designed for outdoor use in corrosive environments. The junction box shall include terminal blocks for all filter mounted equipment such that the installing Contractor will only have to run field wiring to one centralized location. The junction box shall also include a NEMA 4X, 30mm, mushroom head,

Emergency Stop button located on the outer door of the enclosure.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the Disk Filter to be sure all passages and filter meshes are clean and clear of obstructions and that the disks rotate freely. Examine the disk filter unit mounting surface, and make certain that bolts are properly located. Correct any irregularities prior to installation.

3.2 INSTALLATION

A. Installation shall be in strict accordance with the Manufacturer's instructions and recommendations in the locations shown on the drawings. Installation shall include furnishing the required oil and grease for initial operation. See section 01700 – Contractor Closeout.

B. The Contractor shall submit a certification from the equipment Manufacturer stating that the installation of the equipment is satisfactory, that the equipment is ready for operation and that the operating personnel have been suitably instructed in the operation, lubrication and care of the unit.

3.3 TESTING

A. After all disk filter units have been completely installed and working under the direction of the Manufacturer, conduct in the presence of the Engineer tests necessary to indicate that disk filter operation conforms to these specifications. Field test shall include the one (1) disk filter unit under this section. Supply all reclaimed water, labor, equipment and incidentals required to complete the field test.

B. If the disk filter unit performance does not meet these specifications, corrective measures shall be taken, or the disk filter unit shall be removed and replaced with a disk filter which satisfies the conditions specified.

C. Motors: The Contractor shall megger each motor winding before energizing the motor and, if insulation resistance is found to be low, shall notify the Engineer and shall not energize the motor.

D. The Contractor shall check all motors for correct clearance and alignment and for correct lubrication in accordance with the Manufacturer's instructions. The Contractor shall check direction of rotation of all motors and reverse connections if necessary.

3.4 TOOLS AND SPARE PARTS

A. One set of all special tools for the disk filter units required for normal operation

and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys. See Section 01700 - Contract Closeout.

END OF SECTON

SECTION 11313 – VERTICAL TURBINE PUMPS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This section includes furnishing and installing two (2) line shaft vertical turbine pumps in the locations shown in the Drawings. The pumps shall be suitable for pumping the specified quantity of effluent at specified pressures when installed and operating under the conditions shown.

1.2 QUALITY ASSURANCE

A. Design, fabricate, install and test in accordance with the Standards of the Hydraulic Institute.

B. Subject to compliance with the requirements of this Section, manufacturer's offering products which may be incorporated in the work include the following:

1. Fairbank Morse
2. Aurora Vertiline
3. Paco/Johnston
4. Hudson Pump
5. Or approved equal

C. Related Work Specified Elsewhere:

1. Section 09900- Painting and Coatings
2. Section 13300- Instrumentation and Control
3. Section 16150- Motors
4. Section 16483- Variable Frequency Drives

D. Pumps shall conform to the requirements of ANSI/AWWA E101 except as modified in these specifications.

E. Vibration limits shall be in accordance with the Hydraulic Institute Standards. The pump manufacturer shall insure that the first critical frequency of each vertical turbine pump is a minimum of 25% above the maximum operating speed and the second critical frequency is a minimum of 25% below the minimum anticipated operating speed (80% of maximum).

1.3 SUBMITTALS

A. All submittals for vertical turbine pumps shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Operation and Maintenance (O&M) Manuals shall be submitted in accordance with Section 01730 – Operating and Maintenance Data.

C. Submit Manufacturer's Certificate of Compliance certifying compliance with the referenced specifications and standards.

D. Submit certified copies of reports of factory tests specified in this section and required by referenced standards.

E. Submit results of vibration testing on the pumps provided or on similar pumps recently manufactured and tested.

F. Submit shop drawings showing all dimensions; also include performance data and physical characteristics.

G. Submit manufacturer's parts list, operation and maintenance literature and instructions.

H. Submit three copies of Service Representative's Report of Field Tests.

1.4 WARRANTY

A. Provide warranties from the pump manufacturer warranting the complete units being supplied to the OWNER against defects in workmanship and material for a period of five (5) years or 10,000 hours under normal use, operation and service. The Contractor shall provide the warranties in printed form and submit them with the shop drawing submittals.

PART 2 PRODUCTS

2.1 LINE SHAFT VERTICAL TURBINE PUMPS CONSTRUCTION

B. Bowl Assembly: Pump bowls shall be made of ASTM A48 Class 30 close grained cast iron, free from blow holes, sand holes and all other faults. Bowls shall be accurately machined and fitted to close dimensions. The bowl design shall be heavy walled to withstand the pressure developed by the pump and shall have sufficient lateral design to accommodate hydraulic shaft stretch when the pump is operating. The discharge case shall be fitted to attach to the discharge column. The suction case shall be fitted with a cast iron suction bell to reduce entrance losses to a minimum. Pump bowls or impellers shall be provided with replaceable bronze wear rings in accordance with manufacturer's standard. Porcelain enameled bowls may be utilized.

C. Impeller: Pump impellers shall be ASTM B584 (alloy 83800) bronze, of heavy construction, accurately fitted and statically and dynamically balanced. Impellers

shall be securely fastened to a pump shaft of 416 stainless steel. The shaft shall be sized to provide minimum deflection. Bronze sleeve bearings shall be provided in each bowl and in the suction bell. Bowl bearings shall be lubricated by the pumped liquid. Suction bell bearing shall be packed permanently with non-soluble grease and fitted with a bronze sand collar.

D. Column Assembly: Discharge column pipe shall be ASTM A53 Grade B steel pipe with flanged connections, line shaft, line shaft coupling, bearing retainer, and bearing. Column pipe shall be interchangeable and not over 10' in length for 1800 RPM and 5' in length for 3600 RPM.

E. Line Shafting: Line shafting shall be 416 stainless steel with stainless steel keyed line shaft couplings or with threaded Monel metal or stainless steel couplings of a different alloy to prevent galling. Shaft diameter shall be sized to conform with ANSI/AWWA Specifications for the motor horsepower. Line shafts shall be furnished in interchangeable sections not over 10' in length at 1800 RPM or 5' in length at 3600 RPM. The shafts shall be machined so that maximum runout in 10' shall not exceed 0.005 inch and so that maximum permissible axial misalignment of the thread axis within the shaft axis is 0.002 inch in 6 inches.

F. Bearings: Column shaft bearings shall be spiral grooved C425-65 fluted rubber for lubrication by the pumped liquid. Bearings shall be supported by "spider" type bronze retainers installed between each length of discharge column to insure proper shaft alignment. Maximum spacing shall be 10' at 1800 RPM and 5' at 3600 RPM. Bearing retainers shall be so constructed as to allow field reversal; such reversal will result in the bearing surface on the shaft to be completely relocated. The suction and case bearings shall be bronze. Bearings for intermediate bowls shall be dual bronze and rubber.

G. Surface Discharge Head Assembly: Discharge heads shall be of close grained cast iron (ASTM A48-76 Class 30) or fabricated steel (ASTM A53 & A36) with an integral discharge flange.

H. Discharge flanges shall be flat face type faced and drilled for ANSI B-16.1 Class 125.

I. The discharge head base shall be of sufficient size to span an opening of such dimensions as to permit removal of the complete pump unit connected below. Lifting lugs with capacity to support the weight of the entire pump shall be provided. Discharge head mounting base shall be a round flange type with accurately machined surfaces. The top of the head shall be machined with a register fit for locating the driving motor. Cast discharge heads shall be so designed that casting sections supporting the motor shall form a "tee" section for maximum torsional rigidity. Adequate openings shall be provided to permit easy access to the stuffing box and shaft coupling.

J. Stuffing box shall be of cast iron fitted with a mechanical seal. Mechanical seals shall be of the type recommended by the seal manufacturer for the application. Mechanical seals shall be replaceable without removing the motor, disassembling the pump, or disturbing the piping.

K. Stuffing Box Housing: Stuffing box housing shall be one piece construction made of cast iron. It shall have an accurately machined pilot located in a close tolerance counterbore in the discharge head. Pump stuffing box shall be located on this pilot and clamp the bearing housing in place. A bronze sleeve bearing shall be provided in the bearing housing.

L. Head shaft shall be Type 416 stainless steel. Impeller adjustment shall be provided at the top of the head shaft by an adjustable flanged headshaft coupling with bronze adjusting nut and set screws.

M. Pumps shall be supplied with the pump manufacturers' standard fabricated steel sub-base plate. The steel sub-base plate shall be of sufficient thickness to support the pump discharge head and motor and suitable for grouting with a smooth surface for mounting the discharge head. Anchor bolts and all hardware for securing the head to the base plate shall be furnished or approved by the pump manufacturer.

N. Pump Driver: Pumps shall be driven by vertical hollow-shaft or solid shaft electric motors. Motors shall be provided with non-reverse ratchets. When mechanical seals are provided for pumps, a solid shaft motor with a flanged adjustable spacer to allow easy removal of the seal without removal of the motor shall be used. Drive motors shall be suitable for installation in a corrosive atmosphere at the locations shown without additional protection. The motor horsepower shall be non-overloading for all conditions of head and flow. Motors shall be premium efficiency NEMA B motors. Motors shall be rated for inverter duty and meet all the requirements of Section 16150 - Motors.

O. Variable Frequency Drives (VFDs). The pump supplier shall coordinate with the Contractor to insure that the VFD's furnished under Section 16483 – Variable Frequency Drives are suitable for operation with the pumps furnished.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine pumps to be sure all passages are clean and clear of obstructions and that impellers rotate freely. Examine pump mounting surface and also make certain that bolts are properly located. Correct any irregularities prior to installation.

3.2 INSTALLATION

A. Install pump in accordance with specifications, drawings and manufacturer's written instructions. Install units level and plumb. Securely anchor units. Insure that stress is not applied to discharge connection by piping. Make sure all connections are tight.

B. If supplied pump discharge differs from proposed 10" discharge line size, Contractor to provide and install two (2) ductile iron reducers of appropriate size to connect the pumps to the discharge piping.

3.3 TESTING

A. The pump manufacturer shall provide five copies of certified performance curves of the most recent certified performance test for each pump size of a similar pump.

B. The discharge head and bowl assembly shall be hydrostatically tested to 100 psig at the factory. Certification of the hydrostatic testing and the test results shall be submitted.

C. After installation, test each pump in accordance with the Hydraulic Institute Standards. The pumps shall be field tested to establish field head and overall efficiency. Report and test shall include voltage and amperage measurement.

3.4 MANUFACTURER'S REPRESENTATIVE

A. Provide services of qualified manufacturer's service representative to inspect equipment and installation, perform required field tests of each pump, and to instruct the Owner in the operation and maintenance of the pumps. Three days (3) shall be provided for these services.

3.5 TOOLS AND SPARE PARTS

A. One set of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys. See Section 01700 - Contract Closeout.

B. The manufacturer shall furnish recommended spare parts necessary for the first five years of operation of the pumping system, which shall include at least the following:

1. Two complete sets of gaskets for each pump size supplied.

2. Two complete sets of mechanical seals for each pump size supplied.

3. Two complete sets of shaft sleeves, keys and accessories for each pump size supplied.

4. One spare pump and motor of the capacity and size listed in Section 3.07.

5. One spare VFD per pump and motor of the capacity and size listed in Section 3.07.

3.6 PUMP CHARACTERISTICS

A. Pump shall have the following capacities when operating at the design conditions shown. Motor horsepower, efficiency, and speed may vary from that shown depending upon manufacturer of the vertical turbine pump. Manufacturer shall

meet the design condition listed. The additional points of the pump curve may vary.

B. Pump shall operate satisfactorily within the operating range indicated in 3.07:

3.7 VERTICAL TURBINE PUMP DATA SHEET

A. Filter Effluent Transfer Pumps

	Design Condition
Manufacturer & Model	Hudson Pump
(Basis of Design)	Model VIT-FFFM
Quantity	2
Pump Nos.	1 thru 2

	Design Condition
Design Point:	
Capacity - GPM	1,389
TDH - Feet	70
Max Speed - RPM	1,770
Type of Speed	Variable
Maximum Horsepower (NOL)	30
Minimum Efficiency at Design Point	77.3%
Shutoff Head- Feet	100
Max. Column Size - Inches	10
Max. Pump Discharge Size - Inches	10
Discharge Pipe Size - Inches	10
Barrel or Can Required	N/A
NPSH Required - Feet	14.7
Motor Voltage - Volts	460
Type of Motor Drive	Variable Frequency
Range of Speed - RPM	1000 - 1800

END OF SECTION

SECTION 11315 – GRINDER PUMP

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes furnishing, installing and testing two (2) new in-line grinder pumps and controller.

B. The grinder pumps shall be installed where shown on the drawings in the Disk Filter Waste Backwash Pump Station with duplex pumps, as recommended by the supplier and in compliance with all OSHA, local, state and federal codes and regulations.

1.2 RELATED WORK ELSEWHERE

A. Division 01 - General Requirements

1. Section 01300- Submittals
2. Section 01600- Material and Equipment

B. Division 13

1. Section 13100 Controls and Instrumentation

C. Division 16 - Electrical

1.3 REFERENCES

A. General: As specified in Section 01091.

B. ANSI Standards

1. ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings

1.4 SYSTEM DESCRIPTION

A. General

1. Furnish and install one new grinder pump, disconnect and control panel and install one existing grinder pump, disconnect and control panel where indicated on the drawings.

1.5 SUBMITTALS

A. General, as specified in:

1. Section 01300
    a. Shop Drawings.
    b. Certification of compliance.
    c. Manufacturer's installation instructions.
    d. Manufacturer's Operation and Maintenance Data.
    e. Warranty.

1.6 QUALITY ASSURANCE

A. Factory Tests: Check the pumps for alignment, clearance, and vibration. Eliminate misalignments, improper clearances, and excess vibration.

B. Field Tests: Perform field tests specified in this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. As specified in Section 01620.

1.8 TOOLS, SUPPLIES, AND SPARE PARTS

A. Provide manufacturer's recommended spare parts for the furnished pumping unit.

B. Provide any special tools required for the furnished pumping unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers and Models

1. Hydromatic Model HPGF

2.2 IDENTIFICATION

A. The provided unit of equipment shall be identified with a corrosion resistant nameplate, securely affixed in a conspicuous place. Nameplate information shall include equipment model number, serial number, supplier's name and location.

2.3 GRINDER PUMP

A. General

1. The grinder pump shall include cutters, spacers, shafts, bearings and seals, housing, reducer, and motor. If available, the pump shall be provided with a base to be used to support the pump on a concrete pad.

2. The grinder shall be of the single or dual shaft design and be capable of continuous operation, processing wet or dry.

3. Two-shaft design shall consist of two parallel shafts alternately stacked with individual intermeshing cutters and spacers positioned on the shaft to form a helical pattern. The two shafts shall counter-rotate with the driven shaft operating at approximately two-thirds (2/3) the speed of the drive shaft.

4. Single shaft design shall consist of rotor with a center open to flow containing a rack of cutters skewed at 10 degrees; and a concave stationary cutting assembly.

B. Components

1. Cutters and Spacers

a. The combination centrifugal pump impeller and grinder unit shall be attached to the common motor and pump shaft made of 416 stainless steel. The grinder unit shall be on the suction side of the pump impeller and discharge directly into the impeller inlet, leaving no exposed shaft to permit packing of ground solids. The grinder shall consist of two stages. The cutting action of the second stage shall be perpendicular to the plane of the first cut for better control of the particle size. The grinder shall be capable of grinding normal domestic sewage. Both stationary and rotating cutters shall be made of 440C stainless steel hardened to Rockwell 60C.

b. The upper (axial) cutter and stationary cutter rings shall be reversible to provide new cutting edges to double life. The stationary cutter ring shall be a slip fit into the suction opening of the volute and held in place by three (3) 300 series stainless steel screws and a retaining ring. The lower (radial) cutter shall macerate the solids against the I.D. of the cutter ring and extrude them through the slots of the cutter ring. The upper (axial) cutter shall cut off the extrusions, as they emerge from the slots of the cutter ring to eliminate any roping effect that may occur in single stage cutting action. The upper (axial) cutter shall fit over the hub of the impeller and the lower (radial) cutter shall be slop fit and secured by means of peg and hole and rotate simultaneously with the rotation of the shaft and impeller. The grinding mechanism shall be locked to the shaft by a 300 series stainless steel countersunk washer in conjunction with a 300 series stainless steel flat head cap screw threaded into the end of the shaft.

c. The cutters shall exert a minimum force at the tooth tip of 1,651 lbs./hp (9,847 N/kW) during momentary load peaks.

2. Shafts

   a. An upper radial bearing and a lower thrust bearing shall be required. These shall be permanently lubricated by the dielectric oil that fills the motor housing.

   b. The shaft shall be machined from a solid 416 stainless steel and be a design that is of large diameter with minimum overhand to reduce shaft deflection and prolong bearing life.

   c. Grinder drive and driven shafts shall be made of 4140 heat treated steel with a tensile strength rating of not less than 149,000 psi (1,027 kPa).

3. Shafts and Bearings

   a. The radial and axial loads of the cutter shafts shall be borne by sealed, oversized, deep-groove ball bearings at each end.

   b. The bearings shall be protected by a combination of a replaceable and independent tortuous path device and mechanical seals.

   c. Face materials shall be of tungsten carbide to tungsten carbide.

   d. O-rings shall be made of Buna-N elastomers.

   e. Products requiring continuous or occasional lubrication or flushing shall not be accepted.

   f. The mechanical seal shall be rated at 90 psi (620 kPa) continuous duty by the seal supplier.

   g. The bearings shall be housed in a replaceable cartridge that supports and aligns the bearings and seals, as well as protects the shafts and end housings. The seal elements shall be independent of the stack height, therefore cutter stack tightness shall not affect seal performance. The seal elements shall maintain their factory set preload independent of the cutter stack tightness.

   h. Seals shall meet required pressure rating regardless of cutter stack fit. The seal cartridge shall provide seal protection against axial loading on shafts and bearings during shaft deflection.

i. Each seal element shall be positively locked to its corresponding rotating or static cartridge element. This positive lock on the seal elements is critical to long seal life in applications where grit or other abrasive materials are present.

j. The rotator and stator in the motor housing shall be separated and protected from the pumped liquid by an oil-filled seal housing incorporating two type 21 carbon ceramic mechanical seals mounted in tandem. This seal housing shall be equipped with 2 moisture sensing probes installed between the seals, and the sensing of moisture in the seal chamber shall be automatic continuous, and not require the pump be stopped or removed from the wet well.

4. Housing

a. The housing shall be made of ductile or cast iron with ANSI B16.1 Class 150 flanges. Suction and discharge shall be 4-inch diameter. The flanged body shall be capable of remaining in-place if removal of the cutter cartridge and drive assembly is required for service.

5. Reducer

a. The speed reducer shall be a grease-filled planetary or cycloidal-type of reducer with a 500% shock load capacity. The reduction ratio shall be 29:1.

b. The input shaft of the reducer shall be directly coupled to the motor using a three-piece coupling, and the output shaft of the reducer shall be directly coupled with the grinder using a two-piece coupling.

6. Motor

a. The motor shall be 3 hp, TEFC, 460 volt, 3 phase, 60 Hz.

b. Motor service factor shall be 1.15, the efficiency factor not less than 85% at full load and the power factor not less than 80% at full load.

c. Required Running Torque per Horsepower (kW) at Momentary Load Peaks: 3,828 in-lbs. (580 Nm)

2.4 ELECTRICAL CONTROLS

A. General

1. The controller shall independent of the grinder.

2. Controller shall be UL-508 listed.

3. The controller shall be rated for 3 hp, 480 volts, 3 phase, 60Hz and include an internal non-fused disconnect.

B. Operation

1. The controller shall be equipped with a GRINDER ON-OFF/RESET-AUTO three (3) position selector switch.

   a. In the OFF/RESET mode the grinder shall not run. In the ON mode the grinder will run.

   b. In the AUTO mode the grinder shall start and stop as controlled by a remotely-located dry contact.

   c. The grinder shall only be reset by switching the GRINDER ON-OFF/RESET-AUTO switch to the OFF/RESET position.

C. Safety Features

1. When a jam condition occurs in the ON or AUTO mode the controller shall stop the grinder, and then reverse the grinder rotation to clear the obstruction. If the jam is cleared, the controller shall return the grinder to normal operation. Up to two (2) additional reversing cycles (3 times total) may occur within 30 seconds before the controller de-energizes the grinder motor and activates the grinder fail indicator and relay.

2. If a power failure occurs while a grinder is running, operation will resume when power is restored.

3. If a power failure occurs while the grinder is in a fail condition the fail indicator shall reactivate when power is restored.

4. The controller shall provide overload protection for the motor through an overload relay mounted directly on the grinder starter.

5. Short-circuit protection requires that a properly-sized circuit breaker or fuses be installed.

D. Components

1. Enclosure

a. Enclosures shall be NEMA 4X, fabricated of SS and shall be suitable for mounting on unistrut. Doors shall have corrosion-resistant hinges and latches.

b. Enclosure shall house the control devices, relays, terminal blocks and reversing motor starters.

2. Control Devices

a. Pilot devices shall be mounted on the enclosure front panel door.

b. The controller shall have indicator lights for POWER ON, RUN, and FAIL.

c. Indicator lights shall be of an integral-transformer type with 6 volt lamps. Lamps and the selector switches shall be heavy duty NEMA 4X type.

d. Control transformer shall be protected by two primary fuses and one secondary fuse. The 120 volt secondary shall have one leg grounded.

e. Relay contacts shall be included for RUN and FAIL signal outputs. The contacts shall be rated 2 amp, 240 VAC, resistive load.

3. Motor Starters

a. Starter shall be a full-voltage reversing type with 120 volt operating coils.

b. Forward and reverse contactors on the starters shall have both mechanical and electrical interlocks.

c. Overload relays (OL) shall be adjustable so that the range selected includes the FLA (full load amperes) rating and service factor.

2.5 PAINTING

A. Shop coat pumps, motors, motor supports per manufacturer's recommendation.

2.6 CLEANING AND PACKING

A. Thoroughly clean equipment, components, and subassemblies of water, sand, dirt, grit, weld splatter, grease, oil, and other foreign materials before preparation for shipment. Protect machined surfaces against physical damage and exposure to the elements during shipping, handling, storage, and installation.

B. Pack equipment to provide ample protection from damage during shipment, handling, and storage. Cap and seal openings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine pump concrete base.

B. Examine piping.

C. Correct irregularities prior to pump installation.

3.2 INSTALLATION

A. Components of the existing dewatering equipment, including the existing grinder pump, shall not be relocated until new dewatering equipment has been installed, tested and accepted by the Owner.

B. Install pumps as specified in accordance with the Drawings, in accordance with the pump manufacturer's written instructions, and as specified in this Section.

C. Cast stainless steel anchor bolts into each new concrete, pump base. Drill and insert adhesive anchor bolts into each existing concrete, pump base. Use templates to locate the anchor bolts. Use templates to secure anchor bolts for new bases while concrete is being placed in the forms. Secure pumping units with stainless steel nuts and washers.

D. Align pumps and motors in accordance with the manufacturer's written instructions. Lubricate pumps and motors in accordance with the manufacturer's written instructions.

3.3 CLEANING

A. Clean grease, oil, or any other debris from exterior surfaces of equipment.

3.4 MANUFACTURER'S REPRESENTATIVE

A. Provide services of qualified manufacturer's service representative to inspect equipment and installation, to perform required field tests, and to provide operation and maintenance instructions (training). Refer to Section 01660 – System Testing,

Adjusting and Balancing. The manufacturer's representative shall provide a minimum of two (2) days services on site. Training shall be scheduled 10-days in advance.

END OF SECTION

SECTION 11348 – SODIUM HYPOCHLORITE CHEMICAL FEED PUMP SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. Work under this section includes a complete sodium hypochlorite chemical feed system. The system shall consist of a feed system composed of chemical feed pump, all necessary pump accessories, piping, valves and control panel installed on a polyethylene skid. All materials shall be provided in accordance with these specifications. See Table 11348-1 at the end of this Section for design data.

B. All components of the system shall be compatible with the conditions and chemicals to which they are subjected to during the normal operation of the system. Compounds with which the materials must be compatible include, but are not limited to:

1. 12-15% Sodium Hypochlorite

C. It is the intent of these Specifications that the Contractor is to provide a complete and workable system whether or not any specific component is shown or specified.

1.2 MANUFACTURER

A. All components of the feed system shall be provided by a single manufacturer who shall have sole-source responsibility for the system.

B. The manufacturer of this equipment shall be recognized and established in the design, production, and operation of chemical feed injection systems. The manufacturer shall provide, with the submittal data, a list of 10 similar systems in operation using chemicals associated with municipal wastewater. These systems must have been in operation at least five years. The list shall include correct names, phone numbers, and length of service and design criteria.

C. The manufacturer shall maintain regular production facilities at their place of business. These facilities shall be open for inspection by a representative of the Owner or Engineer at any time during construction and testing of this equipment.

D. The manufacturer of the feed system shall be an Underwriters Laboratories listed manufacturer of Enclosed Industrial Control Panels.

E. Acceptable Manufacturers:

1. Blue Planet Environmental Systems – MS1 Series
2. Approved Equal

1.3 SUBMITTAL

A. The manufacturer shall submit complete shop drawings and engineering data to the Owner or Engineer in accordance with Specification 01340. These submittals shall include, at a minimum:

1. Drawings showing plan and elevation views of the feed system including fabrication, assembly, installation and wiring diagrams. Wiring diagrams shall consist of, at a minimum, control schematics, including coordination with other electrical control devices operating in conjunction with the sodium hypochlorite feed system.

2. Manufacturer's catalogue information on major system components including, but not limited to:

   a. Chemical Feed Pumps
   b. Pump Accessories
   c. Valves
   d. Control Panel

3. Statement of design conditions and performance guarantee

4. Statement of warranty

5. Reference list as described in section 1.02, B above

B. The manufacturer shall submit complete Operation and Maintenance manuals to the Owner. These manuals shall include at a minimum:

1. Information on hazards associated with the system and the appropriate safety

2. Equipment installation instructions

3. Equipment startup instructions

4. Equipment maintenance procedures

5. Troubleshooting guide

6. Individual operation and maintenance information on major system components, including but not limited to:
   a. Chemical Feed Pumps
   b. Pump Accessories

1.4 SUBSTITUTIONS

Any substitutions or deviations in equipment or arrangement from that shown on the drawings specified herein shall be the responsibility of the Manufacturer or Contractor. Any deviations must be accompanied by detailed structural, mechanical, electrical drawings and data for review by the Engineer. All costs associated with review of the substitutions or deviations and costs associated with project drawing changes as a result of approval shall be borne by the Manufacturer or Contractor. There shall be no additional costs to the Owner due to substitutions or deviations.

PART 2 – PRODUCTS

2.1 POLYETHYLENE DOSING SKID

A. Chemical Feed Pump Operation

1. The sodium hypochlorite feed system metering pumps shall operate automatically in response to the control signals as described in these Contract Documents.

B. General. The Skid shall contain the following:

3 - Hydraulic Piston Diaphragm Chemical Feed Pumps (1 duty & 2 spare)
1 - Pulsation Dampeners
1 - Pressure Relief Valves
1 - Pressure Gages
1 - Back Pressure Valves
1 - Calibration Cylinder
1 - Control Panel

C. Standards. All fabrication and wiring shall conform to the standards of Underwriter's Laboratories, National Electrical Code, and any other applicable federal, state, or local codes.

D. Pump Accessories.

1. Calibration Cylinder. The skid shall be used to house a calibration cylinder used to measure the chemical being injected into the system.

2. Disconnect Switch. Each pump shall have a local disconnect switch on the control skid.

3. Pressure Relief Valve. The skid shall be equipped with 2 pressure relief valves, one for each pump. Each pressure relief valve shall be field adjustable from 0 – 150 psi via the adjustment screw.

4. Back Pressure Valve. The skid shall be equipped with 2 back pressure valves, one for each pump. The back pressure valve shall be field adjustable from 0 – 150 psi via the adjustment screw

5. Pulsation Dampener. The skid shall be equipped with a pulsation dampener on the discharge of each pump

6. Valves. All valves shall be true union type ball valves.

7. Diaphragm Protected Pressure Gauges

8. 2-1/2” liquid filled pressure gauges with isolators shall be provided for indication of system pressure in the discharge piping of each metering pump. Industrial quality all 316 Stainless Steel gauges shall be utilized. The isolators shall have housings compatible with 12 to 15% sodium

hypochlorite with a Teflon diaphragm and suitable liquid fill. The process connection shall feature a SS reinforcement ring not in contact with the chemical. A fabricated PVC bracket shall be provided for each pressure gauge to secure the isolator and prevent lateral movement of the pressure gauge.

E. Control Panel:

1) Each skid shall be supplied with its own control panel suitable for remote mounting.
2) Each pump shall have its own circuit breaker mounted in the control panel.
3) A common terminal strip shall be utilized for electrical connections at the control panel. Terminals shall be provided for a single control panel 120 volt, single phase power input.
4) All wiring on the skid shall be performed prior to shipping and shall terminate in a NEMA 4X junction box located on the skid. Terminals shall be provided in the junction box for all connections between the remote control panel and the junction box.
5) Each pump shall be provided with the following controls:
   a. Local HOA switch
   b. Start/Stop discrete input to skid
   c. Electronic motor speed controller capable of accepting remote 4 to 20 ma signals for automatic feed rate adjustments.
   d. Stroke length control: Manually adjustable from 0-100%.
   e. Alarm discrete output from skid
6) In addition to local start/stop, stroke and speed control, the pump shall include a selector switch to determine local operation or remote control. The pump shall be capable of accepting a remote start command from a discrete, dry contact input in addition to a 4-20 ma for speed control. Additional monitoring signals shall include a pump in remote control mode, pump run status, pump fail and a 4-20 ma dc signal for speed feedback.

F. Name Plates:

1) Each pump and motor shall be furnished with a suitable nameplate securely mounted to the body of the equipment.
2) As a minimum, the nameplate for the pumps shall include the following:
   a. Complete equipment model number.
   b. Manufacturer's name and address.
   c. Serial number
   d. Rated maximum flow capacity
   e. Maximum discharge head
   f. Horsepower
   g. Speed
   h. Armature voltage
   i. Armature amps
   j. Field voltage
   k. Field amps
   l. Power and service factors.

2.2 CHEMICAL DOSING PUMPS

A. Provide a chemical metering pump on one skid. Each pump shall be completely compatible with 12-15% sodium hypochlorite. Each pump shall be capable of delivering a maximum of 60 gph at a maximum pressure of 145 psi. Pump shall have a 100:1 turndown. Chemical dosing pumps shall be the hydraulic piston diaphragm type. The pump shall be constructed from corrosion resistant materials. The pump shall be a LMI Series 9.

B. Each of the chemical feed pumps shall be of the hydraulic piston diaphragm type, wherein a volume measuring piston reciprocates within a cylinder and causes hydraulic oil to deflect a flat diaphragm, which in turn causes the head to pump the chemical. Each pair of chemical feed pumps shall have compatible materials and be designed to pump 12 to 15% sodium hypochlorite.

C. The pump shall be able to withstand closed suction or discharge valves without damage to the internals of the pump.

D. Pumps shall be mechanical lost motion type flow control where a cam driven by the worm gear actuates a reciprocating piston to drive the hydraulically actuated diaphragm.

E. The pump shall include a diaphragm control package, which shall signal an alarm for a broken diaphragm or an over pressure situation. Each pump shall be equipped with a PTFE double diaphragm and a ball check valve with an integrated contact pressure gauge that can sense an emergency pressure situation.

F. Each pump shall be provided with English process pipe connections.

G. The metered liquid will enter the reagent head at the bottom and exit at the top through gravity seating ball-type valves. These three-component valves shall be free-seating type with valve seats having knife edge contact and will be 4-point guided to accurately control vertical and sideward movement. Valve and seat shall be individually replaceable and sealed by o-ring or flat gasket. Valve assemblies shall not incorporate any threading other than the process pipe connections. Valves shall be serviceable without removing piping.

H. The chemical metering head shall be designed to resist connection forces and help promote leak-free performance.

I. The diaphragm shall be a full teflon design. The diaphragm shall be capable of sealing under full head-bolt torque limits without stressing the diaphragm. Manual capacity adjustment by changing the position of the control slider from 0-100% shall be accomplished while idle or operating. An auto-lock system for the manual (handwheel) slider position control mechanism shall be provided, as standard, to prevent drift. The large handwheel shall be pressed down and shall provide detented indication of slider position adjustment with resolution of $\pm$1/2%.

J. The pump shall incorporate a non-vented gear box and eccentric designs to protect the pump from the ingress of water, dirt, sand or other debris. A rotary type lip seal arrangement shall positively seal and separate the two oils of the gear box and the eccentric box. The gear box shall be filled with a heavy duty gear oil and the eccentric box shall be filled with a hydraulic oil to provide the best environment of operation for the hydraulic system.

K. The eccentric shaft shall be supported by ball bearings for long life. The eccentric shaft shall be a non-axially loaded, one piece design. The main input speed reduction shall be accomplished via a precision cut gear and hardened steel worm shaft.

L. The pump shall be provided with a C-face motor, able to be mounted in a vertical position. The C-face motor mounting arrangement shall eliminate the exposure to rotating couplings. Coupling enclosure shall be totally enclosed and part of the motor mounting assembly. The motor shall be capable of operating in a clockwise or counterclockwise direction without impact on pump performance or components.

M. Pump design shall be modular type to allow for easy access to, and interchangeability of, assemblies or components. The gear reduction unit shall be capable of being mounted on either side of eccentric box.

N. Flow adjustment shall be from 0-100% with a guaranteed accuracy of ±½% steady state on set points over a 10:1 flow turndown range.

O. Each pump shall be capable of pumping with a net positive suction head available as low as 3 psi.

P. Variable Speed Drives

1. The Chemical Feed Pumps shall utilize variable speed motors and automated slider position adjustment to provide the necessary automated pacing of the chemical feed pumps using 4 to 20 ma signals from the plant SCADA system. Variable speed drives and motors shall utilize 460 VAC - 3 phase power. Each variable speed drive shall be capable of variation of pump speed in proportion to a 4-20 ma input signal. Each variable drive shall be capable of producing an output signal of 4-20 ma in proportion to actual speed. Each variable drive shall be capable of operating from a manual potentiometer when this option is manually selected. Each variable drive shall be able to start or stop the motor in response to an external signal. Each variable drive shall produce dry contact outputs to indicate motor running or drive FAULTED.

2. Chemical feed pump motors shall be designed to provide the proper variability and operating performance as required for correct operation of the metering pumps. Motors shall be specially designed to operate in a variable speed mode using the VFD specified. Motors shall be Inverter Duty. Motor insulation requirement shall meet or exceed the requirements of MG1 – 1998, Part 31, Section 4, requiring operation at 1600 V peak to peak, with a .1 micro-second rise time. The operating

speed range shall be 10 to 1. Motors shall be as manufactured by Reliance, Baldor, US Motors, or approved equal.

3. The feed pump supplier shall coordinate the control requirements with the Contractor so that the feed pump power and control configuration is appropriate and complete. The detailed wiring shall also include all of the various protection features which may be provided with the feed pumps, in accordance with the recommendations of the pump manufacturer. Refer to section 13300 for further details.

Q. Materials

1. Reagent Header – Kynar

2. Skid Piping - Kynar

2. Seals – Viton

3. Check Valve Balls – Glass

4. Diaphragms - Teflon

PART 3 - EXECUTION

3.1 SITE AND UTILITIES

The feed system shall be located as shown in the plans. The following utilities shall be provided at the feed system site and located as shown on the drawing. Site preparation and utility services shall be provided by the Contractor, not by the chemical feed pump skid Manufacturer.

A. Electrical. 480 VAC, 3-phase, 60 Hertz power shall be provided to the control panels.

B. Drain - A minimum 2-inch gravity pad drain to sewer is recommended.

C. Concrete Foundation

D. All trenching excavation and backfill.

3.2 EQUIPMENT SHOP TESTING

Before shipping the equipment, the Manufacturer shall perform shop tests. These tests shall include at a minimum:

A. Visual inspection of all equipment.

B. Complete assembly, start-up, and “wet-test” of feed pumps and calibration piping.

3.3 INSTALLATION

The system shall be installed in accordance with the manufacturer's instructions. All installation personnel shall be trained and qualified in the areas of plumbing, electrical work, and instrumentation as required to complete the installation.

3.4 FIELD TESTS

A. The performance of the system shall be demonstrated to dose the specified amounts of sodium hypochlorite.

B. If required, Manufacturer shall make any changes to the system, at his own expense, that may be necessary to assure satisfactory and efficient operation of this system.

3.5 WARRANTY

The Manufacturer shall guarantee that the Chemical Feed system will perform as described in these Specifications. The Manufacturer shall warrant the system, complete, to be free from defects in materials or workmanship for a period twelve (12) months from acceptance or eighteen (18) months from shipment, whichever occurs first. The metering pumps shall be warranted for three (3) years from acceptance by the Manufacturer. The Manufacturer shall repair or provide replacement for any defective components under this warranty.

TABLE 11348-1
CHEMICAL METERING PUMP SCHEDULE

EWRF RCW Filtration System Improvements	
Pump Numbers	1
Location	Chlorine Building
# Pumps	3 (1 duty, 2 spares)
Chemical	12-15% NaOCl
Type Pump	Positive Displacement Hydraulically Actuated Diaphragm
Max. Horsepower	0.50
Controls	Local Control Panel 2.0
Slider Position Control	4-20 ma
Stroke Rate Control	4-20 ma
Design Max. Capacity-GPH	16
Max. Pressure-psi	60
Piping Material	KYNAR
Type Ball Valves	KYNAR (Vented)
Skid Piping Outputs	2
Manufacturer	LMI
Model No.	Series 9

END OF SECTION

SECTION 13400 – INSTRUMENTATION AND CONTROLS GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The Contractor shall provide, through the services of a single Control Systems Integrator (CSI), all components, system installation services, as well as all required and specified ancillary services, in connection with the Instrumentation and Control System (ICS).

B. The system shall include all materials, labor, tools, fees, and documentation required to furnish, install, test, and place into operation, a complete and operable ICS as shown and/or specified within this section, related ICS specification sections, and subsections within equipment specifications.

C. The system shall include all measuring elements, signal converters, transmitters, specialty cables, control panels, digital hardware and software, remote telemetry units (RTU), signal and data transmission systems, interconnecting wiring and such accessories as shown, specified, and/or required to provide the functions indicated, whether specifically mentioned or not.

D. The CSI shall be responsible for the detailed design, field verification, installation, technical oversight, testing, quality assurance, and documentation of all technical details involving instrumentation and controls for this project. The CSI shall furnish trained personnel on site during any activities requiring installation, calibration, testing, or startup of the supplied control system.

E. The specifications provided within this section shall be applied to all of the Instrumentation and Control specifications, Sections 13400 through 13460, as well as additional specifications sections as referenced. The ICS shall be provided as a single and complete system as specified herein and as specified within the following ICS specifications:

1. Section 13420 - Instrumentation and Controls, Field Equipment

2. Section 13430 - Instrumentation and Control, Control Enclosures

3. Section 13440 - Instrumentation and Control, SCADA Hardware

4. Section 13470 – Instrumentation and Control, Functional Requirements

F. For the purposes of these specifications the Control Systems Integrator shall be referred to as the CSI. Where references are made to the SCADA System Programmer or the SSP, it shall be understood that all application software services will be provided by the CSI under this contract.

G. The Contractor shall be ultimately responsible for installation of the ICS.

However, the CSI will include installation within the scope of his subcontract to provide for installation of the complete system as specified. The CSI shall also coordinate his work with the Contractor to ensure that the proper type, size, and number of wires with their conduits are provided and installed. This coordination will also ensure that proper electrical power circuits are provided for all components and systems.

H. The CSI shall coordinate structural work, penetrations, painting, etc., as required for installation of a complete ICS. In-line or integrally mounted items (such as flow elements, level sensors, etc.) shall be installed under the supervision of the CSI.

I. The CSI shall be responsible for coordinating interfaces between ICS equipment provided under the ICS specification sections and the equipment provided under other sections of the specifications. The Contractor shall verify and coordinate space requirements, process equipment power supply and voltage, process equipment control power supply and voltage, compatibility of control signals, details of equipment installation and interconnection. Coordination shall include distribution of approved shop drawings to all vendors, subcontractors, etc., involved in the control interface. Likewise, the Contractor shall ensure that instrumentation and control devices provided under other sections of the specifications are compatible and of the same quality and characteristics as similar devices specified under the ICS specification sections.

1.2 DEFINITIONS AND ABBREVIATIONS

A. The following definitions and abbreviations are used throughout the specifications and drawings when referring to instrumentation and control equipment, functions, and service. Definitions and abbreviations are not listed for those used in common industry practice except where to provide explicit meaning. Refer to ISA, IEEE, and other industry standard references for those not listed herein.

CSI……Control System Integrator
LFEM……Lake Filter Equipment Manufacturer
ICS……Instrumentation and Control System
OIT……Operator Interface Terminal
OWS……..Operator WorkStation
PID……Proportional-Integral-Derivative Control
SCADA…… Supervisory Control and Data Acquisition
SSP…….. SCADA System Programmer
TVSS…… Transient Voltage Surge Suppression
RTU…….. Remote Telemetry Unit
PLC…….. Programmable Logic Controller

1.3 SCOPE

A. The scope listed within this subsection pertains to major items of supply. Refer to the complete Contract Documents for all requirements.

B. This project will include and provide for the expansion of the existing City of Venice Eastside WRF SCADA System for new equipment and instruments provided under this contract as shown on the drawings and specified herein. The ICS shall monitor the new Lake Filter System, backwash pump station, low-head transfer pump station, and other components as shown on the drawings and specified herein and in other related sections.

C. Monitoring of each process shall be accomplished through existing PLC system control panels communicating over a fiber optic cable Ethernet network to the SCADA computer system.

D. Modifications will be required in the existing Control Room PLC (PLC-1) and PLC 1 Remote I/O to accommodate the new Input/Output requirements as shown on the drawings and specified herein.

E. This project will provide for the following components, systems or subsystems:

1. Furnish various local process monitoring instrumentation complete with surge protection and signal transmission as specified.

2. Furnish and install new equipment including in-plant Programmable Logic Controller components to provide all specified SCADA Input/Output signals and functions.

3. Furnish TVSS for instrumentation and control panels as specified.

4. Provide configuration and application programming for the SCADA PLC control panels and SCADA computers HMI software as required and described herein.

5. SCADA and Historian Server application programming.

6. Interface with control panels provided by other equipment suppliers under this contract.

7. Furnish spare parts as described herein.

8. Provide implementation and site testing of the complete SCADA system.

9. Furnish training of Owner personnel.

10. Provide Operations and Maintenance Manuals.

F. The CSI shall provide control panels components complete with wiring, relay logic, pilot devices, backup power systems, power and signal line surge protection, communications equipment and appropriate interfaces to all station equipment.

G. The CSI shall be responsible for providing a complete and operational system in full compliance with the specifications and contract drawings. The CSI shall be

responsible for the detailed design, field verification, installation, technical oversight, testing, quality assurance and documentation of all technical details involving instrumentation and control for this project. The CSI shall furnish trained personnel on site during any activities requiring installation, calibration, testing or startup of any controls or communications.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – Testing

1. Refer to Division 1 for additional requirements for testing the ICS.

B. Division 11 – Equipment

1. Refer to individual product specifications within specification sections for additional requirements specific to those devices. Instrumentation and control equipment supplied as part of packaged systems shall be integrated into the ICS as specified.

2. Where Division 11 equipment suppliers are providing instrumentation and control equipment for which there is no specification within their respective equipment specification, they shall provide equipment in accordance with the ICS specifications. This equipment shall be compatible and of the same quality and characteristics as similar devices specified under the ICS specifications. If possible the same make and/or model supplied under the ICS specifications shall be provided.

3. PLC and HMI programming performed by Division 11 equipment suppliers shall be coordinated with the CSI to provide supervisory control and monitoring of control panels provided under Division 11 via network communications.

C. Division 13 – Special Construction

1. Refer to individual product specifications within specification sections for additional requirements specific to those devices. Instrumentation and control equipment supplied as part of packaged systems shall be integrated into the ICS as specified.

D. Division 15 – Mechanical

1. Refer to individual product specifications within specification sections for additional requirements specific to those devices. Instrumentation and control equipment supplied as part of packaged systems shall be integrated into the ICS as specified.

E. Division 16 – Electrical

1. Where electrical subcomponents are to be provided as part of ICS equipment, but for which there is no specification, provide in accordance

with Division 16 - Electrical. These subcomponents shall be compatible and of the same quality and characteristics as similar devices specified under Division 16 - Electrical. If possible the same make and/or model supplied under Division 16 shall be provided.

2. The following work shall be provided under Division 16 – Electrical:

   a. Conduit, raceways, and installation of wire and cable for all instrumentation and control system signal wiring, grounding systems, special cables and network cables except as noted.

   b. Instrumentation and control system signal field wire.

   c. Grounding systems for all ICS equipment.

   d. Mounting of ICS electrical enclosures (i.e. control panels, TVSS boxes, electronic instrumentation, etc.) with exclusion of final measuring elements of instrumentation (i.e. flow tubes, sensors in process piping, etc.) which shall be as coordinated by the Contractor.

3. The CSI shall provide all termination information for the ICS equipment, to support equipment terminations provided under Division 16. This information shall be provided within ten (10) days of ICS equipment arrival onsite or as required by the project schedule. The information shall be in the form of drawings and termination lists, showing complete termination information (to/from panels, terminal numbers, terminal block locations, signal types, voltages, etc.).

1.5 CODES AND STANDARDS

A. The ICS shall comply with the National Electric Code, National Electric Safety Code, OSHA, and with all applicable federal, state, county, municipal, and electrical utility codes and regulations, as well as the Contract Documents. In the event of any conflict between these codes, regulations, and Contract Documents, the most restrictive shall apply.

B. The Instrumentation and Control System shall comply with the following codes and standards as well as any others within the specifications and drawings. In the event of any conflict between these codes, regulations, standards and Contract Documents, the most restrictive shall apply.

1. Applicable state, county, and municipal code requirements.

2. Applicable standards of the National Fire Protection Association (NFPA)

   a. National Electrical Code (NEC).

3. Applicable standards of the Underwriter's Laboratories, Inc. (U.L.)

   a. UL 508 Industrial Control Equipment

b. UL 508A Industrial Control Panels

4. Applicable standards of the Institute of Electrical and Electronics Engineers (IEEE)

5. Applicable standards of the National Electrical Manufacturers Association (NEMA)

   a. NEMA 250 Enclosures for Electrical Equipment (1000 V Maximum)

   b. NEMA ICS 1 Industrial Control and Systems: General Requirements

   c. NEMA ICS 6 Enclosures for Industrial Control and Systems

6. Applicable standards of the International Society of Automation (ISA)

   a. S5.1 Instrumentation Symbols and Identification

   b. S5.4 Instrument Loop Diagrams

   c. S20 Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves

   d. TR20.00.01 Specification Forms for Process Measurement and Control Instruments

1.6 SUBMITTALS

A. Submittals shall be provided in accordance with the requirements set forth in the specifications and as specified herein.

B. Every submittal shall have a separate section entitled "Requested Deviations from ICS Specifications" which shall clearly define and clearly explain all requested deviations and exceptions of the Instrumentation and Control System to this Specification. Only those deviations requests listed in this section will be reviewed.

C. After all changes or corrections resulting from the review of the system supplier's drawings have been made, panels may be built and instrumentation devices may be supplied in accordance with the approved drawings. One set of "as shipped" prints shall be included in the panels when shipped from the system supplier's wiring and assembly shop.

D. The following major list of submittals shall be provided as a minimum. Major submittals are generally listed in the order they are to be provided. Refer to related ICS specification sections and equipment subsections for additional submittals and submittal requirements.

   1. Process Instrumentation Submittal

   2. SCADA System Hardware and Control Panel Submittal

3. SCADA System Software Submittal

4. Training Submittal

5. Testing Submittal

6. Tools, Supplies, and Spare Parts Lists Submittal

7. Preliminary and Final Operation and Maintenance Manuals

E. Process Instrumentation Submittal

1. This submittal shall provide complete documentation of all field devices and other instrument and control equipment not specified to be submitted elsewhere.

a. Provide data sheets for each component listing all model numbers, optional, and ancillary devices that are being provided.

The data sheets shall be provided with an index and proper identification and cross referencing. They shall include but not be limited to the following information.

(i) Plant Equipment Number and ISA tag number per the Loop Diagrams.

(ii) Product (item) name used herein and on the Contract Drawings.

(iii) Manufacturers complete model number.

(iv) Location of the device.

(v) Input - output characteristics.

(vi) Range, size, and graduations.

(vii) Physical size with dimensions, enclosure NEMA classification and mounting details.

(viii) Materials of construction of all components.

(ix) Instrument or control device sizing calculations where applicable.

(x) Certified calibration data on all flow metering devices.

b. Provide equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment

identification tags. As a minimum the specification sheets shall include the following:

(i) Dimension, rigid-clearances.

(ii) Mounting or installation details.

(iii) Connection.

(iv) Electrical power or air requirements.

(v) Materials of construction.

(vi) Environmental characteristics.

(vii) Performance characteristics.

c. The submittal shall also contain all planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards, and equipment layouts in order to enable the Contractor to proceed with the detailed site preparation for all equipment.

F. SCADA System Hardware and Control Panel Submittal

1. Provide detailed drawings covering control panels, consoles and/or enclosures which shall include:

a. Cabinet assembly and layout drawings to scale. These shall include both front and interior layouts. For existing panels to be refurbished, include details of panel modifications showing new and existing equipment and panel components.

b. Material, fabrication and painting specifications.

c. Color selection samples for selection by the Engineer.

d. Where graphic display panels are required, submit detailed layout to scale, including symbols and line widths as well as color selection samples and details of fabrication. Half-scale layout will be acceptable.

e. Heat calculations for control panels consisting of a PLC control system.

f. Power supply device sizing calculations which includes UPS systems (where applicable).

g. Panel wiring diagrams showing all power connections to equipment within and on the panel, combined panel power draw requirements (volts, amps), breaker sizes, fuse sizes, and

grounding. This wiring diagram shall be in ladder logic format and shall reference the appropriate loop drawing for continuations or details where required. Show all wire numbers and terminal block designations

2. Provide detailed loop diagrams on a single 11-in x 17-in or 8.5-in x 11-in sheet for each monitoring or control loop. The loop diagram shall show all components of the loop including analog, digital, and discrete components including all relays, switches, dropping resistors, etc. which are being provided for proper operation. Loop numbers used shall correspond to the loop numbers indicated in the Contract Documents. The format shall be the International Society of Automation, Standard for Instrument Loop Diagrams, ISA-S5.4 plus the following requirements:

   a. On each diagram, present a tabular summary of (1) the output capability of the transmitting instrument, (2) the input impedance of each receiving instrument, (3) an estimate of the loop wiring impedance based on wire sizes and approximate length used, (4) the total loop impedance, (5) reserve output capacity.

   b. Show all interconnecting wiring between equipment, panels, terminal junction boxes and field mounted components. The diagrams shall show all components and panel terminal board identification numbers and all wire numbers. This diagram shall include all intermediate terminations between field elements and panels (e.g. terminal junction boxes). The diagrams shall be coordinated with the electrical contractor and shall bear his mark showing this has been done.

   c. Show location of all devices.

   d. Show instrument description showing type, manufacturer, model number, range, set points, and operation (e.g. fail open, open on energize, normally closed, etc.) as applicable.

   e. Show all instrument loop power or instrument air requirements back to termination on terminal block or bulkhead, fuse block (including fuse size), etc., as applicable.

3. This submittal shall provide complete documentation of the proposed hardware (PLCs, communications equipment, peripherals, etc.) including:

   a. A system block diagram(s) showing in schematic form, the interconnections between major hardware components such as: control centers, panels, consoles, computer and peripheral devices, telemetry equipment, local digital processors and like equipment. The block diagram shall reflect the total integration of all digital devices in the system and shall reflect any man/machine interface locations. All components shall be clearly identified with appropriate cross references to the location of each.

The diagram shall reference all interconnecting cabling requirements for digital components of the system including any data communication links.

b. Data sheet for each hardware component, listing all model numbers, optional, auxiliary, and ancillary devices that are being provided. The data sheets shall be provided with an index and proper identification and cross referencing. They shall include but not be limited to the following information.

(i) Equipment Number and ISA tag number per the Loop Diagrams (as applicable).

(ii) Product (item) name used herein and on the Contract Drawings.

(iii) Manufacturers complete model number.

(iv) Location of the device.

(v) Input - output characteristics.

(vi) Range, size, and graduations.

(vii) Physical size with dimensions, enclosure NEMA classification and mounting details.

(viii) Materials of construction of all components.

(ix) Power supply device sizing calculations where applicable.

c. Equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment identification tags. As a minimum the specification sheets shall include the following:

(i) Dimensions and working clearances.

(ii) Mounting or installation details.

(iii) Connection diagrams.

(iv) Electrical power requirements (volts, amps).

(v) Materials of construction.

(vi) Environmental characteristics.

(vii) Performance characteristics.

d. The submittal shall also contain all planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards, and equipment layouts in order to enable the Contractor to proceed with the detailed site preparation for all equipment.

4. This submittal shall contain a complete system Input/Output (I/O) and termination list for the local control PLC panel. The list shall be sorted first by ISA tag name and second by I/O type (i.e. AI, AO, D1, DO. etc.). The list shall contain as a minimum the following for each active point and spare point:

a. Full ISA instrument tag (or "SPARE").

b. Type of I/O (i.e., DI, DO, AI or AO).

c. I/O terminal point physical location (panel name, rack, slot, point, etc.).

d. I/O point address.

e. Point name.

f. Terminal Strip and Number

H. SCADA System Software Submittal

1. Software submittals shall include the following as a minimum:

a. Bill of materials with software names, vendors and complete listings of included software modules.

b. Standard manufacturer's literature describing the products.

c. Description of function of software in ICS System.

d. Software features, limitations and constraints of software.

e. Minimum system (processor and memory) requirements.

2. Submit information on the following software:

a. Operator Interface (SCADA or HMI) software, including all add-in software provided to perform specific functions (alarm dialers, schedulers, backup creation software, etc.).

b. Control software (block oriented and/or ladder logic).

c. Office-type products, such as spreadsheets, word processors, etc.

d. Database management software.

e. Communications software, including all applicable local and wide area network software.

f. Programmable logic controller programming software (where applicable).

g. Software configuration, including:

1) Graphic display organization.

2) Database configuration for real-time, historical, etc. databases

3) Trends.

4) System security.

5) Formats for all reports, including all required calculations.

6) Intercommunications between software products required to implement system functions.

7) Equipment backup configuration and requirements.

3. Control Strategies

a. Provide control strategy documentation that includes control strategy diagrams (either block oriented logic or ladder logic diagrams, as appropriate) to describe the control of all processes. The control strategy submittals shall contain the following as a minimum:

1) An overall description of the program structure

2) A detailed description of the program and how it will meet the specified control requirements. The written description shall follow the format of the functional control descriptions contained herein.

3) A listing of inputs and outputs to the control strategy.

4. Application Software

a. Provide application software documentation that contains program descriptions for the operation, modification and maintenance of all application programs provided for the digital system.

b. Application software includes all custom routines developed specifically for this project, or pre-written routines used for accomplishing specified functions for this project. This shall

include VBASIC and C programs, and any other add-in custom software.

5. Graphic Displays

   a. Submit all graphic displays required to perform the control and operator interface functions specified herein.

   b. Submit graphic displays for review by the Owner and the Contractor at least sixty (60) days prior to commencement of factory testing.

   c. The Contractor shall allow for two (2) major cycles of revisions to the displays prior to factory testing and two (2) minor cycle of revisions following factory test. A cycle of revisions shall be defined as all revisions necessary to complete a single set of changes marked by the Owner/Contractor. Additional corrections shall be performed during start-up as required to accommodate changes required by actual field conditions, at no additional cost to the Owner.

   d. Two (2) of the required submittals in each revision cycle shall be full color prints of the entire set of displays. Additional sets may be in black-and-white or gray-scale.

   e. Displays shall be printouts of actual process and control graphics implemented in the system.

K. Training Submittals

1. Training Plan Submittal: The training plan shall include:

   a. Definitions of each course.

   b. Specific course attendance.

   c. Schedule of training courses including dates, duration, and locations of each class.

   d. Resumes of the instructors who will actually conduct the training.

L. Testing Submittals

1. Four levels of system testing shall be required: Unwitnessed Factory Testing, Witnessed Factory Testing, Operational Readiness Testing, and System Acceptance Testing.

2. The test plan shall be submitted after all equipment submittals have been approved.

3. The test plan shall demonstrate that the CSI has designed and configured

a system that meets the design specifications. The documents for the test plan shall be structured so that it is easily understood what the inputs are, what the predicted outputs should be, and what the actual outputs are. The test plan should have sign-off and date block for the CSI, the Contractor, and the Owner.

4. The complete test plan should include but not be limited to the following:

    a. Test assumptions and methods

    b. Test Equipment List

    c. Test Personnel Staffing and Qualifications

    d. Test Schedule with time allotted for each task

    e. System hardware and software summary.

    f. Communications test to the various PLCs for Discrete and Analog I/O data transfer.

    g. 100 percent I/O point test including all spare points based upon the previously submitted System I/O list.

    h. Functional and Control Strategy tests.

5. Test Procedures: Submit the procedures proposed to be followed during the test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. Testing may not be started until all Testing Submittals have been approved.

6. Test Documentation: Submit a copy of the signed off test procedures upon completion of each required test.

M. Tools, Supplies and Spare Parts Lists Submittal

1. This submittal shall include a list of all required and recommended spares. The following information shall be provided in table format:

    a. Specification Section

    b. Tag name

    c. Description

    d. Quantity

    e. Manufacturer

    f. Model, part, order number

g. Storage instructions for all spare parts.

h. Local distributor and manufacturer contact information. Contact information shall include address, phone number, and website.

N. Operational and Maintenance Manuals

1. Prior to installation of any equipment onsite, preliminary O&M manuals shall have been submitted and approved. No installation of equipment shall be permitted without the Contractor maintaining an updated version of these preliminary O&M manuals onsite for the Owner's and Engineer's use.

2. After all field changes or corrections made during installation and field check out have been completed, then all system supplier documentation, including drawings, shall be revised to reflect the "as installed, corrected and accepted" condition of the system and final record copies of O&M manuals for the system shall be provided for approval.

3. Final system documentation shall be provided in 3-hole type binders of archival quality (e.g. slant D or elliptical binding, vinyl with metal hinge or extra heavy weight vinyl, etc.) with a binding no larger than three (3) inches. Materials shall be printed on 8.5" x 11" or 11" x 17" tear resistant paper or ring reinforced paper where tear resistant is not available. Drawings shall be either folded to fit within an 8.5" x 11" binder or in an 11" x 17" 3-hole binder. Each binder shall include fifteen percent (15%) spare space for the addition of future material. Tear resistant paper shall be Xerox Never Tear or equal.

4. Final documentation shall also be provided in an electronic format. Electronic documentation shall be organized and provided on CD which shall include all CAD drawings, manuals and word processing documents. Electronic documentation format shall be primarily Adobe .pdf with additional documents provided in AutoCAD, Microsoft Office, HTML or as approved by the Owner. Organization of the electronic documentation shall be such as to allow point and click navigation from a table of contents to the particular documents with the ability to return to the table of contents from any location with one mouse click.

5. AutoCAD drawings files shall include all supporting files, symbol libraries and print configurations needed to support future modifications and properly print additional drawing copies.

6. All electronic media (i.e. software, electronic documentation, configuration files/reports, device backups, etc.) shall be provided with two (2) backup copies, each organized into a separate binder. Media storage binders shall include but not be limited to the following:

a. Table of contents

b. Archival media holders (e.g. CD, DVD, etc.)

c. Support contacts (i.e. company, phone, internet link, etc.)

d. Software system requirements and installation instructions

7. Laminated or water/tear resistant copies of all applicable instrumentation and control system drawings shall be supplied in drawing pocket of each control enclosure after “as installed, corrected, and accepted" revisions have been made to the enclosure.

8. Operation and Maintenance manuals shall include but not be limited to the following:

   a. Manufacturer standard O&M manuals for all equipment and software furnished.

   b. Custom O&M information describing the specific configuration of equipment and software, and the operation and maintenance requirements for this particular project.

   c. The manuals shall contain all illustrations, detailed drawings, wiring diagrams and instructions necessary for installing, operating and maintaining the equipment.

   d. All modifications to manufacturer standard equipment and/or components shall be clearly identified and shown on the drawings and schematics. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable.

   e. A functional description of the entire system, with references to drawings and instructions.

   f. A complete "as built" set of all approved shop drawings, which shall reflect all work required to achieve final system acceptance.

   g. A complete list of the equipment supplied, including serial numbers, ranges, configuration parameters and other pertinent data.

   h. Full specifications on each item.

   i. Detailed service, maintenance and operation instructions for each item supplied.

   j. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.

k. Complete parts lists with stock numbers and name, address and telephone number of the local supplier.

l. References to manufacturers' standard literature where applicable.

m. Warning notes shall be located throughout the manual where such notes are required to prevent accidents or inadvertent misuse of equipment.

n. The operating instructions shall clearly describe the step by step procedures that must be followed to implement all phases of all operating modes. The instructions shall be in terms understandable and usable by operating personnel and maintenance crews and shall be useful in the training of such personnel.

o. The maintenance instructions shall describe the detailed preventive and corrective procedures required, including environmental requirements during equipment storage and system operation, to keep the System in good operating condition. All hardware maintenance documentation shall make reference to appropriate diagnostics, where applicable, and all necessary wiring diagrams, component drawings and PCB schematic drawings shall be included.

1.7 MEETINGS

A. The CSI and Contractor shall be required to give the Owner and the Engineer, at least two (2) weeks' notice prior to any scheduled meetings. The notice may be shortened by consent.

B. Preliminary Site Testing Meeting: A preliminary site testing meeting shall be conducted by the CSI and Contractor for the Owner and the Engineer, to insure site readiness, testing strategies and proper coordination between parties related or involved in testing the ICS. The CSI shall be responsible for arranging the on-site meeting after the Site Testing Plan has been approved and no earlier than 3 weeks prior to testing. The Owner and the Engineer must be satisfied that the site is ready and that the testing will be performed to their satisfaction prior to any documented ICS testing being performed. The CSI and Contractor shall arrange for detailed meeting minutes to be recorded, approved, and distributed to meeting attendees. Additional meetings may be required at the discretion of the Owner and the Engineer to resolve specific action items not addressed in the preliminary site testing meeting. Two weeks prior to the meeting the CSI and Contractor shall submit the following for approval.

1. A proposed list of meeting attendees including organization and phone number.

2. A proposed meeting agenda.

3. A list of personnel to be involved in the testing including their responsibilities, qualifications, and phone numbers.

4. An overall system description.

5. An overall system block diagram.

6. A list of tasks requiring Owner, Contractor or outside party involvement in testing.

7. A testing schedule that coordinates the ICS testing with the operability of the specific equipment being tested.

8. A description of all numbering, lettering, color, and format conventions that will be used including examples of loop drawings, interconnection diagrams, schematic diagrams, documentation table of contents, etc.

9. A project schedule and implementation plan that coordinates the ICS installation with the installation of the entire site project.

C. Graphic Design and Review Meetings: The CSI and Contractor shall conduct graphic design and review meetings with the Owner and the Engineer at the Owner's location. The purpose of the design meeting shall be to establish conventions, standards, formats, configurations for screen development and for discussion of preliminary graphical displays. The CSI is encouraged to submit preliminary information in advance of this meeting to facilitate discussions. The purpose of the graphic review meetings are for the CSI to present work completed, as a minimum, at the 80% level for comment by the Owner and the Engineer and for any coordination and information requests. The intent is to achieve an acceptability of software prior to demonstration testing in which all parties are confident of the end-product results. Acceptability of software implementation is at the Owner's discretion and must be achieved prior to the scheduling of site testing. A minimum of two graphic design and review meetings shall be conducted but of sufficient quantity to adequately address all issues and concerns of the Owner in developing a quality system.

1.8 CONTROL SYSTEM INTEGRATOR

A. The Control System Integrator shall be regularly engaged in the detailed design, fabrication, installation and startup of instrumentation and control systems for water and wastewater treatment facilities in the state of Florida. Any CSI that has been subject to litigation or the assessment of liquidated damages for nonperformance on any project within the last five calendar years shall not be acceptable.

B. Where specific manufacturers and/or models of major hardware or software products (PLC, Software, Network Equipment, Wireless Equipment, etc.) are specified to be used on this project, the CSI shall have completed at least one project using that specified hardware or software. As used herein, the term

"completed" shall mean that a project has been brought to final completion and final payment has been made.

C. Control System Integrators shall meet the following minimum qualifications:

1. A minimum of 7 years' experience with at least 5 years in water / wastewater projects

2. References for 3 completed projects of like size and application to the project specified herein

3. Project bonding capacity of $2 million

4. UL 508 certified panel shop

5. Electrical contractors license in the project site's state.

6. On staff licensed professional engineer capable of being registered in the state of the project and registered in that state, if required to perform engineering services as specified to implement this project.

D. The listing of acceptable Control System Integrators in this specification in no way relieves the Control System Integrator from meeting the qualifications specified herein. Acceptable Control System Integrators shall be as follows:

1. Curry Controls Company: 4245 S Pipkin Road, Lakeland, FL 33811; (863) 646-5781; www.currycontrols.com

E. The Owner shall have the right of access to the CSI's facilities and the facilities of their equipment suppliers to inspect materials and parts, witness inspections, tests and work in progress, and examine applicable design documents, records and certifications during any stage of design, fabrication and tests. The CSI and their equipment suppliers shall furnish office space, supplies and services required for these inspection activities.

1.8 QUALITY ASSURANCE

A. The listing of specific products in this specification in no way relieves the Contractor of furnishing equipment which shall meet the performance and quality criteria specified herein.

B. All equipment and materials shall be new and the products of reputable recognized suppliers having adequate experience in the manufacture of these particular items.

C. For uniformity, only one manufacturer will be accepted for each type of product.

D. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses that may occur during fabrication, transportation, and erection as well as during continuous or intermittent

operation. They shall be adequately stayed, braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility, shall be given consideration in the design of details.

E. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, which shall be of sturdy and durable construction and be suitable for long, trouble free service.

F. Electronic equipment shall be suitable for the specified environmental conditions.

G. Optional or substituted equipment or both requiring changes in details or dimensions required to maintain all structural, mechanical, electrical, control, operating, maintenance or design features incorporated in these specifications and drawings, shall be made at no additional cost to the Owner. In the event that the changes are necessary, calculations and drawings showing the proposed revisions shall be submitted for approval. The CSI shall coordinate all changes with other affected trades and contracts and pay all additional charges incurred.

PART 2 – MATERIALS AND EQUIPMENT

2.1 GENERAL REQUIREMENTS

A. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL, where UL Standards are established for those items, and the requirements of NFPA-70. All control panels shall comply with the requirements of UL 508A for Industrial Control Panels. All items shall be new and unused unless specified or indicated otherwise.

B. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations. Replace damaged or defective items.

C. All equipment shall be the latest and proven design. Specifications and drawings call attention to certain features, but do not purport to cover all details entering into design of the instrumentation system. The completed system shall be compatible with functions required and the equipment furnished by the Contractor.

D. All electrical components of the system shall operate on 120 volt, single phase, 60 Hz power source, except as otherwise noted in the Specifications. Drawings and specifications indicate the energy sources that will be provided. Any other devices necessary to obtain proper operation of the instrumentation and control system from these energy sources shall be furnished with the system.

E. All necessary fuses or switches required by the instrumentation manufacturer for equipment shall be provided with the equipment. All instruments requiring internal power supply shall have internal on-off switches.

F. The mechanical, process, and electrical drawings indicate the approximate locations of field instruments, control panels, systems and equipment as well as field mounted equipment provided by others. The instrumentation subcontractor shall examine the mechanical, process and electrical drawings to determine actual size and locations of process connections and wiring requirements for instrumentation and controls furnished under this Contract. The CSI shall inspect all equipment, panels, instrumentation, controls and appurtenances either existing or furnished under other Divisions of the Specifications to determine all requirements to interface same with the ICS. The CSI shall coordinate the completion of any required modifications with the associated supplier of the item furnished.

G. Instrumentation equipment and enclosures shall be suitable for ambient conditions specified. All system elements shall operate properly in the presence of telephone lines, power lines, and electrical equipment.

H. Inside control rooms and climate-controlled electrical rooms, the temperature will normally be 68 to 77 degrees F; relative humidity 40 to 80 percent without condensation and the air will be essentially free of corrosive contaminants and moisture. Appropriate air filtering shall be provided to meet environmental conditions (i.e., for dust).

I. Other indoor areas may not be air conditioned/heated; temperatures may range between 32 and 104 degrees F with relative humidity between 40 and 95 percent.

J. Field equipment, including instrumentation and panels, may be subjected to wind, rain, lightning, and corrosives in the environment, with ambient temperatures from -4 to 104 degrees F and relative humidity from 10 to 100 percent. All supports, brackets and interconnecting hardware shall be aluminum, 316 stainless steel, or as shown on the installation detail drawings.

2.2 TOOLS, SUPPLIES, AND SPARE PARTS

A. Provide special tools, other than those normally found in an electronic technician's tool box, required to test, diagnose, calibrate, install, wire, connect, disconnect, assemble and disassemble any digital equipment, instrument, panel, rack, cabinet or console mounted equipment for service and maintenance (i.e., connector pin insertion and removal tools, wire crimping tool, special wrenches, special instrument calibrators, indicator lamp insertion and removal tools, etc.).

B. Provide tools and test equipment together with items such as instruction manuals, carrying/storage cases, unit battery charger where applicable, special tools, calibration fixtures, cord extenders, patch cords and test leads, which are not specified but are necessary for checking field operation of equipment supplied under this Section.

C. The CSI shall provide supplies as needed or as required by the Owner during the specified warranty period. All fuses consumed during installation, testing, start-

up, the system availability demonstration, and the warranty period shall be replaced by the CSI.

D. Provide spare parts for items of ICS equipment as recommended by the manufacturer and in accordance with the Contract Documents.

E. Furnish all spares in moisture-proof boxes designed to provide ample protection for their contents. Label all boxes to clearly identify contents and purpose.

F. Refer to individual product specifications for additional requirements specific to those devices.

2.3 SIGNAL TRANSMISSION

A. The Contractor shall be responsible for providing a signal transmission system free from electrical interference that would be detrimental to the proper functioning of the ICS equipment.

B. The CSI shall be responsible for coordinating signal types and transmission requirements between the various parties providing equipment under this Contract. This shall include, but not be limited to, distribution of appropriate shop drawings among the equipment suppliers and subcontractors.

C. The CSI shall provide 24 VDC power supplies for signals and instruments where applicable and as required inside panels, controls, etc. Where two-wire instruments transmit directly to the instrumentation and control system, the CSI shall provide power supplies at the PLC-equipped control panels for those instruments. Where four-wire instruments with on-board loop power supplies transmit directly to the instrumentation and control system, the CSI shall provide necessary signal isolators or shall otherwise isolate the input from the ICS loop power supply. Similar provisions shall be made when a third element such as a recorder, indicator or single loop controller with integral loop power supply is included in the loop.

D. Analog signal transmission between electric or electronic instruments, controllers, and all equipment and control devices shall be individually isolated, linear 4-20 mA and shall operate at 24 VDC. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating. All cable shields shall be grounded at one end only, at the control panel, with terminals bonded to the panel ground bus. Analog signal isolation and/or conversion shall be provided where necessary to interface with instrumentation, equipment controls, panels and appurtenances.

E. Non-standard analog transmission systems such as pulse duration, pulse rate, and voltage regulated shall not be permitted except where specifically noted in

the Contract Documents. Where transmitters with nonstandard outputs do occur, their outputs shall be converted to an isolated, linear, 4-20 mA signal.

F. All discrete inputs to equipment and PLC's, from field devices, starters, panels, etc., shall be dry contacts in the field device or equipment, powered from the PLCs, unless specified otherwise. Sensing power (wetting voltage) supplied by the PLC shall be 24 VDC.

G. All discrete outputs from local control panels and SCADA System PLCs, to field devices, starters, panels, etc., shall be 120 VAC / 28 VDC 5A dry contacts. Output contacts may be powered from the field equipment, or powered from 24 VDC / 120 VAC sourced from PLCs cabinet power system, as required to interface with field equipment. Outputs to solenoid valves, horns, and strobe lights shall be 120 VAC, powered from the PLC or control panel unless specified or shown otherwise.

H. Discrete signals between starters, panels, etc. where 120 VAC is utilized shall be clearly identified in the starter, panel, etc. as being powered from a different power supply, than other starter/panel components. Where applicable, warning signs shall be affixed inside the starter, panel, etc., stating that the panel is energized from multiple sources. Output contacts in the starter, panel, etc. which are powered from other locations shall be provided with special tags and/or color coding. Disconnecting terminal strips shall be provided for such contacts. The above requirements shall apply to all starters and panels, regardless of supplier.

2.4 NAMEPLATES

A. All items of equipment listed in the instrument schedule, control panels, and all items of digital hardware shall be identified with nameplates. Each nameplate shall be located so that it is readable from the normal observation position and is clearly associated with the device or devices it identifies. Nameplates shall be positioned so that removal of the device for maintenance and repair shall not disturb the nameplate. Nameplates shall include the equipment identification number and description. Abbreviations of the description shall be subject to the Engineer's approval.

B. Nameplates shall be made of 1/16 inch thick machine engraved laminated phenolic plastic having white numbers and letters not less than 3/16 inch high on a black background.

C. Nameplates for field instrumentation shall be 316 Stainless Steel, minimum 1 inch x 4 inch and attached with stainless steel wire.

D. Nameplates shall be attached to metal equipment by stainless steel screws. In cases where the label cannot be attached by the above methods, it shall be drilled and attached to the associated device by means of stainless steel wire.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor and CSI shall provide a periodic written report detailing progress of start-up. This report shall include specific tabulations of devices on which start-up has been completed.

B. Equipment shall be located so that it is accessible for operation and maintenance. The CSI shall examine the Contract Drawings and Shop Drawings for various items of equipment in order to determine the best arrangement for the work as a whole, and shall supervise the installation of ICS equipment.

C. Instrumentation and Control System equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Contractor during construction. Obtain in the field, all information relevant to the placing of process control work and in case of any interference with other work, proceed as directed by the Contractor and furnish all labor and materials necessary to complete the work in an approved manner.

D. The CSI shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the CSI shall be required to ship his material in sections sized to permit passing through restricted areas in the building. The CSI shall also investigate, and make any field modifications to the allocated space for each cabinet, enclosure and panel, to assure proper space and access (front, rear, side).

E. Two complete sets of approved shop drawings shall be kept at the job site during all on-site construction. Both sets shall be identically marked up to reflect any modifications made during field installation or start-up. All markings shall be verified and initialed by the Contractor or his designated representative. Following completion of installation and the operational readiness test, one set of the marked up drawings shall be provided to the Contractor, the other retained by the CSI for incorporation of the mark-ups into final as-built documentation.

F. All work shall be in strict accordance with codes and local rulings, should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bear full responsibility for such violations and assume all costs arising there from.

G. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

H. The CSI shall take steps to keep electrical and control enclosures clean and free of contaminants throughout installation. Cleaning after installation is not acceptable. Under no circumstances are electrical and control enclosures to be cleaned using compressed air to blow out dust, causing contaminants to be forced into sensitive electronics.

I. Provisions shall be made to completely capture filings (metal, etc.) when drilling into enclosures, to prevent contamination of electrical equipment.

J. Upon completion of the instrumentation and control work, the CSI shall thoroughly clean all soiled surfaces of installed equipment and materials and remove all surplus materials, rubbish, and debris that has accumulated during the construction work. The entire area shall be left neat, clean, and acceptable to the Owner.

3.2 WIRING AND GROUNDING

A. The following wiring practice guidelines shall be used in order to minimize ground loops, to minimize electromagnetic interference/radio frequency interference (EMI/RFI) to this equipment, and to provide maximum practical immunity from damage resulting from lightning-induced transients.

B. Common wires or conductors shall not be utilized (either within panels or external to panels or for grounding of field devices) for both signal shield or signal grounding and for safety grounds.

C. Exposed wire lengths extending from within shielded signal cables shall be minimized to reduce pick-up of EMI/RFI by signal circuits. Exposed lengths of less than one inch are preferred, and a maximum exposed length of two inches may be permitted where necessary. No splicing of signal wires is permitted.

D. All signal wiring shall be shielded, both within panels and external to panels. Unless otherwise specified, all signal wiring shall be No. 16 AWG stranded tinned two-conductor twisted pair, with 100 percent coverage aluminized Mylar or aluminized polyester shield and tinned copper drain wire.

E. Signal wiring within outdoor or indoor field device enclosures shall conform to the same requirements as panel wiring.

F. The shield on each process instrumentation cable shall be continuous from source to destination, and grounded at one end only. In general, grounding of signal cable shields shall be done at the control panel end. The signal cable for no signal shall share a common cable shield grounding wire with the signal cable shield for any other signal, and shall not share a common grounding wire with any other circuit. The length of no signal cable shield grounding wire shall not exceed two inches, with less than one-inch maximum length preferred.

G. All outdoor instruments and all outdoor enclosures shall be grounded using the practice defined in Section 800.40 of the National Electric Code.

3.3 TESTING, GENERAL REQUIREMENTS

A. The CSI shall test all equipment hardware and software at the factory prior to shipment. As a minimum, testing shall include the following:

1. Operational Readiness Testing (ORT).

2. System Acceptance Testing (SAT).

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's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied.

C. All tests shall be conducted in accordance with prior approved procedures, forms, and check lists. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.

D. Copies of these sign off test procedures, forms, and check lists will constitute the required test documentation.

E. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data; provide suitable means of simulation. Define these simulation techniques in the test procedures.

F. The Contractor shall require the CSI to coordinate all of his testing with him, all affected Subcontractors, and the Owner.

G. The Owner reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved test procedures.

H. The Owner's decision shall be final regarding the acceptability and completeness of all testing.

I. The CSI shall furnish the services of technicians, all special calibration, and test equipment, and labor to perform the field tests.

3.4 OPERATIONAL READINESS TESTING (ORT)

A. The entire system shall be certified (inspected, calibrated, tested, and documented) that it is ready for operation. Each specified function shall be verified on a paragraph-by-paragraph, loop-by-loop and site-by-site basis.

B. The Owner reserves the right to witness any test, inspection, calibration, or start-up activity. Acceptance by the Owner of any plan, report, or documentation relating to any testing or commissioning activity specified herein, shall not relieve the CSI of his responsibility for meeting all specified requirements.

C. The CSI shall provide the services of factory trained technicians, tools and equipment to field calibrate, test, inspect and adjust each instrument to its specified performance requirement in accordance with manufacturer's specifications and instructions. Any instrument which fails to meet any contract requirements, or any published manufacturer performance specification for functional and operational parameters, shall be repaired or replaced, at the discretion of the Engineer, at no cost to the Owner. The CSI shall bear all costs and provide all personnel, equipment and materials necessary to implement all installation tests and inspection activities for equipment specified herein.

D. Each instrument shall be calibrated at 0, 25, 50, 75 and 100 percent of span using test instruments to simulate inputs and read outputs. Test instruments shall be rated to an accuracy of at least five (5) times greater than the specified accuracy of the instrument being calibrated. Where applicable, such test instruments shall have accuracies as set forth by the National Institute for Standards and Technology (NIST).

E. The CSI shall provide a written calibration sheet for each instrument, certifying that it has been calibrated to its published specified accuracy. The CSI shall submit proposed calibration sheets for various types of instruments for approval prior to the start of calibration. This sheet shall include but not be limited to date, instrument tag numbers, calibration data for the various procedures described herein, name of person performing the calibration, a listing of the published specified accuracy, permissible tolerance at each point of calibration, calibration reading as finally adjusted within tolerance, defect noted, corrective action required and corrections made.

F. If doubt exists as to the correct method for calibrating or checking the calibration of an instrument, the manufacturer's printed recommendations shall be used as an acceptable standard, subject to the approval of the Owner.

G. Upon completion of calibration, devices calibrated hereunder shall not be subjected to sudden movements, accelerations, or shocks, and shall be installed in permanent protected positions not subject to moisture, dirt, and excessive temperature variations. Caution shall be exercised to prevent such devices from being subjected to over-voltage, incorrect voltages, overpressure or incorrect air. Damaged equipment shall be replaced and recalibrated at no cost to the Owner.

H. After completion of instrumentation installation and calibration, the CSI shall perform a loop check. The CSI shall submit final loop test results with all instruments listed in the loop. Loop test results shall be signed by all representatives involved for each loop test.

I. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated, and adjusted on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and the Contract Documents.

1. The Loop/Component Inspections and Tests shall be implemented using approved forms and check lists.

2. The CSI shall maintain the Loop Status Reports and Components Calibration sheets at the job-site and make them available to the Owner at any time.

3. These inspections and tests do not require witnessing. However, the Contractor and Owner will review and initial all Loop Status Sheets and Component Calibration Sheets and spot-check their entries periodically and upon completion of the Operational Readiness Tests. Any deficiencies found shall be corrected.

3.5 SYSTEM ACCEPTANCE TEST (SAT)

A. Successful completion of the operational readiness test, as determined by the Owner and/or Contractor, shall be the basis for starting the witnessed system acceptance test. The Owner shall approve the ORT test results and the Contractor and Owner shall be given two weeks' notice prior to the start of the System Acceptance Test.

B. The system acceptance test shall repeat loop and functional testing done during the operational readiness test in order to demonstrate that the system has been started up, is operating, and is in compliance with these Specifications. Each specified function shall be demonstrated on a paragraph-by-paragraph, loop-by-loop and site-by-site basis.

C. The following documentation shall be made available during the test:

1. All Contract Drawings and Specifications, addenda, and change orders.

2. Master copy of the test procedure.

3. One copy of all O&M Manuals shall be made available to the Engineer at the job-site both before and during testing.

D. Any malfunction during the tests shall be analyzed, and corrections made by the CSI. At any time during the tests, the Owner and/or Engineer reserves the right to halt the test if there are an excessive number of malfunctions until all signals are corrected by the CSI. The Owner and/or Engineer will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

E. After all functions have been tested and all corrections made, the system shall operate continuously for 15 days without failure before this test will be considered successful.

F. The total availability of the system shall be greater than 99.5 percent during this test period. Availability shall be defined as "Avail. = (Total Time-Down Time,) / (Total Time) x 100%". Down times due to power outages or other factors outside the normal protection devices or back-up power supplies provided, shall not contribute to the availability test times above.

3.6 TRAINING

A. The CSI shall provide project specific classroom training at the Owners site or designated location. Training shall be provided for the operation and maintenance of all equipment provided, as well as site specific installation configuration training for the system as a whole.

B. Each student shall be provided with training materials. All training materials shall be provided in hardcopy as well as on a training CD, with all materials in Microsoft Office or Adobe .pdf file format. When a large volume of training materials is to be provided (i.e., software documentation, etc.), only electronic

copies need to be provided per Owner's approval. When providing training materials as electronic copies only, the CSI must ensure that the training attendees will be able to use computers during the training to access information, whether provided by the Owner or not. All training CD's shall be updated with final configuration information and resubmitted for approval. Final CD media shall be archival quality.

C. The Owner reserves the right to video tape any and all training sessions for the purposes of future or refresher training.

D. To facilitate the Owner's operations staff scheduling, training shall be conducted in two (2) four-hour sessions, a morning session and an afternoon session. Morning and afternoon sessions will cover the same material on a given day. The training shall consist of one (1) day minimum with (2) sessions per day.

E. Operator training shall be provided to familiarize operators with the system as a whole and to instruct on the function and operation of each component of the system. Training shall consist of the day-to-day operation of the system and all other operator site specific functions for this project. Instruction shall include a site walk down of installed and retrofitted equipment. Two (2) courses lasting a minimum of one (1) day, with four (4) hours of instruction per day, shall be provided by the CSI.

F. Maintenance training shall be provided to designated maintenance personnel, so that each component may be maintained without the assistance of outside organizations. The training shall be extensive so that after training, personnel shall be able to identify component malfunctions and repair components to the board/module replacement level. Training shall cover the entire system including controls and field equipment.

G. Maintenance training shall be conducted in one (1) session, with a minimum of 4 hours of instruction.

H. Under the scope of this project, the CSI will be responsible for providing PLC and HMI application control programming and logic. Specific training should therefore include, but not be limited to: system architecture and interconnection, wiring, field instrumentation and PLC hardware including maintenance and trouble-shooting.

I. Refer to related specification sections for additional training requirements.

J. Training sessions shall be carried out to the satisfaction of the Owner before final acceptance will be provided.

K. Training schedules shall be coordinated with the Owner and conducted at his convenience.

3.7 WARRANTY

A. The warranty for the ICS shall be provided as specified herein. The warranty

period for this system shall be for one year and shall begin upon acceptance of the complete system by the Owner. During this warranty period, the CSI shall provide, at no additional cost to the Owner, the services of a trained, competent, field service engineer who shall arrive on site within 8 hours of notification by the Owner or Engineer, to repair and/or replace any faulty device or equipment supplied by the system supplier as part of this Instrumentation and Control System. All preventive and corrective activities shall be documented with service reports, which shall identify the equipment being serviced, state the condition of the equipment, describe all work performed, and list materials used. A copy of all service reports shall be delivered to the Owner on or before the next business day.

B. The CSI shall be capable of providing, after the warranty period for this system expires, a 1-year renewable service contract whereby a trained, competent field service engineer shall arrive on site within 8 hours of notification by the Owner. Information relative to charges for such service and availability of such service shall be submitted to the Owner and the Engineer.

C. Components shall be furnished to the manufacturer's standard for service intended, unless otherwise indicated in the Specifications or on the Contract Drawings.

END OF SECTION

SECTION 13420 – INSTRUMENTATION AND CONTROLS FIELD EQUIPMENT

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish, test, install and place in satisfactory operation all equipment required to provide a complete and operable Instrumentation and Control System (ICS) as specified herein and as shown on the Contract Drawings, even if each needed item is not specifically specified or shown.

B. The Control System Integrator (CSI) shall provide full onsite supervision of all equipment provided under this section, where installation is provided by others.

C. Field equipment (i.e. primary elements, measuring devices, transmitters, field controllers, chart recorders, indicators, and other instrumentation and accessories) shall be provided with all components necessary for a fully functional device whether specifically mentioned in these specifications or not. This shall include, as applicable or recommended by the manufacturer: sample conditioning, sensors, sensor holder and mounting brackets, transmitter, all required cables, calibration equipment, chemicals, reagents and spare parts.

D. Specialty cables between sensors/probes and their electronics/transmitters shall be furnished by the CSI with each instrument. Cables shall be coordinated with the conduit installation and be of sufficient length to not require any splicing. Special cables include any type of cable not specified in Division 16 – Electrical.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13400 - Instrumentation and Controls, General Requirements, and the sections referenced therein shall be applied.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Section 13400 - Instrumentation and Controls, General Requirements. In addition, the following specific submittals items shall be provided:

1. An ISA specification sheet for each instrument furnished and/or calibrated shall be submitted with the field equipment submittals. The ISA data sheet shall be in accordance with ISA Standards ISA S20 “Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves” and ISA TR20.00.01 “Specification Forms for Process Measurement and Control Instruments”.

2. The CSI and the field equipment manufacturer shall review the proposed installation and configuration of all field equipment, prior to submittal for

approval, and shall identify any condition which shall require corrective measures. The following as a minimum shall be reviewed for the installation configuration of each instrument:

a. Listed features

b. Material of construction

c. Consideration of process fluid

d. Environmental conditions

e. Installation location

f. Process connections

g. Ability to perform maintenance

3. Submit in writing in the field equipment submittal, that each piece of equipment is suitable for the proposed installation. Any proposed deviations shall be reviewed by the Engineer prior to execution.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Unless otherwise specified, instruments shall be provided with enclosures to suit the specified environmental conditions. Field-mounted devices shall be rugged and mounted on walls, equipment racks, or pipe stanchions. Where the field equipment's integral enclosure for a specified instrument is not available with the specified environmental rating, the field equipment shall be provided in a control enclosure as specified in Specification Section 13430 - Instrumentation and Controls, Control Enclosures.

B. Where separate elements and transmitters are required, they shall be fully matched, and unless otherwise noted or shown on the Contract Drawings, installed adjacent or near to the sensor, in a readily accessible location. Special cables that are required for interconnection between sensors or probes and transmitters shall be furnished with the instrumentation devices by the associated equipment manufacturer. Special cables shall be of the required length for the equipment locations and conduit routing paths shown on the Contract Drawings. No splicing of cables will be accepted.

C. Electronic equipment shall utilize printed circuitry and shall be coated (tropicalized) to prevent contamination by dust, moisture and fungus. Ambient conditions shall be -15 to 50° C and twenty to ninety-five percent (20% - 95%) relative humidity, unless otherwise specified. Field mounted equipment and system components shall be designed for installation in dusty, humid and corrosive service conditions.

D. All non-loop-powered instruments and equipment shall be designed to operate on a 60 Hz alternating current power source at a nominal 120 VAC, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

E. All analog transmitter and controller outputs shall be isolated, 4-20 mA into a load of 0-750 ohms minimum, unless specifically noted otherwise.

F. Process taps for primary sensors shall be sized to suit each individual installation and the requirements of the instrument served. It is the Contractor's responsibility to ensure that the location, supports, orientation and dimensions of the connections and taps for instrumentation furnished under this Division are such as to provide the proper bracing, the required accuracy of measurement, protection of the sensor from accidental damage, and accessibility for maintenance while the plant is in operation. Isolation valves shall be provided at all process taps.

G. All instrumentation exposed to sunlight shall be provided with sunshields constructed from 316 stainless steel. Sunshields shall be designed to withstand wind loads. Sunshield design shall be submitted for approval.

H. All outdoor external sample/process piping, including valves and appurtenances, shall be insulated with weather-proof insulation, and heat-taped to prevent freezing. Heat taping shall be thermostatically controlled and self-regulating, and shall adjust its heat output to the temperature of the lines.

2.2 TOOLS, SUPPLIES AND SPARE PARTS

A. Tools, supplies and spare parts shall be provided as specified in Section 13400 - Instrumentation and Controls, General Requirements, and as specified for each equipment item. In addition, the following items shall be provided:

1. All instruments shall be supplied with one (1) years' worth of supplies, including chemicals and reagents, for the calibration, operation and maintenance of the device.

2. Where the manufacturer's shelf life limit does not support delivery of all spare equipment at one time, the CSI shall utilize the equipment manufacturer's maintenance parts program to provide delivery based on anticipated calendar usage of the parts. Documentation of participation in the program will be provided prior to the project completion.

3. In addition, spares for the following instruments shall be supplied: one (1) pressure transmitter, one (1) Chlorine Analyzer, and one (1) level transducer and transmitter.

2.3 ACCESSORIES

A. Instrument tubing shall be 1/4 x 0.065-inch seamless, annealed, ASTM A-269 Type 316L stainless steel with Type 316 - 37° stainless steel flared fittings, or equal to Swagelock or Parker-CPI flareless fittings.

B. Diaphragm seals shall be provided to systems as shown on the Contract Drawings, as specified herein and/or for isolation of pressure gauges, switches and transmitters attached to systems containing chemical solutions or corrosive fluids. As a minimum, seals shall be of all 316 stainless steel construction. Diaphragms shall be 316L stainless steel for operating pressures at or above 15 psi, and elastomers for operating pressures below 15 psi. Diaphragm material shall be non-reactive with the process fluid. Refer to the Instrument Schedules for specific materials requirements. Seals shall have fill connections, 1/4-inch NPT valve flush ports and be capable of disassembly without loss of filler fluid. Where specified, diaphragm seals shall comply with the above requirements, and shall be provided with 316 stainless steel factory filled capillaries. Seals shall be equal to Helicoid Type 100 HA, Mansfield & Green, Ashcroft or approved equal.

C. Isolating ring seals shall be provided for sensing elements measuring pressure in solids bearing fluids. For heavy solids/slurry applications, wherever the associated pressure instrument is used for control purposes, or where shown on the Contract Drawings, the sensor body shall be full line size wafer design, with 316 stainless steel housing and assembly flanges, and Buna N flexible cylinder lining for in-line mounting. The wafer shall have through bolt holes or centerline gauge for positive alignment with the associated flanged piping. The captive liquid chamber and associated instrument(s) shall be furnished with threaded drain tap and plug. Isolating ring seals shall be equal to RED Valve Series 40, Ronningen-Petter Iso-Ring, Moyno RKL Series W or approved equal.

D. For all other solids bearing fluids, pressure shall be sensed via a 1/2" diameter spool-type isolating ring seal, mounted on a 1/2" pipe nipple at 90 degrees from the process piping. An isolation ball valve shall be provided between the process piping and the ring seal, and a cleanout ball valve shall be provided between the ring seal and the atmosphere. The pressure instrument shall be back or side mounted to the ring seal such that the gauge or readout may be viewed normally. Isolating ring seals for normal solids service shall be equal to Red Valve Series 42, Ronningen-Petter Iso-Spool, or equal.

E. Isolation valves shall be 1/2-inch diameter ball valves with 316 stainless steel body, 316 stainless steel ball.

2.4 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

A. TVSS shall be supplied for all field equipment power, signal, and communications wires that have any portion extending outside of a building. Refer to Specification Section 13430 - Instrumentation and Controls, Control Enclosures for requirements.

2.5 LEVEL SWITCH, SUSPENDED FLOAT TYPE

A. Float switches shall be of the non-mercury displacement type, encapsulated in polyurethane or vinyl floats.

B. Units shall be waterproof, shockproof, explosion-proof and equipped with sufficient submersible cable to extend to the control panel or junction box without splicing.

C. Any required weights shall be provided. Switches shall be suspended on a suitable rack or rail of stainless steel construction.

D. Suspended type float switches shall be equal to Flygt ENM-10, Anchor Scientific Eco-Float or approved equal.

2.6 LEVEL/FLOW TRANSMITTER, ULTRASONIC TYPE

A. Ultrasonic transmitters shall be provided for measurement of tank levels or for flow measurement based on level over a weir or flume. Equipment shall be provided with features and accessories as described herein and suitable for the application.

B. Ultrasonic level/flow transmitters shall meet the following specifications as a minimum:

1. NEMA 4X enclosure

2. 120VAC, 60Hz input power

3. Process display with keypad for menu driven configuration

4. One (1) isolated 4-20 mA output

5. One (1) alarm relay output

6. Non-volatile memory

7. Accuracy: 0.25 %

C. The CSI shall provide all mounting hardware and coordinate the details of the installation so that the instruments are installed in keeping with the best standard and recommended practices of the manufacturer and conforming to the requirements set forth by the Engineer.

D. Level/flow transmitters shall be fully programmable and configurable using a computer and keypad. The final 'As-Built' documentation shall be provided with a tabulation of the Programming Parameters used in each level/flow transmitter so that the initial calibration can be reproduced if a spare transmitter is installed.

E. Level/flow transmitters shall be provided with integral analog signal isolators, as part of the transmitter assembly. All conduit connections shall be sealed to prevent damage or corrosion due to vapors or wetness.

F. Ultrasonic Level/Flow Transmitters shall be Siemens Hydroranger 200 with Echomax XPS-15 sensors. Refer to the Instrumentation Schedule Attachment for flange mounting requirements. Transmitters shall be installed using the appropriate transducer, suitable for the range and process connection of the

installation. The cable provided with the transducer shall be ordered with sufficient length to provide installation without splicing the cable at any point.

G. The CSI shall provide mounting hardware components and appropriate mounting assistance to install and secure the transducers in a manner in keeping with the recommendations of the manufacturer of the equipment and in keeping with the general details provided in the drawings. All hardware shall be fabricated from corrosion resistant materials and shall utilize stainless steel hardware. The mounting system shall be secure and permanent and shall allow easy access to the sensor for servicing. All cables shall be installed in suitable rigid conduit with only short lengths of flexible conduit allowed to complete the installation.

H. In cases where the transducer is used to monitor a covered wet well, the transducer shall be installed using a hinged protective enclosure. The enclosure shall be a special corrosion resistant instrument enclosure made of polyurethane, and stainless steel hardware. Enclosures shall be equal to model C-6, as provided by O'Brien Corp, St. Louis, Missouri. The case shall be secured to the slab using heavy anchors over an appropriately sized hole cored through the slab. The enclosure shall also have a hole in the bottom to match the hole in the slab so that the transducer can be easily installed from above. The transducer shall be installed on a heavy aluminum plate which would lie in the bottom of the enclosure and allow the transducer to extend into the cored hole.

I. In cases where the transducer is used to monitor a water storage tank or other type of location, the CSI shall provide a mounting design and mounting hardware to provide an installation which is appropriate for the operation of the device and easily maintained. For storage tanks, the transducer shall be mounted above the tank or a suitable bracket extending out far enough from the tank sides to receive a strong signal over the entire level range without reflections off the tank sides. The transmitter shall be mounted outside of the wall at a convenient ground-level working height.

J. In cases where the transducer is used on a chemical storage tank, the CSI shall provide a flange mounted arrangement to match the connection point on the storage tank. Flange sizes and type will be coordinated with that equipment supplier.

K. In cases where the transducer is used in a turbulent area, the sensor shall be flange mounted to a stilling well to minimize incorrect responses to wave action in the liquid. The stilling well shall be a eight (8) inch PVC pipe which shall extend the entire depth of the measured range and to below the normal low liquid level. The stilling well shall have holes drilled periodically along the length sufficient to allow adequate response to changes in liquid level. The stilling well shall be supported in a manner which produces a rigid installation minimizing the movement due to the turbulent liquid.

2.7 PRESSURE GAUGE

A. General: Unless otherwise noted or specified, pressure and vacuum gauges shall conform to the following:

B. Mounting Type: Gauges shall be of the stem-mount type unless noted otherwise.

C. Construction: Gauges shall be of the bourdon tube or bellows type with 270 degrees clockwise pointer travel. Dials shall be white face with black numerals. Dial size shall be 4-1/2 inches. Connections for all gauges shall be male 1/2 NPT with square wrench flats. Wetted parts shall be corrosion-resistant to the process fluid shown and unless otherwise specified shall be the manufacturer's best quality standard. The case shall be filled with glycerin and shall be black phenolic. Accuracy shall be ±0.5 percent of span.

D. Chemical Seal: Where specified or shown in the drawings, the gauge, with optional locking device, shall be furnished with a diaphragm seal. The diaphragm seal shall have a 316 stainless steel (minimum) top and bottom housing and a 316 stainless steel diaphragm welded to the top housing. When the process fluid or pressure is not compatible with 316 stainless steel, the manufacturer shall provide a diaphragm seal compatible with the process fluid. The process connection shall be a 3/4-inch threaded connection with a flushing connection. The fill fluid shall be glycerin. A locking device shall be included from the factory on all fluid-filled instruments to prevent inadvertent loosening or removal from the seal.

E. Where no seal is specified the gauge will be supplied with a pressure limiting snubber to protect against surges and pulsations.

F. Manufacturers: The gauges shall be equal to Ashcroft, McDaniels, U.S. Gauge or approved equal.

G. The diaphragm seals shall be field serviceable for oil filling and equal to Ashcroft, Mansfield and Green, FIT, Ametek or equal.

2.8 CHLORINE ANALYZER (TOTAL)

A. The online total residual chlorine analyzer shall measure concentrations of total chlorine residual in water in the range 0-5 ppm with an accuracy ≤±5% of reading. The analyzer's accuracy shall not be affected by pH changes between 6-9.5 pH. The analyzer shall have a response time ≤2.5 minutes. The analyzer shall include but not be limited to the following:

1. Non-corrosive NEMA 4X enclosure

2. 120VAC 60Hz input power

3. Process display with keypad for menu driven configuration

4. One (1) 4-20ma output

5. Two (2) user-selectable alarm relay outputs

6. Flow Controller

7. Sample conditioning kit

8. One (1) year supply of maintenance/operating parts and chemicals

B. The analyzer shall be mounted within a NEMA 4X enclosure with full door window kit for protection of the equipment.

C. Total Residual Chlorine Analyzers shall be Hach CL17.

PART 1 - EXECUTION

3.1 REQUIREMENTS:

A. In addition to the requirements specified in this section, refer to Section 13400 - Instrumentation and Controls General Requirements.

END OF SECTION

Eastside WRF RCW Filtration
City of Venice, Florida
Instrumentation Schedule

TAG	SPECIFICATION	DESCRIPTION	SERVICE	RANGE
AE/AIT-853	13420-2.8	CL2 Analyzer/Transmitter	Transfer Pump Station Effluent Chlorine Residual	0-5 mg/L
LSLL-805	13420-2.5	Non-Mercury Float Level Switch	Backwash Pump Wetwell Low Low Level	
LSL-805	13420-2.5	Non-Mercury Float Level Switch	Backwash Pump Wetwell Pumps Off Level	
LSML-805	13420-2.5	Non-Mercury Float Level Switch	Backwash Pump Wetwell Lead Pump Level	
LSMH-805	13420-2.5	Non-Mercury Float Level Switch	Backwash Pump Wetwell Lag Pump On Level	
LSHH-805	13420-2.5	Non-Mercury Float Level Switch	Backwash Pump Wetwell High High Level	
LSLL-850B	13420-2.5	Non-Mercury Float Level Switch	Transfer Pump Station Wetwell Low Low Level	
LSHH-850B	13420-2.5	Non-Mercury Float Level Switch	Transfer Pump Station Wetwell High High Level	
LE/LIT-850A	13420-2.6	Ultrasonic Level Transmitter	Transfer Pump Station Wetwell Level	0-XXX FT
PI-851	13420-2.7	Pressure Gauge	Transfer Pump Station Pump No. 1 Discharge Pressure	0-XXX PSI
PI-852	13420-2.7	Pressure Gauge	Transfer Pump Station Pump No. 2 Discharge Pressure	0-XXX PSI
PI-624	13420-2.7	Pressure Gauge w/ Diaphragm Seal	Sodium Hypochlorite Pump No. 10 Discharge Pressure	0-XXX PSI

SECTION 13430 – INSTRUMENTATION AND CONTROLS CONTROL ENCLOSURES

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish, modify, test, install and place into satisfactory operation all control enclosures (i.e. field panels, control panels, cabinets, consoles, boxes, etc.) required to provide a complete and operable Instrumentation and Control System (ICS) as specified herein and as shown on the Contract Drawings, even if each needed item is not specifically specified or shown.

B. The Contractor shall also be responsible to provide modifications to existing control panels as described herein, as indicated in the PLC Input/Output Schedule Attachment and shown in the Contract Documents. Modifications to existing control panels shall also conform to the requirements of these specifications. The CSI shall also be responsible for field-verifying all signal wiring to the existing panels retrofitted under this contract. Existing signal wiring, which is not shown or detailed on the contract drawings but is required for operability of the system, shall be incorporated into the new control system furnished under this contract.

C. New control enclosures and/or subpanels shall be assembled, wired and tested in the CSI's own facilities, unless specified otherwise.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13400 - Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.

B. Instrumentation and Controls Schedules. Refer to Instrumentation Schedule and PLC Input/Output Schedule Attachments for a listing of major equipment, enclosure construction and signal monitoring requirements.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification - and as specified in Section 13400 - Instrumentation and Control, General Requirements. In addition, the following specific submittal items shall be provided.

1. Cabinet sizing in relation to heat dissipation and cooling/heating system sizing calculations shall be submitted for all cabinets containing PLCs, UPSs, VFDs, SCRs and, at the request of the Engineer, for all cabinets containing sensitive electronic equipment or chemicals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. All enclosures shall fit within the allocated space shown on the Drawings. The Contractor shall examine plans and/or field inspect new and existing structures as required to determine installation requirements and shall coordinate the installation of all enclosures with the Owner and all affected Trades. The Contractor shall be responsible for all costs associated with installation of enclosures, including repair of damage to structures (incidental, accidental or unavoidable).

B. A minimum estimated size is shown on the Drawings. The Contractor shall furnish enclosures of the size and quantity required to house the manufacturers' equipment supplied and all other electrical components installed in the enclosure. In addition, provide useful space and power supply capacity as spare for future expandability to a minimum of one (1) item per item type installed or twenty percent (20%) of quantity of each type item installed, whichever yields the greater spare space.

C. Enclosures (cabinets, panels, boxes, etc.) shall be formed or welded construction, reinforced with Unistrut, Powerstrut or equal to facilitate mounting of internal components or equipment. Sufficient access plates and doors shall be provided to facilitate maintenance and testing of the supplier's equipment. Doors shall be removable. Enclosures with any dimension thirty-six (36) inches or greater shall be provided with removable lifting lugs designed to facilitate safe moving and lifting of the panel during installation. No screws or bolts shall protrude through from the interior enclosure.

D. All steel enclosures shall be free from dirt, grease and burrs, and shall be treated with a phosphatizing metal conditioner (phosphate conversion coating) before painting. All surfaces shall be filled, sanded, and finish coated by spraying a 1-2 mil epoxy prime coat and smooth, level, high grade textured finish between flat and semi-gloss shine. The colors shall be selected by the Owner from a minimum of six (6) color samples provided. All stainless steel enclosures shall be polished to a No. 4 finish

E. Enclosures shall be prefabricated cabinets and panels equal to Hoffman, Rittal or Vynckier. The Contractor may optionally provide enclosures custom fabricated by a reputable panel fabrication shop acceptable to the Engineer.

F. Each panel shall incorporate a removable back panel on which control components shall be mounted. Back panels shall be secured to the enclosures with collar studs. All components shall be of the highest industrial quality and securely mounted to the removable back panels with screw and lock washers. Back panels shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component.

G. All enclosures with any dimension twenty-four (24) inches or larger shall be provided with drawing pockets for as-built panel drawings. One (1) laminated

copy of the appropriate panel as-built drawings shall be furnished and left in the pocket of each panel.

H. All enclosures shall be protected from internal corrosion-inhibiting vapor capsules as manufactured by Northern Instruments Model Zerust VC, Hoffman Engineering Model A-HCL, or equal.

I. All metallic enclosures with door mounted equipment shall have the door grounded by means of a flexible ground strap.

J. The enclosure and all interior and exterior equipment shall be identified with nameplates. The equipment shall be mounted such that service can occur without removal of other equipment. Panel mounted equipment shall be flush or semi-flush mounted with flat black escutcheons. All equipment shall be accessible such that adjustments can be made while the equipment is in service and operating. All enclosures shall fit within the allocated space as shown on the Contract Drawings.

K. Enclosures shall provide mounting for UPS, power supplies, control equipment, input / output subsystems, panel mounted equipment and appurtenances. Ample space shall be provided between equipment to facilitate servicing and cooling. Enclosures shall be sized to adequately dissipate heat generated by equipment mounted inside the panel. Louvered openings fitted with dust filters near the bottom and top of the cabinet shall be provided for NEMA 12 enclosures. If required, cabinets shall be provided with filtered fans, heat exchangers or air conditioners. Only closed loop cooling systems shall be provided for NEMA 4X cabinets. Cooling systems shall be by the cabinet fabricator or equal to McLean Midwest, Noren Products, or approved equal.

L. Enclosures shall be provided with a main circuit breaker and a circuit breaker on each individual branch circuit distributed from the panel. Main breaker and branch breaker sizes shall be coordinated such that an overload in a branch circuit will trip only the branch breaker but not the main breaker. Circuit breakers shall be provided for the following internal branch circuits distributed within the panel:

1. Receptacles and power strips

2. Lighting

3. UPS

4. HVAC equipment

M. Enclosures shall be provided with 120 volt duplex receptacles for service equipment and fluorescent service lights. Loads not requiring transient voltage surge suppression (i.e. receptacles, lighting, HVAC, branch circuits to remote equipment, etc.) shall be connected ahead of the enclosure TVSS device.

N. Locate equipment, devices, hardware, power supplies, instrumentation and

controls, electrical equipment and wiring to be installed inside the enclosures and/or as front-view mounted on the enclosures, so that connections can be easily made and so that there is ample room for servicing each item. Every component in and on the enclosures shall be able to be removed individually without affecting the other components and without the need to move other components. Support and restrain all internally, as well as panel mounted components to prevent any movement.

O. All cabinets and/or enclosures shall be NEMA rated for the environment in which it is to be installed and as noted in the Drawings.

P. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

Q. Control panels shall be built in accordance with UL508A Industrial Control Panels and NEC Article 409 Industrial Control Panels. Control panels for areas classified as Hazardous shall be built in accordance with UL698 Industrial Control Equipment for Use in Hazardous Locations. Control panels shall be UL508A and/or UL698 labeled and marked as defined in NEC 409.110 with the following:

1. Manufacturer's name and contact information (i.e. address, phone, website, email, etc.).

2. Supply voltage, phase, frequency and full-load current.

3. Short-circuit current rating of the industrial panel based on one of the following:

a. Short-circuit current rating of a listed and labeled assembly

b. Short-circuit current rating established utilizing an approved method

c. Electrical wiring diagram numbers or the index sheet to the electrical wiring diagrams.

d. The enclosure type number (i.e. NEMA 1A, 3R, 12, 4X, 7, 9, etc.)

4. If the industrial control panel is intended as service equipment, it shall be marked to identify it as being suitable for use as service equipment.

R. All work shall be performed in a professional manner and in consideration of allowing ease of future troubleshooting and maintenance. All equipment should be mounted so as to minimize crowding within the panel. All devices shall be mounted and wired in a neat and workmanlike manner. Each component shall be prominently identified with the use of permanent engraved legend plates.

S. Grounding: All suppressors shall be grounded per the suppressor manufacturer's recommendations. Furnish control panels with an integral copper grounding bus for connection of suppressors and other required instrumentation. Provide single-point connection of all grounds to grounding bus using the shortest possible path. Each grounded object shall have a separate connection to the ground bus. Do not connect cable shields to suppressor ground terminal or daisy-chain ground connections. Provide 1-inch wide by 1/8-inch thick copper ground bus as a minimum.

2.2 TOOLS, SUPPLIES, AND SPARE PARTS

A. Tools, supplies, and spare parts shall be provided as specified in Section 13400 - Instrumentation and Control, General Requirements and as specified for each equipment item. In addition, the following items shall be provided.

1. One (1) of each type of panel mounted equipment (i.e., indicators, signal converters, etc.) provided under this Contract.

2. One (1) 24VDC power supply and redundancy module.

3. Three (3) of each type of interposing relay provided under this Contract.

4. One (1) of each type of power TVSS device used

5. Six (6) of each type of signal TVSS device used

6. Two (2) of each type of communication TVSS device used.

B. OUTDOOR ENCLOSURES

1. All outdoor enclosures shall be rated NEMA 4X, constructed of 316 stainless steel with a white powder epoxy coating finish unless specified otherwise. Outdoor enclosures shall have a hinged and gasketed door. Door latches shall be all stainless steel, fast operating clamp assemblies (quick release), which do not require bolts or screws to secure. Gaskets shall be polyurethane.

2. All outdoor enclosures shall be provided with 316 stainless steel sunshield panels with white powder epoxy coating finish mounted on top, sides, and back of the enclosure. The sunshield panel mounted on top of the enclosure shall be suitably sized to provide protection to front panel-mounted instruments and devices exposed to direct sunlight. Sunshield panels shall be securely mounted to the enclosure by bolts and shall have no less than one (1) inch of clearance allowing air circulation, between the sunshield panel and enclosure, and clearance to the panel door.

3. Outdoor panels shall be fitted with pad-lockable latch kits.

4. Outdoor enclosures with internal digital electronics, exterior indicators, or

exterior indicator lights shall have external sun shields or sun shades, constructed of the same materials as the associated enclosure, unless otherwise specified.

5. Outdoor enclosures shall be designed for ambient conditions of -15 to 50°C and twenty to ninety-five percent (20% - 95%) relative humidity, unless otherwise specified. Outdoor enclosures shall be provided with thermostatically controlled space heaters to provide condensation protection.

C. INDOOR ENCLOSURES

1. Indoor enclosures located in the same area (i.e. room, etc.) as open process tanks, open process channels, closed process piping or process equipment containing wet liquids or possible airborne powders, shall be rated NEMA 4X, constructed of 316 stainless steel, fiberglass, fiberglass reinforced polyester, or polycarbonate, unless specified otherwise. Enclosures shall have a hinged and gasketed door. Door latches shall be all stainless steel, fast operating clamp assemblies (quick release) which do not require bolts or screws to secure. Gaskets shall be polyurethane.

2. Indoor enclosures located in a dry or environmentally controlled area (i.e. electrical room, etc.) shall be NEMA 12 steel, unless specified otherwise. Enclosures shall have a hinged and gasketed door. Door latches shall be 3 point door latch with handle for all enclosures with a dimension of 24 inches or larger, or otherwise shall be fast operating clamp assemblies which do not require bolts or screws to secure. Gaskets shall be polyurethane.

3. Indoor enclosures in a non-air conditioned space shall be designed for ambient conditions of 0 to 40°C and twenty to ninety-five percent (20% - 95%) relative humidity, unless otherwise specified. Indoor enclosures in an air conditioned space shall be designed for ambient conditions of 20 to 30°C and twenty to eighty-five percent (20% - 85%) relative humidity, unless otherwise specified.

D. TERMINALS

1. Terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails, securely bolted to the cabinet sub-panel. Terminals shall be of the screw down pressure plate type equal to that manufactured by Allen Bradley, Phoenix Contact, Wieland, Square D, or equal. Power terminal blocks shall be single tier with a minimum rating of 600 volts, 30 amps. Signal terminal blocks shall be single tier with a minimum rating of 600 volts, 20 amps.

2. Fused terminal blocks or miniature thermal circuit breaker terminal blocks shall be supplied for protection and isolation of enclosed equipment, or as specified in the Contract documents. Blown fuse indicators shall be provided and/or tripped breaker status shall be clearly visible. Fused or

miniature thermal circuit breaker terminal blocks shall be provided for, but not limited to each of the following:

a. Each PLC module requiring external power

b. Each piece of equipment provided with a power supply (integral, internal or external) with the exception of devices with internal fusing plugged into a receptacle.

c. Terminals shall be marked with a black waterproof, permanent, continuous marking strip. One side of each terminal shall be reserved exclusively for field incoming conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

E. WIRING

1. All wiring shall be bundled and run open or enclosed in vented plastic wireway, as required. All conductors run open shall be bundled and bound with nylon cable ties, at regular intervals, with intervals not to exceed 12 inches. Adequately support and restrain all wiring runs to prevent sagging or other movement. Care shall be taken to separate communication, network, electronic signal, AC discrete signal, DC discrete signal and power wiring. Wiring to equipment mounted on doors or where movement of the equipment will take place, shall be installed in nylon spiral wrapping sheaths.

2. Wires shall be color coded as follows:

a. Equipment Ground – GREEN

b. 120 VAC Power Distribution – BLACK

c. 120 VAC Power Neutral – WHITE

d. 120 VAC Control (Internally Powered) – RED

e. 120 VAC Control (Externally Powered) – YELLOW

f. 24 VAC Control – ORANGE

g. DC Power (+) – BLUE

h. DC Power (-) – BLUE/WHITE

i. DC Control – BLUE

j. Analog Signal (+) – BLACK

k. Analog Signal (-) – WHITE

3. All wiring shall comply with accepted standard instrumentation and electrical

practices. Field wiring for power, control and signal wires shall comply with Division 16 of the specifications. For each pair of parallel terminal blocks, the field wiring shall be between the blocks.

4. Internal panel wiring shall be as follows:

   a. AC power wiring: 14 AWG minimum, stranded copper conductors, THHN/THHW wire rated for 600 volts and 90 °C. For wiring carrying more than 15 amps, use sizes required by NEC.

   b. AC control and dc power and control wiring: 16 AWG minimum, stranded copper conductors, THHN/THHW wire rated for 600 volts and 90 °C.

   c. Instrument signal wiring: 18 AWG stranded conductors, tinned copper, twisted pair or triad, overall one hundred percent (100%) aluminum foil shield with 20 AWG stranded drain wire, plenum rated 300V 60°C FEP insulated wire with FEP jacket, equal to Belden 88760.

   d. All stranded wire shall have a minimum of sixteen (16) strands, except for drain wires.

F. IDENTIFICATION:

1. Provide a laminated black nameplate with beveled edges and ½ inch white letters to identify each console, panel or cabinet on the front of the enclosure.

2. Provide laminated, beveled edge, plastic legend plates and nameplates, with 1/4 inch letters, for each front panel mounted device as shown on the Drawings. Legend plates and nameplates shall be the size as shown on the Drawings. Color shall be black lettering on white background except caution/warning nameplates which shall be white lettering on a red background. Attach front panel nameplates with both a permanent adhesive and stainless steel machine screws into tapped holes.

3. Tag all interior instruments and other components with engraved, laminated plastic nameplates with 1/8 inch, minimum, lettering. Legends shall be consistent with wiring and layout drawings. Nameplates shall be attached with permanent adhesive to the panel, near the device or on the device itself or as otherwise approved by the Engineer.

4. Number and label each wire in the systems. Every unique wiring node shall have its own individual unique number. Numbers shall be shown on all submitted drawings. All wires shall be labeled at each termination and junction of the wire and at 30 inch intervals along the wire. All multi-conductor cables shall be labeled at each end and at 30-inch intervals with CBL-XXX and also label each conductor at both ends. Labeling shall be self-laminating white/transparent self-extinguishing vinyl strips (equal to Brady DAT 7 292) with clear heat shrink tubing over the markers. Length shall be sufficient to provide at least two and one-half (2 ½) wraps.

All labels shall be machine-printed with wire and/or cable numbers.

G. ACCESSORIES

1. Control operators such as pushbuttons (PB), selector switches (SS), and pilot lights (PL) shall be equal to Allen Bradley 800H, Square D Company Type SK or equal. Control operators shall be 30.5 mm, round, heavy-duty, oil tight NEMA 4X corrosion resistant.

2. Pushbuttons and selector switches shall be non-illuminated, spring release type. Pushbuttons shall include a full guard. Panic stop/alarm pushbuttons shall be red mushroom type with manual-pull release. Pilot lights shall be of the proper control voltage, LED type (indoor) and lamp type (outdoor).

3. Control operators shall have legend plates as specified herein, indicated on the Contract Drawings, or otherwise directed by the Engineer. Legend plates shall be plastic, white field (background) with black lettering. Engraved nameplates shall be securely fastened above each control operator. If adequate space is not available, the nameplate shall be mounted below the operator.

4. Control operators for all equipment shall be as specified herein and of the same type and manufacturer unless otherwise specified or indicated on the Contract Drawings. Modifications to existing panels using control operators and indicators of the same type and manufacturer shall be allowed with Engineer's approval.

5. Where required to interface between motor control centers, equipment controls, and control panels, interposing relays and associated control wiring circuitry shall be furnished and installed to provide the monitoring and/or control functions specified herein. Interposing relays shall be miniature type with DPDT contacts rated a minimum 10 amp @ 120 VAC, push-to-test button, and status indicator. Relay coils shall be 120/240 VAC or 24 VDC as required. Relays shall be equal to Idec, Square D, Omron, Allen-Bradley or approved equal.

6. Digital Indicators shall be provided to indicate rates and readings in digital format and true engineering units. Indicators shall accept a 4-20 mA input signal and shall be programmable through the front panel to provide scaling, calibration, options and accessories. Units shall be 4 digit minimum with red LED indication, 120 VAC power. Digital Indicators shall be equal to Precision Digital, Red Lion or approved equal.

H. POWER SUPPLIES

1. Each control panel shall be provided with a minimum of one 24 VDC power supply. Power supplies shall be enclosed and sized per the guidelines of UL508 and UL508A. Power supplies shall be equal to Phoenix Contact, Model Quint-PS-X, Allen Bradley 1606, or approved

equal.

2. External PLC power supplies provided for loop and/or PLC power shall be redundant and alarm to the PLC upon failure.

I. TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

1. Transient voltage surge suppressors shall be provided at the following minimum locations:

   a. At any connections between AC power and electrical and electronic equipment, including panels, assemblies and field mounted instruments.

   b. At both ends of all analog signal circuits that have any portion of the circuit extending outside of a protecting building.

   c. At the control panel of all discrete signal circuits that have any portion of the circuit extending outside of a protecting building.

   d. At both ends of all copper-based communications cables that extend outside of a building.

   e. At all specified spare analog inputs and outputs in PLCs and RTUs.

2. These protective devices shall be external to and installed in addition to any protective devices built into the equipment. Power and signal protection shall be installed in either in a NEMA 4X enclosure or in the enclosure that houses the equipment to be protected.

3. All surge arrestors shall be mounted and wired per the manufacturer's recommendations including local grounding for surge energy dissipation. For surge suppressors use No. 8 cable for ground connection or install suppressor directly on ground bus using grounding screw. Provide 1-inch wide by 1/8-inch thick copper ground bus as a minimum.

4. Panel-mounted power circuit protectors shall be provided in all enclosures powered by 120 VAC. The protector shall be a 3-stage hybrid, solid-state power line protector with noise filtering, common mode and normal mode suppression and nanosecond reaction time. The unit shall include a replaceable fuse to remove the load (protected equipment) from the line if the unit is either overloaded or the internal protection fails. TVSS devices shall be equal to EDCO HSP121BT, Joslyn LDP-30-120-1, or approved equal.

5. Panel-mounted signal circuit protectors shall be made for mounting on a terminal block rail. Each TVSS shall include a moveable grounding link to allow each signal cable shield to be individually grounded to the panel via the mounting rail through the TVSS for that cable without the use of any

additional grounding wire or to be isolated from ground at the TVSS. Each mounting rail shall be grounded to the panel by the use of rail mounting screws at approximately one-foot intervals. Protection shall be from line to line and from each line to ground. Protection shall also be from shield to ground where the shield is not grounded at the protector. Each TVSS shall have the ability to protect against surge currents greater than 10,000 amperes. Each TVSS shall add no more than 22 ohms per signal wire to the total signal loop resistance of the analog signal loop in which it is installed. TVSSs shall not introduce error-producing ground loop currents into the instrumentation signal circuits. TVSS devices shall be equal to Phoenix Contact 2817055 or EDCO DRS-036.

6. Signal circuit TVSS for 2-wire field instruments shall be a conduit connected/pipe nipple type and shall have characteristics equal to the panel mounted devices. Units shall be mounted to a transmitter conduit entry point where available. When not available or practical, then these devices shall be mounted in NEMA 4X enclosures located at the field devices. TVSS devices shall be equal to EDCO SS64-36, Phoenix Contact, or approved equal.

7. Signal circuit TVSS for 4-wire field instruments shall be a separate enclosure unit capable of providing protection on both the power and signal side. The unit shall contain the characteristics of the line power protector and signal circuit protectors discussed above. Units shall be enclosed in a manufacturer assembled NEMA 4X polycarbonate enclosure with a clear polycarbonate cover. TVSS devices shall be equal to EDCO SLAC-12036, Phoenix Contact or approved equal.

8. TVSS device specifications and ratings for signal or communications types not defined herein shall be as specified elsewhere or of a type recommended by the manufacturer of the device being protected. TVSS devices shall be equal to EDCO, Inc or Phoenix Contact.

PART 3 - EXECUTION

3.1 REQUIREMENTS:

A. In addition to the requirements specified in this section, refer to Section 13400 - Instrumentation and Control, General Requirements.

B. Floor mounted enclosures shall be installed on 1/4 inch thick rubber type pads. These pads shall completely cover the area of the base that is against the floor.

C. Keep enclosures clean at all times. Keep enclosures doors closed except when actually working in the enclosure. Protect all equipment during installation, including hole punching for conduit connection. Remove all filings and thread cuttings from enclosures. Careful attention must be paid to provide installations which are both functional and esthetically acceptable.

D. All conduits used in conjunction with control panels or instrumentation of any kind

shall be sealed using a suitable duct-sealing compound to minimize the possible damage caused by vapors or wetness. It shall be the responsibility of the CSI to verify that this is accomplished early in the project, so that corrosion damage does not occur during the time of construction.

E. The Contractor shall provide the Engineer a periodic written report detailing construction progress. This report shall include specific tabulations of equipment on which construction/installation has been completed.

F. Equipment shall be located so that it is accessible for operation and maintenance. The CSI shall examine the Contract Drawings and Shop Drawings for various items of equipment in order to determine the best arrangement for the work as a whole and shall supervise the installation of all equipment.

3.2 WIRING AND GROUNDING

A. The following wiring practice guidelines shall be used in order to minimize ground loops, minimize the effects of electromagnetic interference/radio frequency interference (EMI/RFI) and to provide maximum practical immunity from damage resulting from lightning-induced transients.

B. Common wires or conductors shall not be utilized (either within panels or external to panels, or for grounding of field devices) for signal shielding, signal grounding, or safety grounds.

C. Exposed wire lengths extending from within shielded signal cables shall be minimized to reduce pick-up of EMI/RFI by signal circuits. Exposed lengths of less than one inch is preferred with a maximum exposed length of two inches only permitted where necessary. No splicing of signal wires shall be permitted.

D. All signal wiring shall be shielded, both within panels and external to panels. Unless otherwise specified, all signal wiring shall be No. 16 AWG stranded tinned two-conductor twisted pair with 100 percent coverage of aluminized Mylar or aluminized polyester shield and tinned copper drain wire.

E. The shield on each process instrumentation cable shall be continuous from source to destination, and grounded at one end only. In general, grounding of signal cable shields shall be done at the control panel end. No signal cable shall share a common cable shield grounding wire with any other signal cable or other circuit. The exposed length of cable shield grounding wires shall not exceed two inches prior to termination with less than one-inch maximum length preferred.

F. All outdoor instruments and all outdoor enclosures shall be grounded using the practice defined in Section 800.40 of the National Electric Code.

END OF SECTION

SECTION 13435 – INSTRUMENTATION AND CONTROLS TRANSFER PUMP STATION CONTROL ENCLOSURE

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish, modify, test, install and place into satisfactory operation a new local duplex pump control panel for the Transfer Pump Station as specified herein and as shown on the Contract Drawings, even if each needed item is not specifically specified or shown. The panel shall be mounted adjacent to the wetwell.

B. All components and all necessary accessories (e.g. mounting hardware, conditioning equipment, TVSS, fuses, circuit breakers, terminals, ground bars, relays, contactors, starters, indicators, control operators, power supplies, signal conditioning, connectors, digital hardware, etc.) that may be required to complete the system, shall be provided.

C. The new control enclosure and/or subpanels shall be assembled, wired and tested in the supplier's own facilities, unless specified otherwise.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the Control Panel shall comply with the requirement for control panels as included herein and as defined in Section 13430 – Instrumentation and Control, Control Enclosures and as shown on the Contract Drawings.

B. In addition to the requirements specified in this section, the requirements of specification Section 13400 - Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.

C. Motor starter, VFD and circuit breaker components shall comply with the requirements defined under Division 16 – Electrical.

D. Instrumentation and Controls Schedules. Refer to Instrumentation Schedule and PLC Input/Output Schedule Attachments for a listing of major equipment, enclosure construction and signal monitoring requirements.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification - and as specified in Section 13400 - Instrumentation and Control, General Requirements. In addition, the following specific submittal items shall be provided.

1. Cabinet sizing in relation to heat dissipation and cooling/heating system sizing calculations shall be submitted for all cabinets containing PLCs, UPSs, VFDs, SCRs and, at the request of the Engineer, for all cabinets

containing sensitive electronic equipment or chemicals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Construction: The electrical control equipment shall be mounted within a NEMA Type 4X, powder epoxy coated white, dead front enclosure with 3-point latch, constructed of not less than 14-gauge, 316 stainless steel.

B. The enclosure shall be equipped with a dead-front door and shall incorporate a removable back panel on which control components shall be mounted. The back panel shall be secured to the enclosure with collar studs.

C. The panel shall be mounted on 3-inch Type 304 stainless steel pipe supports, with stainless steel Unistrut channels attached with stainless steel fasteners or as shown on the Drawings. The support posts shall be anchored in concrete adjacent to the transfer pump station wetwell. Sufficient space shall be provided for mounting of the associated wetwell level transmitter and surge arrestor.

D. No fittings shall enter from the back or sides of the control panel. All conduits shall enter the bottom of the panel and shall be threaded conduit hubs.

E. The minimum panel size shall be 30" x 30" x 8". All panels shall be equipped with main and emergency circuit breakers. All power conductors from the main breaker to the emergency and pump breakers shall be connected via a power distribution block.

F. Two (2) liquid level switches shall be installed and equipped with a continuous length of flexible 600 volt, type S.O. cable to make all connections inside the control panel (no splices shall be permitted).

G. The station shall have a flashing type red alarm beacon mounted on top of control panel and one adjustable audible alarm with a silence pushbutton.

H. The pump station shall be PLC controlled and include an Operator Interface Terminal (OIT) for monitoring of station operation and adjustment of station parameters. The PLC and OIT shall comply with Section 13440 – Instrumentation and Controls, SCADA Hardware.

I. Remote monitoring from the facility SCADA system shall be provided using interposing relay dry contacts for discrete signals and retransmission dual output signal isolators for analog signals.

J. Operating Controls and Instruments:

1. All operating controls and instruments shall be securely mounted on the control compartment inner door. All controls and instruments shall be clearly labeled to indicate function.

2. The pump mode selector switch shall be of the Hand-Off-Auto type to permit override of automatic level controls and manual actuation of shutdown of each pump motor. The operation of each pump in the manual mode shall bypass all safety shutdown circuits except for the pump motor overload shutdown.

3. Switches shall be oil-tight, as manufactured by Allen-Bradley Type 800H, or approved equal, providing three (3) switch positions, each of which shall be clearly labeled according to function.

4. Separate indicator lamps, which shall operate at 120 volts input, shall be provided mounted above the H.O.A. selector switches. The lamps shall be easily replaceable from the front of the control compartment door without removing switch modules from their mounted positions.

K. Control Components: The pumps shall be controlled based on the level in the wetwell. The liquid level in the wetwell shall be sensed by an ultrasonic level transmitter with backup monitoring by polypropylene weighted floats. For full functional description refer to Section 13470 – Instrumentation and Control, Functional Requirements

L. The ultrasonic level sensor shall be flange mounted to a stilling well extending the depth of the wetwell and connected to a level indicating transmitter.

M. The floats shall be secured at the top of the wetwell via a stainless steel hatch mounted bracket designed specifically for the float installations. The floats shall be Anchor Scientific Eco Float, or approved equal. High and low station levels shall be alarmed.

PART 3 - EXECUTION

3.1 REQUIREMENTS:

A. IUnless otherwise noted on the drawings, the bottom of the cabinet shall be mounted a minimum of 20 inches above the top of the wetwell opening, properly aligned and adequately supported independent of the connecting raceways. Controls and indicators on installed control panel shall be no higher than six (6) feet above the ground.

B. All wiring in the control panel shall be neatly formed, grouped, and identified to provide a neat and orderly appearance.

C. Ground Resistance - Tests shall be made on the entire grounding system for the continuity of connections and for resistance to the flow or current through ground connections. The ground resistance of conduits, equipment cases, and supporting frames shall not vary appreciably from that of the system as a whole. The ground resistance of the system shall not exceed 10 ohms.

END OF SECTION

SECTION 13440 – INSTRUMENTATION AND CONTROLS SCADA HARDWARE

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish, test, install and place in satisfactory operation all equipment required to provide a complete and operable Supervisory Control and Data Acquisition (SCADA) system, as specified herein and as shown on the Contract Drawings, even if each needed item is not specifically specified or shown.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 13400 - Instrumentation and Control, General Requirements and the sections referenced therein shall apply.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification - and as specified in Section 13400 - Instrumentation and Control, General Requirements. In addition, the following specific submittals items shall be provided.

1. Battery Backup and UPS sizing calculations

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. The SCADA hardware configuration as specified herein, as specified in related sections and as shown on the Contract Drawings depicts overall system configuration requirements. Unless otherwise specified, designs which vary from this concept will be rejected.

B. All discrete and analog data acquisition, pre-processing, storage and process control functions shall be performed at the PLC level.

C. PLC-to-PLC communication protocols shall be Ethernet based.

D. Cable systems shall be provided for various requirements, including but not limited to data network, fiber optic, printer, power cables, and others as required. Cables shall be routed in suitable conduits, cable ducts, channels and wire ducts to provide a clean, safe, non-obtrusive and workmanlike installation.

E. All software licenses and support contracts shall be registered to City of Venice, FL. The particular contact person and address shall be coordinated with the Owner prior to purchasing of any equipment or software.

2.2 TOOLS, SUPPLIES, AND SPARE PARTS

A. Tools, supplies and spare parts shall be provided as specified in Section 13400 - Instrumentation and Control, General Requirements, and as specified for each equipment item. In addition, the following items shall be provided:

1. One (1) CPU module for each PLC system furnished under this Contract.

2. One (1) communication module for each PLC system furnished under this Contract.

3. Two (2) of each type of input/output module for each PLC system furnished under this Contract.

4. One (1) PLC power supply for each PLC system furnished under this Contract.

5. One (1) equipment power supply for each PLC System furnished under this contract.

6. One (1) Network component for each PLC System furnished under this Contract.

2.3 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

A. Refer to specification section 13430 – Instrumentation and Control, Control Enclosures for TVSS requirements.

B. Provide TVSS protection for all specified spare analog inputs and outputs.

2.4 UNINTERRUPTABLE POWER SUPPLIES (UPS), CONTROL PANEL

A. UPS units shall be line interactive units provided for new PLC control panels as specified herein or shown elsewhere within the Contract Documents.

B. UPS units for locations without Automatic Transfer Switch (ATS) and generators shall be sized to provide a minimum of two (2) hours backup time for all connected equipment. At sites with ATS and generators, UPS units shall be sized for a minimum of twenty (20) minute backup for all connected equipment. Each UPS shall consist of a UPS module and battery modules as required to meet backup run time requirements.

C. UPS units provided for PLC cabinets shall be provided with a dry contact output to alarm on UPS trouble or failure. This fail output shall be wired into the PLC I/O to represent UPS status.

D. Where located in a control or PLC enclosure, the UPS shall be located at the bottom of the enclosure but mounted on a raised shelf or platform.

E. Provide network interface for network management support and power management using SNMP.

F. Each UPS shall be sized to match the maximum power requirements of the

associated digital equipment, control panel power supplies and accessories plus twenty (20) percent spare capacity. Upon loss of the AC supply, the inverter shall continue to supply normal power to the device, drawing DC from the batteries.

G. Each UPS shall meet the following requirements:

1. Input voltage shall be 120 VAC, single phase, 60 Hz.

2. Operating temperature range shall be 0 to 40 degree C.

3. Voltage regulation shall be plus or minus five percent (+/-5%) for line and load changes.

4. The output frequency shall be phase-locked to the input AC line on AC operation and shall be 60 hertz (+/-0.5%) when on battery operation.

5. The batteries shall be of the sealed, lead acid or lead calcium gelled electrolyte type, suitable for high temperatures.

6. Sound absorbing enclosure.

7. EMI/RF noise filtering.

8. Surge protection shall be provided on the AC input circuit, which shall have a UL TVSS clamping voltage rating of 400 V with a <5 ns response time.

9. Adjustment allowed to prevent UPS from going offline when on a standby generator supplied power source.

H. UPS systems shall be equal to Tripp Lite OMNI Series, APC, Eaton or approved equal.

2.5 PROGRAMMABLE LOGIC CONTROLLERS (PLC), GENERAL

A. The Control System Integrator shall furnish programmable controllers (PLCs) as specified herein and as shown on the Drawings. PLCs shall be provided complete with rack, power supply, Input/Output (I/O) modules, special function cards, instructions, memory, input/output capacity and appurtenances to provide all features and functions as described herein. PLC I/O cards may be supplied by third party vendors if approved by the PLC manufacturer and the Owner. No substitutions will be permitted.

B. All components of the PLC system shall be of the same manufacturer; who shall have fully tested units similar to those being furnished, in an industrial environment with associated electrical noise. The PLC system shall have been tested to meet the requirements of NEMA Standard ICS 2-230 (Arc Test) and IEEE C37.90.1 (SWC). The processing unit shall perform the operations functionally described herein, based on the program stored in memory and the

status of the inputs and outputs.

C. The programmable controller shall be designed to operate in an industrial environment. The PLC shall operate in an ambient temperature range of 0°-60°C and a relative humidity of five to ninety-five percent (5% - 95%), non-condensing. The PLC shall operate on supply voltages of 90-132 VAC at 47-63 Hz, or 24 VDC if provided with a battery backup system. Overcurrent and undervoltage protection shall be provided on the power supply.

D. System configuration shall be as shown on the Contract Drawings. PLC types shall be designated on the system block diagram and correspond to the specifications herein. Only a single type of processor shall be supplied for all PLCs of a designated type. Memory, processor and PLC type shall be adequate for all control functions specified. Memory backup shall be provided during loss of power for the configuration, logic program and current operating parameters/addresses.

E. The processor and its associated memory shall be enclosed in a modular enclosure. A multiple-position selector switch or equivalent shall be used to select processor operating mode. LED-type indicating lights shall be provided to indicate processor, memory and battery status. Errors in memory shall be recognized, and shall activate the memory error indicating lights. Memory shall consist of battery-backed RAM or EEPROM, which shall retain the control program for at least one (1) year, in the event of power loss. Visual indication shall be provided if battery charge is insufficient to maintain the program in RAM memory for at least two (2) weeks.

F. All PLC processors shall be provided with the latest manufactured firmware revision level installed.

G. The instruction set for the PLC shall include the following, as a minimum.

1. Relay type instructions

2. Counter and timer instructions

3. Comparison instructions (equal, greater than, limit tests, etc.)

4. Integer, long integer and floating point mathematical instructions

5. Advanced math and trigonometric functions

6. Matrix and array instructions

7. Logical instructions (and, not, or, etc.)

8. Bit modification, moving and shift instructions

9. Diagnostic instructions

10. Sequencer instructions

11. Program control instructions (jump, goto, subroutine, etc.)

12. PID control loops

13. Block read and write capability

14. Master and slave communications capabilities

15. Immediate I/O and communications update instructions

16. Real-time clock and date

H. In addition to a port for communications as shown on the Contract Documents, additional communication ports shall be provided for any other devices as required (i.e., operator interface unit, connection to a notebook computer for programming and configuration.)

2.6 PLC – LARGE-SIZE TYPE

A. In-Plant PLCs, as specified or shown in the Contract Documents, shall meet the following minimum requirements:

1. Two (2) 10/100 Mbps Ethernet IP Port, one (1) USB serial port

2. One power supply for each chassis shall be provided, Modicon 140CPS11420.

3. I/O modules shall be of a dedicated type, i.e. AI, AO, DI, DO. No mixed I/O modules shall be acceptable.

4. 880 KB Integrated Memory.

5. Ethernet network communications shall occur through the use of a separate backplane mounted communications adaptor capable of 10/100 MB Base T. Module shall be a Modicon 140NOE77101.

6. PLCs shall be Modicon Quantum 140CPU43412A

B. I/O added to PLC 1 Remote Input Output (RIO) shall be of this type.

2.7 PLC – MID-SIZE TYPE

A. The PLCs furnished as part of the Lake Gravity Filter, Backwash Pump Station, and the Transfer Pump Station shall be of this type.

B. Central Processor

1. Each CPU shall provide internal fault analysis with a fail-safe mode and a dry contact output for remote location alarming, and a local indicator on

the PLC frame in the event of a fault in the PLC.

2. Each processor shall have a USB terminal port for programming. The processor shall accept an 8Mb SD memory card. This card shall be capable of storing, at a minimum, application files, data files, PDF files, CAD files, Microsoft office files. Processor performance shall be rated at least 6,900 instructions per millisecond at a program make up of 65% Boolean and 35% numerical.

3. It shall be capable of interfacing sufficient discrete inputs, analog inputs, discrete outputs, and analog outputs to meet the specified requirements plus at least 100 percent excess capacity.

4. All PLC's shall be provided to support and implement closed loop floating point processing and PID control which is directly integrated into the PLC control program.

5. The power supply shall contain capacitors to provide for orderly shutdown in the event the incoming power does not meet specifications. If this occurs, the processor will cease operation, forcing all outputs off.

6. The processor shall have a memory protect switch to prevent unauthorized program changes. The processor shall include floating point hardware.

7. The PLC shall have on board status lights to indicate the following various functions:

    a. Green RUN lamp that will illuminate while the program is executing

    b. Red ERR lamp that will illuminate when a fault occurs in the processor

    c. Red I/O Lamp that will illuminate upon an I/O failure or configuration fault.

    d. Yellow SER COM lamp will illuminate when activity is present on the serial port

8. Standard web pages shall display all internal status points, status registers, alarm words, and status of each I/O point. The PLC shall support customizable web pages.

C. 8MB SD Card shall be provided from the PLC manufacturer as specified above in the Central Processor section.

D. As a minimum, each programmable logic controller shall be equipped with, or have access via linked backplane to, the following communication options:

1. One industrial standard, IEEE 802.3, 10 BaseT Ethernet communication port (RJ-45)

2. One software selectable RS-232/RS-485 serial port

3. One Mini B USB programming port.

E. Communication protocol shall be Modbus/TCP.

F. PLCs shall be Schneider Electric M340 BMXP342020.

2.8 PLC INPUT/OUTPUTS

A. Input/output hardware shall be plug-in modules in associated I/O rack assemblies. Each new PLC within an enclosure shall handle the required number of process inputs and outputs, in addition to the active spare future I/O shown on the drawings, plus a minimum of twenty percent (20%) pre-wired spares for each I/O type furnished, plus a minimum of twenty percent (20%) spare I/O rack expansion space for the addition of future circuit cards or modules.

B. PLC input/output systems and processing modules shall be of the same model series. No third party manufacturer models will be accepted.

C. Discrete inputs (DI) shall be two sets of 8-points for a total of 16 points per module, individually isolated, 120VAC modules, developed from dry field contacts. For Quantum – 140DAI54300. For M340 – BMXDAI1604.

D. Discrete outputs (DO) shall be two sets of 8-points for a total of 16-points per module. Output points shall be connected to interposing relays for interface to field equipment. Provide interposing relays as specified in Section 13130 as required to meet dry contact rating. For Quantum – 140DRA84000. For M340 – BMXDAO1605.

E. Analog input (AI) circuits shall be 8-channel isolated, 12-bit (minimum) resolution type. Analog input hardware shall be provided as required for all types of analog inputs being transmitted to the PLC. In general, analog input modules shall be capable of receiving 4-20 mA signals. Each input circuit shall have optical isolation to protect the equipment against high voltage transients. For Quantum – 140ACI03000. For M340 – BMXAMI0810.

F. Analog outputs (AO) shall be 4-channel isolated, 12 bit (minimum) resolution type. Hardware shall be coordinated with the receivers but shall generally be isolated 24 VDC, 4-20mA outputs powered from the PLC. Each output circuit shall have optical isolation to protect the equipment against high voltage transients. For Quantum – 140ACO02000. For M340 – BMXAMO0410.

G. Input/output modules shall be configured for ease of wiring and maintenance. The modules shall be connected to wiring arms which can be disconnected to permit removal of a module without disturbing field wiring. Covers shall be

provided to prevent operator personnel from inadvertently touching the terminals. The process interface modules shall be provided with screw-type terminal blocks with barriers between adjacent terminals for connection of field inputs. Terminals shall be suitable for accepting up to and including No. #22...#12 AWG (0.2...4 mm2) wire.

H. Output failure mode shall be selectable so that upon station or communication system failure, all outputs shall be placed in the non-conducting mode or remain as they were prior to failure. Light-emitting diodes shall be provided for status indication for each input and output point.

I. Signal and control circuitry to individual input/output boards shall be arranged such that board failure shall not disable more than one half (½) of the control loops within any group of controlled equipment (e.g., one pump out of a group of three pumps, two pumps out of four, etc.). Where possible, individual control loops and equipment shall be assigned to individual boards such that failure of the board will disable only one (1) loop or piece of equipment.

J. External power supplies shall be provided with the PLC as required to meet specified installed I/O power requirements, plus spares. Power supplies shall be modular units, shall be fully redundant and shall alarm to the PLC upon failure. Power supplies shall have a line regulation of 0.05% and meet the environmental and power requirements specified herein.

K. Control circuits and signals entering hazardous areas shall be provided with intrinsically safe barriers meeting the requirements of the NEC and UL698.

2.9 OPERATOR INTERFACE TERMINAL (OIT)

A. An Operator Interface Terminal shall be door mounted on PLC control panels for interface to the local PLC.

B. OITs shall be provided as noted herein and as shown on the contract drawings.

C. The OIT shall provide the capability to monitor and control the local PLC functions.

D. The OIT shall be capable of providing the functions specified with additional resources for future additions or modifications.

E. The OIT shall include the following:

1. 10.4 inch diagonal color TFT LCD screen

2. 96 MB nonvolatile flash

3. Hot swappable SD card slot and USB port

4. 10/100 MBS Ethernet port

5. Enclosure to match control panel NEMA rating

6. Programming software and communications cable

F. Configuration of the OIT for screen update times shall be such that no adverse impacts to the overall network operation shall be experienced.

G. Schneider 4 GB SD card shall be furnished for use in OIT.

H. Subject to compliance with the specifications, the OIT shall be Magelis Optimum 10.4 or approved equal.

2.10 PLC PROGRAMMING SOFTWARE

A. The PLC programming and configuration software shall be the manufacturer's latest version. The software package shall consist of all programming, configuration, and documentation software needed to place the control and information system in satisfactory operation. The software shall allow on-line and off-line program development and documentation. Programming shall be accomplished through the use of ladder logic, function block, structured text and sequential function charts. PLC programming software shall include CD-ROM documentation.

B. One licensed copy of the Unity Pro Large programming software shall be provided and licensed to the Owner for his use for maintenance and troubleshooting. This shall include programming software, all necessary communications software, and all needed serial port programming cables and USB port adapters for the Modicon Quantum and M340 PLCs.

C. One licensed copy of Vijeo Designer configuration software shall be provided and licensed to the Owner for his use and maintenance and troubleshooting. This shall include programming software, all necessary communications software, and all needed serial port programming cables and USB port adapters for the Magelis OIT.

D. Digital copies of all PLC programs, new or modified, shall be furnished for the Owner’s use. Digital copies shall be fully commented and non-password protected. Digital copies are to be supplied on both CD and flash drive.

E. Digital copies of all OIT programs, new or modified, shall be furnished for the Owner’s use. Digital copies shall be fully documented and non-password protected. Digital copies are to be supplied on both CD and flash drive.

PART 3 - EXECUTION

3.1 REQUIREMENTS:

A. In addition to the requirements specified in this section, refer to Section 13400 - Instrumentation and Controls, General Requirements.

END OF SECTION

Eastside WRF RCW Filtration System Improvements
City of Venice, FL
PLC Input/Output Schedule

TAG	DESCRIPTION	TYPE	INACTIVE	ACTIVE	UNITS	LOCATION
OL-803A	Lake Gravity Disk Filter No. 1 in Backwash	DI	In Service	In Backwash		PLC1 RIO
OA-800B	Lake Gravity Disk Filter No. 1 Overflow	DI	OK	Overflow		PLC1 RIO
OA-800A	Lake Gravity Disk Filter No. 1 Common Alarm	DI	OK	Alarm		PLC1 RIO
LAL-805	Backwash Pump Station Wetwell Low Alarm	DI	OK	Low		PLC1 RIO
LAH-805	Backwash Pump Station Wetwell High Alarm	DI	OK	High		PLC1 RIO
OL-806	Backwash Pump Station Pump No. 1 Running	DI	Stopped	Running		PLC1 RIO
OA-806	Backwash Pump Station Pump No. 1 Failed	DI	OK	Falied		PLC1 RIO
OL-807	Backwash Pump Station Pump No. 2 Running	DI	Stopped	Running		PLC1 RIO
OA-807	Backwash Pump Station Pump No. 2 Failed	DI	OK	Falied		PLC1 RIO
LI-850A	Transfer Pump Station Wetwell Level	AI	0		FT	PLC1 RIO
OL-851	Transfer Pump Station Pump No. 1 Running	DI	Stopped	Running		PLC1 RIO
OA-851	Transfer Pump Station Pump No. 1 Failed	DI	OK	Falied		PLC1 RIO
OL-852	Transfer Pump Station Pump No. 2 Running	DI	Stopped	Running		PLC1 RIO
OA-852	Transfer Pump Station Pump No. 2 Failed	DI	OK	Falied		PLC1 RIO
AI-853	Transfer Pump Station Effluent Chlorine Residual	AI	0	5	MG/L	PLC1 RIO
OL-624	Sodium Hypochlorite Pump No. 10 Running	DI	Stopped	Running		PLC1 RIO
OA-624	Sodium Hypochlorite Pump No. 10 Failed	DI	OK	Falied		PLC1 RIO
SI-624	Sodium Hypochlorite Pump No. 10 Speed	AI	0	100	%	PLC1 RIO
LAL-850B	Transfer Pump Station Low Level Float	DI	OK	Low		LCP 850
LAH-850B	Transfer Pump Station High Level Float	DI	OK	High		LCP 850
LI-850	Transfer Pump Station Wetwell Level	AI	0		FT	LCP 850
HS-851	Transfer Pump Station Pump No. 1 Run Command	DO	Stop	Run		LCP 850
OL-851	Transfer Pump Station Pump No. 1 Running	DI	Stopped	Running		LCP 850
OA-851	Transfer Pump Station Pump No. 1 Failed	DI	OK	Failed		LCP 850
SC-851	Transfer Pump Station Pump No. 1 Speed Control	AO	0	100	%	LCP 850
SI-851	Transfer Pump Station Pump No. 1 Speed Indication	AI	0	100	%	LCP 850
HS-852	Transfer Pump Station Pump No. 2 Run Command	DO	Stop	Run		LCP 850
OL-852	Transfer Pump Station Pump No. 2 Running	DI	Stopped	Running		LCP 850
OA-852	Transfer Pump Station Pump No. 2 Failed	DI	OK	Failed		LCP 850
SC-852	Transfer Pump Station Pump No. 2 Speed Control	AO	0	100	%	LCP 850
SI-852	Transfer Pump Station Pump No. 2 Speed Indication	AI	0	100	%	LCP 850

SECTION 13470 – INSTRUMENTATION AND CONTROL, FUNCTIONAL REQUIREMENTS

PART 1 - GENERAL

1.1 THE REQUIREMENT:

A. **THE FUNCTIONAL REQUIREMENTS SPECIFIED HEREIN CONTAIN THE NECESSITY FOR FURNISHING AND INSTALLING LABOR AND MATERIALS THAT MAY NOT APPEAR ELSEWHERE IN THE CONTRACT DOCUMENTS AND THAT MAY NEED TO BE INCLUDED IN THE SCOPE OF SUBCONTRACTORS OTHER THAN THE CONTROL SYSTEM INTEGRATOR (CSI). THE CSI IS DIRECTED TO COORDINATE THE WORK OF THIS SPECIFICATION SECTION WITH ALL SUPPLIERS AND SUBCONTRACTORS UNDER THE SUPERVISION OF THE CSI IN ORDER TO MEET THE REQUIREMENTS SPECIFIED HEREIN.**

B. Where references are made to the SCADA System Programmer or the SSP, it shall be understood that the CSI will also be providing this work under this Contract.

C. Where changes or deviations have been made from the functional requirements as specified herein to that which is needed to accommodate the particular equipment and materials furnished, all deviations or changes shall be identified in writing and documented. The CSI shall not be entitled to a change in the work based on changes or adjustments made for coordination of the work.

D. The CSI shall be responsible for the interface of connections from equipment providing designated I/O points to the PLCs, including but not limited to the following:

1. Coordinating all signal types and interfaces to ensure compatibility between equipment
2. Provide signal transmission as specified
3. Furnishing new equipment to provide the signals specified
4. Ensuring that new equipment provided by others is being furnished with the proper interface
5. Unscheduled I/O required by equipment supplier or to meet functional requirements specified herein

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. In addition to the requirements specified in this section, the requirements of specification Section 13400, Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.

B. Unless specifically stated otherwise, all interconnected wiring between all instruments, panels, controls and other devices as required to provide all functions specified herein, shall be furnished by the Electrical Contractor under Division 16.

The Electrical Contractor shall provide all cable and conduit required to carry all signals listed on the Contract Drawings and specified herein. Special cables that are required for interconnection between sensors or probes and transmitters shall be furnished with the instrumentation devices by the equipment supplier.

C. The CSI shall provide the local field mounted TVSS for all instruments scheduled in the applicable specification sections and the Process and Instrument Drawings (P&IDs) even if the instrument was not provided by the CSI.

1.3 SUBMITTALS:

A. The Contractor shall provide submittals as specified in Section 13400, Instrumentation and Control System, General Requirements. In addition, the following specific submittal items shall be provided.

1. The Contractor shall submit a document listing responsible parties, contact information, and their specific scope, for any labor and materials specified herein and within the other ICS specification sections that is not being provided by the CSI and SSP. The CSI shall provide the same for all work that is being subcontracted by the CSI.

2. Functional Control Descriptions: The CSI shall submit Functional Control Descriptions/Control Narrative which completely and adequately describes the functional control(s) for each major hardware component and the software implementation as a whole. The narratives shall include representations using both text and graphic display explanations with highlights.

3. Operational Setpoints and Parameters List Design: Calculations shall be submitted for all process variables and setpoints not determined within the Contract Documents.

4. All software applications and configuration programs shall be complete and tested prior to the respective equipment being shipped to site.

5. Database configurations configured to allow for selection of points by the Owner for historical data collection, trending, alarming and reporting.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. The City of Venice Eastside WRF is an existing, functional facility which operates 24 hours, 7 days a week. As such, it is necessary to coordinate all activities related to the SCADA system with the Engineer and plant operations prior to making any changes or updates.

2.2 GENERAL REQUIREMENTS:

A. Multiple equipment items of similar form and function shall be designed and laid out, to the extent possible, to be the same. In addition, equipment design shall minimize differences in programming between equipment.

B. All I/O specified and/or scheduled within the Contract Documents shall be gathered from their respective process or equipment and brought into the ICS control panels containing PLCs. Where signals are not scheduled but required by process equipment supplied, these signals shall be connected to the ICS at no additional cost. The ICS shall provide all necessary field equipment, modifications to existing equipment, conduit and wire to provide these signals to the new control panels.

C. Where I/O is specified within the Contract Documents and the equipment does not currently exist or planned as part of this project, the full described functionality will be provided. This includes connection points within the PLC control panels, provision of dedicated active spare I/O points, PLC application programming, SCADA software graphic screens and database points, etc. The intent is to have full functionality available for the connection of new equipment when implemented in the future by the Owner.

D. Where setpoints, operating limits, and other control settings are provided by the functional control descriptions, these settings shall be initial settings only and shall be used for assistance in the initial startup of the plant. All such settings shall be fully adjustable and based on actual operating conditions. The SSP shall make all necessary adjustments to provide smooth, stable operation at no additional cost to the Owner.

E. All setpoint control shall be by PID control algorithms unless specifically stated otherwise. Where only proportional control is specified, tuning constants shall be used to reduce the Integral and Derivative functions to zero. All setpoints, sequence times, sequence orders, dead bands, PID tuning parameters, PLC delay timers, variable speed operating range limits and similar control constants shall be accessible and alterable from the SCADA system operator nodes.

F. Provision shall be made in PLC logic to suppress nuisance alarms and control actions by the use of adjustable time delays and hysteresis deadbands. Initial settings for time delays shall be 10 seconds (range 0-900 seconds). Initial settings for deadbands shall be 5% of span (range 0-100%). In addition, process logic shall be used to suppress any alarms that are not applicable due to associated process or equipment status.

G. All system software implementation shall be developed in consultation with the Owner and Engineer through Software Implementation Design Meetings. These meetings shall be conducted in person at the Owner's facilities and shall include a minimum of two meetings but sufficient to adequately address all issues and concerns of the Owner in developing a quality system.

H. This project includes modifications to an existing SCADA system with established application software standards and communications network. All software provided as part of the project will follow the established standards and conventions for

functionality, user interaction, screen design, database naming conventions, alarming, security and reporting.

I. Communication system operation over the SCADA network shall be benchmarked through the use of the SCADA software communication driver diagnostic tools with confirmation of no degradation upon completion of the work.

2.3 POWER BACKUP REQUIREMENTS:

A. Power backup shall be provided for all ICS equipment as specified and shown on the system block diagram. Control panels shall be designed so that only the equipment needed to perform the specified functions shall be provided backup power until power is restored, supplied by a standby generator or the specified power backup time has elapsed.

B. Equipment shall be monitored for loss of power and the status of monitoring equipment. Alarms shall be provided within the SCADA system to indicate loss of line power, failure or alarms from UPS, battery backup and power supply systems.

2.4 SOFTWARE IMPLEMENTATION GENERAL:

A. PLC PROGRAMMING

1. PLC application software shall be separated by functionality, equipment and/or system and arranged in a logical manner that supports troubleshooting of equipment operation.

2. Control routines shall be organized into separate files using file names that adequately describe the operation contained.

3. Software shall be fully documented by element (tag and description) as well as by routine, providing description of the routine and any required data to understand the operation.

4. Fully documented, non-password protected electronic backup versions of all application software shall be provided to the Owner at selected points throughout the project and upon completion of the work for assistance in troubleshooting operation of the facility. Delivery of software shall be by flash drive updated after each site visit.

2.5 EQUIPMENT CONTROL AND MONITORING:

A. Control operators (i.e., H-O-A, H-O-R, L-O-R switches) for equipment shall be provided to operate as follows:

1. HAND = Equipment starts up (or operator-initiated) and operates not allowing remote or local auto operation. This may be a LOCAL position if other local start/stop buttons exist for controlling the equipment.

2. LOCAL = Transfers equipment control to an operator control station at the equipment or to controls local to the panel where the switch is located.
3. OFF = Equipment does not operate
4. AUTO = Equipment is controlled automatically.
5. MAN = Equipment is controlled by manual actions at the equipment.
6. LEAD / LAG = Selection of equipment for lead/lag control.
7. REMOTE = Equipment is controlled remotely. This is used instead of AUTO when there is remote manual and/or auto control.
8. E-STOP = Stops equipment regardless of control mode.

2.6 SCADA EQUIPMENT CONTROL AND MONITORING:

A. Computer Human Machine Interface (HMI) Remote Manual Equipment Control shall be provided for all equipment controlled by the PLC.

B. If present, the local HAND-OFF-REMOTE switches must be placed in REMOTE for operation via the HMI. The following manual controls shall be provided in the HMI as applicable to equipment:

1. Equipment Controls: ON-OFF, ON-OFF-AUTO, HAND-OFF-AUTO and MAN-AUTO virtual selector switch where:
   a. ON/HAND = Equipment shall start and run unless prevented by a hardwired interlock as described in the operational description for the equipment. If Variable Frequency Drive (VFD) equipped, speed shall be controlled manually by operator entry.
   b. OFF = Equipment shall shutdown and remain off. Where applicable, equipment failures that do not automatically reset, shall be reset in OFF.
   c. AUTO = Equipment shall be controlled as described in the functional description for the equipment.

2. Valve Controls: OPEN-CLOSE, OPEN-OFF-CLOSE or OPEN-OFF-CLOSE-AUTO or MAN-AUTO virtual selector switch where:
   a. OPEN = Valve shall open.
   b. CLOSE = Valve shall close.
   c. OFF = Valve does not operate
   d. MAN = Modulating valve shall have its position controlled manually by HMI entry.
   e. AUTO = Valve shall be controlled as described in the functional description for the equipment.

C. A control program that controls multiple pieces of equipment shall not be prevented from running because not all of the equipment is in REMOTE or AUTO. If equipment within an equipment chain is required to be running for program

operation and it is running, then the program shall run and control the other equipment that is in AUTO.

D. Unless specifically stated otherwise, all control interfaces (switches, buttons, indications, etc.) described shall be graphical software presentations available at the HMI.

E. Unless specifically stated otherwise, all analog values shall be recorded historically and presented in a trend format.

2.7 DERIVED ALARMS, INTERLOCKS, AND VARIABLES:

A. Instrument failure shall be generated for any instrument which is generating a signal less than 3.84 mA or greater than 20.16 mA. The value of the failed instrument's signal shall be extended outside of the corresponding span of the signal.

B. Equipment failure to operate alarms shall be generated through the PLC for any drive, motor, etc. for which a run command has been issued but for which the PLC is not receiving a run status signal after an adjustable time delay (0-300 seconds, initial setting: 30 seconds).

C. Fail to Open, Fail to Close or Fail to Operate (modulating) alarms shall be generated for any valve that does not reach its commanded position after an adjustable time delay (0-900 seconds, initial setting: 120 seconds).

D. A Ready indication is generated by a piece of equipment placed in Remote or Auto locally and for which no fault conditions are in effect, i.e. the equipment is ready to operate.

E. No Flow alarms shall be generated if no flow is measured after an adjustable time delay while a pump is running (0-300 seconds, initial setting: 30 seconds) and an interlock shall be latched until reset to prevent the pump from continuing to run.

F. PLC processor status and communications faults shall be monitored and shall generate alarms.

G. Miscellaneous alarms monitored through SCADA, as a minimum for each PLC System, shall include the following: UPS trouble; UPS failure; Panel high temperature; Panel intrusion; 24VDC power loss; 120VAC power loss. Refer to drawings and PLC I/O list for additional required alarm monitoring.

H. The PLC shall store runtime values for all motorized equipment. Runtimes shall include a value for today, yesterday and cumulative. Values for today and yesterday shall automatically reset at midnight, cumulative values shall be individually reset using a password protected software reset pushbutton.

I. All flows shall be totalized within the PLC and shall include values for today, yesterday and cumulative. Values for today and yesterday shall automatically reset at midnight. Cumulative values shall include a minimum of six digits normalized to

a logical unit range to prevent excessive rollover. Cumulative values shall be individually reset using a password protected software reset pushbutton. Flow totals shall be historically saved prior to reset.

J. All tank, reservoir and vessel volumes shall be calculated from their levels and displayed. Volume calculations shall account for the vessel shape.

2.8 TRENDS

A. Pre-configured analog value trends shall display historical data for the values selected. The SSP shall provide a database listing of all analog points in the system for selection by the Owner of for groupings and quantities.

B. No more than six (6) values shall be shown on a single trend. Each value will be displayed in a unique color easily distinguished from the other included values.

C. The trend will include a legend with indications for tag/object name, point description, current value and instrument range.

D. As a minimum, the time period shall be selectable from a choice of hourly, shift, daily, weekly and monthly.

E. Scroll buttons shall be provided to allow shifting of the displayed values by one half and one full shift of the displayed value, both forward and back.

F. A screen button will be provided to print the trend as displayed.

G. All historical data shall be maintained on the computer hard drives for a minimum of five (5) years.

2.9 ALARMS HANDLING

A. An alarm summary page shall be provided as part of the software implementation. This summary shall display all points currently in alarm or returned to normal but unacknowledged, including communication failures.

B. The summary shall include the tag name, description, time of occurrence, alarm type and acknowledgment status.

C. The operator shall have the option of acknowledging a single alarm or all current alarms.

D. All alarms shall also log to a historical alarm data collector which shall be viewable through a historical alarm display. Historical alarms shall be sortable based on area, tag or time.

E. Alarms and the acknowledgement status shall be distinguished in the alarm summary and historical alarm summary through the use of distinct colors and descriptions. The states will include as a minimum new, unacknowledged alarms, acknowledged alarms that have not returned to normal and alarms that have returned to normal but have not been acknowledged.

F. Alarms included in the graphic displays will include a black background box with border and alternating color text for clear identification of alarm conditions. Acknowledgement of individual alarms from the process graphic will be provided.

2.10 LAKE GRAVITY DISK FILTERS

A. The Lake Gravity Disk Filters will be controlled through a vendor-supplied local control panel. Monitoring from the SCADA system will include the following:

1. Filter System in Backwash

2. Backwash Duration (calculated)

3. Filter System Overflow Alarm

4. Filter System Common Alarm

2.11 LAKE GRAVITY FILTER BACKWASH PUMP STATION

A. The Lake Gravity Disk Filter Backwash Pump Station will be controlled through a vendor-supplied local control panel and float switches. Monitoring from the SCADA system will include the following:

1. Wetwell High Level Alarm

2. Pump No. 1 and No. 2 Run Status

3. Pump No. 1 and No. 2 Fail

2.12 LOW HEAD TRANSFER PUMP STATION

A. The Low Head Transfer Pump Station will be controlled through a local control panel and ultrasonic level transmitter. The panel will include an OIT for monitoring and controlling the station.

B. Wetwell Level - LE/LIT 850

1. Display, adjustable low and high level alarms, adjustable low cutoff alarm for Return Pumps.

2. The station will have an operator adjustable high level alarm. This alarm will interlock with the existing Storage Pond Return Pumping station. On high level, the Return Pumps will automatically be shut down.

C. Transfer Pump Controls – P-851, P-852

1. In manual, the pumps can be started and stopped through the pump LCP. The speed of the pumps is adjustable through the VFD keypad.

2. Both manual and automatic functions and setpoints will also be available through the provided OIT.

3. In auto, the pumps will function in a lead/lag, automatic alternation

configuration. Operator adjustable set points will be provided for Lead Start, Lead Stop, Wetwell Level Setpoint, Max Speed, and Min Speed.

a) The lead pump will start once the level is maintained above the Lead Start setpoint. The pump's speed will utilize PID loop control to maintain the Wetwell Level Setpoint.

b) If the lead pump speed reaches and maintains the Max Speed Setpoint then the station will bring on the lag pump. The Lead pump's speed will drop to the minimum speed. The Lag Pump will be started at the Minimum speed. Both pumps will ramp up in speed together to maintain the wetwell level.

c) If both pumps are in operation and the speed decreases and is maintained below the Minimum Speed setpoint, then lag pump will stop.

d) If the wetwell level drops and is maintained below the Lead Stop setpoint, the station will be shut down until the wetwell level rises back above the Lead Start Setpoint.

e) Once all pumps have stopped, the station will auto-rotate Lead/Lag duties.

f) If at any point, the Lead Pump is called and fails, the Lag Pump will start immediately.

g) If the Low Level Float is tripped, the pump station will shutdown immediately. The pump station will not start again until the float has cleared and the Lead Pump setpoint has been reached and maintained.

D. Effluent Chlorine Residual - AE/AIT-853

1. Display only.

E. Monitoring from the OIT will include the following:

1. Low Wetwell Level Float

2. High Wetwell Level Float

3. Wetwell Level, Low and High level alarms

4. Pump No. 1 and No. 2 Run Status

5. Pump No. 1 and No. 2 Runtime

6. Pump No. 1 and No. 2 Speed

7. Pump No. 1 and No. 2 Local/Remote

8. Pump No. 1 and No. 2 Fail

9. Pump No. 1 and No. 2 No Flow

F. Monitoring from the SCADA system will include the following:

1. Wetwell Level

2. High Wetwell Level Alarm

3. Pump No. 1 and No. 2 Run Status

4. Pump No. 1 and No. 2 Fail

5. Effluent Chlorine Residual

2.13 SODIUM HYPOCHLORITE (NaOCl) PUMPING

A. A new Sodium Hypochlorite Metering Pump will be provided for dosing to the Lake Gravity Filter effluent.

B. Sodium Hypochlorite Pump – P-624

1. The pump will include local controls for manual operation based on an Auto/Manual selector switch on the pump. When placed in Auto mode, control of the pump will be transferred to the SCADA system.

2. In Auto mode, the pump will operate when either of the low head transfer pumps are called to operate. Speed of the pump will be manually set at the pump.

C. Monitoring and control from the SCADA system will include the following:

1. NaOCl Pump in Remote

2. NaOCl Pump Run Status

3. NaOCl Pump Runtime (calculated)

4. NaOCl Pump Fail

5. NaOCl Pump Speed

PART 3 - EXECUTION

3.1 REQUIREMENTS:

A. In addition to the requirements specified in this section, refer to Section 13400, Instrumentation and Control, General Requirements.

END OF SECTION 13470

SECTION 15044 – PRESSURE TESTING OF PIPING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope of Work: This section specifies the leakage and pressure testing of piping.

B. Testing Records:

1. Provide record of each piping installation during the testing. These records shall include:

a. Date of test.
b. Identification of pipeline tested or re-tested.
c. Identification of pipeline material.
d. Identification of pipe section tested.
e. Test pressure
f. Remarks: Leaks identified (type and location), types of repairs, or corrections made.
g. Certification by CONTRACTOR that the leakage rate measured conformed to the Specifications.
h. Signature of Owner/Engineer witnessing pipe test.

1.2 SUBMITTALS

A. Submit five (5) copies of the test records to the Owner/Engineer upon completion of the testing.

PART 2 – PRODUCTS

2.1 GENERAL

A. Testing fluid shall be water, unless specified otherwise.

B. All testing shall be performed in accordance with applicable AWWA Standards (C-600 and C-605), latest edition.

2.2 MATERIALS AND EQUIPMENT

A. Provide pressure gauges, pipes, pipe fittings, bulkheads, hydraulic force pumps, meters and graduated containers to perform the hydrostatic testing.

B. Pressure gauges shall have been calibrated just prior to their use.

PART 3 – EXECUTION

3.1 TESTING PREPARATION

A. Pipes shall be in place and anchored before commencing pressure testing.

B. Conduct hydrostatic tests on exposed and above ground piping after the piping has been installed and attached to the pipe supports, hangers, anchors, expansion joints, valves and meters.

C. Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris.

D. Test new pipelines which are to be connected to existing pipelines by isolating the new line from the existing line by means of pipe caps, plugs, special flanges, or blind flanges. After the new line has been successfully tested, and all other tests/certifications/releases have been obtained, remove caps or flanges and connect to the existing piping.

3.2 PIPE FLUSHING

A. GENERAL

All pressure mains shall be thoroughly flushed of sand and debris prior to pressure leakage testing. Flushing shall continue until clear water flows from the available point closest to the ends of the mains or at the end of the main itself. Pressure mains 10-inches in diameter and larger shall be cleaned during flushing using a polyurethane plug manufactured of eight (8) lb./cubic foot density blown elastomer with open cell construction. The plug ("pig") shall have a resilient surface that engages the inner surface of the main with a sliding seal. The plug shall be able to reduce itself a minimum of 35 percent of its original cross-sectional area, negotiate bends, short radius elbows, pass through tees, crosses, multiple pipe sizes and valves and shall be abrasion resistant and capable of traveling in either direction.

3.3 HYDROSTATIC TESTS (DUCTILE IRON, PVC AND PCCP PIPE)

A. GENERAL

Hydrostatic tests shall consist of a pressure test and a leakage test. Hydrostatic tests shall be conducted on all newly installed pressure pipes, joints, valves and all service lines from tapped connection of main to the curb stops. AIR TESTING of pressure pipes WILL NOT BE PERMITTED under any circumstance. Tests may be made on sections not exceeding 2,000 feet, or as field conditions dictate. Length of the pipe to be tested shall be acceptable to The City of Venice. CONTRACTOR shall furnish all necessary equipment and material, make all taps, and furnish all closure pieces in the pipe as required. The CONTRACTOR may conduct hydrostatic tests after the trench has been partially backfilled with the joints left exposed for inspection for his informational purposes only. The hydrostatic tests for acceptance shall only be conducted after the trenches have

been completely backfilled and compacted as specified. Where any section of pipe is provided with concrete thrust blocking or encasement, pressure test will not be made until at least seven days have elapsed after the thrust blocking is installed. If high-early cement is used for the concrete thrust blocking, the time may be reduced to 3 days if The City of Venice concurs that the concrete has cured and reached adequate strength. When testing mortar-lined or PCCP pipe, fill the pipe to be tested with water and allow it to soak for at least 48 hours to absorb water before conducting the pressure test.

B. TESTING CRITERIA

All pipe sections to be pressure tested, including water mains, reuse mains and force mains, shall be subjected to a hydrostatic pressure of 150 psi. The duration of each pressure test shall be for a period of 2 hours. If during the test, the integrity of the tested line is in question, The City of Venice may require a 6-hour pressure test. The basic provisions of AWWA C-600 and C-605/M23 shall be applicable.

C. PROCEDURE FOR PRESSURE TEST

Each section of pipe to be tested, as determined by The City of Venice, shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, and appropriate valves installed to ensure bleeding of all air from the main. If defective pipes, fittings, valves, or hydrants are discovered in consequence of this pressure test, all such items shall be removed and replaced by the CONTRACTOR with sound material and the test shall be repeated until satisfactory results are obtained. Provisions of AWWA C600 and C605/M23, where applicable, shall apply.

D. PROCEDURE FOR LEAKAGE TEST

After completion of the pressure test, a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Applicable provisions of AWWA C600 and C605/M23 shall apply.

For DUCTILE IRON PIPE, allowable leakage in gallons per hour shall not be greater than that determined by the formula:

$$L = \frac{SD\,(P)^{\frac{1}{2}}}{133{,}200}$$

Where:

L	=	Allowable leakage, in gallons per hour.
S	=	Length of pipe tested, in feet.
D	=	Nominal diameter of the pipe, in inches.
P	=	Average test pressure during leakage test, in pounds per square inch (gauge).

For PVC PIPE, allowable leakage in gallons per hour shall not be greater than that determined by the formula:

$$L = \frac{ND(P)^{\frac{1}{2}}}{7{,}400}$$

Where:

L	=	Allowable leakage, in gallons per hour.
N	=	Number of joints in the length of pipeline tested.
D	=	Nominal diameter of the pipe, in inches.
P	=	Average test pressure during leakage test, in pounds per square inch (gauge).

Leakage is defined as the quantity of water to be supplied in the newly installed pipe or any valved section under test, which is necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. Should any test of pipe installed disclose leakage greater than that allowed, CONTRACTOR shall locate and replace or repair the defective joints, pipe or valve until the leakage from subsequent testing is within the specified allowance.

3.4 HYDROSTATIC TESTS (HDPE PIPE)

A. GENERAL

CONTRACTOR shall test pipelines installed under this Contract in accordance with these specifications prior to acceptance of the pipeline by The City of Venice. All field tests shall be made in the presence of The City of Venice. Except as otherwise directed, all pipelines shall be tested. All piping to operate under liquid pressure shall be tested in sections of approved length. The pressure testing of an HDPE line section shall be tested separately from the PVC and DIP line sections. Where impractical, the HDPE test section shall include only a minimum amount of PVC and ductile iron pipe within the test section. If at all possible, the PVC and DIP test sections shall be left exposed during the pressure test for visual leakage observation. For these tests, the CONTRACTOR shall furnish clean water, suitable temporary testing plugs or caps, and other necessary equipment, and all labor required. If the CONTRACTOR chooses to pressure test against an existing City of Venice water main / valve, the new water main must be disinfected prior to connection to the City of Venice line. The City of Venice will not be responsible for failure of the pressure test due to the existing valve leaking. The City of Venice may elect to furnish suitable pressure gauges for these tests. If not, the CONTRACTOR will furnish suitable pressure gauges, calibrated by an approved testing laboratory, which increments no greater than 2 psi. Gauges used shall be of such size that pressures tested will not register less than 10 percent or more than 90 percent of the gauge capacity. All valved sections shall be hydrostatic tested to insure sealing (leak allowance) of all line valves.

Unless it has already been done, the section to pipe to be tested shall be filled with potable water and air shall be expelled from the pipe. If blow-offs or other

outlets are not available at high points for releasing air, the CONTRACTOR shall provide 1-inch [minimum taps and blow-off valves (at the 12:00 position)], as necessary. The cost of constructing blow-off valves and plugging them, after a successful pressure test, shall be included in the unit price bid amount for the HDPE pipe.

B. TESTING CRITERIA

Hydrostatic testing shall consist of a 150 psig test pressure, based on the elevation of the highest point of the line or section under test. Pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to The City of Venice. The pump, pipe connection and all necessary apparatus shall be furnished by the CONTRACTOR and shall be subject to the approval of The City of Venice.

Maximum duration for pressure test, including initial and final phase of the test, shall not exceed eight (8) hours. If the test is not completed due to leakage, equipment failure, etc., depressurize the test section, and then allow it to "relax" for at least eight (8) hours before bringing the test section up to test pressure again.

C. PROCEDURE FOR PRESSURE TEST

Initial Phase of Pressure Testing: First, all air must be removed from the test section. The pressure test shall be completed after the line is backfilled. If possible, all flanged or mechanical joint valves and fittings shall be left exposed for visual leak inspection. If possible all PVC and DIP test sections shall be left exposed for visual leak inspection. Initially, the pressure within the test section shall be raised to approximately 160 psi and then allowed to be idle (no additional make-up water / pressure to be injected), for approximately 3 hours. During this 3-hour period, the test section shall be allowed to stabilize and come to an equilibrium stage. No additional make-up water / pressure shall be applied to the test section during this 3-hour stabilization period unless the line pressure drops below 140 psi. In this case, make-up water / pressure shall only be applied to the test section to maintain a minimum of 140 psi (during the 3-hour stabilization period).

Final Phase of Pressure Testing: The final phase of the pressure test shall involve applying make-up water / pressure to achieve an "Initial test pressure" of 150 psi (minimum) / 155 psi (maximum). The test section is then allowed to be idle (no make-up water / pressure is added) for a period of 2 hours. After this 2-hour period, make-up water / pressure is applied and measured to re-establish the "initial test pressure." The quantity of water utilized to re-pump the line shall be measured and compared to the allowable quantities as determined by TABLE 1, shown below. If the actual make-up water quantity is equal to or less than the allowable amount, the pressure test passes. If the actual make-up water quantities are greater than the allowable amount, the pressure test fails.

TABLE 1: ALLOWABLE MAKE-UP AMOUNT (HDPE PIPE)

Nominal Pipe Size (inches)	Make-up Water Allowance (U.S. Gallons /100 ft. of Pipe) 2-Hour Test
6	0.30
8	0.50
10	0.65
12	1.15
14	1.40
16	1.65
18	2.15
20	2.75
22	3.50
24	4.40
26	5.00
28	5.55
30	6.35
32	7.15
34	8.10
36	9.00
42	11.55
48	13.50

In the event a section fails to pass the tests, the CONTRACTOR shall do everything necessary to locate, uncover (even to the extent of uncovering the entire section), and replace the defective pipe, valve, fitting or joint. Visible leaks shall be corrected regardless of total leakage. Lines which fail to meet these tests shall be retested as necessary until test requirements are complied with. All testing shall be performed at the CONTRACTOR'S expense.

3.5 TESTS FOR NON-PRESSURE PIPING

A. GENERAL

Testing of non-pressure gravity flow pipe shall be accomplished by infiltration or exfiltration testing. Non-pressure piping which has a crown elevation below the groundwater table shall be tested by measuring the infiltration. Non-pressure piping which has a crown elevation above the groundwater table shall be tested by measuring the exfiltration.

B. INFILTRATION TESTING

The CONTRACTOR shall identify and prepare each section of piping to be tested. The designated piping shall be monitored for a minimum period of four (4) hours. Any accumulated liquid shall be measured; the line shall not be accepted until this measured quantity is less than 25 gallons per inch of diameter of pipe per mile of pipe per 24 hours. All buried leaks shall be located and repaired immediately and retested. All visible leaks must be repaired regardless of the measured leakage.

C. EXFILTRATION TESTING

The CONTRACTOR shall close all openings in the section of pipe to be tested. The hydrostatic water level of the pipe system shall be raised to a height equal to the maximum design submergence, but in no case less than 3 feet above the highest point in the line. The closed system shall be maintained for a minimum duration of 4 hours. Any loss of volume shall be noted. The line will not be accepted until this measured quantity is less than 25 gallons per inch of diameter of pipe per mile of pipe per 24 hours. All buried leaks shall be located and repaired as soon as possible. All visible leaks must be repaired regardless of the measured leakage.

D. LOW PRESSURE TESTING

If impractical to conduct the infiltration or exfiltration tests as specified, the line can be pressurized for low pressure air testing. The air test shall be made by attaching an air compressor or testing apparatus to a suitable opening. After closing all other inlets and outlets to the system, force air into the system until there is a uniform gauge pressure of 5 psi. This pressure shall be held constant without introduction of additional air for a period of at least 30 minutes.

E. MANDREL TESTING

Perform mandrel testing throughout the entire length of the gravity pipe system. The mandrel size shall be 95% of the inside diameter of the pipe.

F. MANHOLE TESTING

The allowable limits of infiltration or exfiltration of manholes shall not exceed a rate of 0.165 gallons per manhole per hour.

G. RE-TESTING

Should any test fail, necessary repairs shall be accomplished by the CONTRACTOR and the test repeated until within the established limits. The CONTRACTOR shall furnish the necessary labor, water and all other items required to conduct the required testing and shall perform the necessary system repairs required to comply with the specified test.

3.6 TESTS FOR VALVES

A. GENERAL

All valves shall be tested according to the following criteria:

1. Butterfly and plug valves shall be tested in accordance with AWWA C504.

2. Ball valves shall be tested in accordance with AWWA C507.

3. Gate valves shall be tested in accordance with AWWA C509 and C515.

END OF SECTION

SECTION 15050 – PIPE AND PIPE FITTINGS – GENERAL STATEMENT

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. General:

1. Furnish all labor, materials, tools, equipment, and services for all pipe and pipe fittings as indicated in accordance with provisions of Contract Documents.

2. Completely coordinate with work of all other trades.

3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation.

4. See Division 1 for General Requirements.

B. Related specification sections include but are not limited:

1. 15062 - Ductile Iron Pipe and Fittings

2. 15063 – High Density Polyethylene (HDPE) Pipe

3. 15067 – Plastic Pipe for Pressure Service

4. 15100 - Valves and Appurtenances

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Verify on shop drawings, dimensions, schedule of pipe, linings, coatings, fittings, hangers, supports, and miscellaneous appurtenances. When special fittings are necessary, verify locations of items and include complete details.

C. Yard piping drawings. Submit scaled drawings showing locations and dimensions to and from fittings, valves, structures, gates, and related appurtenances. Provide scaled drawings to a minimum scale of 1/8-inch equals 1-foot. Provide details to minimum scale of 1/8-inch equals 1-foot. Information shall include but not necessarily be limited to:

1. Dimensions of piping lengths

2. Invert or centerline elevations of piping crossings
3. Acknowledgment of bury depth requirements

4. Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint segments, hydrants, and related appurtenances.

5. Line slopes and vents

PART 2 PRODUCTS

2.1 GENERAL PIPING SYSTEMS

A. Unless otherwise shown on drawings or drawing schedule, piping system materials, fittings, and appurtenances are subject to requirements of specific technical specifications and shall be as follows:

Service Category	Pipe Size Range in Inches	Above Ground or Below Ground	Piping System
BW –Backwash RCW – Reclaimed Water OF-Overflow INF- Influent EFF - Effluent SPW - Storage Pond Water	4 to 14	Above Ground	AWWA C115 and C151, Class 53 ductile iron, cement-lined, flanged, AWWA C110 and C111 flanged ductile iron fittings, cement-lined or fusion bonded epoxy lining
RCW - Reclaimed Water OF – Overflow (Disk Filters) BW-Backwash SPW – Storage Pond Water OF-Overflow INF- Influent EFF - Effluent WAS – Waste Activated Sludge	4 to 14	Below Ground	AWWA C150 and C151 ductile iron pipe, 350 psi pressure class, push-on joints, cement-lined, coal tar epoxy coating AWWA C110 ductile iron fittings, mechanical joints, cement-lined or fusion-bonded epoxy lining, coal tar epoxy or fusion bonded epoxy coating.
CL – Sodium Hypochlorite	½ to 2	Above Ground	Schedule 80 Kynar pipe, threaded, heat welded or flanged
	3 x ½”	Below Ground	Double-contained Schedule 80 Kynar pipe, 1/2-inch carrier, 3 inch containment, threaded or heat welded
BW –Backwash Pump Station Effluent	2	Above and Below Ground	Schedule 40 PVC Pipe, Solvent Weld or Flanged.

PART 3 EXECUTION

3.1 DELIVERY, INSPECTION AND STORAGE

A. Inspect materials thoroughly upon arrival. Remove damaged or rejected materials from site.

B. Observe manufacturer's directions for delivery and storage of materials and accessories.

C. Store materials on-site in enclosures or under protective coverings above ground to keep them clean and dry.

3.2 HANDLING OF PIPE

A. Protect pipe coating during handling using methods recommended by manufacturer. Use of bare cables, chains, hooks, metal bars, or narrow skids in contact with coated pipe is not permitted.

B. Prevent damage to pipe during transit. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

C. Erect piping to accurate lines and grades and support as required on drawings or described in specifications. When temporary supports are used, ensure that sufficient rigidity is provided to prevent shifting or distortion of pipe. Install expansion devices, as necessary, to allow expansion and contraction movements.

3.3 PIPING - GENERAL

A. Minimum bury. Unless otherwise shown on the drawings, provide a minimum of 36-inches earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions.

3.4 PIPING WITHIN BUILDINGS, STRUCTURES AND UNITS

A. Install piping in vertical and horizontal alignment as shown on drawings. Alignment of piping smaller than 4-inches may not be shown. However, install according to drawing intent and with ample clearance and allowance for:

1. Expansion and contraction

2. Operation and access to equipment, doors, windows, hoists, moving equipment

3. Headroom and walking space for working areas and aisles

4. Install vertical piping plumb and horizontal piping runs parallel with structure walls

B. Use methods of piping support as shown on the drawings and as required in Section 15141 – Pipe Support Systems. Where pipes run parallel and as same elevation or grade, they may be grouped and supported from common trapeze-type hanger, provided hanger rods are increased in size as specified for total supported weight. The pipe in the group requiring the least maximum distance between supports shall set the distance between trapeze hangers.

C. Locate and size sleeves required for piping system. Arrange for chases, recesses, inserts, or anchors at proper elevation and location.

D. Install service piping to provide every plumbing fixture and equipment requiring potable water with suitable supply and soil or waste and vent connection as required by code. Consult manufacturer's data and large scale details of rooms containing plumbing fixtures before roughing in piping. Plug or cap piping immediately after installation.

E. Use reducing fittings throughout piping systems. Bushings will not be allowed unless specifically approved.

F. Provide drain pans and piping from items of equipment where condensation may occur. Run drain piping to nearest floor drain or rainwater downspout. Condensate drain piping shall generally be 1-inch except where otherwise indicated.

G. Soil, waste, vent and rainwater piping installation:

1. Install horizontal soil or waste lines with fall to produce flow rate of 2-feet per second or 1/8-inch per foot. Hold as close to construction as possible to maintain maximum headroom. Make changes of direction with 1/8 bends, and junctions with wye fittings. Use short wye fittings in vertical pipe only. Install handhold test tee at base of each stack. Install cleanouts at dead ends, at changes of direction, and at 50-foot intervals on horizontal runs. Where cleanouts occur in concealed spaces, provide with extensions to floors above or to wall as required.

2. Run vent stack parallel to each soil or waste stack to receive branch vents from fixtures. Each vent stack shall originate from soil or waste pipe at its base. Where possible, combine soil, waste, or vent stacks before passing through roof so as to minimize roof openings. Offset pipes running close to exterior walls away from such walls before passing through roof to permit proper flashing. Provide pipes passing through roofs with cast iron increases minimum of 12-inches below roof one size larger than pipe but in no case less than 4-inches. Terminate each vent with approved frostproof jacket.

3. Provide each vent pipe passing through roof with 4-lb sheet lead flashing consisting of 18 x 18-inch base with tubular vertical sleeve surrounding pipe with 1-inch minimum spacing and turning in 2-inches at top. Provide gasket seal between top and lead sleeve.

4. Carry vent stacks 4-inches and larger full size through roof. Extend vent stacks at least 12-inches above roofing.

5. Provide each roof drain with 4-lb sheet lead flashing 36 x 36-inch square clamped under flashing ring of drain.

H. Potable or service water piping installation:

1. Install drain tees with capped nipples of PIS brass 3-inches long at low points. If low points occur in concealed piping, provide approved flush access panel. These drains are not shown on drawings.

2. Slope water lines down to drain points not less than 1-inch in 60-feet.

3. Wherever threaded piping is installed, provide clean-cut tapered threads with ends thoroughly reamed after cutting to remove burrs. Pipe joint cement permitted only on external threads. For screwed nipples for connections to flush valves, lavatory supplies, and other equipment with threaded connections use iron, copper, or brass pipe.

4. Install ball, butterfly, gate, check, and plug valves where indicated or required to adequately service all parts of system and equipment. Unless otherwise indicated, install valves on each branch serving restroom. Install valve on inlet and outlet connections of heat exchangers and on other equipment connected to water lines.

5. Install union between valves and connections to each piece of equipment and install sufficient number of unions throughout piping system to facilitate installation and servicing. On copper pipe line, install wrought copper solder-joint copper to copper unions for lines 2-inches and smaller; for lines 2-1/2-inches and over, install brass flange unions.

6. Construct and equip plumbing fixtures and equipment with anti-siphon devices as to entirely eliminate any danger of siphoning waste material into potable water supply system.

7. Where exposed pipes 6-inches in size and smaller pass through floors, finished walls, or finished ceilings, fit with nickel or chrome-plated plates large enough to close hole completely around pipes. Secure plates to pipe by set screw in approved manner.

8. Size supply branches to individual fixtures as scheduled or indicated on drawings.

9. Install piping so as to be free to expand with proper loops, anchors, and joints with injury to system or structure.

10. Provide branches to wall hydrants or hose bibbs in exterior location with interior shutoff and drain valves.

11. Provide approved type vacuum breaker installations indicated or as required by Code.

3.5 PIPING OUTSIDE BUILDINGS AND STRUCTURES

A. Install piping as shown on drawings with ample clearance and allowance for expansion or contraction.

B. Install flexible joint within two (2) feet of point where pipe enters or leaves structure. Provide balance of piping with standard laying lengths and in accordance with drawings.

3.6 PIPE INTERSECTIONS WITH STRUCTURES AND UNITS

A. Enter and exit through structure walls by using wall seals specified or as shown on drawings.

3.7 EQUIPMENT PIPE CONNECTIONS

A. Exercise care in bolting flanged joints so that there is no restraint on the opposite end of pipe or fitting which would prevent uniform gasket pressure at connection or would cause unnecessary stresses to be transmitted to equipment flanges. Where push-on joints are used in conjunction with flanged joints, final positioning of push-on joints shall not be made until flange joints have been tightened without strain.

B. Tighten flange bolts at uniform rate which will result in uniform gasket compression over entire area of joint. Provide tightening torque in accordance with manufacturer's recommendations.

C. Support and match flange face to uniform contact over their entire face area prior to installation of any bolt between the piping flange and equipment connecting flange.

D. Permit piping connecting to equipment to move freely in directions parallel to longitudinal centerline when and while bolts in connection flange are tightened. Align, level, and wedge equipment into place during fitting and alignment of connecting piping. Grout equipment into place prior to final bolting of piping but not before initial fitting and alignment. To provide maximum flexibility and ease of alignment, assemble connecting piping with gaskets in place and minimum of four (4) bolts per joint installed and tightened. Test alignment by loosening flange bolts to see if there is any change in relationship of piping flange with equipment

connecting flange. Realign as necessary, install flange bolts, and make equipment connection.

E. Provide utility connections to equipment shown on drawings, scheduled or specified.

F. Obtain rough-in data from approved shop drawings on equipment. Obtain rough-in data for relocating existing equipment and coordinate with Owner.

G. Unless otherwise specified, make piping connections to equipment, including but not limited to installation of brass and fittings, strainers, pressure-reducing valves, flow control valves, and relief valves provided with or as an integral part of equipment.

H. Furnish and install sinks, brass, fittings, strainers, pressure-reducing valves, flow control valves, pressure relief valves, and shock absorbers which are not specified to be provided with or an integral part of equipment.

I. For each potable or service water supply piping connection to equipment, furnish and install union and gate or angle valve. Minimum size to be 1/2-inch.

J. Furnish and install "P" trap for each waste piping connection to equipment if waste is connected directly to building sewer system. Size trap as required by Plumbing Code.

K. Stub piping for equipment, sinks, lavatories, supply and drain fittings, key stops, "P" traps, miscellaneous traps, and miscellaneous brass through wall or floor and cap and protect until such time when later installation is performed. Run piping mains and branches in laboratory benches, built-in counters, and cabinet work if acceptable to Construction Manager.

3.8 ANCHORAGE AND BLOCKING

A. Block, anchor, or harness exposed piping subjected to internal pressure, in which mechanical, push-on, flexible, or similar joints are installed to prevent separation of joints.

B. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by internal pressure in buried piping tees, wye branches, plugs, or bends.

C. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall. Concrete blocks shall not cover pipe joints. Provide bearing area of concrete in accordance with drawing detail. In event that adequate support cannot be achieved against undisturbed soil, install restrained piping joints.

D. Provide reaction blocking, anchorages, or other supports for fittings as shown on drawings for piping installed in fills, unstable ground, above grade, or exposed within structures.

3.9 CLEANING

A. Clean interior of piping systems thoroughly before installing. Maintain pipe in clean condition during installation.

B. Before jointing pipe, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.

C. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.

D. At completion of work and prior to final acceptance, thoroughly clean work installed under these specifications. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing or from other causes. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.

3.10 PIGGING, FLUSHING AND CLEANING

A. All mains and distribution lines shall be pigged, cleaned and flushed to remove all sand and other foreign matter. The Contractor shall be responsible for developing a pigging and flushing plan to be submitted to the Engineer for approval prior to pigging and flushing. The contractor shall dispose of all water used for pigging and flushing without causing a nuisance or property damage. Any permits required for the disposal of flushing water shall be the responsibility of the Contractor.

B. Flushing water used by the Contractor shall be taken from an approved metered source. The water utility will provide the meter and designate the source. Flushing water shall be at the Contractor's expense. Flushing water shall be potable water for potable water mains.RCW mains may be flushed with potable or reclaimed water.

C. The cleaning of the new piping system shall be accomplished by the controlled and pressurized passage of a series of hydraulic or pneumatic polyurethane plugs of varying dimensions, coatings, and densities; which shall be selected by the pipe cleaning Contractor. The Contractor shall provide a means to enter the pig into the system, control and regulate flow, monitor flows and pressures, and to remove the pig from the system. The contractor shall maintain a constant surveillance of the system and immediately report to the proper authority any inline problems encountered or any malfunctions discovered in the piping system. A record of pig models, sizes, styles, and other pertinent information shall be kept by the Contractor and turned over to the Owner

3.11 TESTING AND INSPECTION

A. Upon completion of piping, but prior to application of insulation on exposed piping, test all piping systems. Utilize pressures, media and pressure test

duration at specified on piping specification sheets. Isolate equipment which may be damaged by the specified pressure test conditions. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates. Select each gage so that the specified test pressure falls within the upper half of the gage's range. Notify the Engineer 24 hours prior to each test.

B. Unless otherwise specified, completely assemble and test new piping systems prior to connection to existing pipe systems.

C. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.

D. Provide all necessary equipment and perform all work required in connection with the tests and inspections.

E. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

3.12 DISINFECTING POTABLE WATER PIPELINES

A. All record drawing requirements must be submitted to the Owner/Engineer prior to starting the bacteriological testing of the water lines.

B. Prior to being placed in service, all potable water pipe lines shall be chlorinated in accordance with AWWA 651, “Standard Procedure for Disinfecting Water Main”. The procedure shall meet Health Department requirements. The location of the chlorination and sampling points shall be determined by the Engineer. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.

C. The general procedure for chlorination shall be to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipe line for 24 hours.

Water for flushing, filling and disinfecting the new lines will be provided by the owner and must be obtained without contaminating existing pipe lines. Water obtained from existing pipe lines for this purpose shall pass through an approved air gap or backflow prevention device.

D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling (taken by the Contractor and provided to an approved laboratory by the Contractor) and analysis of the replacement water shall then be made by an approved laboratory or the Health Department in full accordance with the AWWA Manual C651. The line shall not be placed in service until the requirements of the Florida Department of Environmental Protection (FDEP) and County Public Health Department are met. Results of the bacteriological tests

together with certified record drawings must be submitted to the Health Department (FDEP) within 30 days of the tests.

E. Special disinfecting procedures when approved by the City may be used where the method outlined above is not practical.

3.13 LOCATION OF BURIED OBSTACLES

A. Furnish exact location of buried utilities encountered and any below grade structures. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants, and related fixed structures. Include such information as location, elevation, coverage, supports, and additional pertinent information which will be required by future contractors for replacement servicing, or adjacent construction around any buried facility.

B. Incorporate information to "Record Drawings".

3.14 SPECIAL REQUIREMENTS AND PIPING SPECIALTIES

A. Insulating joints: Provide insulating joints where dissimilar metals are joined together and where specifically indicated on drawings. Type of joint shall be as detailed and in accordance with the following requirements:

1. Insulating flanges: Provide each unit to consist of flat-faced rubber gaskets.

2. Insulating unions: Provide "dielectric" union by Epco or equal.

3. Insulating couplings: When joining larger diameter dissimilar metal pipe, use insulating coupling equal to Rockwell No. 416, Dresser Style 39, or equal. When pipes have different outside diameters, use insulating reducing couplings equal to Rockwell No. 417, Dresser Style 39-62, or equal.

B. Welding:

1. Have each welding operator affix an assigned symbol to all his welds. Mark each longitudinal joint at the extent of each operator's welding. Mark each circumferential joint, nozzle, or other weld in two places 180 degrees apart.
2. Use only certified welders meeting procedures and performance outlined in Section 9 of the ASME other codes and requirements per local building and utility requirements.

3. Have all welds conform to highest industrial practice in accordance with ANSI B31.3 and ANSI B31.1 or other codes and requirements per local building and utility requirements.

C. Protective coatings and linings:

1. Where coatings, linings, paint, tests and other items qualified in applications of service are stated, pipe and fittings shall be included in referenced conditions.

2. Where specified, provide coal-tar epoxy linings and coatings in accordance with AWWA C210 to a minimum thickness of 20 mils in not less than two coats.

3. Where specified, provide cement mortar lining in accordance with AWWA C205.

4. Where specified, provide Protecto 401 lining.

5. Where specified, galvanize surface in accordance with hot-dip method using any grade of zinc acceptable to ASTM B6.

6. Where specified, field paint pipe in accordance with Section 09900 – Painting and Coatings and Section 09902 – Pipe and Equipment Painting.

D. Underground alarming tape. Provide underground warning tape constructed of heavy gage 0.004-inch polyethylene film to identify all buried utilities except 3-inch and smaller irrigation pipe. Provide 6-inch wide tape as follows:

Film Legend	Film Color
Electric line below	Red
Telephone line below	Orange
Water line below	Blue
Sewer line below	Green
Nonpotable water below	Brown
Reclaimed Water Below	Purple

E. Install tape directly above each buried utility as shown on the Drawings.

END OF SECTION

SECTION 15062 – DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Install within the project site all materials and incidentals including flanged joint, mechanical joint, push-on joint, and restrained joint ductile iron pipe and/or ductile iron restrained, flanged, or mechanical joint fittings for potable water mains, reclaimed water mains, wastewater treatment plant process piping, and gravity sewers, complete, as shown on the project drawings.

B. The Contractor shall coordinate all deliveries with the related Vendor(s) in a manner not to impede construction.

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Except as otherwise shown on the Drawings, either push-on, mechanical or flanged joints shall be used. Prior to commencing work, jointing systems for pipe shall be submitted to the Owner's Representative for approval. The joints of all buried pipe, fittings and valves on the treatment plant site shall be restrained.

C. All ductile iron pipe and fittings to be installed under this Contract shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. Furnish in duplicate to the Owner's Representative sworn certificates of such tests and their results.

D. Shop Drawings including layout drawings shall be submitted to the Owner's Representative for approval and shall include dimensioning, methods and locations of supports and all other pertinent technical specifications for all piping to be furnished. Layout Drawings shall be to scale, and shall clearly indicate the amount of pipe to be restrained from each fitting.

E. The Contractor shall transmit from the Vendor to the Owner's Representative, the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe shall be supplied in lengths not in excess of 21-feet.

B. Buried Pipe shall conform to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, current editions. Below grade pipe 4 to 12-inches in diameter shall be rubber-ring type push-on joint or mechanical joint, pressure Class 350. Below grade pipe 14 to 20-inches in diameter shall be rubber-ring type push-on joint, Pressure Class 250. Below grade pipe 24-inches in diameter shall be rubber-ring type push-on joint, pressure Class 200. Below grade pipe 30 to 60-inches in diameter shall be rubber-ring type push-on joint, pressure Class 150.

C. Mechanical joint fittings for 4 to 24-inch diameter ductile iron pipe shall be compact ductile iron cast in accordance with ANSI/AWWA C153/A21.53. The working pressure rating for the fittings shall be 350 psi.

D. Mechanical joint fittings for 30 to 60-inch diameter ductile iron pipe shall be compact ductile iron cast in accordance with ANSI/AWWA C153/A21.53. The working pressure rating for the fittings shall be 250 psi.

E. Gaskets shall be EPDM (Ethylene-Propylene Dine Monomer) such as the "Fastite Gasket" of American Ductile Iron Pipe Co., or approved equal in conformance with ANSI/AWWA C111/A21.11, latest edition.

F. All mechanical joints and push-on joints for pipe, fittings and valves on the wastewater treatment plant site shall be restrained. Restraints shall be Megalug by EBAA Iron, Romac, or equal. Restraints may also be American Ductile Iron Pipe's Fast Grip Gasket, U.S. Pipe's Field Lok Gasket, or equal.

G. Below grade pipe shall have a one-mil coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI/AWWA C151/A21.51.

H. All buried ductile iron pipe and fittings shall be provided with a 4-mil thick cross laminated high density polyethylene encasement or an 8-mil thick polyethylene encasement per ANSI/AWWA C105/A21.5. Color of encasement shall be in accordance with City of Venice requirements based on the service type of the pipe.

I. Flanged ductile-iron pipe for above ground piping shall conform to current ANSI/AWWA C115/A21.15 with factory applied screwed long hub flanges except as otherwise specified hereinafter. Flanges shall be faced and drilled after being screwed on the pipe with flanges true to 90 degrees with the pipe axis and shall be flush with end of pipe conforming to ANSI B16.1, 125 pounds standard. Flanged pipe shall be special thickness Class 53.

J. Flanged fittings shall be ductile as specified herein. Flanges and flanged fittings shall be flat face and shall conform to ANSI/AWWA C110/A21.10 for 350 psi pressure ratings between 4 and 24-inch diameter pipe and for 250 psi pressure ratings for 30 to 60-inch diameter pipe. Full face type 1/8-inch thick SBR rubber ring gaskets shall conform to ANSI/AWWA C111/A21.11.

K. Bolts and nuts on flanged fittings shall be Grade B, ASTM A-307, cadmium plated and conform to ANSI B16.1 for Class 125.

L. Pipe and fittings exposed to view in the finished work to be painted shall not receive the standard tar or asphalt coat on the outside surfaces but shall be shop primed on the outside with one coat of Koppers No. 621 rust inhibitive primer or approved equal. All other pipe and fittings shall be shop coated on the outside with a 1.0 mil thick bituminous coat in accordance with ANSI/AWWA C151/A21.51.

1. Should portions of the pipe inadvertently be given the outside coating of coal tar enamel instead of the rust inhibitive primer as required for exposed piping, the surfaces shall be sealed with a non-bleeding sealer coat such as Kopcoat Inertol Tar Stop, or Mobil Anti-bleeding Aluminum Sealer. Sealing shall be part of the work of this section.

M. All ductile iron pipe and fittings carrying clarifier effluent, effluent, filter effluent, reclaimed water, reject, waste backwash from disk filters, and potable water shall have a standard thickness cement lining and seal coats on their interiors in accordance with ANSI/AWWA C104/A21.4.

N. All ductile iron pipe and fittings carrying raw wastewater, internal recycle, mixed liquor, plant drain wastewaters, return activated sludge, thickened sludge and waste activated sludge shall have an interior lining of Protecto 401 ceramic epoxy applied at a nominal thickness of 40 mils. The Protecto 401 material shall be a high-build, multi-component, Amine-cured, Novalac epoxy lining. At least 20% of the volume of the lining material shall be ceramic quartz pigment. The linings shall be checked for thickness using a magnetic film thickness gauge and the method outlined in SSPC-PA-2, Film Thickness Rating. The interior lining of all pipe and fittings shall be tested for pinholes with a non-destructive 2,500 volt test. Each pipe and fitting shall be marked with the date of application of the lining system and with its sequence number of application on that date. The pipe and fitting manufacturers shall supply a certificate attesting that the lining material used was as specified, and that the lining material was applied as required by the specifications and the lining material manufacturer.

O. All interior linings for potable water piping shall be EPA/NSF approved.

P. Pipe and fitting manufacturers shall be the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, McWane, Tyler, or approved equal.

PART 3 EXECUTION

3.1 HANDLING PIPE AND FITTINGS

A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall

be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Owner's Representative.

B. All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being installed.

C. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner.

3.2 UNDERGROUND PIPE INSTALLATION

A. Alignment and Grade: The pipelines shall be laid and maintained to lines and grades established by the Drawings and Specifications, with fittings, valves and hydrants at the required locations unless otherwise approved by the Owner's Representative. Valve-operating stems shall be oriented to allow proper operation. Hydrants shall be installed plumb.

B. Underground Conflicts: Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. Care shall be exercised to avoid damage to existing structures. When obstructions that are not shown on the drawings are encountered during the progress of the work and interfere so that an alteration of the Drawings is required, the Owner's Representative will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the Owner's Representative, to provide clearance as required by federal, state, or local regulations or as deemed necessary by the Owner's Representative to prevent future damage or contamination of either structure.

C. Trench Construction:

1. Trench preparation shall proceed in advance of pipe installation for only as far as necessary to allow proper pipe installation. The width of the trench at the top of the pipe shall be ample to permit the pipe to be laid and joined properly and allow the backfill to be placed as specified.

2. Bedding shall be provided and compacted in accordance with the details shown on the Drawings.

3. Holes for the bells shall be provided at each joint but shall not be larger than necessary for joint assembly and assurance that the pipe barrel will lie flat on the trench bottom. Other than noted previously, the trench bottom shall be true and even in order to provide support for the full length of the pipe barrel, except that slight depression may be provided to allow withdrawal of pipe slings or other lifting-tackle.

4. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 6-inches below and on each side of all pipe, valves, and fittings for pipe sizes 24-inches or smaller, and 9-inches for pipe 30- inches and larger. When excavation is completed, a bed of sand, crushed stone or earth that is free from stones, large clods, or frozen earth shall be placed on the bottom of the trench to the previously mentioned depths, leveled, and tamped. These clearances and bedding procedures shall also be observed for pieces of concrete or masonry and other debris or subterranean structures, such as masonry walls, piers, or foundations that may be encountered during excavation.

5. This installation procedure shall be followed when gravel formations containing loose boulders greater than 8 inches in diameter are encountered. In all cases, the specified clearances shall be maintained between the bottom of all pipe and appurtenances and any part, projection, or point of rock, boulder, or stones of sufficient size and placement which, in the opinion of the Engineer could cause a fulcrum point.

6. Should the trench pass over a sewer or other previous excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.

7. When the subgrade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 3-inches, or to the depth ordered by the Engineer and replaced under the directions of the Engineer with clean, stable backfill material. The bedding shall be consolidated and leveled in order that the pipe may be installed as specified.

8. When the bottom of the trench or the subgrade is found to consist of material that is unstable to such a degree that, in the judgment of the Engineer it cannot be removed, a foundation for the pipe and/or appurtenance shall be constructed using piling, timber, concrete, or other materials at the direction of the Engineer.

3.3 PIPE INSTALLATION

A. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to pipeline material and protective coatings and linings. Under no circumstances shall pipeline materials be dropped off or dumped into the trench. The trench shall be dewatered prior to installation of the pipe.

B. All pipe fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective

materials shall be marked and held for inspection by the Owner's Representative who may prescribe corrective repairs or reject the materials.

C. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign material before the pipe is laid.

D. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.

E. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

F. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Owner's Representative. When practical, the plug shall remain in place until the trench is pumped completely dry. Care shall be taken to prevent pipe flotation should the trench fill with water.

G. Trench width at the top of pipe, bedding conditions, and backfill placement and compaction shall be such that design loadings on the pipe will not be exceeded.

H. Joint Assembly: Pipe joints shall be assembled in accordance with the Manufacturer's instructions and the requirements of ANSI/AWWA C600.

I. Pipe Deflection: When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane, or where long radius curves are permitted, the amount of deflection shall not exceed that shown in AWWA C600, latest edition.

J. Pipe Cutting: Cutting pipe for the insertion of valves, fittings, or closure pieces shall be done in a neat, workmanlike manner without creating damage to the pipe or lining. Ductile cast iron may be cut using an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw, milling wheel saw, or oxyacetylene torch. Cut ends and rough edges shall be ground smooth and for push-on joint connections, the cut end shall be beveled.

K. Thrust Restraint:

1. All pipe joints, plugs, caps, tees, and bends shall be suitably restrained by attaching steel tie rods or restrained joints as specified.

2. Thrust-restraint design pressure shall be equal to the test pressure of the line.

3. Restrained mechanical joints utilizing setscrew retainer glands or steel harness and tie rods shall be used in place of concrete. Steel tie rods or

other components of dissimilar metal shall be protected against corrosion by hand application of a bituminous coating or by encasement of the entire assembly within an 8-mil thick, loose polyethylene casing in accordance with ANSI/AWWA C105/A21.5.

3.4 ABOVE GROUND PIPE INSTALLATION

A. Install pipe in horizontal or vertical planes, parallel or perpendicular to building surfaces unless otherwise shown. Support pipe and fittings to prevent strain on joints, valves and equipment. Install flanged joints so that contact faces bear uniformly on the gasket. Tighten bolts with relatively uniform stress.

3.5 TESTING

A. Hydrostatic pressure and leakage test shall conform to Section 4 of AWWA C600, with the exception that the Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line.

B. The pressure required for the field hydrostatic pressure test shall be 180 psi for potable water lines and reclaimed water lines, and shall be 150 psi for force mains. The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure of 180 psi or 150 psi. Corporation cocks at least 3/4-inches in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end in order to bleed air from the line. Duration of pressure test shall be at least two hours.

C. The leakage test may be conducted at the same time as the pressure test, and shall be of not less than one hour duration. All leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipe lines shall be tested in such sections as may be required. The line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire test period by means of a force pump to be furnished by the Contractor. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage.

D. The amount of leakage which will be permitted shall be in accordance with AWWA C600 Standards for all pressure tests. No pipe installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)1/2}{133{,}200^*}$$

L = Leakage in gallons per hour
S = Length of pipe in feet
D = Nominal diameter in inches
P = Pressure in psi

* Note: If 20-foot pipe lengths are used, factor to be 148,000

E. Ductile iron pipe used for gravity sanitary sewers shall be tested for leakage by conducting infiltration tests, exfiltration tests, or low pressure air tests.

3.6 SURFACE PREPARATION AND PAINTING

A. All piping and fittings exposed to view shall have their surfaces prepared and painted with a prime coat as defined in these Specifications. Surface preparation and shop priming is a part of the work of this Section.

END OF SECTION

SECTION 15063 – HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes materials and methods of installation of HDPE pipe. Pipe is intended for use in a reclaimed water system or in a potable water system.

1.2 SUBMITTALS

A. Provide manufacturer's Certificate of Compliance with specified requirements.

B. All submittals shall be in accordance with Section 01340 – Shop Drawings, Project Data and Samples.

1.3 HANDLING AND STORAGE

A. All pipe, fittings, valves and accessories shall be loaded and unloaded by lifting with hoists or by skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe.

B. Materials, if stored, shall be kept safe from damage. The interior as well as all sealing surfaces of all pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves shall be drained and stored in a manner that will protect them from damage or freezing.

C. Pipe stored outside and exposed to prolonged periods of sunlight shall be covered with canvas or other opaque material. Air circulation shall be provided under covering.

D. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Pipe shall not be stored close to heat sources.

E. Gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis. Mechanical-joint bolts shall be handled and stored in a manner that will ensure proper use with respect to types and sizes.

1.4 REFERENCE DOCUMENTS

A. Ductile Iron Pipe ANSI/AWWA C151/A21.51
B. HDPE Pipe AWWA C906.

C. HDPE Pipe AWWA C901.

D. Water Resources Act, Chapter 373, F.S.

E. Chapter 17-40 Florida Administrative Code.

F. Chapter 17-610 Florida Administrative Code.

G. American National Standards Institute (ANSI).

H. American Water Works Association (AWWA).

I. American Society for Testing Materials (ASTM)

J. American Association of State Highway Transportation Officials (AASHTO).

K. American Society of Sanitary Engineers (ASSE).

L. Plastic Pipe Institute (PPI).

1.5 SHOP DRAWINGS AND SUBMITTALS

A. In general, shop drawings and related manufacturer's product certification shall be made in accordance with the General and Special Conditions of the Contract for approval prior to construction or fabrication of the material by the manufacturer. The following items which require shop drawings are brought to the Contractor's attention. The list may not include all items for which shop drawing submittals are required to meet the requirements of the project.

1. Detail drawings of all classes of pipe, joints, and fittings.

2. Detail Drawings of restrained and flexible joints, including test reports to confirm thrust restraint capacities and restraining mechanism application.

3. Pipeline laying schedule tabulated and referenced to construction line and grade controls shown on plans, with station, offset and elevations. References shall be provided for pipe fittings, valves, service connections and other important features of the pipeline.

4. All Appurtenant Items.

B. Certification and test reports for the materials, manufacturing, and testing of the types of pipe supplied shall be performed and furnished by the pipe manufacturer in accordance with the latest standards of the industry as described in Sub-section 1.2 herein.

C. Provide a statement in writing from the HDPE pipe manufacturer that it is listed with the Plastic Pipe Institute as a qualified extruder for the polyethylene resin being used to manufacture the pipe for this project.

PART 2 PRODUCTS

2.1 REFERENCES

A. The following documents are a part of this Section. Where this Specification section differs from these documents, the requirements of this section shall apply.

1. ASTM D1248-84, Polyethylene Plastics Molding and Extrusion Materials.
2. ASTM D3350-84, Polyethylene Plastic Pipe and Fittings Material.
3. ASTM F714-85, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

2.2 HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

A. General:

1. All High Density Polyethylene (HDPE) shall be manufactured by Driscopipe, a subsidiary of Phillips Petroleum Company; PLEXCO, Division of Chevron Chemical Company; or approved equal.

2. All HDPE pipe 4-inches in diameter and larger shall have a Ductile Iron Pipe outside diameter unless otherwise specified in the Contract Documents.

3. All HDPE piping system components shall be the products of one manufacturer.

B. HDPE Pipe Specifications

1. High Density Polyethylene pipe 4-inches diameter and larger shall conform to material standard ASTM D3350 345464 C/E cell classification rated as PE 3408 by the Plastics Pipe Institute. Minimum pressure rating shall be 160 psi SDR 11 (Standard Dimension Ratio) for pipe sizes 4 inches and greater in diameter. For pipe sizes 3-inches and smaller in diameter, the minimum pressure rating shall be 200 psi SDR 9. All pipe 4-inches in diameter and greater shall have a ductile iron pipe O.D. HDPE pipe ½ " to 3-inches in diameter shall have a steel pipe O.D. Pressure ratings are at standard test conditions and temperature of 73.4^{O}F (23^{O}C).

2. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black, well dispersed by precompounding in a concentration of not less than 2 percent.

3. The maximum allowable hoop stress shall be 800 psi at 73.4 degrees F.

4. The pipe manufacturer shall be listed with the Plastic Pipe Institute as meeting the recipe and mixing requirements of the resin manufacturer for the resin used to manufacture the pipe in this project.

C. Fittings.

1. D.I./HDPE Mechanical Joint Adaptors.

a. The manufacturer of the HDPE pipe shall supply all D.I./HDPE mechanical joint adaptors and accessories required to perform the work as shown on the Drawings.

b. The D.I./HDPE mechanical joint adaptor shall consist of:

(1) A molded or fabricated HDPE mechanical joint transition fitting
(2) A standard rubber gasket for a D.I. mechanical joint.
(3) A D.I. mechanical joint backup drive ring.
(4) Cor-Ten mechanical joint tee bolts.

c. The D.I./HDPE mechanical joint adaptor shall be connected to the HDPE pipe by a heat-fused joint on one end, and connected to a ductile iron pipe valve, or fitting with a mechanical joint on the other end.

d. The tee bolts and backup drive ring shall act as a joint restraint to keep the connecting pieces from pulling apart.

e. The HDPE transition fitting shall be molded or fabricated by the manufacturer of the HDPE pipe. All molded fittings shall be fully pressure rated to match the SDR pressure rating for which they are made. Fabricated fittings shall be rated for internal pressure service equivalent to the full pressure rating of the mating pipe.

f. If rework compounds are required, only those generated in the manufacturer's own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

g. Solvent epoxy cementing and mechanical joining with bolt on wrap around clamps shall not be used for connections.

D. HDPE Pipe Jointing Method

1. HDPE pipe shall be jointed by the butt-fusion process in accordance with pipe manufacturer's directions. Contractor shall provide butt-fusion technicians who are trained and certified by the P.E. pipe manufacturer to complete the project. The date of technician certification shall not exceed 12 months before commencing construction.

2. All HDPE pipe joined by butt-fusion shall be made from the same class and type of raw material made by the same raw material supplier.
3. Butt-fusion means the butt-joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure.

4. The internal and external beads resulting from the butt-fusion process shall be visible and examined for penetration 360 degrees around the pipe diameter.

5. Short pieces of pipe between valves and fittings shall be DIP with all joints restrained for sizes 4-inches and larger. For 3-inch and smaller HDPE pipe, the short pieces shall be brass or Sch. 80 PVC with IP threads and DI, HDPE or brass fittings with all joints restrained.

PART 3 EXECUTION

3.1 GENERAL

A. All polyethylene pipe shall be cut, fabricated, and installed in strict conformance with the pipe manufacturer's recommendations. Joining, laying, and pulling of polyethylene pipe shall be accomplished by personnel experienced in working with polyethylene pipe. The pipe supplier shall certify in writing that the Contractor is qualified to join, lay, and pull the pipe or representative of the pipe manufacturer shall be on site to oversee the pipe joining. Expenses for the representative shall be paid for by the Contractor.

3.2 PIPE INSPECTION

A. The Contractor shall obtain from the pipe manufacturer a certificate of inspection to the effect that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications. The Contractor shall submit these certificates to the Engineer prior to installation of the pipe materials. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are lowered into the trench to be laid. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor. The entire product of any plant may be rejected when, in the opinion of the Owner, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.

3.3 TRANSPORTATION

A. Care shall be taken during transportation of the pipe that it is not cut, kinked, or otherwise damaged.

3.4 STORAGE

A. Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects which could damage the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers at pipes under anticipated temperature condition. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such widths as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

B. Pipes shall be stored in such a manner as to limit their exposure to ultraviolet light as the pipe color will fade. Excessive loss of color in the pipe material may result in the rejection of piping material by the Project Representative.

3.5 HANDLING PIPE

A. The handling of the joined pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped onto rocky or unprepared ground. Slings for handling the pipeline shall not be positioned at butt-fused joints. Sections of the pipes with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined. The dragging of fused HDPE pipe along asphalt and concrete paving will not be allowed.

B. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged at night to prevent animals or foreign material from entering the pipe line or pipe section.

C. Waterproof nightcaps of approved design may be used but they shall be so constructed that they will prevent the entrance of any type of natural precipitation into the pipe and will be fastened to the pipe in such a manner that the wind cannot blow them loose.

D. The practice of stuffing cloth or paper in the open ends of the pipe will not be permitted.

E. Where possible, the pipe shall be raised and supported at a suitable distance back from the open end such that the open end will be below the level of the pipe at the point of support.

3.6 LAYING PIPE.

A. Joints:

1. All HDPE pipe shall be jointed by the heat fusion process which produces homogeneous, seal, leak tight joints.

2. Restrained mechanical joints shall be provided at tie-ins with valves and other pipe materials.

B. Butt Fusion Testing:

1. Contractor shall test the first fusion of the day on a daily basis.

2. In testing, the fusion shall be allowed to cool completely, and then fusion test straps shall be cut out. The test shall be a minimum of 12" or 30 times the wall thickness in length with the fusion in the center, and minimum of 1" or 1.5 times the wall thickness in width. Bend the test strap until the ends of the strap touch. Contractor shall not commence until a fusion test has passed the bent strap test.

3.7 PIGGING, FLUSHING AND CLEANING

A. All mains shall be pigged, cleaned and flushed to remove all sand and other foreign matter. The Contractor shall be responsible for developing a pigging and flushing plan to be submitted to the Engineer for approval prior to pigging and flushing. The Contractor shall dispose of all water used for pigging and flushing without causing a nuisance or property damage. Any permits required for the disposal of flushing water shall be the responsibility of the Contractor.

B. Flushing water used by the Contractor for reclaimed water mains shall be provided by the City at the Eastside Water Reclamation Facility. The flushing water shall consist of plant effluent (reclaimed water). The Contractor shall be responsible for conveying the reclaimed water to the point of application. Flushing water for potable water mains shall be taken by the Contractor from the potable water system at the Eastside Water Reclamation Facility. The City will provide a water meter and backflow device, the Contractor shall compensate the City for the meter usage and the quantity of potable water used.

3.8 INSPECTION AND TESTING

A. All HDPE pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. The Contractor shall conduct two (2) hydrostatic tests on each HDPE pipeline. The first test shall be performed when the pipe is above ground and before it is installed. The second test shall be performed on the pipe when it is below ground after installation.

B. Hydrostatic Testing for High Density Polyethylene Pipe:

1. HDPE hydrostatic testing shall be done in accordance with ASTM 2164-02 as briefly described below. Testing phase shall last 2-hours.

2. For any test pressure from 1.0 to 1.5 times the system design pressure, the total test time including initial pressurization, initial expansion, and time at test pressure, shall not exceed eight (8) hours. If the pressure test is not completed due to leakage, equipment failure or other reason, the test section shall be de-pressurized, and allowed to "relax" for at least eight (8) hours before bringing the test section up to test pressure again.

3. The test procedure consists of initial expansion, and the test phase:

a. During the initial expansion phase, the test section is pressurized to 10 psi above the test pressure (see Table A for Expansion Pressure), and sufficient make-up water is added each hour for three (3) hours to return to the expansion phase pressure.

b. After the initial expansion phase, about four (4) hours after pressurization, the test phase begins.

c. During the test phase, the pipe is stabilized at the test pressure (see Table A). The pressure shall remain steady within 5% of this target value for two (2) hours. If the pressure falls below 5% of the test pressure (see Table A), leakage or insufficient expansion is indicated, and the test shall be repeated after the pipe is allowed to "relax" as indicated above. Make-up water is not allowed during the test phase.

TABLE A

Pipe Class	Expansion Pressure	Test Pressure	5% Pressure Reduction
SDR 17	150 psi	140 psi	133 psi
SDR 13.5	170 psi	160 psi	152 psi
SDR 11	170 psi	160 psi	152 psi
SDR 9	210 psi	200 psi	190 psi

3.9 CONNECTIONS TO EXISTING SYSTEM

A. Connections to existing pipelines shall be made as shown on the Contract Drawings. Coordination between the Owner and the Contractor shall be required in order to accomplish this task. The Contractor shall supply connection procedures to the Owner for approval two (2) weeks prior to the proposed connection date.

END OF SECTION

SECTION 15067 – PLASTIC PIPE FOR PRESSURE SERVICE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes materials and methods of installation of Plastic Pipe for pressure service as shown on the Drawings and as Specified herein.

1.2 SUBMITTALS

A. Three certified copies of the tests made by the manufacturer or by a reliable commercial laboratory shall be submitted to the Engineer with each shipment of pipe.

B. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

1.3 HANDLING AND STORAGE

A. All pipe, fittings, valves, hydrants and accessories shall be loaded and unloaded by lifting with hoists or by skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe.

B. Materials, if stored, shall be kept safe from damage. The interior as well as all sealing surfaces of all pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage or freezing.

C. Pipe stored outside and exposed to prolonged periods of sunlight shall be covered with canvas or other opaque material. Air circulation shall be provided under covering.

D. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. Pipe shall not be stored close to heat sources.

E. Gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in,

first-out basis. Mechanical-joint bolts shall be handled and stored in a manner that will ensure proper use with respect to types and sizes.

PART 2 - MATERIALS AND EQUIPMENT

2.1 PLASTIC PIPE

A. Pipe for pressure service shall be Class 12454-A or B rigid PVC compound in accordance with the requirements of ASTM D1784. Pipe and appurtenances for use in potable water systems shall bear the seal of approval for potable water use of the National Sanitation Foundation or other accredited testing laboratory. All pipe shall have markings indicating pipe size, manufacturer's name, AWWA and/or ASTM specification number, working pressure, and production code.

B. PVC pressure rated pipe having a nominal diameter between 1.5" and 3", shall be made of 2000 psi hydrostatic design stress compounds designated PVC 1120 and shall conform to ASTM D2241. PVC pipe shall be furnished in 20-foot lengths unless otherwise noted. PVC pipe shall have a standard dimension ratio of SDR 21 and a water pressure rating of 200 psi. Pipe couplings shall have a dimension ratio of SDR 21 and a water pressure rating of 200 psi. Pipe shall have both ends beveled for use with gasketed couplings or one end beveled and one end with a bell. Couplings and gaskets shall be furnished with each length of pipe. Rubber ring gaskets shall conform to ASTM D3139 Nontoxic gasket lubricant shall be as specified by the manufacturer.

C. Pressure pipe 4-inches through 12-inches in diameter shall conform to the requirements of AWWA C900 for PVC pipe with cast iron pipe equivalent outside diameters. Pipe shall be minimum pressure class 150 unless otherwise shown. Pipe shall have a minimum wall thickness equivalent to a dimension ratio of DR 18 unless otherwise shown. Pipe may be furnished with plain ends for use with elastomeric-gasket couplings or with one end plain and one end with a gasket bell. Couplings and gaskets shall be furnished with the pipe. Gaskets shall conform to ASTM D3139. Nontoxic gasket lubricant shall be as specified by the pipe manufacturer.

D. Pressure pipe 14-inches through 48-inches in diameter shall conform to the requirements of AWWA C 905 for PVC pipe with cast iron pipe equivalent outside diameters. Pipe 14-inch through 48-inch shall have a minimum wall thickness equivalent to a dimension ratio of DR 25 unless otherwise shown. Pipe shall be pressure Class 165 unless otherwise shown. Pipe may be furnished with plain ends for use with elastometric gasket couplings or with one end plain and one end with a gasket bell. Couplings and gaskets shall be furnished with the pipe. Gaskets shall conform to ASTM 1869. Non-toxic gasket lubricant shall be as specified by the pipe manufacturer.

2.2 FITTINGS

A. Fittings for use with PVC pipe 3-inches through 24-inches in diameter shall be compact mechanical joint ductile-iron fittings conforming to the requirements of

ANSI/AWWA C153/A21.53. Fittings for use with pipe 30-inches and larger shall be mechanical joint gray iron or ductile-iron conforming to the requirements of ANSI/AWWA C111/A21.11a. Bolts for use with mechanical joints shall conform to the requirements of the joint standard. Fittings shall be suitable for a working pressure of 150 psi.

B. Exterior Coating. Fittings for buried service shall be coated with a 1 mil thick coal-tar enamel coating or a fusion-bonded epoxy coating. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe.

C. Polyethylene Encasement. All buried ductile iron fittings shall be provided with a 4-mil thick cross-laminated high density polyethylene encasement or an 8-mil thick polyethylene encasement per ANSI/AWWA C105/A21.5.

D. Fittings in exposed locations which are to be painted shall be primed with a universal shop primer suitable for use under the finish paint specified.

E. Linings. Fittings shall have a cement-mortar lining conforming to the requirements of ANSI/AWWA C104/A 21.4, a fusion-bonded epoxy lining, or a Protecto 401 ceramic epoxy lining depending upon the type of fluid being conveyed. Cement mortar linings and fusion-bonded epoxy linings shall be used for all ductile iron fittings conveying potable water, reclaimed water, and waste backwash from the disk filters. Protecto 401 shall be used for all ductile iron fittings conveying wastewater sludge, sand filter backwash water, leachate, mixed liquor, sludge thickening water, and plant drain water.

2.3 RESTRAINED JOINTS

A. Restrained Joints. Restrained joints for use with PVC pipe shall consist of retainer glands fabricated of ductile-iron conforming to ASTM A536. The gland shall be such that it can replace the standard mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA A21.11/C111 and ANSI/AWWA A21-53/C153. The retainer glands shall have a pressure rating equal to that of the PVC pipe on which it is used.

B. PVC push-on joints adjacent to restrained fittings shall be restrained using harness restraint devices. This harness restraint shall be split to enable installation of the restraint after the spigot has been installed into the bell. The restraint shall consist of a split ring that fits behind the bell, a split restraint ring that installs on the spigot and a number of tie bars to connect the other two parts. Restraint components shall be of ductile-iron conforming to ASTM A536. The restraint ring shall consist of a plurality of individually activated gripping surfaces to hold the spigot and maximize restraint capability.

C. Twist off nuts, sized same as the tee-head bolts shall be used to insure proper actuating of restraining devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Excavation. Excavate trenches as specified in Section 02221 – Trenching, Bedding and Backfill for Pipe.

B. All pipe and appurtenances shall be examined at the point of delivery. Material found to be defective due to manufacture or damage in shipment shall be rejected. Tests as specified in the applicable material standard may be performed to ensure conformance with the standard.

3.2 TRENCH CONSTRUCTION

A. Alignment and Grade. The pipelines shall be laid and maintained to the lines and grades established by the Drawings and Specifications, with fittings, valves and hydrants at the required locations unless otherwise approved by the Engineer. Valve-operating stems shall be oriented to allow proper operation. Hydrants shall be installed plumb.

B. Underground Conflicts. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. Care shall be exercised to avoid damage to existing structures. When obstructions that are not shown on the drawings are encountered during the progress of work and interfere so that an alteration of the plans is required, the Owner's Representative will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the Owner's Representative, to provide clearance as required by the Owner's Representative to prevent future damage or contamination of either structure.

C. Trench Construction. The trench shall be excavated to the required alignment, depth, and width. Trench preparation shall proceed in advance of pipe installation for only as far as necessary to allow proper pipe installation. The width of the trench at the top of the pipe shall be ample to permit the pipe to be laid and joined properly and allow the backfill to be placed as specified.

D. PVC pipe shall be installed with pipe bedding and backfill as shown on the drawings.

E. Holes for the bells shall be provided at each joint but shall not be larger than necessary for joint assembly and assurance that the pipe barrel will lie flat on the trench bottom. Other than noted previously, the trench bottom shall be true and even in order to provide support for the full length of the pipe barrel, except that a slight depression may be provided to allow withdrawal of pipe slings or other lifting tackle.

F. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 6-inches below and on each side of all pipe, valves and fittings. When excavation is completed, a bed of sand, crushed stone or earth that is free from stones, large clods, or frozen earth, shall be placed on the bottom of the trench to the previously mentioned depths; leveled, and tamped. These clearances and bedding procedures shall also be observed for pieces of concrete or masonry and other debris of subterranean structures, such as masonry walls, piers, or foundations that may be encountered during excavation. This installation procedure shall be followed when gravel formations containing loose boulders greater than 8-inches in diameter are encountered. In all cases, the specified clearances shall be maintained between the bottom of all pipe and appurtenances and any part, projection, or point or rock, boulder, or stones of sufficient size and placement which, in the opinion of the Engineer could cause a fulcrum point.

G. Should the trench pass over a sewer or other previous excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.

H. When the subgrade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 4-inches, or to the depth ordered by the Engineer and replaced under the directions of the Engineer with clean, stable backfill material. The bedding shall be consolidated and leveled in order that the pipe may be installed as specified.

I. When the bottom of the trench or the subgrade is found to consist of material that is unstable to such a degree that, in the judgment of the Engineer it cannot be removed, a foundation for the pipe and/or appurtenance shall be constructed using piling, timber, concrete, or other materials at the direction of the Engineer.

3.3 PIPE INSTALLATION

A. The Contractor shall install all pipe in accordance with the recommendations of the pipe manufacturer and as specified herein.

B. The Contractor shall take care in handling, storage and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before installation and pipe which is deemed to be defective by the Owner/Engineer shall not be installed.

C. The Contractor shall thoroughly clean and keep thoroughly clean, all pipe and fittings prior to, during, and after installation.

D. The Contractor shall lay the pipe to the lines and grades shown on the Contract Drawings with bedding and backfill as shown on the Drawings or called out in the Contract Documents. Blocking under the pipe shall not be permitted except through casing sleeves.

E. The Contractor shall keep the open ends of all pipe closed with a tightly fitting plug when installation is not in progress or the potential exists for dirt or debris to enter the pipe.

F. The pipe or accessories shall not be dropped into the trench under any circumstances.

G. The Contractor shall construct all water mains pursuant to the provisions of "Recommended Standards for Water Works", Part 8, incorporated by reference in Rule 17-555.330(3), F.A.C.

H. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, and valves, and hydrants shall be lowered carefully into the trench by means of suitable tools or equipment in such a manner as to prevent damage to pipeline materials. Under no circumstances shall pipeline materials be dropped or dumped into the trench. The trench shall be dewatered prior to installation of the pipe.

I. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

J. Trench width at the top of pipe, bedding conditions, and backfill placement and compaction shall be such that design loadings on the pipe will not be exceeded.

K. Joint Assembly. Pipe joints shall be assembled in accordance with the manufacturer's instructions.

L. Pipe Deflection. When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane, or where long radius curves are permitted, the amount of deflection shall not exceed 75% of the amount recommended by the manufacturer.

M. Pipe Cutting. Cutting pipe for the insertion of valves, fittings, or closure pieces shall be done in a neat, workmanlike manner without creating damage to the pipe. Ends shall be cut square and perpendicular to the pipe axis.

N. Burrs shall be removed from spigots and ends shall be smoothly beveled. Field cut ends shall be marked for proper depth of joint assembly.

O. Locator Tape. Install all plastic pipe with a locator tape of the type specified.

P. Electronic Marker. Install electronic markers of the type specified for all buried piping at 24-inches below grade.

Q. Thrust Restraint. All plugs, caps, tees, and bends, unless otherwise specified, shall be provided with reaction backing, or restrained joints as specified.

R. Thrust-restraint design pressure shall be equal to 1.5 times the design pressure of the line.

3.4 TESTING

A 48-hour notice is needed prior to testing. A letter stating the reasons testing should be scheduled ahead of other jobs must accompany all emergency testing requests.

B. Owner's Representative and Contractor must be present for all testing, except for testing tapping valves and sleeves.

C. All pressure pipe lines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipe lines shall be subjected to a hydrostatic pressure test for two (2) hours at full working pressure, but not less than 180 psi for water/reclaimed (150 psi for force main). Maximum length of pipe to be tested at one time is 2,600 feet. If line is longer than 2,600 feet and cannot be sectioned in 2,600 feet (max.) lengths, the allowable leakage will be figured at 2,600 feet.

D. Allowable leakage shall be determined by AWWA C600 table for hydrostatic tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof; to maintain the test pressure after the air in the pipe line has been expelled and the pipe has been filled with water.

E. All digging on the job site in the right-of-way must be completed before any testing of water or sewer. Any digging or boring across water or sewer lines after they have been tested may result in a retest of the lines at the County's request.

F. If any revisions or changes are made after initial testing, lines will be re-tested at the County's request.

G. Disconnect water supply during test.

H. All force mains will be tested from the valves in the valve vault at the lift station to the point of connection, whether it be against a valve on another force main or into a manhole.

I. All services to be aboveground during test. The services should be the correct length so they will be one (1) foot inside right-of-way line.

J. All fire hydrant gate valves to be open during test.

K. All visible leaks are to be repaired, regardless of the amount of leakage.

L. Check gauge pressure periodically during test. If test pressure drops to 175 psi for water/reclaimed lines or to 145 psi for force mains during test, the line must be repumped back to 180 psi for water/reclaimed (150 psi force mains) and the

amount of leakage measured. The test will continue on with the remaining time left. At the end of the test, the line must be repumped again back to 180 psi (150 psi for force main) and the amount of leakage measured and added to any previous leakage determined earlier in the test.

M. After the line passes the test, the pressure will be blown off from the opposite end of line from the gauge location. Fire hydrants, services and end-of-line blow offs will be opened to demonstrate they were on line during the test.

N. At end of test, the test gauge must return to zero. The pressure gauge must read 0 psi to a maximum of 300 psi in 5 psi increments.

O. The section of line being tested must be identified on the charge sheet. The length and size of pipe, the exact area being tested and the valves being tested against, must be identified. Use Station numbers if available.

Q. A copy of the charge sheet will be given to the Owner's Representative and the Contractor at the end of the test.

END OF SECTION

SECTION 15100 – VALVES AND APPURTENANCES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.

B. All valves and appurtenances shall be of the size shown on the Drawings and to the extent possible, all equipment of the same type shall be from one manufacturer.

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. The equipment shall include, but may not be limited to, the following:

1. Plug Valves
2. Swing Check Valves
3. Resilient Seated Gate Valves
4. Air Release Valves
5. Wastewater Air Release Valve
6. Combination Air Valve
7. Corporation Stops and Saddles
8. Valve Boxes
9. Restrained Flange Adapter
10. Solid Sleeve Couplings
11. Restraining Clamps
12. Manual Valve Actuators
13. Tapping Sleeves
14. Small Gate Valves
15. Ball Valves
16. Butterfly Valves
17. Bonneted Knife Gate Valves
18. Small PVC Check Valves

1.2 DESCRIPTION OF SYSTEMS

A. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaimed water, chemicals, wastewater, etc., depending on the applications.

1.3 QUALIFICATIONS

A. All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

1.4 SUBMITTALS

A. Submit to the Engineer within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.

B. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer for approval in accordance with the requirements of Section 01340 – Shop Drawings, Project Data and Samples.

1.5 TOOLS

A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.1 PLUG VALVES

A. Eccentric Plug Valves 3”-36” shall meet or exceed the latest revision of AWWA Standard C517, and shall meet or exceed the requirements of this specification.

B. Valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the plans. Flanges shall be per the ANSI B16.1 125 lb. standard. End-to-end length of flanged valves shall be per AWWA C517, Table 1. Mechanical joint ends shall be to the AWWA Standard C111-64.

C. Bodies shall be of ASTM A126 Class B cast iron. Port area shall be 100% of standard pipe area. The body shall have minimal pooling, and provide complete flushing of the valve every time it cycles. Port of valve shall be rectangular on valves sizes 14” and larger. Port of valve shall be either rectangular or round on valves sizes 12” and smaller. The term “full port” shall represent 100% port.

D. Seats shall be rectangular ported, 1/8" thick welded overlay of not less than 95% pure nickel. Seat area shall at least ½” wide and raised, with the raised surface completely covered with weld to insure that the plug face contacts only nickel.

E. Plugs shall be solid one-piece castings of ASTM A536 ductile iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The plug shall not contact the seat prior to 90% closed. The interference between the plug face and body seat, with the plug in the closed position, shall

be externally adjustable in the field with the valve in the line under pressure. Plug shall be Chloroprene (CR), or other resilient facing suitable for the application.

F. Bearings shall have sleeve type metal bearings and shall be of sintered, oil impregnated permanently lubricated type 316 ASTM A743 Grade CF8M stainless steel. Non-metallic bearings shall not be acceptable.

G. Grit Excluders in the form of PTFE washers at the upper and lower journals shall be provided to prevent the entry of grit and foreign solids into the bearing areas.

H. Shaft seals shall be of the multiple V-ring type with a packing gland follower or of the “U” cup type in accordance with AWWA C504. Shaft seals shall be self or externally adjustable and repackable without removing the bonnet from the valve.

I. Pressure ratings shall be 175 psi for sizes 3”-12" and 150 psi for sizes 14"-36". Every valve shall be given a hydrostatic and seat test, with test results being certified when required by the specifications.

J. Manual valves shall have lever or gear actuators and tee wrenches, extension stems, floorstands, etc., as specified. Valves 6" and larger shall be equipped with worm gear actuators. Non-buried actuators shall clearly indicate valve position.

K. Worm Gears shall be constructed in accordance with AWWA C517. Actuators shall be enclosed in a cast iron housing with outboard seals to protect the bearings and other internal components. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Input shaft and fasteners shall be made of stainless steel.

L. Externally adjustable open and closed position stops shall be provided. The adjustable closed position stop shall be used to set closing torque and provide adjustment to compensate for change in pressure differential or flow direction.

M. Valves and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuators shall be 90% grease filled. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals.

N. Eccentric plug valves shall have a two year warranty from date of shipment. Manufacturers name shall be cast in body of valve and a metal tag containing a serial number shall be riveted to the valve for future parts identification.

O. Valves and actuators shall be DeZurik PEF, Val-matic 5600R, or Milliken 600 Series.

2.2 SWING CHECK VALVES

A. Check valves shall be swing-type, flanged, with an external hinge arm with outside lever and adjustable weight meeting the requirements of AWWA C508. Double door, torsional-spring, and internal spring type check valves are not acceptable. Check valves shall have a design working pressure of no less than 150 psi.

B. The outside lever and weight assembly shall be capable of being relocated to the opposite side without requiring modifications to the valve body.

C. Arms with discs attached shall be hinged at the top of the body and attached to the shaft. Features or devices to limit arm-travel shall be incorporated into the valve body. Utilization of adjacent pipeline flanges to restrict arm travel will not be allowed. For sizes 6" and larger, the ratio of bolt diameter to arm width shall not exceed 0.3 and the ratio of bolt diameter thickness shall not exceed 0.9.

D. The disc shall clear the inside of the pipe by 1.125" minimum throughout its entire travel.

E. Valve materials shall be as follows:

1. Body, cover, disc, weight- cast iron, ASTM A126 c1.B.
2. Rubber disc facing, body O-ring, stuffing box O-ring, cover gasket, hinge pin O-rings- ASTM D-2000 rubber.
3. Stuffing box- bronze, ASTM 138
4. Seat ring, clapper arm, retaining washer- bronze, ASTM B584.
5. Stud nut- bronze, ASTM B62
6. Disc stud- bronze, ASTM B21
7. Stuffing Box Hinge Pin- 303 Stainless Steel, ASTM A276
8. Set screw, jam nut- stainless steel, ASTM A194
9. Cover, bolt, nut, test plug- steel, ASTM B18.2.1
10. Weight lever- A36 steel

F. Valves shall be as manufactured by Mueller, Clow, American, Kennedy, M&H, or approved equal.

G. When there is no flow, the check valve disc shall hang lightly against its seat in an almost vertical position. When there is flow, the disc shall swing clear of the waterway.

H. Valves shall be air cushioned to reduce valve slam.

I. Valves shall be constructed so that the disc and body seat may be removed and replaced without removing the valve from the line.

J. Swing Check Valve Locations

1. Disk Filter Waste Backwash Pump Station, 4-inch size
2. Transfer Pump Station, 12-inch size

2.3 RESILIENT SEATED GATE VALVES

A. Gate valves with 4" - 24" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve. Valves for potable water, reclaimed water and wastewater service shall be epoxy coated.

B. The valves shall be non-rising stem with the stem made of cast or forged stainless steel, specified in AWWA C509. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar. The top two O-rings shall be field replaceable without removing the valve from service. Low friction thrust bearings shall be provided above and below the stem collar.

C. The sealing mechanism shall consist of a cast iron gate completely encapsulated with a vulcanized synthetic EPDM rubber coating. The resilient sealing material shall be permanently bonded to the cast iron wedge with a rubber tearing bond meeting ASTM D429. The resilient sealing mechanism shall provide zero leakage at 200 psi differential pressure with the line flow in either direction.

D. The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. The stem nut shall be solid bronze. All ferrous surfaces inside and outside shall have a fusion-bonded epoxy coating meeting the requirements of AWWA C550. A handwheel or wrench nut shall be provided for operating the valve. All valves shall be tested in strict accordance with AWWA C509.

E. Valves shall be equal to the following models: American Series 2500, Clow / Kennedy / M&H; U.S. Pipe Metroseal 5460.

F. All internal parts shall be removable from the bonnet without removing the body from the pressure main.

G. Discs of valves shall be operated by methods which will allow operation in any position with respect to the vertical. Valves for interior piping or exposed above grade outside structures, shall be handwheel operated. Valves four inches and larger, buried in earth shall be equipped with 2-inch square operating nuts, extension stems, valve wrenches, valve boxes and covers. Valves shall be fitted with joints suitable for the pipe with which they are to be used. Valves located above grade or in valve vaults shall be OS & Y with flanged joints. All exterior bolts, nuts and washers shall be stainless steel. The direction of opening for all valves shall be to the left (counter-clockwise).

H. Unless otherwise shown or specified, valves shall be rated at not less than 150 psi cold water, nonshock. The manufacturer's name and pressure rating shall be cast in raised letters on the valve body

2.4 AIR RELEASE VALVES

A. Automatic Air Release Valves for Reclaimed Water Service Pipelines: Provide and install automatic air release valves for pipelines as shown on the drawings.

1. The air release valve shall be of the simple lever type or float operated, compound lever type, and capable of automatically releasing accumulated air from a fluid system while that system is in operation and under pressure.

2. Valves shall be manufactured and tested in accordance with AWWA Standard C512. Manufacturers shall have a quality management system

certified to ISO 9001:2000. Valves for potable water service shall be NSF 61 approved.

3. To assure drop tight shut off, a viton orifice button having an adjustable feature shall be used to seal the valve discharge orifice. The orifice diameter shall be sized for use within a given operating pressure range to insure maximum discharge capacity.

4. The float shall be of all Type 316 stainless steel construction and capable of withstanding a pressure of 1,000 P.S.I. Floats shall be unconditionally guaranteed against failure, including pressure surges. Mechanical linkages shall provide sufficient mechanical advantages so that the valve will open under full operating pressure. Simple lever designs shall consist of a single pivot arm and a resilient orifice button. Compound lever designs shall consist of two levers and an adjustable threaded resilient orifice button.

5. The valve cover shall be bolted to the valve body and sealed with a flat gasket. Resilient seats shall be replaceable and shall provide drop-tight shutoff to the full valve pressure rating.

6. The valve body shall be threaded with NPT inlets and outlets. The body inlet connection shall be hexagonal for a wrench connection. The valve shall have two NPT connections for gauges, testing or draining. The air release valve shall have a Type 316 stainless steel isolation ball valve on its inlet.

7. The body and cover shall be of Type 316 stainless steel construction with all internal trim to be of Type 316 stainless steel or viton, consistent with the following specifications:

Body and Cover	ASTM A351 Grade CF8M Type 316 Stainless Steel
Float	316 Stainless Steel
Orifice Button	Viton for simple lever and compound valves
Lever Mechanisms	316 Stainless Steel

8. The air release valves shall be manufactured by H-Tec or approved equal. Valves required for the project include:

   a) Air Release Valves for Transfer Pump Station

2.5 WASTEWATER AIR RELEASE VALVE

A. Automatic Air Release Valve for Disk Filter Waste Backwash Pump Station Discharge Pipeline: Provide and install automatic air release valve for pipeline as shown on the drawings.

1. The air release valve shall be of the simple lever type or float operated, compound lever type, and capable of automatically releasing

accumulated air from a fluid system while that system is in operation and under pressure.

2. Valves shall be manufactured and tested in accordance with AWWA Standard C512. Manufacturer shall have a quality management system certified to ISO 9001:2000. Valves for potable water service shall be NSF 61 approved.

3. To assure drop tight shut off, a viton orifice button having an adjustable feature shall be used to seal the valve discharge orifice. The orifice diameter shall be sized for use within a given operating pressure range to insure maximum discharge capacity.

4. The float shall be of all Type 316 stainless steel construction and capable of withstanding a pressure of 1,000 P.S.I. Floats shall be unconditionally guaranteed against failure, including pressure surges. Mechanical linkages shall provide sufficient mechanical advantages so that the valve will open under full operating pressure. Simple lever designs shall consist of a single pivot arm and a resilient orifice button. Compound lever designs shall consist of two levers and an adjustable threaded resilient orifice button.

5. The valve cover shall be bolted to the valve body and sealed with a flat gasket. Resilient seats shall be replaceable and shall provide drop-tight shutoff at the full valve pressure rating of 150 psi.

6. The valve body shall be threaded with NPT inlets and outlets. The body inlet connection shall be hexagonal for a wrench connection. The valve shall have a 2-inch NPT cleanout connection and a 1-inch NPT drain connection. The air release valve shall have a Type 316 stainless steel isolation ball valve on its inlet.

7. The body and cover shall be of Type 316 stainless steel construction with all internal trim to be of Type 316 stainless steel or viton, consistent with the following specifications:

Body and Cover	ASTM A351 Grade CF8M Type 316 Stainless Steel
Float	316 Stainless Steel
Orifice Button	Viton for simple lever valves; Buna-N for compound valves
Lever Mechanisms	316 Stainless Steel

8. Backwash accessories shall be furnished and shall consist of an inlet shut-off valve, a blow-off valve, a clean water inlet valve, rubber supply hose, and quick disconnect couplings. Accessory valves shall be quarter-turn full ported 316 stainless steel ball valves.

9. The air release valve shall be manufactured by Val-Matic Corp., Elmhurst, Illinois or approved equal. Valve required for the project includes:

a. Disk Filter Waste Backwash Pump Station Discharge Header.

1. Val-matic Model No 48A
2. Quantity: 1
3. 200 GPM Maximum Flow
4. 150 psi design cold water pressure
5. 2-inch NPT inlet
6. ½" NPT outlet
7. 3/16" orifice

2.6 COMBINATION AIR VALVE

A. Combination: Provide and install air valve for pipeline as shown on the drawings.

1. Combination Air Valves shall be automatic float operated valves designed to exhaust large quantities of air during the filling of a piping system and close upon liquid entry. The valve shall open during draining or if a negative pressure occurs. The valve shall also release accumulated air from a piping system while the system is in operation and under pressure. The valve shall perform the functions of both Air Release and Air/Vacuum Valves and be furnished as a single body type.

2. Valves shall be manufactured and tested in accordance with AWWA Standard C512. Manufacturer shall have a quality management system certified to ISO 9001:2000.

3. Single body valves shall provide a through flow area equal to the nominal size. A resilient bumper shall be provided to cushion the float during sudden opening conditions. The resilient seat shall be replaceable and provide drop tight shut off for the full valve pressure rating.

4. The Air/Vacuum Valve assembly shall have a cover fitted to the valve body by means of a machined register to maintain concentricity between the top and bottom guide bushings at all times. The float shall be double guided with a guide shaft extending through the float to prevent any contact with the body. The float shall be protected against direct water impact by an internal baffle bolted to the cover or integrally cast in the body. The seat shall be a minimum of ½ inch thick and secured in such a manner as to prevent distortion.

5. Single body combination valves shall have an expanded outlet to provide full flow area around the guide mechanism. The valve shall have a double guided plug on 2 inch and larger sizes, and an adjustable threaded orifice button. The plug shall be protected against direct water impact by an internal baffle. The plug shall have a precision orifice drilled through the center stem.

6. To assure drop tight shut off, a viton orifice button having an adjustable feature shall be used to seal the valve discharge orifice for the air release assembly. The orifice diameter shall be sized for use within a given operating pressure range to insure maximum discharge capacity.

7. The float, guide shafts and bushing shall be of all Type 316 stainless steel construction and capable of withstanding a pressure of 1,000 P.S.I. Floats shall be unconditionally guaranteed against failure, including pressure surges. Mechanical linkages shall provide sufficient mechanical advantages so that the valve will open under full operating pressure. Simple lever designs shall consist of a single pivot arm and a resilient orifice button. Compound lever designs shall consist of two levers and an adjustable threaded resilient orifice button.

8. The valve cover shall be bolted to the valve body and sealed with a flat gasket.

9. The valve body shall be provided with an ANSI B16.1 Class 125 stainless steel flange inlet and an NPT outlet. The valve shall have two additional NPT connections for gauges, testing or draining. The combination valve shall have an isolation ball valve on its inlet.

10. The body and cover shall be of Type 316 stainless steel construction with all internal trim to be of Type 316 stainless steel or viton, consistent with the following specifications:

Body and Cover	ASTM A351 Grade CF8M Stainless Steel
Float	316 Stainless Steel
Orifice Button	Viton for simple lever valves; Buna-N for compound valves
Lever Mechanisms, Guide Shafts, Bushings	316 Stainless Steel

11. The air release valve shall be manufactured by H-Tec or approved equal.

    a) Air Release Valve with Vacuum for Lake Return Pump Station

2.7 CORPORATION STOPS AND SADDLES

A. Corporation Stops

1. AWWA C800, ASTM B62 red brass, alloy 85-5-5-5, ball type, 300 psi rated working pressure.

B. Saddles

1. Potable Water and Reclaimed Water

    a) ASTM B62 red brass, alloy 85-5-5-5, Smith-Blair 325 Bronze saddles

    b) Stainless Steel straps, washers and nuts

2.8 VALVE BOXES

A. All buried valves shall have cast-iron two or three piece valve boxes as required. Valve boxes shall be provided with suitable heavy bonnets to extend to elevations at or slightly above the finished grade surface as directed by the Engineer. The barrel shall be two or three-piece, screw type, having a 5 1/4-inch inside diameter on the bottom barrel. The bottom barrel shall have a flange at the bottom having sufficient bearing area to prevent settling, valve boxes shall be complete with cast iron covers. Covers shall have “WATER”, “SEWER”, or ‘RECLAIM’, as applicable, cast into the top. All valves shall have actuating nuts extended to within 4’ of the lid of the valve boxes. Extension stems shall be attached to the valve operating nut with a stainless steel fastener. Reclaimed valve box lids shall be 9 X 9 inches square, load bearing, painted purple and identified as noted above. Grade adjustment risers shall be the same cast iron material as the valve box assemblies. An AFC entering device, Part No. B59434, shall be installed in the valve box. Valve boxes shall be provided with a concrete base and identification disks per the detail on the drawings. The valve boxes shall be Tyler Pipe 6850 Series, Box 461-S through 668-S, Russco 461-S through 668-S or an approved equal.

2.9 RESTRAINED FLANGE ADAPTER

A. Restrained flange adapters shall be of the size and pressure rating required for each installation and shall be suitable for use on either PVC, Steel, HDPE (with inserts) or ductile iron pipe.

B. Restrained flange adapters shall be used in lieu of threaded or welded flanged spool pieces. Flange adapters shall be made of ductile iron conforming to ASTM A536, 65-45-12, and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10.

C. Restraint for the flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limited actuating screws shall be used to insure proper initial set of gripping wedges.

D. The flange adapters shall be capable of deflection during assembly, or permit lengths of pipe to be field cut to allow a minimum 0.6” gap between the end of the pipe and the mating flange without affecting the integrity of the seal. The joints shall be capable of deflecting between 5 degrees for 3-inch pipe and 0.5 degrees for 60-inch pipe.

E. For PVC pipe, the flange adapter will have a pressure rating equal to the pipe.

F. For Ductile Iron pipe, the flange adapter shall have a safety factor of 2:1 minimum.

G. The restrained flange adapter is comprised of two rings. The first is the restraint ring which incorporates wedges around the circumference of the ring to grip the pipe firmly and securely. The wedge style of restraint offers enormous pullout strength when compared to set screw restraints. The resiliency of the wedge style restraint allows the flange adapter to withstand severe moment loads.

The second ring is the gasket ring which separates the seals dedicated to each sealing surface. This ring allows pipe to be cut to lengths in the field at a

tolerance of 0.6 inch or more. And the gasket ring also enables the joint to deflect during assembly.

H. The restrained flange adapter shall be coated with fusion bonded epoxy paint at the factory.

I. The flange adapter shall be the Series 2100 Megaflange adapter as manufactured by EBAA Iron, Inc., or approved equal.

J. All flange adapters shall have a sufficient number of factory installed anchor studs to meet or exceed the test pressure rating for this project, 150 psi minimum.

2.10 SOLID SLEEVE COUPLINGS

A. Solid sleeve couplings shall be used in locations as shown on the Drawings.

1. Solid sleeve type couplings shall be used with all buried piping. The couplings shall be of ductile iron meeting the requirements of ANSI/AWWA C110/A21.10 as manufactured by U.S. Pipe, American Cast Iron Pipe, McWane, or Equal. Solid sleeves shall be furnished with mechanical joint fittings. The solid sleeve coupling shall be provided with 316 stainless steel bolts and nuts unless indicated otherwise.

2. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

2.11 RESTRAINING CLAMPS

A. Restraining clamp assemblies as detailed in the drawings for use at hydrant connections to water mains, or at fittings where shown on the drawings, shall be as manufactured by EBAA Iron Sales, Inc., Eastland, TX, or Equal.

2.12 MANUAL VALVE ACTUATORS

A. General

1. All manual valve actuators shall conform to Section 3.8 of the AWWA C504 Standard Specification and shall be manually operated.

2. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

3. Valve actuators shall be provided, mounted and tested by the valve manufacturer.

B. Manual Actuators

1. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Actuators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds in the handwheel or chainwheel. Actuator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme actuator positions without damage. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and a cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

2.13 TAPPING SLEEVE

A. Size: 14 through 42 inches

1. Body and Outlet, ASTM A240 type 304/304L stainless steel. Nominal Pipe Size: 14 through 42 inches. Outlet Size: 3 through 24 inches.
2. Bolts and Nuts, 5/8 inch 304 SS, threaded, coated nuts for galling prevention.
3. Gaskets, ASTM D2000 MBA 710 SBR
4. Test Plug, ¾ inch 304 SS
5. Flange, ASTM A240 type 304SS, AWWA Class D plate flange, ANSI Class 150 drilling, for tapping valves.
6. Manufacturer: Romac Industries, Inc Model STS 420 or approved equal.

B. Size: 4 through 30 inches

1. Body Outlet and Lugs, ASTM A240 type 304 and 304L stainless Steel. Nominal Pipe Size: 4 through 30 inches. Nominal Outlet size: 3 through 12 inches.
2. Bolts, ASTM A193 type 304 stainless steel, 5/8 inch
3. Nuts, ASTM A194 type 304 stainless steel, coated to prevent galling.
4. Gaskets, ASTM D2000, MAA 610 SBR
5. Flange, ASTM A240 type 304SS, for tapping valves
6. Manufacturer: Romac Industries, Inc. Model SST III or approved equal.

2.14 SMALL GATE VALVES

A. Gate valves 2-1/2-in in diameter and smaller in size, shall have flanged or threaded ends as required; and shall be brass conforming to Federal Specification WW-V-54, Type I or II, solid wedge, rising-stem-type gate valves as

manufactured by Jenkins Bros. or equal products as manufactured by Crane, Fairbanks, Kennedy Valve Mfg. Co., or equal.

2.15 PVC BALL VALVES

A. PVC Ball Valve sizes 1/2" to 4" shall be TYPE 21 and shall be of true union design with two-way blocking capability. All O-rings shall be EPDM or FKM with PTFE seats. PTFE seats shall have elastomeric backing cushion of the same material as the valve seals. Stem shall have double O-rings and be of blowout-proof design. The valve handle shall double as carrier removal and/or tightening tool. ISO mounting pad shall be integrally molded to valve body for actuation. The ball valves shall have a pressure rating of 230 psi for sizes"1/2" to 3" and 150 psi for 4" at 70 º F. Type 21 Ball Valves must carry a two-year guarantee, as manufactured by Asahi/America, Inc.

B. All ball valves used for chemicals prone to "off-gassing" (e.g. sodium hypochlorite, hydrogen peroxide) shall be vented to avoid entrapment of vapors.

2.16 BUTTERFLY VALVES

A. Butterfly valves (4" thru 48" size) shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designated C504, except as hereinafter specified. Valves shall be Class 150A or B, with a maximum working pressure of 150 psi, except for those butterfly valves downstream of the high service effluent pumps, which shall be Class 250 B with a maximum working pressure of 250 psi. All butterfly valves shall be factory leak tested at a pressure of 200 psi. The Contractor shall supply all of the butterfly valves for this project from one manufacturer. Acceptable manufacturers of the proposed butterfly valves shall include GA Industries, Val-Matic, Henry Pratt Company, DeZurik, Mueller, KOR-FLO or approved equal.

B. The face-to-face dimensions of flanged end valves shall be in accordance with AWWA Standard Specification C504 for short-body valves. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance with ANSI B16.1. Mechanical Joint end valve dimensions shall be in accordance with AWWA Standard Specification C504.

C. All Butterfly valves shall have a factory applied fusion bonded epoxy coating inside and outside, in accordance with AWWA C550. The interior and exterior surfaces shall be shown to be holiday free using an electronic holiday test, in accordance with AWWA C550.

D. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting the operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material with stainless Nylock or ASTM A276, 316 stainless steel screws, and shall be capable of a 1/8 inch adjustment. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C 504. Where the rubber seat is mounted on the valve body, the mating edge of the valve disc shall be 18-8 stainless steel or ASTM A276, 316 stainless steel. Where the EPDM seat is mounted on the valve disc, the valve body shall be fitted with an 18-8

stainless steel or ASTM A 276, 316 stainless steel seat offset from the shaft, mechanically restrained and covering 360 degrees of the peripheral opening or seating surface.

E. The Class 150 A or B valve body shall be constructed of close grain cast iron per ASTM A126, Class B, or ASTM A536, Grade 65-45-12 ductile iron with integrally cast hubs for shaft bearing housings of the through-boss type. Butterfly valves of the "wafer": or "spool" type shall not be accepted.

F. The Class 150 A or B valve shaft shall be turned, ground, and polished, constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. The shaft shall be either a one piece unit extending full length through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon, self-lubricated type.

G. Additional materials of construction for Class 150 A or B butterfly valves include:

1. Disc-ASTM A536, Grade 65-45-12 ductile iron.
2. O-Rings-EPDM.

H. Class 250 butterfly valves shall be constructed from the same materials as the Class 150 A or b butterfly valves noted above except for the following:

1. Body-ASTM A536, Grade 65-45-12 ductile iron.
2. Shaft-Type 17-4 PH, Condition H1150 stainless steel.
3. Bearings – Teflon/Dacron Fabric Liner, fiberglass back-up shell.
4. Torque Screw – Type 17-4 PH, Condition 1100 stainless steel.
5. Tangential Pin – Type 17-4 PH, Condition H1100 stainless steel.

I. All valves shall be subject to hydrostatic and leakage tests at a pressure of 200 psi at the point of manufacture. The Class 150 valves shall be tested in conformance with AWWA C504. During the hydrostatic test there shall be no leakage through the metal, the end joints or the valve shaft seal. No adjustment of the valve disc will be necessary after the pressure test for normal operation of the valve.

J. In general, the butterfly valve operators shall conform to the requirements of Section 11 of the AWWA Standard specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable and as herein specified.

K. Gearing for the operators shall be totally enclosed in a gear case in accordance with the above-mentioned AWWA Standard Specifications.

L. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.

M. All valve operators shall conform to Section 11 of the AWWA Standard Specification and shall be manual unless otherwise shown or specified and shall

have permanently lubricated, totally enclosed gearing with handwheels and gear ratios sized on the basis of actual line pressures and velocities. Operators shall be equipped with handwheels, position indicators, and mechanical stop-limiting locking devices to prevent over travel of the discs in the open and closed positions when valves are located above grade. Operators shall turn counterclockwise to open valves. Manual operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Operators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwell when the valve is located above grade. Operator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme operator positions without damage. Valves located above grade shall have handwheel operators, and valves located below grade shall be equipped with two-inch (2") square AWWA operating nuts located at ground level in cast iron extension type valve boxes. Valve operators shall conform to AWWA C504, latest revision.

N. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform to all requirements of the specifications and the AWWA standards.

O. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.17 BONNETED KNIFE GATE VALVES

A. Provide and install a 20-inch Bonneted Knife Gate Valves to be installed on the existing 20-inch return pump station intake piping.

B. Description

Each Valve shall be resilient seated with a pressure-retaining bonnet that fully encloses the gate. The bonnet shall be rated at the same pressure as the valve body and shall not include any type of internal gate packing or gate wiper. A packing gland shall be located at the top of the bonnet to provide a tight seal to prevent leakage around the stem.

C. Materials

1. BODY & BONNET: Except for the resilient seat, all wetted parts of the body and bonnet shall be 18-8, ASTM A-276, Type 304SS, including fasteners. Exterior flanges and stiffeners shall be fabricated carbon steel. Flush and drain ports, shall be 304SS. The 304SS body cladding and face rings shall be fully welded to the carbon steel body – "floating" body liners are not acceptable. Each valve shall be provided with 304SS gate guides for installation in a horizontal position. The exterior of the valve shall be provided with an epoxy primer specified in Section 09900.

2. GATE: The gate shall be 304SS, suitable for the service conditions, and shall be ground and polished to a minimum surface finish of 32 micro-inch/inch R.M.S. to prevent damage to the seat.

3. SEAT: The resilient seat shall be Viton, installed in a self-retaining groove that is cut into the 304SS seat ring, and shall be replaceable without removing the valve from the pipeline. No fasteners or adhesives shall be allowed to hold the seal in place.

4. STEM: The stem shall be either A.I.S.I. 303SS or 304SS, with Acme threads.

5. STEM NUT: The stem nut shall be of acid-resisting Bronze.

6. PACKING: The packing shall be Teflon–impregnated synthetic fiber and the packing follower shall be 304SS. The packing shall be replaceable without disassembling the valve or removing the valve from the pipeline, and while under pressure.

7. YOKE: The valve yoke shall be carbon steel, designed to support the manual operator and resist twisting.

D Construction Details

1. FLANGES: Flanges shall be flat faced. The gasket surfaces shall be 304SS and shall be fully machined with a spiral serrated finish.

   Flanged drilling for the 20-inch valves shall match ANSI B16.1, Class 125. Unless otherwise specified, all flange bolt holes shall be threaded.

2. LUBRICATION: The valve shall be designed so that all required lubrication can be completed externally with the valve installed in the pipeline.

3. DESIGN PRESSURE: Unless otherwise specified, the 30-inch valves shall be rated at 50 PSIG CWP (cold working pressure).

4. TESTING: Manufacturer's Testing shall be conducted as follows:

   a) Shell Test – Each valve body and bonnet shall be hydrostatically pressure tested in the manufacturer's shop at 1.5 times the rated working pressure with no visible leakage allowed (leakage through the packing shall not be a cause for rejection, as long as there is no leakage at the rated pressure).

   b) Gate/Seat Test – Each valve shall be hydro-statically pressure tested at 1.1 times the rated working pressure in the direction of closure with no visible leakage through the gate material or past the seat.

E. Manual Operator

3. The steel operator shall be sized to seat and unseat the knife gate valve at the specified operating pressure with a maximum rim pull of 60 pounds. A bevel gear operator shall be supplied for the hand-wheel.

2. Bevel gear operators shall be fully enclosed and permanently lubricated, with a sealed housing to prevent contamination.

3. Bevel gear operators shall be provided with a stem cover to protect the stem when the valve is in the open position. The stem cover shall be removable for inspection and maintenance.

4. Hand-wheels shall turn counter clockwise to open the valves.

2.18 SMALL PVC CHECK VALVES

1. PVC check valves shall be fully serviceable, replaceable and use standard o-ring seats. Sizes from ½" to 2" shall be pressure rated for a maximum pressure of 235 psi and be rated for vacuum service. The PVC check valve shall be True Union 2000 Industrial Ball Check Valve as manufactured by Spears.

2. Disk Filter Waste Backwash Pump Station Discharge Header.

PART 3 EXECUTION

3.1 INSTALLATION

A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.

B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.

C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections in Division 15.

E. Flanged joints shall be made with high strength, low alloy Corten bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.

F. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8 inches. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to

a distance of about 6 inches from the end, and the middle ring shall be placed on the substantial completion date unless otherwise requested by the Owner.

G. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place a cast iron box over each stem with the base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on the cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.2 RESTRAINING CLAMPS AND TIE RODS ON PIPE RUN

A. Restraining clamps and tie rods shall be used on all pipe runs, as directed by the Engineer and/or shown on the Drawings. Restraining devices shall be JCM Industries, Inc. - Sur-Grip, EBAA Iron, Inc. - Megalug, Romac, or approved equal. Other types shall be submitted to the Owner's Representative for approval.

3.3 SHOP PAINTING

A. Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.4 FIELD PAINTING

A. All metal valves and appurtenances specified herein and exposed to view will be painted per Section 09900 with a color appropriate to its usage in accordance with the color code.

3.5 INSPECTION AND TESTING

A. Completed pipe shall be subjected to a hydrostatic pressure test for two hours at 180 psi pressure. All leaks shall be repaired and lines retested as approved by the Owner's Representative. Prior to testing, the gravity pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION

SECTION 15141 – PIPE SUPPORT SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. General

1. Furnish all labor, materials, tools, equipment and services for all pipe support and anchor systems, in accordance with the provisions of the Contract Documents.

2. Completely coordinate with work of all other trades.

3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

4. The layout of pipe supports is the responsibility of the Contractor, and must take into consideration pipe material, joint type, location, and other requirements of these specifications.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. American National Standards Institute (ANSI)

2. American Society of Mechanical Engineers (ASME)

3. American Society for Testing and Materials (ASTM)

4. ASTM A575 Merchant Quality Hot-Rolled Carbon Steel Bars

5. American Welding Society (AWS)

6. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS)

7. MSS SP-58 (Latest Edition) Pipe Hangers and Supports - Materials and Design

8. MSS SP-69 (Latest Edition) Pipe Hangers and Supports - Selection and Application

9. National Bureau of Standards (NBS)

10. NBS Handbook H-28

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples.

B. Submit itemized list of wall sleeves, anchors, support devices and all other items related to pipe support system.

C. Submit scaled drawings showing guides, hangers, supports, anchors, structural members and appurtenances to describe the pipe support system.

PART 2 PRODUCTS

2.1 MATERIALS

A. All structural steel angles, rods, channels and special devices integral to pipe support systems shall be fabricated from ASTM-A-276 Type 304 stainless steel. Locate supports and accessories to support pipe system at concentrated loads and in accordance with minimum suggested by MSS SP-69-66.

2.2 PIPE SADDLES

A. Provide ASTM-A-276 Type 304 Stainless Steel pipe support saddles for pipe supported from the floor, unless otherwise indicated on the drawings. Pipe saddles equal to B-Line Figure B3092, or equal.

B. Use Schedule 40 ASTM-A-276 Type 304 stainless steel support pipe risers and floor plate recommended by saddle manufacturer.

2.3 WALL BRACKETS

A. Provide ASTM-A-276 Type 304 stainless steel wall bracket supports for pipe located near walls, including all horizontal pipe and all vertical pipe 8-feet or more above floor elevation or as indicated on the drawings. Provide wall brackets at all changes of direction and as shown on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install supports capable of supporting the pipe for all service and testing conditions. Allow free expansion and contraction of the piping to prevent excessive stress resulting from service and testing conditions or from weight transferred from the piping or attached equipment.

B. Install pipe support system in accordance with highest industry practices, and in full accordance with manufacturer's recommendations. Adjust supports and hangers to allow for proper pitch of pipes.

C. Ensure design, materials of construction, and installation of pipe hangers, supports, guides, restraints, and anchors for chemical and waste piping are in accordance with ANSI B31.3, and MSS Standard SP-58 and SP-69, except where modified by this specification.

D. Check all physical clearances between piping, support system, and structure. Provide for vertical adjustment after erection.

E. Provide piping system exhibiting pulsation, vibration, swaying, or impact with suitable constraints to correct the condition. Movements from trap discharge, water hammer, and similar internal forces are included in this requirement. No system will be accepted until the adequacy and safety of the system is assured under all anticipated conditions of operation.

F. Weld supports in accordance with the requirements of AWS Code D1.1 Structural Welding.

G. Locate piping and pipe supports so as to not interfere with open accesses, walkways, platforms, and with maintenance or disassembly of equipment.

H. After erection of piping systems, and prior to pipe testing and flushing, inspect for adequacy of clearance for piping and supports.

I. Support pipes for lateral movement with clamps or brackets.

J. Provide 20-gauge ASTM-A-276 Type 304 stainless steel pipe saddle for fiberglass and plastic support points to insure minimum contact width of 4 inches.

3.2 SUPPORT SPACING

A. General: Locate pipe supports at maximum spacing scheduled unless indicated otherwise on the drawings. Provide at least one support for each length of pipe, at each change of direction and at each valve.

B. Steel, stainless steel, cast-iron, and ductile iron support schedule:

Pipe Size - Inches	Maximum Span - Feet
1-1/2 and less	5.0
2 thru 4	10.0
5 thru 8	15.0
10 and greater	20.0

C. Schedule 40 PVC Pipe, Temperature 100° or Less:

Pipe Size - Inches	Maximum Span - Feet
1	5.0
1.5	5.5
2	6.0
3	7.0
4	7.5
6	9.0
8	9.5
10	10.0
12	10.5
14	11.0

D. Schedule 80 CPVC Pipe, Temperature 140° or Less:

Pipe Size - Inches	Maximum Span - Feet
1	5.0
1.5	5.5
2	6.0
3	7.0
4	7.5
6	8.0
8	9.0
10	9.5
12	10.5

3.4 WELDING

A. Identify welding rods clearly identified meeting the requirements of ASTM and American Welding Society Standards.

B. Integral attachments include welded-on ears, shoes, plates, and angle clips. Ensure material for integral attachments is of good weldable quality. Have preheating, welding, and postheat treating in accordance with Chapter V of ANSI B31.3.

3.4 PAINTING

A. All stainless steel items shall not be painted. Painting for all other materials shall comply with Section 09900 – Painting and Coatings.

END OF SECTION

SECTION 16010 – ELECTRICAL BASIC REQUIREMENTS

PART 1 GENERAL

1.1 THE REQUIREMENT

A. Furnish all labor, materials, equipment and incidentals required for a complete electrical installation for the Work associated with the Contract Documents, as hereinafter specified and shown on the Contract Drawings.

B. Provide functioning systems in compliance with manufacturer's instructions, performance requirements specified or shown on the Contract Drawings and modifications resulting from reviewed shop drawings and field coordinated drawings.

C. The work, apparatus and materials which shall be furnished under these Specifications and accompanying Contract Drawings shall include all items listed hereinafter and/or shown on the Contract Drawings. Certain equipment will be furnished as specified in other sections of these Specifications which will require wiring thereto and/or complete installation as indicated. All materials necessary for the complete installation shall be furnished and installed by the Contractor to provide complete power, lighting, communication systems, instrumentation, wiring, and control systems as indicated on the Contract Drawings and/or as specified herein.

D. Provide complete bonding and/or grounding systems for all equipment as specified herein, shown on the contract documents, and as required for specific pieces of equipment per manufacturer.

E. The Contractor shall furnish and install the necessary cables, transformers, motor control centers, protective devices, conductors, exterior electrical system, etc., to serve motor loads, lighting loads and miscellaneous electrical loads as indicated on the Contract Drawings and/or as specified hereinafter.

F. The work shall include complete testing of all equipment and wiring at the completion of the work and making any connection changes or adjustments necessary for the proper functioning of the system and equipment.

G. Mount and wire control panels and process instruments furnished under other Divisions of these Specifications unless specifically stated otherwise. Mount and make all field connections to process instrument panels and other control panels furnished under other Divisions of these Specifications. For process instrumentation, furnish and install all conduit, wire and interconnections between primary elements, transmitters, local indicators, surge protection devices and receivers.

H. Mount and wire isolation transformers, operator's stations, and power conversion equipment for all variable speed drive systems furnished under other Divisions of these specifications.

I. Install and wire all thermostats, aqua-stats and other devices furnished under other Divisions of this Specification directly controlling HVAC equipment or fan motors.

J. Mount and wire electric heaters, and heat tracing furnished under other Divisions of this Specification.

K. The scheduling and duration of any power or control interruption for the removal of existing equipment or the installation of new equipment shall be coordinated in advance with the Owner.

L. 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.

M. Provide all temporary power as required to facilitate the Contract phased construction plan.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Related Sections include but are not necessarily limited to:

1. Division 1 - General Requirements
2. Section 02050 - Demolition
3. Section 03300 – Cast-in-Place Concrete
4. Division 11 – Equipment
5. Division 13 Special Construction

1.3 AREA CLASSIFICATIONS

A. Outdoor locations may contain wet, corrosive and hazardous areas.

1. Corrosive and hazardous areas are identified on the Contract Drawings. Areas not identified as such shall be considered wet.

B. Indoor locations may contain unclassified, damp, wet, corrosive and hazardous areas.

1. Damp, wet, corrosive and hazardous areas are identified on the Contract Drawings. Areas not identified as such, but provided with heating shall be considered unclassified. Areas not identified as such, but provided without heating shall be considered damp.

C. Hazardous Locations

1. Hazardous locations shall be as defined in NFPA 70 NEC, NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities, and other applicable standards or codes governing the classification of a particular type of facility or location. In addition, areas are classified as shown on Contract Drawings and as follows:

a) Class I Division 1
b) Class I Division 2
c) Class II Division 1
d) Class II Division 2

1.4 DEFINITIONS

A. Outdoor Areas

1. Those locations on the Project site where the equipment is normally exposed to wind, dust, rain, etc. Outdoor areas include areas protected by a roof or rain/sun shields but not enclosed within a structure.

B. Indoor Areas

1. Those locations on the Project site where the equipment is normally protected from wind, dust, rain, etc.

1.5 QUALITY ASSURANCE

A. Referenced Standards

1. American Iron and Steel Institute (AISI)

2. American National Standards Institute (ANSI)

a) C2, National Electrical Safety Code.

3. American Society for Testing and Materials (ASTM)

4. Factory Mutual System (FM)

a) A Guide to Equipment, Materials and Services.

5. Institute of Electrical and Electronics Engineers (IEEE)

a) 141, Recommended Practice for Electrical Power Distribution for Industrial Plants.

b) 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.

6. National Electrical Contractors Association (NECA)

a) NECA 1, Good Workmanship in Electrical Construction

b) NECA 200, Recommended Practice for Installing and Maintaining Temporary Electrical Power at Construction Sites.

7. National Electrical Manufacturers Association (NEMA)

    a) 250, Enclosures for Electrical Equipment (1000 V Maximum)

    b) ICS 6, Enclosures for Industrial Control and Systems

8. National Fire Protection Association (NFPA)

    a) 70, National Electrical Code (NEC).

    b) 70E, Standard for Electric Safety in the Workplace

    c) 79, Electrical Standard for Industrial Machiner

    d) 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities

9. Underwriters Laboratories, Inc (UL)

    a) 508, Industrial Control Equipment

    b) 508A, Industrial Control

    c) 698, Industrial Control Equipment for Use in Hazardous Locations.

B. When a specific code or standard has not been cited, the applicable codes and standards of the following code-making authorities and standards organizations shall apply.

1. American Association of State Highway and Transportation Officials (AASHTO)

2. American Iron and Steel Institute (AISI).

3. American National Standard Institute (ANSI).

4. American Society for Testing and Materials (ASTM).

5. ETL Testing Laboratories, Inc (ETL).

6. Insulated Cable Engineers Association (ICEA).

7. Institute of Electrical and Electronic Engineers (IEEE).

8. Illuminating Engineering Society of North America (IES).

9. Instrument Society of America (ISA).

10. Lightning Protection Institute (LPI).

11. National Electrical Manufacturers Association (NEMA).

12. National Fire Protection Association (NFPA).

13. Occupational, Health and Safety Administration (OSHA).

14. Underwriters Laboratories Inc (UL).

C. In case of conflict or disagreement between codes, standards, laws, ordinances, rules, regulations, drawings and specifications, or within either document itself, the more stringent condition shall govern.

1.6 SUBMITTALS

A. Shop Drawings – All submittals shall be in accordance with Specification 01340 – Sop Drawings, Project Data and Samples.

1. Shop drawings shall be arranged and labeled according to specification section and Contract Drawing.

2. Submit shop drawings prior to purchase or fabrication of equipment. See individual Division 16 sections for additional specific requirements.

3. Prior to submittals of shop drawings, coordinate electrical equipment, particularly motor control equipment, control panels, and instrumentation, with all applicable equipment and systems interfacing with that equipment.

4. Submittals shall be made in the following combinations:

a) Conduits, raceways, cable trays, ductbank details, wire and cable 600V and below, medium voltage cable, boxes and fittings.

b) Medium voltage switchgear, medium voltage motor starters, distribution transformers and secondary substations.

c) Motor control centers and control equipment, low voltage switchboards, safety switches, dry-type (specialty) transformers, panelboards, power factor correction capacitors, grounding.

d) Lamps, interior lighting, exterior building lighting, site lighting.

e) Wiring devices.

f) Alarm systems, communication systems and telephone systems.

g) Provide a wire or cable identification schedule for all power, control, signal, process and protective circuits. The schedule shall be submitted in an electronic spreadsheet type Excel compatible file format and include the following information:
(1) Wire or Cable tag number.

(2) Number of conductors.
(3) Conductor size and type.
(4) Wire or Cable usage description.
(5) Conduit tag number
(6) Conduit routing (to and from).
(7) Conduit size and type.
(8) Additional notes

5. For each product, clearly identify manufacturer by name. When general data sheets are provided as part of the submittal, specifically identify the products to be used on this Project. Provide manufacturer's technical information on products to be used, including:

   a) Product descriptive bulletin.

   b) Electrical data pertinent to the Project and necessary to assure compliance with Specifications and Contract Drawings.

   c) Equipment dimensions, where applicable.

   d) Evidence that the products submitted meet the requirements of the standards referenced.

   e) Specify part number with explanation of options selected.

6. Ensure that all submittals clearly indicate the equipment is UL or ETL listed.

7. For all equipment, provide manufacturer's installation instructions.

B. When a quality standard has been established by identification of a specific manufacturer or catalog number, submittals for proposed alternates and substitutions shall include:

1. Alternate and substitute equipment cross-referenced to the equipment it is replacing. Submittal shall be marked to show how differences will be accommodated.

2. Calculations and other detail data to allow determination of alternate and substitute equipment equivalency to the equipment it is replacing. Data supplied shall allow detailed comparison of all significant characteristics upon which the design equipment is based.

3. Dimensioned drawings, of the same or larger scale as the Contract Drawings, for all alternate and substitute equipment, which differs in size, configuration, service accessibility or in any significant way from the equipment it is replacing.

   a) Complete system layout, except that portion which is identical to the Contract Drawings.

b) Redesign and modifications to all work required by the alternate or substitute equipment.

C. Operation and Maintenance Manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall unload and handle materials using methods, rigging, and equipment that will prevent damage to the materials. Care shall be used to prevent damage to painted and galvanized surfaces.

1. Bare wire rope slings shall not be used for unloading and handling materials and equipment, except with the specific written permission of the Engineer.

B. Equipment and materials, in accordance with the manufacturer's recommendations, shall be stored, supported and protected to prevent damage.

1. Stored materials and equipment shall not be allowed to contact the ground.

2. Equipment and materials which incorporate electrical equipment or which have finished painted surfaces, and other items which would be damaged by outdoor exposure, shall be stored indoors.

a) Provide covering and shielding for all equipment to protect from damage.

b) When such storage would present an unreasonable building space or volume requirement, the equipment or materials may, when acceptable to the Engineer, be stored under weatherproof coverings on shoring or platforms.

3. All small loose items that could be easily lost, stolen, broken, or misused shall not be stored on open platforms or shoring.

4. All storage methods and schedules shall be acceptable to the Engineer.

C. Ensure that equipment is not used as steps, ladders, scaffolds, platforms, or for storage-either inside or on top of enclosures.

D. Protect nameplates on electrical equipment to prevent defacing.

E. Repair, restore or replace damaged, corroded and rejected items at no additional cost to the Owner.

F. Record Drawings

1. The Contractor shall maintain a marked up set of Document Drawings showing actual installed circuit numbers, conduit sizes, cable tray routing, number of conductors, conductor sizes (other than #12AWG) and all other deviations from the design drawings.

2. All underground conduit and concealed items shall be dimensioned on the Document Drawings from permanent, visible, building features. Depths to the top of ductbanks shall be recorded.

3. Provide actual motor size, starter size, and heater size, along with all other protective equipment for all motor circuits as part of the one-line record drawings.

4. Revise all wire/cable identification schedules to indicate as installed conditions.

5. Revise all panelboard schedules to indicate as installed conditions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Refer to related Division 16 sections. All equipment of a similar type shall be by one manufacturer unless otherwise noted in the Specifications.

2.2 MATERIALS

A. Trade names and catalog numbers may be used in the Contract Drawings or Specifications to establish quality standards and basics of design.

1. Other listed manufacturers in the applicable specification sections with equal equipment may be acceptable.

2. If no other manufacturer is listed then any manufacturer of equal equipment may be acceptable.

B. Listed: Where UL test procedures have been established for the product type, electrical equipment shall be approved by UL or ETL and shall be provided with the UL or ETL label.

2.3 FABRICATION

A. When equipment is shop fabricated for the Project, the electrical devices and enclosures utilized shall be UL or ETL listed and labeled or shall be UL recognized.

B. Shop or Factory Finishes: Interiors of other painted equipment shall be white.

PART 3 EXECUTION

3.1 INSTALLATION

A. Equipment shall be installed in accordance with the requirements of the NEC.

B. Enclosures for use with electrical equipment unless specifically shown or specified elsewhere in the Contract Documents:

1. NEMA 1/12

   a) Acceptable in unclassified indoor locations.

2. NEMA 3/3R

   a) Acceptable in damp or wet indoor/outdoor non-corrosive locations

3. NEMA 4X

   a) Use in wet indoor/outdoor corrosive locations.

   b) Enclosures shall be 304-Stainless-Steel minimum. Enclosures constructed of 316-Stainless Steel may be required in extremely corrosive areas as shown on the Contract Drawings

   c) Nonmetallic enclosures shall not be used in areas subject to physical damage or sunlight. Nonmetallic enclosures may be used in interior locations.

4. NEMA 6P

   a) Use in “Accidental Submergence” locations.

5. NEMA 7

   a) Use in all Class I, Division 1, 2, Group A, B, C, D locations.

   b) Unless other enclosures are approved and UL listed for the application.

6. NEMA 9

   a) Use in all Class II, Division 1, 2, Group E, F, G and Class III, Division 1, 2 locations.

   b) Unless other enclosures are approved and UL listed for the application.

7. Exceptions

   a) As modified in other Division 16 sections.

   b) As otherwise indicated on the Contract Drawings.

C. Coordinate the installation of electrical equipment with other trades.

1. Arrange for the building in of equipment during structure construction.

2. Where equipment cannot be built-in during construction, arrange for sleeves, box-outs, openings, etc., as required to allow installation of equipment after structure construction is complete.

D. Verify that equipment will fit support layouts indicated.

E. Equipment Dimensions and Clearances

1. Equipment shall fit in the locations shown on the Contract Drawings.

2. Do not use equipment or arrangements of equipment that reduce required clearances or exceed the space allocation.

F. Install equipment in accordance with the manufacturer's instructions.

G. Equipment Access

1. Install equipment so it is readily accessible for operation and maintenance.

2. Equipment shall not be blocked or concealed.

3. Do not install electrical equipment such that it interferes with normal maintenance requirements of other equipment.

H. Equipment shall be installed plumbed, square and true with the building construction and shall be securely fastened.

I. Outdoor wall-mounted equipment and indoor equipment mounted on earth or water bearing walls shall be provided with corrosion-resistant spacers to maintain 1/4 IN separation between the equipment and the wall.

J. Screen or seal all openings into outdoor equipment to prevent the entrance of rodents and insects.

K. Equipment fabricated from aluminum shall not be placed in direct contact with earth or concrete.

L. Provide all necessary anchoring devices and supports.

1. Use supports as detailed on the Drawings and as specified. Where not detailed on the Drawings or specified, use supports and anchoring devices rated for the equipment load and as recommended by the manufacturer.

2. Supports and anchoring devices shall be rated and sized based on dimensions and weights verified from approved equipment submittals.

3. Hardware shall be malleable type, corrosion resistant and shall be supported by heavily plated machine screws or brass, bronze or stainless steel bolts.

4. Do not cut, weld to, or modify building structural members without written approval by the Engineer of record.

5. Do not mount safety switches and external equipment to other equipment enclosures, unless enclosure-mounting surface is properly braced to accept mounting of external equipment.

M. Contractor shall verify exact rough-in location and dimensions for connection to electrical items to be installed under this Contract.

1. Shop drawings shall be secured from those furnishing the equipment.

2. Proceeding without proper information may require the Contractor to remove and replace work that does not meet the conditions imposed by the equipment supplied.

3. Provide sleeves wherever openings are required through new concrete or masonry members. Place sleeves accurately and coordinate locations with the Engineer.

4. Should any cutting and patching be required on account of failure of the Contractor to coordinate penetrations, such cutting and patching shall be done at the expense of the Contractor.

a) Contractor shall not endanger the stability of any structural member by cutting, digging, chasing, or drilling and shall not, at any time, cut or alter the work without the Engineer's written consent.

1) Provide additional reinforcing if required.

2) Cutting shall be done neatly using proper tools and methods.

b) Subsequent patching to restore walls, ceilings, or floors to their original condition shall be done by workmen skilled in their particular field.

N. Provide concrete foundations or pads required for electrical equipment as indicated or specified.

1. Floor-mounted equipment shall be mounted on a 4IN high concrete housekeeping pad. Pad shall be poured on top of the finished floor or slab.

O. Material that may cause rusting or streaking on a building surface shall not be used.

P. Perform excavation and backfill in accordance with Section 02200 - Earthwork.

Q. Contractor shall coordinate the installation of the conduit and wire associated with the HVAC equipment supplied under this Contract.

R. Enclosed electronic equipment located outdoors shall be provided with sun/rain shields and oriented to minimize sun exposure.

S. Device Mounting

1. Dimensions are to top of item unless otherwise indicated.

2. Mounting heights as indicated below unless otherwise indicated on the Contract Drawings

a) Light switch: 48IN.

b) Receptacle in offices and other finished areas: 16IN.

c) Receptacle in all other locations: 48IN.

d) Telephone outlet for desk-mounted phone: 16IN.

e) Telephone outlet for wall-mounted phone: 64IN.

f) Bracket light above lavatory: 80IN to bottom of fixture.

g) Disconnect / Safety-Switch: 64IN to top of enclosure.

h) Panelboard: 72IN to top of enclosure.
i) Motor starter: 64IN to top of enclosure.

j) Pushbutton motor control station: 48IN to top of enclosure.

3.2 IDENTIFICATION

A. Identify all major items of equipment including controls, panels, switches, contactors, motor starters/controllers, junction boxes and metering by permanent nameplates, with wording approved by the Engineer. Secure nameplates to equipment with stainless-steel screws or rivets. Adhesives may be used in conjunction with mechanical fasteners.

B. Nameplates after installation shall be easily visible and shall bear notations corresponding to those shown on the Record Drawings.

C. All conduits shall be identified with a stamped stainless-steel tag system. Conduit tags shall be permanently attached to each exposed end of conduit runs such as in manholes, pull boxes, panels, motor control centers, junction boxes, etc., and at each point of entry into a structure or building. Each tag shall be stamped with the appropriate conduit number per the conduit and cable schedules.

D. Each instrument shall be identified with a stamped stainless-steel tag system. Instrument tags shall be permanently attached to each individual instrument and stamped with the appropriate tag number per the instrument specification section.

E. Each cable shall be identified with a heat-shrinkable polyolefin label printing system. Instrumentation cables shall be labeled with the appropriate instrument tag (Example: FIT-200-1). Multiplex cables, power and control cables shall be labeled with the appropriate cable tag number per the equipment tag number (Example: PP1-CKT-9).

F. All motor control centers, power panels, lighting panels, control panels, control cabinets, etc., shall be identified with permanently mounted nameplates.

G. All power and lighting panels shall have matte-finish plastic laminated typed schedules mounted on panel doors.

H. Identification Types

1. Equipment Nameplates

a) Phenolic Resin or Thermoplastic Elastomer

1) Thickness: 3/32IN minimum.
2) Size: As required by text.
3) Letters: White letters on Black background.
4) Mount with stainless-steel screws.

2. Wire and Cable Labels

a) Heat shrinkable Polyolefin
1) Size: As required by wire or cable.
2) Letters: Black letters on White background.
3) Heat-shrink after termination.
4) Replace damaged or illegible labels.

3. Raceway Tags

a) Material: Stainless-Steel
b) Size: As required by text.
c) Attach with stainless-steel wire and permanent crimp sleeve

4. Instrument Tags

a) Material: Stainless-Steel
b) Size: As required by text.
c) Attach with stainless-steel wire and permanent crimp sleeve

5. UNDERGROUND WARNING TAPE

a. Manufacturers: Brady Company, Seton or as approved.

b. Description: 2-inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

3.3 FIELD QUALITY CONTROL

A. Do not remove or damage fireproofing materials.

1. Install hangers, inserts, supports, and anchors prior to installation of fireproofing.

2. Repair or replace fireproofing removed or damaged.

B. Make all penetrations through roofs prior to installation of roofing.

C. All penetrations required after installation of roofing, shall be completed by an authorized roofer to maintain the roof warranty.

D. Make all penetrations of electrical work through walls water and weather-tight.

E. Equipment furnished under this Contract for use on future work and all concealed equipment, including conduits, shall be dimensioned, on the Record Drawings, from visible and permanent building features.

F. After installation, all equipment shall be tested as recommended by the manufacturer.

G. Verify all components are operational.

H. Perform ground-fault performance testing as required by NEC Article 230-95(c).

I. Test Equipment Interface

1. Verify systems coordination and operation.

J. Set all adjustable trip protective devices as required for system protection and coordination.

K. Verify all system and equipment ground continuity.

L. Adjust installed equipment for proper operation of all electrical and mechanical components.

M. Replace equipment and systems found inoperative or defective and re-test.

1. If equipment or system fails re-test, replace it with products that conform to Contract Documents.

2. Continue remedial measures and re-tests until satisfactory results are obtained.

3. Remedial measures and re-tests will be done at no cost to the Owner.

N. The Engineer shall be notified of tests and Engineer may witness individual tests.

O. Required certificates of testing and test reports shall be presented to the Engineer upon completion of the tests.

P. At Completion of Installation

1. Test to ensure all equipment is free of short circuits and improper grounds.

2. Test to ensure all equipment is operational.

3.4 CLEANING

A. Clean dirt and debris from all interior and exterior surfaces.

B. Apply touch-up paint as required to repair scratches, etc.

C. Replace nameplates or wire and cable markers damaged during installation.

D. Thoroughly vacuum the interior of all enclosures to remove dirt and debris. Do NOT use pressurized air systems to blow out dirt and debris.

3.5 DEMONSTRATION

A. Demonstrate equipment in accordance with Contract Requirements.

END OF SECTION

SECTION 16050 – MATERIALS AND METHODS

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 16010 – Electrical, Basic Requirements and the sections referenced therein shall be applied.

B. Specification Section 03300 – Cast-in-Place Concrete

C. Specification Section 09900 – Painting and Coatings

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. In accordance with the procedures and requirements set forth in the Contract requirements, the Contractor shall obtain from the equipment manufacturer and submit shop drawings. Each submittal shall be identified by the applicable Specification Section.

C. Shop drawings shall include but not be limited to:

1. Equipment specifications and product data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, installation, and foundation drawings with clearly marked dimensions.

1.3 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of products for electrical related work of sizes, types, ratings, and materials required, whose products have been in satisfactory use in similar service for not less than three (3) years.

1.4 PROJECT CONDITIONS

A. Protect property from any and all damage that might result from excavating and backfilling.

B. Protect persons from injury at excavations, by barricades, warnings and illumination.

C. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXCAVATING FOR ELECTRICAL WORK

A. General: Do not excavate for electrical work until the work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimized.

B. Excavate with vertical-sided excavations to greatest extent possible, except where otherwise indicated. Where necessary, provide sheeting and cross-bracing to sustain sides of excavations. Remove sheeting and cross-bracing during backfilling wherever such removal would not endanger the work or other property. Where not removed, cut sheeting off at sufficient distance below finished grade to not interfere with other work.

C. Depth for sub-base Support: Unless otherwise noted, provide installation of sub-base material(s). Excavate for installation of sub-base material in depth indicated or, if not otherwise indicated, 6IN below bottom of work to be supported.

D. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

E. Excavate trenches to the uniform dimensions required for the particular item(s) to be installed and provide sufficient working clearances. Dig trenches to approximate depth and hand grade bottom to accurate elevation as required.

F. Where rock is encountered, carry excavation 6IN below required elevation and backfill with a 6IN layer of sand prior to installation of conduit.

G. Where soil conditions at bottom of indicated excavation are unsatisfactory, excavate additional depth as directed to reach satisfactory soil-bearing condition. Backfill with sub-base material compacted as directed, to indicated excavation depth.

H. Unless otherwise noted in the Contract Drawings, store excavated material (temporarily) near excavation, in manner that will not interfere with or damage excavation or other work. Do not store under trees (within drip-line).

I. Retain excavated material that complies with requirements for backfill material.

J. Dispose of excess or unsatisfactory excavated material(s) as directed by the Contract requirements and site conditions.

K. Refer to the Contract requirements and site conditions for removal of large subsurface materials.

3.2 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

C. Maintain dry excavations for electrical work, by removing water. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water, by installing temporary sheeting and waterproofing. Provide adequate barriers that will protect other excavations and below-grade property from being damaged by water, sediment or erosion from or through electrical work excavations.

3.3 BASE PREPARATION

A. Install subbase material to receive electrical work, and compact by tamping to form a firm base for the work.

B. Provide finely-graded subbase material for equipment to be buried.

C. Tamp fill to uniform compacted density.

D. Where conduit crosses over areas which have been previously excavated to depths greater than required for conduit installation, provide suitable support that comply with details shown and Contract requirements.

3.4 BACKFILLING

A. Backfill with approved backfill materials.

B. Backfill with finely-graded subbase material to 6IN above equipment to be buried. Backfill materials shall be soil materials free of clay, rock or gravel larger than 3/4IN, debris, waste, frozen materials, vegetation and other deleterious matter.

C. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.

D. Backfill simultaneously on opposite sides of electrical work, and compact simultaneously; do not dislocate the work from installed positions.

E. Backfill excavations in 8IN high courses of backfill material, uniformly compacted to the following densities (% of maximum density, ASTM D 1557), using power-driven hand-operated compaction equipment.

F. When backfilling excavations for electrical work, backfill to elevations matching finished grades.

G. Backfill trenches with concrete where trench excavations pass within 18IN of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing.

H. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Engineer. Use care in backfilling to avoid damage or displacement of conduit systems.

3.5 INSTALLATION OF CONCRETE WORK

A. Refer to Specification Section 03300 – Cast-in-Place Concrete

B. Miscellaneous Concrete Work

1. Concrete Grouting: Grout openings and recesses as indicated on the Contract Drawings and around all electrical work and other work that penetrates or adjoins all concrete work. Provide formwork where required, and tamp, screed and trowel surfaces. Cure grout as specified for concrete work.

2. Refer to Specification Sections for grouting of equipment base plates on foundations (with high-strength, non-shrinking grout), and similar grouting requirements not defined herein.

C. Clean-Up: Upon completion of work, clean excess concrete and grout from adjacent areas and surfaces. Remove excess concrete and grout by proper methods of removal, using care not to scratch or otherwise damage finished surfaces.

3.6 SUPPORT AND FASTENERS

A. The Contractor shall furnish and install structural supports and fasteners for mounting and installing all electrical, lighting, alarm systems, instrumentation, communications and other equipment furnished under this Contract.

B. Where the weight of equipment exceeds 75LBS and is supported from walls, ceilings, columns and/or beams, such structural supports, methods, and locations shall be approved in writing by a professional engineer currently registered in the State of the projects location.

C. Concrete or Masonry Inserts

1. The Contractor shall be responsible for the furnishing and installation of all conduit sleeves, anchor bolts, masonry inserts, and similar devices required for installation of equipment furnished under this Contract.

2. The Contractor shall furnish leveling channels for all switchgear, switchboards, motor control centers, and similar equipment spanning 60IN, in any direction, along the floor. The leveling channels shall be provided for

installation into the equipment supporting pads. Coordination of the installation of these channels within the concrete pad is essential and required. Pad height shall be as required to maintain coverage of the reinforcement bars while not exceeding the maximum mounting heights requirements of the NEC.

D. Support Fastening and Locations

1. All equipment fastened to structural steel; columns, beams, and trusses shall be made by approved clamps or welded. No holes shall be drilled in structural steel.

2. Where supports or hangers are required for heavy electrical equipment units exceeding 75LBS, the structural engineer of record shall check the structural members. Where required, additional sections shall be provided for a safe installation.

3. All holes in hung ceilings for support rods, conduits, and other equipment shall be made adjacent to ceiling supports where possible, to facilitate removal of ceiling panels.

4. For interior dry areas, a bracket and channel type support of galvanized steel construction shall be provided wherever required for the support of starters, switches, panels, and miscellaneous equipment.

5. For outdoor service or in indoor damp/wet process areas, the support system shall be made of either stainless steel, PVC coated rigid galvanized steel, aluminum or as indicated on the Contract Drawings.

6. All fastening hardware (bolts, nuts, washers, etc.) shall be approved stainless steel materials or as indicated on the Contract Drawings.

7. All supports shall be rigidly bolted together and braced to make a substantial supporting framework. Where possible, control equipment shall be grouped together and mounted on a single framework. Wherever this occurs, a provision shall be made for ready access to the wiring for connections to the equipment by means of boxes with screw covers.

8. Aluminum support members shall not be installed in direct contact with concrete. Stainless steel or non-metallic "spacers" shall be used to prevent contact of aluminum with concrete.

9. The Contractor is responsible for the design of supporting structures and shall submit design details to the Engineer for acceptance before proceeding with the fabrication and installation.

10. Wherever dissimilar metals come into contact, the Contractor shall isolate these metals as required with nylon washers, 9MIL polyethylene tape, or gaskets.

END OF SECTION

SECTION 16111 – CONDUIT AND RACEWAY

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, tools and equipment necessary for furnishing, installing, connecting, testing and placing into service all raceway to include all conduits, conduit fittings, wireway, supports, etc. as required for a complete electric installation as specified herein and indicated on the Contract Drawings.

1. Conduit home runs for lighting, receptacle and other misc. circuits are not necessarily indicated on the Contract Drawings; however, the circuit numbers are shown. Conduit shall be furnished and installed for these circuits.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. In addition to the requirements specified in this section, the requirements of specification Section 16010 – Electrical Basic Requirements, and the sections referenced therein shall be applied.

1. Additional raceway from what is shown on the Contract Drawings may be required. Coordinate with the requirements of equipment provided under other Divisions of the specifications.

1.3 CODES AND STANDARDS

A. Raceway shall comply with the following applicable codes and standards as well as any others within the specifications and drawings. In the event of any conflict between these codes, regulations, standards, and Contract Documents, the most restrictive shall apply.

1. American National Standards Institute (ANSI)

a) C80.4 Fittings for Rigid Metal Conduit and Electrical Metallic Tubing.

b) C80.5 Electrical Rigid Aluminum Conduit.

2. American Society for Testing and Materials (ASTM):

a) A36, Standard Specification for Structural Steel.

b) A153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

c) A307,Carbon Steel Externally Threaded Standard Fasteners.

d) A563, Standard Specification for Carbon Steel Nuts.

e) A569, Steel Carbon, Hot-Rolled Sheet and Strip, Commercial Quality.

f) A570, Hot-Rolled Sheet and Strip, Structural Quality.

g) A575, Merchant Quality Hot-Rolled Carbon Steel Bars.

h) A635, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled.

i) D1784, Standard Specification for Rigid Poly (Vinyl Chloride)(PVC)Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

j) D1788, Standard Specification for Rigid Acrylonitrile-Butadiene-Styrene(ABS) Plastics.

k) D2564, Solvent Cements for (PVC) Plastic Pipe, Tubing, and Fittings.

l) F512, Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation.

3. ETL Testing Laboratories, Inc (ETL).

4. National Electric 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-6, PVC and ABS Plastic Utilities Duct for Underground Installation.

5. National Electric Contractors Association

   a) NECA 1: Standard Practices for Good Workmanship in Electrical Construction

6. National Fire Protection Association (NFPA)

   a) 70, National Electric Code (NEC)

   b) 79, Electrical Standard for Industrial Machinery

7. Underwriters Laboratories Inc (UL)

   a) 1, Flexible Metal Conduit

   b) 6A, Electrical Rigid Metal Conduit – Aluminum

   c) 209, Cellular Metal Floor Raceways and Fittings

   d) 360, Liquid-Tight Flexible Steel Conduit

   e) 467, Grounding and Bonding Equipment

   f) 514, Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

   g) 514B, Conduit, Tubing and Cable Fittings

   h) 651, Schedule 40 and 80 Rigid PVC Conduit

   i) 870, Wireways, Auxiliary Gutters, and Associated Fittings

   j) 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations

   k) 1242, Intermediate Metal Conduit

   l) 1660, Liquid-Tight Flexible Non-Metallic Conduit

1.4 SUBMITTALS

A. Shop Drawings - All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

   1. Proposed routing of all site conduits including direct buried, concrete encased, and long run above ground conduits.

   2. Proposed routing of conduits buried under floor slabs.

   3. Proposed routing and details of construction, including conduit and rebar, of conduits embedded in floor slabs, columns, etc.

   4. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. The material covered by this Specification is intended to be standard material of proven performance as manufactured by reputable firms. Raceways and

appurtenances shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. All equipment shall be UL listed and labeled for its intended service.

C. Subject to compliance with the Contract Documents, the listed manufacturers are acceptable.

2.2 RIGID ALUMINUM CONDUIT (RAC)

A. Acceptable Manufacturers

1. Allied Tube and Conduit Corporation

2. Western Tube and Conduit Corporation

3. Wheatland Tube Company

B. RAC and associated fittings shall be manufactured from 6063 aluminum alloy in temper designation T-1.

C. RAC shall be installed for all above ground conduit installations indoor or outdoor unless otherwise noted on the contract drawings.

D. Standards

1. ANSI C80.5

2.3 PVC-COATED RIGID GALVANIZED STEEL CONDUIT (PVC-RGS)

A. Acceptable Manufacturers

1. Thomas & Betts

2. Perma-Cote

3. Rob-Roy Ind.

B. PVC-RGS shall have a minimum 40MIL polyvinyl chloride exterior coating. The coating shall be bonded to hot-dipped galvanized rigid steel conduit conforming to ANSI C80.1. The bond between the polyvinyl chloride coating and the conduit surface shall be greater than the tensile strength of the coating. PVC-RGS shall have a nominal 2MIL, minimum, urethane interior coating and a urethane coating on threads. The PVC-RGS conduit shall have an epoxy prime coating prior to application of polyvinyl chloride and urethane coatings.

C. Female ends shall have a plastic sleeve extending a minimum of 1 pipe diameter or 2 inch, whichever is less beyond the opening. The inside diameter of the sleeve

shall be the same as the outside diameter of the conduit to be used with it.

D. Standards

1. ANSI C80.1

2. NEMA RN-1

2.4 RIGID POLYVINYL CHLORIDE CONDUIT (PVC)

A. Acceptable Manufacturers

1. Allied Tube and Conduit Corporation

2. Carlon

3. Cantex

B. PVC shall be either Schedule 40 or Schedule-80. The polyvinyl-chloride plastic compound shall meet, as a minimum, ASTM D1784 cell classification PVC 12233-A, B, or C. PVC shall be rated for direct sunlight exposure, 90°C wire, and fire retardant with low smoke emission.

C. Schedule 40 PVC conduit shall be installed in concrete encased underground conduit installations. Schedule 80 PVC conduit shall be installed in direct buried installations.

D. Standards

1. ANSI C33.91

2. NEMA TC-2

3. UL 651

2.5 LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Acceptable Manufacturers

1. Anamet, Inc.

2. Electri-Flex Company

3. International Metal Hose Company

B. LFMC shall have a core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked, contain an interwoven copper strip suitable as a grounding means, and have an extruded vapor and liquid tight polyvinyl chloride outer jacket positively locked to the steel core.

C. Standard

1. UL 360

2.6 WIREWAY

A. Acceptable Manufacturers

1. E.M. Wiegmann and Company, Inc.

2. Hoffman Engineering Company

3. Stahlin

4. Square D

B. Wireway shall have a minimum wall thickness of 0.040 inch, be furnished without knockouts, be designed for continuous grounding, and suitable for lay-in conductors. Provide Solid and non-removable covers when passing through partitions and solid hinged covers with captive screw fasteners when accessible.

C. Wireway shall not be smaller than 4-inch x 4-inch unless otherwise indicated on the Contract Drawings.

D. Types

1. NEMA-1: Wireway shall be steel, finished with rust inhibiting phosphatizing coating and gray baked enamel finish on interior and exterior surfaces.

2. NEMA-3/3R/12: Wireway shall be steel, finished with rust inhibiting phosphatizing coating and gray baked enamel finish on interior and exterior surfaces. Cover shall be fully gasketed and provided with captive clamp type latches.

3. NEMA- 4/4X: Wireway shall be type 304 stainless steel for interior or exterior corrosive areas. Cover shall be fully gasketed and provided with captive external screw type clamps.

4. NEMA- 4/4X: Fiberglass or PVC may be utilized for interior corrosive areas only where specifically shown on the Contract Drawings.

E. Standards

1. NFPA 79

2. UL 870

2.7 CONDUIT FITTINGS AND ACCESSORIES

A. Acceptable Manufacturers

1. Appleton
2. Carlon
3. Crouse-Hinds
4. Killark
5. OZ Gedney Company
6. Perma-Cote
7. RACO
8. Rob-Roy Ind.
9. Steel City
10. Thomas and Betts
11. Western Plastics Company

B. Fittings for Use with RAC

1. Materials: Following minimum requirements unless otherwise noted.
   a) Body: Copper-free aluminum with aluminum lacquer or aluminum enamel finish.
   b) Covers: Copper-free aluminum and gasketed.
   c) Gaskets: Neoprene or PVC.
   d) Insulators-phenolic, thermosetting: minimum 105 Deg C UL rating.
   e) Grounding saddles tin-plated copper or bronze suitable for use with copper and aluminum conductors.
   f) Bonding jumpers: Tinned copper flexible braid.
   g) Locknuts: Malleable iron, zinc plated.
2. All fittings: Threaded unless otherwise noted.
3. Conduit Hubs shall be cast aluminum with insulated throat.

4. Straight couplings: Same material and finish as the conduit with which they are used.

5. Mogul pulling elbows and tees:

    a) Die cast copper free aluminum

    b) Rain tight

6. Conduit seals

    a) Drain and breather: Stainless steel or brass

    b) Fiber and sealing compound: UL listed for use with the sealing fitting

7. Standards

    a) UL 467

    b) UL 514B

C. Fittings for Use with PVC

1. Fittings shall be of the same material, thickness, and construction as the conduits with which they are used.

    a) Standards

        1) UL 651

        2) NEMA TC-2-1978

2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.

    a) Shall not be more than 1 year past date of manufacture.

    b) Standard: ASTM D2564

D. Fittings for Use with LFMC

1. Fittings shall meet the following minimum requirements unless otherwise noted:

    a) Body: Malleable iron, zinc-plated

    b) Ferrule: Steel, zinc-plated

    c) Locknuts and compression nuts: Malleable iron, zinc-plated

d) Sealing ring: Neoprene

2. Fittings shall be compression type

3. Standard: UL 514

2.8 STRUT CHANNEL SUPPORT SYSTEMS

A. Acceptable manufacturers:

1. Allied Power-Strut Products

2. B-Line Systems

3. Rob-Roy Industries

4. Thomas & Betts

5. Unistrut Building Systems

B. All strut-channel, clamps, fittings and fastener materials shall conform to the following unless otherwise noted on the Contract Drawings.

1. Indoor Wet/Dry Areas:

a) Aluminum 6063-T6

2. Indoor Corrosive Areas:

a) Fiberglass (ASTM D-4385)

b) Stainless Steel Type-316 (ASTM A240)

c) PVC Coated Hot-Dipped Galvanized Steel (ASTM D1151, D2247)

3. Outdoor Wet Areas:

a) Stainless Steel Type-304 (ASTM A240)

b) Aluminum 6063-T6

4. Outdoor Corrosive Areas:

a) Stainless Steel Type-316 (ASTM A240)

b) PVC Coated Hot-Dipped Galvanized Steel (ASTM D1151, D2247)

C. Strut-channel shall not be bent, drilled, cut or otherwise modified to produce fittings, braces or brackets for conduit and equipment supports.

D. Manufactured strut-channel braces, brackets, fittings and post-bases shall be provided and installed with associated hardware and fasteners as a complete system for conduit and equipment supports.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. All conduit, raceway, wireway and associated fittings shall be stored in accordance with the manufacturer recommendations and shall not be stored exposed to sunlight or other UV rays.

3.2 INSTALLATION

A. The Contractor shall plan the layout of conduit and raceway systems so that when the work is complete it will exhibit good workmanship practices in accordance with NECA-1.

B. Routing of Conduits and Raceways

1. Conduit and Raceway runs, where shown, indicate the preferred location. Site conditions may affect actual routing. Contractor shall coordinate routing and measurement with other trades and with equipment suppliers.

2. Shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.

3. Wherever possible avoid routing conduits and raceways through areas of high ambient temperature or radiant heat.

C. Size of Conduits and Raceways

1. The size of conduits and raceways are normally shown on the Contract Drawings. If a size is not shown on the Contract Drawings, or if a minimum size is not stated in the Specifications, then the size of conduits and raceways shall be in accordance with the NEC.

2. Conduits shall not be smaller than 1 inch for underground installations and 3/4 inch elsewhere, unless otherwise shown on the Contract Drawings.

D. Types of Conduits and Raceways

1. Shall be installed as defined in the Contract Drawings.

2. As required by NFPA.

3. Flexible Conduit

a) Install as the final conduit to motors, electrically operated valves, primary elements (instrumentation), and electrical equipment that is liable to vibrate.

b) Shall not be used as a conduit run:

c) Maximum length shall not exceed:

(1) 36 inch to motors.

(2) 24 inch to all other equipment.

4. PVC-RGS

a) Contractor shall use tools, clamps, dies, equipment, etc. designed specifically for the cutting, bending and threading of PVC-RGS.

b) Contractor shall follow the recommendations and methods of the manufacturer for installing PVC-RGS.

E. Provide openings in walls, floors, and ceilings for all required raceway penetrations.

1. Sleeves and block outs: Set in masonry walls during erection.

2. Sleeves and block outs: Set in concrete during forming.

a) Material: Not harmful to the concrete.

b) Not considered to replace structurally the displaced concrete.

F. Conduit Runs

1. All conduits within a structure shall be installed concealed unless otherwise noted on the Contract Drawings.

2. Total of Bends in a Conduit Run

a) Less than 270 degrees.

b) Provide pull boxes, conduits, or pulling elbows or tees as needed.

3. Run in straight lines parallel to or at right angles to structural members or building lines.

4. Maintain minimum 2-inch separation between all conduits.

5. Maintain minimum 6-inch separation between instrumentation and power conduits.

6. Maintain minimum 12-inch separation from process, gas, air and water pipes.

7. Conduits and accessories embedded in concrete:

   a) Shall not be larger in outside diameter than one-third the thickness of the slab, column or beam.

   b) Place conduit and accessories after reinforcing steel has been laid.

   c) Shall not displace the reinforcement steel.

   d) Provide a minimum of 1-1/2 inches of concrete cover around conduit.

   e) Do not run against reinforcing steel.

   f) Provide 2 inch minimum of spacing between conduits.

   g) Install expansion/deflection fittings wherever conduit spans structural or expansion joint.

G. Field Bending of Conduits

1. Utilize tools, equipment, methods and recommendations by the manufacturer to make all field bends.

2. The internal diameter of conduit shall not be reduced or distorted.

H. Field Cutting and Threading Conduits

1. Utilize tools, equipment, methods and recommendations by the manufacturer to field cut and thread conduit.

2. All field cut conduit shall be smooth and evenly chamfered on the inside.

3. All field threaded conduit shall be clean and degreased before applying a zinc rich paint.

I. Terminating Conduits

1. NEMA 1 enclosures

   a) Top: Locknuts and insulated bushings.

   b) Side: Locknuts and insulated bushings.

   c) Bottom: Locknuts and insulated bushings.

2. NEMA 2/12/12K enclosures

a) Top: Sealing locknuts and insulated bushings.

b) Side: Locknuts and insulated bushings.

c) Bottom: Locknuts and insulated bushings.

3. NEMA 3/3R/3S/13 enclosures

a) Top: Threaded conduit hubs with insulated throats.

b) Side: Sealing locknuts and insulated bushings.

c) Bottom: Locknuts and insulated bushings.

4. NEMA 4/4X enclosures

a) Top: Threaded conduit hubs with insulated throats or approved cable gland fittings.

b) Side: Threaded conduit hubs with insulated throats or approved cable gland fittings.

c) Bottom: Threaded conduit hubs with insulated throats or approved cable gland fittings.

5. NEMA 5 enclosures

a) Top: Sealing locknuts with insulated throats.

b) Side: Sealing locknuts and insulated bushings.

c) Bottom: Locknuts and insulated bushings.

6. NEMA 6/6P enclosures

a) Top: Threaded conduit hubs with insulated throats or approved cable gland fittings.

b) Side: Threaded conduit hubs with insulated throats or approved cable gland fittings.

c) Bottom: Threaded conduit hubs with insulated throats or approved cable gland fittings.

7. NEMA 7/8/9 enclosures

a) Enclosures shall be provided with integral conduit hubs

J. Conduit Seal Installation

1. In each conduit entering or leaving a Class I area.

2. In each conduit in a Class I Division 1 area entering or leaving an enclosure containing switches, circuit breakers, fuses, relays, resistors or other apparatus which may produce arcs, sparks or high temperature.

3. In each conduit 2-inch or larger in a Class I Division 1 area entering or leaving an enclosure containing terminals, splices and taps.

4. In each conduit in a Class I Division 2 area entering or leaving an enclosure required to be approved for use in Class I environments.

5. In each conduit in a Class II location between an enclosure required to be dust ignition-proof and an enclosure that is not required to be dust ignition-proof.

6. In each conduit in a corrosive area entering or leaving that area and entering or leaving an electrical equipment enclosure in that area.

7. So that the filler plug and drain is accessible.

8. Complete with approved sealing fiber and compound.

K. Conduit Moisture Sealing

1. All conduits terminated into enclosures located outdoors or routed from interior to exterior locations shall have non-hardening conduit sealing putty packed into and around conductors within each conduit opening.

L. Conduit Coatings

1. The protective coating of metallic conduits, fittings, and accessories shall be maintained.

   a) Repair PVC-RGS utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit.

      (1) The total nominal thickness: 40 MIL.

   b) Repair surfaces that will be inaccessible after installation prior to installation.

2. All metallic raceways installed in direct contact with concrete, masonry or soils shall be:

   a) PVC-RGS

   b) Installed with 40 MIL minimum coating of cured coal-tar bitumastic paint.

3. All metallic raceway transitions through concrete, masonry or soils shall be:

   a) PVC-RGS

   b) Installed with heavy-wall heat-shrink polyolefin tubing extending 6-inch minimum on each side of transition.

   c) Installed with 40 MIL minimum coating of cured coal-tar bitumastic paint.

M. Power Cable Pulling Preparation

1. Remove water and debris from conduit prior to installation of power cables.

2. Pull mandrel with diameter nominally 1/4 inches smaller than the interior of the conduit, to ensure circular cross-section and removal of obstructions.

3. Swab conduit by pulling a clean, tight-fitting rag through the conduit.

4. Tightly plug ends of conduit with manufactured pipe plugs or plastic conduit inserts until power cables are pulled.

5. Only nylon or polyethylene rope shall be used to pull power cables in rigid non-metallic conduit systems.

END OF SECTION

SECTION 16115 – UNDERGROUND CONDUIT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes manholes; handholes; pull-boxes; and underground power, control, and instrumentation conduits and ductbanks.

B. In addition to the requirements specified in this section, the requirements of specification Section 16010 – Electrical, Basic Requirements and the sections referenced therein shall be applied.

1.2 QUALITY ASSURANCE

A. Referenced Standards

1. American Association of State Highway & Transportation Officials (AASHTO).

2. American Society for Testing Materials (ASTM):

a) A536, Standard Specification for Ductile Iron Castings.

3. National Fire Protection Association (NFPA):

a) NFPA 70, National Electrical Code (NEC), 2008 Edition.

B. Miscellaneous

1. Contract Drawings indicate the intended location of manholes, handholes and pull-boxes; and routing of ductbanks and direct buried conduit. Field conditions may affect actual routing.

1.3 DEFINITIONS

A. Direct-buried conduit means individual (single) underground conduits without concrete encasement.

B. Direct-buried ductbank means multiple underground conduits, in a common trench, without concrete encasement.

C. Concrete encased ductbank means any underground conduit or combination of underground conduits encased in a common concrete envelope.

1.4 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples and 16010 - Electrical Basic Requirements.

B. Fabrication and layout drawings

1. Provide cross-sectioned sketch of each ductbank.

a) Dimension spacing between conduits

b) Dimension concrete envelope and reinforcing, where applicable

2. Provide ductbank and direct-buried conduit profile.

a) Dimension from grade to ductbank and direct buried conduit

b) Dimension from ductbank and direct buried conduit to other utilities in the route

3. Certifications

4. Test reports

C. Operation and Maintenance Manuals

1. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 - Operating and Maintenance Data.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Precast manholes, handholes and pull-boxes

a) Carolina Precast Concrete, Inc.
b) Oldcastle Precast
c) Utility Vault Co.

2. Manhole and handhole covers

a) Neenah
b) Utility Vault Co.

3. Cable racks

a) Unistrut
b) B-Line
c) Condux International, Inc.
d) Underground Devices, Inc.

4. Cable pulling irons

a) Condux International, Inc.

5. Ground rods and grounding equipment

a) See Section 16450 - Grounding and Bonding

6. Ground wire

a) See Section 16450 - Grounding and Bonding

7. Duct terminators

a) Carlon
b) Condux International, Inc.

8. Conduit

a) See Section 16111 - Conduit and Raceway

9. Duct spacers

a) Underground Devices, Inc.
b) Condux International, Inc.

10. Warning Tape

a) W. H. Brady Company
b) Seton Nameplate Company

2.2 MATERIALS

A. Handholes and Pull-Boxes

1. Pre-Cast steel reinforced concrete

a) Boxes are required to meet ASTM C 858 with 4,000 PSI minimum compressive strength concrete and designed for AASHTO H-20 loading unless otherwise noted on the Contract Drawings.

b) Tongue-and-grove double sealed joints on mating edges of pre-cast components. The joints shall firmly interlock adjoining components and provide waterproof junctions and adequate shear transfer. Joints shall be sealed with approved watertight joint sealant as prescribed in the manufacturer's installation specifications and conforming to AASHTO M198, Type B. Sealing material shall be installed in strict accordance with manufacturer's printed instructions.

c) Knockout panels or pre-cast individual conduit openings may be used. Blockout panels are not acceptable.

d) Cover

(1) Heavy-duty type frames and covers made of cast iron, suitable for H-20 loading, and having machined bearing surfaces shall be used.

(2) The covers shall be of indented type with solid top design.

(3) The upper side of each cover shall have the letters “Electrical”, “Control”, or “Communication” cast in integral letters no less than 2-inches high as indicated on the Contract Drawings.

2. Cast-In-Place

a) Comply with Section 03300 - Cast-In-Place Concrete unless otherwise specified herein.

b) Constructed as detailed on the Contract Drawings.

c) Cover

(1) Heavy-duty type frames and covers made of cast iron, suitable for H-20 loading, and having machined bearing surfaces shall be used.

(2) The covers shall be of indented type with solid top design.

(3) The upper side of each cover shall have the letters “Electrical”, “Control”, or “Communication” cast in integral letters no less than 2-inches high as indicated on the Contract Drawings.

d) Shall have an AASHTO live load rating of H-20, unless otherwise noted in the Contract Drawings or Specifications.

B. Manholes

1. Pre-Cast Steel Reinforced Concrete

a) Boxes are required to meet ASTM C 858 with 4,000 PSI minimum compressive strength concrete and designed for AASHTO H-20 loading unless otherwise noted on the Contract Drawings.

b) Tongue-and-grove double sealed joints on mating edges of pre-cast components. The joints shall firmly interlock adjoining components and provide waterproof junctions and adequate shear transfer. Joints shall be sealed with approved watertight joint sealant as prescribed in the manufacturer’s installation specifications and conforming to AASHTO M198, Type B. Sealing material shall be installed in strict accordance with manufacturer’s printed instructions.

c) Knockout panels or pre-cast individual conduit openings may be used. Blockout panels are not acceptable.

d) Minimum interior dimensions shall be 4 feet wide x 4 feet long x 6 feet tall

e) Cover

(1) Minimum access opening dimensions

(a) Rectangular 26-inch x 22-inch

(b) Round 26-inch Diameter

(2) Heavy-duty type frames and covers made of cast iron, suitable for H-20 loading, and having machined bearing surfaces shall be used.

(3) The covers shall be of indented type with solid top design.

(4) The upper side of each cover shall have the letters "Electrical", "Control", or "Communication" cast in integral letters no less than 2-inch high as indicated on the Contract Drawings.

2. Cast-In-Place

a) Comply with Section 03300 - Cast-In-Place Concrete unless otherwise specified herein.

b) Constructed as detailed on the Contract Drawings.

c) Shall have an AASHTO live load rating of H-20, unless otherwise noted on the Drawings.

d) Minimum interior dimensions shall be 4-feet wide x 4-feet long x 6-feet tall.

e) Cover

(1) Minimum access opening dimensions

(a) Rectangular 26-inch x 22-inch

(b) Round 26-inch Diameter

(2) Heavy-duty type frames and covers made of cast iron, suitable for H-20 loading, and having machined bearing surfaces shall be used.

(3) The covers shall be of indented type with solid top design.

(4) The upper side of each cover shall have the letters “Electrical”, “Control”, or “Communication” cast in integral letters no less than 2-inches high as indicated on the Contract Drawings.

f) Cable Racks

(1) Hot-dipped galvanized hot-rolled steel; or Lexan.

(2) 120 Lbs. minimum loading capacity.

(3) Three-point locking to resist twisting.

g) Cable Pulling Irons

(1) Hot-dipped galvanized steel

(2) 6,000 Lbs. minimum pulling load

h) Ground Rods and Grounding Equipment

(1) See Section 16450 - Grounding and Bonding

i) Ground Wire

(1) See Section 16120 - Wire and Cable: 600 Volt and Below

j) Duct Terminators

(1) Window type

(2) ABS plastic

(3) Provide for conduit entrance

(4) Designed for installation into manhole, handhole or pull-box walls for a watertight seal.

(5) Sufficient space between terminator walls to allow for placement of rebar and concrete.

k) Conduit

(1) See Section 16111 - Conduit and Raceway

l) Duct Spacers

(1) High density polyethylene or high impact polystyrene.

(2) Interlocking

(3) Provide 2-inch minimum spacing between conduits.

m) Warning Tape

(1) Material: Polyethylene

(2) Thickness: 3.5 MIL

(3) Tensile strength: 1,750 PSI

(4) Size: 6-inches wide (minimum)

(5) Legend: Preprinted and permanently imbedded:

(a) Message continuously printed.

PART 3 EXECUTION

3.1 INSTALLATION

A. General

1. Install products in accordance with manufacturer's instructions.

2. Comply with Section 16050 - Materials and Methods for trenching, backfilling and compacting.

3. Buried conductor warning tape

a) See Section 16010 - Electrical Basic Requirements.

B. Manholes, Handholes and Pull-Boxes

1. Shape: Manholes, handholes and pull-boxes may be either square or rectangular.

2. Size

a) Manholes shall have minimum interior dimensions of 48-inch x 48-inch with a minimum interior height of 72-inches unless other dimensions are detailed on the Contract Drawings.

b) Handholds shall be sized for the number of conduits entering unless other dimensions are detailed on the Contract Drawings.

(1) Minimum interior dimensions shall be 24-inch x 17-inch with a minimum depth of 36-inches.

c) Pull-Boxes shall be sized for the number of conduits entering unless other dimensions are detailed on the Contract Drawings.

3. Precast or Cast-In-Place

    a) Optional unless otherwise noted in the Contract Drawings or Specifications.

4. Precast manholes, handholes and pull-boxes shall be installed in accordance with the manufacturer's instructions for "subject to occasional heavy vehicles."

5. For cast-in-place construction, comply with Section 03300-Cast-In-Place Concrete.

6. Provide minimum 12-inches of tamped crushed rock or gravel prior to setting manhole, handhole or pull box.

7. Construct manholes, handholes and pull-boxes approximately where shown on the Contract Drawings. Determine the exact locations after careful consideration has been given to location of other utilities, grading, and paving.

    a) Locations are to be approved by the Engineer prior to excavation and construction of manholes, handholes and pull-boxes.

8. Grout or seal all joints

    a) For precast construction, comply with the manufacturer's instructions.

    b) For cast-in-place construction, comply with Section 03300 - Cast-In-Place Concrete.

9. Set frames and covers

    a) For manholes, handholes and pull-boxes located in roadways, paint with two coats asphaltic paint before setting and set top of covers flush with finished surface of paving.

    b) For manholes, handholes and pull-boxes not located in roadways, set top of covers 2-inches above finished grade. Slope surrounding grade away from edge to insure water drains away from opening.

    c) Install sufficient number of concrete extensions between top of manhole, handhole or pull-box frame as required to elevate cover to existing grade level.

10. Support cables on walls by cable racks

    a) Equip cable racks with adjustable hooks

        (1) Quantity of hooks as required by the number of conductors

(2) Minimum of two (2) cable hooks per rack

b) Install a minimum of two (2) racks on each wall in each manhole, handhole and pull-box.

c) Space cable racks so that both ends of cable splices will be supported horizontally.

d) In manholes, install one (1) spare hook on each rack.

e) Install a cable-pulling iron in each wall opposite each ductbank entrance.

11. Grounding: In each manhole, drive copper ground rod into the earth and extend ground rod approximately 6-inches above finished floor.

a) In precast structures, drill openings in floor for ground rod.

b) Connect all metallic conduits, racks, and other metallic components to ground rod by means of #8AWG minimum tinned copper wire and approved grounding clamps**.**

12. Provide an 18-inch diameter sump in the bottom of each manhole and handhole.

13. After installation is complete, backfill and compact soil around manholes and handholes.

C. Underground Conduits

1. Concrete encased ductbank

a) Provide electrical duct system consisting of conduits completely encased in a minimum of 2-inches of concrete.

b) For circuits 600V and below, install so that top of concrete encased duct, at any point, is not less than the minimum depths established by the NEC (Table 300-5 and exceptions):

(1) RGS conduit: 24-inch

(2) PVC sch-40 conduit: 24-inch

(3) Under areas subject to vehicular traffic

(a) All applications: 24-inch

(4) Unless a greater depth is detailed on the Contract Drawings.

c) Under traffic areas (roadways, parking lots, etc.) and for a distance 10 feet either side of the traffic area, and elsewhere as defined on

the Contract Drawings or specified, the concrete shall be reinforced in accordance with Section 03300-Cast-In-Place Concrete.

2. Direct-buried ductbank

   a) Provide electrical duct system consisting of conduits directly buried in earth.

      (1) Lay conduits on minimum 2-inch sand base completely encased by 2-inch of selected backfill containing no stones or other hard material larger than 1/2-inch diameter.

   b) For circuits 600V and below, install so that the top selected backfill at any point, is not less than the minimum depths established by the NEC (Table 300-5 and exceptions).

      (1) RGS conduit: 24-inch

      (2) PVC sch-80 conduit: 24-inch

      (3) Under areas subject to vehicular traffic

         (a) All applications: 24-inch

      (4) Unless a greater depth is detailed on the Contract Drawings.

3. Direct-buried conduit

   a) Provide electrical duct system consisting of conduits directly buried in earth.

      (1) Lay conduit on minimum 2-inch sand base completely encased by 2-inches of selected backfill containing no stones or other hard material larger than 1/2-inch diameter.

   b) For circuits 600V and below, install so that top of the selective backfill, at any point, is not less than the minimum depths established by the NEC (Table 300-5 and exceptions).

      (1) RGS conduit: 24-inch

      (2) PVC sch-80 conduit: 24-inch

      (3) Under areas subject to vehicular traffic

         (a) All applications: 24-inch

      (4) Unless a greater depth is detailed on the Contract Drawings.

4. Underground conduits and ductbanks shall comply with the following:

a) Minimum grade shall be 4-inches per 100 feet or as detailed on the Contract Drawings.

(1) Low point shall be at one end of the conduit run.

b) During construction and after conduit installation is complete; plug the ends of all conduits.

c) Provide conduit supports and separators of concrete, plastic, or other suitable nonmetallic, non-decaying material designed for that purpose.

(1) Concrete encasement supports shall provide a uniform minimum clearance of 2 inches between the bottom of the trench and the bottom row of conduit.

(2) Separators shall provide a uniform minimum clearance of 2-inches between conduits.

(3) Place supports and separators for PVC conduit on maximum centers as indicated for the following trade sizes:

(a) 1 inches and less: 2 feet

(b) 1-1/4 to 3 inches: 4 feet

(c) 3-1/2 to 6 inches: 6 feet

(4) Place supports and separators for RGS conduit on maximum centers as indicated for the following trade sizes:

(a) 1-inch and less: 8 feet

(b) 1-1/4 to 2-1/2 inches: 10 feet

(c) 3-inches and larger: 12 feet

(5) Securely anchor conduits to supports and separators to prevent movement during placement of concrete or soil.

(6) Do not place concrete or soil until conduits have been observed by the Engineer.

d) Stagger conduit joints at intervals of 6-inches horizontally.

e) Make conduit joints watertight and in accordance with manufacturer's recommendations.

(1) Make plastic conduit joints by uniformly brushing a plastic solvent cement on inside of plastic coupling fitting and

outside of conduit ends. Slip conduit and fitting together with a quick one-quarter turn twist to set joint tightly.

(2) Accomplish changes in direction of runs exceeding a total of 5 degrees by long sweep bends having a minimum radius of 25-inches.

(3) Sweep bends shall be made up of one curved section.

f) Furnish manufactured bends at end of runs.

(1) Minimum radius of 18-inches for conduits less than 3-inch trade size and 36-inches for conduits 3-inch trade size and larger.

g) After the conduit run has been completed, pull a standard flexible mandrel having a length of not less than 12-inches and a diameter approximately 1/4-inch less than the inside diameter of the conduit through each conduit. Then pull a brush with stiff bristles through each conduit to remove any foreign material left in conduit.

h) Pneumatic rodding may be used to draw in pull-cords.

(1) Install a 1/8-inch polypropylene pull-cord free of kinks and splices in all unused new ducts.

(2) Extend pull-cord 3-feet beyond ends of conduit and fasten to prevent loss of pull-cord in conduits.

i) Transition from PVC to RGS conduit with a minimum of 3-feet prior to entering a structure or going above ground.

(1) Unless otherwise indicated on the Contract Drawings.

(2) PVC conduit may be extended directly to pull, junction and transformer boxes; manholes and handholes.

j) Where conduits enter transformer boxes; manholes and handholes:

(1) Terminate PVC conduits in end bells.

(2) Terminate RGS conduits in insulated bushings.

B. Warning Tape

1. Place warning tape in trench directly over ductbanks, direct-buried conduit, and direct-buried wire and cable.

a) 6-inches below finished grade where conduit or ductbank is 12-inches or more below finished grade.

b) 3-inches below finished grade where conduit or ductbank is less than 12-inches below finished grade.

2. Provide warning tape as follows:

a) Electrical trenches and ductbanks or directly buried conduit

(1) Legend: “CAUTION CAUTION CAUTION” (1st line), “BURIED ELECTRIC LINE” (2nd line).

(2) Letters: 1-1/4-inch minimum

(3) Interval: Continuous

(4) Color: Red and black letters.

b) Trenches and direct-buried or conduit encased telephone lines:

(1) Legend: “CAUTION CAUTION CAUTION” (1st line), “BURIED TELEPHONE LINE” (2nd line).

(2) Letters: 1-1/4-inch minimum

(3) Interval: Continuous

(4) Color: Orange with black letters

c) Trenches with direct-buried or conduit encased computer or SCADA system communications lines:

(1) Legend: “CAUTION CAUTION CAUTION” (1st line), “BURIED COMPUTER LINE” (2nd line).

(2) Letters: 1-1/4-inch minimum

(3) Interval: Continuous

(4) Color: Orange with black letters

3.2 MAINTENANCE

A. Provide the Owner with two (2) sets of manhole cover, underground pull-box cover or precast cable trench cover removal tools.

END OF SECTION

SECTION 16120 – WIRE AND CABLE: 600 VOLT AND BELOW

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish, install, connect, test, and place in satisfactory operating condition, ready for service, all cables and wires indicated on the Contract Drawings and as specified herein or required for proper operation of the installation, with the exception of internal wiring provided by electrical equipment manufacturers. The work of connecting cables to equipment, machinery, and devices shall be considered a part of this Section. All hardware, junction boxes, bolts, clamps, insulators, and fittings required for the installation of cable and wires system shall be furnished and installed by the Contractor

B. The Contractor shall submit Shop Drawings and other material required to substantiate conformance with the requirements set forth on the Contract Drawings and in Section 16010 – Electrical Basic Requirements, and Section 01340 - Shop Drawings, Project Data and Samples. Shop drawings shall include, but not be limited to, detailed specifications and product data sheets for the power, control, and instrumentation cable required for this project.

C. The wire and cable to be furnished and installed for this project shall be the product of manufacturers who have been in the business of manufacturing wire and cable for a minimum of ten (10) years.

D. Reference Section 16010 – Electrical Basic Requirements.

1.2 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples, the Contractor shall obtain from the wire and cable manufacturer and submit the following:

1. Shop Drawings

2. Reports of Certified Shop and Field Tests

3. Wiring Identification Methods.

Each submittal shall be identified by the applicable specification section.

1.3 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed material's compliance with the Contract Documents.

B. Partial, incomplete, or illegible Submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Material specifications and product data sheets identifying all materials used and methods of fabrication

2. Cable and wire identification methods and materials

1.4 IDENTIFICATION

A. Each cable or wire shall be identified as specified in Section 16010 – Electrical Basic Requirements.

PART 2 PRODUCTS

2.1 600V POWER WIRE AND CABLE

A. All 600V rated power wire and cable shall consist of stranded, copper conductor with insulation type XHHW-2, 90°C.

B. Circuits within the interior spaces of buildings may utilize 600V rated insulation, type XHHW-2, 90°C.

C. Conductors shall be stranded copper per ASTM-B8, B-33 and B-189, Class B or C stranding contingent on the size unless otherwise specified. Minimum size wire shall be #12AWG.

D. 600V rated individual or multi-conductor power wire and cable shall be manufactured by the Okonite Company, BICC Industrial Cable Company or approved equal.

2.2 600V CONTROL CABLE

A. All 600V rated control cable shall consist of stranded, copper conductor with insulation type XHHW-2, 90°C.

B. Control circuits within the interior spaces of buildings may utilize 600V rated insulation, type XHHW-2, 90°C.

C. The individual conductors of the multiple conductor cable shall be color coded for proper identification. Color coding shall be equal to ICEA S-68-514, Table K-1. Cables shall meet requirements of IEEE-383.

D. Conductors shall be stranded copper per ASTM B-8, B-33 and B-189, Class B or C stranding contingent on the size unless otherwise specified. Minimum wire size shall be #14AWG.

E. 600V rated individual or multi-conductor control wire shall be manufactured by the Okonite Company, BICC Industrial Cable Company or approved equal.

2.3 600V SHIELDED MOTOR POWER CABLE FOR VARIABLE FREQUENCY DRIVES

A. Where indicated on the Contract Drawings, the power connection between the variable frequency drive (VFD) and the associated motor shall utilize a shielded three-conductor plus ground conductor VFD output cable.

B. Shielded motor power cables with #2AWG and smaller conductors shall have an overall polyvinyl chloride jacket, utilize XLPE conductor insulation with 100 percent rated ground conductor, overall foil shield, 85% TC braid and drain wire.

C. Shielded motor power cables with #1AWG and larger conductors shall have an overall polyvinyl chloride jacket, utilize XLPE conductor insulation with three-symmetrical BC grounds, two spiral copper tape shields.

D. Shielded Motor cable shall meet the following requirements:

1. Utilize high-strand tined copper conductors

2. Lower capacitance suitable for longer runs

3. Sunlight and oil resistant

4. Suitable for Class I and II; Division 2 hazardous locations

5. Rated for 90°C temperature for wet or dry locations

6. Pass UL 1685 vertical tray flame test

E. All VFD cables shall be terminated with approved VFD cable connectors and/or termination kits.

F. 600V rated shielded motor power cable shall be:

1. Belden: 29500 Series Cable

2. General Cable: CVTC VFD Cable

3. Service Wire Company: ServiceDrive ASD/VFD Cable

4. Southwire Armor-X VFD Cable

5. Approved equal

2.4 600V POWER CABLE, MULTICONDUCTOR ALUMINUM INTERLOCKED ARMOR.

A. Aluminum interlocked armor cable shall consist of XHHW insulated compressed or compact stranded copper conductors, non-hygroscopic fillers, interlocked aluminum armor, and outer PVC jacket.Multiconductor interlocked power cable shall be rated for 90 deg. C for wet or dry locations. Power cable shall be listed for cable tray installation

B. Multiconductor Aluminum Interlocked 600V power cable shall be OKONITE type MC (XHHW-2), or equal

2.5 LIGHTING AND RECEPTACLE WIRE AND CABLE

A. All exterior lighting and receptacle branch circuit wire and cable shall consist of stranded, copper conductors with 600v rated insulation, type XHHW-2, 90°C.

B. Interior lighting and receptacle branch circuit wire and cable may utilize stranded, copper conductors with 600v rated insulation, type XHHW-2 90°C.

C. Conductors shall be stranded copper per ASTM-B8, B-33 and B-189, Class B or C stranding contingent on the size unless otherwise specified. Minimum size wire shall be #12AWG.

D. Lighting and receptacle cables and wire shall be manufactured by the General Cable Company, Southwire Cable Company or approved equal.

2.6 INSTRUMENTATION SIGNAL CABLE (STP)

A. The instrumentation cable for analog signals shall be individually shielded twisted pair cable (STP) or individually shielded twisted multi-pair cable (M#STP, where # = number of pairs). Conductors shall be tin or alloy coated, soft, annealed copper, #16AWG minimum with a minimum of 19 strands with 600V rated insulation for 75°C. Pairs shall have 100% coverage foil shields with a #18AWG tinned copper drain wire. Outer jackets shall be chromed polyvinyl chloride.

B. The instrumentation cable shall be Belden, Okonite or approved equal for single and multiple pair applications or approved equal.

C. Instrumentation cables shown on the Contract Drawings to be direct buried shall be UL labeled for direct buried service.

2.7 TELEPHONE/DATA CABLE (CAT-6)

A. All interior telephone/data cables shall be ANSI/TIA/EIA 568 (Category 6e), #24AWG copper, plenum rated and ETL Type-CMP.

PART 3 EXECUTION

3.1 600V CABLE INSTALLATION

A. The cable and wires shall be installed as specified herein and shown on the Contract Drawings.

B. The cables shall be terminated in accordance with the cable and/or termination product manufacturer's instructions for the particular type of cable.

C. To minimize oxidation and corrosion, wire and cable shall be terminated using an oxide-inhibiting joint compound recommended for "copper-to-copper" connections.

The compound shall be Penetrox E as manufactured by Burndy Electrical, or approved equal.

D. Splices are normally not permitted in the underground duct, manhole and handhole systems. If splices are required, the Contractor shall obtain approval in writing from the Engineer prior to splicing.

1. Splicing material shall be a two-part insulating and encapsulating resin.

B. Cable and Wire Sizes

1. The sizes of cable and wire shall be as shown on the Contract Drawings, or if not shown, as approved by the Engineer. If required due to field routing, the size of conductors and respective conduit shall be shall be coordinated with and approved by the Engineer.

2. Minimum wire size within control panels, motor control centers, switchboards and similar equipment shall be #12AWG for power and #14AWG for control.

C. Number of Wires

1. The number of wires indicated on the Contract Drawings for the various control, indication, and metering circuits were determined for general schemes of control and for particular indication and metering systems.

2. The actual number of wires installed for each circuit shall, in no case, be less than the number required; however, the Contractor shall add as many wires as may be required for control and indication of the actual equipment selected for installation at no additional cost to the Owner. The addition of conductors shall be coordinated with and approved by the Engineer.

D. Wiring Identification

1. Wiring Identification shall meet the requirements of Section 16010 – Electrical Basic Requirements.

E. Cable Installation

1. All interior cable not protected by a compartment enclosure shall be run in conduit.

F. Training of Cable

1. The Contractor shall furnish all labor and material required to train cables around cable vaults within buildings and in manholes in the outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole

cables shall be arc and fire-proofed. The training shall be done in such a manner as to minimize chaffing.

G. Connections at Control Panels, Limit Switches, and Similar Devices

1. Where stranded wires are terminated at panels, and/or devices, connections shall be made by solderless lug, crimp type ferrule or solder dipped.

2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make 7-strand, #12AWG, wire terminations impractical, the Contractor shall terminate external circuits in an adjacent junction box of proper size and shall install #14AWG stranded wires from the device to the junction box in a conduit. The #12 AWG field wiring shall also be terminated in the same junction box to complete the circuit.

H. Pulling Temperature

1. Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40°F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage area with an ambient temperature not lower than 55°F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

I. Color Coding

1. Unless otherwise noted on the Contract Drawings, conductor insulation shall be color coded as follows:

a) 480V AC Power

(1) Phase A - BROWN

(2) Phase B - ORANGE

(3) Phase C - YELLOW

(4) Neutral – WHITE

b) 120/208V or 120/240V AC Power

(1) Phase A - BLACK

(2) Phase B - RED

(3) Phase C - BLUE

(4) Neutral – WHITE

c) 120VAC Control

(1) Ungrounded conductors – RED

(2) Ungrounded conductors, foreign source - YELLOW.

d) 24VAC Control

(1) All wiring – ORANGE

e) 24VDC Power

(1) Positive Lead – RED

(2) Negative Lead – BLACK

f) 24VDC Control

(1) Ungrounded conductors – BLUE

(2) Grounded conductors – BLUE w/WHITE stripe

g) Equipment Grounding Conductor:

(1) All wiring – GREEN

2. Conductors #4AWG and smaller shall be factory color coded with a separate color for each phase and neutral, which shall be used consistently throughout the system. Larger cables shall be coded by the use of colored tape.

3.2 INSTRUMENTATION / TELEPHONE / DATA CABLE INSTALLATION

A. Grounding of cable shield shall be accomplished at one end point only.

B. Raceways exceeding 5 feet and containing instrumentation / telephone / data cable shall be installed to provide the following clearances:

1. Raceway installed parallel to raceway conductors energized at 480 through 208V shall be 18 inch and 208/120V shall be 12 inch.

2. Raceway installed at right angles to conductors energized at 480V or 120/208V shall be 6 inch.

C. Where practical, raceways containing instrumentation / telephone / data cable shall cross raceway containing conductors of other systems at right angles.

D. Where instrumentation / telephone / data cables are installed in panels, etc., the Contractor shall arrange wiring to provide maximum clearance between cables and other conductors. Instrumentation / telephone / data cables shall not be installed in same bundle with conductors of other circuits.

E. Additional pullboxes shall be furnished and installed for ease of cable pulling and the cable manufacturer's recommended conduit fill factor shall be followed.

F. All cable, insulation and jacket shall have adequate strength to allow for it to be pulled through the conduit systems. Sufficient conductors shall be installed to provide space and serve future equipment where shown and specified. All conductors shall be color coded and all wires shall be suitably tagged with permanent markers at each end.

3.3 TESTING

A. All testing shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:

1. Shop Test

a) Prior to the first shipment of each size of power, control, and telephone / data cable to be furnished and installed under this Contract, samples of each size of cable shall be subjected to complete physical and electrical factory production tests at the manufacturer's plant. Other cable and wiring shall be tested in accordance with the applicable ICEA Standards. Six copies of certified test data sheets shall be submitted to the Engineer for approval prior to installation at the site. Subsequent shipment of each size of wire shall be covered by certificates of compliance which shall list Contractor's name, point of delivery, reel numbers, size of wire, length of wire, and date of shipment. Certificates shall attest the wires and cables comply with specification requirements and that wires and cables are equal in every respect to wires and cables which have been successfully tested.

b) All test data or certificates shall be notarized and submitted.

2. Field Tests

a) Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 1, and Section 16010–Electrical-Basic Requirements.

b) After installation, all wires and cables shall be tested for insulation levels and continuity. Insulation resistance between conductors of the same circuit and between conductor and ground shall be tested. Testing for insulation levels shall be as follows:

(1) For 600V rated power and control cable, apply 1,000VDC from a Megaohmeter for all 600V wires and cables installed in lighting, control, power, indication, alarm and motor feeder circuits. Testing for continuity shall be "test light" or "buzzer".

(2) 600V rated instrumentation signal cable shall be tested from conductor to conductor, conductor to shield, and conductor to ground using a 260 volt-ohmmeter, or approved equal. The resistance value shall be 200 megaohms or greater.

B. Low voltage wires and cables shall be tested before being connected to motors, devices or terminal blocks.

C. Voltage tests shall be made successively between each conductor of a circuit and all other conductors of the circuit grounded.

D. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner.

E. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.

END OF SECTION

SECTION 16130 – OUTLET PULL AND JUNCTION BOXES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Outlet pull and junction boxes

B. Related Sections include but are not necessarily limited to:

1. Contract and Bidding Requirements

2. Section 16010 - Electrical Basic Requirements

1.2 QUALITY ASSURANCE

A. Referenced Standards

1. Refer to Section 16010 - Electrical Basic Requirements

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples, Shop Drawings

B. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

1.4 DELIVERY, STORAGE, AND HANDLING

A. see Section 16010 - Electrical Basic Requirements

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Galvanized Steel Boxes

(a) Appleton Electric Co.

(b) Steel City

(c) Raco

2. Corrosion-Resistant Boxes

   (a) Hoffman Engineering Co.

   (b) Crouse-Hinds

3. Hazardous Location Boxes (Class I, II & III)

   (a) Appleton Electric Co.

   (b) Crouse-Hinds

   (c) Killark

   (d) O-Z/Gedney

4. Raintight and Watertight Boxes

   (a) Appleton Electric Co.

   (b) Crouse-Hinds

5. Terminal Boxes

   (a) Hoffman Engineering Co.

6. Exposed Switch and Receptacle Boxes

   (a) Appleton Electric Co.

   (b) Crouse-Hinds

   (c) Killark

2.1 MATERIALS

A. Pull and Junction Boxes (smaller than 100 cubic inch)

1. Wet Areas

   (a) Material: Malleable-Iron or 14 gage steel with polyester powder coating inside and out over phosphatized surfaces.

   (b) 14 gage steel

      (1) Continuously welded seams, ground smooth, no conduit punch-outs

      (2) Stainless steel clamps on four sides

(3) Flat cover with oil resistant gasket

(4) NEMA 4 classification

(5) UL listed

2. Corrosive Areas:

(a) Material: Nylon, PVC or fiberglass reinforced polyester material.

(1) Neoprene door gasket

(2) Grounding bushing(s)

(3) NEMA 4X classification

(4) UL listed

3. Hazardous Areas

(a) Material: Cast gray iron alloy or copper-free cast aluminum

(b) Drilled and tapped openings or tapered threaded hub equipped

(c) Flat bolted-down or threaded cover with neoprene gasket

(d) Stainless steel hex head screws

(e) Explosion-proof, UL listed for Class 1 Groups C and D

B. Large Pull and Junction Boxes (100CU-IN and larger)

1. Wet and Corrosive areas

(a) NEMA 4X with stainless steel screws

(1) Type 304 L welded stainless steel

(2) Continuously welded seams, ground smooth, no conduit punch-outs

(3) Rolled lip around all sides

(b) Termination Boxes

(1) Galvanized 16 GA steel box provided with plain blank screw cover, subpanel, and terminal points.

(2) Terminal blocks shall be screw-cage barrier-type with white marker strip.

(3) Refer to Contract Drawings for dimensions, number of terminals and ratings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Use listed and labeled boxes with threaded conduit hubs for use in hazardous areas.

C. Use malleable iron Type FS and FD boxes in wet areas and where exposed rigid steel conduit is required.

D. Use stainless steel, fiberglass, nylon or PVC boxes for corrosive areas.

E. Fill unused punched, tapped, or threaded hub openings with insert plugs of like material to maintain enclosure NEMA rating.

F. Use boxes sized to accommodate the quantity of conductors and devices enclosed.

G. Set all outlet pull and junction boxes plumb and vertical to the finish floor or grade.

H. Provide and install pull boxes or junction boxes in conduit runs as required to facilitate pulling of wires or making connections.

I. Make covers of boxes accessible.

J. Install pull boxes or junction boxes rated for the area classification.

K. Install all conduits squarely into all outlet pull and junction boxes.

L. Terminate all conduits as required in Specification **Section 16111-Conduit and Raceway**.

M. Large pull and junction boxes shall NOT be mounted to hand-rail or safety rail.

N. Do not install “back-to-back” boxes anywhere within this Project.

O. Support outlet boxes for lighting fixtures and other ceiling-mounted devices in lay-in acoustical tile ceilings by bar hangers anchored to ceiling construction members which do not interfere with tile removal.

END OF SECTION

SECTION 16140 – WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes**:**

1. Light switches, receptacles, device plates, dimmers, plug-in strips.

B. Related Sections include but are not necessarily limited to:

1. Division 1 - General Requirements

2. Section 16010 - Electrical Basic Requirements

1.2 QUALITY ASSURANCE

A. Referenced Standards

1. Refer to Section 16010 - Electrical Basic Requirements

1.3 SUBMITTALS

A. Shop Drawings

1. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples and 16010 - Electrical Basic Requirements.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Light switches (except explosion-proof)

a) Hubbell

b) Slater

c) P&S

d) Arrow Hart

e) General Electric

f) Leviton

2. Explosion-proof light switches

    a) Crouse-Hinds

    b) Appleton Electric Co.

    c) Killark

3. Door switches

    a) General Electric

    b) Slater

    c) P&S

    d) Arrow Hart

    e) Micro-switch

4. Receptacles (except explosion-proof)

    a) Hubbell

    b) Slater

    c) P&S

    d) Arrow Hart

    e) General Electric

    f) Leviton

5. Explosion-proof Receptacles

    a) Crouse-Hinds

    b) Appleton Electric Co.

    c) Killark

6. Dimmers

    a) Lutron

    b) General Electric

    c) P&S

7. Plug-in Strip

    a) Wiremold

    b) Walker

2.2 MATERIALS

A. Light Switches for Unclassified Areas

1. Toggle type, quiet action, and specification grade with grounding terminal
2. Back and side wired
3. Solid silver cadmium oxide contacts
4. One-piece switch arm rated 20A, 120/277VAC
5. UL listed
6. Color: Ivory
7. Wall plate: Type 304 stainless steel
8. Type: As indicated on Contract Drawings

B. Receptacles for Unclassified Areas

1. Straight blade, grounding type, specification grade
2. Back and side wired with Wrap-around Bridge
3. Rated 20A, 125 VAC
4. UL listed
5. Color

    a) For use on normal power: IVORY

    b) For use on UPS systems: RED

    c) For use on isolated ground systems: ORANGE

6. Wall plate: Type 304 stainless steel
7. Type: As indicated on Contract Drawings

C. Light Switches for Wet Areas

1. Press-switch type, quiet action, specification grade, with grounding terminal

2. Back and side wired

3. Solid silver cadmium oxide contacts

4. One-piece switch arm rated 20A, 120/277VAC

5. UL listed

6. Color: IVORY

7. Wall plate: GREY weatherproof press-switch type

8. Type: As indicated on Contract Drawings

D. Receptacles for Outdoor and Wet Areas

1. Straight blade, grounding type, GFIC specification grade

2. Back and side wired with wrap around bridge

3. Rated 20A, 125VAC

4. UL listed

5. Color: IVORY

6. Wall plate: Weatherproof, cast aluminum, UL listed “IN USE” cover

7. Type: As indicated on Contract Drawings

E. Ground Fault Circuit Interrupter (GFCI) Receptacles

1. Straight blade, grounding type, specification grade

2. Rated 20A, 125VAC

3. UL listed

4. Test and reset buttons

5. Wall plate: Indoor or weatherproof “IN USE” as required

6. Feed-thru type

F. Light Switches for Corrosive Areas

1. Corrosion-resistant NEMA 4X enclosure with switch consisting of:

a) Fiberglass reinforced polyester enclosure

b) Fiberglass reinforced polyester gasketed wall plate with built-in toggle lever switch with stainless steel shaft

c) Grounding bushing

d) Rated 20A, 125VAC

e) UL listed

f) Type: As indicated on Contract Drawings

g) Color: YELLOW

2. Optional: Corrosion-resistant enclosure and switch consisting of:

a) Cast copper-free aluminum "FS" or "FD" ridge type hub box

b) Toggle type, quiet action, and specification grade with grounding terminal

c) Rated 20A, 125VAC with solid silver cadmium oxide contacts

d) UL listed

e) Neoprene gasket

f) Cast aluminum cover with stainless steel screws and lever to activate switch

g) Type: As indicated on Contract Drawings

h) Color: YELLOW

G. Receptacles for Corrosive Areas

1. Corrosion-resistant straight blade, grounding type, specification grade

2. Back and side wired with Wrap-around Bridge

3. Rated 20A, 125VAC

4. UL listed

5. Color: YELLOW

6. Box: "FS" or "FD" ridge type cast hub box of copper-free aluminum

7. Gasket: Neoprene

8. Wall plate: Weatherproof, cast aluminum, UL listed “IN USE” cover

9. Type: As indicated on Contract Drawings

H. Explosion-proof Light Switches for Use in Hazardous Areas:

1. Explosion-proof, UL listed for Class I, Division 1 and 2, Groups B, C, and D; and Class II, Division 1 and 2 areas, Groups E, F, and G.

2. EDS factory sealed

3. Malleable iron body and cover

4. Aluminum sealing chamber

5. Front operated handle with stainless steel shaft

6. Rated 20A, 125VAC

7. With grounding screw

8. Type: As indicated on Contract Drawings

I. Explosion-proof Receptacles for Use in Hazardous Areas

1. Explosion-proof, UL listed for Class I, Division 1 and 2, Groups B, C, and D; and Class II, Division 1 and 2, Groups F and G

2. Factory-sealed malleable iron receptacle with spring-loaded cover

3. Malleable iron mounting box

4. Rated 20A, 125VAC

5. "Dead-front" construction requiring plug to be inserted and rotated to activate receptacle

6. Type: As indicated on Contract Drawings

J. Plug-In Strip: Surface steel raceway plug-in strip with single 15A, 125VAC, 3 wire grounding-type receptacles spaced 18 inch on center.

1. Pre-wired with two #12 TW and one #12 TW green insulated ground

2. Minimum 1-1/4 inch wide x 3/4 inch deep

3. Suitable fittings and snap-in cover

4. Finish

a) Stainless steel

5. Receptacle color

a) For use on normal power: Ivory

b) For use on UPS systems: Red

c) For use on isolated ground systems: ORANGE

K. Door Switches

1. Rated 5A, 120VAC

2. Mode of operation: Door open - lights on

3. UL listed

L. Lighting Dimmers

1. Electronic solid state type, rated for load, 120 and 277VAC

2. Circuit design: Silicon symmetrical gate to provide full wave dimming and withstand current and inverse voltage surges

3. Controls: Linear slide with positive off

4. Provide built-in filter to minimize noise interference in nearby audio lines

5. Rated 100^{o}F maximum, ambient

6. UL listed

7. Finish: IVORY

M. Pedestal-Type Floor-Mounted or Counter-Mounted Duplex Receptacles

1. Straight blade, grounding type, specification grade

2. Back and side wired with Wrap-around Bridge

3. Rated 15A, 125VAC

4. Horizontal design housing with threaded conduit fittings in base with satin chromium finish

5. Install on adjustable 4-inch flush floor box

6. Color

a) For use on normal power: IVORY

b) For use on UPS systems: RED

c) For use on isolated ground systems: ORANGE

N. Thermostats

1. Contacts close on falling temperature to cycle unit heater on rising temperature to cycle exhaust fan motor

2. Rated 20A, 120VAC

3. Range: 46-84 Degrees F scale.

4. Switch: AUTO/OFF/ON

5. Provide sub-base and mounting plate.

6. Provide standard outlet box for mounting thermostat

PART 3 EXECUTION

A. Installation

1. Install products in accordance with manufacturer's instructions.

2. Mount devices where indicated on the Contract Drawings.

3. Surface-mount receptacles and light switches in concrete construction.

4. In masonry and metal stud construction, recess- mount receptacles and light switches unless device precludes recessed mounting or unless otherwise noted on the Contract Drawings.

5. Where more than one receptacle is installed in a room, they shall be symmetrically arranged.

6. Set all wiring devices including covers plumb and vertical to the floor.

7. Set recess-mounted switches and receptacles flush with face of walls.

8. Do not connect dimmers to loads in excess of 80 percent of the rating of the dimmer.

9. Provide blank plates for empty outlets.

10. Securely attach top to ceiling grid and base to mating surface.

END OF SECTION

SECTION 16150 – MOTORS

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, tools and equipment necessary for furnishing, installing, connecting, testing and placing into service all Motors as specified herein and indicated on the Contract Drawings.

B. All Motors shall be sufficient size for the duty to be performed and shall not exceed their full rated load when the driven equipment is operating at specified capacity. Unless otherwise noted, motors driving pumps shall not be overloaded at any head or discharge condition of the pump.

1.2 CODES AND STANDARDS

A. Motors shall comply with the following applicable codes and standards as well as any others within the Specifications and Contract Drawings. In the event of any conflict between these codes, regulations, standards, and Contract Documents, the most restrictive shall apply.

1. American National Standards Institute (ANSI/NEMA)

   a) MG1-2006, REV 1 2007 – Motors and Generators

2. National Fire Protection Association (NFPA)

   a) 70, National Electric Code (NEC)
   b) 79, Electrical Standard for Industrial Machinery

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. The Motor manufacturer shall submit to the Engineer certified dimensional drawings showing nameplate data and outline dimensions.

C. Guarantee: All motors and associated equipment furnished and installed under this Section shall be guaranteed against defects of workmanship, materials and improper installation for a period of three years from date of acceptance. All such motors, equipment or parts proven defective, due to the above noted causes, shall be replaced and installed by the Contractor at no expense to the Owner.

D. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 RATINGS

A. All three-phase motors shall be "premium efficiency" type.

B. Unless otherwise noted, all Motors shall be of the low voltage type (600V or less). All Motors 2HP through 100HP shall be rated 230/460VAC, 3-PH, 60Hz. All Motors 125HP through 300HP shall be rated 460VAC, 3-PH, 60Hz. Motors below 2HP shall be rated 115/230VAC, 1-PH, 60Hz.

C. All Motors controlled by a Variable Frequency Drive (VFD) shall indicate on the motor nameplate that it is suitable for the intended application (inverter duty rated) and shall be provided with an integral temperature switch that opens on high temperature. All Motors operated by a VFD shall meet the requirements of ANSI/NEMA MG1 Class II Part 32.

2.2 CONSTRUCTION

A. General

1. Unless otherwise noted in these Specifications, all motors shall be totally enclosed fan cooled (TEFC).

2. TEFC motors shall be provided with condensate drain hole and epoxy coated motor windings to protect against moisture.

3. All motors shall have 1.15 service factor unless otherwise noted.

4. The output shaft shall be suitable for mechanical connection as required.

5. Space heaters shall be provided on motors 25 HP and larger for moisture control. Space heaters shall operate at 120 VAC, single-phase with leads brought out to terminal blocks enclosed within a NEMA-12 accessory box. Motors shall be provided with a metallic or plastic warning plaque, permanently fixed to motor casing, with red background and white letters which has the following legend:

WARNING-ELECTRICAL SHOCK HAZARD
Motor Equipped with Strip-Heaters
Strip-Heater remains Energized when Local Disconnect is OFF

B. Three-Phase Motors

1. Motors shall be of the squirrel-cage induction type, NEMA design B. Horizontal, vertical solid shaft, vertical hollow shaft, normal thrust and high thrust types shall be furnished as specified herein. All Motors shall be built in accordance with current NEMA, IEEE, ANSI and AFBMA standards where applicable. Motors shall be of the type and quality described by these Specifications, fully capable of performing in accordance with manufacturer's

nameplate rating, and free from defective material and workmanship.

2. Motors shall have normal or high starting torque (as required), low starting current (not to exceed 600 percent full load current), and low slip.

3. Motors shall have a Class B non-hygroscopic insulation system. Class F insulation may be used but shall be limited to Class B temperature rise.

4. All machine surfaces shall be coated with rust inhibitor for easy disassembly.

5. All Motors shall have a final coating of chemical resistant corrosion and fungus protective epoxy fortified enamel finish sprayed over red primer over all interior and exterior surfaces. Stator bore and rotor of all motors shall be epoxy coated.

6. Motors installed outdoors shall be mill and chemical duty suitable for operation in moist air with hydrogen sulfide gas present.

7. All fittings, bolts, nuts, and screws shall be 316 stainless steel. Bolts and nuts shall have hex heads.

8. Nameplates shall be stainless steel. Lifting lugs or "O" type bolts shall be supplied on all frames 254T and larger. Enclosures will have stainless steel screen and motors shall be protected for corrosion, fungus and insects.

9. Conduit boxes shall be gasketed. Lead wires between motor frame and conduit box shall be gasketed.

10. Three-Phase Motors shall be manufactured by Baldor, General Electric, U.S. Motors, Westinghouse or approved equal.

C. Fractional Horsepower Motors

1. Fractional Horsepower Motors shall be rigid, welded-steel, designed to maintain accurate alignment of Motor components and provide adequate protection. End shields shall be reinforced, lightweight die-cast aluminum. Windings shall be of varnish-insulated wire with slot insulation of polyester film, baked-on bonding treatment to make the stator winding strongly resistant to heat, aging, moisture, electrical stresses and other hazards.

2. Motor shaft shall be made from high-grade, cold-rolled shaft steel with drive-shaft extensions carefully machined to standard NEMA dimensions for the particular drive connection.

3. For light to moderate loading, bearings shall be quiet all-angle sleeve type with large oil reservoir that prevents leakage and permits motor operation in any position.

4. For heavy loading, bearings shall be carefully selected precision ball bearings with extra quality, long-life grease, and large reservoir providing 10 years' normal operation without relubrication.

D. Integral Horsepower Motors

1. Motor frames and end shields shall be cast iron or heavy fabricated steel of such design and proportions as to hold all Motor components rigidly in proper position and provide adequate protection for the type of enclosure employed.

2. Windings shall be adequately insulated and securely braced to resist failure due to electrical stresses and vibrations.

3. The shaft shall be made of high-grade machine steel or steel forging of size and design adequate to withstand the load stresses normally encountered in Motors of the particular rating. Bearing journals shall be ground and polished.

4. Rotors shall be made from high-grade steel laminations adequately fastened together, and to the shaft. Rotor squirrel-cage windings may be copper or bar-type construction with brazed end rings.

5. Motors shall be equipped with vacuum-degassed antifriction bearings made to AFBMA Standards, and be of ample capacity for the Motor rating. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent lubrication, but facilities shall be provided for adding new lubricant and draining out old lubricant without Motor disassembly. The bearing housing shall have long, tight, running fits or rotating seals to protect against the entrance of foreign matter into the bearings, or leakage of lubricant out of the bearing cavity.

6. Bearings of high thrust Motors will be locked for momentary upthrust of 30% downthrust. All bearings shall have a minimum B10 life rating of 100,000 hours in accordance with AFBMA life and thrust values.

7. Vertical hollow-shaft motors will have non-reverse ratchets to prevent backspin.

E. Single-Phase Motors

1. Single-Phase Motors shall be split-phase and capacitor-start induction types rated for continuous horsepower at the RPM as called for on the Contract Drawings. Motors shall be rated 115/230VAC, 1-PH, 60Hz, TEFC with temperature rise in accordance with NEMA Standards for Class B insulation.

2. TEFC Motors shall be designed for severe-duty.

3. Motors shall have corrosion and fungus protective finish on internal and external surfaces. All fittings shall have corrosion-protective plating.

4. Mechanical characteristics shall be the same as specified for Fractional

Horsepower Motors.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. All Motors and associated equipment shall be stored in accordance with the manufacturer recommendations and shall not be stored exposed to weather.

3.2 INSTALLATION

A. The Contractor shall plan the layout of the raceway systems so that when the work is complete it will exhibit good workmanship practices.

B. All Motors and their peripheral devices shall be connected to the raceway system by means of a short section of flexible conduit, 18IN minimum and 60-inch maximum, unless otherwise indicated on the Contract Drawings.

C. The Contractor shall install a grounding conductor in the conduit and terminate at the Motor Controller with an approved grounding clamp for all motor connections.

D. Connection to Motor leads shall be made with high-compression type lugs with heat-shrinkable insulating boots.

E. Phase rotation corrections shall be made within the Motor connection box.

3.3 TESTING

A. The Contractor shall check each Motor for correct clearances and alignment and for correct lubrication, and shall lubricate, if required, in accordance with manufacturer's instructions.

B. The Contractor shall utilize a 1000V meg-ohmmeter to test each Motor winding before energizing the Motor. If the Motor insulation resistance is at or below the manufacturer’s allowable limit, the Contractor shall notify the Engineer and shall not energize the Motor. The Contractor shall confirm the direction of rotation of all Motors with a phase rotation meter and reverse the connections, as required, at the Motor connection box.

END OF SECTION

SECTION 16450 – GROUNDING AND BONDING

PART 1 GENERAL

1.1 THE REQUIREMENTS

A. The Contractor shall furnish and install grounding systems complete in accordance with the minimum requirements established by Article 250 of the NEC. Article 250 of the NEC shall be considered as a minimum requirement for compliance with this Specification.

B. Grounding of all instrumentation and control systems shall be furnished and installed in accordance with the manufacturer/system requirements and IEEE 1100-92, Powering and Grounding of Sensitive Electronic Equipment. Conflicts shall be promptly brought to the attention of the Engineer.

C. In addition to the NEC requirements, building structural steel columns shall be permanently and effectively grounded.

D. Reference Section 16010 – Electrical Basic Requirements.

E. Additional requirements for grounding are shown on the Contract Drawings.

1.2 CODES AND STANDARDS

A. All grounding components and the completed system shall comply with the following codes and standards as well as within the Specifications or as shown on the Contract Drawings:

1. American National Standards Institute (ANSI/IEEE)

    a) C2, National Electrical Safety Code (NESC)

2. Institute of Electrical and Electronic Engineers (IEEE)

    a) IEEE 81, Guide for Measuring Earth Resistivity.

    b) IEEE 142, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

3. National Fire Protection Association (NFPA)

    a) NFPA 70, National Electric Code (NEC)

4. Underwriters Laboratories Inc (UL)

    a) 588, Grounding Equipment

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. In accordance with the procedures and requirements set forth in the General Conditions and Division 1, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Reports of certified field tests. Each submittal shall be identified by the applicable Specification section.

1.4 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Equipment specifications and product data sheets identifying all materials used and methods of fabrication.

2. Drawings and written description of how the Contractor intends to furnish and install the grounding system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

2.2 GROUNDING CONDUCTOR

A. A green, insulated equipment grounding conductor, which shall be separate from the electrical system neutral conductor, shall be furnished and installed for all circuits. Equipment grounding conductors shall be furnished and installed in all conduits. Use of conduits as the NEC required equipment grounding conductor is not acceptable.

B. Where specified or shown a 3-inch strap shall be furnished and installed as the grounding conductor.

2.3 EQUIPMENT GROUND CONDUCTOR

A. Equipment ground conductors shall be solid and continuous from a connection at earth to all distribution panelboards. Ground connections at panelboards, outlets, equipment, and apparatus shall be made in an approved and permanent manner.

2.4 BONDING FITTINGS

A. Grounding connections to equipment shall be bolted. Cable end connections may be made by use of the crucible weld process or bolted type connectors. Bolted type connectors for this application shall consist of corrosion resistant copper alloy with silicone bronze bolts, nuts and lock-washers which are designed for this purpose.

2.5 GROUND RODS

A. Ground rods shall be rolled to a commercially round shape from copper-clad steel manufactured by the molten-welding process or by the electro-formed process (molecularly bonded). They shall have an ultimate tensile strength of 75,000 PSI and an elastic limit of 49,000 PSI. The rods shall be not less than 3/4-inch diameter by 20 feet in length; and the proportion of copper shall be uniform throughout the length of the rod. The copper shall have a minimum wall thickness of 0.013 inch at any point on the rod.

B. The maximum resistance to ground of a driven ground rod shall not exceed 10-OHM under normally dry conditions. Where the resistance obtained with one (1) ground rod exceeds 10-OHM, additional ground rods shall be coupled, by exothermic welds. Except where specifically indicated otherwise, all exposed non current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductors in nonmetallic raceways and neutral conductors of wiring systems shall be grounded.

The ground connection shall be made at the main service equipment and shall be extended to the point of entrance of the metallic water service. Connection to the water pipe shall be made by a suitable ground clamp or lug connection to a plugged tee. If flanged pipes are encountered, connection shall be made with the lug bolted to the street side of the flanged connection. If there is not suitable metallic water service to the facility, the ground connection shall be made to the driven ground rods on the exterior of the building.

Where ground fault protection is employed, care shall be taken so that the connection of the ground and neutral does not interfere with the correct operation of the ground fault protection system.

2.6 GROUNDING GRID

A grounding grid shall be provided for each structure and interconnected between structures. The grounding grid shall be installed such that the ground resistance does not exceed 5-OHM. The grounding grid shall be interconnected by bare copper

conductors sized to the largest service entrance ground, spliced and connected to ground rods by exothermic welds. The grounding conductors shall be installed after the excavations for the building have been completed and prior to the pouring of concrete for the footings, mats, etc. Copper "pigtails" shall be connected to the grounding grid system; shall enter the buildings and structure from the outside; and shall be connected to steel structures and equipment as described in this Section and as shown on the Contract Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Metal surfaces where grounding connections are to be made shall be clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease, and dirt. Copper and galvanized steel shall be cleaned with emery cloth to remove oxide before making connections.

B. Grounding conductors shall be continuous between points of connection; splices shall not be permitted.

C. Where conductors are exposed and subject to damage from personnel, traffic, etc., conductors shall be installed in PVC sch-80 raceway.

D. Mechanical connections shall be permitted to ground rods in “Ground Test Wells” and shall be exposed to permit maintenance and inspection for continuity and effectiveness of grounding system.

E. Where subsurface conditions do not permit use of driven ground rods to obtain proper ground resistance, rods shall be installed in a trench or plate electrodes shall be provided, as applicable and necessary to obtain proper values of resistance.

F. Conduit

1. Conduit that enters equipment such as motor control centers, switchboards, switchgear, variable frequency drives, instrument and control panels, and similar equipment shall be bonded to the ground bus, where provided, and as otherwise required by the NEC.

3.2 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:

1. Witnessed Shop Tests: None required

2. Field Tests

a) Ground resistance shall be measured with a three-point, fall of potential instrument.

b) All ground rods shall be tested after being driven and prior to connection to the grounding system. Where test results show resistance-to-ground is greater-than 10-OHM, additional ground rods shall be driven by coupling with exothermic welds. The compliance shall be demonstrated by retesting ground rod.

c) Upon completion of installation of the grounding and bonding system, the entire system shall be tested at the ground test well(s), as indicated on the Contract Drawings. The completed system shall have less-than 5-OHM of ground resistance.

3. Documentation

a) All tests shall be completely documented indicating time of day, date, temperature, weather conditions, measuring instrument and all pertinent test information.

b) All required documentation of readings indicating non-compliance, shall be submitted to the Engineer prior to and required for final acceptance of the project.

END OF SECTION

SECTION 16460 – DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish, install, and test transformers for power and lighting distribution systems as described herein, as shown on the Contract Drawings, and as required to complete the electrical installations.

B. All equipment specified in this Section shall be furnished by the transformer manufacturer who shall be responsible for the suitability and compatibility of all included equipment.

C. Reference Section 16010 - Electrical Basic Requirements, and Section 09900 - Painting and Coatings.

1.2 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:

1. Witnessed Shop Tests: None required

2. Certified Shop Tests

a) The transformers shall be given routine factory tests in accordance with the requirements of the ANSI and NEMA standards. Temperature rises may be certified from basic design.

b) As a minimum, the following tests shall be made on all transformers:

(1) Ratio tests on the rated voltage connection and on all tap connections

(2) Polarity and phase-relation tests on the rated voltage connection

(3) Polarity and phase-relation tests on the rated voltage connection

(4) Applied potential tests

(5) Induced potential tests

(6) No-load and excitation current at rated voltage on the rated voltage connection

3. Field Tests

a) Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 1, and Section 16010 - Electrical Basic Requirements.

b) After installation, the transformers shall be subjected to routine insulation resistance tests. The tests shall be made by the Contractor who shall also furnish the required testing equipment.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples. The Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings
2. Operation and Maintenance Manuals
3. Spare Parts List
4. Special Tools List
5. Reports of Certified Shop Tests

B. Each submittal shall be identified by the applicable specification section.

1.4 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein, and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Equipment specifications and product data sheets identifying all materials used and methods of fabrication

2. Drawings showing clearly marked dimensions for each transformer

3. Sample equipment nameplate diagram

D. The submittal information shall reflect the specific equipment identification number as indicated on the Contract Drawings.

E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items that the Contractor intends to provide are acceptable and shall be submitted.

1.5 OPERATION AND MAINTENANCE MANUALS

A. Operations and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

1.6 TOOLS, SUPPLIES AND SPARE PARTS

A. The transformers shall be furnished with all special tools necessary to disassemble, service, repair and adjust the equipment. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor.

B. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

C. 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. Those parts which are identical for more than one size shall have the same parts number.

1.7 IDENTIFICATION

A. Each transformer shall be identified with the equipment tag number indicated on the Contract Drawings and the accepted shop drawings. A nameplate shall be securely affixed in a conspicuous place on each transformer. Nameplates shall be as specified in Section 16010 - Electrical Basic Requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Square-D
2. Cutler-Hammer
3. General Electric

2.2 DRY TYPE TRANSFORMERS

A. Furnish and install single-phase and three-phase general purpose, dry-type transformers, as specified herein and indicated on the Contract Drawings. The transformers shall be 60Hz, self-cooled, quiet-design insulated of the two winding type.

B. The transformers shall be Underwriters Laboratories, Inc. listed and shall bear the UL label.

C. The primary windings shall be rated 480VAC for use on 3-phase, 3-wire systems and connected delta unless indicated otherwise on the Contract Drawings. KVA ratings shall be as shown on the Contract Drawings. Furnish taps for transformers as follows:

1. 1 PH, 25 KVA and below: Two 5% FCBN

2. 3 PH, 15 KVA and below: Two 5% FCBN

3. 3 PH, 30 KVA and above: Two 2.5% FCAN and four 2.5% FCBN

D. All taps shall be full capacity rated.

E. The ratings of the secondary windings shall be as indicated on the Contract Drawings.

F. Transformers shall be designed for continuous operation at rated KVA, 24 hours a day, 365 days a year, with normal life expectancy as defined in IEEE 65 and ANSI C57.96. This performance shall be obtainable without exceeding 150 degrees Celsius average temperature rise by resistance or 180 degrees Celsius hot spot temperature rise in a 40 degrees Celsius maximum ambient and 30 degrees Celsius average ambient. The maximum coil hot spot temperature shall not exceed 220 degrees Celsius. All insulating materials shall be flame retardant and shall not support combustion as defined in ASTM Standard Test Method D 635. All insulating materials shall be in accordance with NEMA ST 20 Standard for a 220 degrees Celsius UL component recognized insulation system.

G. Transformer coils shall be of the continuous wound copper construction and shall be impregnated with nonhydroscopic, thermosetting varnish.

H. Transformers shall have copper windings.

I. All cores are to be constructed of high grade, nonaging, grain-oriented silicon steel with high magnetic permeability and low hysteresis and eddy current loses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be tightly clamped and compressed with structural steel angles. The completed core and coil shall then be bolted to the base by means of vibration-absorbing mounts to minimize sound transmission. There shall be no metal-to-metal contact between the core and coil assembly and the enclosure.

J. Indoor non-classified enclosures shall be made of heavy gauge steel and shall be degreased, cleaned, primed, and finished with a baked, weather-resistant enamel. See painting requirements specified in this section. Outdoor enclosures or enclosures within a corrosive area shall be constructed of stainless steel and rated NEMA 4X.

K. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. The maximum temperature of

the enclosure shall not exceed 90 degrees Celsius. Transformers shall be furnished with lugs of the size and quantity required and suitable for termination of the field wiring.

L. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

M. Transformers shall be mounted on neoprene-rubber isolation pads. The transformers shall not exceed the following ANSI sound levels:

1.	0	to	9 kVA	40dB
2.	10	to	50kVA	45dB
3.	51	to	150kVA	50dB
4.	151	to	300kVA	55dB
5.	301	to	500kVA	60dB
6.	501	to	700kVA	62dB
7.	701	to	1000kVA	64dB
8.	1001	to	1.5MVA	65dB

2.3 PAINTING

A. The exteriors of the transformer enclosures shall be painted as follows:

1. Factory painting: Surfaces shall be cleaned carefully and given a priming basic lead chromate. This shall be followed by two coats of an approved paint applied by brushing.

2. Field painting: After delivery and installation, but before transformers are placed in service, all factory-painted surfaces shall be carefully cleaned and all abrasions shall be repaired.

PART 3 EXECUTION

3.1 INSTALLATION

A. The transformers shall be furnished and installed as shown on the Contract Drawings and as recommended by the equipment manufacturer.

B. Conduit routed to and from the transformer shall be arranged for easy removal of the transformer.

END OF SECTION

SECTION 16470 – PANELBOARDS

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish and install panelboards of voltage and current ratings as shown on the Contract Drawings. Panelboards shall be furnished with circuit breaker ratings, number of breakers, number of poles and locations conforming to the panelboard schedules on the Contract Drawings.

B. Reference Section 16010 – Electrical Basic Requirements.

1.2 STANDARDS

A. Panelboards shall conform to all applicable Federal, UL, and NEMA standards. Materials and components shall be new and conform to grades, qualities and standards as specified herein and shown on the Contract Drawings.

B. Panelboards shall comply with the following industry standards:

1. UL Listing/ Approval

2. Standards

a) UL 50 – Cabinets and Boxes

b) UL 67 – Panelboards

c) NEMA – PB1

d) NFPA 70 – National Electrical Code

1.3 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:

1. Witnessed Shop Tests: None Required

2. Field Tests:

a) Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 1, and Section 16010 – Electrical Basic Requirements.

1.4 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340-Shop Drawings, Project Data and Samples. The Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Reports of Certified Shop Tests

3. Spare Parts List

4. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

B. Each submittal shall be identified by the applicable specification section.

1.5 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Material specifications and product data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, and installation drawings with clearly marked dimensions for each panelboard.

3. Complete panelboard schedules indicating circuit designations and connected loads as shown on the Contract Drawings for each panelboard.

D. The submittal information shall reflect the specific equipment identification as indicated on the Contract Drawings.

1.6 TOOLS, SUPPLIES AND SPARE PARTS

A. The panelboards and accessories shall be furnished with all special tools necessary to disassemble, service, repair, and adjust the equipment. For each panelboard, the Contractor shall furnish to the Owner all spare parts as recommended by the equipment manufacturer including two (2) molded case circuit breakers of each type, size, and rating used.

B. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

C. 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. Those parts which are identical for more than one size shall have the same parts number.

1.7 IDENTIFICATION

A. Each panelboard shall be identified with the identification tag number indicated on the Contract Drawings and the accepted shop drawings. A nameplate shall be securely affixed in a conspicuous place on each panelboard.

PART 2 PRODUCTS

2.1 GENERAL

A. The Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

2.2 CONDUCTORS (MAIN BUS AND BRANCH CONNECTORS)

A. All main bus shall be copper sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above a maximum ambient temperature of 40 degrees C.

2.3 LIGHTING PANELBOARDS

A. General

1. The Lighting Panelboards, as defined by NEC or noted on the Contract Drawings, shall be dead-front type with automatic trip-free, non-adjustable, thermal-overload, branch circuit breakers. Panelboards shall be of the configuration and rating as specified herein and indicated on the Contract Drawings. Panelboards shall be listed and labeled by Underwriter's Laboratories, Inc.

2. The Lighting Panelboards shall be equipped with a main breaker or main lugs complete with branch circuit breakers, as shown on the Contract Drawings. The panelboards shall be enclosed in a cabinet suitable for flush or surface mounting. Some panelboards shall be furnished and installed within motor control center structures as shown on the Contract Drawings.

3. Lighting Panelboards shall be fully rated and shall have a short circuit rating of 22kA symmetrical, minimum. In the event the results of the Contractor's short circuit fault analysis, as accepted by the Engineer, indicate that a

higher short circuit rating of the panelboards is required, furnish complete panelboards with that higher rating.

4. Lighting Panelboards shall be furnished with transient voltage surge suppression (TVSS) and filtering equipment as required in Specification Section 16671-Transient voltage Surge Suppression and indicated on the Contract Drawings. The TVSS devices shall be UL labeled.

5. Subject to compliance with specifications Lighting Panelboards shall be:

   a) Square-D Company

   b) Eaton/Cutler-Hammer Electric Corporation

   c) General Electric

   d) Approved equal

B. Cabinets

1. Except for lighting panelboards installed in motor control centers, the cabinet shall be NEMA 12 (minimum) constructed of #12 U.S.S. code gauge galvanized steel. The door shall be fastened to the cabinet with concealed brass hinges and shall be equipped with flush-type catches and locks. All locks shall be keyed alike. The cabinet shall have wiring gutters on sides and shall be at least 20-inches wide and 5-3/4-inches deep. The Contractor shall provide an engraved nameplate for the panelboard. The nameplate shall include the panelboard designation, voltage, phase, wires, and bus rating.

2. An Underwriter's Laboratories, Inc. inspection label shall appear on the interior of the cabinet.

C. Bus Work

1. Main bus bars shall be of ample size so that a current density of not more than 1000A per square inch of cross section will be attained. This current density shall be based on the application of the full load connected to the panel plus approximately 25% of the full load for spare capacity. The main bus shall be full capacity as based on the preceding for the entire length of the panel so as to provide full flexibility of circuit arrangement.

2. Solid neutral bus bars are required. Ratings shall be in accordance with applicable standards.

3. A separate ground bus shall be provided with lugs for termination of equipment grounding conductors.

4. Branch bus work shall be rated to match the maximum branch circuit breaker which may be installed in the standard space.

5. All bus shall be plated copper.

D. Circuit Breakers

1. Circuit breakers shall be bolt-on, molded-case type conforming to NEMA Standard AB 1. Trip elements of circuit breakers shall be 20A unless otherwise shown on the Contract Drawings. Minimum branch circuit breaker shall be 100A frame for 60A and above except where shown otherwise on the Drawings or where a larger frame size is standard for the continuous current rating required. Breakers shall have an interrupting rating of 22kA symmetrical at 240VAC, minimum. All breakers shall have quick-make, quick-break, toggle mechanism for manual as well as automatic operation. Tandem or half-size breakers are not acceptable.

2. Where indicated, or where required by Code, circuit breakers for receptacle circuits shall be equipped with integrally mounted ground fault interrupters complete with "TEST" push button and shall be of a type which fit standard panelboard spaces for the breaker continuous current rating required.

3. Instrument power panel branch circuit breakers set for control instrumentation, telephone, data, fire alarm or auxiliary equipment circuits requiring continuous operation shall be provided with a lock-on device.

4. Circuit breakers used for fluorescent lighting circuit switching shall be approved for the purpose and shall be marked "SWD". Circuit breakers used for high intensity discharge lighting circuit switching shall be approved for the purpose and shall be marked "HID". Where required by Article 440 of the NEC, circuit breakers installed for air conditioning units shall be HACR type.

E. Directories

1. Approved directories with glass or noncombustible plastic cover and with typewritten designations of each branch circuit, shall be furnished and installed in each panelboard. The Contractor shall maintain in each panel, during the duration of the Contract, a handwritten directory clearly indicating the circuit breakers in service. This directory shall be updated as work progresses, and final, typewritten directories, as specified above, shall be installed at the end of the project. Designations and circuit locations shall conform to the panelboard schedules on the Contract Drawings, except as otherwise authorized by the Engineer.

2. The Contractor shall provide directories identifying panelboards and indicating the size of the feeder (cable and conduit) serving the panel, circuit numbers, and a description of associated branch circuits including branch circuit trip and connected load for each circuit.

2.4 POWER DISTRIBUTION PANELBOARDS

A. General

1. The Power Distribution Panelboards, as defined by NEC or noted on drawings, shall be of the configuration and rated as shown on the Contract Drawings. The panelboards shall be dead-front type with automatic trip-free, non-adjustable, thermal overload branch circuit breakers. Circuit breakers shall be bolt-on molded case type conforming to NEMA Standard AB1. Trip elements of the circuit breakers shall be rated 20A unless otherwise shown on the Contract Drawings. The bus ratings shall be as shown on the Contract Drawings. Panelboards shall be listed and labeled by Underwriter's Laboratories, Inc.

2. Power distribution panelboards shall be fully rated and shall have a short circuit rating of 25kA symmetrical, minimum. In the event the results of the Contractor's short circuit fault analysis, as accepted by the Engineer, indicate that a higher short circuit rating of the panelboards is required, furnish complete panelboards with that higher rating.

3. Power Distribution Panelboards shall be furnished with transient voltage surge suppression (TVSS) and filtering equipment as required in Section 16671 – Transient Voltage Surge Suppression (TVSS) 1kV or Less, and as indicated on the Contract Drawings. The TVSS devices shall be UL labeled.

4. Subject to compliance with specifications Power Distribution Panelboards shall be:

   a) Square-D Company

   b) Eaton/Cutler-Hammer Electric Corp.

   c) General Electric

   d) Approved equal

B. Cabinets

1. Except for power panelboards installed in motor control centers, the cabinets shall be NEMA 12 (minimum) constructed of #12 U.S.S. code gauge galvanized steel. The door shall be fastened to the cabinet with concealed brass hinges and shall be equipped with flush-type catches and locks. All locks shall be keyed alike. The cabinet shall have wiring gutters on sides and shall be at least 20-inch wide and 5-3/4-inches deep. The Contractor shall provide nameplates for each panelboard. The nameplate shall include the panelboard designation, voltage, phase, wires, and bus rating.

2. An Underwriter's Laboratories, Inc. inspection label shall appear on the interior of the cabinet.

C. Bus Work

1. Main bus bars shall be of ample size so that a current density of not more than 1,000A per square inch of cross section will be attained. This current

density shall be based on the application of the full load connected to the panel plus approximately 25% of the full load for spare capacity. The main bus shall be full capacity as based on the preceding for the entire length of the panel so as to provide full flexibility of circuit arrangement.

2. Solid neutral bus bars, where required, shall be provided. Ratings shall be in accordance with applicable standards.

3. A separate ground bus shall be provided with lugs for termination of equipment grounding conductors.

4. Branch bus work shall be rated to match the maximum branch circuit breaker which may be installed in the standard space.

5. All bus shall be plated copper.

D. Circuit Breakers

1. Circuit breakers shall be bolt-on, molded-case type conforming to NEMA Standard AB 1. Trip elements of circuit breakers shall be 20A unless otherwise shown on the Contract Drawings. Minimum branch circuit breaker shall be 100A frame for 60A and above except where shown otherwise on the Contract Drawings or where a larger frame size is standard for the continuous current rating required. Breakers shall have an interrupting rating of 25kA symmetrical at 480VAC, minimum. All breakers shall have quick-make, quick-break, toggle mechanism for manual as well as automatic operation. Tandem or half-size breakers are not acceptable.

E. Directories

1. Approved directories with glass or noncombustible plastic cover, and with typewritten designations of each branch circuit, shall be provided in each panel. The Contractor shall maintain in each panel, during the duration of the Contract, a handwritten directory clearly indicating the circuit breakers in service. This directory shall be updated as work progresses, and final, typewritten directories, as specified above, shall be installed at the end of the project. Designations and circuit locations shall conform to the panelboard schedules on the Contract Drawings, except as otherwise authorized by the Engineer.

2. The Contractor shall provide directories identifying panelboards and indicating the size of the feeder (cable and conduit) serving the panel, circuit numbers, and a description of associated branch circuits including branch circuit trip and connected load for each circuit.

2.5 PAINTING

A. All metal surfaces of the panelboard enclosures shall be thoroughly cleaned and given one prime of zinc chromate primer. All interior surfaces shall then be given one shop finishing coat of a lacquer of the nitro-cellulose enamel variety. All exterior

surfaces shall be given three coats of the same lacquer. The color of finishing coats shall be light gray ANSI #61.

B. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.

PART 3 EXECUTION

3.1 MOUNTING

A. The lighting panelboards, power distribution panelboards, and combination power units shall be furnished and installed as shown on the Contract Drawings and as recommended by the equipment manufacturer.

B. Panelboards shall be set true and plumb in all locations as shown on the Contract Drawings. The top of panelboard enclosure shall not exceed 6 feet above finished floor elevation.

C. Panelboards installed outdoors shall NOT be mounted to hand-rail or safety rail.

D. Enclosures shall not be fastened to concrete or masonry surfaces with wooden plugs, conical plastic anchors. Appropriate cadmium plated or galvanized steel bolts shall be used with expansion shields or other metallic type concrete insert for mounting on concrete or solid masonry walls. Cadmium plated or galvanized steel toggle bolts shall be used for mounting on concrete block or other hollow masonry walls. Bolt diameter shall be as required considering the size and weight of the completed panelboard and enclosure to provide adequate structural support.

E. The Contractor shall not use factory furnished knockouts with surface back boxes. The Contractor shall punch or drill required openings during installation and shall equip flush back boxes with manufacturer's standard pattern of knockouts. The Contractor shall equip cabinet doors exceeding 40-inches height with vertical bolt three point locking mechanism.

F. The Contractor shall install cabinets (and other enclosure products) in plumb with the building construction. Flush enclosures shall be installed so that the trim will rest against the surrounding surface material and around the entire perimeter of the enclosure.

END OF SECTION

SECTION 16475 – SAFETY DISCONNECT SWITCHES

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish and install separately mounted, individual disconnect switches as specified herein and indicated on the Contract Drawings.

B. 16010 – Electrical Basic Requirements.

C. 16111 – Conduit and Raceway

1.2 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:

1. Witnessed Shop Tests: None required.

2. Field Tests: Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 1, and Section 16010 – Electrical Basic Requirements.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples and the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Spare Parts List

B. Each submittal shall be identified by the applicable specification section.

1.4 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Equipment specifications and product data sheets identifying all materials used and methods of fabrication.

2. Complete layout and installation drawings with clearly marked dimensions for each type/size/rating of disconnect switch.

3. Assembled weight of each unit.

D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items that the Contractor intends to provide are acceptable and shall be submitted.

1.5 TOOLS, SUPPLIES, AND SPARE PARTS

A. The equipment shall be furnished with all special tools necessary to disassemble, service, repair, and adjust the equipment, and with all spare parts as recommended by the equipment manufacturer.

B. One complete set of spare fuses for each ampere rating installed shall be furnished and delivered to the Owner at the time of final inspection.

C. Spare parts lists, included with the shop drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

D. 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. Those parts which are identical for more than one size shall have the same parts number.

1.6 IDENTIFICATION

A. Each equipment item shall be identified with a nameplate. The nameplate shall be engraved indicating the operating voltage, panel and circuit number of the power source and the equipment name with which it is associated.

1.7 OPERATIONS AND MAINTENANCE MANUALS

A. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

B. Disconnect switches shall be manufactured by:

1. Square-D
2. Eaton/Cutler-Hammer
3. General Electric
4. Approved equal

2.2 DISCONNECT SWITCHES

A. Disconnect switches shall be heavy-duty type and/or as specified in these Specifications. Switches shall be furnished and installed as shown on the Contract Drawings and as required by the NEC. Handles shall be lockable.

B. Disconnect switches shall be NEMA Type HD, single throw, externally operated, non-fused or provided with circuit breakers as required. Disconnect switches shall have the poles, voltage, and ampere ratings as shown on the Contract Drawings.

C. Disconnect Switches shall be provided in NEMA 4X stainless steel enclosures.

D. Disconnect switches shall be quick-make, quick-break and with an interlocked cover which cannot be opened when switch is in the "ON" position and capable of being locked in the "OPEN" position.

PART 3 EXECUTION

3.1 INSTALLATION

A. All disconnect switches to be mounted 60-inches above the floor, at the equipment height where appropriate, or as shown on the Contract Drawings.

B. Disconnect switches shall NOT be mounted to any hand-rail or safety rail.

C. The Contractor shall furnish and install fuses or circuit breakers as required or shown on the Contract Drawings.

END OF SECTION

SECTION 16481 – MOTOR CONTROL CENTERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Motor control centers, separately mounted motor starters (including those supplied with equipment), manual motor starters, control equipment.

2. Modifications to existing Westinghouse (Eaton) Series 2100 MCCs. As shown on the Contract Documents.

B. Related Sections include but are not necessarily limited to:

1. Division 1 — General Requirements

2. Section 16010 - Electrical Basic Requirements

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American National Standards Institute (ANSI)

a) C62.41, Guide for Surge Voltages in Low Voltage AC Power Circuits

2. Canadian Standards Association (CSA)

3. Institute of Electrical and Electronics Engineers (IEEE)

4. National Electrical Manufacturers Association (NEMA)

a) ICS 2, Industrial Control Devices, Controllers, and Assemblies

b) 250, Enclosures for Electrical Equipment (1000 Volt Maximum)

5. National Fire Protection Association (NFPA)

a) 70, National Electrical Code (NEC)

6. Underwriters Laboratories, Inc (UL)

a) 845, Electric Motor Control Centers

B. Miscellaneous

1. Verify motor horsepower loads, other equipment loads and controls from approved shop drawings and notify Engineer of any discrepancies.

2. Verify the required instrumentation and control wiring for a complete system and notify Engineer of any discrepancies.

1.3 SUBMITTALS

A. Shop Drawings:

1. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples and Section 16010 — Electrical Basic Requirements.

2. MCC elevation drawings and complete description of units in the MCC

3. Typical MCC unit wiring diagrams

4. Typical wiring diagrams for all control equipment

1.4 OPERATIONS AND MAINTENANCE MANUALS

A. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Motor control centers:

1. Square D

2. Cutler Hammer

3. General Electric

4. Allen—Bradley

B. Separately mounted motor starters:

1. Square D

2. Cutler Hammer

3. General Electric

4. Allen—Bradley

C. Control relays:

1. Square D

2. Cutler Hammer

3. General Electric

4. Allen—Bradley

D. Programmable controllers:

1. Refer to Division 13

E. Manual motor starters:

1. Square D

2. Cutler Hammer

3. General Electric

4. Allen-Bradley

F. Submit requests for substitution in accordance with Specification Section 01600 — Material and Equipment.

2.2 COMPONENTS

A. Motor Control Centers:

1. Design:

a) Service voltage: 480 V, 3 PH, 4 W, 60 HZ, unless otherwise indicated on the Drawings.

b) Main horizontal bus: 800 A

1) Unless otherwise indicated on the Drawings

c) Vertical bus: 300 A

1) Unless otherwise indicated on the Drawings

d) Short circuit withstand rating: 65,000 AIC symmetrical

1) Unless otherwise indicated on the Drawings

e) Provide main horizontal bus in each structure; full capacity, full-length, with provisions for extension.

1) Bus bars:

(a) Plated copper

(b) Rectangular cross section

(c) Support in each structure by means of bus supports

f) Provide each structure with full-length vertical bus to distribute incoming power to each circuit breaker and starter in structure:

1) Starters NEMA size 5 and larger and certain other components may be cable connected to the main bus with the approval of the Engineer.

2) Vertical bus shall be extended to spaces provided for future equipment.

g) Provide ground bus:

1) Continuous

2) 14” x 2” copper

3) Solidly grounded to each structure

4) Locate near bottom of structure

5) Provide for lug connection of equipment ground wires

h) Provide guides for supporting and aligning starters

2. Construction:

a) NEMA Class I, Type B

b) NEMA 1G, free standing

c) Unit structures:

1) Totally enclosed

2) Joined together to form one (1) assembly:

(a) Each unit structure will be nominal 20” wide, 20” deep, and 90” high, unless otherwise indicated on the Drawings.

d) Fabricate of not less than 14 GA steel with 16 GA steel doors in standardized units

e) Provide each structure with two (2) horizontal wiring spaces.

1) One (1) at top

2) One (1) at bottom

3) Spaces will line up with adjacent units to form convenient wiring raceway entire length of control center.

f) Provide each structure with one (1) vertical wireway for unit wiring.

1) With cable tie supports to hold wiring in place

2) With a separate door

g) Bottom shall have ample unrestricted space for conduit entry.

h) Doors:

1) Formed round corners and rolled edges

2) Gasketed

3) Minimum of two (2) heavy—duty hinges or continuous piano hinge

4) Held closed by means of captive fasteners.

i) Fabricate doors to be a part of the structure and not part of the starter.

j) Cubicles:

1) Totally enclosed

2) Effectively baffled to isolate any ionized gases which may occur within unit starter.

k) Assemblies effectively ventilated, to allow relocation of starters and other components:

1) Within the assembly and with the same load.

2) Without having to compensate for changes in location.

3. Combination full voltage magnetic starters mounted in MCC:

a) Circuit breaker:

1) Motor circuit protector (MCP) type.

b) Contactor NEMA rated.
c) Line plug-in, pull—out, lock-out type

1) Except starters NEMA size 5 and larger

(a) Fixed mounted with the approval of the Engineer.

2) Provide guides in structure for supporting and aligning unit starter during removal or replacement.

3) Plug-in units:

(a) Silver—plated

(b) Pressure type line disconnecting stabs

(c) High—strength copper alloy

4) Lock—out latch to padlock unit in “pull-out” position and at same time isolate stubs and entire unit from bus. Hold each unit in place by means of quick—captive fasteners.

d) Operating handle shall clearly indicate whether circuit breaker is ON, OFF or TRIPPED.

1) Provide means to lock each circuit breaker handle in OFF position with cover closed by means of up to three (3) padlocks. Interlock so that circuit breaker must be in OFF position before door can be opened:

(a) Provide defeater mechanism for use by authorized personnel.

e) Provide starter unit with ambient compensated, external manually reset table, three (3) bimetallic type overload relays. Coordinate size with actual motor full load current.

1) For motors with power factor correction capacitors, size heater elements to compensate for the capacitors effect on load current.

f) Provide heavy-duty devices:

1) NEMA 4K 30mm selector switches

2) NENA 4K 30mm pushbuttons

3) NEMA 4X 30mm pilot lights:

(a) Push-to-test type
(b) LED Lamps

4) Other devices as indicated on the Drawings

5) Devices will be accessible with the door closed

g) Provide each starter with two (2) extra field reversible N.O. auxiliary contacts for future use.

h) Provide each starter with bus voltage to 120 V control power transformer:

1) 480/120 V

2) Fused on primary and secondary sides

3) Rated for minimum of one hundred forty percent (140%) of required load suitable for operating controls and power motor winding space heaters as per the drawings and specifications.

4) For all motor starters

i) Provide six—digit readout elapsed time meter

j) Starter units will have the same fault current withstand rating as the main bus fault current withstands rating.

k) Provide each starter with the following status signals, wired to terminal boards:

1) Motor run contact (N.O.)

2) Motor stop contact (N.C.)

3) Auxiliary overload relay contact (N.O.)

B. Main and Feeder Circuit Breakers in MCC and Separately Mounted:

1. Molded case thermal magnetic or solid-state trip type, with minimum interrupting rating equal to the main bus fault current rating:

2. Circuit breaker frame sizes 150 A and less:

a) Non-interchangeable, non—adjustable thermal magnetic trip units.

3. Circuit breaker frame sizes 225 A and higher:

a) Interchangeable and adjustable thermal magnetic trip units.

4. Circuit breaker frame sizes 600 A and greater:

a) Solid state trip units, unless otherwise noted on the Drawings.

b) Current sensor or rating plug.

c) Adjustable current setting: Minimum range seventy to one hundred percent (70% — 100%) of current sensor or rating plug.

d) Adjustable instantaneous pickup: Minimum range three (3) to eight (8) times.

e) On circuit breakers 1000 A and larger provide ground fault protector.

1) Adjustable pick-up

2) Adjustable delay

5. Provide main circuit breaker with service entrance label.

6. All circuit breakers to be provided with padlocking provision in the OFF position for up to three padlocks.

7. Circuit breakers rated 400 A or above: One hundred percent (100%) rated.

C. Provide ambient compensated devices

D. Manual Starters with Thermal Element:

1. Quick—make, quick—break toggle mechanism

2. Trip free

3. Clearly indicate ON, OFF and TRIPPED position.

4. NEMA rated enclosure per area classification unless otherwise indicated on the Drawings.

E. Separately Mounted Starters:

1. Circuit breaker shall be motor circuit protector (MCP) type.

2. Contactor shall be NENA rated.

a) One—half (1/2) size and IEC sized starters not permitted.

3. Operating handle shall clearly indicate whether circuit breaker is ON, OFF, or TRIPPED.

a) Provide means to lock each circuit breaker handle in OFF position with cover closed by means of up to three padlocks.
b) Interlock so that circuit breaker must be in OFF position before door can be opened. Provide defeater mechanism for use by authorized personnel.

4. Provide starter unit with ambient compensated, external manually resettable, three (3) bimetallic type overload relays. Coordinate size with actual motor full load current.

   a) For motors with power factor correction capacitors size heater elements to compensate for the capacitors effect on load current.

5. Provide heavy-duty oil tight selector switches, pushbuttons, push-to-test pilot lights with LED lamps, or other devices as indicated on the Drawings. These devices will be accessible with the door closed.

6. Provide each starter with two (2) extra field reversible NO auxiliary contacts for future use.

7. Provide each starter with 480/120 V control power transformer fused on secondary side and rated for a minimum of one hundred forty percent (140%) of required load suitable for operating controls and motor winding space heaters as per the drawings and specifications.

8. Provide six—digit readout elapsed time meter.

9. Starter units will have the same fault current withstand rating as the MCC main bus fault current withstand rating from which they are fed.

10. Provide each starter with the following status signals, wired to terminal boards.

    a) Motor run contact (N.O.)

    b) Motor stop contact (N.C.)

    c) Auxiliary overload relay contact (N.O.)

F. Selector Switches, Indicating Lights, and Pushbuttons:

1. NEMA 4X for all areas

2. NEMA 4X/7 and 4X/9 for Class I, Division I Groups C and D; and Class II, Division I, Groups E, F, and G hazardous locations.

3. Selector switches shall have standard gloved operator.

4. Pushbuttons shall have standard flush operator.

5. Provide switch positions and contacts:

a) As specified on Contract Drawings or as necessary for proper control.

6. Switch contacts shall be NEMA A600 rated.

7. Indicating lights with LED lamps, unless specified otherwise.

8. Provide fifty percent (50%) replacement lamps for indicating lights.

9. Provide ten percent (10%) percent replacement caps for indicating lights.

G. Alarm Horns

1. Siren type

2. Sheet metal housing

a) Primer and finish coat of paint shall be suitable for use in corrosive areas.

3. Adjustable mounting bracket

4. For use on 120 V AC

5. Universal motor

6. Nominal 106 dE at 10' from source

7. Federal Signal Model ATT or approved equal

H. Control Relays:

1. Provide industrial control relays as specified on the Drawings and as required for proper operation and control of supplied equipment.

2. All control relays shall have 120 V coils capable of operating on line voltage fluctuations of plus or minus ten percent (+/— 10%) unless specified otherwise.

3. Relays shall be provided with NEMA A600 rated contacts, and shall be capable of supporting a minimum of eight contacts.

4. Provide relays with all N.O. contacts unless otherwise specified.

a) Contacts shall be field reversible.

5. Provide contacts for all required control plus two (2) spares.

I. Remote Operator Stations:

1. NEMA 12 for unclassified areas unless specified otherwise.

2. NEMA 4X for wet areas, outdoors or equipment specified WP, and control panel enclosures not covered under Div 11.

3. NEMA 4X for corrosive areas.

4. NEMA 7 and 9 for Class I, Division I, Groups C and D; and Class II, Division I, Groups E, F, and G hazardous locations.

5. Construction and installation shall be in accordance with NEC Article 373.

6. Provide barrier—type terminal strips for termination of all control and 120 V power field wiring plus twenty percent (20%) spare for all control panels.

7. Control panel construction:

   a) 14 GA steel

   b) Continuously welded seams

   c) Manufacturer's standard gray

J. Time Delay Relays:

1. Provide time delay relays with delayed pickup or release as specified on Drawings.

2. All time delay relays shall operate at 115 V AC plus or minus ten percent (+/— 10%)

3. Heavy duty, solid-state construction

4. Contact rating: 10 amps.

5. Provide external adjust dial with 0—9.99/99.9/999 second selectable range unless specified otherwise.

6. Operating temperature ranges: -18 to +50 °C

7. Repeat accuracy: plus or minus three percent (+/- 3%) plus ±lOms over specified voltage range.

8. Provide all required contacts plus two (2) N.O. spares.

9. Provide auxiliary relays as required to perform functions specified on Drawings.

K. Terminal Strips:

1. 600 V

2. Full size

3. Rated for 20 A continuous current

L. Enclosures and Control Panels:

1. NEMA 12 for unclassified areas

2. NEMA 4X for outdoor or wet areas

a) Except MCCs, which shall be NEMA 3R non-walk-in type

3. NEMA 4X for corrosive areas

4. NEMA 7 for Class I hazardous locations

PART 3 EXECUTION

3.1 INSTALLATION

A. Install as indicated and in accordance with manufacturer's recommendations and instructions.

B. Mount MCC on 4" high concrete pad:

1. Install two (2) 4" wide channel sills flush in pads to support and maintain alignment of the MCC.

2. Align front of MCC with top edge of pad chamfer.

C. Mount other equipment as scheduled in Section 16010 — Electrical Basic Requirements.

3.2 FIELD QUALITY CONTROL

A. Field—test and verify operation of the equipment.

END OF SECTION

SECTION 16483 – VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This section provides specification requirements for adjustable frequency drives; variable speed drives or herein identified as AC Drives for use with NEMA B design AC motors.

B. The AC Drive manufacturer shall furnish, field test, adjust and certify all installed AC Drives for satisfactory operation.

C. Any exceptions/deviations to this specification shall be indicated in writing to the specifying engineer in the submittal documentation.

D. AC Drives shall fit in locations as shown in the contract documents.

E. AC Drives shall operate auxiliary equipment such as seal water valves, motor space heaters, and include safety and equipment protection interlocks as shown in the contract documents.

F. The AC Drive manufacturer shall be responsible for providing all equipment specified under this section, and furnishing the equipment to the Contractor for installation.

G. The Contractor shall provide one fully configured variable frequency drive and enclosure for each size of drive suppled under this contract.

1.2 REFERENCES

A. NFPA-70 “National Electric Code (NEC)”

B. ANSI C84.1 “Electric Power Systems and Equipment - Voltage Ratings (60Hz)”

C. CSA® C22.2 No.14-95 “Industrial Control Equipment”

D. UL508A “Standard for Safety for Industrial Control Panels”

E. UL508C “Standard for Safety for Power Conversion Equipment”

F. NFPA 79 “Electrical Equipment of Industrial Machines/Industrial Machinery

G. NEMA ICS7 “Industrial Control and Systems: Adjustable Speed Drives

H. NEMA ICS7.1 “Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems

I. NEMA 250 “Enclosures for Electrical Equipment (1000V maximum

J. IEC 61800-2 “Adjustable speed electrical power drive systems - Part 2: General requirements - rating specifications for low voltage adjustable frequency AC power drive systems”

K. IEC 61800-3 “Adjustable speed electrical power drive systems - Part 3: EMC product standard including specific test methods”

L. IEC 61800-5-1 “Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy

M. IEC 61800-6 "Adjustable speed electrical power drive systems - Part 6: Guide for determination of types of load duty and corresponding current ratings.”

N. EGSA 101P “Engine Driven Generator Sets - Performance Standard”

O. IEEE 519 “Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems”

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Approval drawings shall be furnished for Engineer’s approval prior to factory assembly of the AC Drives. These drawings shall consist of elementary power and control wiring diagrams and enclosure outline drawings. The enclosure drawings shall include front and side views of the enclosures with overall dimensions and weights shown, conduit entrance locations and nameplate legend details.

C. Standard catalog sheets showing voltage, horsepower, maximum current ratings and recommended replacement parts with part numbers shall be furnished for each different horsepower rated AC Drive provided.

1.4 WARRANTY

A. The equipment manufacturer shall provide a two (2) year warranty beginning from substantial completion of the project, and shall guarantee that the equipment furnished is suitable for the purpose intended and free from defects of design, material and workmanship. In the event the equipment fails to perform as specified, the equipment manufacturer shall promptly repair or replace the defective equipment without any cost to the Owner (including handling, shipment, labor, travel time and expense costs).

1.5 QUALITY ASSURANCE

A. The manufacturer of the AC Drive shall be a certified ISO 9001 facility.

B. The AC Drive and all associated optional equipment shall be UL LISTED according to UL508C Power Conversion Equipment. A UL label shall be attached inside each enclosure as verification.

C. The AC Drive shall be designed constructed and tested in accordance with NEMA, NEC, VDE, IEC standards.

D. Every power converter shall be tested with an actual ac induction motor, 100% load and temperature cycled within an environmental chamber at 104°F. Documentation shall be furnished to verify successful completion at the request of the engineer.

E. All Drive door mounted pilot devices shall be tested to verify successful operation. Documentation shall be furnished upon written request of the engineer.

F. The AC Drive shall undergo QA test procedures and be submitted to a hi-pot test with all enclosed devices mounted and wired, prior to shipment.

1.6 OPERATIONS AND MAINTENANCE MANUALS

A. Operations and maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The AC Drive shall be provided by Square-D, or approved equal.

B. AC drive shall be Square-D Altivar including the following features: VFD, Bypass starter with service Switch, NEMA 12 enclosure with fans and filters, Input Circuit Breaker, 480 volt with factory authorized start-up.

C. Drive output rating shall be a minimum of 40 Amps at 480 Volts and shall be suitable for operation with 30 HP Pump Motors.

D. Drive shall include control interfaces as shown on the drawings and as specified. The VFD remote control shall be through discrete analog and digital signals

E. Drive enclosure shall be a standard manufactured assembly by the drive manufacture , NEMA 12 with front ventilation. Drives assembled into an enclosure by an OEM are not acceptable. There shall be no restriction on space requirements between the sides and rear of the floor mounted enclosures.

F. Alternate control techniques other than pulse width modulated (PWM) are not acceptable.

2.2 CONSTRUCTION

A. Seismic ratings and certifications shall be provided for all floor mounted enclosures. The seismic ratings shall meet IBC 2000, NFPA 5000, ASCE 7-02, UBC zone 4, CDC zone 4 and the 1995 NBCC with exceptions for application in the British Columbia area and the New Madrid Hazard Zone. Verification of testing shall be in accordance with ICC AC156 Acceptance Criteria testing

procedures. Enclosures shall exhibit a certification label on the inside enclosure door stating compliance to these requirements.

B. The AC Drive shall be mounted in a Type 1 enclosure with an external operated disconnect device. For AC Drives greater than 100Hp, NEMA Type 12 or Type 1G ventilated enclosures with gaskets and filters are acceptable.

C. There shall be no restriction on space requirements between floor mounted enclosures.

D. A mechanical interlock shall prevent personnel from opening the AC Drive door when the disconnect is in the "ON" position. It shall be possible for authorized personnel to defeat this interlock. Provisions shall be provided for locking all disconnects in the off position with up to three padlocks. Provisions shall also be made for accepting a padlock on the circuit breaker disconnect, preventing movement of the disconnect to the "ON" position when the door is open.

E. Provisions shall be made for both top and bottom conduit entry. Conduit knockouts shall be provided for wall mounted enclosures. Removable conduit entry plates shall be provided for floor mounted enclosures.

F. All fans within an enclosed AC Drive including the AC Drive heatsink fans shall be front accessible and removable without removal the AC Drive power converter to facilitate maintenance and or fan replacement.

G. Control wiring shall have permanent wire markings on printed on the wire insulation. Both ends of the control wiring shall contain wire markings per the as built control elementary diagram. Red control wiring shall be used for 115Vac control circuits and blue control wiring shall be used for 24V control circuits.

H. All AC Drive enclosures shall be painted ANSI 49 Gray. The enclosure interior shall include a white mounting surface for control and power component mounting for improved visibility.

2.3 GENERAL DESCRIPTION

A. The Drive shall be solid state, with a Pulse Width Modulated (PWM) output. The drive shall be a Direct Torque Control (DTC) AC to AC converter utilizing the latest isolated gate bipolar transistor (IGBT) technology. The Drive shall employ Direct Torque Control (DTC) inner loop torque control strategy that mathematically determines motor torque and flux every 25 microseconds (μs) (40,000 times per second). The drive must also provide an optional operational mode for scalar or V/Hz operation.

B. Ratings

1. The Drive shall be rated to operate from 3-phase power at 230VAC to 500VAC +10/-10%, 48Hz to 63Hz. The Drive shall employ a full wave rectifier to prevent input line notching and operate at a fundamental (displacement) input power factor of 0.97 at all speeds and loads. The Drive efficiency shall be 98% or better at full speed and load. An

internally mounted AC line reactor or DC choke shall be provided to reduce input current harmonic content, provide protection from power line transients such as utility power factor correction capacitor switching transients and reduce RFI emissions.

2. The overvoltage trip level shall be a minimum of 30% over nominal, and the under voltage trip level shall be a minimum 35% under the nominal voltage.

3. Output voltage and current ratings shall match the adjustable frequency operating requirements of standard 460VAC, 3ph, 60Hz, NEMA design A or NEMA design B motors. The overload current capacity shall be 110% of rated current for one (1) minute out of five (5). Output frequency shall be adjustable between 0Hz and 300Hz. Operation above motor nameplate shall require programming changes to prevent inadvertent high-speed operation. The drive's switching pattern shall be continually adjusted to provide optimum motor flux and avoid the high-pitched audible noise produced by motors energized by conventional PWM drives. The drive shall be furnished in a UL Type 1 listed enclosure rated for operation at ambient temperatures between 0° and 40°C at an altitude not exceeding 3300 feet, with relative humidity less than 95% and no condensation allowed. The drive shall be protected from atmospheric contamination by chemical gasses and solid particles pre IEC 721-3-3, classes 3C2 and 3S2. The drive shall be protected from vibration per IEC 68-2-6 (max. sinusoidal displacement 1 mm, 5Hz to 13.2Hz and max. acceleration 7m/s^2, 13.2Hz to 100Hz).

C. Control Functions and Adjustments

1. An intelligent start-up assistant shall be provided as standard. The Start-up assistant will guide the user through all necessary adjustments to optimize operation and will include "plug and produce" operation, which recognizes the addition of options/fieldbus adapters and provides the necessary adjustment assistance.

2. Start-up data entries shall include motor nameplate power, speed, voltage, frequency and current.
3. A motor parameter ID function shall automatically define the motor equivalent circuit used by the sensor less vector torque controller.

4. A PID speed/torque loop regulator shall be provided with an auto tune function as well as manual adjustments.
5. A selection of six (6) preprogrammed application macro parameter sets shall be provided to minimize the number of different parameters to be set during start-up. Macros included as standard are as follows: Factory Default, Hand/Auto, PID Control, Sequential Control, and Torque Control. A selection of two (2) user defined macros shall are also be available.

6. Start/Stop control functions shall include two (2) or three-(3) wire start/stop, coast/ramp stop selections, optional dynamic braking and flux braking.

7. The AFD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to reference without safety tripping or component damage (flying start). The AFD shall also be capable of flux braking at start to stop a reverse spinning motor prior to ramp.

8. The AFD shall have the ability to automatically restart after an overcurrent, overvoltage, under voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.

9. Accel/Decel control functions shall include two (2) sets of ramp time adjustments with linear and three (3) s-curve ramp selections.

10. Speed/Torque control functions shall include:

    a) Adjustable min. /max. speed and/or torque limits
    b) Selection of up to 15 preset speed settings or external speed control
    c) Three (3) sets of critical speed lockout adjustments.
    d) A built-in PID controller to control a process variable such as pressure, flow or fluid level.
    e) Reference signal processing shall include increase/decrease floating point control and control of both speed/torque and direction using a “joystick” reference signal. Two (2) analog inputs shall be programmable to form a reference by addition, subtraction, multiplication, minimum selection or maximum selection.

11. Output control functions shall include:

    a) Flux optimization to limit the audible noise produced by the motor and to maximize efficiency by providing the optimum magnetic flux for any given speed/torque operating point.
    b) Current and torque limit adjustments to limit the maximum Drive output current and the maximum torque produced by the motor. These limits shall govern the inner loop torque regulator to provide tight conformance with the limits with minimum overshoot.
    c) A torque regulated operating mode with adjustable torque ramp up/down and speed/torque limits.

12. The Drive shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output

and/or over the serial communications bus. Relay output shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.

13. The Drive shall have programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped from the level of a process feedback signal.

14. Two (3) programmable critical frequency lockout ranges to prevent the AFD from operating the load continuously at an unstable speed.

D. Static and Dynamic Performance

1. Open loop static speed regulation shall be 0.1% to 0.3% (10% of motor slip). When motor speed feedback is provided from a suitable encoder, closed loop speed regulation shall be 0.01% or better. Dynamic speed accuracy shall be 0.3-0.4 %-sec or better open loop and 0.1-0.2 %-sec or better-closed loop.

2. Torque response time shall be 5ms or less. In the torque regulating mode, torque regulating accuracy shall be 4% or better.

E. Operator Control Panel (Keypad)

1. Each Drive shall be equipped with a front mounted operator control panel (keypad) consisting of a four- (4-) line by 20-character back-lit alphanumeric display and a keypad with keys for Run/Stop, Local/Remote, Increase/Decrease, reset, menu navigation and parameter select/save.

2. All parameter names, fault messages, warnings and other information shall be displayed in complete English words or standard English abbreviations to allow the user to understand what is being displayed without the use of a manual or cross-reference table.

3. Other languages selectable in addition to American English (Am) shall be as follows: English (European), French, Spanish, Portuguese, German, Italian, Dutch, Danish, Swedish, Finnish, Czech and Polish.

4. The Display shall have contrast adjustment provisions to optimize viewing at any angle.

5. The control panel shall include a feature for uploading parameter settings to control panel memory and downloading from the control panel to the same drive or to another drive.

6. All Drives throughout the entire power range shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.

7. The keypad is to be used for local control, for setting all parameters, and for stepping through the displays and menus.

8. The keypad shall be removable and insertable under drive power, capable of remote mounting, and shall have its own non-volatile memory.

9. During normal operation, one (1) line of the control panel shall display the speed reference, and run/stop forward/reverse and local/remote status. The remaining three (3) lines of the display shall be programmable to display the values of any three (3) operating parameters. At least 26 selections shall be available including the following:

    a) Speed/torque in percent (%), RPM or user-scaled units
    b) Output frequency, voltage, current and torque
    c) Input voltage, power and kilowatt hours
    d) Heatsink temperature and DC bus voltage
    e) Status of discrete inputs and outputs
    f) Values of analog input and output signals
    g) Values of PID controller reference, feedback and error signals
    h) Control interface inputs and outputs shall include:

F. I/O Capabilities

1. A minimum of threediscrete inputs, all independently programmable. Inputs shall be designed for “dry contact” inputs used with either an internal or external 120V AC source.

2. A minimum of three (3) form C relay contact outputs, all independently programmable with at least 30 output function selections. Relay contacts shall be rated to switch 2 Amps at 24VDC or 115/230VAC. Function selections shall include indications that the drive is ready, running, reversed and at set speed/torque. General and specific warning and fault indications shall be available. Adjustable supervision limit indications shall be available to indicate programmed values of operating speed, speed reference, current, torque and PID feedback.

3. Two (2) analog inputs, 4mA - 20mA, all independently programmable. A differential input isolation amplifier shall be provided for each input. Analog input signal processing functions shall including scaling adjustments, adjustable filtering and signal inversion. If the input reference is lost, the AFD shall give the user the option of the following: (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the AFD speed based on the last good reference

received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.

4. Two (2) analog outputs providing 4mA to 20mA signals. Outputs shall be independently programmable to provide signals. including output speed, frequency, voltage, current and power.

G. Protective Functions

1. For each programmed warning and fault protection function, the drive shall display a message in complete English words or Standard English abbreviations. The five (5) most recent fault messages and times shall be stored in the drive's fault history.

2. The drive shall include internal MOV's for phase to phase and phase to ground line voltage transient protection.

3. Output short circuit and ground fault protection rated for 65,000 amps shall be provided per UL508C without relying on line fuses. Motor phase loss protection shall be provided.

4. The drive shall provide electronic motor overload protection qualified per UL508C.

5. Protection shall be provided for AC line or DC bus overvoltage at 130% of maximum rated voltage or under voltage at 65% of min. rated voltage and input phase loss.

6. A power loss ride through feature will allow the drive to remain fully operational after losing power as long as kinetic energy can be recovered from the rotating mass of the motor and load.

7. Stall protection shall be programmable to provide a warning or stop the drive after the motor has operated above a programmed torque level for a programmed time limit.
8. Underload protection shall be programmable to provide a warning or stop the drive after the motor has operated below a selected underload curve for a programmed time limit.
9. Over-temperature protection shall provide a warning if the power module temperature is less than 5°C below the over-temperature trip level.
10. Input terminals shall be provided for connecting a motor thermistor (PTC type) to the drive's protective monitoring circuitry. An input shall also be programmable to monitor an external relay or switch contact (klixon).

2.4 OPERATOR CONTROLS

A. Industrial rated control operators and pilot devices shall be door mounted and used independently of the keypad display control modes of Hand-Off-Auto, VFD-OFF-BYPASS, etc. as required. The Keypad Display shall be mounted on front of the drive cabinet.

Control modes shall function as follows:

1. Hand – The Hand mode shall allow manual operation of start, stop and speed control. The AC drive shall start when the control operator is in the Hand mode and run and at low speed setting of the drive or higher as required by the position of the manual speed potentiometer. This mode shall function as 2-wire control and automatically restart after a power outage or auto restart after fault.

2. Off - The "Off" position of the control operator shall stop the AC drive and prevent it from restarting while in the "Off" position. This position shall also reset the AC Drive after a fault condition has occurred.

3. Auto - The Automatic mode shall receive an auto start contact to control start and stop of the AC Drive. This contact shall also start and stop bypass (if used) when both the Automatic mode and Bypass modes of operations are selected. In Automatic mode the user shall remotely reset the AC Drive by opening and closing the Auto-start contact. Speed control shall be from a customer supplied 4-20mA signal.

B. The AC Drive shall include door-mounted "VFD Run", "VFD Fault", "External/MOL Fault" and "Bypass Run" pilot lights. All pilot lights shall Utilize LED lamps.

2.5 SYSTEM CONTROL AND INTERFACE REQUIREMENTS

A. The following additional controls and interface requirements shall be provided:

1. Seal Water Solenoid – The AC Drive shall provide 120Vac/50VA to operate the seal water solenoid whenever the motor is energized.

2. Check Valve Sequencing – The AC Drive shall provide a circuit that shuts down the drive whenever a user supplied check valve limit switch does not open within a specified time. This circuit shall provide an illuminated reset push button to indicate improper sequence.

3. Provide N.C. Contacts and 120V AC power source for motor winding space heater.

4. Auxiliary Contacts – The AC Drive shall provide the following auxiliary contacts to indicate the following conditions:

1 N.O. contact to indicate DRIVE RUN
1 N.O. contact to indicate VFD FAULT
1 N.O. contact to indicate BYPASS RUN
1 N.O. contact to indicate AUTO MODE

1 N.O. contact to indicate HAND MODE

2.6 EMERGENCY FULL SPEED REQUIREMENTS (BYPASS)

A. The AC Drive shall include fully rated isolation and bypass contactors complete with Class 20 thermal overload relay protection for emergency full speed capability. Bypass and isolation contactor shall be interlocked. Emergency full speed bypass starters for motors larger than 75 HP shall be solid state reduced voltage soft starter. Bypass and isolation contactors shall be integrated construction configuration.

1. Integrated bypass shall consist of integrating bypass and isolation contactors into the same enclosure compartment as the AC drive controller if space permits. One disconnect shall be common to the drive controller and bypass contactor.

B. Manual transfer to bypass function shall be provided in the event of drive fault or failure. This feature shall be enabled or disabled by an internally mounted selector switch. An adjustable timer shall provide control of the delay time between fault and transfer to bypass.

2.7 HARMONIC MITIGATION EQUIPMENT REQUIREMENTS

A. The AC Drive shall be provided with a line reactor mounted inside the enclosure.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that the location is ready to receive work and the dimensions are as indicated.

B. Do not install AC Drive equipment until the building environment can be maintained within the service conditions required by the manufacturer.

3.2 PROTECTION

A. Before and during the installation, the AC Drive equipment shall be protected from site contaminants and debris in accordance with the manufacturer’s recommendations.

3.3 INSTALLATION

A. The Drive manufacturer shall provide adequate drawings and instruction material to facilitate installation of the Drive by the Contractor. Installation shall comply with manufacturer's instructions, drawings and recommendations.

B. The AC Drive manufacturer shall provide a factory certified technical representative to supervise the Contractor's installation, testing and start-up of the AC Drives furnished under this specification as required. The technical

representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations. A Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer. A copy of all drives configuration parameters and their associated settings programmed into each VFD shall be provided to the Owner at the completion of start-up and shall be included in the final O&M.

3.4 TRAINING

A. The AC Drive manufacturer shall arrange for an on-site training course of a minimum of 2 training days, provided by a representative of the AC Drive manufacturer plant and/or maintenance personnel.

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END OF SECTION

SECTION 16500 – LIGHTING

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, tools and equipment necessary for furnishing, installing, connecting, testing and placing into satisfactory operation all lighting fixtures, lamps, contactors, controls, supports, etc. as required for a complete and operational lighting system as specified herein and indicated on the Contract Drawings.

B. Lighting shall be in accordance with the latest requirements of the Illuminating Engineering Society, and all lighting fixtures shall have the Underwriters Laboratories, Inc. label of approval.

C. All wiring shall be placed in conduit and shall comply with the Specifications for conduit, outlet boxes, pull and junction boxes, wires and cables, grounding, and other Sections as set forth in these Specifications and as noted herein.

D. All light fixtures and LED Lamps, and drivers shall be provides with a minimum 5 year warranty.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Specification Section 16010 – Electrical Basic Requirements.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples. The Contractor shall provide submittals to include the following:

1. Equipment specifications and product data sheets identifying all materials used and methods of fabrication.

2. Catalog cuts for each lighting fixture type showing performance and construction details of standard lighting fixtures, and complete working drawings showing all proposed construction details of special or modified standard lighting fixtures.

3. Photometric curves

4. Photometric plans shall be provided if substitutions are made from the equipment shown or specified. Data shall be submitted electronically in an approved Engineer format.

5. LED light source data

6. LED Driver information

7. Catalog data including applicable coefficients of utilization tables, isolux chart of illumination on a horizontal plane, beam efficiency, horizontal and vertical beam spread, and beam lumens.

8. Wind-load calculations for light poles

1.4 OPERATONS AND MAINTENANCE MANUALS

A. Operations and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable firms regularly engaged in the manufacturing of lighting equipment, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

B. Manufacturer's catalog number and description in the lighting fixture schedule on the Contract Drawings establishes a level of quality, style, finish, etc. The use of a catalog number describing the various types of light fixtures shall be used as a guide only, and does not exclude all the required accessories or hardware that may be required for a complete installation.

C. All products shall be UL listed and meet the requirements of the National Electrical Code (NEC). Electrical components shall be listed and labeled by U.L.

2.2 TOOLS, SUPPLIES, AND SPARE PARTS:

A. The Contractor shall provide to the Owner, for each equipment item, the following:

1. Special tools necessary to disassemble, service, repair and adjust the equipment.

2. All spare parts as recommended by the equipment manufacturer.

3. A minimum two (2) or one (1) ballast for every ten (10) ballasts (of the same type) installed; whichever is greater.

4. A minimum of one (1) lamp for every five (5) lamps (of the same type) installed; whichever is greater.

2.3 LIGHTING CONTROLS

A. The lighting systems shall be controlled as specified herein and indicated on the Contract Drawings.

B. Lighting contactors shall be furnished and installed for specific lighting control applications as specified herein and indicated on the Contract Drawings.

2.4 EXTERNALLY MOUNTED PHOTOCELL SWITCHES

A. Hermetically sealed cadmium sulfide cell with single-throw contacts rated for 277V for 1800VA. The photocell switch shall be housed within a die-cast, vandal and impact resistant enclosure. Designed to turn on at level below 3 footcandles and off at 3 to 10 footcandles. A 15 second time delay to prevent switching from transient light sources. Directional lens, mounted in front of cell, to prevent fixed light sources from turning unit off. Temperature range -40F to +170F. Power consumption less than 1.4W average.

2.5 LIGHT FIXTURES

A. All light fixtures shall utilze a LED light source

B. Light fixture leads shall be as required by the NEC.

C. All glassware shall be high quality, homogeneous in texture, uniform in quality, free from defects, of uniform thickness throughout and properly annealed. Edges shall be well rounded and free from chips or rough edges.

D. Refer to the lighting fixture schedule on the Contract Drawings.

2.7 LAMPS

A. The contractor shall furnish and install lamps in all light fixtures. Alll light fixtures shall utilize a LED light souce.

2.8 LIGHT POLES

A. Pole mounted light fixtures shall be mounted on light poles as designated in the lighting fixture schedule or as indicated on the Contract Drawings. Light poles shall be designed for wind loading in accordance with the latest edition of the Florida Building Code for 3 second gust wind speeds per specific site location.

B. The Contractor shall furnish and install a concrete foundation for all light poles as required or as indicated on the Contract Drawings. All anchor bolts and nuts shall be stainless steel and provided by the light pole manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Lighting fixtures shall be located symmetrically with architectural lines and landscape features as shown on the Contract Drawings. The Contractor shall furnish and install the light fixtures to allow "convenient" access for maintenance such as cleaning, relamping, and other activities. The light fixtures shall be installed to be accessed by a 25FT ladder. Where light fixtures are shown in locations on the Contract Drawings where maintenance would be difficult, the Contractor shall notify the Engineer.

B. The Contractor shall provide and install all inserts, conduit, structural supports, lamps, ballasts, poles, wiring, and any other items as required for a complete system. Contractor shall properly adjust and test, to the satisfaction of the Engineer, the entire lighting system.

C. The Contractor shall furnish and install all pendant trapezes and pendant stem hangers with durable swivel or equivalent trapeze hanger permitting normal light fixture motion and self-alignment. Light fixture pendants shall be type UNJ ball type flexible hanger at the light fixture and supports from a JBLX junction box with JBLX hub cover, or approved equal. Pendant lengths shall be adequate and adjusted to provide uniformity of installation heights above the reference datum. Stems shall be one-piece, with matching canopies and fittings.

D. Light fixtures located on the exterior of the building shall be provided with neoprene gasket and non-ferrous metal screws finished to match the light fixtures.

E. The finish or exposed metal parts of light fixtures and finish trims of all recessed light fixtures shall be as directed by the Engineer.

F. The Contractor shall furnish and install recessed light fixtures with a separate junction box concealed and located as to be accessible when the light fixture is removed.

G. The Contractor shall furnish and install all boxes for light fixtures such that the box is not the sole support of the light fixture. The boxes shall be offset to allow maintenance such that access to wiring within the box can be attained without having to consider supporting the light fixture.

H. All lighting units, when installed, shall be set true and be free of light leaks, warps, dents, and other irregularities. All hangers, cables, supports, channels,

and brackets of all kinds for safely erecting this equipment in place, shall be furnished and erected in place by the Contractor.

I. The Contractor shall install light fixtures at mounting heights indicated on the Contract Drawings or the Engineer. In areas with exposed ducts and/or piping, installation of light fixtures shall be adapted to field conditions as determined by the Engineer.

J. The Contractor shall support each light fixture securely. Each light fixture shall be secured to the building structure. The Contractor shall not secure light fixtures to the work of other trades, unless specified or noted otherwise, and shall not support light fixtures to plaster. The Contractor shall furnish and install all steel members and supports as required to fasten and suspended light fixtures from the structure.

K. In all mechanical equipment areas, the Contractor shall install light fixtures on the ceiling after all piping and equipment therein has been installed. Exact locations for such light fixtures may be determined by the Engineer on the site during the course of the work.

L. Upon completion of work, and after indoor areas are cleaned, all lighting fixtures shall be made clean and free of dust and all other foreign matter both on visible surfaces, and on surfaces that affect the lighting performance of the light fixture including diffusers, lenses, louvers, reflectors, and lamps.

M. All light fixtures that require physical adjustment shall be so adjusted in accordance with the directions of the Engineer. The Contractor shall also adjust angular direction of light fixtures and/or lamps, as directed.

N. Relamping access shall require no special tools. All optical control surfaces such as lenses and reflectors shall be safely and securely attached to lighting fixtures and shall be easily and quickly removed and replaced for cleaning without the use of tools. No light fixture part that may be removed, for maintenance, shall be held in place by metal tabs that must be bent to remove said part.

O. Pole mounted light fixtures shall be mounted on poles as designated in the lighting fixture schedule or as indicated on the Contract Drawings. All metal poles shall be bonded to the site grounding system. Poles shall have adequate handholes and weatherproof receptacles where indicated.

P. The Contractor shall furnish and install switches as indicated on the Contract Drawings. Switches shall be installed in accordance Specification Section 16140 - Wiring Devices.

Q. The Contractor shall furnish and install time switches or photocells as specified herein or indicated on the Contract Drawings

R. All exterior light fixtures mounted on concrete or masonry shall be caulked with approved color matching compounds.

S. The Contractor shall protect all light fixtures and light poles at all times. Before final acceptance, by the Engineer, all light fixtures, light poles and associated devices shall be:

1. Operating condition

2. Free of any scraps, dents or chips in the finish

3. Cleaned of all dust, dirt or other material

4. Fully lamped

END OF SECTION

SECTION 16671 – TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS) 1kV or LESS

PART 1 GENERAL

1.1 THE REQUIRMENT

A. The Contractor shall furnish and install the Transient Voltage Surge Suppression (TVSS) equipment having the electrical characteristics, ratings and modifications as specified herein and as shown on the Contract Drawings.

B. The TVSS equipment shall provide effective high-energy protection against transient surges, temporary over voltages, voltage swells and high-frequency noise attenuation for power, control and telephone/data circuits 1kV or less and as shown on the Contract Drawings.

C. The TVSS units and all components shall be designed, manufactured and tested in accordance with the latest applicable UL standards.

D. The TVSS equipment installation shall conform to local code requirements and the National Electric Code (NEC).

E. All materials and workmanship shall be of the highest quality.

1.2 DEFINITIONS

A. EMI: ElectroMagnetic Interference

B. NTRL: Nationally Recognized Testing Laboratory

C. SCCR: Short Circuit Current Rating

D. SPD: Surge Protection Device

1. Type-I: Permanently connected between the secondary of the utility transformer and the line or load side of the service entrance overcurrent device and intended to be installed without an external overcurrent device.

2. Type-II: Permanently connected to the load side of the service entrance overcurrent device including branch circuit panels.

3. Type-III: Connected from the electrical service panel to the point of utilization with a minimum conductor length of 30 FT.

4. Type-IV: Component and/or component assemblies.

E. SVR: Suppressed Voltage Rating

F. TOV: Temporary Over Voltage

G. TVSS: Transient Voltage Surge Suppressor

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. Institute of Electrical and Electronics Engineers (IEEE):

a) C62.41, IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits.

b) C62.43, IEEE Certified by NRTL as “Secondary Surge Arrestor”

c) C62.45, IEEE Guide for Surge Testing for Equipment Connected to Low-Voltage AC Power.

2. International Electrotechincal Commission (IEC):

a) 61024, Protection of Structures against Lightning.

3. National Electrical Manufacturers Association (NEMA):

a) LS-1 (1992), Low Voltage Surge Protection Devices

4. National Fire Protection Association (NFPA):

a) NFPA 70, National Electrical Code (NEC) Article 285.

5. Underwriters Laboratories, Inc (UL):

a) 1283, Electromagnetic Interference Filters

b) 1449, Transient Voltage Surge Suppressors

1.4 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. Product Data: For each type of product indicated, include unit dimensions, weights, installation instructions, wiring details, rated capacities, operating characteristics, furnish specialties and accessories. Include the following documents:

1. Suppressed Voltage Rating

2. Symmetrical Fault Current Withstand Ratings

3. Provide independent third-party testing lab report indicating device is capable of surviving the specified number of 8x20 micro-second waveforms.

4. Spectrum Analysis based on MIL-STD-220A test procedures between 50 kHz and 200 kHz verifying the device noise attenuation equals or exceeds 50 dB at 100 kHz.

5. Survivability of multiple TOV events for Type-I and Type-II devices.

C. Product Certificates: For TVSS/SPD devices, signed by third-party NRTL testing agencies certifying compliance with the following standards:

1. UL 1283

2. UL 1449 Second Edition 2005 Revision

3. IEEE C62.34 Secondary Surge Arrestor

4. NEMA LS-1 (1992) Low Voltage Surge Protective Devices

D. Qualification Data: Third-Party testing lab or U.S. Department of Labor/OSHA approved NRTL.

E. Field Quality-Control test reports, including the following:

1. Test procedures used. Include single impulse testing data that matches label rating, including fuses or upstream breaker.

2. Test results that comply with requirements.

3. Failed test results and corrective actions taken to achieve requirements.

F. Operation and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data. For each type or series of TVSS/SPD devices to include emergency, operation and maintenance manuals.

G. Warranties: The manufacturer shall provide a full ten (10) year warranty from the date of installation against any TVSS/SPD device part failure when installed in compliance with manufacturer's written instructions and any applicable national or local codes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following manufacturers:

1. Advanced Protection Technologies Inc.

2. Current Technology

3. Eaton/ Cutler Hammer

4. Innovative Technology

5. General Electric

6. Square-D

7. Approved Equivalent

2.2 SERVICE ENTRANCE SPD (TYPE-I)

A. Surge Protection Device Description: Modular design with field-replaceable module with EMI filtering and the following features:

1. The SPD unit tested at 200kA interrupting capacity (AIC).

2. The SPD unit shall provide overvoltage protection as follows:

   a) >1800 cycles at 180% of rated voltage to 0.7 OHM load

   b) Test Report included

3. Fabrication using bolted compression lugs for internal wiring.

4. Utilizing copper bus bars, wire connections and bolted connections to phase buses, neutral bus and ground bus.

5. Integral disconnect switch capable of passing full rated surge current.

6. Multiple suppression circuits with current sharing.

7. LED indicator lights for power and protection status.

8. Monitoring system capable of the following:

   a) Number of transient surges, overvoltages and undervoltages

   b) Neutral-to-ground voltage and current

   c) EMI filter status

   d) Percentage of protection available

9. Audible alarm with silencing switch to indicate when protection has failed.

10. Dual set of dry contacts rated at 5A and 250VAC for remote monitoring of protection status.

11. Field testable with test data from factory provided comparison.

12. Field replaceable surge protection modules.

B. Peak Single-Impulse Surge Current Rating of 200kA per mode.

C. Connection Means: Permanent

D. Protection modes and UL 1449 SVR for voltages of 480/277V, 3-Phase, 4-Wire, grounded wye circuits shall be as follows:

1. Line to Neutral: 800V

2. Line to Ground: 1000V

3. Neutral to Ground: 900V

E. EMI noise rejection or attenuation values shall be in compliance with test and evaluation procedures outlined in NEMA LS-1 1992.

2.3 MOTOR CONTROL CENTER (MCC) SPD (TYPE-II)

A. Surge Protection Device Description: Modular design with field-replaceable module mounted externally to the MCC with EMI filtering and the following features:

1. Supplied with fuses rated at 200kA interrupting capacity (AIC).

2. Fabrication using bolted compression lugs for internal wiring.

3. Utilizing wire connections to phase buses, neutral bus and ground bus.

4. Multiple suppression circuits with current sharing.

5. LED indicator lights for power and protection status.

6. Monitoring system capable of the following

a) Number of transient surges, overvoltages and undervoltages

b) Neutral-to-ground voltage and current

c) Percentage of protection available

7. Audible alarm with silencing switch to indicate when protection has failed.

8. Dual set of dry contacts rated at 5A and 250VAC for remote monitoring of protection status.

9. Field testable with test data from factory provided comparison.

10. Field replaceable surge protection modules.

B. Peak Single-Impulse Surge Current Rating of 100kA per mode.

C. Connection Means: Permanent

D. Protection modes and UL 1449 SVR for voltages of 480/277V, 3-Phase, 4-Wire, grounded wye circuits shall be as follows:

1. Line to Neutral: 900V

2. Line to Ground: 900V

3. Neutral to Ground: 900V

E. EMI noise rejection or attenuation values shall be in compliance with test and evaluation procedures outlined in NEMA LS-1 1992.

2.4 LIGHTING PANELBOARD SPD (TYPE-II)

A. Surge Protection Device Description: Modular design with field-replaceable module mounted externally to the panelboard with EMI filtering and the following features:

1. Supplied with fuses rated at 200kA interrupting capacity (AIC).

2. Fabrication using bolted compression lugs for internal wiring.

3. Utilizing wire connections to phase buses, neutral bus and ground bus.

4. Multiple suppression circuits with current sharing.

5. LED indicator lights for power and protection status.

6. Monitoring system capable of the following

a) Number of transient surges, overvoltages and undervoltages

b) Neutral-to-ground voltage and current

c) Percentage of protection available

7. Audible alarm with silencing switch to indicate when protection has failed.

8. Field testable with test data from factory provided comparison.

9. Field replaceable surge protection modules.

B. Peak Single-Impulse Surge Current Rating of 80kA per mode.

C. Connection Means: Permanent

D. Protection modes and UL 1449 SVR for voltages of 208/120V, 3-Phase, 4-Wire, grounded wye circuits shall be as follows:

1. Line to Neutral: 400V

2. Line to Ground: 500V

3. Neutral to Ground: 500V

E. EMI noise rejection or attenuation values shall be in compliance with test and evaluation procedures outlined in NEMA LS-1 1992.

PART 3 EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICE (SPD)

A. For Dual Rated Surge Protection (listed as both Surge Arrestor and SPD) for service entrance, product can be placed on either Line or Load side of the Service Entrance Equipment.

1. Provide and install circuit breakers or fuses as shown on the Contract Drawings.

B. For all remaining SPD devices:

1. Provide and install circuit breakers or fuses as shown on the Contract Drawings.

C. Install SPD devices for panelboards and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do NOT exceed manufacturer's recommended lead length. Do NOT connect neutral and ground leads together.

D. SPD devices shall NOT be integrated with Switchgear or Panelboards as recommended by IEEE-1100, Section 8.4.2.5.

E. All SPD devices shall have the raceway between the SPD and the switchgear enclosure sealed with approved fire sealant. The sealant shall prevent vapors from entering the switchgear enclosure.

3.2 PLACING EQUIPMENT INTO SERVICE

A. Do not energize or connect service entrance equipment, panelboards, control panels or telephone/data equipment to their sources until surge protection devices are installed and connected.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Contractor shall engage a factory-authorized service representative to perform inspections, field tests and adjustments to the equipment including all connections. Service Representative shall report results in writing to the Engineer.

1. Verify that the electrical wiring installation complies with manufacturer's written installation instructions and requirements.

2. After installation of SPD devices but before circuitry has been energized, test for compliance with requirements.

3. Complete installation checks according to manufacturer's written instructions.

4. Remove and replace malfunctioning SPD devices and retest as specified as above.

END OF SECTION

SECTION 16960 – ELECTRICAL EQUIPMENT TESTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Electrical equipment test reports.

1.3 SUBMITTALS

A. All submittals shall be in accordance with Specification 01340 – Shop Drawings, Project Data and Samples.

B. All testing shall be performed by a third party independent testing company certified by the International Electrical Testing Association (NETA).

C. Motor Circuit Test Reports: Complete Motor Circuit Test Report for each three-phase motor 5 HP and above.

D. Low Voltage Feeder Insulation Test Reports: Complete the Low Voltage Feeder Insulation Test Report for each single-phase and three-phase feeder rated 100 amperes and above.

E. Ground Resistance Test Reports: Complete the Ground Resistance Test Report for each structure that receives a service or a feeder.

F. Medium and High Voltage Feeder Insulation Test Reports: Complete the Medium and High Voltage Feeder Insulation Test Report for each medium and high voltage feeder and motor circuit.

G. Manufacturer's insulation testing instructions for medium and high voltage cable.

1.4 OPERATION AND MAINTENANCE MANUALS

A. Operations and Maintenance Manuals shall be submitted as outlined in Specification 01730 – Operation and Maintenance Data.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Use an ohmmeter for motor winding resistance testing. Perform in accordance with ohmmeter manufacturer's instructions.

B. Use a ground resistance test instrument for ground resistance testing. Perform testing in accordance with test instrument manufacturer's instructions. Perform test in normally dry weather, not less than 48 hours after rainfall.

C. Use a 1000 VDC megohms meter for low voltage insulation testing. Perform testing in accordance with megohms meter manufacturer's instructions.

D. Use suitable test instruments for medium and high voltage insulation testing. Perform testing in accordance with test instrument manufacturer's instructions.

1. Individually test each conductor with all other conductors and all shields grounded.

2. Provide proper corona suppression at each termination using a guard ring or other suitable method.

3. Apply DC hypotential in at least eight equal increments until maximum test voltage is reached. Record the DC leakage current at each step after a constant stabilization time consistent with system charging current decay.

4. Hold the test voltage at the maximum level for 10 minutes. Record the DC leakage current every 30 seconds for the first 2 minutes, and then every minute thereafter.

5. Reduce the test voltage to zero and apply ground to tested conductor for a period adequate to drain all potential stored in the insulation.

6. Make a graphic plot of the leakage current versus the test voltage at each step and continue plot with leakage current versus time based upon the recorded values.

7. Maximum Test Voltage: IEEE and manufacturer‘s stated levels.

8. Use an ohmmeter to test shield continuity and record values measured.

9. Replace conductors and cable which indicate poor insulation levels as determined by the ENGINEER. Do not splice as a means of repair.

10. Install additional ground rods as required to achieve specified ground resistance. See Section 16450 – Grounding and Bonding.

3.1 REPORT FORMS

A. Motor Circuit Test Report

Equipment _____ Location _____

Manufacturer _____ Frame _____

Horsepower _____ Phase _____ RPM _____ Service Voltage _____

Motor Overload _____ Manufacturer _____

Nameplate Volts* _____ Running Volts* _____

Nameplate Amperes* _____ Running Amperes* _____

Nameplate Locked Rotor Amps _____ Nameplate Power Factor _____ % Nameplate Efficiency _____ %

Insulation Class _____ Starting Code _____

Feeder runs from _____

Feeder Wire Size _____ Insulating Voltage Rating _____ Insulation Type _____

* Give armature/field for DC motors.

1. Motor Winding Resistance Test (multi-meter)

Winding	Resistance (ohms)
A to B	
B to C	
C to A	

2. Motor Feeder/Winding Insulation Test (Megohm Meter)

   a) Perform the following test AFTER connecting the feeder to the motor.

   b) Test from load side of motor controller.

   c) Readings must be greater than 50 Megohms.

Phase	Megohms at 1000 VCD
A to Ground	
B to Ground	
C to Ground	

Testing performed by _____ Date: _____

Testing Witnessed by _____

B. Feeder Insulation Test Report

1. Perform test BEFORE terminating feeder to equipment.

Feeder runs from _____

Feeder runs to _____

Wire Size _____ Insulation Voltage Rating _____ Insulation Type _____

Readings must be greater than 50 Megohms.

Phase	Megohms at 1000 VDC
A to Ground	
B to Ground	
C to Ground	

Testing performed by _____ Date: _____

Testing Witnessed by _____

COMMENTS

C. Grounding Test Report

Type of Ground _____
(Single Rod or Multiple Rod – Provide Quantity)

Location _____

Date Installed _____

Weather Conditions(Temp,Humidity) _____

Date of Last Rain _____

Ground Resistance(ohms) _____

Testing Performed by _____ Date: _____

Testing Witnessed by _____

COMMENTS

D. Hi-Pot Test Report

MEDIUM AND HIGH VOLTAGE DC CABLE TEST REPORT					
Project No.	Operating Voltage	GN ____ Y ____ Aerial ____ Magnetic Duct ____ UN-GN ____ Dry ____ Buried ____ Non-Magnetic Duct ____			
Insulation Material	Insulation Thickness	Voltage Rating	Jacket & Thickness	Shield Tap ____ Wire ____	Non-Shielded ____ Extruded ____
Cable Mfg.	Type of Termination & Mfg.				Indoor ____ Outdoor ____
Weather Conditions				Temperature	
Cable Testing Company			Signature of Operator		

10% Voltage Steps				Max. Voltage for 10 min.				Remarks
DC kV	Micro-amps			Time @ kV	Æ1	Æ2	Æ3	
	Æ1	Æ2	Æ3	0				
				15 sec.				
				30 sec.				
				1 min.				
				2 min.				
				3 min.				
				4 min.				
				5 min.				
				6 min.				

				7 min.				
				8 min.				
				9 min.				
				10 min.				

Current Leakage Plot																		
Leakage vs. Step Voltage											Leakage vs. Time							

20%	40%	60%	80%	Max kV	2	4	6	8
Test Voltage @ 10% Steps				Time @ Max. Voltage				

END OF SECTION

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
South District Office
P.O. Box 2549
Fort Myers, FL 33902-2549

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

VIA ELECTRONIC MAIL

February 13, 2014

McKim & Creed
Mathew S. Love, P.E.
3903 Northdale Blvd.
Suite 140 W
Tampa, Florida 33624
mlove@mckimcreed.com

Re: Sarasota County – ERP
File No. 58-0323835-001
Eastside Water Reclamation Facility
Reclaimed Water Filtration Improvements

Dear Mr. Love:

On **January 17, 2014**, we received your request for verification of exemption to perform the following activities:

Construction of an onsite reclaimed water filtration system for the Eastside Water Reclamaition Facility at 3510 Laurel Road, Venice, Section 33, Township 38 South, Range 19 East, Sarasota County.

Your request has been reviewed to determine whether it meets the requirements for any of three kinds of authorization that may be necessary for work in wetlands or waters of the United States. The kinds of authorization are (1) regulatory authorization, (2) proprietary authorization (related to state-owned submerged lands), and (3) federal authorization. The authority for review and the outcomes of the reviews are listed below. Please read each section carefully. Your project **may not** have qualified for all three forms of authorization. If your project did not qualify for one or more of the authorizations, refer to the specific section dealing with that authorization for advice on how to obtain it.

1. Regulatory Review –VERIFIED

Based on the information submitted, the Department has determined that the construction of an onsite reclaimed water filtration system is exempt, under section 373.406(6) of the Florida Statutes, from the need to obtain a regulatory permit under part IV of chapter 373 of the Florida Statutes. This determination is made because the

activity, in consideration of its type, size, nature, location, use, and operation, is expected to have only minimal or insignificant individual or cumulative adverse impacts on the water resources.

This exemption verification is based on the information you provided the Department and the statutes and rules in effect when the information was submitted. This verification will expire after one year, and will not be valid at any other time if site conditions materially change, the project design is modified, or the statutes or rules governing the exempt activity are amended. However, the activity may still be conducted without further notification to or verification from the Department after the one-year expiration of this verification, provided: 1) the project design does not change; 2) site conditions do not materially change; and 3) there are no changes to the statutes or rules governing the exempt activity. In the event you need to re-verify the exempt status for the activity after the one-year expiration of this verification, a new application and verification fee will be required. Any substantial modifications to the project design should be submitted to the Department for review, as changes may result in a permit being required.

2. **Authorization to use state-owned (sovereign) submerged lands –NOT REQUIRED**

The activity does not appear to be location on sovereign submerged lands, and does not require further authorization under chapter 253 of the Florida Statutes, or chapters 18-20 or 18-21 of the Florida Administrative Code.

Please be advised that any use of sovereign submerged lands without specific prior authorization from the Board of Trustees will be considered a violation of Chapter 253, Florida Statutes and may subject the affected upland riparian property owners to legal action as well as potential fines for the prior unauthorized use of sovereign land.

3. SPGP Review – NOT REQUIRED

Your proposed activity as outlined on your application and attached drawings has been reviewed for compliance with the State Programmatic General Permit IV-R1 and it has been determined to not be within the jurisdiction of the Corps. No further permitting for these activities is required by the Corps.

Authority for review - an agreement with the USACOE entitled "Coordination Agreement Between the U. S. Army Corps of Engineers (Jacksonville District) and the Florida Department of Environmental Protection, or Duly Authorized Designee, State Programmatic General Permit", Section 10 of the Rivers and Harbor Act of 1899, and Section 404 of the Clean Water Act.

Additional Information
This letter does not relieve you from the responsibility of obtaining other federal, state, or local authorizations that may be required for the activity.

Please retain this letter. The activities may be inspected by authorized state personnel in the future to insure compliance with appropriate statutes and administrative codes. If the activities are not in compliance, you may be subject to penalties under Chapter 373, F.S., and Chapter 18-14, F.A.C.

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice.

Petition for Administrative Hearing

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rule 28-106.201, F.A.C., a petition for an administrative hearing must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, any email address, any facsimile number, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
(c) A statement of when and how the petitioner received notice of the agency decision;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
(f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and

(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed (received by the Clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing by the applicant must be filed within 21 days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under Section 120.60(3), F.S. must be filed within 21 days of publication of the notice or within 21 days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), F.S., however, any person who has asked the Department for notice of agency action may file a petition within 21 days of receipt of such notice, regardless of the date of publication. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

Extension of Time

Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the applicable deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation

Mediation is not available in this proceeding.

FLAWAC Review

The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when the order is filed with the Clerk of the Department.

Judicial Review

Any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, M.S. 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this action is filed with the Clerk of the Department.

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Thank you for applying to the Submerged Lands and Environmental Resource Program. If you have any questions, please contact Nolin Moon, P.E. by telephone at (239) 344-5672 or by e-mail at nolin.moon@dep.state.fl.us. When referring to this project, please reference the file number listed above.

Executed in Lee County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Sincerely,

Megan Mills
Environmental Administrator
Submerged Lands and Environmental
Resources Program
South District

Attachments:
14 project drawings

Copies furnished to:
Doug Fry, doug.fry@dep.state.fl.us
Nolin Moon, P.E., Nolin.moon@dep.state.fl.us

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this document, including all copies, was mailed before the close of business on February 13, 2014, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52(7), F.S., with the designated Department clerk, receipt of which is hereby acknowledged.

Marie Vidrine
Clerk

February 13, 2014
Date

RECEIVED January 17, 2014
South District DEP

58-0323835-001

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS
ISSUED FOR PERMIT
JANUARY 2014

PROJECT VICINITY MAP
NTS

PLANS DEVELOPED FOR:

CITY OF VENICE

MAYOR:
JOHN HOLIC

VICE MAYOR:
EMILIO CARLESIMO

CITY COUNCIL:
JIM BENNETT
BOB DANIELS
JEANETTE GATES
KIT McKEON
DAVID SHERMAN

CITY MANAGER:
EDWARD F. LAVALLEE

PLANS DEVELOPED BY:
McKIM&CREED
1365 Hamlet Avenue
Clearwater, FL 33756
Phone: (727)442-7196, Fax: (727)461-3827
EB0006691
www.mckimcreed.com

EXEMPT
File Number:
58-032385-001

MATTHEW S. LOVE
LICENSE
No 66118
STATE OF FLORIDA
PROFESSIONAL ENGINEER

ENGINEER OF RECORD / PROJECT MANAGER:
MATTHEW S. LOVE, P.E. FL REG. NO. 66118 DATE: 1/16/14

5883-0005: EASTSIDE WRF RECLAIMED WATER FILTRATION IMPROVEMENTS
NOVEMBER, 2013
90% SUBMITTAL
G1 COVER SHEET

GENERAL NOTES

1. THESE PLANS ARE SOLELY TO ASSIST THE CONTRACTOR IN ASSESSING THE NATURE AND EXTENT OF THE EXISTING CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE COURSE OF WORK. CONTRACTORS ARE DIRECTED TO CONDUCT WHATEVER INVESTIGATION THEY DEEM NECESSARY PRIOR TO BIDDING TO DETERMINE THE ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED.
2. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL VERIFY, PRIOR TO CONSTRUCTION, THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES (WHETHER OR NOT SHOWN ON THE PLANS) AFFECTING THE WORK.
3. THE CONTRACTOR SHALL REVIEW AND VERIFY ALL DIMENSIONS ON THE PLANS AND REVIEW ALL FIELD CONDITIONS THAT MAY AFFECT CONSTRUCTION. SHOULD DISCREPANCIES OCCUR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO OBTAIN WRITTEN CLARIFICATION BEFORE COMMENCING WITH CONSTRUCTION.
4. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES, STORM DRAINS, SEWERS, UTILITIES, AND OTHER FACILITIES IN THE CONSTRUCTION AREA. THE CONTRACTOR SHALL REPAIR ANY DAMAGES DUE TO HIS CONSTRUCTION ACTIVITIES AT NO ADDITIONAL COST TO THE OWNER.
5. WHERE IT IS NECESSARY TO DEFLECT PIPE EITHER HORIZONTALLY OR VERTICALLY, PIPE JOINT DEFLECTION SHALL NOT EXCEED 75% OF THE MANUFACTURERS' MAXIMUM RECOMMENDED DEFLECTION.
6. THERE SHALL BE NO "SIZE ON SIZE TAPS" OR "SIZE ON SMALLER TAPS" ON THIS PROJECT.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE EXISTING DRAINAGE SYSTEM WITHIN THE LIMITS OF THE PROJECT AREA FOR THE DURATION OF THE PROJECT.
8. THE CONTRACTOR SHALL PROVIDE CERTIFIED RECORD DRAWINGS AS OUTLINED IN THE SPECIFICATIONS. RED-LINE DRAWINGS SHALL BE CURRENT WITH EACH PAY APPLICATION SUBMITTED AND WILL BE CHECKED AS PART OF THE PAY APPLICATION REVIEW PROCESS. PAYMENT WILL NOT BE MADE TO CONTRACTOR WITHOUT APPROVED RED-LINE DRAWINGS. THE MOST CURRENT SET OF RED-LINES DRAWINGS SHALL ALSO BE BROUGHT TO EACH MONTHLY PROGRESS MEETING.
9. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A DETAILED CONSTRUCTION PHASING PLAN FOR APPROVAL, PRIOR TO BEGINNING CONSTRUCTION.
10. FIELD CONDITIONS MAY NECESSITATE ALIGNMENT AND GRADE DEVIATION OF THE PROPOSED PIPELINES TO AVOID CONFLICTS. NO ADDITIONAL PAYMENT SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE OWNER AND THE OWNER'S ENGINEER.
11. THE CONTRACTOR SHALL INCLUDE IN HIS BID:BY-PASS PUMPING FACILITIES, PUMPS, FITTINGS, LABOR, ETC, AS NECESSARY, BASED ON METHOD AND SEQUENCE OF CONSTRUCTION TO COMPLETE ALL WORK WHILE MAINTAINING THE EXISTING WASTEWATER TREATMENT PLANT OPERATIONS AT ALL TIMES.
12. ALL PROPOSED WORK SHALL BE COORDINATED WITH WASTEWATER TREATMENT PLANT PERSONNEL AND CITY OF VENICE UTILITIES DEPARTMENT AT LEAST TWO WEEKS IN ADVANCE OF PROPOSED CONSTRUCTION.
13. THE CONTRACTOR SHALL FURNISH SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL OF ALL PIPE CONNECTIONS, TRANSITIONS AND SPECIALS PRIOR TO FABRICATION OR DELIVERY TO THE JOB SITE.
14. CONNECTIONS TO EXISTING FACILITIES SHALL BE ACCOMPLISHED IN A NEAT WORKMANLIKE MANNER. WHEN FIELD CONDITIONS INDICATE ANY VARIANCE FROM DETAILED METHODS, THE CONTRACTOR SHALL PROVIDE COMPREHENSIVE AND DETAILED DRAWINGS FOR ENGINEER REVIEW AND APPROVAL PRIOR TO MAKING THE CONNECTIONS.
15. UNLESS OTHERWISE INDICATED OR APPROVED, ALL BELOW GROUND DUCTILE IRON PIPE SHALL HAVE PUSH-ON OR MECHANICAL JOINTS, AND ALL ABOVE GROUND DUCTILE IRON PIPE SHALL HAVE FLANGED JOINTS. ALL ABOVE AND BELOW GROUND PIPE JOINTS SHALL BE FULLY RESTRAINED.
16. ALL PIPELINES SHALL HAVE A MINIMUM COVER OF 36" BELOW EXISTING GRADE UNLESS OTHERWISE NOTED OR DIRECTED.
17. SANITARY SEWERS AND FORCE MAINS CROSSING OVER OR UNDER WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18" BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER OR FORCE MAIN PIPE JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN 10' BETWEEN ANY TWO JOINTS. AS AN ALTERNATE, THE SEWER OR FORCE MAIN MAY BE PLACED IN A WATERTIGHT CASING PIPE.
18. WATER SHALL NOT BE PERMITTED IN STRUCTURE EXCAVATIONS AND TRENCHES DURING CONSTRUCTION. DEWATERING IS REQUIRED TO A MINIMUM OF 18" BELOW BOTTOM OF EXCAVATION.
19. THE CONTRACTOR SHALL NOT ALLOW ANY DISCHARGE OF WASTEWATER TO LANDS AND/OR ADJACENT WATER BODIES OR STORM DRAINS. ANY LEAKAGE MUST BE CONTAINED AND TRANSFERRED BY THE CONTRACTOR TO THE PLANT DRAIN PUMP STATION AT THE WASTEWATER TREATMENT PLANT.
20. ALL EXPOSED PIPING SHALL BE PAINTED WITH DESIGNATED COLORS ASSOCIATED WITH THEIR USAGE AS PROVIDED IN THE SPECIFICATIONS.
21. ALL NEW PIPELINES SHALL BE FLUSHED, PRESSURE TESTED, AND APPROVED PRIOR TO TIE-INS TO EXISTING FACILITIES. THE CONTRACTOR WILL BE ALLOWED TO USE TEMPORARY PLUGS FOR PRESSURE TESTING.
22. ALL CONCRETE THRUST BLOCKS INSTALLED FOR TESTING PURPOSES AND NOT REQUIRED FOR THE PIPELINE SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE.
23. CONTRACTOR SHALL MAINTAIN A CLEAR PATH FOR ALL SURFACE WATER DRAINAGE STRUCTURES AND DITCHES DURING ALL PHASES OF CONSTRUCTION.THE CONTRACTOR SHALL BE REQUIRED TO INSTALL ALL EROSION, SEDIMENT AND TURBIDITY CONTROL MEASURES PRIOR TO CONSTRUCTION OF ANY COMPONENTS ASSOCIATED WITH THE PROJECT. SEDIMENT CONTROL INCLUDES SILT DAMS, TRAPS, EROSION PROTECTION, AND ANY OTHER APPURTENANCES NEEDED BUT NOT NECESSARILY SHOWN ON THESE DRAWINGS.
24. CONTRACTOR SHALL PROVIDE PROTECTIVE MATTING, FUEL CONTAINMENT AND ALL OTHER MATERIALS, EQUIPMENT AND LABOR TO PROTECT THE STAGING AREA DURING CONSTRUCTION.
25. CONTRACTOR SHALL, PRIOR TO BEGINNING CONSTRUCTION, SUBMIT A "FUELING SPILL PREVENTION PLAN" THAT SHALL CLEARLY INDICATE HOW FUEL SPILLS WILL BE PREVENTED WHEN FUELING BOTH WITHIN AND OUTSIDE OF THE STAGING AREA.

UTILITY NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE FOLLOWING JURISDICTIONAL BODIES AND UTILITY COMPANIES:

INVESTIGATE BEFORE YOU EXCAVATE
CALL LOCAL PUBLIC UTILITY NOTIFICATION CENTER
TOLL FREE 1-800-432-4770
MIN. 48 HOURS BEFORE YOU EXCAVATE

CITY OF VENICE UTILITIES DEPARTMENT
RALPH WARD
(941) 480-3333

FLORIDA POWER AND LIGHT SARASOTA
TRACY STERNS
1-800-808-9554

VERIZON FLORIDA Inc.
DAVID WYNNS
(813) 827-8343

TECO PEOPLES GAS SARASOTA
DANNY SHANAHAN
(941) 342-4006

SARASOTA COUNTY TRAFFIC
MARK RICHMOND
(941) 650-2108

SARASOTA COUNTY UTILITIES
WATER/SEWER
ANN COLEMAN
(941) 861-0530

COMCAST CABLE VENICE
GONZALO ROJAS
(941)342-3578

2. ALL UTILITY CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE LATEST VERSION OF THE CITY OF VENICE UTILITY STANDARDS.
3. ALL BELOW GROUND DUCTILE IRON PIPE SHALL BE ENCASED IN A POLYETHYLENE WRAP IN ACCORDANCE WITH AWWA STANDARDS.
4. ALL VALVE BOX COVERS SHALL BE PAINTED TO INDICATE THEIR TYPE OF SERVICE.
5. ALL TEST POINT TAPPING SHALL BE CUT LOOSE FROM THE CORPORATION STOP AND COMPLETELY REMOVED AND DISPOSED OF BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE. THE CORPORATION STOP SHALL BE CAPPED AND REMAIN IN PLACE.
6. ADJUST EXISTING MANHOLE FRAMES AND COVERS TO MATCH FINAL GRADE.

RESTORATION AND MISCELLANEOUS NOTES

1. THE CONTRACTOR SHALL PROVIDE AN ASPHALT PATCH FOR TRENCH AREAS CONSTRUCTED IN EXISTING ROADWAYS. ADJUST ALL CASTINGS TO MATCH NEW PAVEMENT SURFACE.
2. THE CONTRACTOR SHALL REPLACE ALL EXISTING PAVING, STABILIZED EARTH, CURBS, SIDEWALKS, FENCES, LANDSCAPING AND OTHER IMPROVEMENTS DISTURBED DURING CONSTRUCTION WITH THE SAME OR BETTER TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION OR AS DIRECTED BY THE ENGINEER AT NO ADDITIONAL COST TO THE CITY.
3. ALL RESTORATION WORK PERFORMED THROUGHOUT THE PROJECT SHALL CONFORM TO EXISTING LINES AND GRADES UNLESS OTHERWISE NOTED.
4. ALL EXISTING FENCES DISTURBED DURING CONSTRUCTION SHALL BE REPLACED AND REINSTALLED BY THE CONTRACTOR IN LIKE KIND AT NO ADDITIONAL COST TO THE OWNER UNLESS SHOWN TO BE REMOVED ON CONSTRUCTION PLANS.
5. CONTRACTOR SHALL RESTORE ALL IRRIGATION SYSTEM COMPONENTS TO PRE-CONSTRUCTION CONDITIONS.
6. THE CONTRACTOR SHALL ADJUST EXISTING MANHOLE FRAMES AND COVERS TO MATCH FINAL GRADE.
8. ALL DISTURBED GRASS AREAS SHALL BE RESTORED WITH SOLID SOD IN LIKE KIND UNLESS OTHERWISE DIRECTED BY OWNER

SURVEY NOTES

1. BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON STATE PLANE COORDINATES (NAD 83(07) FLORIDA WEST ZONE).
2. THE HORIZONTAL COORDINATES FOR THE CONTROL POINTS LISTED ABOVE WERE DERIVED FROM GPS POSITIONS WITH #GPS VRS CORRECTIONS.
3. INFORMATION SHOWN HEREON REFLECTS CONDITIONS AS THEY EXISTED ON THE DATE SHOWN AND CAN ONLY BE CONSIDERED INDICATIVE OF CONDITIONS AT THAT TIME.
4. THIS IS NOT A BOUNDARY SURVEY.
5. THE LOCATION OF UTILITIES, FOUNDATIONS OR STRUCTURES, IF ANY, BENEATH THE SURFACE HAS NOT BEEN DETERMINED OTHER THAN THE ITEMS SHOWN.
6. THIS SURVEY DRAWING WAS PREPARED FOR THE EXCLUSIVE USE OF THE PARTY OR PARTIES CERTIFIED TO BELOW FOR THE EXPRESS PURPOSE STATED HEREON AND/OR CONTAINED IN THE CONTRACT BETWEEN HYATT SURVEY SERVICES, INC. AND THE CLIENT FOR THIS PROJECT. COPYING, DISTRIBUTING, AND/OR USING THIS DRAWING, IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN ORIGINALLY INTENDED WITHOUT WRITTEN CONSENT FROM HYATT SURVEY SERVICES, INC. IS STRICTLY PROHIBITED, AND RENDERS THE SURVEYORS CERTIFICATION, SIGNATURE, AND SEAL NULL AND VOID. ANY QUESTIONS CONCERNING THE CONTENT OR PURPOSE OF THIS DRAWING SHOULD BE DIRECTED TO HYATT SURVEY SERVICES, INC.
7. THIS SURVEY IS SUBJECT TO PERTINENT EASEMENTS, RIGHTS OF WAY AND RESTRICTIONS, IF ANY.
8. ALL ELEVATIONS ARE REFERENCED THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
9. THE FOLLOWING NGS CONTROL POINTS WERE RECOVERED AND WERE USED TO VERTICALLY CONTROL THIS SURVEY: G727 AND F727.
10. TOPOGRAPHIC DATA WAS COLLECTED WITH TRIMBLE 5700 RTK SYSTEMS AND ROBOTIC TOTAL STATIONS.
11. SURVEY DATA SHOWN WAS COLLECTED OVER THE FOLLOWING DATES: AUGUST 1, AUGUST 26, SEPTEMBER 16, SEPTEMBER 17, AND OCTOBER 01, 2013.
12. SURVEY AREA IS LOCATED IN FLOOD ZONE C, AS PER FLOOD INSURANCE RATE MAP COMMUNITY-PANEL NUMBER 125154 0005 D. SAID PANEL LISTS THE 100 YEAR FLOOD ELEVATION AS 11' NGVD 29 (9.88' NAVD 88) APPROXIMATLY 1.3 MILES AWAY FROM THE SITE. NGVD 29 TO NAVD 88 CONVERSION WAS DERIVED FROM NGS MONUMENT "175 S 19" (PID AG8201).

SURVEY LEGEND

SND	SET NAIL AND DISK
DIP	DUCTILE IRON PIPE
P.S.M	PROFESSIONAL SURVEYOR AND MAPPER
NGS	NATIONAL GEODETIC SURVEY
NAVD	NORTH AMERICAN VERTICAL DATUM OF 1988
NGVD	NATIONAL GEODETIC VERTICAL DATUM
+-4.0	SPOT GRADE (TYPICAL)
GI	GRATE INLET
WP	WITNESS POST
INV.	INVERT
— —	MAJOR CONTOUR
— —	MINOR CONTOUR
— —	SANITARY SEWER PIPE
○	SANITARY MANHOLE
□	ELECTRICAL BOX
□	INSTRUMENT BOX
□	SIGNAL BOX
○	POST
	BORE LOCATION
△	CONTROL POINT
	WRE PULL BOX
	VALVE
	CLEAN OUT
	SIGN

SURVEY CONTROL POINTS
NAD 83(07) FLORIDA WEST ZONE / NAVD 88

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	1017536.71	525706.31	15.71	SND
101	1017192.69	525706.16	15.57	SND
102	1017525.16	525508.70	15.73	SND
103	1017203.33	525504.51	15.86	SND

DRAWING INDEX

SHEET	DESCRIPTION
GENERAL	
G1	COVER SHEET
G2	DRAWING INDEX, GENERAL NOTES, SURVEY NOTES AND SURVEY LEGEND
G3	CIVIL ABBREVIATIONS, SYMBOLS, LEGENDS AND SUE LOCATE DATA
G4	KEY SHEET
~~G5~~	~~EXISTING PROCESS FLOW DIAGRAM~~
G6	PROPOSED EFFLUENT MANAGEMENT AND RECYCLE SYSTEM PROCESS FLOW DIAGRAM
DEMOLITION	
D1	DEMOLITION AND HORIZONTAL CONTROL PLAN
CIVIL	
C1	DISK FILTER SITE PLAN AND YARD PIPING
C2	PROPOSED 12" LAKE FILTER INFLUENT LINE PLAN AND PROFILE
C3	PROPOSED 12" LAKE FILTER INFLUENT LINE PLAN AND PROFILE
C4	PROPOSED 12" LAKE FILTER INFLUENT LINE PLAN AND PROFILE
C5	CIVIL DETAILS 1
C6	CIVIL DETAILS 2
C7	CIVIL DETAILS 3
C8	CIVIL DETAILS 4
~~STRUCTURAL~~	
~~S1~~	~~STRUCTURAL GENERAL NOTES, DESIGN LOADS, CRITERIA AND LEGEND~~
~~S2~~	~~GRAVITY DISK FILTER PLAN~~
~~S3~~	~~GRAVITY DISK FILTER SECTIONS & FRAMING ADDITIONAL DETAILS~~
~~S4~~	~~TRANSFER STATION PLAN AND SECTIONS~~
~~S5~~	~~STRUCTURAL SECTIONS AND DETAILS~~
~~MECHANICAL~~	
~~M1~~	~~GRAVITY DISK FILTER PLAN~~
~~M2~~	~~GRAVITY DISK FILTER SECTIONS~~
~~M3~~	~~GRAVITY DISK FILTER BACKWASH PUMP STATION PLAN AND SECTION~~
~~M4~~	~~EXISTING STORAGE POND RETURN PUMP STATION MODIFICATIONS~~
~~M5~~	~~TRANSFER PUMP STATION PLAN AND SECTION~~
~~M6~~	~~CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM~~
~~M7~~	~~MECHANICAL DETAILS~~
~~INSTRUMENTATION AND CONTROLS~~	
~~I1~~	~~PROCESS & INSTRUMENTATION DIAGRAM NOTES, LEGENDS AND ABBREVIATIONS~~
~~I2~~	~~PROCESS & INSTRUMENTATION DIAGRAM EXISTING STORAGE POND RETURN PUMPING STATION~~
~~I3~~	~~PROCESS & INSTRUMENTATION DIAGRAM GRAVITY DISK FILTER AND BACKWASH PUMP STATION~~
~~I4~~	~~PROCESS & INSTRUMENTATION DIAGRAM TRANSFER PUMP STATION~~
~~I5~~	~~PROCESS & INSTRUMENTATION DIAGRAM SODIUM HYPOCHLORITE SYSTEM~~
~~I6~~	~~PROCESS & INSTRUMENTATION DIAGRAM INSTALLATION DETAILS~~
~~ELECTRICAL~~	
~~E1~~	~~ELECTRICAL NOTES, SYMBOLS AND LEGEND~~
~~E2~~	~~ELECTRICAL SITE PLAN~~
~~E3~~	~~SINGLE LINE DIAGRAMS 1~~
~~E4~~	~~SINGLE LINE DIAGRAMS 2~~
~~E5~~	~~PANELBOARD SCHEDULES~~
~~E6~~	~~GRAVITY DISK FILTER — ELECTRICAL PLAN~~
~~E7~~	~~OPERATIONS BUILDING — PARTIAL PLAN~~
~~E8~~	~~IMPROVED CHEMICAL SYSTEM ELECTRICAL PLAN~~
~~E9~~	~~ELECTRICAL DETAILS 1~~
~~E10~~	~~ELECTRICAL DETAILS 2~~
~~E11~~	~~ELECTRICAL DETAILS 3~~

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DEPARTMENT OF ENVIRONMENTAL PROTECTION FLORIDA
EXEMPT
File Number:
58-032385-001

MATTHEW S. LOVE LICENSE No 66118 PROFESSIONAL ENGINEER
STATE OF FLORIDA

REV.NO. | DESCRIPTIONS REVISIONS | DATE

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756
Phone: (727)442-7196, Fax: (727)461-3827
EB0008691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

DRAWING INDEX, GENERAL NOTES, SURVEY NOTES AND SURVEY LEGEND

DATE: JANUARY 2014
MCE PROJ # 5883-0005
DRAWN OES
DESIGNED MSL
CHECKED JSL
PROJ. MGR. MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
G2

STATUS: ISSUED FOR PERMIT
REVISION

S:\5883\0005\Dft-Drawings\General\0005-5883G005.dwg, 1/9/2014 11:53:11 AM, Sam Shafer

GENERAL ABBREVIATIONS

@	AT	LN	LANE
ABW	AUTOMATIC BACKWASH	LP	LIGHT POLE
A/C	AIR CONDITIONER UNIT	LS	LICENSED SURVEYOR
AC	ACRES	MAS	MASONRY
AC	ASPHALTIC CONCRETE	MAX	MAXIMUM
ABD	ABANDONED	MCC	MOTOR CONTROL CENTER
AL/ALUM	ALUMINUM	MES	MITERED END SECTION
ANCH	ANCHOR	MG	MILLION GALLONS
APPROX	APPROXIMATE		
BLDG	BIULDING	MGD	MILLION GALLONS PER DAY
BM	BEAM	MHW	MEAN HIGH WATER
BOT/BOTT	BOTTOM	MON	MONUMENT
(C)	CALCULATED DATA	NG	NATURAL GROUND
C	CHANNEL	N.T.S.	NOT TO SCALE
C	CONDUIT	NO	NUMBER
CB	CATCH BASIN	NP	NORMAL POOL
CCR	CERTIFIED CORNER RECORD	ø	DIAMETER/PHASE
CHKR	CHECKERED	O/A	OVERALL
CIR	CIRCLE	OPNG	OPENING
CLF	CHAIN LINK FENCE	OR	OFFICIAL RECORDS BOOK
℄	CENTERLINE	(P)	PLAT BOOK
CMP	CORRUGATED METAL PIPE	PCCP	PRE-STRESSED CONCRETE PIPE
COL	COLUMN	PG	PAGE
CONN	CONNECTOR/CONNECTION	PLCS	PLACES
CONC	CONCRETE	PLS	PROFESSIONAL LAND SURVEYOR
COR	CORNER	POB	POINT OF BEGINNING
C/T	CURB TIE	POC	POINT OF COMMENCEMENT
CU	COPPER	POT	POTABLE
(D)	DEED DATA	PP	POWER POLE
D	DEEP/DRAIN	PRM	PERMANENT REFERENCE MONUMENT
DB	DEED BOOK	PROP	PROPOSED
DBL	DOUBLE	PSM	PROFESSIONAL SURVEYOR & MAPPER
DHW	DESIGN HIGH WATER	P/T	PAVEMENT TIE
DISCH	DISCHARGE	PV	PLUG VALVE
DN	DOWN	PVMT	PAVEMENT
DRWY	DRIVEWAY	R	RADIUS/RISER/RELAY
EW	EACH WAY	RCP	REINFORCED CONCRETE PIPE
EA	EACH	REF	REFERENCED
ECMP	ELLIPTICAL CORRUGATED METAL PIPE	REINF	REINFORCED/REINFORCING
EL/ELEV	ELEVATION	REQ'D	REQUIRED
ELEC	ELECTRICAL CONDUIT	RESTR	RESTRAINED
EP	EDGE OF PAVEMENT	RLS	REGISTERED LAND SURVEYOR
ERCP	ELLIPTICAL REINFORCED CONCRETE PIPE	RW;R/W	RIGHT-OF-WAY
ETC	AND SO FORTH	SAN	SANITARY
EXIST	EXISTING	SEC	SECTION
EXP	EXPANSION	SGL	SINGLE
(F)	FIELD DATA	SHW	SEASONAL HIGH WATER
FCM	FOUND CONCRETE MONUMENT	SIR	SET IRON ROD ⅝" LB 6113
FDOT	FLORIDA DEPARTMENT OF TRANSPORTATION	SND	SET NAIL & DISC LB 6113
		SPRK	SPRINKLER
FF	FINISHED FLOOR	SQ	SQUARE
FIR	FOUND IRON ROD	SN	SIGN
FND	FOUND NAIL & DISC	SSMH	SANITARY SEWER MANHOLE
FOP	FOUND OPEN PIPE	S/T	SIDEWALK TIE
FPP	FOUND PINCHED PIPE	STL	STEEL
FRRS	FOUND RAILROAD SPIKE	STY	STORY
F/T	FENCE TIE	S/W;SWK	SIDEWALK
FT	FOOT	SYM	SYMBOL
FTG	FOOTING	TBM	TEMPORARY BENCH MARK
FXC	FOUND X-CUT	TOB	TOP OF BANK
GALV	GALVANIZED	T&B	TOP & BOTTOM
GDRL	GUARDRAIL	TEL	TELEPHONE
GE	GRATE ELEVATION	TEMP	TEMPORARY
GEN	GENERATOR	THK	THICK
GI	GRATED INLET	TS&V	TAPPING VALVE AND SLEEVE
GPM	GALLONS PER MINUTE	TOS	TOE OF SLOPE
GRTG	GRATING	TYP	TYPICAL
GS	GALVANIZED STEEL	UG	UNDERGROUND GAS
GR/GRD	GRADE	UP	UTILITY POLE
GWP	GUY WIRE POLE	UT	UNDERGROUND TELEPHONE
HDWALL	HEADWALL	VCP	VITRIFIED CLAY PIPE
HR	HANDRAIL	VERT	VERTICAL
HWL	HIGH WATER LEVEL	W	WIDE FLANGE/WIDE/WATT
IE	INVERT ELEVATION	W/	WITH
IN	INCH	WBW	WASTE BACKWASH
INV	INVERT	WF	WOOD FENCE
IP	IRON PIPE	W/L	WATER LINE
IR	IRON ROD	WL	WATER LEVEL
JB	JUNCTION BOX	W/M	WATER MAIN
JT	JOINT	WM	WATER METER
(L)	LEGAL DESCRIPTION DATA	WP	WEATHER PROOF
LB	LICENSED BUSINESS	WS	WALL SLEEVE/WATER STOP/ WATER SERVICE
LG	LONG	W/T	WALL TIE
		WTR	WATER

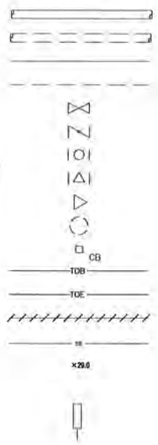
FLOW ABBREVIATIONS

AL	ALUM SOLUTION
AB	AERATION BASIN
AD	AEROBIC DIGESTER
AX	ANOXIC BASIN
BA	BLOWER AIR
BP	BYPASS
BW	BACKWASH
CA	COMPRESSED AIR
CCC	CHLORINE CONTACT CHAMBER
CCE	CHLORINATED EFFLUENT
CF	CLOTH FILTER
CLE	CLARIFIER EFFLUENT
CLG	CHLORINE GAS
CLS/CL2S	CHLORINE SOLUTION
D/DR	DRAIN
DAF	DISSOLVED AIR FLOTATION
DF	NEW CLOTH FILTER
DS	DEWATERED SLUDGE
EFF	EFFLUENT
EXP	EXPANSION
FBW	FILTER BACKWASH
FC	FINAL CLARIFIER
FE	FILTER EFFLUENT
FLE	FILTERED LAKE EFFLUENT
FLW	FLOCCULATED WATER
FM	FLOW METER
FW	FILTERED WATER
GBT	GRAVITY BELT THICKENER
GR	GRIT
HDW	HEADWORKS
INF	INFLUENT
IR	INTERNAL RECYCLE
HSBFP	HIGH SOLIDS BELT FITER PRESS
ML	MIXED LIQUOR
OF	OVERFLOW
P	POLYMER
PD	PLANT DRAIN
PDFM	PLANT DRAIN FORCE MAIN
PLY	POLYMER
PLW	PLANT WATER
PS	PUMP STATION
PW	POTABLE WATER
RAS	RETURNED ACTIVATED SLUDGE
RCW	RECLAIMED WATER
RCWR	RECLAIMED WATER RETURN
RECIRC	RECIRCULATED WATER
REJ	REJECT
RML	RECIRCULATED MIXED LIQUOR
RW	REUSE WATER
SAM	SAMPLE
SB	SPLITTER BOX
SC	SCUM
SDR	STORMWATER DRAINAGE
SL	SAMPLE LINE
SPW	STORAGE POND WATER
SS	SANITARY SEWER
TS	THICKENED SLUDGE
WAS	WASTE ACTIVATED SLUDGE
WBW	WASTE BACKWASH WATER
WW	WASTEWATER

PIPING ABBREVIATIONS

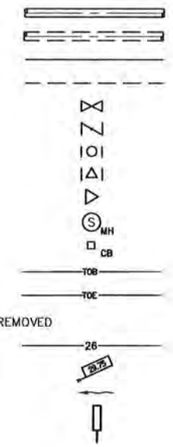
ARV	AIR RELEASE VALVE
ABD	ABANDONED
BFV	BUTTERFLY VALVE
BV	BALL VALVE
CB	CATCH BASIN
CO	CLEANOUT
CORP	CORPORATION
CV	CHECK VALVE
DI	DUCTILE IRON
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
ELEC	ELECTRICAL
EXIST	EXISTING
FHA	FIRE HYDRANT ASSEMBLY
FL	FLANGED
GS	GALVANIZED STEEL
GV	GATE VALVE
HB	HOSE BIBB
HDPE	HIGH DENSITY POLYETHYLENE
MH	MANHOLE
MJ	MECHANICAL JOINT
PE	PLAIN END
PS	PUMP STATION
PV	PLUG VALVE
PVC	POLYVINYLCHLORIDE
RED	REDUCER
SCH	SCHECULE
SDR	DIAMETER RATIO
SS	STAINLESS STEEL
TBR	TO BE REMOVED
UE	UNDERGROUND ELECTRIC
VERT	VERTICAL
WOB	WELD ON BOSS
WM	WATER METER

EXISTING



PIPING LEGEND

PROPOSED

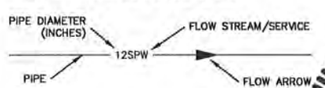


- PIPE 12" OR LARGER (ABOVE GROUND)
- PIPE 12" OR LARGER (UNDERGROUND)
- PIPE SMALLER THAN 12" (ABOVE GROUND)
- PIPE SMALLER THAN 12" (UNDERGROUND)
- GATE VALVE
- BUTTERFLY VALVE
- BALL VALVE
- PLUG VALVE
- REDUCER
- MANHOLE
- CATCH BASIN
- TOP OF BANK
- TOE OF BANK
- PIPING, STRUCTURES OR EQUIPMENT TO BE REMOVED
- CONTOURS
- SPOT ELEVATION
- FLOW ARROW
- ARV

SUE LOCATE DATA

VVH	SHEET	UTILITY REQUESTED	UTILITY REPORTED	SIZE	MATERIAL	GROUND TO TOP OF UTILITY	GROUND ELEVATION	TOP OF UTILITY ELEVATION	NORTHING	EASTING
1	C1/C2	WL	WL	6"	DI	2.90	15.3	12.4	1,017,666.6	525,493.5
2	C1/C2	SS	SS	8"	PVC	6.66	15.3	8.6	1,017,664.9	525,487.9
3	C1/C2	ABW INF	ABW INF	30"	CI	4.98	16.0	11.0	1,017,749.3	525,452.7
4	C1/C2	BW	BW	8"	PVC	1.56	15.4	13.8	1,017,774.3	525,384.5
5	C1/C2	CHEMICAL	CL	1 1/2"	PVC	2.58	15.5	12.9	1,017,764.9	525,384.5
6	C1/C2	CL	CL	1 1/2"	PVC	2.62	15.9	13.3	1,017,739.8	525,386.2
7	C1/C2	RCW	RCW	8"	DI	4.10	14.3	10.2	1,017,764.8	525,323.9
8	C1/C2	RCW	RCW	8"	DI	4.40	14.6	10.2	1,017,730.4	525,324.9
9	C1/C2	CL	CL	1 1/2"	PVC	2.64	15.2	12.6	1,017,695.3	525,326.9
10	C2	RCW	RCW	20"	DI	5.46	15.1	9.6	1,017,561.3	525,323.1
11	C2	RCW	RCW	8"	DI	3.64	15.2	11.6	1,017,543.0	525,322.7
12	C3	FM	FM	30"	DI	2.46	15.2	12.7	1,017,379.5	525,352.2
13	C3	FM	FM	24"	DI	3.88	14.1	10.2	1,017,295.5	525,324.3
14	C1	WL	WL	2"	PVC	3.40	15.8	12.4	1,017,674.7	525,447.6
15	C1	CL	CL	1/2"	PVC	3.68	15.9	12.2	1,017,674.7	525,445.9
15A	C1	CL	CL	1/2"	PVC	3.68	15.9	12.2	1,017,674.8	525,445.1
16	C1	RCW	RCW	4"	DI	3.26	15.8	12.5	1,017,756.6	525,442.8
17	C1	WL	WL	2"	PVC	2.94	15.7	12.8	1,017,768.9	525,442.6
18	C1	RCW	RCW	6"	DI	3.26	15.8	12.5	1,017,754.9	525,440.9
19	C1	CL	CL	1/2"	PVC	2.56	15.4	12.8	1,017,768.0	525,402.8
19A	C1	CL	CL	1/2"	PVC	2.56	15.8	13.2	1,017,769.2	525,402.7
20	C1	RCW	RCW	8"	PVC	4.70	15.8	11.1	1,017,633.6	525,328.3

PIPE IDENTIFICATION



SECTION DESIGNATION

EXEMPT
File Number:
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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL ABBREVIATIONS, SYMBOLS, LEGENDS AND SUE LOCATE DATA

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: NA VERTICAL: NA

DRAWING NUMBER: G3

STATUS: ISSUED FOR PERMIT

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RECLAIMED WATER STORAGE LAKE (35 MG)

LAKE RETURN PUMP STATION

NORTH

60' 0 60' 120'
SCALE: 1" = 60' (Horiz.)

EXISTING STORAGE POND RETURN PUMP STATION MODIFICATIONS (SEE SHEET M4)

STORMWATER RETENSION POND

REJECT POND

ADMINISTRATION

MAINTENANCE BUILDING

SECONDARY CLARIFICATION

SLUDGE THICKENING AND DEWATERING BUILDING

5 STAGE BARDENPHO BIOLOGICAL PROCESS

SLUDGE HOLDING

DRYING BEDS

HEADWORKS

SODIUM HYPOCHLORITE BUILDING

MBW FILTERS

CHLORINE CONTACT CHAMBERS

OPERATIONS BUILDING

8" METER ASSEMBLY

I-75 (NORTH BOUND)

SEE SHEET C1

SEE SHEET C2

SEE SHEET C3

SEE SHEET C4

HIGH SERVICE PUMP STATION

RECLAIMED WATER GROUND STORAGE TANK (3.0 MG)

FUTURE RECLAIMED WATER GROUND STORAGE TANK (7.5 MG) (BY OTHERS)

EXEMPT
File Number
58-032385-001

MATTHEW S. LOVE LICENSE No 66118 STATE OF FLORIDA PROFESSIONAL ENGINEER

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SEAL

SEAL

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

KEY SHEET

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: 1" = 60' VERTICAL: NA

DRAWING NUMBER: G4

STATUS: ISSUED FOR PERMIT

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NORTH

RCW
SAM
CLS
SAM TO PD
WBW TO PD
WBW TO WAS
TRANSFER PUMP STATION
GRAVITY DISK FILTER
BACKWASH PUMP STATION
FUTURE RECLAIMED WATER GROUND STORAGE TANK (7.5 MG) (BY OTHERS)
HIGH SERVICE PUMP STATION
RECLAIMED WATER GROUND STORAGE TANK (3 MG)
CLE
ABW FILTER 3
ABW FILTER 2
ABW FILTER 1
CLS
CC BASIN 3
CC BASIN 2
CC BASIN 1
EFFLUENT TRANSFER PUMP STATION
PLANT WATER
PLW
RCW/REJ
PD
SPW
RCW
STORM WATER STORAGE POND
TOE DRAIN PUMP STATION
STORAGE POND RETURN PUMP STATION
RECLAIMED WATER STORAGE POND (35 MG)
LINED REJECT STORAGE POND (6 MG)

EXEMPT
File Number:
58-032385-001

LEGEND

FE	FLOW METER		PUMP		CHECK VALVE
	FIXED WEIR		GATE VALVE		BALL VALVE
	ADJUSTABLE WEIR		BUTTERFLY VALVE		CONTROL VALVE
M N	MOTORIZED VALVE		FLOW DIRECTION		

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED EFFLUENT MANAGEMENT AND RECYCLE SYSTEM PROCESS FLOW DIAGRAM

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: NA VERTICAL: NA

DRAWING NUMBER: G5

STATUS: ISSUED FOR PERMIT

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File Number:
58-032385-001

NORTH

SCALE: 1"=20' (Horiz.)

CP-1
CP-2
CP-3
CP-4
VH-1
VH-2
VH-3
VH-6
VH-7
VH-8
VH-9
VH-10
VH-11
VH-12
VH-13
VH-14
VH-15
VH-15A
VH-16
VH-17
VH-18
VH-19
VH-20

SODIUM HYPOCHLORITE BUILDING
ABW FILTERS
CHLORINE CONTACT BASIN
OPERATIONS BUILDING
HIGH SERVICE PUMP STATION
EXISTING LAKE FILTERS

EXISTING 8" SPW TO BE REMOVED SEE NOTE 1

SEE 8" METER ASSEMBLY DEMOLITION DETAIL

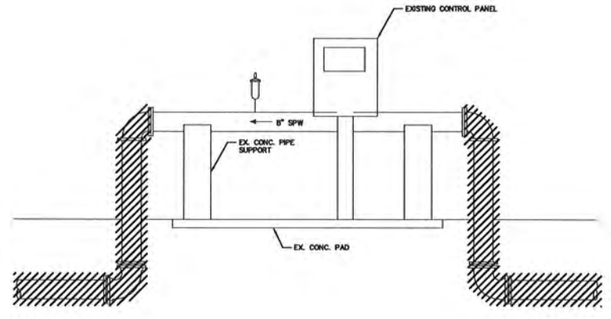
Horizontal Control Table			
Point #	Description	Elevation	Location
CP-1	NAIL & DISK	15.64	N: 1017822.56 E: 525480.22
CP-2	MAG NAIL & DISK	15.73	N: 1017526.16 E: 525508.70
CP-3	IRON ROD CAP	15.86	N: 1017675.23 E: 525351.53
CP-4	IRON ROD CAP	14.82	N: 1017486.74 E: 525334.86

NOTES:

1. THE EXISTING 8" SPW SHALL REMAIN IN SERVICE DURING THE INSTALLATION OF THE 12" SPW REPLACEMENT MAIN. TIE-INS SHALL BE COORDINATED WITH CITY STAFF TWO WEEKS PRIOR AND SHALL MINIMIZE PERIODS WHERE THE SPW RETURN SYSTEM IS OUT OF SERVICE.

LEGEND

TO BE REMOVED AND REPLACED



8" METER ASSEMBLY DEMOLITION DETAIL
NTS

MATTHEW S. LOVE LICENSE No 66118 STATE OF FLORIDA PROFESSIONAL ENGINEER

MATTHEW S. LOVE, P.E. No. 66118

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EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

DEMOLITION AND HORIZONTAL CONTROL PLAN

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: 1" = 20' VERTICAL: NA

DRAWING NUMBER: D1

STATUS: ISSUED FOR PERMIT

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EXEMPT
File Number:
58-032385-001

N:1017677.79
E:525489.47
CUT IN 6"x4" TEE
4" GV
6" PV
ELEV. 8.6
CONNECT TO
EX. 6" WAS

6" WAS

VVH-2

10' MIN.

LIMITS OF ASPHALT RESTORATION SEE DETAILS

N:1017677.73
E:525452.59
4" 90° BEND
CL ELEV. 11.90

N:1017762.65
E:525452.59
4" 90° BEND
CL ELEV. 13.83

VVH-3

VVH-14
VVH-15
VVH-15A

VVH-17
VVH-16
VVH-18

(2)1/2" CLS

6" RCW

8" BW

4" RCW

2" PW

1" RCW

2" HW

FOOD SERVICE DRAIN

SODIUM HYPOCHLORITE BUILDING

4" BACKWASH FM TO 6" WAS LINE

N:1017766.65
E:525414.50

N:1017758.65
E:525414.50

N:1017762.65
E:525405.50
CENTER OF WETWELL

BACKWASH PUMP STATION SEE SHEET M3 FOR DETAILS

N:1017758.65
E:525401.00

N:1017774.26
E:525404.90
4" CROSS
4" CAP W/ ¾"TAP
8"x4" RED
4" 45° BEND

N:1017766.65
E:525401.00

N:1017762.65
E:525395.34
4" WYE
(2) 4" PV

VVH-4
VVH-5
VVH-6

CONNECT TO EX. 8" DI

OVERFLOW TO ABW FILTERS SEE MECHANICAL DETAILS

ABW FILTERS

CHLORINE CONTACT CHAMBERS

1/2" SAMPLE LINE

N:1017767.09
E:525374.08

N:1017745.84
E:525374.08

GRAVITY DISK FILTER SEE SHEET M1 FOR DETAILS THIS AREA

1/2" CLS FEED

N:1017767.09
E:525357.58

N:1017745.84
E:525357.58

1 1/2" CLS

N:1017753.30
E:525353.69
14" 90° BEND

N:1017760.66
E:525347.02

TRANSFER PUMP STATION SEE SHEET M5 FOR DETAILS THIS AREA

N:1017745.99
E:525347.02

N:1017760.66
E:525330.85

N:1017745.99
E:525330.85

12" SPW
SEE SHEETS C2, C3
FOR PLAN AND PROFILE INFO

SEE SHEETS C2, C3
FOR CONNECTION TO EXIST. 8"

1+00

2+00

VVH-7

N:1017753.32
E:525327.13
12" 90° BEND

8" RCW

VVH-8

VVH-9

VVH-20
20" RCW

VVH-10

24" RCW EFFLUENT

N:1017753.32
E:525320.60
CHEMICAL INJECTION
SEE DETAILS ON C4

N:1017753.32
E:525307.29
12" 45° BEND
℄ ELEV. 8.00

1/2" CI FEED

11/2" CLS

EX. 8" SPW
SEE DEMOLITION
SHEET FOR DETAILS

20" TANK INFLUENT

8" DR

1/2" SAMPLE LINE

20" RCW

20" TAPPING SLEEVE AND VALVE (BY OTHERS)

24" RCW

HIGH SERVICE PUMP STATION

18" RCP

NORTH

SCALE: 1"=10' (Horiz.)

MATTHEW S. LOVE LICENSE No 66118 STATE OF FLORIDA PROFESSIONAL ENGINEER

MATTHEW S. LOVE, P.E.
No. 66118

SEAL

REV.NO. | DESCRIPTIONS REVISIONS | DATE

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756
Phone: (727)442-7196, Fax: (727)461-3827
EB0006691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

DISK FILTER SITE PLAN AND YARD PIPING

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	GES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 60'
VERTICAL: NA

DRAWING NUMBER
C1

STATUS: ISSUED FOR PERMIT
REVISION

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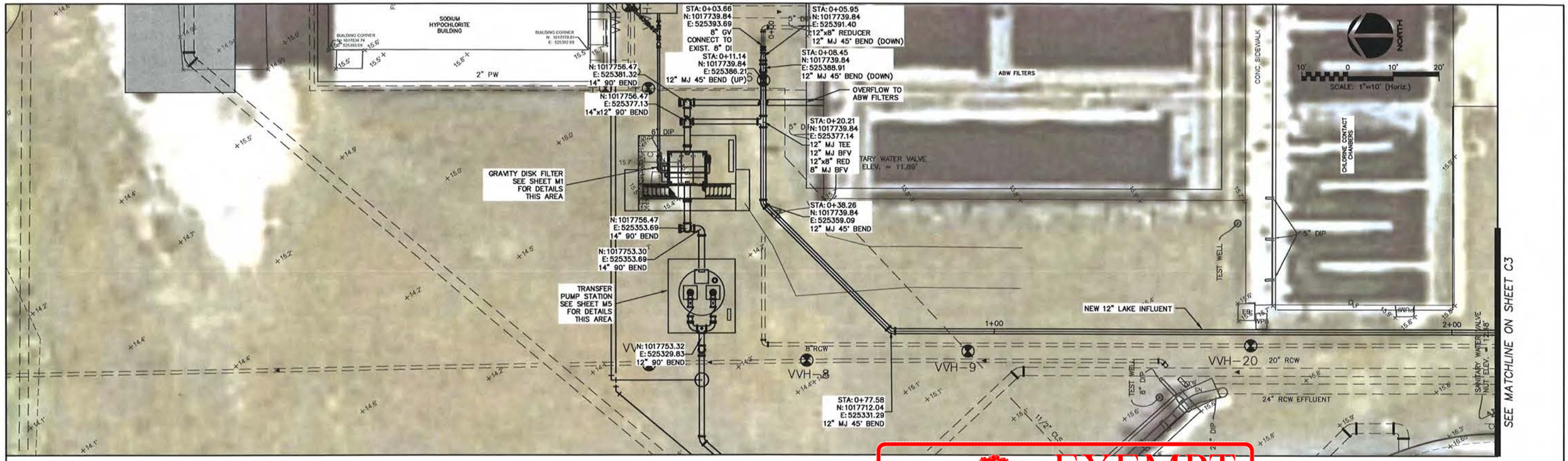
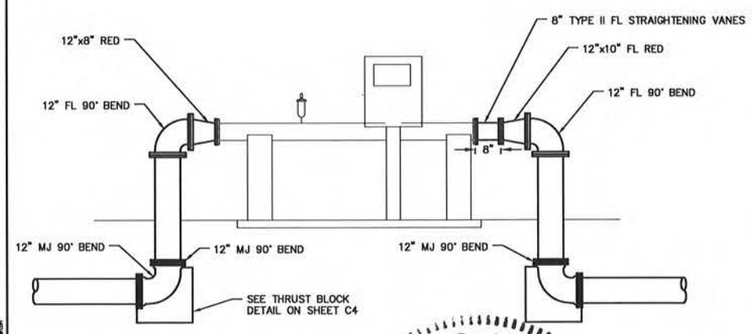
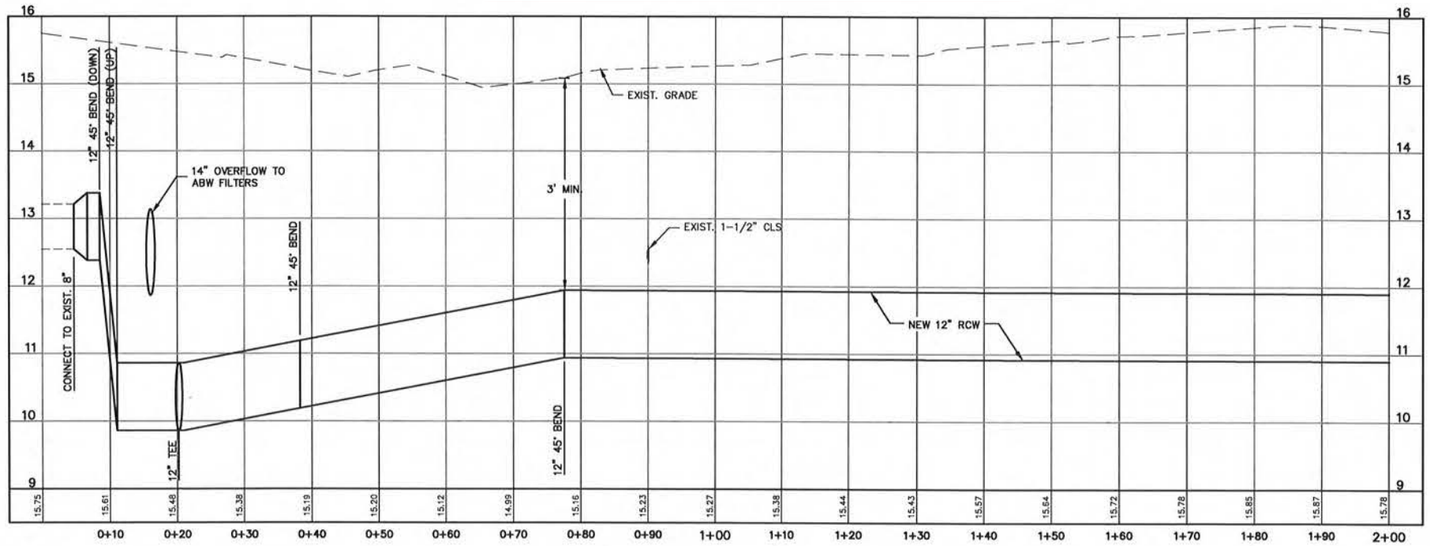


RECEIVED January 17, 2014
South District DEP

DEPARTMENT OF ENVIRONMENTAL PROTECTION FLORIDA
EXEMPT
File Number:
58-032385-001



8" RETROFITTED METER ASSEMBLY IMPROVEMENTS
NTS



MATTHEW S. LOVE LICENSE No 66118 STATE OF FLORIDA PROFESSIONAL ENGINEER

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED 12" LAKE FILTER INFLUENT LINE PLAN AND PROFILE

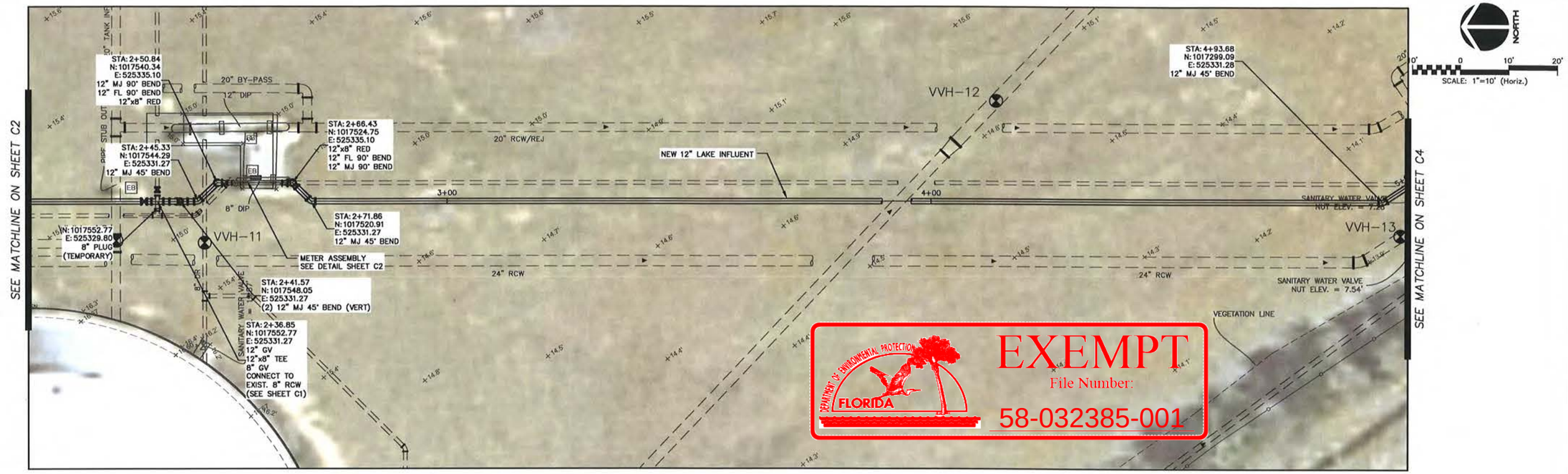
DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

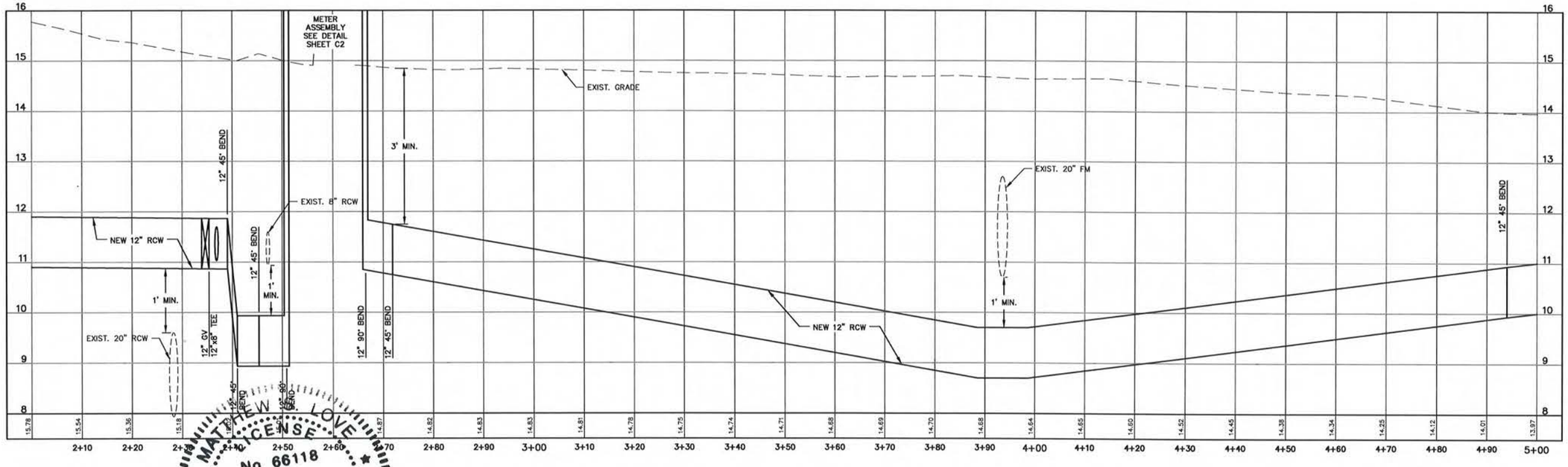
SCALE: HORIZONTAL: 1" = 10' VERTICAL: NA

DRAWING NUMBER: C2

STATUS: ISSUED FOR PERMIT
REVISION

RECEIVED January 17, 2014
South District DEP





EXEMPT
File Number:
58-032385-001

MATTHEW LOVE LICENSE No 66118 STATE OF FLORIDA PROFESSIONAL ENGINEER

REV.NO.	DESCRIPTIONS REVISIONS	DATE

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED 12" LAKE FILTER INFLUENT LINE PLAN AND PROFILE

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: 1" = 10' VERTICAL: NA

DRAWING NUMBER: C3

STATUS: ISSUED FOR PERMIT

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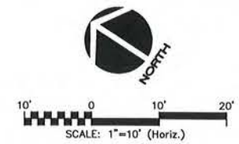
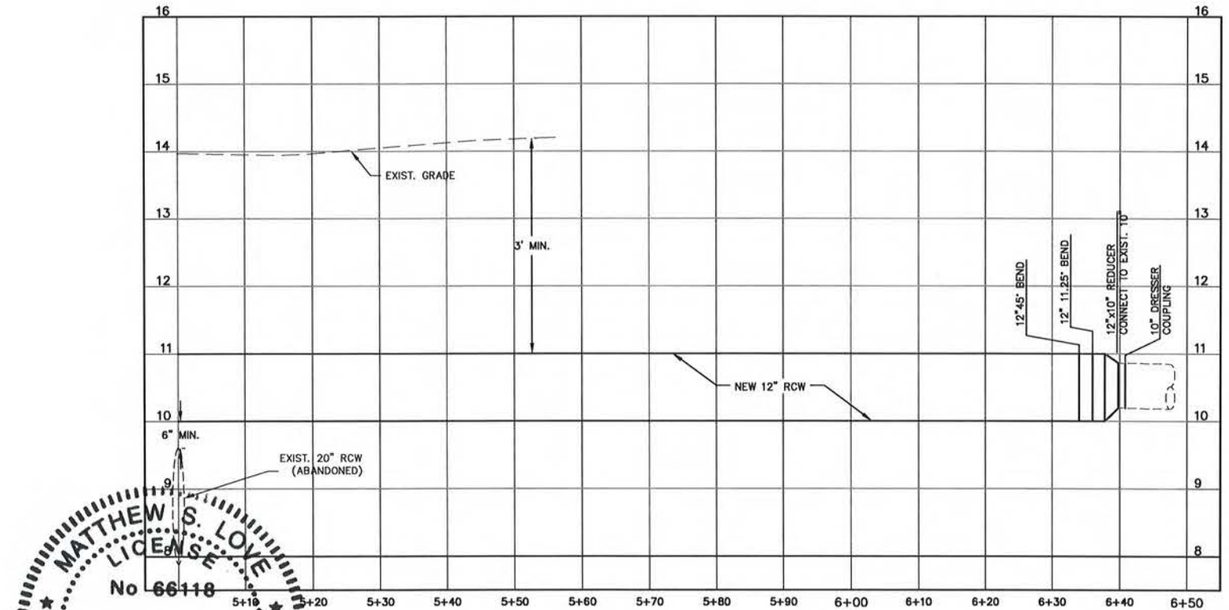


RECEIVED January 17, 2014
South District DEP



EXEMPT
File Number:
58-032385-001

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED 12" LAKE FILTER INFLUENT LINE PLAN AND PROFILE

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: 1" = 10' VERTICAL: NA

DRAWING NUMBER: C4

STATUS: ISSUED FOR PERMIT

REVISION

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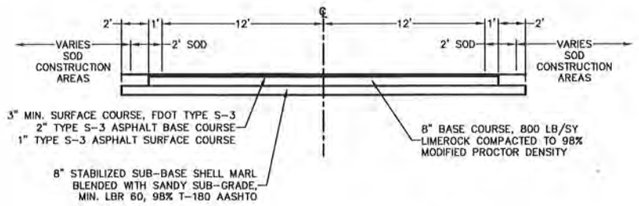
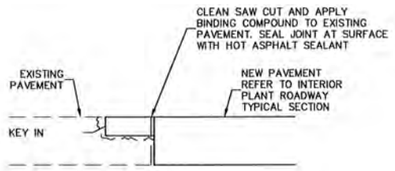


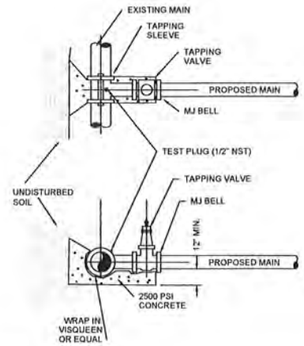
INTERIOR PLANT ROADWAY TYPICAL SECTION

NOT TO SCALE



ASPHALT CONNECTION

NOT TO SCALE



NOTES:

1.) EXISTING MAIN SHALL NOT BE TAPPED UNTIL THE ASSEMBLED SLEEVE AND VALVE ARE TESTED IN PLACE AT A MINIMUM OF 150 PSI FOR THIRTY MINUTES.

2.) UPON SUCCESSFUL TAPPING SLEEVE PRESSURE TEST (NOTE 1), THE THRUST BLOCK SHALL BE POURED AND HAVE SET FOR 24 HRS PRIOR TO TAPPING. READY-MADE THRUST BLOCKS CAN BE USED WITH CITY APPROVAL.

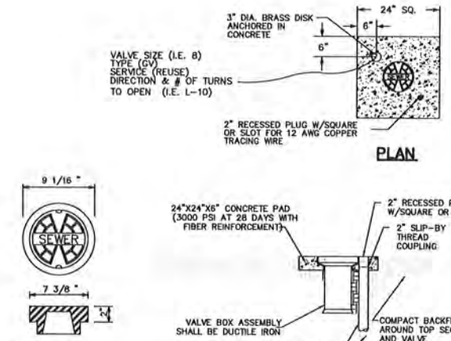
3.) STAINLESS STEEL TAPPING SLEEVE SHALL BE FORD. ALL HARDWARE SHALL BE STAINLESS STEEL. GASKETS SHALL BE VIRGIN SBR COMPOUND FOR WATER SERVICE.

4.) GATE VALVES SHALL BE RESILIENT WEDGE-TYPE MANUFACTURED BY MUELLER OR AMERICAN VALVE. ALL GATE VALVES SHALL BE FUSION BONDED EPOXY COATED (INTERIOR AND EXTERIOR) MEET ANSI/AWWA C550, AND BE NSF61 CERTIFIED.

5.) TAPPING SLEEVES MAY ONLY BE USED WHEN THE TAP DIAMETER IS AT LEAST ONE PIPE SIZE SMALLER THAN THE DIAMETER OF THE MAIN BEING TAPPED.

TAPPING SLEEVE AND VALVE DETAIL

NOT TO SCALE



NOTES:

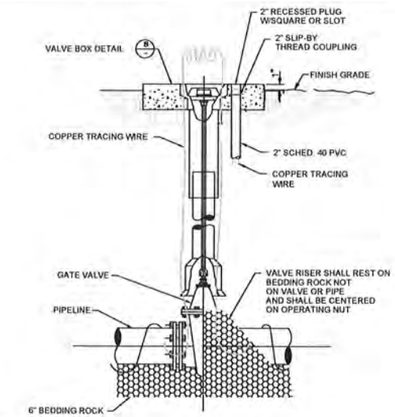
1.) PAVED AREAS: SET CONCRETE PAD AND COVER FLUSH WITH FINISHED PAVEMENT SURFACE.

2.) UNPAVED AREAS: SET PAD AND COVER 1 INCH ABOVE FINISHED GRADE.

3.) VALVES LOCATED IN DITCH AND OVER 4' DEPTH (LINE) MUST USE TRENCH ADAPTER VALVE BOX (AMERICAN FLOW CONTROL).

4.) COPPERHEAD TRACING WIRE PART #1230HS #12 AWG SHALL BE USED. IT SHALL BE COLOR CODED TO REFLECT WHAT THE PIPE CARRIES. (BLUE = WATER, GREEN = SEWER, PURPLE = REUSE)

5.) PRE-CAST PADS MAY BE USED WITH CITY APPROVAL.



NOTES:

1.) GATE VALVES SHALL BE RESILIENT WEDGE-TYPE MANUFACTURED BY MUELLER, AMERICAN VALVE, OR EQUAL. ALL GATE VALVES SHALL BE FUSION BONDED EPOXY COATED (INTERIOR AND EXTERIOR) MEET ANSI/AWWA C550, AND BE NSF61 CERTIFIED.

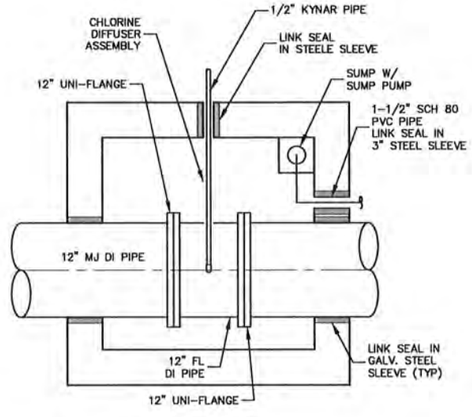
2.) FOR VALVES LARGER THAN 12" IN DIAMETER AN OFFSET GEAR ACTUATED OPERATOR IS REQUIRED.

3.) VALVE SHALL BE INSTALLED IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.

4.) COPPERHEAD TRACING WIRE PART #1230HS #12 AWG SHALL BE USED. IT SHALL BE COLOR CODED TO REFLECT WHAT THE PIPE CARRIES. (BLUE = WATER, PURPLE = REUSE)

GATE VALVE DETAIL

NOT TO SCALE

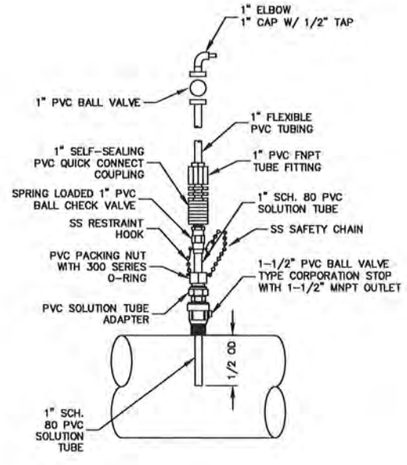


NOTES:

1. 4'W X 4" L X 7' DEEP PRECAST CHEMICAL INJECTION VAULT TO CONFORM TO ASTM C-478, SEE SPECIFICATIONS FOR INFORMATION.
2. CONTRACTOR SHALL SUBMIT FLOTATION CALCULATIONS, SIGNED AND SEALED BY A FLORIDA LICENSED P.E. FOR REVIEW.
3. PRECAST VAULT MANUFACTURER SHALL PROVIDE 30" SQ. GALVANIZE ALUMINUM HATCH THAT IS H20 RATED.

CHEMICAL INJECTION VAULT SECTION VIEW

SCALE: NTS



SODIUM HYPOCHLORITE INJECTOR DETAIL

SCALE: NTS

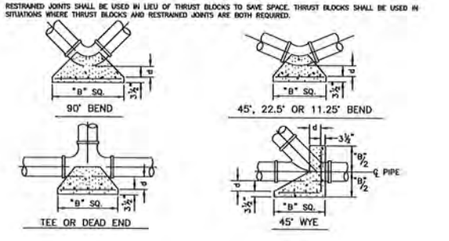
PIPE SIZE (IN.)	90° BEND B	90° BEND d	45° BEND B	45° BEND d	22.5° BEND B	22.5° BEND d	11.25° BEND B	11.25° BEND d	DEAD END & TEE B	DEAD END & TEE d	45° WYE B	45° WYE d
4	1.5	3½	1.1	3½	0.8	3½	0.6	3½	1.3	3½	1.1	3½
6	2.2	5¼	1.6	3¾	1.2	3½	0.8	3½	1.9	4½	1.6	3¾
8	2.9	7	2.1	5	1.5	3½	1.1	3½	2.4	5¾	2.0	4¾
10	3.5	8½	2.6	6¼	1.9	4½	1.3	3½	3.0	7¼	2.5	6
12	4.2	10	3.1	7½	2.2	5¼	1.6	3¾	3.5	8½	3.0	7¼
14	4.9	11¾	3.8	8¾	2.6	6¼	1.8	4¼	4.1	9¾	3.4	8¼
16	5.5	13¼	4.1	9¾	2.9	7	2.1	5	4.7	11¼	3.9	9¼
18	6.2	15	4.6	11	3.3	8	2.3	5½	5.2	12½	4.4	10½
20	6.9	16½	5.0	12	3.6	8¾	2.6	6¼	5.8	14	4.9	11¾
24	8.2	19¾	6.0	14½	4.3	10¼	3.1	7½	6.9	16½	5.8	14
30	10.1	24¼	7.5	18	5.3	12¾	3.8	9	8.5	20½	7.2	17¼
36	12.1	29	8.9	21¼	6.4	15¼	4.5	10¾	10.2	24½	8.6	20¾

REINFORCEMENT MAT SCHEDULE

FOR DIM."B" BETWEEN 5.75' & 12.5' USE #4 @ 8" EACH WAY.
FOR DIM."B" LESS THAN 5.75' USE #3 @ 8" EACH WAY

NOTES:

1. ALL THRUST BLOCKS SHALL BE CAST IN PLACE. FITTINGS ADJACENT TO THRUST BLOCKS SHALL BE WRAPPED IN POLYETHYLENE.
2. THIS TABLE IS BASED ON WATER PRESSURE=150 PSI WITH AN ALLOWABLE SOIL BEARING PRESSURE=2000 PSF, CONCRETE STRENGTH f'c=3000 PSI, REINFORCEMENT fy=60.0 KSI. THRUST BLOCK SHALL BE CAST AGAINST FIRM UNDISTURBED SOIL.
3. FOR LARGER "B" DIMENSIONS IT IS NECESSARY TO CHECK THAT PIPE IS SUFFICIENTLY DEEP TO ALLOW 15" MIN. SOIL COVER OVER TOP EDGE OF THRUST BLOCK.
4. RESTRAINED JOINTS SHALL BE USED IN LIEU OF THRUST BLOCKS TO SAVE SPACE. THRUST BLOCKS SHALL BE USED IN SITUATIONS WHERE THRUST BLOCKS AND RESTRAINED JOINTS ARE BOTH REQUIRED.



THRUST BLOCK DETAILL

SCALE: NTS

RECEIVED January 17, 2014
South District DEP

EXEMPT
File Number:
58-032385-001

REVISIONS

REV.NO.	DESCRIPTIONS	DATE

SEAL — STATE OF FLORIDA — PROFESSIONAL ENGINEER — MATTHEW S. LOVE — LICENSE — No. 66118 — MATTHEW S. LOVE — No. 66118

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 1

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: NA, VERTICAL: NA

DRAWING NUMBER: C5

STATUS: ISSUED FOR PERMIT

REVISION

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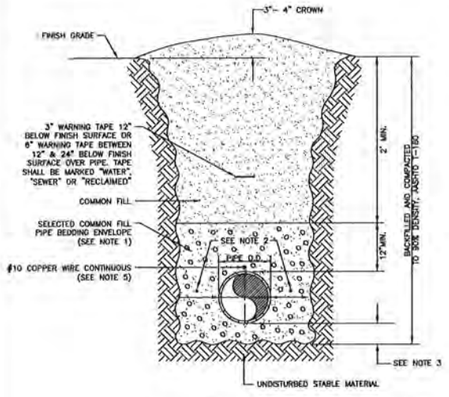
NOTES:

1. USE OF TYPE A-2 AND A-3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

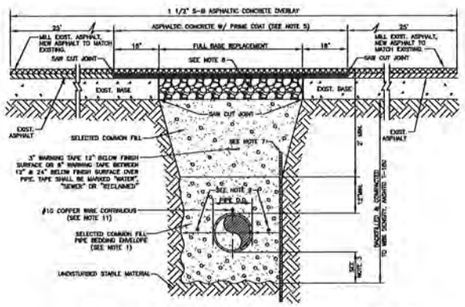


TRENCH WITH UNIMPROVED SURFACE TYPE A-1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. USE OF TYPE A-2 AND A-3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. ASPHALTIC CONCRETE STRUCTURE COURSE WITH PRIME COAT SHALL BE THE SAME DEPTH AND TYPE AS EXISTING OR A MINIMUM OF 1 1/4 INCH, WHICHEVER IS GREATER.
6. MILL 25' BACK FROM TRENCH SAW CUT. ADJUST MILLING PER INDIVIDUAL SITE TO NOT IMPACT BASE. BUTT JOINT TO EXIST ASPHALT. FINAL OVERLAY LIMITS ARE FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT. FINAL OVERLAY TO MATCH EXISTING WITH NO DISCERNABLE "BUMP" AT JOINT. MILLING LIMITS THAT IMPACT INTERSECTION SHALL BE ADDRESSED ON A CASE BY CASE BASIS AND APPROVED BY CITY OF VENICE.
7. SHEETING ORDERED LEFT IN PLACE TO BE CUT OFF 24" BELOW FINISHED GRADE OR 12" BELOW SUBGRADE.
8. BASE SHALL BE 8" MINIMUM THICKNESS CRUSHED CONCRETE.
9. TEMPORARY PATCHES WILL BE INSTALLED TO PROVIDE A SMOOTH ALL WEATHER SURFACE AT ALL TIMES. PERMANENT REPLACEMENT TO BE MADE AS SOON AS POSSIBLE.
10. RESTORE SIGNAGE & MARKING WITH THERMOPLASTIC PER FDOT STANDARDS, LATEST EDITION.
11. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.
12. NOTES 5. THRU 10. ARE MINIMUM REQUIREMENTS FOR A TRENCH IN A ROAD. REFER TO LATEST EDITION OF CITY OF VENICE HIGHWAY AND TRAFFIC STANDARDS FOR ADDITIONAL REQUIREMENTS.

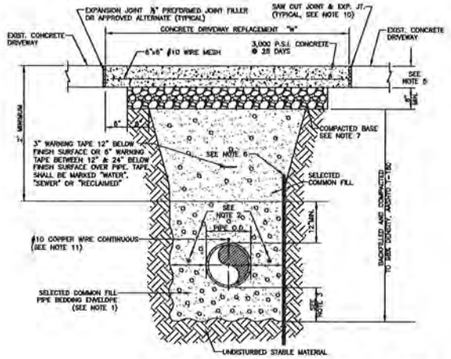


TRENCH WITH ASPHALT PAVEMENT SURFACE TYPE A-1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. USE OF TYPE A-2 AND A-3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. THICKNESS TO MATCH EXISTING OR BE 6" MINIMUM, WHICHEVER IS GREATER.
6. SHEETING ORDERED LEFT IN PLACE TO BE CUT OFF 24" BELOW FINISH GRADE OR 12" BELOW SUBGRADE.
7. BASE SHALL BE COMPACTED 8" MINIMUM THICKNESS OF APPROVED MATERIAL.
8. DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST ADOPTED CONSTRUCTION STANDARDS OF THE CITY OF VENICE TRANSPORTATION DEPARTMENT.
9. IF THE DRIVEWAY IS 12' OR WIDER, SAWCUT AN EXPANSION JOINT ALONG THE CENTER OF THE DRIVEWAY (¼" WIDE AND 1½" DEEP) AFTER THE CONCRETE HAS SET.
10. IF THERE IS AN EXISTING EXPANSION JOINT WITHIN 3' OF THE PROPOSED JOINT, EXTEND DRIVEWAY REPLACEMENT TO THE EXISTING JOINT.
11. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

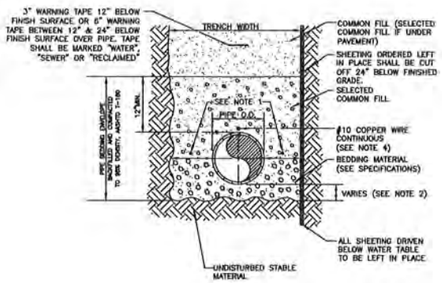


TRENCH WITH CONCRETE DRIVEWAY SURFACE TYPE A-1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
2. TYPICALLY 4" TO 6".
3. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
4. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

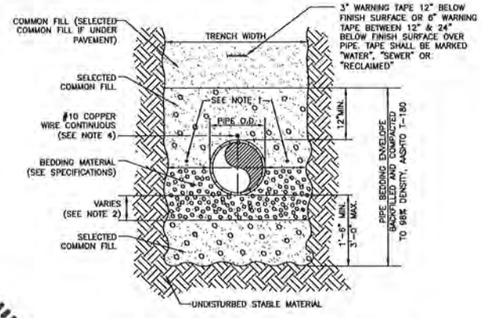


TRENCH WITH TYPE A-1 PIPE BEDDING

NOT TO SCALE

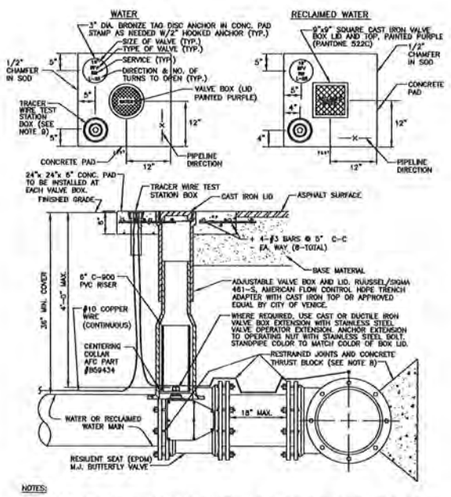
NOTES:

2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.



TRENCH WITH TYPE A-3 PIPE BEDDING

NOT TO SCALE

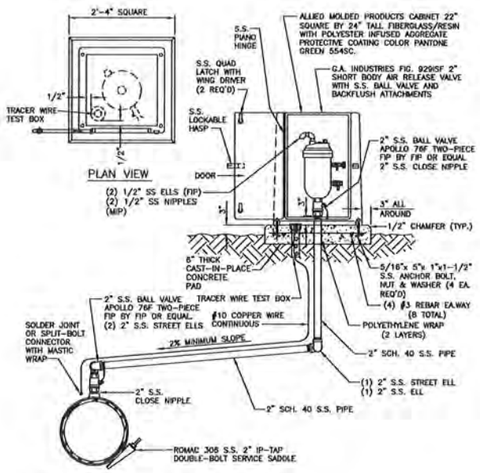


NOTES:

1. "WV" OR "RWV" TO BE IMPRESSED INTO THE NEWLY-POURED CONCRETE CURB, ALONG WITH 6" NO CURB, INSTALL A BLUE DISC WITH "WV" OR PURPLE DISC DISTANCE IN FEET TO THE VALVE. WITH "RWV" AND A 1/8"x1" GALVANIZED STEEL SCREW IN THE EDGE OF PAVEMENT WITH THE FOOTAGE FROM THE DISC TO THE VALVE.
2. ALL EXISTING AND PROPOSED VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADES AS DETERMINED IN THE FIELD.
3. WATER VALVES SHALL NOT BE PLACED IN HANDICAPPED RAMPS.
4. PRECAST CONCRETE PADS & THRUST BLOCKS SHALL NOT BE USED.
5. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1/2".
6. FOR VALVES 16" AND LARGER, USE BUTTERFLY VALVES.
7. PIPELINE DIRECTION TO BE IMPRESSED INTO NEWLY POURED CONCRETE PAD.
8. WHERE THRUST BLOCK NOT USED, RESTRAINED JOINTS MUST THEN EXTEND FROM TEE FULL LENGTH SPECIFIED FOR "TEES."
9. BINGHAM & TAYLOR P200NFD OR EQUAL FOR NORMAL YARD SERVICE. WHERE VALVE WILL BE IN STREET OR PARKING UNDER VEHICLE TRAFFIC, USE P5255RD CENTERED IN SEPARATE CONCRETE PAD SIMILAR TO STANDARD VALVE BOX PAD.

BUTTERFLY VALVE, BOX, LID AND TAG

NOT TO SCALE



NOTES:

1. AIR RELEASE VALVES TO BE INSTALLED AT HIGH POINTS, OR WHERE AIR WOULD BE ENTRAPPED, ALONG 4" AND LARGER FORCE MAINS.
2. FORCE MAIN VERTICAL ALIGNMENT TO BE DESIGNED SUCH THAT THE MINIMUM NUMBER OF REQUIRED AIR RELEASE VALVES ARE INSTALLED.
3. ALL INCIDENTAL FITTINGS AND HARDWARE TO BE STAINLESS STEEL.
4. ALL PIPE THREADS TO BE SEALED AIR TIGHT.
5. VENT PIPE TO BE LAID ACCURATELY ON SLOPE, WITHOUT HIGH OR LOW POINTS.
6. AIR RELEASE VALVES TO BE IN BELOW-GRADE INSTALLATIONS UNLESS IMPRACTICAL. INSTALLATIONS MAY BE ABOVE-GROUND ONLY WHERE APPROVED AND SPECIFICALLY INDICATED ON THE PLAN.
7. CONCRETE PAD SHALL BE TYPE I CONCRETE W/ 3,000 P.S.I., 28 DAY COMPRESSIVE STRENGTH.

ABOVE-GROUND ARV ASSEMBLY

NOT TO SCALE

EXEMPT
File Number:
58-032385-001

RECEIVED January 17, 2014
South District DEP

REVISIONS

REV.NO.	DESCRIPTIONS	DATE

SEAL

STATE OF FLORIDA
MATTHEW S. LOVE
LICENSE
No 66118
PROFESSIONAL ENGINEER

SEAL

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Clearwater, Florida 33756
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EB0006691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 2

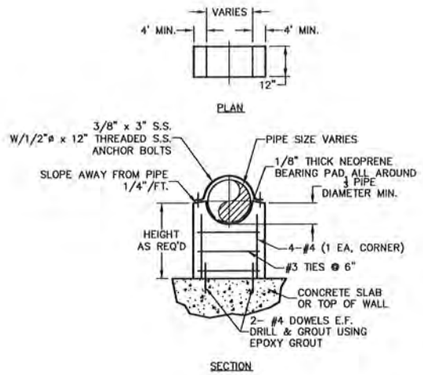
DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

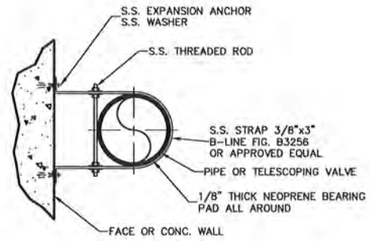
DRAWING NUMBER
C6

STATUS: ISSUED FOR PERMIT
REVISION

RECEIVED January 17, 2014
South District DEP



PIPE SUPPORT TYPE 1
NOT TO SCALE



PIPE STAND-OFF BRACKET TYPE 8
NOT TO SCALE

FROM THE UNI-BELL HANDBOOK OF PVC PIPE
SPECIFICATION TIME REQUIRED FOR A 1.0 PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED
THE EOR SHALL PROVIDE TESTING SPECIFICATIONS CONSISTENT WITH THE FOLLOWING TABLE FOR PVC AND DIP:

1	2	3	4		SPECIFICATION TIME FOR LENGTH (L) SHOWN (MIN., SEC)							
PIPE DIAMETER (INCHES)	MINIMUM TIME (MIN:SEC)	LENGTH FOR MINIMUM (FEET)	TIME FOR LONGER (SECONDS)		100 FT.	150 FT.	200 FT.	250 FT.	300 FT.	350 FT.	400 FT.	450 FT.
4	3.46	597	0.380	L	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46
6	5.40	398	0.854	L	5.40	5.40	5.40	5.40	5.40	5.40	5.42	6.24
8	7.34	298	1.520	L	7.34	7.34	7.34	7.34	7.36	8.52	10.08	11.24
10	9.26	239	2.374	L	9.26	9.26	9.26	9.53	11.52	13.51	15.49	17.48
12	11.20	199	3.416	L	11.20	11.20	11.24	14.15	17.05	19.56	22.47	25.38
15	14.10	159	5.342	L	14.10	14.10	17.48	22.15	26.42	31.09	35.38	40.04
18	17.00	133	7.692	L	17.00	19.13	25.38	32.03	38.37	44.52	51.16	57.41
21	19.50	114	10.470	L	19.50	26.10	34.54	43.37	52.21	61.00	69.48	78.31
24	22.40	99	13.674	L	22.47	34.11	45.34	56.58	68.22	78.46	91.10	102.33
27	25.30	88	17.306	L	28.51	43.16	57.41	72.07	86.32	100.57	115.22	129.48
30	28.20	80	21.366	L	35.37	53.25	71.13	89.02	106.50	124.38	142.26	160.15
33	31.10	72	25.852	L	43.05	64.38	86.10	107.43	129.16	150.43	172.21	193.53
36	34.00	66	30.768	L	51.17	76.55	102.34	128.12	153.50	179.29	205.07	230.46

a.) FOR PIPE LENGTHS GREATER THAN FOUR HUNDRED FIFTY (450) FEET BUT LESS THAN LENGTH IN COLUMN 3, USE MINIMUM TIME IN COLUMN 2.

EXAMPLE: DETERMINE TEST TIME FOR 425 FEET OF TWELVE (12) INCH PVC.

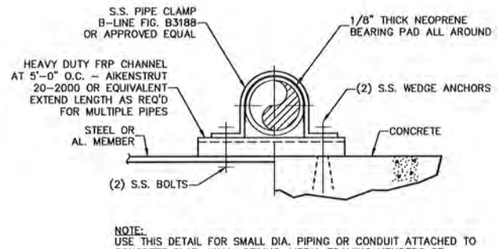
b.) FOR PIPE LENGTHS GREATER THAN FOUR HUNDRED FIFTY FEET AND GREATER THAN LENGTH IN COLUMN 3, SUBTRACT LENGTH OF COLUMN 3 FROM ACTUAL PIPE LENGTH, THEN MULTIPLY DIFFERENCE BY TIME IN COLUMN 4 AND ADD TO TIME IN COLUMN 2.

CONVERT min:sec TO SECONDS
(min. X 60) + sec: 1400 = 360 s; 450=450s
INTERPOLATE t425 = 363s + (408 - 363) X (425 - 400) / (450 - 400)
T425 386s

NOTE: INTERPOLATE BETWEEN VALUES ON TABLE AS SHOWN IN EXAMPLE FOR AIR TEST.

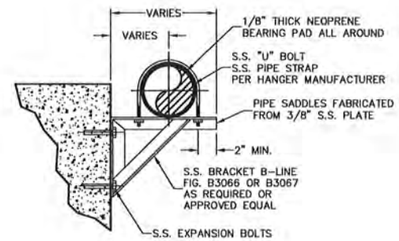
CONVERT SECONDS TO min:sec
(386 sec/60) = 6.43 min. 6.43 min. = 6 min. + (60 X 0.43)
1425 = 6 min. 26 sec.
NOTE: FOR LENGTHS GREATER THAN FIVE HUNDRED (500) FEET CONTACT THE EOR.

AIR TEST TABLE

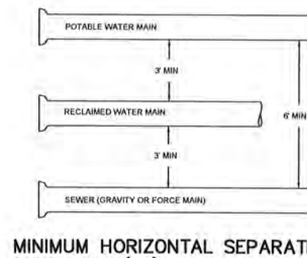


NOTE:
USE THIS DETAIL FOR SMALL DIA. PIPING OR CONDUIT ATTACHED TO CONCRETE SLAB, WALL, CEILING, METAL FRAMING MEMBERS OR EQUIPMENT MOUNTING BOARDS.

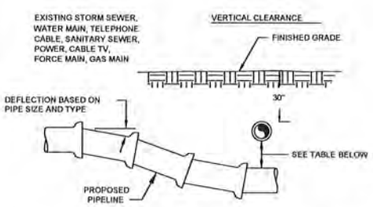
PIPE SUPPORT TYPE 5
NOT TO SCALE



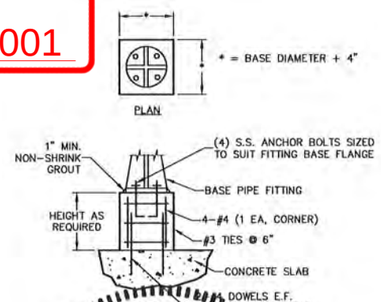
PIPE SUPPORT TYPE 3
NOT TO SCALE



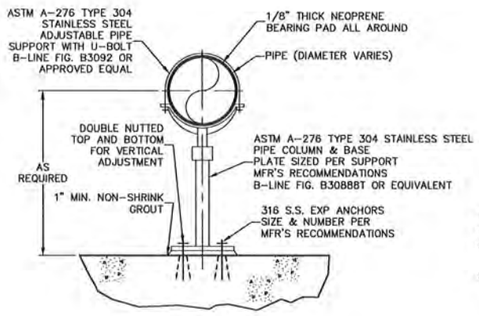
MINIMUM HORIZONTAL SEPARATION DISTANCES (FT)



MINIMUM VERTICAL SEPARATION DISTANCES (IN)



PIPE SUPPORT TYPE 2
NOT TO SCALE



PIPE SUPPORT TYPE 7
NOT TO SCALE

(OUTSIDE OF PIPELINE TO OUTSIDE OF PIPELINE)

	WATER MAIN	FORCE MAIN	SANITARY SERVICE	REUSE MAIN	STORM WATER	OTHER UTILITIES (TELEPHONE, CABLE, ETC.)
WATER MAIN	3	6	6	3	3	3
FORCE MAIN	6	3	3	3	3	3
SANITARY SEWER	6	3	3	3	3	3
REUSE MAIN	3	3	3	3	3	3
STORM WATER	3	3	3	3	3	3
OTHER UTILITIES	3	3	3	3	3	3

(OUTSIDE OF PIPELINE TO OUTSIDE OF PIPELINE)

	WATER MAIN	FORCE MAIN	SANITARY SERVICE	REUSE MAIN	STORM WATER	OTHER UTILITIES (TELEPHONE, CABLE, ETC.)
WATER MAIN	6	12	12	6	6	6
FORCE MAIN	12	6	6	6	6	6
SANITARY SEWER	12	6	6	6	6	6
REUSE MAIN	6	6	6	6	6	6
STORM WATER	6	6	6	6	6	6
OTHER UTILITIES	6	6	6	6	6	6

NOTES:
1.) MAXIMUM JOINT DEFLECTION SHALL BE 90% OF MANUFACTURER'S RECOMMENDATION.
2.) WHEREVER POSSIBLE, THE STRATIGRAPHY OF UTILITIES SHALL PLACE SANITARY SEWER AND SEWER FORCE MAINS BELOW RECLAIMED MAINS AND BELOW WHERE WATER MAINS ARE ABOVE GRAVITY SEWERS OR WASTEWATER FORCE MAINS. A VERTICAL CLEARANCE OF 6 INCHES IS ACCEPTABLE.
3.) ACCEPTABLE VARIANCES
   A. WHERE HORIZONTAL SEPARATION CANNOT BE MAINTAINED, C900 DR14 PVC PIPE SHALL BE USED FOR ONE OF THE PIPELINES.
   B. WHERE VERTICAL CLEARANCE CANNOT BE MAINTAINED, ONE FULL LENGTH OF DR14 C900 PIPE SHALL BE INSTALLED CENTERED AT THE POINT OF CROSSING.
   C. WHERE 30" MINIMUM DEPTH OF COVER CANNOT BE MAINTAINED, SPECIAL PROTECTION OR PIPE MATERIAL UPGRADE MAY BE REQUIRED, AT THE DISCRETION OF THE CITY ENGINEER.
4.) NO WATER PIPE SHALL PASS THROUGH, OR COME IN CONTACT WITH ANY PART OF A SANITARY MANHOLE OR STORMWATER STRUCTURE.

UTILITY CONFLICT DETAIL
NOT TO SCALE

EXEMPT
File Number:
58-032385-001

MATTHEW S. LOVE LICENSE No 66118 STATE OF FLORIDA PROFESSIONAL ENGINEER

REVISIONS: REV.NO. | DESCRIPTIONS | DATE

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EB0006691
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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 3

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	GES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: NA VERTICAL: NA

DRAWING NUMBER: C7

STATUS: ISSUED FOR PERMIT

REVISION

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EXEMPT
File Number:
58-032385-001

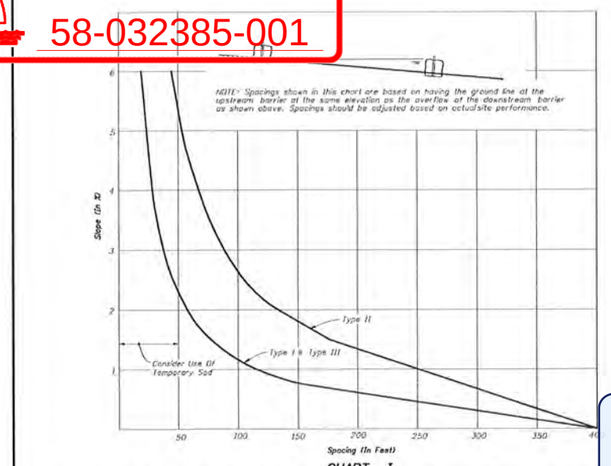
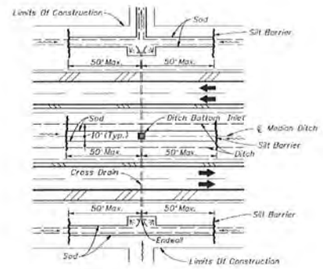


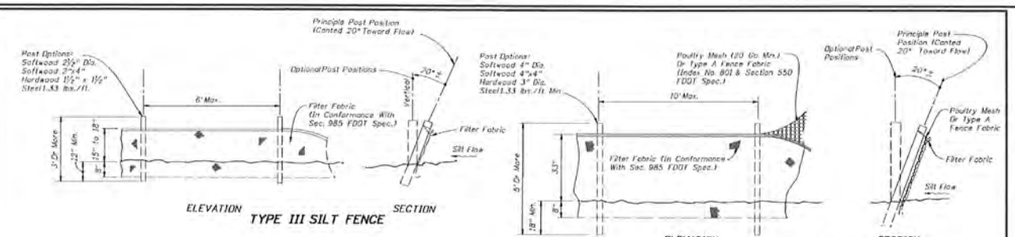
CHART I

RECOMMENDED SPACING FOR SYNTHETIC BALES OR BALE TYPE BARRIERS AND TYPE III SILT FENCE



DITCH INSTALLATIONS AT DRAINAGE STRUCTURES

RECEIVED January 17, 2014
South District DEP

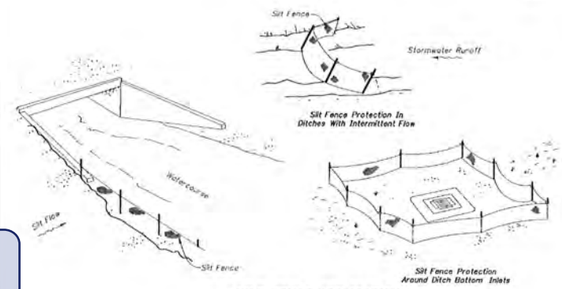


ELEVATION — SECTION

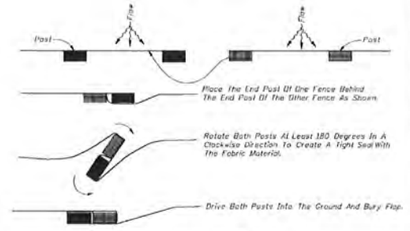
TYPE III SILT FENCE

ELEVATION — SECTION

TYPE IV SILT FENCE



SILT FENCE APPLICATIONS



PLAN VIEW

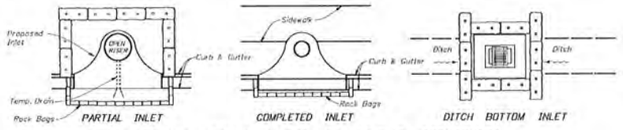
JOINING TWO SILT FENCES

NOTES FOR SILT FENCES

1. Type III Silt Fence to be used at most locations. Where used in ditches, the spacing for Type III Silt fence shall be in accordance with Chart 1, Sheet 1.
2. Type IV Silt Fence to be used where large sediment loads are anticipated. Suggested use is where (A)slope is 1:2 or steeper and length of slope exceeds 25 feet. Avoid use where the detained water may back into travelanes or off the right of way.
3. Do not construct silt fences across permanent flowing watercourses. Silt fences are to be at upland locations and turbidity barriers used at permanent bodies of water.
4. Where used as slope protection, Silt Fence is to be constructed on 0% longitudinal grade to avoid channelizing runoff along the length of the fence.
5. Silt Fence to be paid for under the contract unit price for Staked Silt Fence, (LF).

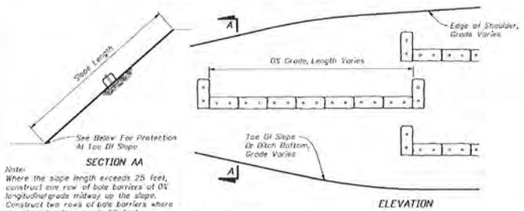
2010 FDOT Design Standards	Last Revision 07/01/07	Sheet No. 1 of 3
TEMPORARY EROSION AND SEDIMENT CONTROL	Index No. 102	

2010 FDOT Design Standards	Last Revision 07/01/06	Sheet No. 3 of 3
TEMPORARY EROSION AND SEDIMENT CONTROL	Index No. 102	



PARTIAL INLET — COMPLETED INLET — DITCH BOTTOM INLET

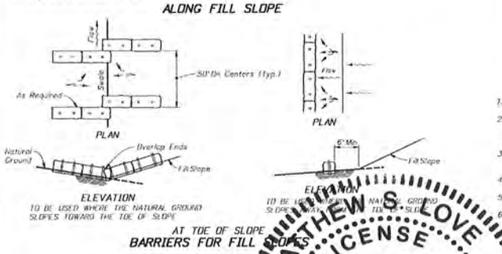
PROTECTION AROUND INLETS OR SIMILAR STRUCTURES



SECTION AA — ELEVATION

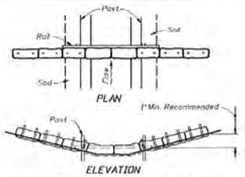
ALONG FILL SLOPE

Note:
Where the slope length exceeds 25 feet, construct one row of bale barriers at 0% longitudinal grade midway up the slope. Construct two rows of bale barriers where toe slope length exceeds 50 feet.

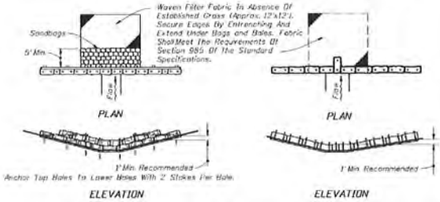


AT TOE OF SLOPE

BARRIERS FOR FILL SLOPES



SYNTHETIC BALES OR BALE TYPE BARRIERS FOR PAVED DITCHES

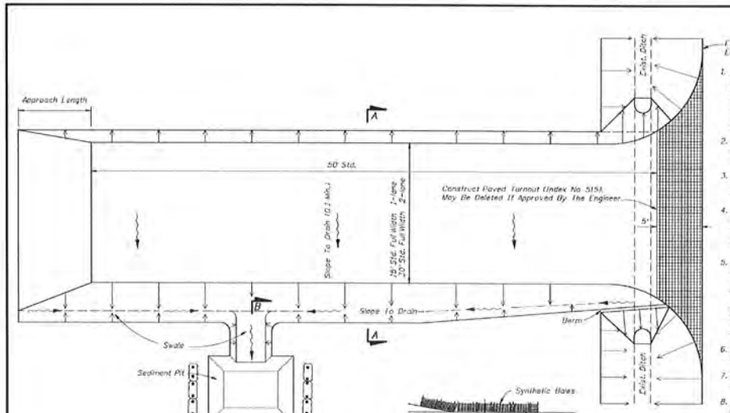


SYNTHETIC BALES OR BALE TYPE BARRIERS FOR UNPAVED DITCHES

NOTES FOR SYNTHETIC BALES OR BALE TYPE BARRIERS

1. Type I and II Synthetic Barrier should be spaced in accordance with Chart 1, Sheet 1.
2. Bales shall be anchored with 2-1" x 2" for 1" dia.) x 4' wood stakes. Stakes of other material or shape providing equivalent strength may be used if approved by the Engineer. Stakes other than wood shall be removed upon completion of the project.
3. Rails and posts shall be 2" x 4" wood. Other materials providing equivalent strength may be used if approved by the Engineer.
4. Adjacent bales shall be butted firmly together.
5. Where used in conjunction with silt fence, bales shall be placed on the upstream side of the fence.
6. Bales to be paid for under the contract unit price for Synthetic Bales, LF. The unit price shall include the cost of filter fabric for Type I and II Barriers. Sandbags shall be paid for under the unit price for Sandbagging, CY. Rock bags to be paid for under the contract unit price for Rock Bags, EA.

2010 FDOT Design Standards	Last Revision 07/01/09	Sheet No. 2 of 3
TEMPORARY EROSION AND SEDIMENT CONTROL	Index No. 102	



GENERAL NOTES

1. A Soil Tracking Prevention Device (STPD) shall be constructed at locations designated by the engineer for points of egress from unstabilized areas of the project to public roads where off-site tracking of mud could occur. Traffic from unstabilized areas of the construction project shall be directed thru a STPD. Barriers, flagging, or other positive means shall be used as required to limit and direct vehicular egress across the STPD.
2. The Contractor may propose an alternative technique to minimize off-site tracking of sediment. The alternative must be reviewed and approved by the Engineer prior to its use.
3. All materials spilled, dropped, or tracked onto public roads (including the STPD aggregate and construction mud) shall be removed daily, or more frequently if so directed by the Engineer.
4. Aggregates shall be as described in Section 901 excluding 901-2.3. Aggregates shall be FDOT size #1. If this size is not available, the next available smaller size aggregate may be substituted with the approval of the Engineer. Sizes containing excessive small aggregate will track off the project and are unsuitable.
5. The sediment pit should provide a retention volume of 3600 cubic feet/acre of surface area draining to the pit.
   When the STPD is isolated from other drainage areas, the following pit volumes will satisfy this requirement:
   15' x 50'=300 ft.³ 30' x 50'=200 ft.³
   As an option to the sediment pit, the width of the swale bottom can be increased to obtain the volume. When the sediment pit or swale volume has been reduced to one half, it shall be cleaned. When a swale is used, synthetic bales or silt fence shall be placed along the entire length.
6. The swale ditch draining the STPD shall have a 0.02% minimum and a 1.0% maximum grade using the STPD and to the sediment pit.
7. Mitered end sections are not required when the sidedrain pipe satisfies the clear zone requirements.
8. The STPD shall be maintained in a condition that will allow it to perform its function. To prevent off-site tracking, the STPD shall be rinsed daily when in use to move accumulated mud downward thru the stone. Additional stabilization of the vehicular route leading to the STPD may be required to limit the mud tracked.
9. A STPD shall be paid for under the contract unit price for Soil Tracking Prevention Device, EA. The unit price shall constitute full compensation for construction, maintenance, replacement of materials, removal, and restoration of the area utilized for the STPD, including but not limited to excavation, grading, temporary pipe (including M.E. when required), filter fabric, aggregate, paved turnout (including asphalt and base construction), ditch stabilization, approach route stabilization, sediment removal and disposal, water, rinsing and cleaning of the STPD and cleaning of public roads, grassing and sod. Synthetic Bale or Bale Type Barrier shall be paid for under the contract unit price for Synthetic Bales, LF. Silt fence shall be paid for under the contract unit price for Staked Silt Fence, LF.
10. The construction of a standard STPD is 15' x 50' unless otherwise shown in the plans. If the volume of entering and existing vehicles warrant, a 30' width STPD may be used if approved by the Engineer. When a double width (30') STPD is used, the pay quantity shall be 2 for each location.

2010 FDOT Design Standards	Last Revision 07/01/07	Sheet No. 1 of 1
SOIL TRACKING PREVENTION DEVICE TYPE A	Index No. 106	

MATTHEW S. LOVE
LICENSE
No 66118
STATE OF FLORIDA
PROFESSIONAL ENGINEER
SEAL

REV.NO.	DESCRIPTIONS REVISIONS	DATE

McKIM&CREED
1365 Hamlet Avenue
Clearwater, Florida 33756
Phone: (727)442-7196, Fax: (727)461-3827
EB0006691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 4

DATE:	JANUARY 2014
MCE PROJ. #	5883-0005
DRAWN	CES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE: HORIZONTAL: NA VERTICAL: NA

DRAWING NUMBER: C8

STATUS: ISSUED FOR PERMIT

REVISION

S:\2005\0005\04-Drawings\Civil\0005-3800005.dwg, 1/9/2014 11:34:55 AM, Scott Shelton

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
South District Office
Post Office Box 2549
Fort Myers, Florida 33902-2549

RICK SCOTT
GOVERN OR

HERSCHEL T. VINYARD JR.
SECRETARY

Sent Via electronic mail

STATE OF FLORIDA
DOMESTIC WASTEWATER PERMIT REVISION

In the Matter of an
Application for Permit
Revision by:

City of Venice
Lenox E. Bramble, P.E., Utilities Manager
401 West Venice Avenue
Venice, FL 34285
lbramble@ci.venice.fl.us.com

Sarasota County - DW
City of Venice, Eastside AWWTF
PA File No.: FL0041441-013-DW1/MR
Water Body Identification (WBID) Class III Fresh Water, No. 2009
Revision Date: January 22, 2014
Issuance Date: December 12, 2011
Permit Expiration date**:** December 11, 2016

This permit revision is in response to your request for a minor modification to improve the Eastside WRF Reclaimed Water Filtration system. The City of Venice is hereby authorized to:

1. Install a new 2 million gallon per day (MGD) lake filtration system to remove sediment and algae consisting of one gravity disk filter with a stainless steel mesh media. All water returned from the existing Part III lined storage pond ("supplemental water") will be filtered and chlorinated before being pumped directly into the ground storage tank and subsequently into the reclaimed water system.

2. Install one new low head transfer pump station to pump 2 MGD of filtered effluent from the new gravity disk filter to the ground storage tank inlet.

3. Install a new pump station to pump waste backwash from the new gravity disk filter to either the plant drain lift station or the WAS line to the sludge holding tanks.

4. Upgrade the existing lake return pump to provide 2 MGD of flow to the new gravity disk filter.

5. Install a new chemical feed pump and residual analyzer to provide final polishing chlorination prior to discharge into the ground storage tank.

6. Improve piping for the proposed improvements are included in this project.

The following five specific conditions are hereby added to Section VIII of permit FL0041441:

11. Tanks shall be designed and constructed in accordance with sound engineering practices and applicable current codes of practice of nationally recognized associations such as ASME, ASTM, ANSI, STI and UL.

12. The permittee must submit a completed Notice of Demolition or Asbestos Renovation [DEP Form 62-257.900(1)] to the Department at least 10 working days prior to any demolition or renovation. The form is available at http://www.dep.state.fl.us/air/rules/forms/asbestos.htm.

13. Disinfection shall be provided and the fecal coliform and TSS limits established for high-level disinfection in Rule 62-600.440(5), F.A.C., shall be met before entering the reclaimed water storage tank. [62-610.472(3)(a)1.]

14. Continuous monitoring for disinfectant residual shall be performed on the disinfected supplemental water at a point before entering the reclaimed water storage tank. Fecal coliforms and TSS shall be monitored at this point in accordance with the schedule established in Chapter 62-601, F.A.C., for high-level disinfection facilities, based on the permitted capacity of the largest domestic wastewater treatment facility providing reclaimed water to the reuse system. [62-610.472(3)(a)4.]

15. The permittee shall sample the disinfected supplemental water for Cryptosporidium and Giardia as follows:

a. Sampling shall be conducted at one time during each two-year period. Intervals between sampling shall not be greater than two years.
b. Samples shall be taken at a point after treatment of the supplemental water supply (before entering the reclaimed water storage tank).

[62-610.472(3)(d)1.]

All other conditions of the permit shall remain unchanged. This letter must be attached to the referenced permit and become a permanent part thereof.

The Department's proposed agency action shall become final unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, Florida Statutes, within fourteen days of receipt of notice. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Under Rule 62-110.106(4), Florida Administrative Code, a person may request enlargement of the time for filing a petition for an administrative hearing. The request must be filed (received by the clerk) in the Office of General Counsel before the end of the time period for filing a petition for an administrative hearing.

Petitions by the applicant or any of the persons listed below must be filed within fourteen days of receipt of this written notice. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), Florida Statutes, must be filed within fourteen days of publication of the notice or within fourteen days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within fourteen days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within fourteen days of receipt of notice shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, Florida Statutes. Any subsequent intervention (in a proceeding initiated by

another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

(a) The name, address, and telephone number of each petitioner; the name, address, and telephone number of the petitioner's representative, if any; the Department permit identification number and the county in which the subject matter or activity is located;
(b) A statement of how and when each petitioner received notice of the Department action;
(c) A statement of how each petitioner's substantial interests are affected by the Department action;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
(f) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and
(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation under Section 120.573, Florida Statutes, is not available for this proceeding.

This permit action is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this permit will not be effective until further order of the Department.

Any party to the permit has the right to seek judicial review of the permit action under Section 120.68, Florida Statutes, by the filing of a notice of appeal under Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when this permit action is filed with the clerk of the Department.

Executed in Fort Myers, Florida

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

for
Jon M. Iglehart
Director of District Management

Date: January 22, 2014

CERTIFICATE OF SERVICE

The undersigned hereby certifies that this NOTICE OF PERMIT REVISION and all copies were mailed before the close of business on January 22nd, 2014, to the listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, under Section 120.52, Florida Statutes, with the designated deputy clerk, receipt of which is hereby acknowledged.

Regina C. Dick — January 22, 2014
[Clerk] [Date]

JMI/BJS/rcd

Copies furnished to:
Mathew S. Love, P.E. (Mlove@mckimcreed.com)
Samantha Jones, EI (sjones@mckimcreed.com)
James A. Petrosky, City of Venice (jpetros@ci.venice.fl.us)
Barbara Skates, FDEP
Deanna Newburg, FDEP
Allen Slater, FRWA (Allen.Slater@frwa.net)

GEOTECHNICAL REPORT FOR PROPOSED
GRAVITY DISK FILTER & PUMP WET WELL,
CITY OF VENICE
EAST WATER RECLAMATION FACILITY,
3510 E. LAUREL ROAD,
NOKOMIS,
SARASOTA COUNTY, FLORIDA

Ardaman & Associates, Inc.

OFFICES

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West Palm Beach, 2511 Westgate Avenue, Suite 10, West Palm Beach, Florida 33409, Phone (561) 687-8200

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Monroe, 1122 Hayes Street, Monroe, Louisiana 71292, Phone (318) 387-4103
New Orleans, 1305 Distributors Row, Suite 1, Jefferson, Louisiana 70123, Phone (504) 835-2593
Shreveport, 7222 Greenwood Road, Shreveport, Louisiana 71119, Phone (318) 636-3723

MEMBERS:
A.S.F.E.
American Concrete Institute
American Society for Testing and Materials
Florida Institute of Consulting Engineers

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

(Revised December 2, 2013)
November 13, 2013
File No. 13-7202

TO: McKim & Creed
1365 Hamlet Avenue
Clearwater, FL 33756

Attention: David C. Wehner, P.E.

SUBJECT: Geotechnical Report for Proposed Gravity Disk Filter and Pump Wet Well, City of Venice East Water Reclamation Facility, 3510 East Laurel Road, Nokomis, Sarasota County, Florida

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Dear Mr. Wehner:

As requested, our firm has completed a subsurface soil exploration program at the subject site, in general accordance with our subcontract for professional services (M&C Project Charge Code 5883-0003, dated July 19, 2013). The purpose of this program was to determine the nature and condition of the subsurface soils and to prepare recommendations relative to foundation design for these structures.

This report documents our findings and conclusions. It has been prepared for the exclusive use of McKim & Creed, their client and their subconsultants for specific application to the subject project, in accordance with generally-accepted geotechnical engineering practices.

It has been a pleasure to be of assistance to you with this project. Please contact us when we may be of further service to you, or should you have any questions concerning this report.

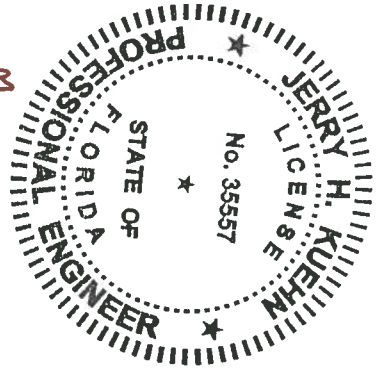
Very truly yours,

ARDAMAN & ASSOCIATES, INC.
Certificate of Authorization No. 5950

12/2/13

Jerry H. Kuehn, P.E.
Senior Project Engineer
Fl. License No. 35557

JHK/GHS:ly



Gary H. Schmidt, P.E.
Vice President
Fl. License No. 12305

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APPENDIX Soil Boring, Sampling and Testing Methods

FIGURE 1 Test Boring Location and Soil Profile

1.0 SCOPE

The scope of our services has included the following items:

1. Conducting one (1) Standard Penetration Test boring within the proposed structure area to determine the nature and condition of the subsurface soils.

2. Reviewing each soil sample obtained in our field testing program by a geotechnical engineer in the laboratory for further investigation, classification, and assignment of laboratory test, if required.

3. Analyzing the existing soil conditions with respect to the proposed construction.

4. Preparing this report to document the results of our field testing program, engineering analysis and recommendations.

2.0 FIELD EXPLORATION PROGRAM

Our field exploration program included conducting one (1) Standard Penetration Test (SPT) boring at the location shown on the attached Figure 1. This boring was performed to determine the nature and condition of the subsurface soils to a depth of 35 feet below the existing ground surface. The boring was advanced from the ground surface to a depth of 4.5 feet using a hand auger, in order to minimize risk of damage to underground utilities. The drill rig was then used to advance the boring to greater depth and to perform the SPT.

The soil profile encountered is shown on the graphic soil profile (boring log) on Figure 1. The equipment and procedures used in the boring are described in the Appendix of this report.

As noted on the boring log, an auto-hammer was used to perform the SPT. Additional information on this is also included in the Appendix.

3.0 GENERAL SUBSURFACE CONDITIONS

The general subsurface conditions encountered during the field exploration program are shown on the graphic soil profile on Figure 1 of this report. Soil stratification is based upon examination of recovered soil samples and interpretation of field boring logs. The stratification lines represent the approximate boundaries between the soil types, while the actual transitions may be gradual.

A generalization of the subsurface soil conditions encountered in the boring is described below:

Depth (feet)	Soil Description
0 to 5	Fine sand (SP) to silty fine sand (SM)
5 to 12	Medium dense fine sand with shell (SP)
12 to 17	Very loose clayey fine sand (SC)
18 to 27	Medium dense to dense cemented silt (ML) and cemented silty fine sand (SM)
27 to 35	Medium dense silty fine sand (SM) (cemented in lower part)

On the date of our field exploration program, the groundwater table was encountered at a depth of approximately three feet below the existing ground surface. The groundwater table is anticipated to fluctuate due to seasonal rainfall variations and other factors.

4.0 LABORATORY TESTING PROGRAM

Representative soil samples obtained during our field sampling operation were packaged and transferred to our office and, thereafter, examined by a geotechnical engineer to obtain more accurate descriptions of the existing soil strata. Routine laboratory classification tests were not deemed necessary to further define the physical properties of the soils. The soil descriptions shown on the soil boring logs are based on visual/manual classification procedures in general accordance with the Unified Soil Classification System (ASTM D-2488) and standard practice.

5.0 ANALYSIS AND RECOMMENDATIONS

Our scope of work included providing foundation design recommendations for the proposed gravity filters structure. Geotechnical properties of the soils and related recommendations are also provided for the proposed wet well.

5.1 Gravity Filters Structure Foundations

We understand that the filters will be supported on a 16.5' x 27.25' x 12" thick concrete slab-on-grade and that the floor live load on the slab will not exceed 300 pounds per square foot (psf).

5.1.1 Soil Analysis

The soils encountered consisted of fine sands (some with silt or shell) in the upper 17 feet, with clayey sand, silty sand and silt below this depth. No unusually weak or compressible soils, such as muck, were encountered at our boring location, within the boring depth.

The soils encountered at the subject site are well suited to support the proposed structure on a reinforced concrete slab-on-grade (mat) foundation. The allowable bearing pressure of the soil depends upon the area being subjected to that pressure, the magnitude of settlement that is acceptable, and other factors. For a 16.5' x 27.25' mat, we recommend an allowable soil bearing pressure no greater than 450 psf.

For continuous strip (wall) footings and isolated point loads (i.e. column loads), an allowable soil bearing pressure of up to 2,000 psf can be used, as long as the strip footings are no more than 3.0 feet wide (maximum "wall" load of 6.0 kips/foot) and the column footings are no larger than 6' x 6' (maximum "column" load of 72 kips). We recommend, however, that all continuous strip footings be no less than eighteen inches wide and column foundations be no less than twenty-four inches wide. A minimum soil cover of twelve inches, as measured from the bottom of the foundation system to outside adjacent finished grade, should be provided.

Assuming that the soils are prepared in accordance with the soil preparation recommendations of this report and that foundation loads are no greater than those indicated previously, we anticipate that total settlement of the slab will not exceed 0.5 inch. Differential settlements should not exceed 0.25 inch. Due to the granular nature of the materials at the site, this settlement will occur primarily during construction and initial use (application of total live load).

5.1.2 Soil Preparation Recommendations

The following soil preparation recommendations are made as a guide to the design professionals, parts of which should be incorporated into the project's general specifications:

1. The entire structure area, plus a margin of 5.0 feet outside its perimeter lines, should be cleared and grubbed of all surface vegetation and organic debris.

2. The cleared and grubbed elevation should be compacted with a vibratory roller having a static weight of at least 8,000 pounds or with a loaded, rubber-tired, front-end loader. Each pass should overlap the preceding pass by at least 30%. Sufficient passes should be made over the area, plus the 5.0 foot margin, to produce a density of at least 95% of Modified Proctor (ASTM D-1557) maximum density to a depth of 1.0 foot below the compacted surface. Extreme care should be used when vibratory compaction is used next to existing structures. A representative of Ardaman & Associates should be present during initial compaction efforts.

3. After compaction and testing to verify that the desired compaction has been achieved at this elevation, fill consisting of clean fine sands containing no more than 10% passing the No. 200 sieve, and having a Unified Soil Classification (ASTM D-2487) of "SP" or "SP-SM," can be placed in level lifts not exceeding 12 inches loose thickness and compacted with the equipment described above. Each lift should be compacted to at least 95% of Modified Proctor maximum density prior to the placement of subsequent lifts.

4. A geotechnical engineer or his representative from Ardaman & Associates, Inc., Sarasota office, should inspect and test the compacted excavated elevation and each layer of fill to verify compliance with the above recommendations. In addition, a representative should inspect and test the foundation contact soils immediately prior to concrete placement.

5.2 Other Geotechnical Recommendations and Soil Parameters

5.2.1 Excavations and Slopes

It should be noted that excavations in sandy soils, especially below the groundwater table, can result in unstable excavation bottoms and slopes. If the construction requires excavation below the groundwater table, dewatering of the excavation is recommended. Dewatering should be performed prior to beginning excavation operations, in order to minimize the disturbance of subgrade and excavation bottom soils due to seepage forces. Sufficient dewatering should be performed to lower the groundwater table to a minimum depth of 2 feet below the excavation depth. The contractor should be responsible for adequate dewatering and safe temporary excavation slopes during construction.

We understand that the proposed wet well is to be approximately 14 feet deep (below the existing ground surface). The SPT boring indicates that very loose, clayey fine sand will likely be encountered at this depth. Even with dewatering, this soil will likely remain saturated due to its clay content and resulting poor drainage characteristics. It may, therefore, be unstable and impractical to compact at the excavation bottom. In this case, it will need to be undercut to a depth of one to two feet below the wet well bottom elevation and replaced with clean freely

draining sand (such as beach compatible sand or similar) or fine gravel (FDOT No. 89) bedding, adequately compacted to form a firm and unyielding subgrade.

5.2.2 Soil Friction and Lateral Earth Pressures

We understand that the proposed wet well is to be approximately 10 feet in diameter and 14 feet deep (below the existing ground surface). In the following paragraphs, recommended soil parameters are presented for use in the wet well design. They should be considered ultimate values that do not include a factor or safety. In general, however, the engineering calculations performed by the design engineer should include a factor of safety.

The friction angle of the sandy soils against concrete will vary depending upon the roughness of the concrete surface. Assuming the soils are compacted (such as beneath foundations or as backfill against vertical earth retaining walls), the friction angle against mass (poured against earth) concrete or masonry would be approximately 27 degrees and the friction angle against formed concrete would be approximately 20 degrees.

Lateral earth pressures acting on subsurface structures include lateral loading due to soil and groundwater. The lateral earth pressure (not including hydrostatic pressure) will be a function of soil properties, the depth below the ground surface and whether an active, passive or at-rest condition exists.

Based upon the soil classifications and SPT "N" values, we have estimated the internal friction angle, cohesion, saturated unit weights and lateral earth pressure coefficients for the soils encountered at the site. These are listed in the following table.

Depth (feet)	Unified Soil Class.	Average SPT N-Value	Saturated Unit Weight (pcf)	Buoyant Unit Weight (pcf)	Internal Friction Angle (degrees)	Cohesion (ksf)	Active Earth Pressure Coef.	Passive Earth Pressure Coef.	At-Rest Earth Pressure Coef.
0 – 12	SP, SM	10	120	58	30	0	0.33	3.0	0.50
12 – 17	SC	1	107	45	26	0	0.39	2.5	0.54
17 – 22	ML*	17	126	64	32	0	0.31	3.2	0.47

*cementation is disregarded

The values listed in the above table are for the soils in their in situ condition. If backfill is to be placed next to structures, these values may not be relevant. For a clean, well compacted, granular (sand) backfill, we recommend an internal friction angle of 32 degrees, saturated unit weight of 125 pcf and a buoyant unit weight of 63 pcf. The corresponding active lateral earth pressure coefficient (K_a) is 0.31 and the corresponding passive lateral earth coefficient (K_p) is 3.3. The at-rest lateral earth pressure coefficient (K_o) would be in the range of 0.45 to 0.50, but could be in the range of 1.0 to 1.5 during construction (while being compacted).

Lateral earth pressure distributions used in design should also consider construction loads or surcharge loads, to the extent that such pressures and forces may act on the structure. In general, heavy construction equipment and excavated soils should be kept a minimum distance of five feet from the edge of a braced or shored excavation. Soil placed adjacent to (maintaining a minimum 5-foot horizontal clearance) a braced or shored excavation should have a minimum slope of 2.0H to 1.0V.

Means and methods of excavation and bracing should be the responsibility of the contractor. However, excavation and/or bracing should, at a minimum, meet the requirements of the Occupational Safety Health Administration (OSHA).

6.0 GENERAL COMMENTS

The analysis and recommendations submitted in this report are based upon the data obtained from one (1) test boring performed at the location indicated on the attached Figure 1. This report does not reflect any variations which may occur outside the boring location. While the boring is representative of the subsurface conditions at its location, local variations characteristic of the subsurface materials of the region are anticipated and may be encountered. The boring logs and related information are based upon the driller's logs and visual examination of selected samples in the laboratory. The delineation between soil types shown on the logs is approximate, and the description represents our interpretation of the subsurface conditions at the designated boring location on the particular date drilled.

The water table level shown on the boring log represents water table surfaces encountered on the dates shown. Fluctuations in water table levels should be anticipated throughout the year.

APPENDIX

SOIL BORING, SAMPLING AND TESTING METHODS

Standard Penetration Test

The Standard Penetration Test (SPT) is a widely accepted method of in situ testing of foundation soils (ASTM D-1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load. The following tables relate N-values to a qualitative description of soil density and, for cohesive soils, an approximate unconfined compressive strength (Qu):

Cohesionless Soils:

N-Value	Description
0 to 4	Very loose
4 to 10	Loose
10 to 30	Medium dense
30 to 50	Dense
Above 50	Very dense

Cohesive Soils:

N-Value	Description	Qu (ton/ft^2)
0 to 2	Very soft	Below 1/4
2 to 4	Soft	1/4 to 1/2
4 to 8	Medium stiff	1/2 to 1
8 to 15	Stiff	1 to 2
15 to 30	Very stiff	2 to 4
Above 30	Hard	Above 4

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from each sampling interval and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for at least six months prior to being discarded. After completion of a test boring, the hole is kept open until a steady-state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

A hammer with an automatic drop release (auto-hammer) is sometimes used in place of the safety hammer. The auto-hammer has been calibrated to relate its blow counts to equivalent safety hammer N-values.

Soil Classifications

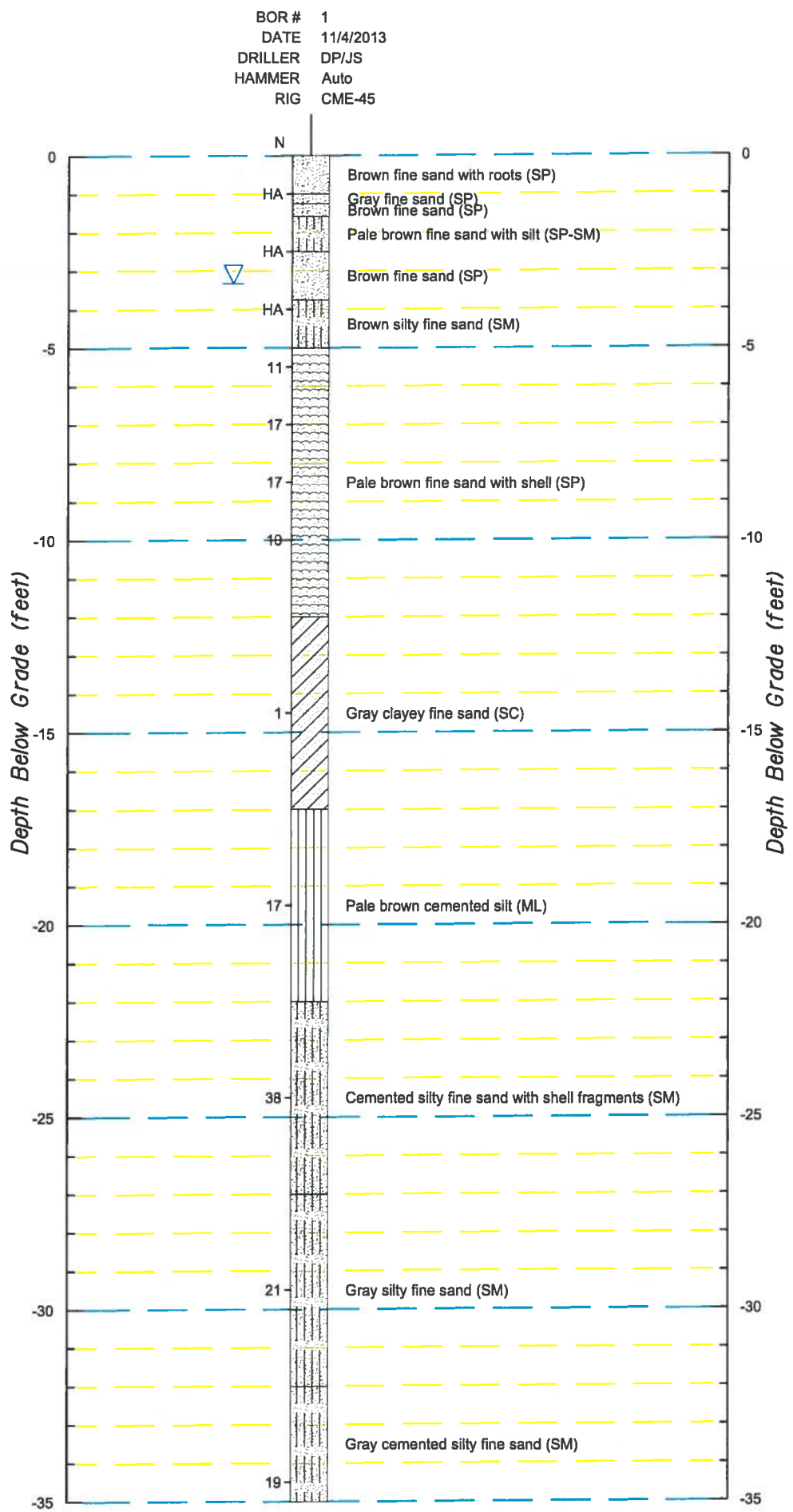
The soil descriptions presented on the soil boring logs are based upon the Unified Soil Classification System (USCS), which is the generally accepted method (ASTM D-2487 and D-2488) for classifying soils for engineering purposes. The following modifiers are the most commonly used in the descriptions.

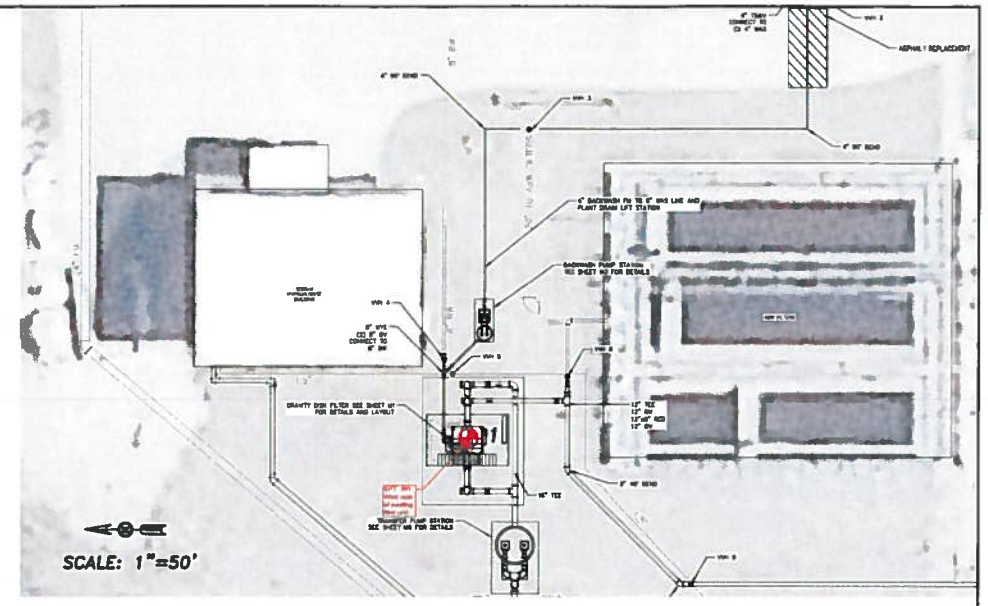
For Sands:	Modifier	Fines, Sand or Gravel Content*
	with silt or with clay	5% to 12% fines
	silty or clayey	12% to 50% fines
	with gravel or with shell	15% to 50% gravel or shell

For Silts or Clays:	Modifier	Fines, Sand or Gravel Content*
	with sand	15% to 30% sand and gravel; and % sand > % gravel
	sandy	30% to 50% sand and gravel; and % sand > % gravel
	with gravel	15% to 30% sand and gravel; and % sand < % gravel
	gravelly	30% to 50% sand and gravel; and % sand < % gravel

* may be determined by laboratory testing or estimated by visual/manual procedures. Fines content is the combined silt and clay content, or the percent passing the No. 200 sieve.

Other soil classification standards may be used, depending on the project requirements. The AASHTO classification system is commonly used for highway design purposes and the USDA soil textural classifications are commonly used for septic (on-site sewage disposal) system design purposes.





Base PDF Image By: McKim & Creed

TEST BORING LOCATIONS

LEGEND

∇ GROUNDWATER LEVEL MEASURED ON DATE DRILLED

N SPT N-VALUE IN BLOWS PER FOOT (UNLESS OTHERWISE NOTED)

SPT N VALUES CONVERTED TO EQUIVALENT SAFETY HAMMER

GRANULAR MATERIALS–RELATIVE DENSITY	SPT (BLOWS/FOOT)
VERY LOOSE	LESS THAN 4
LOOSE	4–10
MEDIUM DENSE	10–30
DENSE	30–50
VERY DENSE	GREATER THAN 50

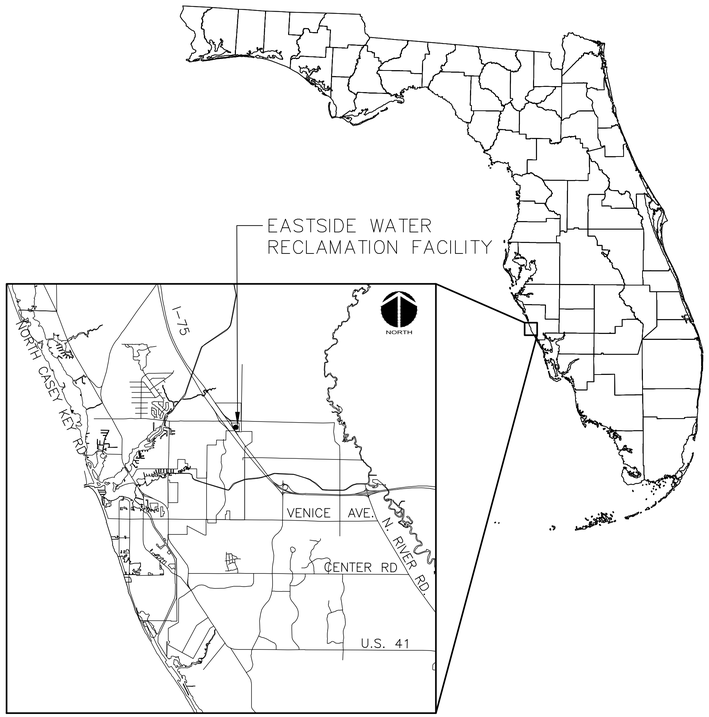
SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FOOT)
VERY SOFT	LESS THAN 4
SOFT	2–4
FIRM	4–8
STIFF	8–15
VERY STIFF	15–30
HARD	GREATER THAN 30

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

Test Locations/Boring Logs
City of Venice Eastside WRF
Laurel Road East, Venice
Sarasota County, Florida

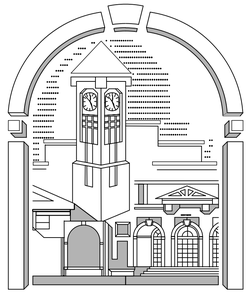
DRAWN BY: KGS	CHECKED BY:	DATE: 11/5/1
FILE NO. 13-7202	APPROVED BY:	FIGURE: 1

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS
ISSUED FOR BID
MARCH 2014



PROJECT VICINITY MAP
NTS

PLANS DEVELOPED FOR:



CITY OF VENICE

MAYOR: JOHN HOLIC

VICE MAYOR: EMILIO CARLESIMO

CITY COUNCIL MENBERS:
JIM BENNETT
BOB DANIELS
JEANETTE GATES
KIT McKEON
DAVID SHERMAN

CITY MANAGER: EDWARD F. LAVALLEE

PLANS DEVELOPED BY:

McKIM&CREED
1365 Hamlet Avenue
Clearwater, FL 33756
Phone: (727)442-7196, Fax: (727)461-3827
EB0006691
www.mckimcreed.com

ENGINEER OF RECORD / PROJECT MANAGER:

MATTHEW S. LOVE, P.E. | 66118 FL. REG. NO. | DATE

5883-0005: EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS
MARCH 2014
ISSUED FOR BID
G1 COVER SHEET

S:\5883\0005\05-Drawings\General\0001-58830005.dwg, 3/19/2014 1:56:39 PM, Quint Shelton

GENERAL NOTES

1. THESE PLANS ARE SOLELY TO ASSIST THE CONTRACTOR IN ASSESSING THE NATURE AND EXTENT OF THE EXISTING CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE COURSE OF WORK. CONTRACTORS ARE DIRECTED TO CONDUCT WHATEVER INVESTIGATION THEY DEEM NECESSARY PRIOR TO BIDDING TO DETERMINE THE ACTUAL CONDITIONS THAT WILL BE ENCOUNTERED.
2. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL VERIFY, PRIOR TO CONSTRUCTION, THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES (WHETHER OR NOT SHOWN ON THE PLANS) AFFECTING THE WORK.
3. THE CONTRACTOR SHALL REVIEW AND VERIFY ALL DIMENSIONS ON THE PLANS AND REVIEW ALL FIELD CONDITIONS THAT MAY AFFECT CONSTRUCTION. SHOULD DISCREPANCIES OCCUR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO OBTAIN WRITTEN CLARIFICATION BEFORE COMMENCING WITH CONSTRUCTION.
4. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES, STORM DRAINS, SEWERS, UTILITIES, AND OTHER FACILITIES IN THE CONSTRUCTION AREA. THE CONTRACTOR SHALL REPAIR ANY DAMAGES DUE TO HIS CONSTRUCTION ACTIVITIES AT NO ADDITIONAL COST TO THE OWNER.
5. WHERE IT IS NECESSARY TO DEFLECT PIPE EITHER HORIZONTALLY OR VERTICALLY, PIPE JOINT DEFLECTION SHALL NOT EXCEED 75% OF THE MANUFACTURERS' MAXIMUM RECOMMENDED DEFLECTION.
6. THERE SHALL BE NO "SIZE ON SIZE TAPS" OR "SIZE ON SMALLER TAPS" ON THIS PROJECT.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE EXISTING DRAINAGE SYSTEM WITHIN THE LIMITS OF THE PROJECT AREA FOR THE DURATION OF THE PROJECT.
8. THE CONTRACTOR SHALL PROVIDE CERTIFIED RECORD DRAWINGS AS OUTLINED IN THE SPECIFICATIONS. RED-LINE DRAWINGS SHALL BE CURRENT WITH EACH PAY APPLICATION SUBMITTED AND WILL BE CHECKED AS PART OF THE PAY APPLICATION REVIEW PROCESS. PAYMENT WILL NOT BE MADE TO CONTRACTOR WITHOUT APPROVED RED-LINE DRAWINGS. THE MOST CURRENT SET OF RED-LINES DRAWINGS SHALL ALSO BE BROUGHT TO EACH MONTHLY PROGRESS MEETING.
9. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A DETAILED CONSTRUCTION PHASING PLAN FOR APPROVAL, PRIOR TO BEGINNING CONSTRUCTION.
10. FIELD CONDITIONS MAY NECESSITATE ALIGNMENT AND GRADE DEVIATION OF THE PROPOSED PIPELINES TO AVOID CONFLICTS. NO ADDITIONAL PAYMENT SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE OWNER AND THE OWNER'S ENGINEER.
11. THE CONTRACTOR SHALL INCLUDE IN HIS BID:BY-PASS PUMPING FACILITIES, PUMPS, FITTINGS, LABOR, ETC, AS NECESSARY, BASED ON METHOD AND SEQUENCE OF CONSTRUCTION TO COMPLETE ALL WORK WHILE MAINTAINING THE EXISTING WASTEWATER TREATMENT PLANT OPERATIONS AT ALL TIMES.
12. ALL PROPOSED WORK SHALL BE COORDINATED WITH WASTEWATER TREATMENT PLANT PERSONNEL AND CITY OF VENICE UTILITIES DEPARTMENT AT LEAST TWO WEEKS IN ADVANCE OF PROPOSED CONSTRUCTION.
13. THE CONTRACTOR SHALL FURNISH SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL OF ALL PIPE CONNECTIONS, TRANSITIONS AND SPECIALS PRIOR TO FABRICATION OR DELIVERY TO THE JOB SITE.
14. CONNECTIONS TO EXISTING FACILITIES SHALL BE ACCOMPLISHED IN A NEAT WORKMANLIKE MANNER. WHEN FIELD CONDITIONS INDICATE ANY VARIANCE FROM DETAILED METHODS, THE CONTRACTOR SHALL PROVIDE COMPREHENSIVE AND DETAILED DRAWINGS FOR ENGINEER REVIEW AND APPROVAL PRIOR TO MAKING THE CONNECTIONS.
15. UNLESS OTHERWISE INDICATED OR APPROVED, ALL BELOW GROUND DUCTILE IRON PIPE SHALL HAVE PUSH-ON OR MECHANICAL JOINTS, AND ALL ABOVE GROUND DUCTILE IRON PIPE SHALL HAVE FLANGED JOINTS. ALL ABOVE AND BELOW GROUND PIPE JOINTS SHALL BE FULLY RESTRAINED.
16. ALL PIPELINES SHALL HAVE A MINIMUM COVER OF 36" BELOW EXISTING GRADE UNLESS OTHERWISE NOTED OR DIRECTED.
17. SANITARY SEWERS AND FORCE MAINS CROSSING OVER OR UNDER WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18" BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER OR FORCE MAIN PIPE JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN 10' BETWEEN ANY TWO JOINTS. AS AN ALTERNATE, THE SEWER OR FORCE MAIN MAY BE PLACED IN A WATERTIGHT CASING PIPE.
18. WATER SHALL NOT BE PERMITTED IN STRUCTURE EXCAVATIONS AND TRENCHES DURING CONSTRUCTION. DEWATERING IS REQUIRED TO A MINIMUM OF 18" BELOW BOTTOM OF EXCAVATION.
19. THE CONTRACTOR SHALL NOT ALLOW ANY DISCHARGE OF WASTEWATER TO LANDS AND/OR ADJACENT WATER BODIES OR STORM DRAINS. ANY LEAKAGE MUST BE CONTAINED AND TRANSFERRED BY THE CONTRACTOR TO THE PLANT DRAIN PUMP STATION AT THE WASTEWATER TREATMENT PLANT.
20. ALL EXPOSED PIPING SHALL BE PAINTED WITH DESIGNATED COLORS ASSOCIATED WITH THEIR USAGE AS PROVIDED IN THE SPECIFICATIONS.
21. ALL NEW PIPELINES SHALL BE FLUSHED, PRESSURE TESTED, AND APPROVED PRIOR TO TIE-INS TO EXISTING FACILITIES. THE CONTRACTOR WILL BE ALLOWED TO USE TEMPORARY PLUGS FOR PRESSURE TESTING.
22. ALL CONCRETE THRUST BLOCKS INSTALLED FOR TESTING PURPOSES AND NOT REQUIRED FOR THE PIPELINE SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE.
23. CONTRACTOR SHALL MAINTAIN A CLEAR PATH FOR ALL SURFACE WATER DRAINAGE STRUCTURES AND DITCHES DURING ALL PHASES OF CONSTRUCTION.THE CONTRACTOR SHALL BE REQUIRED TO INSTALL ALL EROSION, SEDIMENT AND TURBIDITY CONTROL MEASURES PRIOR TO CONSTRUCTION OF ANY COMPONENTS ASSOCIATED WITH THE PROJECT. SEDIMENT CONTROL INCLUDES SILT DAMS, TRAPS, EROSION PROTECTION, AND ANY OTHER APPURTENANCES NEEDED BUT NOT NECESSARILY SHOWN ON THESE DRAWINGS.
24. CONTRACTOR SHALL PROVIDE PROTECTIVE MATTING, FUEL CONTAINMENT AND ALL OTHER MATERIALS, EQUIPMENT AND LABOR TO PROTECT THE STAGING AREA DURING CONSTRUCTION.
25. CONTRACTOR SHALL, PRIOR TO BEGINNING CONSTRUCTION, SUBMIT A "FUELING SPILL PREVENTION PLAN" THAT SHALL CLEARLY INDICATE HOW FUEL SPILLS WILL BE PREVENTED WHEN FUELING BOTH WITHIN AND OUTSIDE OF THE STAGING AREA.
26. CONTRACTOR SHALL IDENTIFY A STAGING AREA AND GAIN PLANT STAFF APPROVAL PRIOR TO MOBILIZING TO BEGIN CONSTRUCTION.

UTILITY NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE FOLLOWING JURISDICTIONAL BODIES AND UTILITY COMPANIES:

INVESTIGATE BEFORE YOU EXCAVATE
CALL LOCAL PUBLIC UTILITY NOTIFICATION CENTER
TOLL FREE 1-800-432-4770
MIN. 48 HOURS BEFORE YOU EXCAVATE

CITY OF VENICE
UTILITIES DEPARTMENT
RALPH WARD
(941) 480-3333

FLORIDA POWER AND LIGHT
SARASOTA
TRACY STERNS
1-800-868-9554

VERIZON FLORIDA Inc.
DAVID WYNNS
(813) 627-8343

TECO PEOPLES GAS SARASOTA
DANNY SHANAHAN
(941) 342-4006

SARASOTA COUNTY TRAFFIC
MARK RICHMOND
(941) 650-2108

SARASOTA COUNTY UTILITIES
WATER/SEWER
ANN COLEMAN
(941) 861-0530

COMCAST CABLE VENICE
GONZALO ROJAS
(941)342-3578

2. ALL UTILITY CONSTRUCTION SHALL BE IN CONFORMANCE WITH THE LATEST VERSION OF THE CITY OF VENICE UTILITY STANDARDS.
3. ALL BELOW GROUND DUCTILE IRON PIPE SHALL BE ENCASED IN A POLYETHYLENE WRAP IN ACCORDANCE WITH AWWA STANDARDS.
4. ALL VALVE BOX COVERS SHALL BE PAINTED TO INDICATE THEIR TYPE OF SERVICE.
5. ALL TEST POINT TAPPING SHALL BE CUT LOOSE FROM THE CORPORATION STOP AND COMPLETELY REMOVED AND DISPOSED OF BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE. THE CORPORATION STOP SHALL BE CAPPED AND REMAIN IN PLACE.
6. ADJUST EXISTING MANHOLE FRAMES AND COVERS TO MATCH FINAL GRADE.

RESTORATION AND MISCELLANEOUS NOTES

1. THE CONTRACTOR SHALL PROVIDE AN ASPHALT PATCH FOR TRENCH AREAS CONSTRUCTED IN EXISTING ROADWAYS. ADJUST ALL CASTINGS TO MATCH NEW PAVEMENT SURFACE.
2. THE CONTRACTOR SHALL REPLACE ALL EXISTING PAVING, STABILIZED EARTH, CURBS, SIDEWALKS, FENCES, LANDSCAPING AND OTHER IMPROVEMENTS DISTURBED DURING CONSTRUCTION WITH THE SAME OR BETTER TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION OR AS DIRECTED BY THE ENGINEER AT NO ADDITIONAL COST TO THE CITY.
3. ALL RESTORATION WORK PERFORMED THROUGHOUT THE PROJECT SHALL CONFORM TO EXISTING LINES AND GRADES UNLESS OTHERWISE NOTED.
4. ALL EXISTING FENCES DISTURBED DURING CONSTRUCTION SHALL BE REPLACED AND REINSTALLED BY THE CONTRACTOR IN LIKE KIND AT NO ADDITIONAL COST TO THE OWNER UNLESS SHOWN TO BE REMOVED ON CONSTRUCTION PLANS.
5. CONTRACTOR SHALL RESTORE ALL IRRIGATION SYSTEM COMPONENTS TO PRE-CONSTRUCTION CONDITIONS.
6. THE CONTRACTOR SHALL ADJUST EXISTING MANHOLE FRAMES AND COVERS TO MATCH FINAL GRADE.
8. ALL DISTURBED GRASS AREAS SHALL BE RESTORED WITH SOLID SOD IN LIKE KIND UNLESS OTHERWISE DIRECTED BY OWNER

SURVEY NOTES

1. BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON STATE PLANE COORDINATES (NAD 83(07) FLORIDA WEST ZONE).
2. THE HORIZONTAL COORDINATES FOR THE CONTROL POINTS LISTED ABOVE WERE DERIVED FROM GPS POSITIONS WITH eGPS VRS CORRECTIONS.
3. INFORMATION SHOWN HEREON REFLECTS CONDITIONS AS THEY EXISTED ON THE DATE SHOWN AND CAN ONLY BE CONSIDERED INDICATIVE OF CONDITIONS AT THAT TIME.
4. THIS IS NOT A BOUNDARY SURVEY.
5. THE LOCATION OF UTILITIES, FOUNDATIONS OR STRUCTURES, IF ANY, BENEATH THE SURFACE HAS NOT BEEN DETERMINED OTHER THAN THE ITEMS SHOWN.
6. THIS SURVEY IS SUBJECT TO PERTINENT EASEMENTS, RIGHTS OF WAY AND RESTRICTIONS, IF ANY.
7. ALL ELEVATIONS ARE REFERENCED THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
8. THE FOLLOWING NGS CONTROL POINTS WERE RECOVERED AND WERE USED TO VERTICALLY CONTROL THIS SURVEY: G727 AND F727.
9. TOPOGRAPHIC DATA WAS COLLECTED WITH TRIMBLE 5700 RTK SYSTEMS AND ROBOTIC TOTAL STATIONS.
10. SURVEY DATA SHOWN WAS COLLECTED OVER THE FOLLOWING DATES: AUGUST 1, AUGUST 26, SEPTEMBER 16, SEPTEMBER 17, AND OCTOBER 01, 2013.
11. SURVEY AREA IS LOCATED IN FLOOD ZONE C, AS PER FLOOD INSURANCE RATE MAP COMMUNITY-PANEL NUMBER 125154 0005 D. SAID PANEL LISTS THE 100 YEAR FLOOD ELEVATION AS 11' NGVD 29 (9.88' NAVD 88) APPROXIMATLY 1.3 MILES AWAY FROM THE SITE. NGVD 29 TO NAVD 88 CONVERSION WAS DERIVED FROM NGS MONUMENT "175 S 19" (PID AG8201).

SURVEY LEGEND

SND	SET NAIL AND DISK
DIP	DUCTILE IRON PIPE
P.S.M	PROFESSIONAL SURVEYOR AND MAPPER
NGS	NATIONAL GEODETIC SURVEY
NAVD	NORTH AMERICAN VERTICAL DATUM OF 1988
NGVD	NATIONAL GEODETIC VERTICAL DATUM
x-4.0	SPOT GRADE (TYPICAL)
GI	GRATE INLET
WP	WHITNESS POST
INV.	INVERT
	MAJOR CONTOUR
	MINOR CONTOUR
	SANITARY SEWER PIPE
	SANITARY MANHOLE
	ELECTRICAL BOX
	INSTRUMENT BOX
	SIGNAL BOX
	POST
	BORE LOCATION
	CONTROL POINT
	WIRE PULL BOX
	VALVE
	CLEAN OUT
	SIGN

SURVEY CONTROL POINTS

NAD 83(07) FLORIDA WEST ZONE / NAVD 88

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	1017536.71	525706.31	15.71	SND
101	1017192.69	525706.18	15.57	SND
102	1017526.16	525508.70	15.73	SND
103	1017203.33	525504.51	15.86	SND

DRAWING INDEX

SHEET	DESCRIPTION
GENERAL	
G1	COVER SHEET
G2	DRAWING INDEX, GENERAL NOTES, SURVEY NOTES AND SURVEY LEGEND
G3	CIVIL ABBREVIATIONS, SYMBOLS, LEGENDS AND SUE LOCATE DATA
G4	KEY SHEET
G5	PROPOSED EFFLUENT MANAGEMENT AND RECYCLE SYSTEM PROCESS FLOW DIAGRAM
DEMOLITION	
D1	DEMOLITION AND HORIZONTAL CONTROL PLAN
CIVIL	
C1	GRAVITY DISK FILTER SITE PLAN AND YARD PIPING
C2	PROPOSED 12" GRAVITY FILTER INFLUENT LINE PLAN AND PROFILE 1
C3	PROPOSED 12" GRAVITY FILTER INFLUENT LINE PLAN AND PROFILE 2
C4	CIVIL DETAILS 1
C5	CIVIL DETAILS 2
C6	CIVIL DETAILS 3
C7	CIVIL DETAILS 4
STRUCTURAL	
S1	STRUCTURAL NOTES, DESIGN LOADS, CRITERIA AND LEGEND
S2	GRAVITY DISK FILTER PLAN
S3	GRAVITY DISK FILTER SECTIONS AND FRAMING ADDITIONAL DETAILS
S4	TRANSFER STATION PLAN AND SECTIONS
S5	STRUCTURAL SECTIONS AND DETAILS
MECHANICAL	
M1	GRAVITY DISK FILTER PLAN
M2	GRAVITY DISK FILTER SECTIONS
M3	GRAVITY DISK FILTER BACKWASH PUMP STATION PLAN AND SECTION
M4	EXISTING STORAGE POND RETURN PUMP STATION MODIFICATIONS
M5	TRANSFER PUMP STATION PLAN AND SECTION
M6	CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM
M7	MECHANICAL DETAILS
INSTRUMENTATION AND CONTROLS	
I1	INSTRUMENTATION & CONTROL NOTES, LEGENDS AND ABBREVIATIONS
I2	PROCESS & INSTRUMENTATION DIAGRAM EXISTING STORAGE POND RETURN PUMPING STATION
I3	PROCESS & INSTRUMENTATION DIAGRAM GRAVITY DISK FILTER AND BACKWASH PUMP STATION
I4	PROCESS & INSTRUMENTATION DIAGRAM TRANSFER PUMP STATION
I5	PROCESS & INSTRUMENTATION DIAGRAM CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM
I6	INSTRUMENTATION DETAILS
ELECTRICAL	
E1	ELECTRICAL NOTES, SYMBOLS, AND LEGEND
E2	ELECTRICAL SITE PLAN
E3	SINGLE LINE DIAGRAMS 1
E4	SINGLE LINE DIAGRAMS 2
E5	PANELBOARD SCHEDULES
E6	GRAVITY DISK FILTER ELECTRICAL PLAN
E7	GRAVITY DISK FILTER BACKWASH PUMP STATION ELECTRICAL PLAN
E8	TRANSFER STATION ELECTRICAL PLAN
E9	OPERATIONS BUILDING PARTIAL PLAN
E10	CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM ELECTRICAL PLAN
E11	ELECTRICAL DETAILS 1
E12	ELECTRICAL DETAILS 2
E13	ELECTRICAL DETAILS 3

DISCIPLINE DESIGNATION TABLE

C	CIVIL
D	DEMOLITION
E	ELECTRICAL
G	GENERAL
I	INSTRUMENTATION AND CONTROL
M	MECHANICAL
S	STRUCTURAL

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

MATTHEW S. LOVE, P.E.
No. 66118

SEAL

McKIM&CREED
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Clearwater, Florida 33756
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EB0006691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

DRAWING INDEX, GENERAL NOTES, SURVEY NOTES AND SURVEY LEGEND

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
G2

STATUS: ISSUED FOR BID
REVISION

S:\5883\0005\90-Drawings\General\0002-20830005.dwg, 3/19/2014 11:56:43 PM, Quint Shelton

GENERAL ABBREVIATIONS

@	AT
ABW	AUTOMATIC BACKWASH
A/C	AIR CONDITIONER UNIT
AC	ACRES
AC	ASPHALTIC CONCRETE
ABD	ABANDONED
AL/ALUM	ALUMINUM
ANCH	ANCHOR
APPROX	APPROXIMATE
BLDG	BIULDING
BM	BEAM
BOT/BOTT	BOTTOM
(C)	CALCULATED DATA
C	CHANNEL
C	CONDUIT
CB	CATCH BASIN
CCR	CERTIFIED CORNER RECORD
CHKR	CHECKERED
CIR	CIRCLE
CLF	CHAIN LINK FENCE
℄	CENTERLINE
CMP	CORRUGATED METAL PIPE
COL	COLUMN
CONN	CONNECTOR/CONNECTION
CONC	CONCRETE
COR	CORNER
C/T	CURB TIE
CU	COPPER
(D)	DEED DATA
D	DEEP/DRAIN
DB	DEED BOOK
DBL	DOUBLE
DHW	DESIGN HIGH WATER
DISCH	DISCHARGE
DN	DOWN
DRWY	DRIVEWAY
EW	EACH WAY
EA	EACH
ECMP	ELLIPTICAL CORRUGATED METAL PIPE
EL/ELEV	ELEVATION
ELEC	ELECTRICAL CONDUIT
EP	EDGE OF PAVEMENT
ERCP	ELLIPTICAL REINFORCED CONCRETE PIPE
ETC	AND SO FORTH
EXIST	EXISTING
EXP	EXPANSION
(F)	FIELD DATA
FCM	FOUND CONCRETE MONUMENT
FDOT	FLORIDA DEPARTMENT OF TRANSPORTATION
FF	FINISHED FLOOR
FIR	FOUND IRON ROD
FND	FOUND NAIL & DISC
FOP	FOUND OPEN PIPE
FPP	FOUND PINCHED PIPE
FRRS	FOUND RAILROAD SPIKE
F/T	FENCE TIE
FT	FOOT
FTG	FOOTING
FXC	FOUND X-CUT
GALV	GALVANIZED
GDRL	GUARDRAIL
GE	GRATE ELEVATION
GEN	GENERATOR
GI	GRATED INLET
GPM	GALLONS PER MINUTE
GRTG	GRATING
GS	GALVANIZED STEEL
GR/GRD	GRADE
GWP	GUY WIRE POLE
HDWALL	HEADWALL
HR	HANDRAIL
HWL	HIGH WATER LEVEL
IE	INVERT ELEVATION
IN	INCH
INV	INVERT
IP	IRON PIPE
IR	IRON ROD
JB	JUNCTION BOX
JT	JOINT
(L)	LEGAL DESCRIPTION DATA
LB	LICENSED BUSINESS
LG	LONG
LN	LANE
LP	LIGHT POLE
LS	LICENSED SURVEYOR
MAS	MASONRY
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MES	MITERED END SECTION
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MHW	MEAN HIGH WATER
MON	MONUMENT
NG	NATURAL GROUND
N.T.S.	NOT TO SCALE
NO	NUMBER
NP	NORMAL POOL
ø	DIAMETER/PHASE
O/A	OVERALL
OPNG	OPENING
OR	OFFICIAL RECORDS BOOK
(P)	PLAT BOOK
PCCP	PRE-STRESSED CONCRETE PIPE
PG	PAGE
PLCS	PLACES
PLS	PROFESSIONAL LAND SURVEYOR
POB	POINT OF BEGINNING
POC	POINT OF COMMENCEMENT
POT	POTABLE
PP	POWER POLE
PRM	PERMANENT REFERENCE MONUMENT
PROP	PROPOSED
PSM	PROFESSIONAL SURVEYOR & MAPPER
P/T	PAVEMENT TIE
PV	PLUG VALVE
PVMT	PAVEMENT
R	RADIUS/RISER/RELAY
RCP	REINFORCED CONCRETE PIPE
REF	REFERENCED
REINF	REINFORCED/REINFORCING
REQ'D	REQUIRED
RESTR	RESTRAINED
RLS	REGISTERED LAND SURVEYOR
RW;R/W	RIGHT-OF-WAY
SAN	SANITARY
SEC	SECTION
SGL	SINGLE
SHW	SEASONAL HIGH WATER
SIR	SET IRON ROD ½" LB 6113
SND	SET NAIL & DISC LB 6113
SPRK	SPRINKLER
SQ	SQUARE
SN	SIGN
SSMH	SANITARY SEWER MANHOLE
S/T	SIDEWALK TIE
STL	STEEL
STY	STORY
S/W; SWK	SIDEWALK
SYM	SYMBOL
TBM	TEMPORARY BENCH MARK
TOB	TOP OF BANK
T&B	TOP & BOTTOM
TEL	TELEPHONE
TEMP	TEMPORARY
THK	THICK
TS&V	TAPPING VALVE AND SLEEVE
TOS	TOE OF SLOPE
TYP	TYPICAL
UG	UNDERGROUND GAS
UP	UTILITY POLE
UT	UNDERGROUND TELEPHONE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
W	WIDE FLANGE/WIDE/WATT
W/	WITH
WBW	WASTE BACKWASH
WF	WOOD FENCE
W/L	WATER LINE
WL	WATER LEVEL
W/M	WATER MAIN
WM	WATER METER
WP	WEATHER PROOF
WS	WALL SLEEVE/WATER STOP/ WATER SERVICE
W/T	WALL TIE
WTR	WATER

FLOW ABBREVIATIONS

AL	ALUM SOLUTION
AB	AERATION BASIN
AD	AEROBIC DIGESTER
AX	ANOXIC BASIN
BA	BLOWER AIR
BP	BYPASS
BW	BACKWASH
CA	COMPRESSED AIR
CCC	CHLORINE CONTACT CHAMBER
CCE	CHLORINATED EFFLUENT
CF	CLOTH FILTER
CLE	CLARIFIER EFFLUENT
CLG	CHLORINE GAS
CLS/CL2S	CHLORINE SOLUTION
D/DR	DRAIN
DAF	DISSOLVED AIR FLOTATION
DF	NEW CLOTH FILTER
DS	DEWATERED SLUDGE
EFF	EFFLUENT
EXP	EXPANSION
FBW	FILTER BACKWASH
FC	FINAL CLARIFIER
FE	FILTER EFFLUENT
FLE	FILTERED LAKE EFFLUENT
FLW	FLOCCULATED WATER
FM	FLOW METER
FW	FILTERED WATER
GBT	GRAVITY BELT THICKENER
GR	GRIT
HDW	HEADWORKS
INF	INFLUENT
IR	INTERNAL RECYCLE
HSBFP	HIGH SOLIDS BELT FITER PRESS
ML	MIXED LIQUOR
OF	OVERFLOW
P	POLYMER
PD	PLANT DRAIN
PDFM	PLANT DRAIN FORCE MAIN
PLY	POLYMER
PLW	PLANT WATER
PS	PUMP STATION
PW	POTABLE WATER
RAS	RETURNED ACTIVATED SLUDGE
RCW	RECLAIMED WATER
RCWR	RECLAIMED WATER RETURN
RECIRC	RECIRCULATED WATER
REJ	REJECT
RML	RECIRCULATED MIXED LIQUOR
RW	REUSE WATER
SAM	SAMPLE
SB	SPLITTER BOX
SC	SCUM
SDR	STORMWATER DRAINAGE
SL	SAMPLE LINE
SPW	STORAGE POND WATER
SS	SANITARY SEWER
TS	THICKENED SLUDGE
WAS	WASTE ACTIVATED SLUDGE
WBW	WASTE BACKWASH WATER
WW	WASTEWATER

PIPING ABBREVIATIONS

ARV	AIR RELEASE VALVE
ABD	ABANDONED
BFV	BUTTERFLY VALVE
BV	BALL VALVE
CB	CATCH BASIN
CO	CLEANOUT
CORP	CORPORATION
CV	CHECK VALVE
DI	DUCTILE IRON
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
ECC	ECCENTRIC
ELEC	ELECTRICAL
EXIST	EXISTING
FHA	FIRE HYDRANT ASSEMBLY
FL	FLANGED
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
GS	GALVANIZED STEEL
GV	GATE VALVE
HB	HOSE BIBB
HDPE	HIGH DENSITY POLYETHYLENE
MH	MANHOLE
MJ	MECHANICAL JOINT
PE	PLAIN END
PS	PUMP STATION
PV	PLUG VALVE
PVC	POLYVINYLCHLORIDE
RED	REDUCER
SCH	SCHECULE
SDR	DIAMETER RATIO
SS	STAINLESS STEEL
TBR	TO BE REMOVED
UE	UNDERGROUND ELECTRIC
VERT	VERTICAL
WOB	WELD ON BOSS
WM	WATER METER

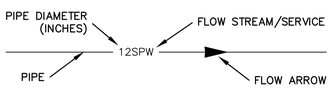
SUE DATA

VVH	SHEET	UTILITY REQUESTED	UTILITY REPORTED	SIZE	MATERIAL	GROUND TO TOP OF UTILITY	GROUND ELEVATION	TOP OF UTILITY ELEVATION	NORTHING	EASTING
1	C1/C2	WL	WL	6"	DI	2.90	15.3	12.4	1,017,666.6	525,493.5
2	C1/C2	SS	SS	8"	PVC	6.66	15.3	8.6	1,017,664.9	525,487.9
3	C1/C2	ABW INF	ABW INF	30"	CI	4.98	16.0	11.0	1,017,749.3	525,452.7
4	C1/C2	BW	BW	8"	PVC	1.56	15.4	13.8	1,017,774.3	525,384.5
5	C1/C2	CHEMICAL	CL	1 1/2"	PVC	2.58	15.5	12.9	1,017,764.9	525,384.5
6	C1/C2	CL	CL	1 1/2"	PVC	2.62	15.9	13.3	1,017,739.8	525,386.2
7	C1/C2	RCW	RCW	8"	DI	4.10	14.3	10.2	1,017,764.8	525,323.9
8	C1/C2	RCW	RCW	8"	DI	4.40	14.6	10.2	1,017,730.4	525,324.9
9	C1/C2	CL	CL	1 1/2"	PVC	2.64	15.2	12.6	1,017,695.3	525,326.9
10	C2	RCW	RCW	20"	DI	5.46	15.1	9.6	1,017,561.3	525,323.1
11	C2	DR	DR	8"	DI	3.64	15.2	11.6	1,017,543.0	525,322.7
12	C3	FM	FM	30"	DI	2.46	15.2	12.7	1,017,379.5	525,352.2
13	C3	FM	FM	24"	DI	3.88	14.1	10.2	1,017,295.5	525,324.3
14	C1	WL	WL	2"	PVC	3.40	15.8	12.4	1,017,674.7	525,447.6
15	C1	CL	CL	1/2"	PVC	3.68	15.9	12.2	1,017,674.7	525,445.9
15A	C1	CL	CL	1/2"	PVC	3.68	15.9	12.2	1,017,674.8	525,445.1
16	C1	RCW	RCW	4"	DI	3.26	15.8	12.5	1,017,756.6	525,442.8
17	C1	WL	WL	2"	PVC	2.94	15.7	12.8	1,017,768.9	525,442.6
18	C1	RCW	RCW	6"	DI	3.26	15.8	12.5	1,017,754.9	525,440.9
19	C1	CL	CL	1/2"	PVC	2.56	15.4	12.8	1,017,768.0	525,402.8
19A	C1	CL	CL	1/2"	PVC	2.56	15.8	13.2	1,017,769.2	525,402.7
20	C1/C2	SPW	SPW	8"	PVC	4.70	15.8	11.1	1,017,633.6	525,328.3

PIPING LEGEND

	EXISTING	PROPOSED
PIPE 12" OR LARGER (ABOVE GROUND)		
PIPE 12" OR LARGER (UNDERGROUND)		
PIPE SMALLER THAN 12" (ABOVE GROUND)		
PIPE SMALLER THAN 12" (UNDERGROUND)		
GATE VALVE		
BUTTERFLY VALVE		
BALL VALVE		
PLUG VALVE		
REDUCER		
MANHOLE		MH
CATCH BASIN	CB	CB
TOP OF BANK	TOB	TOB
TOE OF BANK	TOE	TOE
PIPING, STRUCTURES OR EQUIPMENT TO BE REMOVED		
ABANDONED		
CONTOURS	25	26
SPOT ELEVATION	×29.0	29.75
FLOW ARROW		
ARV		

PIPE IDENTIFICATION



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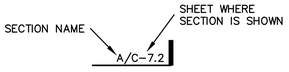

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL ABBREVIATIONS, SYMBOLS, LEGENDS AND SUE LOCATE DATA

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
G3

STATUS: ISSUED FOR BID
REVISION

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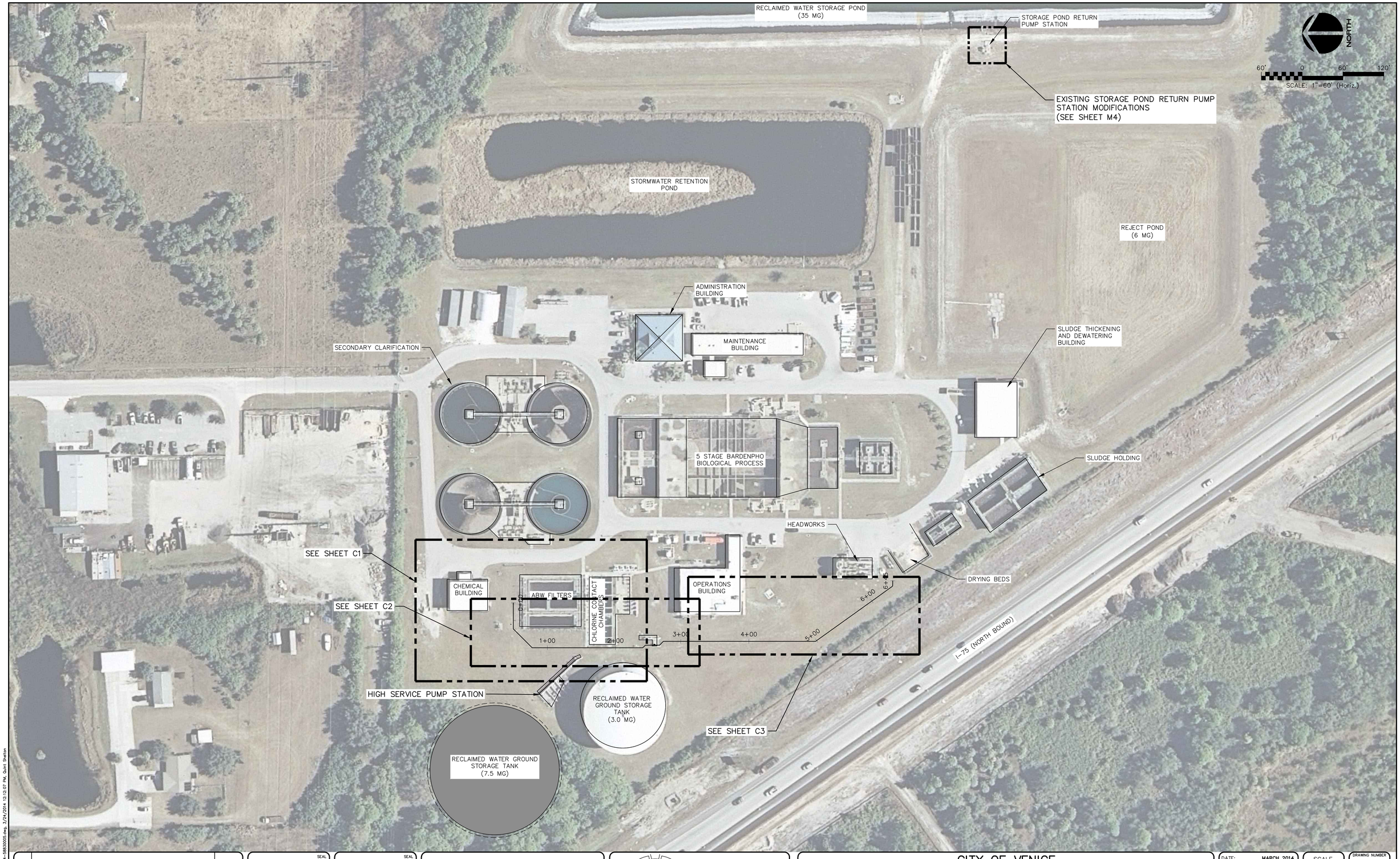

REV.NO.	DESCRIPTIONS	DATE
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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

KEY SHEET

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 60'
VERTICAL: NA

DRAWING NUMBER
G4

STATUS: ISSUED FOR BID
REVISION

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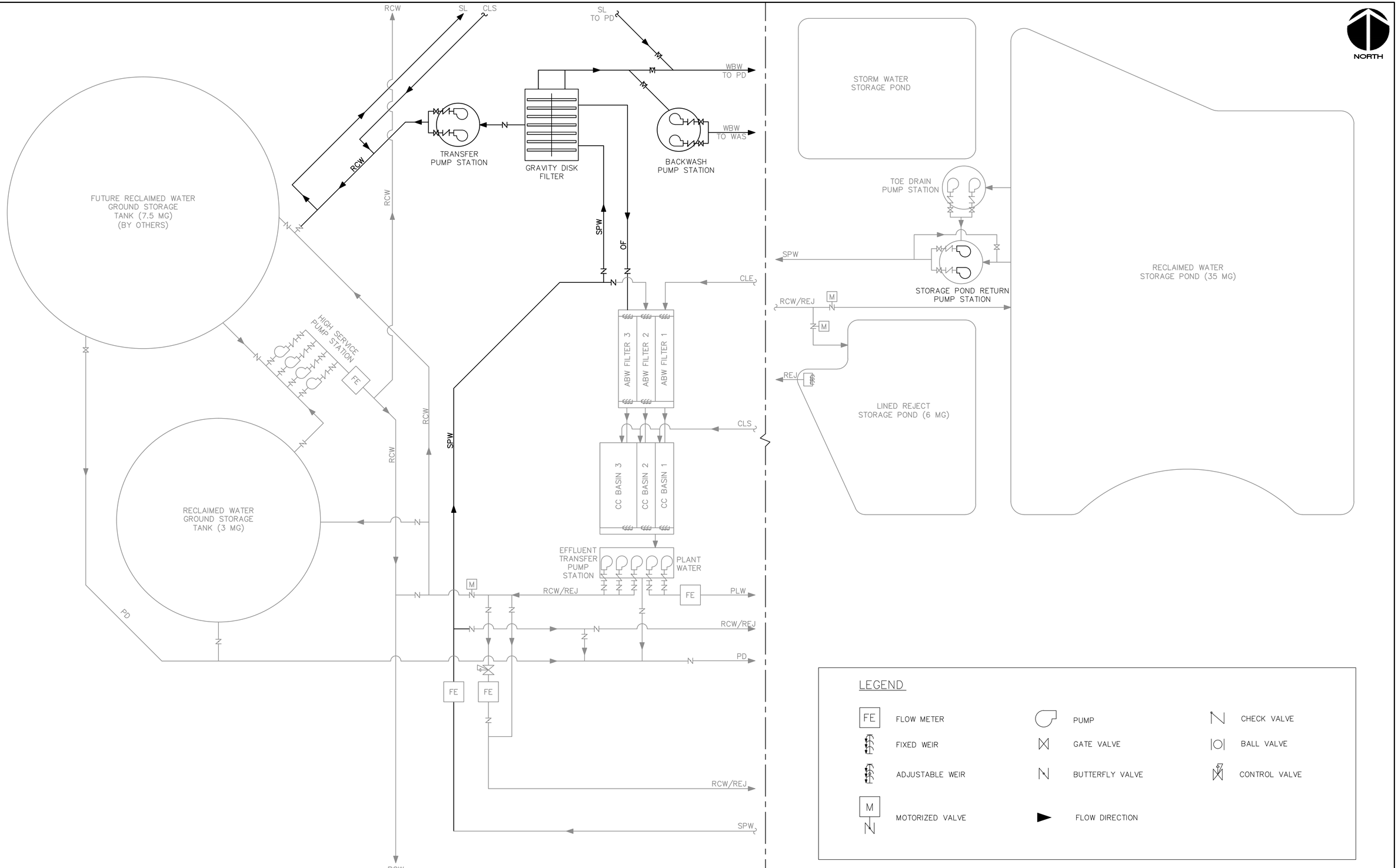

LEGEND

FE	FLOW METER		PUMP		CHECK VALVE
	FIXED WEIR		GATE VALVE		BALL VALVE
	ADJUSTABLE WEIR		BUTTERFLY VALVE		CONTROL VALVE
M	MOTORIZED VALVE		FLOW DIRECTION		

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EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED EFFLUENT MANAGEMENT AND RECYCLE SYSTEM PROCESS FLOW DIAGRAM

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
G5

STATUS: ISSUED FOR BID

REVISION

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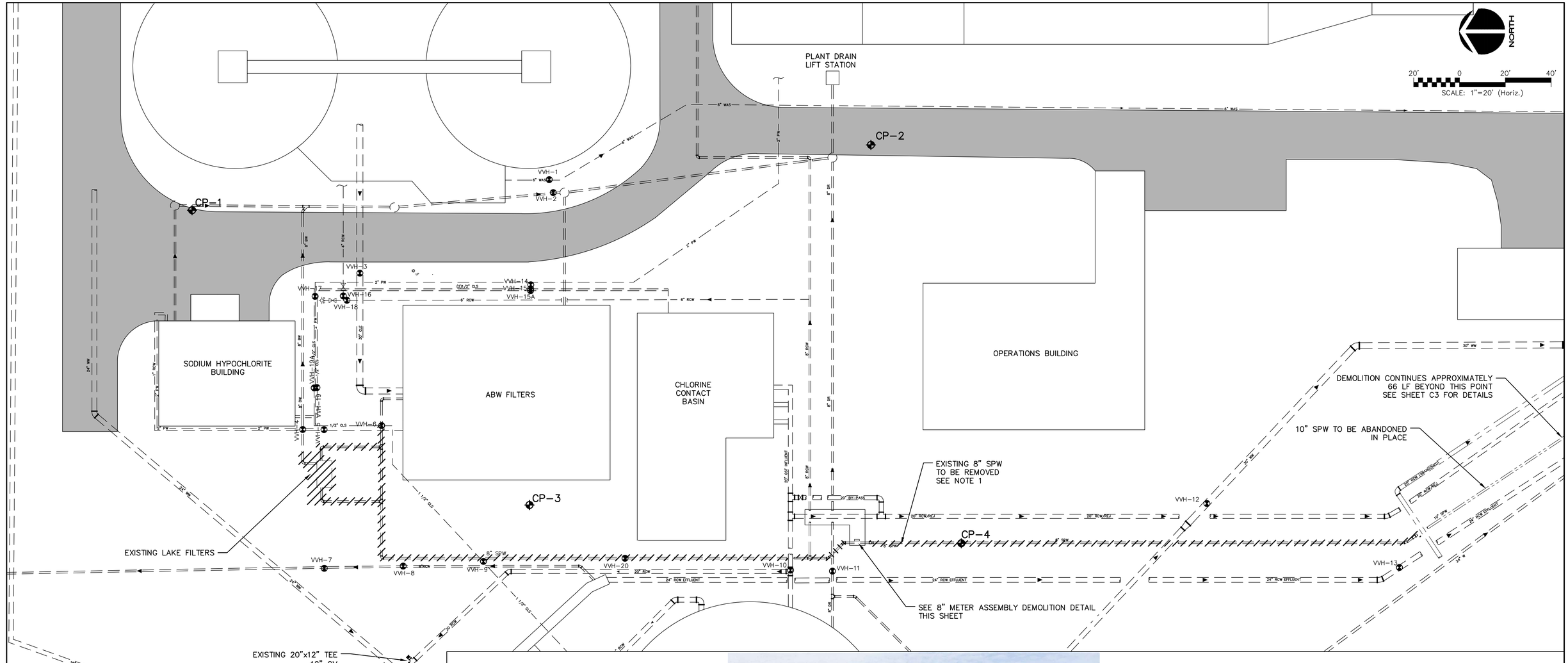
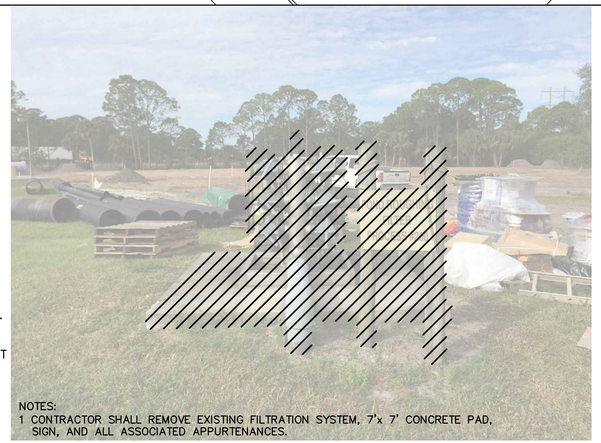


Horizontal Control Table			
Point #	Description	Elevation	Location
CP-1	NAIL & DISK	15.64	N: 1017822.56 E: 525480.22
CP-2	MAG NAIL & DISK	15.73	N: 1017526.16 E: 525508.70
CP-3	IRON ROD CAP	15.86	N: 1017675.23 E: 525351.53
CP-4	IRON ROD CAP	14.82	N: 1017486.74 E: 525334.86

NOTES:
1. THE EXISTING 8" SPW SHALL REMAIN IN SERVICE DURING THE INSTALLATION OF THE 12" SPW REPLACEMENT MAIN. TIE-INS SHALL BE COORDINATED WITH CITY STAFF TWO WEEKS PRIOR AND SHALL MINIMIZE PERIODS WHERE THE SPW RETURN SYSTEM IS OUT OF SERVICE. THE SPW RETURN SYSTEM MAY NOT BE OUT OF SERVICE WITHOUT APPROVAL.

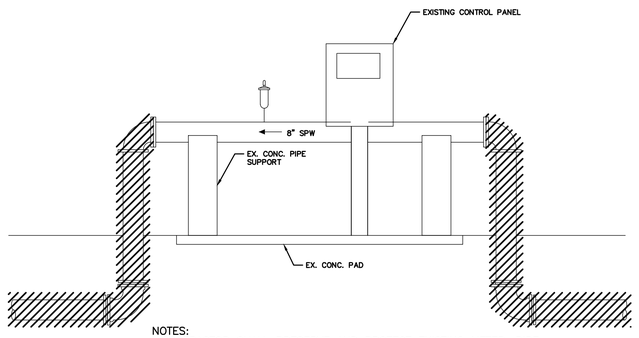
LEGEND

TO BE REMOVED



NOTES:
1 CONTRACTOR SHALL REMOVE EXISTING FILTRATION SYSTEM, 7'x 7' CONCRETE PAD, SIGN, AND ALL ASSOCIATED APPURTENANCES.

EXISTING FILTRATION REMOVAL DETAIL
NTS



NOTES:
1.CONTRACTOR SHALL PRESERVE AND PROTECT EXISTING METER, PIPE SUPPORTS, EQUIPMENT PAD, CONTROL PANEL AND ASSOCIATED APPURTENANCES. IMPROVEMENTS ARE TO PIPING ONLY AS SHOWN. ALL REMAINING METERING INFRASTRUCTURE IS TO REMAIN AND BE REUSED.

8" METER ASSEMBLY DEMOLITION DETAIL
NTS

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

DEMOLITION AND HORIZONTAL CONTROL PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 20'
VERTICAL: NA

DRAWING NUMBER
D1

STATUS: ISSUED FOR BID
REVISION

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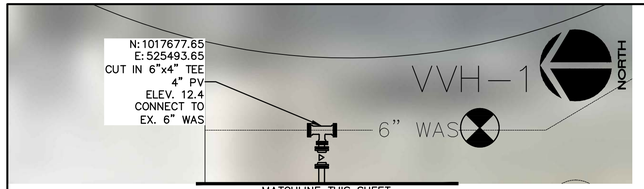

WAS CONNECTION DETAIL

NOTES:
1. LOCATION OF 20"x12" TEE AND 12" VALVE AS SHOWN IS APPROXIMATE. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF THE 12" VALVE FOR CONNECTION OF THE CONNECTION OF THE 12" RCW MAIN FROM TRANSFER PUMP STATION TO THE 7.5 MG GROUND STORAGE TANK AND COORDINATE PIPING AS NECESSARY TO MAKE THE CONNECTION.

MATCHLINE THIS SHEET
SEE WAS CONNECTION DETAIL

LIMITS OF ASPHALT RESTORATION SEE DETAILS

10' MIN.

PRESERVE AND PROTECT

N: 1017762.65
E: 525451.30
4" 90° BEND
CL ELEV. 13.25

N: 1017677.73
E: 525451.30
4" 90° BEND
CL ELEV. 13.25

8" BW

4" RCW

2" PW

(2)1/2" CLS

6" RCW

VVH-3
VVH-14
VVH-15
VVH-15A
VVH-17
VVH-16
VVH-18

LP

4" BACKWASH FM TO 6" WAS LINE
CL ELEV. 13.25

30" CLE

N: 1017774.26
E: 525405.85
4" CROSS
4" CAP W/ ½"TAP
8"x4" RED
4" WYE
(2) CO

CHEMICAL BUILDING

BACKWASH PUMP STATION SEE SHEET M3 FOR DETAILS

N: 1017762.92
E: 525396.43
4" WYE
(2) 4" PV

CONNECT TO EX. 8" DI

1" TAPPING VALVE AND SLEEVE

ABW FILTERS

CHLORINE CONTACT CHAMBERS

OVERFLOW TO ABW FILTERS SEE MECHANICAL DETAILS

VVH-19A
VVH-19
VVH-4
VVH-5
VVH-6

1/2" CLS

1/2" SAMPLE LINE

1/2" CLS FEED

GRAVITY DISK FILTER SEE SHEET M1 FOR DETAILS THIS AREA

1 1/2" CLS

24" WW

1" RCW

2" PW

N: 1017753.30
E: 525353.69
14" 90° BEND

TRANSFER PUMP STATION SEE SHEET M5 FOR DETAILS THIS AREA

12" SPW
SEE SHEETS C2, C3
FOR PLAN AND PROFILE INFO

SEE SHEET C2
FOR CONNECTION TO EXIST. 8" SPW

20" GST INFLUENT

8" RCW

1+00

2+00

VVH-7
VVH-8
VVH-9
VVH-20
VVH-10

8"RCW

20" RCW

24" RCW EFFLUENT

N: 1017753.32
E: 525327.13
12" 90° BEND

N: 1017753.32
E: 525307.29
12" 45° BEND
℄ ELEV. 11.4

1/2" CI FEED

1/2" SAMPLE LINE

EX. 8" SPW
SEE DEMOLITION
SHEET FOR DETAILS

20 RCW

20"x12" TEE AND GV VALVE
SEE NOTE 1

SAMPLE CONNECTION
SEE DETAIL ON SHEET C6

18" RCP

24" RCW

SCALE: 1"=10' (Horiz.)

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

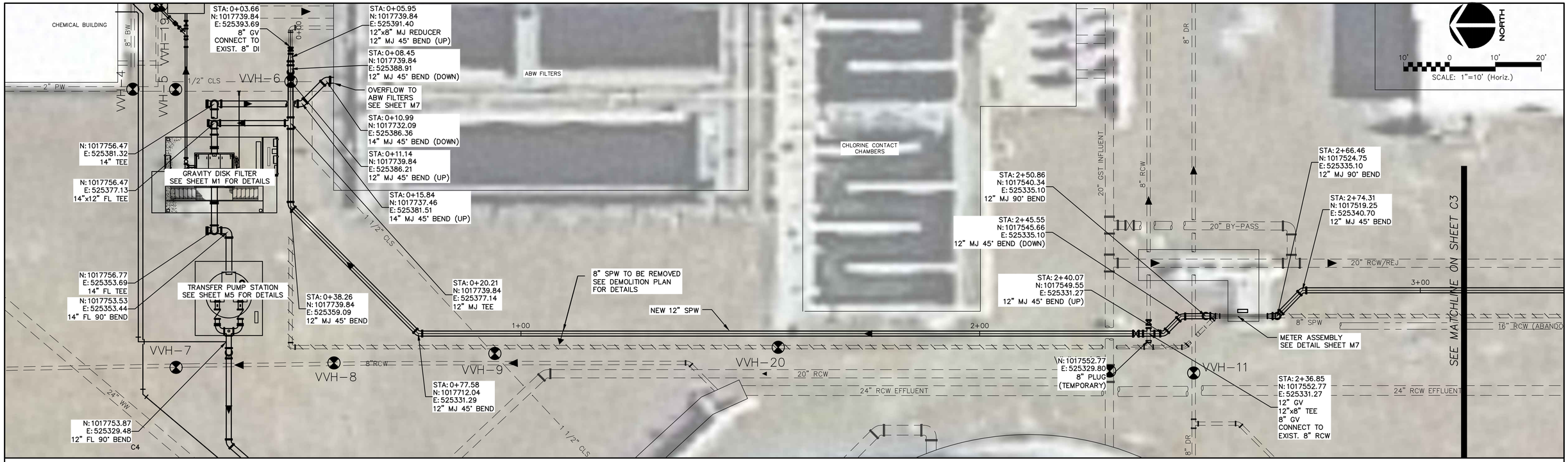
GRAVITY DISK FILTER SITE PLAN AND YARD PIPING

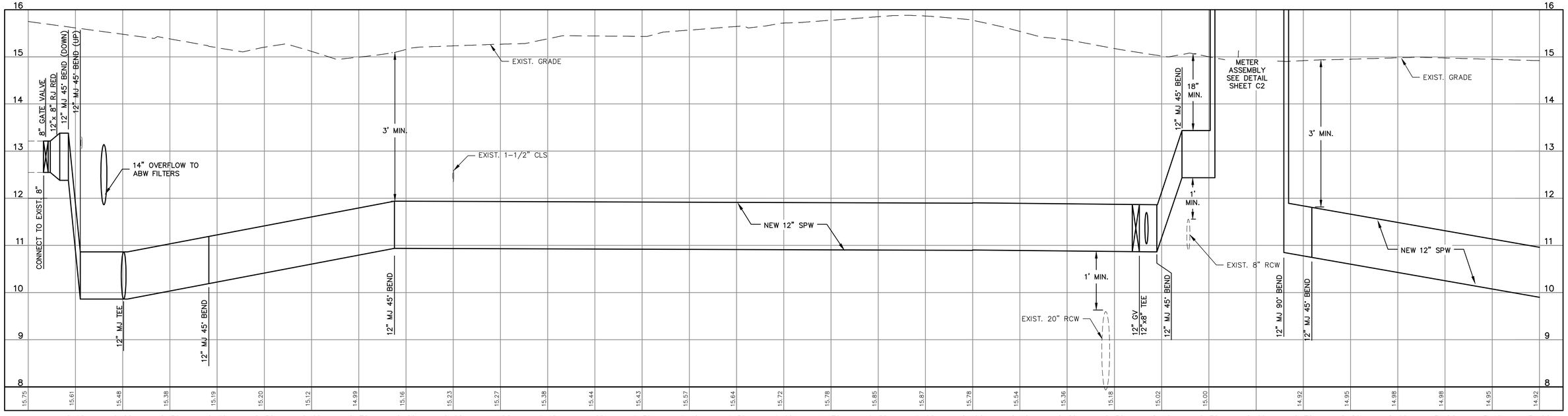
DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 60'
VERTICAL: NA

DRAWING NUMBER
C1

STATUS: ISSUED FOR BID
REVISION





REV.NO.	DESCRIPTIONS	DATE
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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED 12" GRAVITY FILTER INFLUENT LINE PLAN AND PROFILE 1

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 10'
VERTICAL: 1" = 1'

DRAWING NUMBER
C2

STATUS: ISSUED FOR BID
REVISION

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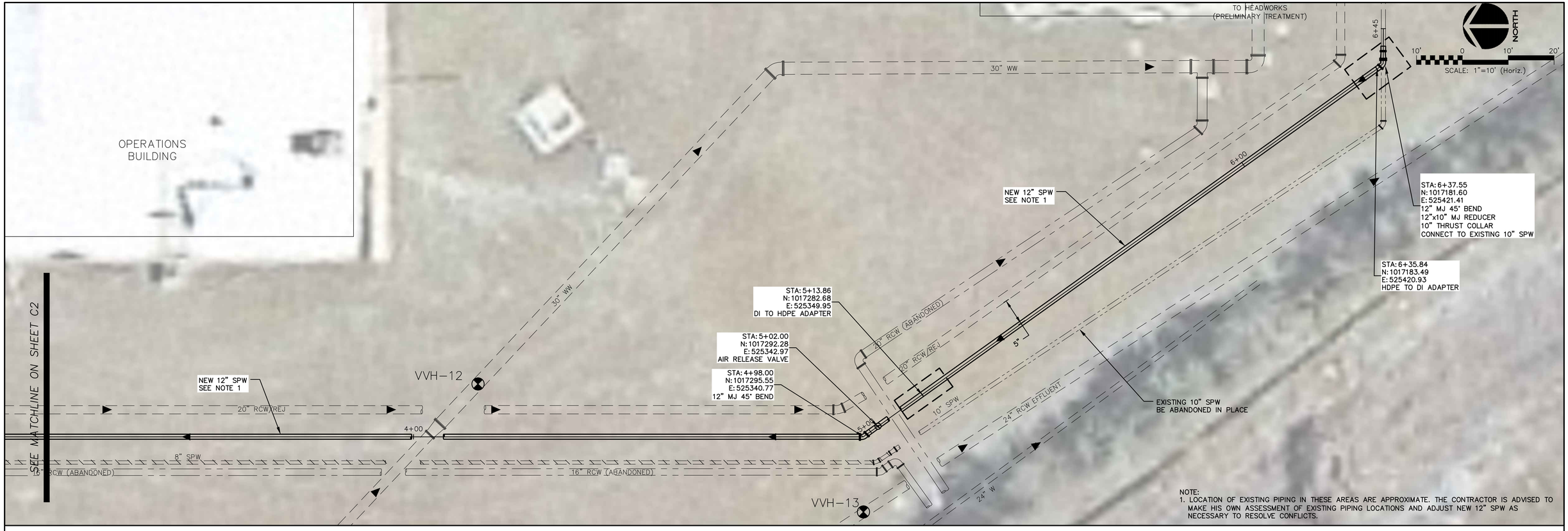

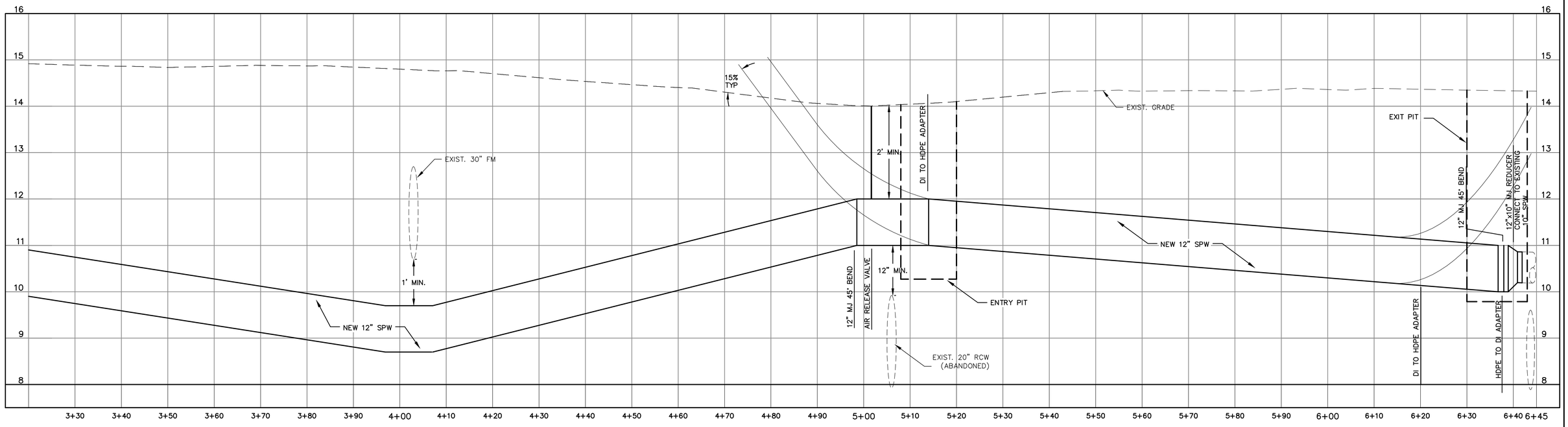

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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No. 66118

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PROPOSED 12" GRAVITY FILTER INFLUENT LINE PLAN AND PROFILE 2

DATE:	MARCH 2014
MCE. PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 10'
VERTICAL: NA

DRAWING NUMBER
C3

STATUS: ISSUED FOR BID
REVISION

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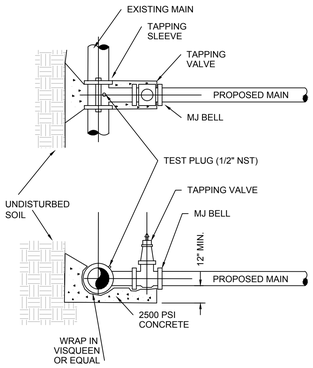


NOTES:

1.) EXISTING MAIN SHALL NOT BE TAPPED UNTIL THE ASSEMBLED SLEEVE AND VALVE ARE TESTED IN PLACE AT A MINIMUM OF 150 PSI FOR THIRTY MINUTES.

2.) UPON SUCCESSFUL TAPPING SLEEVE PRESSURE TEST (NOTE 1), THE THRUST BLOCK SHALL BE POURED AND HAVE SET FOR 24 HRS PRIOR TO TAPPING. READY-MADE THRUST BLOCKS CAN BE USED WITH CITY APPROVAL.

3.) STAINLESS STEEL TAPPING SLEEVE SHALL BE FORD. ALL HARDWARE SHALL BE STAINLESS STEEL. GASKETS SHALL BE VIRGIN SBR COMPOUND FOR WATER SERVICE.

4.) GATE VALVES SHALL BE RESILIENT WEDGE-TYPE MANUFACTURED BY MUELLER OR AMERICAN VALVE. ALL GATE VALVES SHALL BE FUSION BONDED EPOXY COATED (INTERIOR AND EXTERIOR) MEET ANSI/AWWA C550, AND BE NSF61 CERTIFIED.

5.) TAPPING SLEEVES MAY ONLY BE USED WHEN THE TAP DIAMETER IS AT LEAST ONE PIPE SIZE SMALLER THAN THE DIAMETER OF THE MAIN BEING TAPPED.

TAPPING SLEEVE AND VALVE DETAIL
NOT TO SCALE

THRUST BLOCK DIMENSIONS B ft. x d inches												
PIPE SIZE	90°BEND		45°BEND		22.5°BEND		11.25°BEND		DEAD END & TEE		45° WYE	
(IN.)	B	d	B	d	B	d	B	d	B	d	B	d
4	1.5	3 1/2	1.1	3 1/2	0.8	3 1/2	0.6	3 1/2	1.3	3 1/2	1.1	3 1/2
6	2.2	5 1/4	1.6	3 3/4	1.2	3 1/2	0.8	3 1/2	1.9	4 1/2	1.6	3 3/4
8	2.9	7	2.1	5	1.5	3 1/2	1.1	3 1/2	2.4	5 3/4	2.0	4 3/4
10	3.5	8 1/2	2.6	6 1/4	1.9	4 1/2	1.3	3 1/2	3.0	7 1/4	2.5	6
12	4.2	10	3.1	7 1/2	2.2	5 1/4	1.6	3 3/4	3.5	8 1/2	3.0	7 1/4
14	4.9	11 3/4	3.6	8 3/4	2.6	6 1/4	1.8	4 1/4	4.1	9 3/4	3.4	8 1/4
16	5.5	13 1/4	4.1	9 3/4	2.9	7	2.1	5	4.7	11 1/4	3.9	9 1/4
18	6.2	15	4.6	11	3.3	8	2.3	5 1/2	5.2	12 1/2	4.4	10 1/2
20	6.9	16 1/2	5.0	12	3.6	8 3/4	2.6	6 1/4	5.8	14	4.9	11 3/4
24	8.2	19 3/4	6.0	14 1/2	4.3	10 1/4	3.1	7 1/2	6.9	16 1/2	5.8	14
30	10.1	24 1/4	7.5	18	5.3	12 3/4	3.8	9	8.5	20 1/2	7.2	17 1/4
36	12.1	29	8.9	21 1/4	6.4	15 1/4	4.5	10 3/4	10.2	24 1/2	8.6	20 3/4

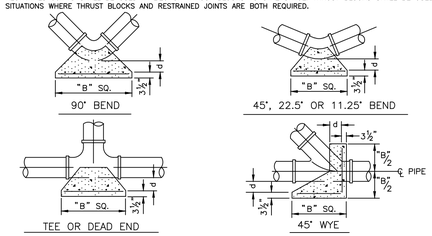
REINFORCEMENT MAT SCHEDULE

FOR DIM."B"BETWEEN 5.75' & 12.5' USE #4 @ 8" EACH WAY

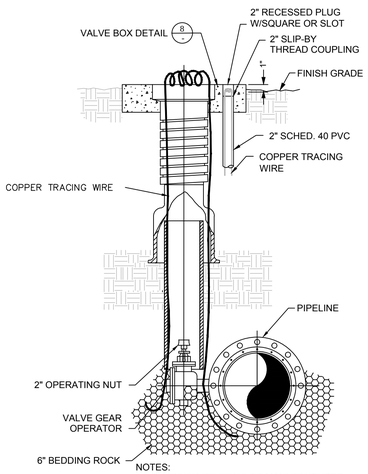
FOR DIM."B"LESS THAN 5.75' USE #3 @ 8" EACH WAY

NOTES:

1. ALL THRUST BLOCKS SHALL BE CAST IN PLACE. FITTINGS ADJACENT TO THRUST BLOCKS SHALL BE WRAPPED IN POLYETHYLENE.
2. THIS TABLE IS BASED ON WATER PRESSURE=180 PSI WITH AN ALLOWABLE SOIL BEARING PRESSURE=2000 PSF, CONCRETE STRENGTH f_c=3000 PSI, REINFORCEMENT f_y=60.0 KSI.THRUST BLOCK SHALL BE CAST AGAINST FIRM UNDISTURBED SOIL.
3. FOR LARGER"B"DIMENSIONS IT IS NECESSARY TO CHECK THAT PIPE IS SUFFICIENTLY DEEP TO ALLOW 15" MIN. SOIL COVER OVER TOP EDGE OF THRUST BLOCK.
4. RESTRAINED JOINTS SHALL BE USED IN LIEU OF THRUST BLOCKS TO SAVE SPACE. THRUST BLOCKS SHALL BE USED IN SITUATIONS WHERE THRUST BLOCKS AND RESTRAINED JOINTS ARE BOTH REQUIRED.



THRUST BLOCK DETAIL
NOT TO SCALE



NOTES:

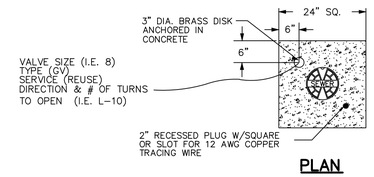
1.) PLUG VALVES SHALL BE MANUFACTURED BY DEZURIK.

2.) SEAT OF PLUG VALVE SHALL BE ON THE UPSTREAM SIDE OF THE BODY.

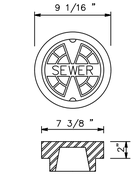
3.) VALVE SHALL BE INSTALLED IN CONFORMANCE WITH MANUFACTURES RECOMMENDATIONS.

4.) ALL SEWER FORCE MAIN PLUG VALVES SHALL BE GEAR OPERATED.

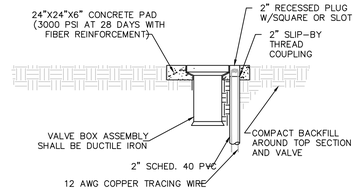
PLUG VALVE DETAIL
NOT TO SCALE



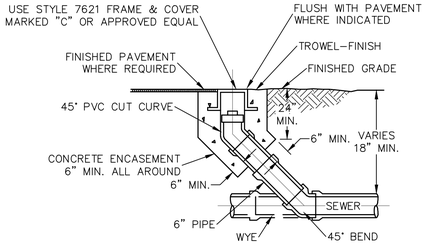
PLAN



COVER DETAIL
VALVE BOX DETAIL
APPROPRIATE SERVICE SHALL BE INDICATED



PROFILE



CLEANOUT DETAIL
NOT TO SCALE

NOTES:

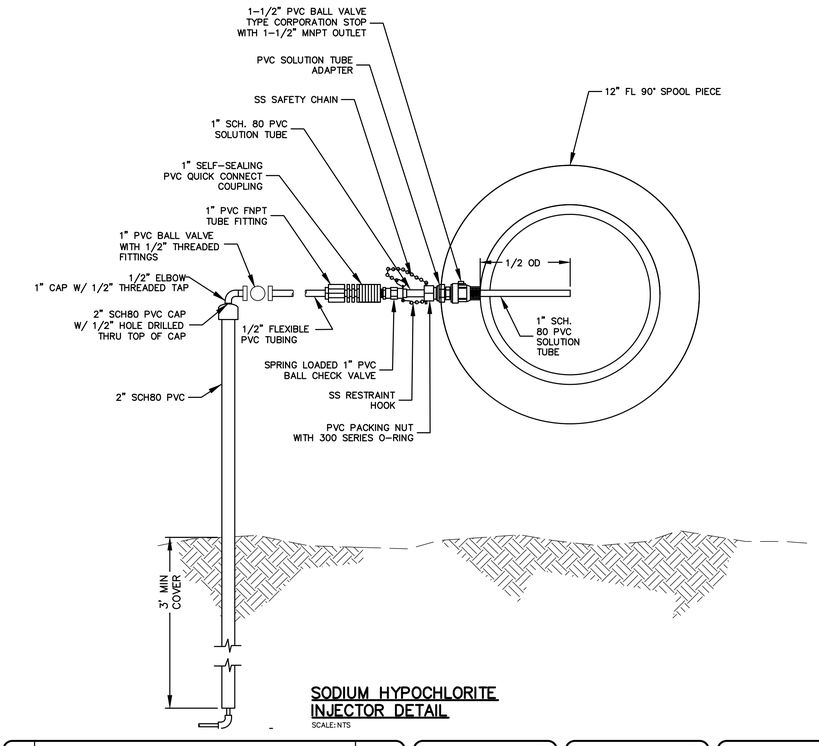
1.) PAVED AREAS: SET CONCRETE PAD AND COVER FLUSH WITH FINISHED PAVEMENT SURFACE.

2.) UNPAVED AREAS: SET PAD AND COVER 1 INCH ABOVE FINISHED GRADE.

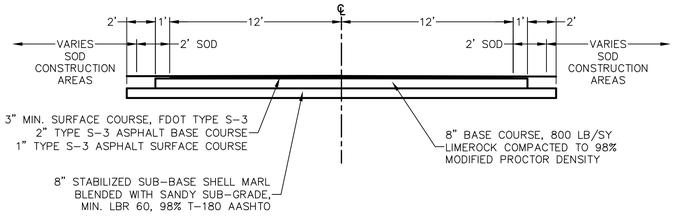
3.) VALVES LOCATED IN DITCH AND OVER 4' DEPTH (LINE) MUST USE TRENCH ADAPTER VALVE BOX (AMERICAN FLOW CONTROL).

4.) COPPERHEAD TRACING WIRE PART #1230HS #12 AWG SHALL BE USED. IT SHALL BE COLOR CODED TO REFLECT WHAT THE PIPE CARRIES. (BLUE = WATER, GREEN = SEWER, PURPLE = REUSE)

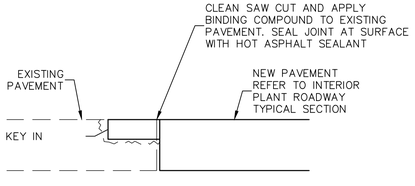
5.) PRE-CAST PADS MAY BE USED WITH CITY APPROVAL.



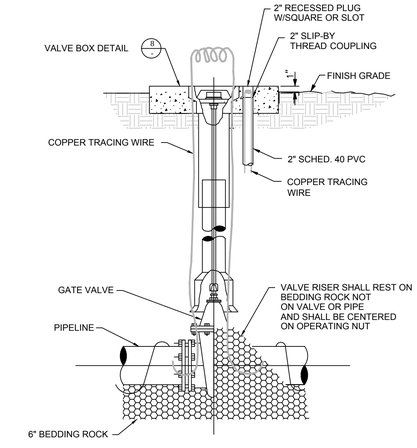
SODIUM HYPOCHLORITE INJECTOR DETAIL
SCALE:NTS



INTERIOR PLANT ROADWAY TYPICAL SECTION
NOT TO SCALE



ASPHALT CONNECTION
NOT TO SCALE



NOTES:

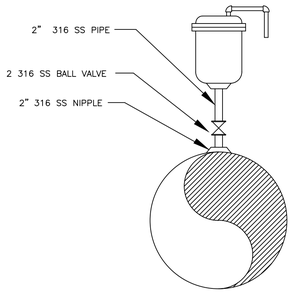
1.) GATE VALVES SHALL BE RESILIENT WEDGE-TYPE MANUFACTURED BY MUELLER, AMERICAN VALVE, OR EQUAL. ALL GATE VALVES SHALL BE FUSION BONDED EPOXY COATED (INTERIOR AND EXTERIOR) MEET ANSI/AWWA C550, AND BE NSF61 CERTIFIED.

2.) FOR VALVES LARGER THAN 12" IN DIAMETER AN OFFSET GEAR ACTUATED OPERATOR IS REQUIRED.

3.) VALVE SHALL BE INSTALLED IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS.

4.) COPPERHEAD TRACING WIRE PART #1230HS #12 AWG SHALL BE USED. IT SHALL BE COLOR CODED TO REFLECT WHAT THE PIPE CARRIES. (BLUE = WATER, PURPLE = REUSE)

GATE VALVE DETAIL
NOT TO SCALE



AIR RELEASE VALVE
NOT TO SCALE

REVISIONS		
REV.NO.	DESCRIPTIONS	DATE

SEAL

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www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 1

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

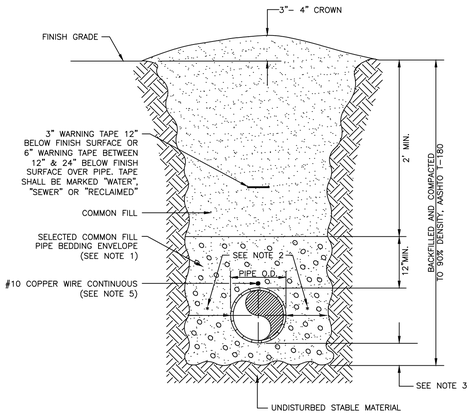
DRAWING NUMBER
C4

STATUS: ISSUED FOR BID
REVISION

S:\5883\0005\90-Drawings\Civil\20501-58830005.dwg, 3/18/2014 1:36:05 PM, Joint Shelton

NOTES:

1. USE OF TYPE A–2 AND A–3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

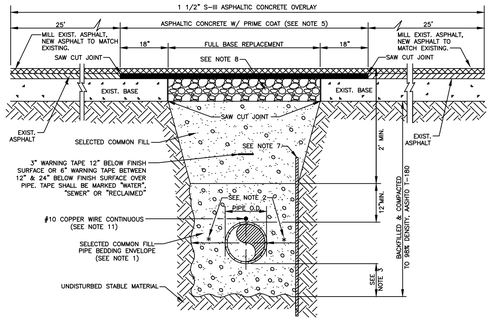


TRENCH WITH UNIMPROVED SURFACE TYPE A–1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. USE OF TYPE A–2 AND A–3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. ASPHALTIC CONCRETE STRUCTURE COURSE WITH PRIME COAT SHALL BE THE SAME DEPTH AND TYPE AS EXISTING OR A MINIMUM OF 1 1/4 INCH, WHICHEVER IS GREATER.
6. MILL 25' BACK FROM TRENCH SAW CUT. ADJUST MILLING PER INDIVIDUAL SITE TO NOT IMPACT BASE. BUTT JOINT TO EXIST ASPHALT. FINAL OVERLAY LIMITS ARE FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT. FINAL OVERLAY TO MATCH EXISTING WITH NO DISCERNABLE "BUMP" AT JOINT. MILLING LIMITS THAT IMPACT INTERSECTION SHALL BE ADDRESSED ON A CASE BY CASE BASIS AND APPROVED BY CITY OF VENICE.
7. SHEETING ORDERED LEFT IN PLACE TO BE CUT OFF 24" BELOW FINISHED GRADE OR 12" BELOW SUBGRADE.
8. BASE SHALL BE 8" MINIMUM THICKNESS CRUSHED CONCRETE.
9. TEMPORARY PATCHES WILL BE INSTALLED TO PROVIDE A SMOOTH ALL WEATHER SURFACE AT ALL TIMES. PERMANENT REPLACEMENT TO BE MADE AS SOON AS POSSIBLE.
10. RESTORE SIGNAGE & MARKING WITH THERMOPLASTIC PER FDOT STANDARDS, LATEST EDITION.
11. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.
12. NOTES 5. THRU 10. ARE MINIMUM REQUIREMENTS FOR A TRENCH IN A ROAD. REFER TO LATEST EDITION OF CITY OF VENICE HIGHWAY AND TRAFFIC STANDARDS FOR ADDITIONAL REQUIREMENTS.

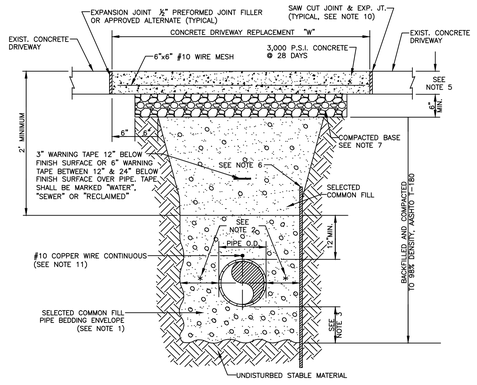


TRENCH WITH ASPHALT PAVEMENT SURFACE TYPE A–1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. USE OF TYPE A–2 AND A–3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. THICKNESS TO MATCH EXISTING OR BE 6" MINIMUM, WHICHEVER IS GREATER.
6. SHEETING ORDERED LEFT IN PLACE TO BE CUT OFF 24" BELOW FINISH GRADE OR 12" BELOW SUBGRADE.
7. BASE SHALL BE COMPACTED 6" MINIMUM THICKNESS OF APPROVED MATERIAL.
8. DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST ADOPTED CONSTRUCTION STANDARDS OF THE CITY OF VENICE TRANSPORTATION DEPARTMENT.
9. IF THE DRIVEWAY IS 12' OR WIDER, SAWCUT AN EXPANSION JOINT ALONG THE CENTER OF THE DRIVEWAY (3/16" WIDE AND 1/2" DEEP) AFTER THE CONCRETE HAS SET.
10. IF THERE IS AN EXISTING EXPANSION JOINT WITHIN 3' OF THE PROPOSED JOINT, EXTEND DRIVEWAY REPLACEMENT TO THE EXISTING JOINT.
11. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

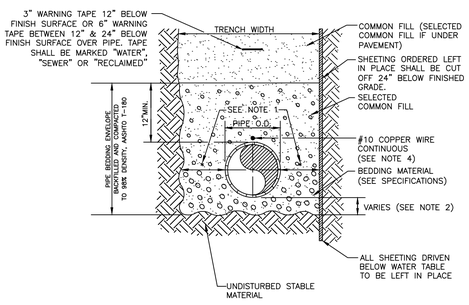


TRENCH WITH CONCRETE DRIVEWAY SURFACE TYPE A–1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
2. TYPICALLY 4" TO 6".
3. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
4. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

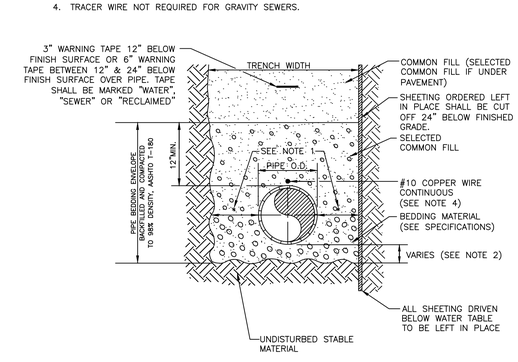


TRENCH WITH TYPE A–1 PIPE BEDDING

NOT TO SCALE

NOTES:

1. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
2. TYPICALLY 4" TO 6".
3. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
4. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.

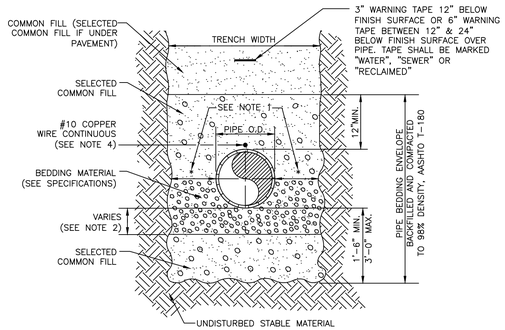


TRENCH WITH TYPE A–2 PIPE BEDDING

NOT TO SCALE

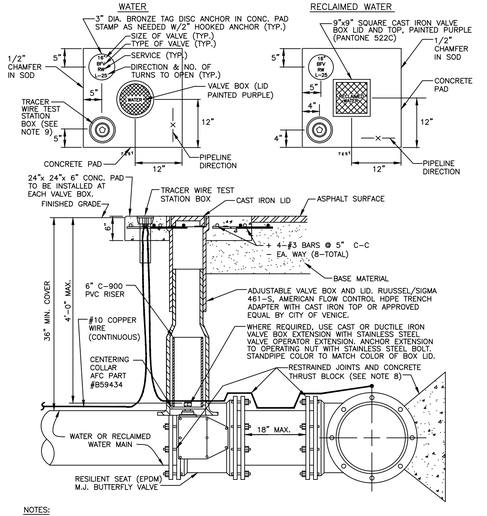
NOTES:

2. PROVIDE ADEQUATE CLEARANCE TO PLACE AND COMPACT STAGE 1 BEDDING MATERIAL IN TRENCH AREA BELOW PIPE SPRINGLINE. PIPE EMBEDMENT MUST BE COMPACTED OUT TO THE TRENCH WALL OR 2.5 TIMES THE PIPE OD, WHICHEVER IS LESS.
3. TYPICALLY 4" TO 6".
4. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.
5. TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.



TRENCH WITH TYPE A–3 PIPE BEDDING

NOT TO SCALE

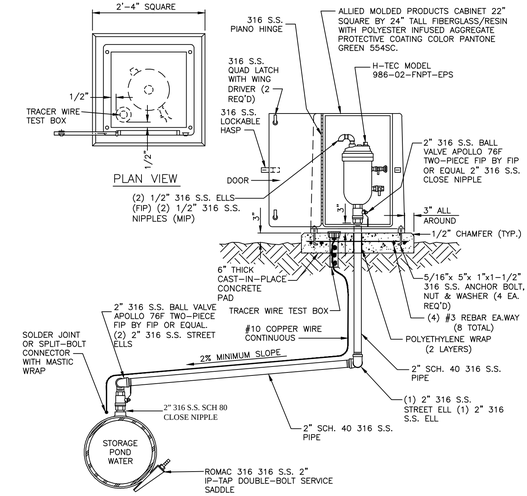


NOTES:

1. "W" OR "RW" TO BE IMPRESSED INTO THE NEWLY–POURED CONCRETE CURB, ALONG WITH IF NO CURB, INSTALL A BLUE DISC WITH "W" OR PURPLE DISC DISTANCE IN FEET TO THE VALVE. WITH "RW" AND A 1/8"x1" GALVANIZED STEEL SCREW IN THE EDGE OF PAVEMENT WITH THE FOOTAGE FROM THE DISC TO THE VALVE.
2. ALL EXISTING AND PROPOSED VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADES AS DETERMINED IN THE FIELD.
3. WATER VALVES SHALL NOT BE PLACED IN HANDICAPPED RAMPS.
4. PRECAST CONCRETE PADS & THRUST BLOCKS SHALL NOT BE USED.
5. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1/2".
6. FOR VALVES 16" AND LARGER, USE BUTTERFLY VALVES.
7. PIPELINE DIRECTION TO BE IMPRESSED INTO NEWLY POURED CONCRETE PAD.
8. WHERE THRUST BLOCK NOT USED, RESTRAINED JOINTS MUST THEN EXTEND FROM TEE FULL LENGTH SPECIFIED FOR 'TEES.'
9. BINGHAM & TAYLOR P200NFG OR EQUAL FOR NORMAL YARD SERVICE. WHERE VALVE WILL BE IN STREET OR PARKING UNDER VEHICLE TRAFFIC, USE P525RD CENTERED IN SEPARATE CONCRETE PAD SIMILAR TO STANDARD VALVE BOX PAD.

BUTTERFLY VALVE, BOX, LID AND TAG

NOT TO SCALE



NOTES:

1. AIR RELEASE VALVES TO BE INSTALLED AT HIGH POINTS, OR WHERE AIR WOULD BE ENTRAPPED, ALONG 4" AND LARGER MAINS.
2. MAIN VERTICAL ALIGNMENT TO BE DESIGNED SUCH THAT THE MINIMUM NUMBER OF REQUIRED AIR RELEASE VALVES ARE INSTALLED.
3. ALL INCIDENTAL FITTINGS AND HARDWARE TO BE 316 STAINLESS STEEL.
4. ALL PIPE THREADS TO BE SEALED AIR TIGHT.
5. VENT PIPE TO BE LAID ACCURATELY ON SLOPE, WITHOUT HIGH OR LOW POINTS.
6. AIR RELEASE VALVES TO BE IN BELOW–GRADE INSTALLATIONS UNLESS IMPRACTICAL. INSTALLATIONS MAY BE ABOVE–GROUND ONLY WHERE APPROVED AND SPECIFICALLY INDICATED ON THE PLAN.
7. CONCRETE PAD SHALL BE TYPE I CONCRETE W/ 3,000 P.S.I., 28 DAY COMPRESSIVE STRENGTH.

ABOVE–GROUND ARV ASSEMBLY

NOT TO SCALE

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

MATTHEW S. LOVE, P.E.
No. 66118

SEAL

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EB0006691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 2

DATE:	MARCH 2014
MCE PROJ. #	5883–0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
C5

STATUS: ISSUED FOR BID
REVISION

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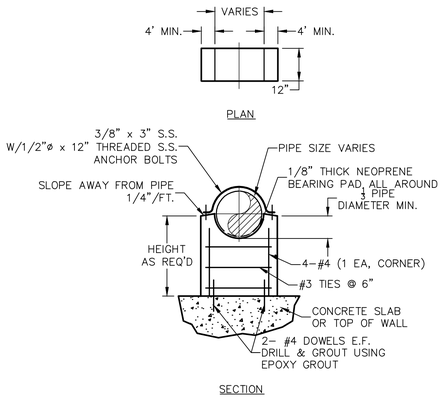
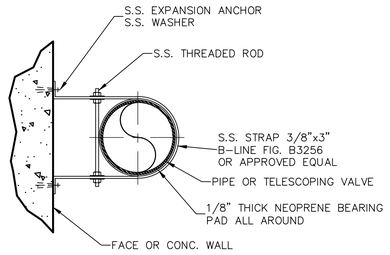


PIPE SUPPORT TYPE 1

NOT TO SCALE



PIPE STAND-OFF BRACKET TYPE 8

NOT TO SCALE

FROM THE UNI-BELL HANDBOOK OF PVC PIPE
SPECIFICATION TIME REQUIRED FOR A 1.0 PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED.
THE EOR SHALL PROVIDE TESTING SPECIFICATIONS CONSISTENT WITH THE FOLLOWING TABLE FOR PVC AND DIP:

1	2	3	4	SPECIFICATION TIME FOR LENGTH (L) SHOWN (MIN., SEC)							
PIPE DIAMETER (INCHES)	MINIMUM TIME (MIN:SEC)	LENGTH FOR MINIMUM (FEET)	TIME FOR LONGER (SECONDS)		100 FT.	150 FT.	200 FT.	250 FT.	300 FT.	350 FT.	400 FT.	450 FT.
4	3.46	597	0.380	L	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46
6	5.40	398	0.854	L	5.40	5.40	5.40	5.40	5.40	5.40	5.42	6.24
8	7.34	298	1.520	L	7.34	7.34	7.34	7.34	7.36	8.52	10.08	11.24
10	9.26	239	2.374	L	9.26	9.26	9.26	9.53	11.52	13.51	15.49	17.48
12	11.20	199	3.418	L	11.20	11.20	11.24	14.15	17.05	19.56	22.47	25.38
15	14.10	159	5.342	L	14.10	14.10	17.48	22.15	26.42	31.09	35.36	40.04
18	17.00	133	7.692	L	17.00	19.13	25.38	32.03	38.27	44.52	51.16	57.41
21	19.50	114	10.470	L	19.50	26.10	34.54	43.37	52.21	61.00	69.48	78.31
24	22.40	99	13.674	L	22.47	34.11	45.34	56.58	68.22	79.46	91.10	102.33
27	25.30	88	17.306	L	28.51	43.16	57.41	72.07	86.32	100.57	115.22	129.48
30	28.20	80	21.366	L	35.37	53.25	71.13	89.02	106.50	124.38	142.26	160.15
33	31.10	72	25.852	L	43.05	64.38	86.10	107.43	129.16	150.43	172.21	193.53
36	34.00	66	30.768	L	51.17	76.55	102.34	128.12	153.50	179.29	205.07	230.46

a.) FOR PIPE LENGTHS GREATER THAN FOUR HUNDRED FIFTY (450) FEET BUT LESS THAN LENGTH IN COLUMN 3, USE MINIMUM TIME IN COLUMN 2.

EXAMPLE: DETERMINE TEST TIME FOR 425 FEET OF TWELVE (12) INCH PVC.

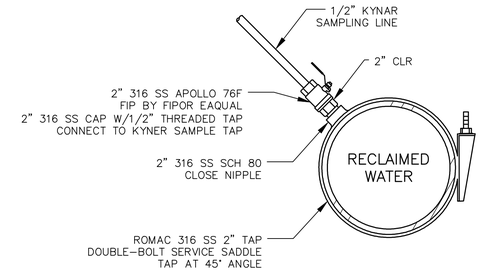
b.) FOR PIPE LENGTHS GREATER THAN FOUR HUNDRED FIFTY FEET AND GREATER THAN LENGTH IN COLUMN 3, SUBTRACT LENGTH OF COLUMN 3 FROM ACTUAL PIPE LENGTH, THEN MULTIPLY DIFFERENCE BY TIME IN COLUMN 4 AND ADD TO TIME IN COLUMN 2.

CONVERT min:sec TO SECONDS
(min. X 60) + sec: t400 = 360 s; 450=480s
INTERPOLATE t425 = 363s + (408 - 363) X (425 - 400) (450 - 400)
T425 386s

NOTE: INTERPOLATE BETWEEN VALUES ON TABLE AS SHOWN IN EXAMPLE FOR AIR TEST.

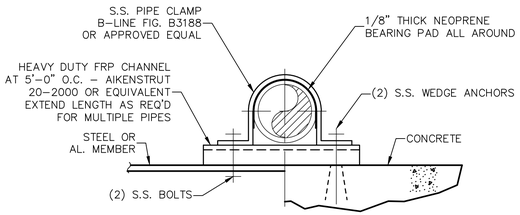
CONVERT SECONDS TO min:sec
(386 sec/60) = 6.43 min. 6.43 min. = 6 min. + (60 X 0.43)
t425 = 6 min. 26 sec.
NOTE: FOR LENGTHS GREATER THAN FIVE HUNDRED (500) FEET CONTACT THE EOR.

AIR TEST TABLE



SAMPLE TAP DETAIL

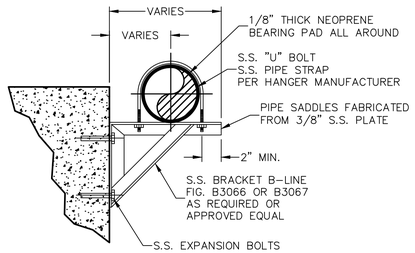
NOT TO SCALE



NOTE:
USE THIS DETAIL FOR SMALL DIA. PIPING OR CONDUIT ATTACHED TO CONCRETE SLAB, WALL, CEILING, METAL FRAMING MEMBERS OR EQUIPMENT MOUNTING BOARDS.

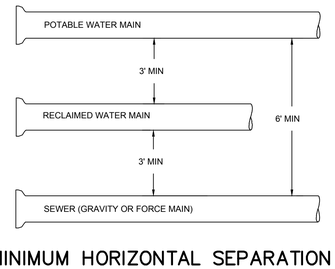
PIPE SUPPORT TYPE 5

NOT TO SCALE

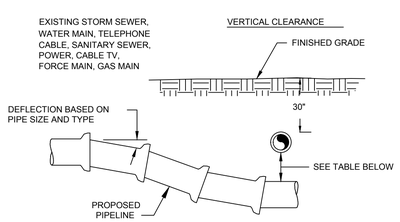


PIPE SUPPORT TYPE 3

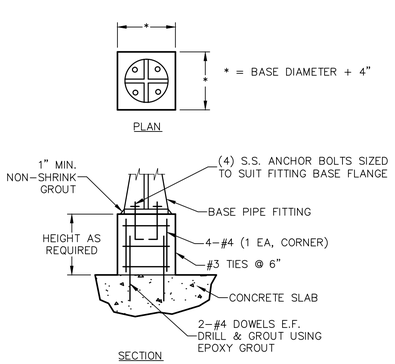
NOT TO SCALE



MINIMUM HORIZONTAL SEPARATION DISTANCES (FT)

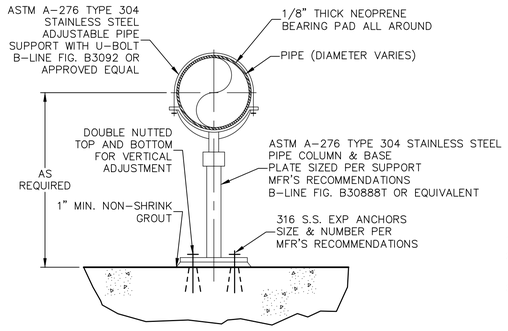


MINIMUM VERTICAL SEPARATION DISTANCES (IN)



PIPE SUPPORT TYPE 2

NOT TO SCALE



PIPE SUPPORT TYPE 7

NOT TO SCALE

(OUTSIDE OF PIPELINE TO OUTSIDE OF PIPELINE)

	WATER MAIN	FORCE MAIN	SANITARY SERVICE	REUSE MAIN	STORM WATER	OTHER UTILITIES (TELEPHONE, CABLE, ETC.)
WATER MAIN	3	6	6	3	3	3
FORCE MAIN	6	3	3	3	3	3
SANITARY SEWER	6	3	3	3	3	3
REUSE MAIN	3	3	3	3	3	3
STORM WATER	3	3	3	3	3	3
OTHER UTILITIES	3	3	3	3	3	3

(OUTSIDE OF PIPELINE TO OUTSIDE OF PIPELINE)

	WATER MAIN	FORCE MAIN	SANITARY SERVICE	REUSE MAIN	STORM WATER	OTHER UTILITIES (TELEPHONE, CABLE, ETC.)
WATER MAIN	6	12	12	6	6	6
FORCE MAIN	12	6	6	6	6	6
SANITARY SEWER	12	6	6	6	6	6
REUSE MAIN	6	6	6	6	6	6
STORM WATER	6	6	6	6	6	6
OTHER UTILITIES	6	6	6	6	6	6

NOTES:

1.) MAXIMUM JOINT DEFLECTION SHALL BE 90% OF MANUFACTURER'S RECOMMENDATION.

2.) WHEREVER POSSIBLE, THE STRATIGRAPHY OF UTILITIES SHALL PLACE SANITARY SEWER AND SEWER FORCE MAINS BELOW RECLAIMED MAINS AND BELOW WHERE WATER MAINS ARE ABOVE GRAVITY SEWERS OR WASTEWATER FORCE MAINS, A VERTICAL CLEARANCE OF 6 INCHES IS ACCEPTABLE.

3.) ACCEPTABLE VARIANCES

A. WHERE HORIZONTAL SEPARATION CANNOT BE MAINTAINED, C900 DR14 PVC PIPE SHALL BE USED FOR ONE OF THE PIPELINES.

B. WHERE VERTICAL CLEARANCE CANNOT BE MAINTAINED, ONE FULL LENGTH OF DR14 C900 PIPE SHALL BE INSTALLED CENTERED AT THE POINT OF CROSSING.

C. WHERE 30" MINIMUM DEPTH OF COVER CANNOT BE MAINTAINED, SPECIAL PROTECTION OR PIPE MATERIAL UPGRADE MAY BE REQUIRED, AT THE DISCRETION OF THE CITY ENGINEER.

4.) NO WATER PIPE SHALL PASS THROUGH, OR COME IN CONTACT WITH ANY PART OF A SANITARY MANHOLE OR STORMWATER STRUCTURE.

UTILITY CONFLICT DETAIL

NOT TO SCALE

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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EB0006691
www.mckimcreed.com

City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 3

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
C6

STATUS: ISSUED FOR BID
REVISION

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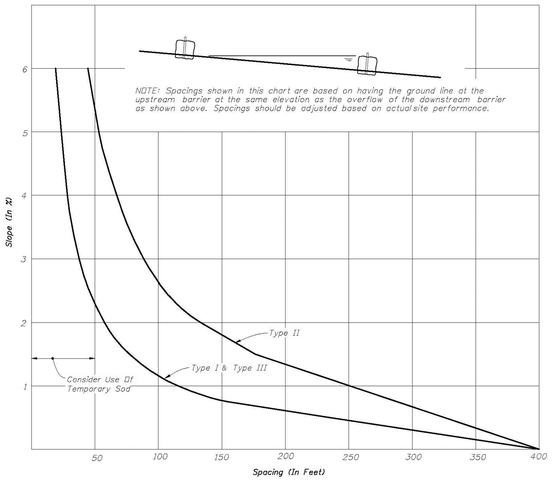
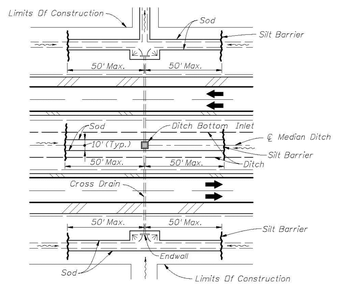
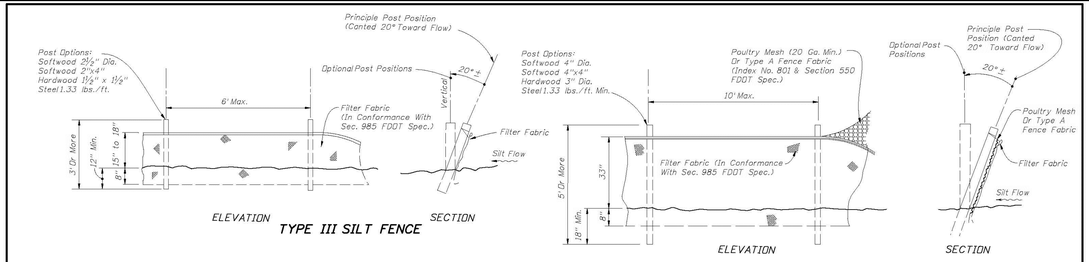


CHART I

RECOMMENDED SPACING FOR SYNTHETIC BALES OR BALE TYPE BARRIERS AND TYPE III SILT FENCE

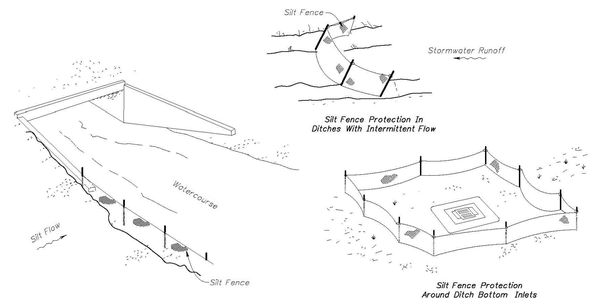


DITCH INSTALLATIONS AT DRAINAGE STRUCTURES

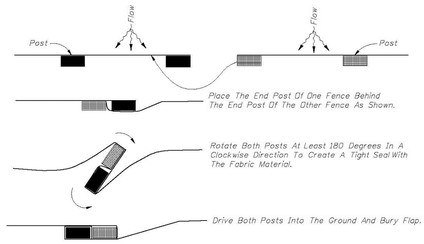


TYPE III SILT FENCE

TYPE IV SILT FENCE



SILT FENCE APPLICATIONS

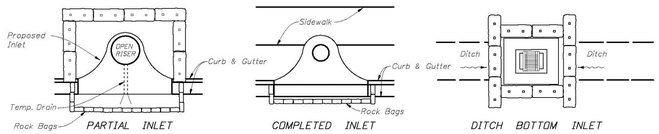


PLAN VIEW

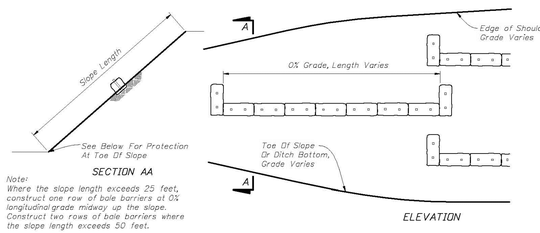
JOINING TWO SILT FENCES

NOTES FOR SILT FENCES

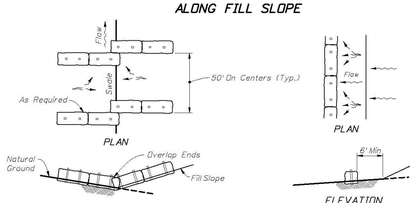
1. Type III Silt Fence to be used at most locations. Where used in ditches, the spacing for Type III Silt fence shall be in accordance with Chart I, Sheet 1.
2. Type IV Silt Fence to be used where large sediment loads are anticipated. Suggested use is where fill slope is 1:2 or steeper and length of slope exceeds 25 feet. Avoid use where the detained water may back into travellanes or off the right of way.
3. Do not construct silt fences across permanent flowing watercourses. Silt fences are to be at upland locations and turbidity barriers used at permanent bodies of water.
4. Where used as slope protection, Silt Fence is to be constructed on 0% longitudinal grade to avoid channelizing runoff along the length of the fence.
5. Silt Fence to be paid for under the contract unit price for Staked Silt Fence, (LF).



PROTECTION AROUND INLETS OR SIMILAR STRUCTURES

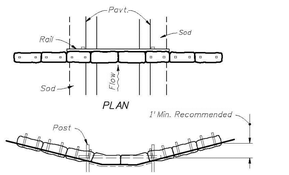


ALONG FILL SLOPE

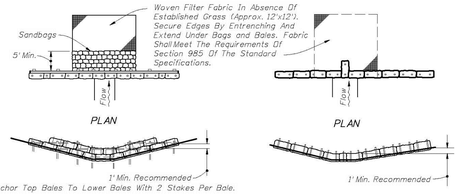


AT TOE OF SLOPE

BARRIERS FOR FILL SLOPES



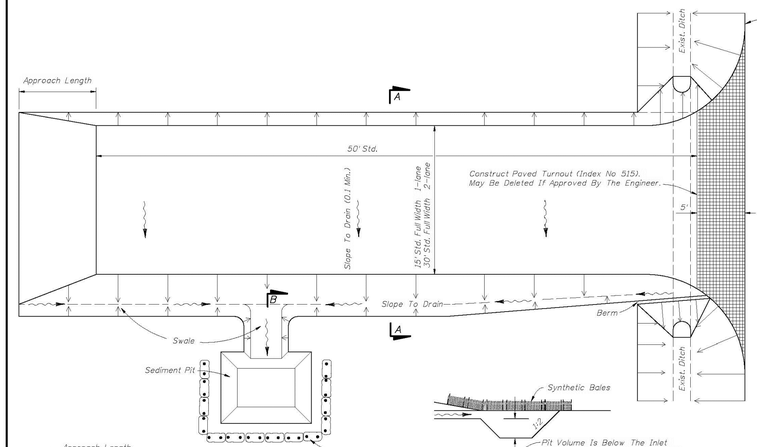
SYNTHETIC BALES OR BALE TYPE BARRIERS FOR PAVED DITCHES



SYNTHETIC BALES OR BALE TYPE BARRIERS FOR UNPAVED DITCHES

NOTES FOR SYNTHETIC BALES OR BALE TYPE BARRIERS

1. Type I and II Synthetic Barrier should be spaced in accordance with Chart 1, Sheet 1.
2. Bales shall be anchored with 2-1" x 2" (or 1" dia.) x 4' wood stakes. Stakes of other material or shape providing equivalent strength may be used if approved by the Engineer. Stakes other than wood shall be removed upon completion of the project.
3. Rails and posts shall be 2" x 4" wood. Other materials providing equivalent strength may be used if approved by the Engineer.
4. Adjacent bales shall be butted firmly together.
5. Where used in conjunction with silt fence, bales shall be placed on the upstream side of the fence.
6. Bales to be paid for under the contract unit price for Synthetic Bales, LF. The unit price shall include the cost of filter fabric for Type I and II Barriers. Sandbags shall be paid for under the unit price for Sandbagging, CY. Rock bags to be paid for under the contract unit price for Rock Bags, EA.



GENERAL NOTES

1. A Soil Tracking Prevention Device (STPD) shall be constructed at locations designated by the engineer for points of egress from unstabilized areas of the project to public roads where off-site tracking of mud could occur. Traffic from unstabilized areas of the construction project shall be directed thru a STPD. Barriers, flagging, or other positive means shall be used as required to limit and direct vehicular egress across the STPD.
2. The Contractor may propose an alternative technique to minimize off-site tracking of sediment. The alternative must be reviewed and approved by the Engineer prior to its use.
3. All materials spilled, dropped, or tracked onto public roads (including the STPD aggregate and construction mud) shall be removed daily, or more frequently if so directed by the Engineer.
4. Aggregates shall be as described in Section 901 excluding 901-2.3. Aggregates shall be FDOT size #1. If this size is not available, the next available smaller size aggregate may be substituted with the approval of the Engineer. Sizes containing excessive small aggregate will track off the project and are unsuitable.
5. The sediment pit should provide a retention volume of 3600 cubic feet/acre of surface area draining to the pit. When the STPD is isolated from other drainage areas, the following pit volumes will satisfy this requirement:
   15' x 50'=100 ft.³ 30' x 50'=200 ft.³
   As an option to the sediment pit, the width of the swale bottom can be increased to obtain the volume. When the sediment pit or swale volume has been reduced to one half, it shall be cleaned. When a swale is used, synthetic bales or silt fence shall be placed along the entire length.
6. The swale ditch draining the STPD shall have a 0.02% minimum and a 1.0% maximum grade along the STPD and to the sediment pit.
7. Mitered end sections are not required when the sidedrain pipe satisfies the clear zone requirements.
8. The STPD shall be maintained in a condition that will allow it to perform its function. To prevent off-site tracking, the STPD shall be rinsed (daily when in use) to move accumulated mud downward thru the stone. Additional stabilization of the vehicular route leading to the STPD may be required to limit the mud tracked.
9. A STPD shall be paid for under the contract unit price for Soil Tracking Prevention Device, EA. The unit price shall constitute full compensation for construction, maintenance, replacement of materials, removal, and restoration of the area utilized for the STPD; including but not limited to excavation, grading, temporary pipe (including MES when required), filter fabric, aggregate, paved turnout (including asphalt and base construction), ditch stabilization, approach route stabilization, sediment removal and disposal, water, rinsing and cleaning of the STPD and cleaning of public roads, grassing and sod. Synthetic Bale or Bale Type Barrier shall be paid for under the contract unit price for Synthetic Bales, LF. Silt fence shall be paid for under the contract unit price for Staked Silt Fence, LF.
10. The nominal size of a standard STPD is 15' x 50' unless otherwise shown in the plans. If the volume of entering and existing vehicles warrant, a 30' width STPD may be used if approved by the Engineer. When a double width (30') STPD is used, the pay quantity shall be 2 for each location.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CIVIL DETAILS 4

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
C7

STATUS: ISSUED FOR BID
REVISION

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STRUCTURAL NOTES:

1.0 GENERAL

1.1 ALL WORK IS TO BE PERFORMED IN A GOOD, WORKMANLIKE AND PROFESSIONAL MANNER.

1.2 ALL CONSTRUCTION SHALL BE IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF THE FLORIDA STATE BUILDING CODE, LATEST EDITION, OR LOCAL BUILDING CODE REQUIREMENTS IF MORE STRINGENT.

1.3 THESE DRAWINGS DO NOT SHOW PROVISIONS FOR SAFETY DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO PROVIDE THE REQUIRED BRACING, SHORING, AND SAFETY DEVICES THROUGHOUT THE CONSTRUCTION OF THIS PROJECT.

2.0 COORDINATION

2.1 STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH AND COORDINATED WITH GENERAL, CIVIL, ELECTRICAL AND MECHANICAL DRAWINGS AND OTHER CONTRACT DOCUMENTS.

2.2 COORDINATE THE EXACT SIZE AND LOCATION OF ALL SLEEVES AND OPENINGS THROUGH SLABS AND WALLS w/ GENERAL, CIVIL, ELECTRICAL AND MECHANICAL DRAWINGS AND OTHER CONTRACT DOCUMENTS.

2.3 ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND THOSE SHOWN ON THESE DRAWINGS ARE TO BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER BEFORE CONSTRUCTION WORK PROCEEDS, INCLUDING ORDERING AND FABRICATING MATERIALS.

2.4 INDEPENDENT TESTING OF MATERIALS SHALL BE PROVIDED AS DEFINED IN PROJECT SPECIFICATIONS. IN GENERAL PROJECT INVOLVES THE FOLLOWING:
- A. CONCRETE.
- B. SOIL COMPACTION

2.5 IF COORDIINATION OF INFORMATION PRESENTED CONFLICTS w/ THE PROJECT SPECIFICATIONS, THE DRAWINGS WILL TAKE PRECEDENCE.

2.6 IN GENERAL CALL–OUTS ARE FOR NEW CONSTRUCTIONS U.N.O.. THE (*) SYMBOL ON "STRUCTURAL" DRAWINGS INDICATE DIMENSIONS TO BE VERIFIED BY THE GENERAL CONTRACTOR BASED ON FURNISHED SHOP DRAWINGS FOR EQUIPMENT PRIOR TO CONSTRUCTION, INCLUDING ORDERING AND FABRICATING MATERIALS.

3.0 FOUNDATIONS

3.1 DESIGN ALLOWABLE SOIL BEARING PRESSURE – 2,000 PSF IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THIS VALUE PRIOR TO FOUNDATION CONSTRUCTION. IN AREAS WHERE THE SOIL DOES NOT YIELD THIS BEARING STRESS VALUE, ADJUSTMENT IN THE FOOTING OR BASE SLAB DEPTHS AND FOUNDATION DIMENSION MAY BE MADE BY THE ENGINEER BEFORE WORK PROCEEDS. CONTRACTOR IS RESPONSIBLE FOR PERFORMING ANY SUCH ADJUSTMENTS.

3.2 PREPARE THE EXISTING SUBGRADE IN ACCORDANCE w/ THE GEOTECHNICAL REPORT. IN THE EVENT UNUSUAL SOIL CONDITIONS ARE UNCOVERED, INCLUDING CONDITIONS THAT DEVIATE FROM THOSE DESCRIBED IN THE GEOTECHNICAL REPORT, NOTIFY THE OWNER AND ENGINEER PRIOR TO FOUNDATION CONSTRUCTION FOR INSTRUCTIONS HOW TO PROCEED. ADJUSTMENT IN THE FOOTING OR BASE SLAB DEPTHS AND GENERAL FOUNDATION CONSTRUCTION MAY BE MADE BY THE ENGINEER BEFORE WORK PROCEEDS. CONTRACTOR IS RESPONSIBLE FOR PERFORMING ANY SUCH ADJUSTMENTS.

3.3 ALL FILL BELOW FOUNDATIONS SHALL BE SELECT MATERIAL FREE FROM ROOTS, TRASH WOOD SCRAPS, AND OTHER EXTRANEOUS MATERIALS. PLACE FILL IN LIFTS NOT EXCEEDING THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT.

3.4 FOOTING ELEVATIONS SHALL NOT BE RAISED OR LOWERED WITHOUT APPROVAL OF THE STRUCTURAL ENGINEER.

3.5 ALL EXCAVATIONS SHALL BE ADEQUATELY DEWATERED BEFORE PLACEMENT OF CONCRETE. NO CONCRETE OR CONCRETE FILL SHALL BE PLACED IN STANDING WATER.

3.6 FOOTING EXCAVATIONS AND FORMS SHALL BE REVIEWED BY AN OWNER'S CONSTRUCTION REPRESENTATIVE PRIOR TO PLACEMENT OF CONCRETE.

3.7 ALL FOOTINGS SHALL BE CENTERED UNDER THE SUPPORTING MEMBER UNLESS NOTED OTHERWISE.

3.8 CONSTRUCTION JOINTS IN SLABS, WALLS & FOOTINGS SHALL BE MADE AT LOCATIONS SHOWN ON DRAWINGS.

3.9 ANCHOR BOLTS SHALL BE SET BY MEANS OF TEMPLATE. "FLOATING" ANCHOR BOLTS INTO PLACE IS PROHIBITED.

3.10 CONTRACTOR IS TO VERIFY THE ELEVATION AND LOCATION OF ALL EXISTING AND PROPOSED UTILITIES PRIOR TO CONSTRUCTION. ANY "KNOWN" UTILITY LINES DAMAGED WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE. IF ANY "UNKNOWN" UTILITY LINES ARE ENCOUNTERED WHEN EXCAVATING THE CONTRACTOR IS TO CEASE ALL EXCAVATION ACTIVITY UNTIL THE ENGINEER AND OWNER ARE NOTIFIED AND INSTRUCTIONS ARE PROVIDED ABOUT HOW TO PROCEED.

3.11 THE CONTRACTOR SHALL OBTAIN THE OWNER'S PERMISSION BEFORE ENCASING OR BACK FILLING AROUND ANY EXISTING UNDERGROUND STRUCTURE, PIPING, ELECTRICAL, OR OTHER UNDERGROUND WORK.

4.0 REINFORCING STEEL

4.1 BARS SHALL BE ROLLED FROM NEW BILLET–STEEL OF DOMESTIC MANUFACTURE CONFORMING TO "STANDARD SPECIFICATION FOR DEFORMED AND PLAIN BILLET STEEL BARS FOR CONCRETE REINFORCEMENT," ASTM A 615, GRADE 60 AND SUPPLEMENTARY REQUIREMENT S–1.

4.2 DETAIL AND FABRICATE REINFORCING STEEL IN ACCORDANCE WITH THE AMERICAN CONCRETE INSTITUTE "ACI DETAILING MANUAL," LATEST PUBLICATION.

4.3 REINFORCING STEEL IN PLACE SHALL BE REVIEWED BY THE OWNER'S CONSTRUCTION REPRESENTATIVE PRIOR TO PLACEMENT OF CONCRETE. IN GENERAL "CLR" DISTANCES FOR CONCRETE COVER ARE PROVIDED ON THE DRAWINGS IN THE SECTIONS & DETAILS. FOR SECTIONS & DETAILS w/OUT CONCRETE COVER FOR REINFORCING BARS REFERENCE THE PROJECTS SPECIFICATIONS.

4.4 WELDED WIRE FABRIC SHALL CONFORM TO "STANDARD SPECIFICATION FOR WELDED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT," ASTM A–185.

4.5 PLACE WELDED WIRE FABRIC AT CENTER OF SLABS–ON–GRADE UNLESS NOTED OTHERWISE.

4.6 PROVIDE BARS AT CORNERS AND INTERSECTIONS OF SLAB THK'D T/D EDGES, WALLS & FOOTINGS OF THE SAME NUMBER AND SIZE AS LONGITUDINAL BARS, U.N.O. ON THE DRAWINGS.

4.7 FABRICATE CONTINUOUS BARS IN SLABS, WALLS & FOOTINGS TO THE LONGEST PRACTICABLE LENGTHS.

4.8 REINFORCING STEEL SHALL NOT BE BENT AFTER BEING PARTIALLY EMBEDDED IN HARDENED CONCRETE.

4.9 BARS SHALL BE COLD BENT AND SHALL NOT BE HEATED FOR ANY REASON.

4.10 REINFORCING BARS SHALL NOT BE WELDED UNLESS NOTED OTHERWISE ON THE DRAWINGS.

4.11 REFERENCE DRAWINGS FOR REQUIREMENTS FOR LAP REINFORCING STEEL IN CONCRETE. ALL SHALL CONFORM TO CLASS B SPLICE CRITERIA. IT IS ACCEPTABLE TO LAP REINFORCING A MINIMUM 50 BAR DIAMETERS, UNLESS NOTED OTHERWISE.

4.12 LAP SPLICED BARS IN CONCRETE ARE TO BE WIRE TIED.

5.0 CONCRETE

5.1 IN GENERAL CONCRETE SHALL DEVELOP 3,000 TO 4,000 psi MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS. REFERENCE "DESIGN CRITERIA" THIS DWG. & PROJECT SPECIFICATIONS, FOR APPLICATION & SPECIFIC CONCRETE MIX DESIGN REQUIREMENTS.

5.2 CONCRETE WORK SHALL CONFORM TO "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", ACI 318 & TO "CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES", ACI 350 (LATEST EDITIONS).

5.3 PLACE 1 /2 INCH EXPANSION JOINT MATERIAL BETWEEN EDGES OF SLABS AND VERTICAL SURFACES UNLESS NOTED OTHERWISE.

5.4 PROVIDE CONSTRUCTION OR CONTROL JOINTS IN SLABS & WALLS AT LOCATIONS SHOWN ON DRAWINGS, AT OFFSETS AND CHANGES IN DIRECTION AND AT THIRTY (30) FEET MAXIMUM U.N.O.. GENERAL CONTRACTOR TO PROVIDE CONSTRUCTION JOINT LAYOUT PLAN PER THE PROJECT SPECIFICATIONS PRIOR TO CONSTRUCTION, INCLUDING ORDERING & FABRICATING MATERIALS.

5.5 CHAMFER EXPOSED EDGES OF CONCRETE 3/4 INCH, UNLESS NOTED OTHERWISE.

5.6 CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER CURING OF ALL CONCRETE. CURING METHODS SHALL CONFORM TO "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", ACI 318, "CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES" ACI 350 AND "STANDARD PRACTICE FOR CURING CONCRETE," ACI 308, LATEST EDITIONS.

5.7 UNLESS NOTED OTHERWISE DOWELS SHALL BE THE SAME NUMBER AND SIZE AS THE LARGEST VERTICAL BAR TO WHICH THEY ARE SPLICED.

5.8 REFERENCE PROJECT SPECIFICATIONS FOR REQUIRED FINISHES.

5.9 BONDING AGENT TO BE STRUCTURAL EPOXY ADHESIVE CONFORMING TO ASTM C–881 TYPE I AND II, GRADE 2, CLASS B AND C WITH A MINIMUM BOND STRENGTH OF 1900 PSI.

5.10 CONTRACTOR SHALL SUBMIT REBAR SHOP DRAWINGS FOR APPROVAL TO OWNER PRIOR TO FABRICATION. DO NOT FABRICATE REINFORCING PRIOR TO RECEIPT OF APPROVED SHOP DRAWINGS.

5.11 ROUGHEN THE "BASE" CONCRETE POUR SURFACE TO A FULL AMPLITUDE OF 1/4" MINIMUM, WHERE NOTED ON THE CONSTRUCTION DRAWINGS.

5.12 CONCRETE MIXES TO BE REVIEWED BY THE OWNER'S CONSTRUCTION REPRESENTATIVE PRIOR TO PLACEMENT OF CONCRETE. COMPRESSIVE STRENGTH TEST CYLINDERS TO BE REVIEWED BY THE OWNER'S CONSTRUCTION REPRESENTATIVE THROUGHOUT CONCRETE CONSTRUCTION OF THE PROJECT.

5.13 CONCRETE ACCESSORIES AS FOLLOWS:
- a.) PREFORMED WATERSTOPS SHALL BE PVC IN ACCORDANCE w/ THE PROJECT SPECIFICATIONS.
- b.) NON–EXPANSIVE WATERSTOPS SHALL BE SYNKO–FLEX WATERSTOP BY HENRY.
- c.) CAULK/SEALANT – SONOLASTIC (2) PART POLYSULFIDE.
- d.) BONDING AGENT – SHALL BE STRUCTURAL EPOXY ADHESIVE CONFORMING TO ASTM C–881 TYPE I STRENGTH AND II, GRADE 2, CLASS B AND C WITH A MINIMUM BOND STRENGTH OF 1900 PSI.
  - 1.) SIKA ARMATEC 110 EpoCem.

6.0 GROUT

6.1 PROVIDE NON–SHRINK GROUT UNDER ALL BASE PLATES AND AND ELSEWHERE AS INDICATED ON DRAWINGS. NON–SHRINK GROUT SHALL CONFORM TO ASTM C 1107.

6.2 GROUT SHALL BE NON–METALLIC AND NON–STAINING AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 7000 psi.

7.0 MASONRY (NOT APPLICABLE)

8.0 STRUCTURAL STEEL

8.1 STEEL SHALL CONFORM TO "STANDARD SPECIFICATION FOR STRUCTURAL STEEL," ASTM A–36 (Fy=36 ksi) FOR ANGLES, PLATES AND CHANNEL SECTIONS. WIDE FLANGE SECTIONS SHALL CONFORM TO ASTM A–572 (Fy=50ksi). HOLLOW STEEL SECTIONS (HSS) SHALL CONFORM TO ASTM A500, GRADE B (Fy=46 ksi). STEEL PIPE SHALL CONFORM TO ASTM A–53, GRADE B, (Fy=35 ksi).

8.2 STEEL WORK SHALL CONFORM TO "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL BUILDINGS", OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC., (LATEST EDITION), INCLUDING ALL SUPPLEMENTS AND THE "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES", (LATEST EDITION).

8.3 CONNECTION BOLTS SHALL BE 3/4 INCH DIAMETER CONFORMING TO "STANDARD SPECIFICATION FOR HIGH–STRENGTH BOLTS FOR STRUCTURAL STEEL JOINTS", ASTM A–325, UNLESS NOTED OTHERWISE CONNECTIONS ARE BEARING TYPE WITH THREADS EXCLUDED FROM SHEAR PLANES–(A–325x).

8.4 WELDING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY AWS D1.1 "STRUCTURAL WELDING CODE". WELDING SHALL BE PERFORMED BY CERTIFIED PERSONNEL WHO HAVE BEEN PREVOUSLY QUALIFIED BY TEST PRESCRIBED IN THE AWS "STRUCTURAL WELDING CODE". ELECTRODES SHALL CONFORM TO AWS 5.5, E70XX.

8.5 THE CONTRACTOR SHALL PROVIDE ADEQUATE TEMPORARY BRACING, SHORING, AND GUYING OF STEEL FRAMING AGAINST WIND, CONSTRUCTION LOADS, AND OTHER TEMPORARY FORCES UNTIL SUCH PROTECTION IS NO LONGER REQUIRED FOR THE SAFE SUPPORT OF THE FRAMING.

8.6 ALL COPES, BLOCKS, CUTS, CUT–OFFS AND OTHER CUTTING OF STRUCTURAL MEMBERS SHALL HAVE ALL RE–ENTRANT CORNERS SHAPED, AND NOTCH–FREE TO A RADIUS OF AT LEAST 1 /2 INCH. THE FILLET AND ITS CONTINUOUS CUTS SHALL MEET WITHOUT OFFSET OR CUTTING PAST THE POINT OF TANGENCY.

8.7 ANCHOR BOLTS SHALL BE ASTM F–1554 OR A–36 (NON–HEADED) AND SHALL HAVE HOOKS AS REQUIRED BY THE DRAWINGS. PROVIDE TWO (2) NUTS AND WASHERS WITH EACH ANCHOR BOLT AT COLUMNS UNLESS NOTED OTHERWISE.

8.8 OVERSIZED AND SLOTTED HOLES SHALL NOT BE USED FOR BOLTED CONNECTIONS ON THIS PROJECT EXCEPT AT LOCATIONS NOTED ON DRAWINGS.

8.9 SPLICING OF STRUCTURAL STEEL MEMBERS IS PROHIBITED WITHOUT THE APPROVAL OF THE STRUCTURAL ENGINEER, AS TO LOCATION AND TYPE OF SPLICE. ANY MEMBER HAVING A SPLICE NOT SHOWN AND DETAILED ON THE SHOP DRAWINGS WILL BE REPLACED.

8.10 PRE–GROUTING BASE PLATES IS NOT PERMITTED.

8.11 ALL HOLES IN STRUCTURAL STEEL ARE TO BE PUNCHED OR DRILLED. FLAME CUTTING OF STEEL IS STRICTLY PROHIBITED.

8.12 ALL DESIGN, DETAILING, FABRICATION AND ERECTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) MANUAL OF STEEL CONSTRUCTION.

8.13 STRUCTURAL STEEL ERECTION SHALL BE REVIEWED BY THE OWNER'S CONSTRUCTION REPRESENTATIVE.

8.14 IN GENERAL SHOP CONNECTIONS SHALL BE EITHER WELDED OR BOLTED AND FIELD CONNECTIONS SHALL BE BOLTED UNLESS NOTED OTHERWISE.

8.15 FABRICATOR/CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR OWNER/ENGINEER APPROVAL PRIOR TO FABRICATION. ALL SHOP DRAWINGS MAY BE EXPEDITED IF THE FABRICATOR ADHERES CLOSELY TO THE DETAILS, NOTES, AND INSTRUCTIONS, SHOWN ON THE DRAWINGS.

8.16 ALL GALVANIZED MATERIALS THAT ARE FIELD CUT, FIELD WELDED OR DAMAGED IN SURFACE FINISH SHALL BE CLEANED AND RE–COATED AS CALLED OUT IN THE PROJECT SPECIFICATIONS.

9.0 ALUMINUM

9.1 ALUMINUM FABRICATION SHALL BE IN CONFORMANCE WITH THE ALUMINUM ASSOCIATION, INC. "SPECIFICATIONS FOR ALUMINUM STRUCTURES".

9.2 UNLESS NOTED OTHERWISE, MATERIALS SHALL BE:
- a. PLATE & SHEET – ASTM B209; 6061–T6, 6061–T651 ALLOY.
- b. EXTRUDED SHAPES – ASTM B221; 6061–T6, 6061–T651 ALLOY. PIPE SECTIONS ARE SCHEDULE 40 U.N.O..
- c. CASTINGS – ASTM B108; 214 ALLOY.
- d. BOLTS – ASTM A193; GRADE B8 OR, ASTM 276; TYPE 316 STAINLESS STEEL.
- e. NUTS – ASTM A194; GRADE M, OR ASTM 276; TYPE 316 STAINLESS STEEL.

9.3 ALUMINUM SHALL BE SEPARATED FROM DIRECT CONTACT WITH OTHER MATERIALS (STEEL, CONCRETE, ETC.) BY PRESSURE SENSITIVE TAPE, BITUMASTIC COATING, OR OTHER PROTECTIVE METHOD SUBMITTED BY THE CONTRACTOR AND APPROVED BY THE OWNER'S CONSTRUCTION REPRESENTATIVE.

9.4 CONNECTIONS SHALL HAVE A MINIMUM OF TWO 3/4" DIAMETER STAINLESS STEEL BOLTS.

9.5 WELDING ALUMINUM SHALL CONFORM TO AWS A5.10 & THE REQUIREMENTS OF THE ALUMINUM ASSOCIATIONS "ALUMINUM DESIGN MANUAL" (LATEST EDITION)
TABLE 7.1–1 FOR WELD FILLERS FOR WROUGHT ALLOYS.

9.6 REFERENCE PROJECT SPECIFICATIONS FOR HANDRAIL REQUIREMENTS.

10.0 ABBREVIATIONS

10.1 THE FOLLOWING LIST OF ABBREVIATIONS IS NOT INTENDED TO REPRESENT ALL THOSE USED ON THE DRAWINGS, BUT TO SUPPLEMENT THE MORE COMMON ABBREVIATIONS USED.

ADD'L	=	ADDITIONAL	LLH	=	LONG LEG HORIZONTAL
AL	=	ALUMINUM	LLV	=	LONG LEG VERTICAL
BM.	=	BEAM	L.P.	=	LOW POINT
B.O.	=	BOTTOM OF	LSL	=	LONG SLOTTED
BRG.	=	BEARING	MAT'L.	=	MATERIAL
BTM.	=	BOTTOM	MECH.	=	MECHANICAL
C.I.P.	=	CAST–IN–PLACE	MFG.	=	MANUFACTURER
CJ	=	CONSTRUCTION JT.	MIN.	=	MINIMUM
CLR.	=	CLEAR	MTL.	=	METAL
COL.	=	COLUMN	NO.	=	NUMBER
CONC.	=	CONCRETE	N.S.	=	NEAR SIDE
CONN.	=	CONNECTION	N.T.S.	=	NOT TO SCALE
CONT.	=	CONTINUOUS	O.C.	=	ON CENTER
COORD.	=	COORDINATE	O/F	=	OUTSIDE FACE
CTR.	=	CENTER	O/O	=	OUT TO OUT
CTR'D.	=	CENTERED	OPNG.	=	OPENING
DIR.	=	DIRECTION	OPP.	=	OPPOSITE
DIST.	=	DISTANCE	ORIENT.	=	ORIENTED
DWG.	=	DRAWING	PLCS.	=	PLACES
DWG's.	=	DRAWINGS	PROJ.	=	PROJECT
DWL.	=	DOWEL	P.S.	=	PUMP STATION
DWL.'s	=	DOWELS	RAD.	=	RADIUS
EA.	=	EACH	RECT.	=	RECTANGULAR
EFFL.	=	EFFLUENT	REF.	=	REFERENCE
EL	=	ELEVATION	REINF.	=	REINFORCING
E.O.	=	EDGE OF	REINF.	=	REINFORCED
EQUIP.	=	EQUIPMENT	REQ'D.	=	REQUIRED
EXIST.	=	EXISTING	SIM.	=	SIMILAR
EXP.	=	EXPANSION	SL.	=	SLOPED
EXTR.	=	EXTERIOR	SPA.	=	SPACED
FDN.	=	FOUNDATION	SPECS.	=	SPECIFICATIONS
FLG.	=	FLANGE	SQ.	=	SQUARE
F.S.	=	FAR SIDE	S.S.	=	STAINLESS STEEL
FT.	=	FEET	SSL	=	SHORT SLOTTED
FTG.	=	FOOTING	STD.	=	STANDARD
GA.	=	GAGE	STL.	=	STEEL
GALV.	=	GALVANIZED	SUPPT.	=	SUPPORT
GALV'D	=	GALVANIZED	T&B	=	TOP & BOTTOM
G'RAIL	=	GUARD RAIL	T/D	=	TURN DOWN
HORZ.	=	HORIZONTAL	THK.	=	THICK
H.P.	=	HIGH POINT	THK'D	=	THICKENED
H'RAIL	=	HAND RAIL	T.O.	=	TOP OF
I/F	=	INSIDE FACE	TYP.	=	TYPICAL
INFO.	=	INFORMATION	U.N.O.		UNLESS NOTED OTHERWISE
INTR.	=	INTERIOR	VERT.		VERTICAL
JT.	=	JOINT	W.W.F.		WELDED WIRE FABRIC

DESIGN LOADS:

LIVE LOAD:	300 PSF SLAB–ON–GRADE, 100 PSF STAIRS & PLATFORMS
ROOF:	NA
SNOW:	NA, IMPORTANCE FACTOR (Is): NA
SEISMIC:	NA, IMPORTANCE FACTOR (Ie): NA
WIND: ZONE:	161 mi/hr, EXPOSURE C, RISK CATEGORY III

FLORIDA BUILDING CODE (FBC) 2010 & ASCE 7–10 WIND DESIGN:

DESIGN CRITERIA:

CONCRETE 28 DAY COMPRESSIVE STRENGTH:	
SLAB–ON–GRADE:	f'c = 4,000 psi
EQUIPMENT PADS:	f'c = 4,000 psi
FOOTINGS:	f'c = 4,000 psi
BELOW GRADE & RETAINING WALLS:	f'c = 4,000 psi
SIDEWALK:	f'c = 3,000 psi
REINFORCING STEEL:	ASTM A615, GRADE 60
WELDED WIRE FABRIC:	ASTM A185
STRUCTURAL STEEL:	REF. STRUCTURAL NOTE 8.1
ALUMINUM:	REF. STRUCTURAL NOTE 9.2
BOLTS SHALL BE 3/4"ø ASTM A325 OR	REF. STRUCTURAL NOTES
TYPE 316 S.S.:	8.3 & 9.2.d
ANCHOR BOLTS SHALL BE 3/4"ø ASTM F–1554 OR	REF. STRUCTURAL NOTE 8.8
ASTM A–36 (STEEL); TYPE 316 S.S. (ALUMINUM):	
STEEL ELECTRODES SHALL CONFORM TO:	AWS 5.5 E70XX
ALUMINUM WELD FILLERS ALLOYS SHALL	
CONFORM TO:	AWS A5.10 (REF. STRUCTURAL NOTE 9.5)
SOIL BEARING CAPACITY:	REF. STRUCTURAL NOTE 3.1

LEGEND:

ENLARGED PLAN AREA, DETAIL =

CONC. WALL, PAD, ETC. =

GROUT =

GRATING =

DETAIL OR SECTION NUMBER/SHOWN ON SHEET = X.S|Y.SY

PROJECT NORTH = NORTH

ELEVATION DATUM =

ELEVATION NUMBER/SHOWN ON SHEET = X.S–YY

ELEVATIONS X'–X" (Y.YY') = X'–X" = DISTANCE TO/FROM FACILITY REFERENCE EL 0'–0"
Y.YY' = EQUIVALENT SITE EL VERTICAL DATUM

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

H. A. HOBI, P.E.
No. 59360

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

STRUCTURAL NOTES, DESIGN LOADS, CRITERIA AND LEGEND

DATE:	MARCH 2014
MCE PROJ. #	5883–0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
S1

STATUS: ISSUED FOR BID
REVISION

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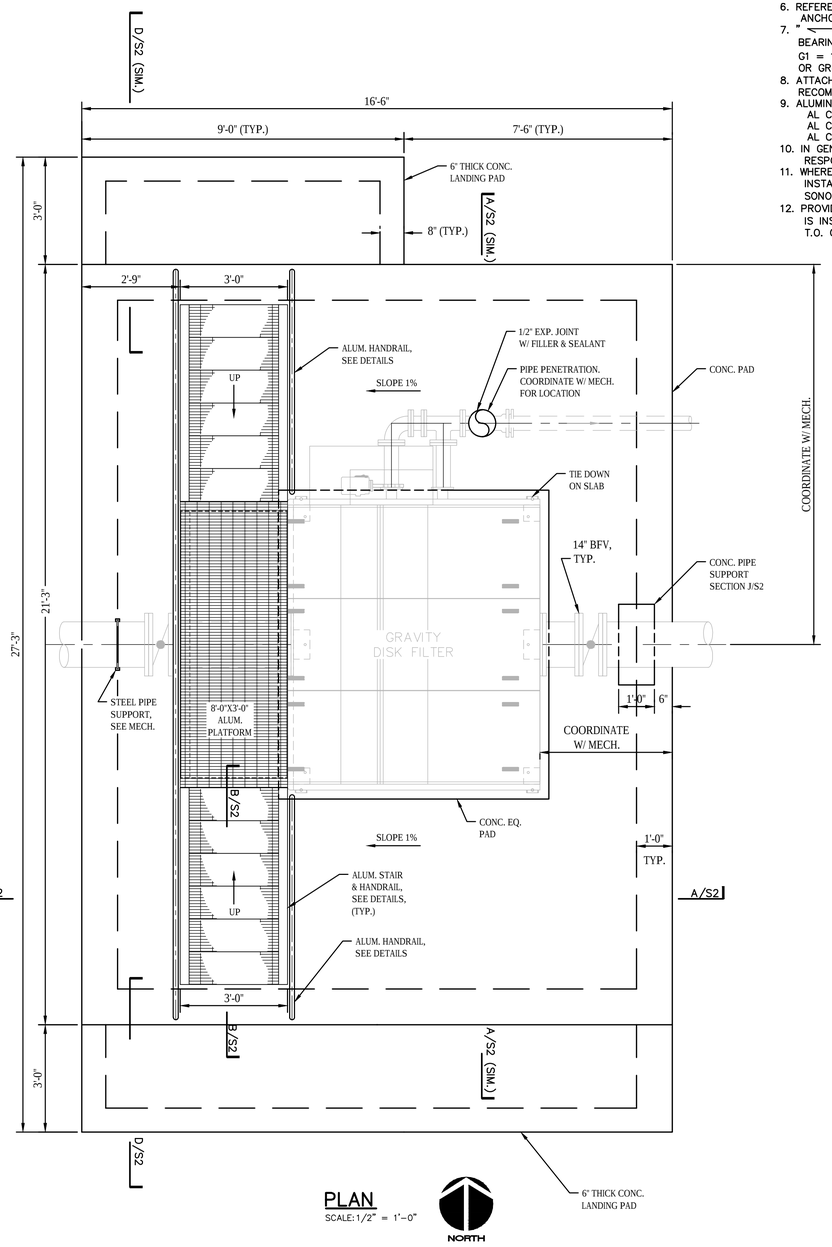
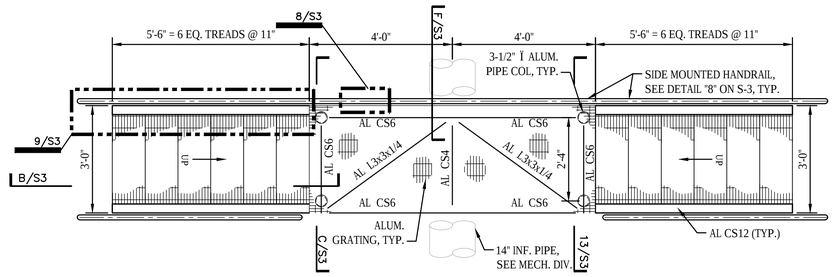
FOUNDATION PLAN NOTES:

1. REFERENCE ELEVATION FOR THE GRAVITY DISK FILTER FACILITY IS THE SLAB-ON-GRADE T.O. CONC. L.P. EL 0'-0. REFERENCE CIVIL DWGS. FOR T.O. CONC. ELEVATION.
2. REFERENCE DWG. S-0.1 FOR ADDITIONAL GENERAL NOTES & DESIGN CRITERIA.
3. FOR GRADE ELEVATION AROUND THIS STRUCTURE, REFERENCE CIVIL DRAWINGS. FOR ADDITIONAL INFORMATION.
4. PREPARE THE SUBGRADE MATERIAL BELOW THE FACILITY SLAB-ON-GRADE PER THE RECOMMENDATIONS OF THE PROJECT GEOTECHNICAL REPORT. REFERENCE DRAWING S-0.1 & PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
5. PIPE & EQUIPMENT LAYOUTS ARE SHOWN FOR GENERAL INFORMATION ONLY. REFERENCE CIVIL, ELECTRICAL, MECHANICAL & EQUIPMENT VENDOR DRAWINGS FOR LOCATIONS & INFO REGARDING SLAB PENETRATIONS, PIPING & MISCELLANEOUS EQUIPMENT EITHER SHOWN OR NOT SHOWN.
6. REFERENCE EQUIPMENT VENDOR DRAWINGS FOR COORDINATION & INSTALLATION OF ANCHORING EQUIPMENT TO T.O. CONC. SLAB.
7. " ⟷ " SYMBOL ON PLANS INDICATES SPAN DIRECTION OF GRATING MAIN BEARING BARS. GRATING IS ALUMINUM (AL) RECTANGULAR BAR U.N.O..
   G1 = 1¼ x ⅜" AL RECTANGULAR BAR GRATING (MFG's 19 "SG" SERIES SPACE PROFILE OR GREATER).
8. ATTACH GRATING TO AL SUPPORT FRAMING w/ S.S. CLIPS PER GRATE MFG's. RECOMMENDATIONS.
9. ALUMINUM FRAMING SECTIONS:
   AL CS4 = CS4x2.33 ALUMINUM ASSOCIATION STD. CHANNEL SECTION.
   AL CS6 = CS6x4.03 ALUMINUM ASSOCIATION STD. CHANNEL SECTION.
   AL CS12 = CS12x8.27 ALUMINUM ASSOCIATION STD. CHANNEL SECTION.
10. IN GENERAL FOR PLATFORM CONNECTIONS NOT SHOWN IT IS THE FABRICATOR'S RESPONSIBILITY TO PROVIDE IN THE PROJECT SHOP DRAWINGS.
11. WHERE SLAB WILL BE CONSTRUCTED TO ADJACENT CONCRETE SIDEWALK SECTIONS INSTALL EXTR. GRADE EXP. JT. MATERIAL. CAULK & SEAL THE TOP OF JOINT w/ SONOLASTIC "SL-2" POLYEURETHANE OR AN APPROVED EQUAL.
12. PROVIDE GROUT PAD IF REQ'D BY THE FILTER EQUIPMENT MFG. TO ENSURE EQUIPMENT IS INSTALLED LEVEL & w/IN MFG.'s ALLOWED TOLERANCES. GC TO FIELD COORDINATE T.O. CONC. CURB EL AS REQUIRED.



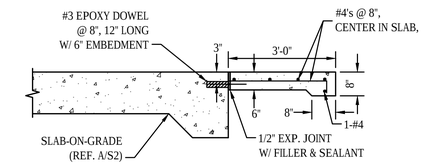
PLAN
SCALE: 1/2" = 1'-0"

NORTH

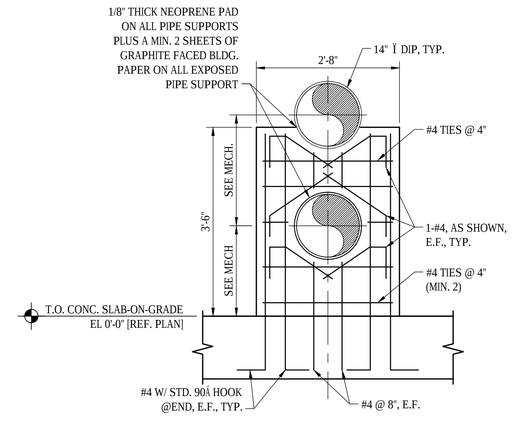


PLATFORM PLAN VIEW
SCALE: 1/2" = 1'-0"

NORTH



SECTION D/S2
SCALE: 1/2" = 1'-0"



SECTION J/S2
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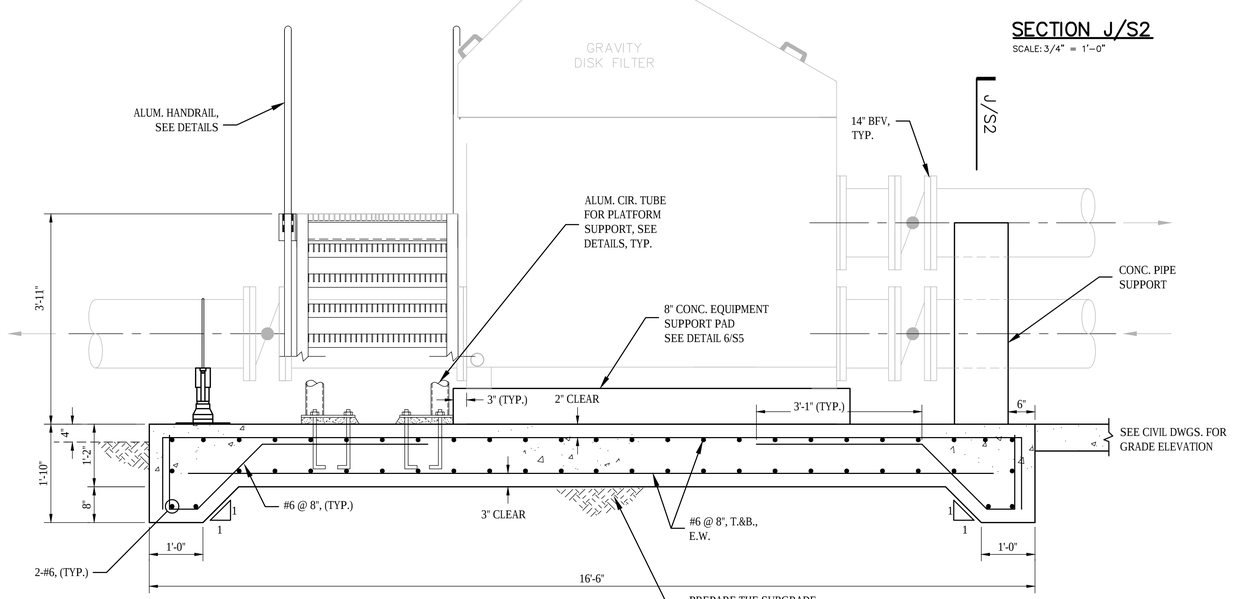

SECTION A/S2
SCALE: 3/4" = 1'-0"

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

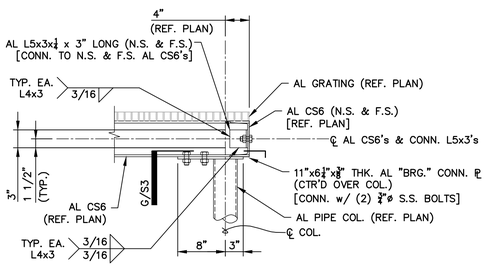
DRAWING NUMBER
S2

STATUS: ISSUED FOR BID
REVISION

S:\5883\0005\90-Drawings\Structural\S0005-5883005.dwg, 3/19/2014 1:58:26 PM, Scott Shelton

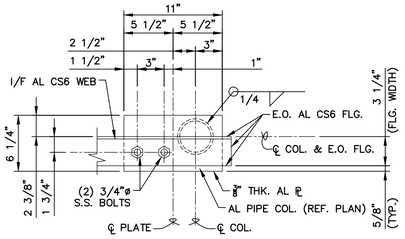
AL HAND & GUARD RAIL LAYOUT PLAN NOTES:

1. REFERENCE DWG. S1 FOR ADDITIONAL GENERAL NOTES & DESIGN CRITERIA.
2. IN GENERAL FOR PLATFORM CONNECTIONS NOT SHOWN IT IS THE FABRICATOR'S RESPONSIBILITY TO PROVIDE IN THE PROJECT SHOP DRAWINGS.
3. HAND RAIL & GUARD RAIL ASSEMBLY INFORMATION AS FOLLOWS:
   a.) PROVIDE HAND RAIL ALONG STAIR RUNS & GUARD RAIL AT PLATFORMS.
   b.) HANDRAILS DETAILS SHOWN DEPICT INTENT OF HANDRAIL INSTALLATION. HANDRAIL FABRICATOR/INSTALLER SHALL BE RESPONSIBLE FOR ADHERING TO FLORIDA BUILDING, OSHA & ADDITIONAL JURISDICTION CODES THAT MAY BE APPLICABLE. IT IS THE GENERAL CONTRACTOR'S (GC) RESPONSIBILITY TO VERIFY APPLICABLE CODES w/ THE INSPECTOR FOR THE LOCAL JURISDICTION.
   c.) HANDRAIL DETAILS SHOWN ARE 1 1/2"ø ALUMINUM POSTS AND RAILS. REFERENCE DWG. S1 GENERAL NOTES & DESIGN CRITERIA, IN ADDITION TO THE PROJECT SPECS. FOR MATERIAL REQUIREMENTS.
   d.) COORDINATE w/ MECH. DWG.s THE REQUIRED LOCATIONS OF HANDRAIL/GUARDRAIL ASSEMBLIES. GC TO VERIFY LOCATIONS w/ THE INSPECTOR FOR THE LOCAL JURISDICTION, IF APPLICABLE.
   e.) WHERE ALUMINUM MEETS CONCRETE OR DISSIMILAR METALS, BITUMASTIC OR AN APPROVED EQUAL SHALL BE APPLIED TO THE MATING SURFACE.
   f.) HANDRAIL CENTERLINE TO EDGE OF CONCRETE DIMENSION SHALL BE 6" (MIN.) U.N.O. WHERE APPLICABLE.
   g.) GAP FOR TOE PLATE ABOVE WALKING SURFACE U.N.O..
   h.) POST & HANDRAIL FABRICATOR TO PROVIDE HARDWARE AND/OR JOINTS FOR THERMAL EXPANSION / CONTRACTION AS REQ'D.



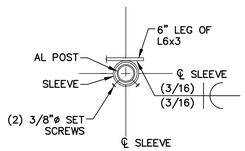
5 - DETAIL - AL PIPE COL. / AL CS6 BRG CONN. ℙ

SCALE: 1" = 1'-0"



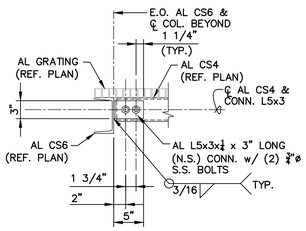
G - SECTION - AL COL. / BRG. ℙ CONN.

SCALE: 1-1/2" = 1'-0"



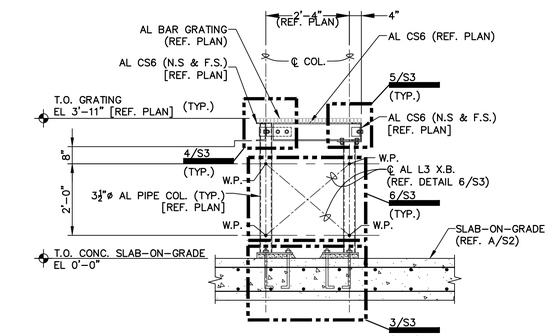
E - SECTION - AL POST C-SHAPE CONN.

SCALE: 1 1/2" = 1'-0"



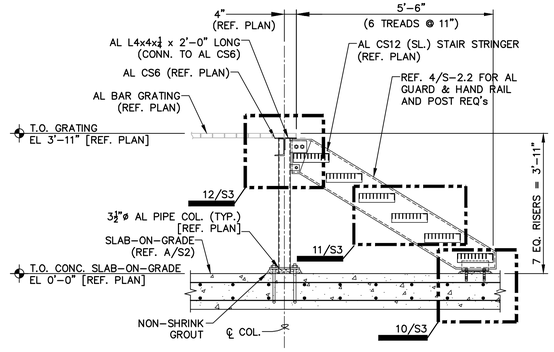
F - SECTION - AL CS6 / AL CS4 CONN.

SCALE: 1" = 1'-0"



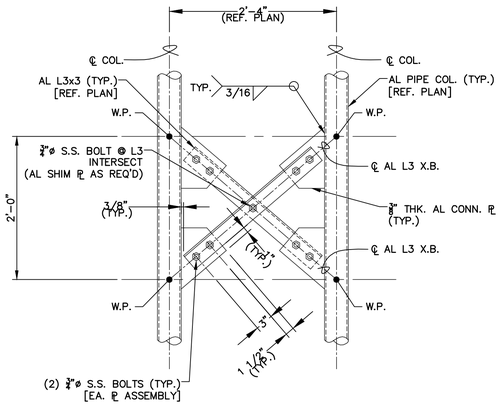
SECTION C/S3

SCALE: 1/2" = 1'-0"



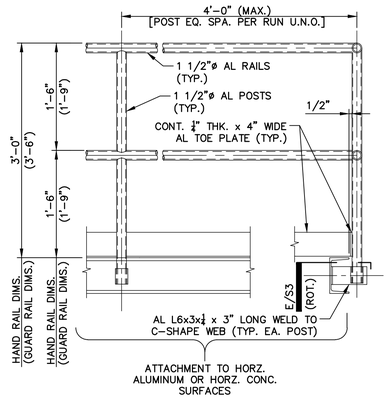
SECTION B/S3

SCALE: 1/2" = 1'-0"



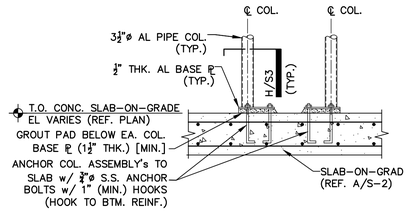
6 - DETAIL - AL PLATFORM E/W DIR. "X" BRACING

SCALE: 1" = 1'-0"



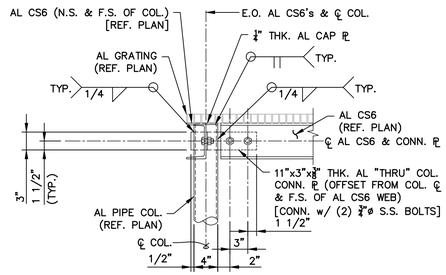
8 - DETAIL - AL HAND & GUARD RAIL / POST CONN.'s

SCALE: 1" = 1'-0"



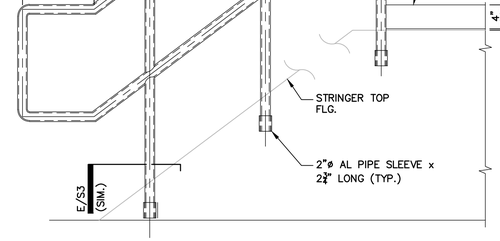
3 - DETAIL - AL COL. / SLAB CONN.'S

SCALE: 1/2" = 1'-0"



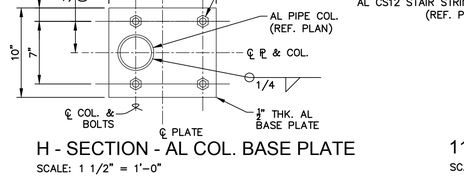
4 - DETAIL - AL PIPE COL. / AL CS6 THRU CONN. ℙ

SCALE: 1" = 1'-0"



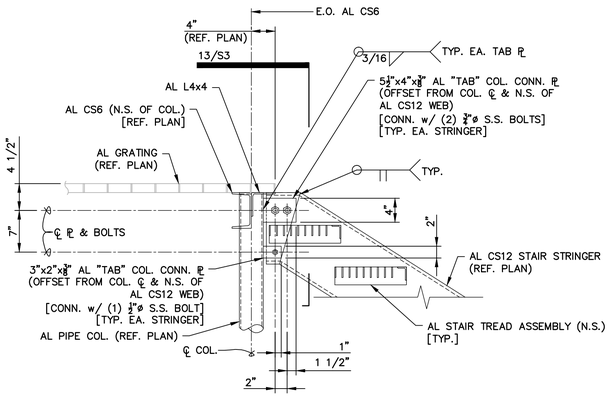
9 - DETAIL - AL RAIL STAIR STRINGER INFO

SCALE: 1" = 1'-0"



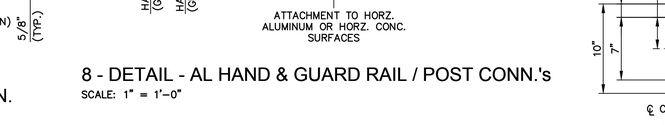
11 - DETAIL - TYP. AL STAIR INFO

SCALE: 1" = 1'-0"



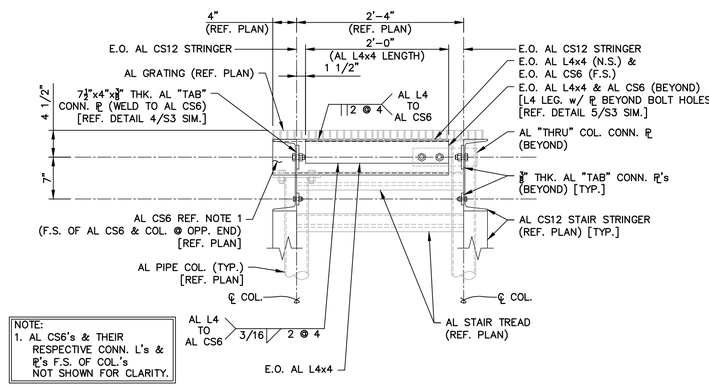
12 - DETAIL - TYP. AL PIPE COL. / STAIR AL CS12 CONN.

SCALE: 1" = 1'-0"



10 - DETAIL - TYP. AL STAIR / SLAB-ON-GRADE CONN.

SCALE: 1" = 1'-0"



NOTE:
1. AL CS6's & THEIR RESPECTIVE CONN. L's & ℙ's F.S. OF COL.'s NOT SHOWN FOR CLARITY.

13 - SECTION - AL STAIR FRMG. & GRATING SUPPORT

SCALE: 1" = 1'-0"

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER SECTIONS AND FRAMING ADDITIONAL DETAILS

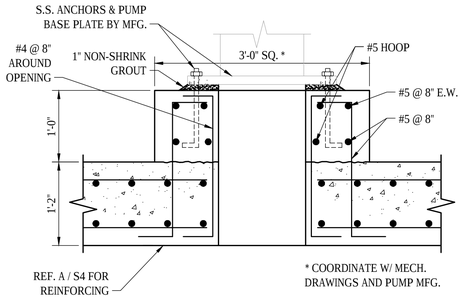
DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

DRAWING NUMBER
S3

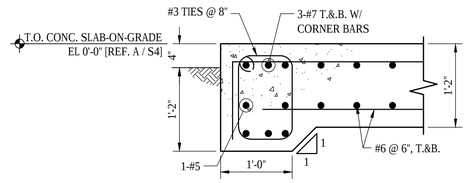
STATUS: ISSUED FOR BID
REVISION

S:\5883\Q\0005\90-Drawings\Structural\Q0002-88830000.dwg, 3/19/2014 1:38:28 PM, Quint Shelton



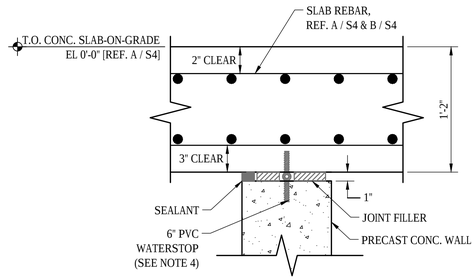
SECTION D/S4

SCALE: 1" = 1'-0"



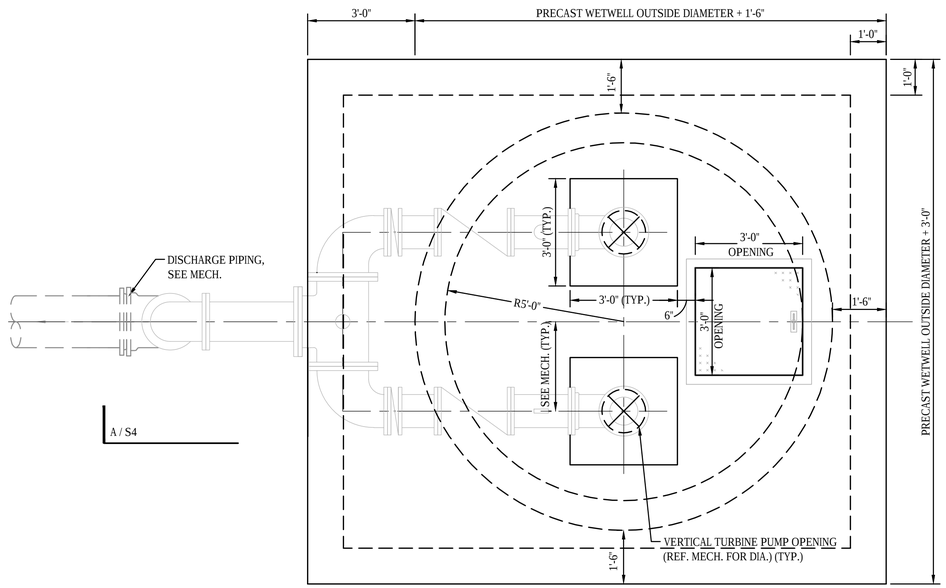
SECTION B/S4

SCALE: 1" = 1'-0"



SECTION C/S4

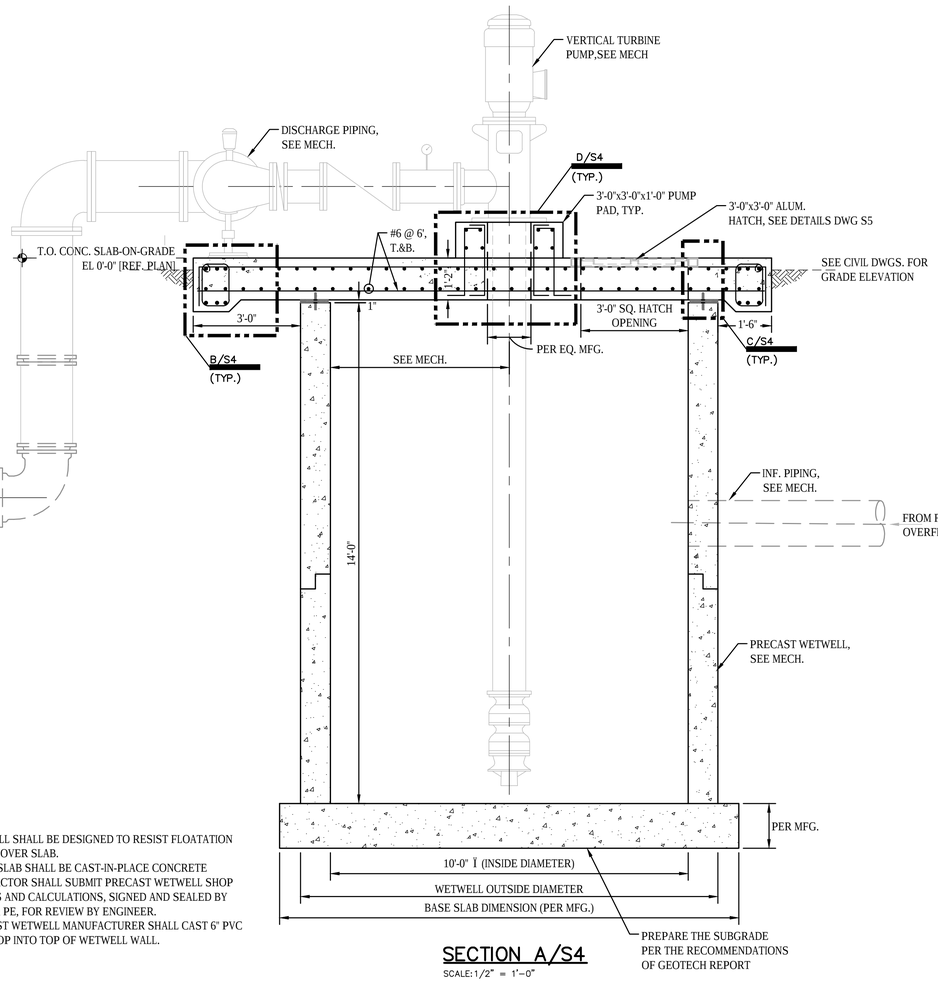
SCALE: 1-1/2" = 1'-0"



PLAN

SCALE: 1/2" = 1'-0"

NORTH



SECTION A/S4

SCALE: 1/2" = 1'-0"

NOTES:

1. WETWELL SHALL BE DESIGNED TO RESIST FLOATATION W/O THE COVER SLAB.
2. COVER SLAB SHALL BE CAST-IN-PLACE CONCRETE
3. CONTRACTOR SHALL SUBMIT PRECAST WETWELL SHOP DRAWINGS AND CALCULATIONS, SIGNED AND SEALED BY A FLORIDA PE, FOR REVIEW BY ENGINEER.
4. PRECAST WETWELL MANUFACTURER SHALL CAST 6" PVC WATERSTOP INTO TOP OF WETWELL WALL.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

TRANSFER STATION PLAN AND SECTIONS

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL:
VERTICAL:

DRAWING NUMBER
S4

STATUS: ISSUED FOR BID
REVISION

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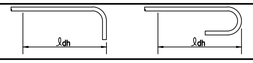
DEVELOPMENT LENGTH OF STANDARD HOOKS

FOR BARS IN TENSION
fy = 60,000 psi fc' = 4000 psi OR GREATER

BAR SIZE	DEVELOPMENT LENGTH,ℓ dh	
	BASIC	W/ CONC COVER *
#3	8"	6"
#4	10"	7"
#5	1'-0"	9"
#6	1'-2"	10"
#7	1'-5"	1'-0"
#8	1'-7"	1'-1"
#9	1'-9"	1'-3"
#10	2'-0"	1'-5"
#11	2'-2"	1'-6"

*SIDE COVER NORMAL TO PLANE OF HOOK AT LEAST 2 1/2"; AND FOR 90° HOOK END COVER BEYOND OUTSIDE END OF HOOK AT LEAST 2".



BASIC DEVELOPMENT LENGTH AND SPLICE LENGTH

FOR BARS IN COMPRESSION
fy = 60,000 psi fc' = 4000 psi OR GREATER

BASIC DEVELOPMENT LENGTH		BAR SIZE	SPLICE LENGTH	
BASIC	CONFINEMENT *		BASIC	CONFINEMENT **
8"	8"	# 3	12"	12"
10"	8"	# 4	1'-3"	13"
1'-0"	9"	# 5	1'-7"	1'-4"
1'-3"	1'-0"	# 6	1'-11"	1'-7"
1'-5"	1'-1"	# 7	2'-2"	1'-10"
1'-7"	1'-3"	# 8	2'-6"	2'-1"
1'-9"	1'-4"	# 9	2'-10"	2'-4"
2'-0"	1'-6"	# 10	3'-2"	2'-7"
2'-2"	1'-8"	# 11	3'-6"	2'-10"

* BAR ENCLOSED WITHIN SPIRALS OF NOT LESS THAN 1/4 INCH DIAMETER AND NOT MORE THAN 4 INCH PITCH OR WITHIN #4 TIES IN CONFORMANCE WITH ACI 318, SECTION 7.10.5 AT NOT MORE THAN 4 INCHES ON CENTER, FACTOR 0.75 USED.

** BAR ENCLOSED WITHIN TIES PER ACI 350-01 SECTION 12.17.2.4.

BASIC DEVELOPMENT LENGTH AND SPLICE LENGTH

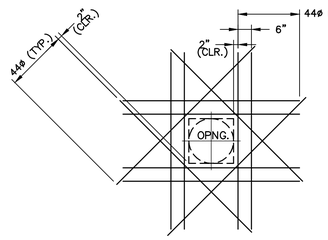
FOR BARS IN TENSION
fy = 60,000 psi fc' = 4000 psi OR GREATER, NORMAL WEIGHT CONCRETE

BASIC DEVELOPMENT LENGTH ** ℓd				BAR SIZE	CLASS B SPLICE LENGTH ** 1.3 x ℓ d			
CLEAR SPACING ≥2db		CLEAR SPACING <2db			CLEAR SPACING ≥2db		CLEAR SPACING <2db	
BASIC	TOP *	BASIC	TOP *		BASIC	TOP *	BASIC	TOP *
1'-3"	1'-7"	1'-10"	2'-4"	# 3	1'-7"	2'-0"	2'-4"	3'-0"
1'-7"	2'-1"	2'-5"	3'-1"	# 4	2'-1"	2'-8"	3'-1"	4'-0"
2'-0"	2'-7"	3'-0"	3'-10"	# 5	2'-7"	3'-4"	3'-10"	5'-0"
2'-5"	3'-1"	3'-7"	4'-8"	# 6	3'-1"	4'-0"	4'-8"	6'-0"
3'-6"	4'-6"	5'-2"	6'-9"	# 7	4'-6"	5'-10"	6'-9"	8'-9"
4'-0"	5'-2"	6'-0"	7'-9"	# 8	5'-2"	6'-8"	7'-9"	10'-0"
4'-6"	5'-9"	6'-8"	8'-8"	# 9	5'-9"	7'-6"	8'-8"	11'-3"
4'-11"	6'-5"	7'-5"	9'-8"	# 10	6'-5"	8'-4"	9'-8"	12'-6"
5'-5"	7'-1"	8'-2"	10'-8"	# 11	7'-1"	9'-2"	10'-8"	13'-9"

* TOP REINFORCEMENT IS HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE REINFORCEMENT.

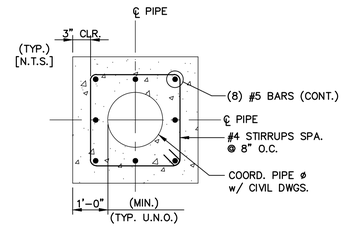
** LENGTHS SHOWN IN CHART SHALL BE MODIFIED WHERE REQUIRED TO CONFORM TO THE PROVISIONS OF ACI 318, SECTION 12.2.

4 - SCHEDULE - REINF. BAR SPLICE REQUIREMENTS
SCALE: N.T.S.



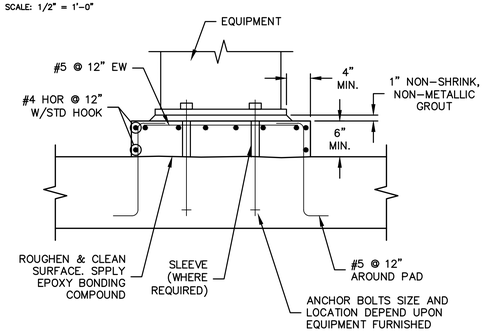
NOTES:
1. USE THIS DETAIL FOR PENETRATIONS 8" OR LARGER. FOR SMALLER OPENINGS BEND BARS IN FIELD PER ACI 350 LATEST EDITION.
2. PLACE EXTRA BARS OF THE SAME SIZE AS THE INTERRUPTED BARS AT EACH SIDE OF OPENINGS. QUANTITY OF EXTRA BARS AT EACH SIDE SHALL EQUAL HALF THE QUANTITY OF INTERRUPTED BARS, EXCEPT WHERE NOTED OTHERWISE. PROVIDE ONE DIAGONAL BAR EACH SIDE OF OPENING, SIZE TO BE EQUAL TO MAIN REINFORCING. (TYP. EA. FACE).
3. ø SYMBOL = BAR DIAMETERS.

2 - DETAIL-TYP. RENIF. @ SLAB / WALL OPNG
SCALE: 3/8" = 1'-0"

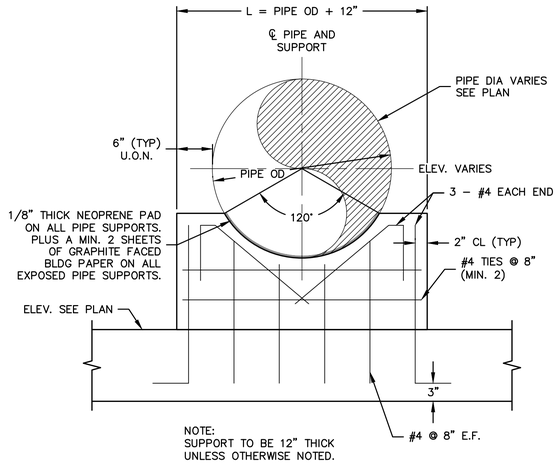


8"Ø (MIN.)

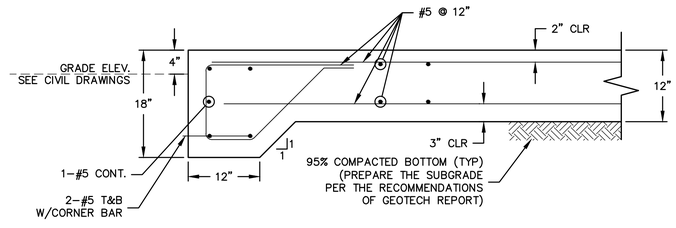
3- DETAIL - TYP. CONC.ENCASED PIPE
SCALE: 1/2" = 1'-0"



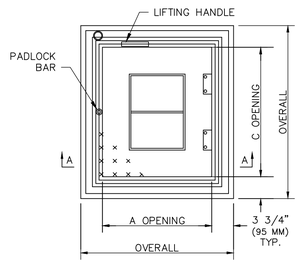
6- DETAIL - TYP. EQUIPMENT SUPPORT PAD
SCALE: NTS



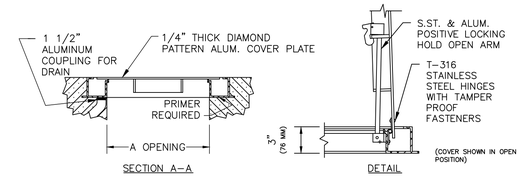
1- DETAIL - TYP. PIPE SUPPORT DETAIL
SCALE: NTS



5- DETAIL - TYP. EQUIPMENT PAD
SCALE: NTS



STANDARD FEATURES:
- AUTO-LOCK T-316 STAINLESS STEEL HOLD OPEN ARM WITH RELEASE HANDLE
- T-316 STAINLESS STEEL HINGES AND ATTACHING HARDWARE
- NON-CORROSIVE LOCKING BAR
- SINGLE LEAF CONSTRUCTION
- 300 LBS. PER SQ. FT. LOAD RATING
- EXTRUDED ALUMINUM CHANNEL FRAME
- RECESSED LIFTING HANDLE
- LIFETIME GUARANTEE



3- DETAIL - TYP. CONC.ENCASED PIPE
SCALE: 1/2" = 1'-0"

HATCH SCHEDULE

HATCH DETAILS TAKEN FROM HALLIDAY PRODUCTS

HATCH	LOCATION DESCRIPTION	SHEET NO.	OPENING DIMENSIONS LxW	TYPE	QUANTITY	COMMENTS
	TRANSFER STATION	S4	3'-0"x3'-0"	SINGLE	1	ALUMINUM HATCH (HALLIDAY PRODUCT OR EQUAL)

NOTE:
1) DRAIN HATCH TO DAY LIGHT

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

STRUCTURAL SECTIONS AND DETAILS

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NA
VERTICAL: NA

DRAWING NUMBER
S5

STATUS: ISSUED FOR BID
REVISION

S:\5883\0005\Bn-Drawings\Structural\S0005-5883S0005.dwg, 3/19/2014 1:08:37 PM, Quint Shelton

C/M2

B/M2

NORTH

D/M2

B/M2

LIGHTS (TYP)
SEE ELECTRICAL SHEETS

CONTROL PANEL
(SEE ELECTRICAL
FOR DETAILS)

AL 3' WALKWAY,
HANDRAIL AND STAIRS
SEE STRUCTURAL
DRAWINGS

PROPOSED CONC. PAD
(SEE STRUCTURAL DRAWINGS)

4" FL TEE W/ BF

4" FL TEE

4" FL 90° BEND

TO BACKWASH
PUMP STATION

TIE DOWN ON
EQUIPMENT PAD

14"x12" FL
REDUCER

12" PLUG

14" PLUG

12" FL
90° BEND

14" FL 90° BEND

14" MJ TEE

14" PLUG

14" FL BFV

14" FL BFV

GRAVITY DISK FILTER
(SEE SPECIFICATIONS)

14" FL 90° BEND

14" MJ TEE

TYPE 7
PIPE SUPPORT

3'

12" MJ TEE

CONCRETE PIPE
SUPPORT
(SEE STRUCTURAL
DRAWINGS)

TO TRANSFER
PUMP STATION

14" DI EFFLUENT

3' MIN. (TYP.)

14" MJxPE
90° BEND

P.F.

TO 1" RCW
SEE SHEET C1

BACKWASH PUMP

12" INFLUENT

3'

3'

14" OVERFLOW

A/M2

A/M2

C/M2

D/M2

CONTROL PANEL
(SEE ELECTRICAL FOR DETAILS)

PLAN
SCALE: 3/4" = 1'-0"

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

DRAWING NUMBER
M1

STATUS: ISSUED FOR BID
REVISION

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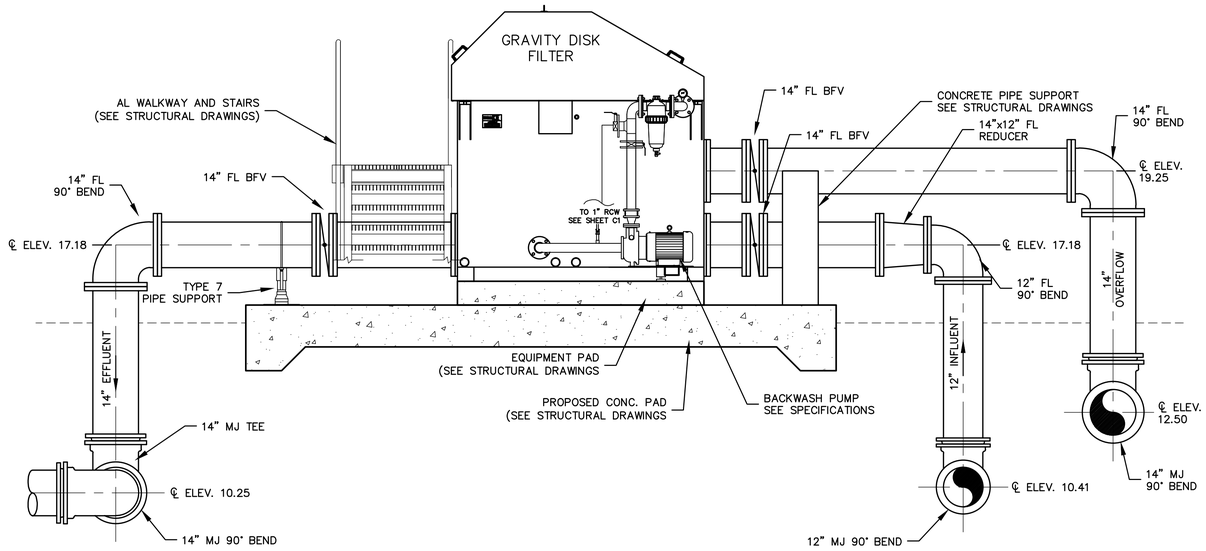
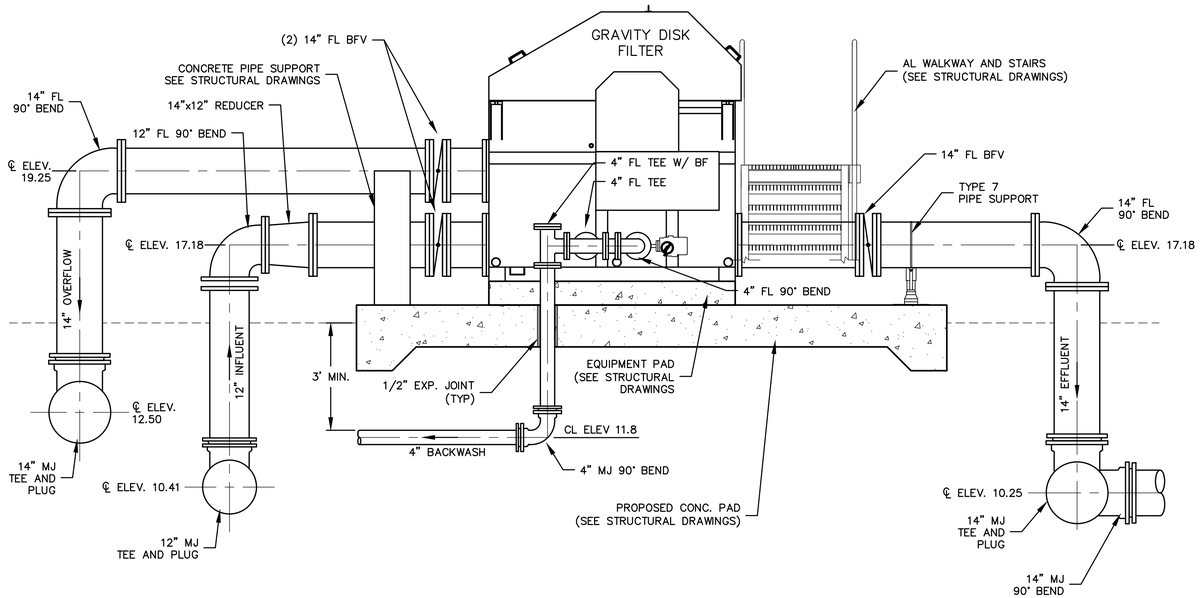


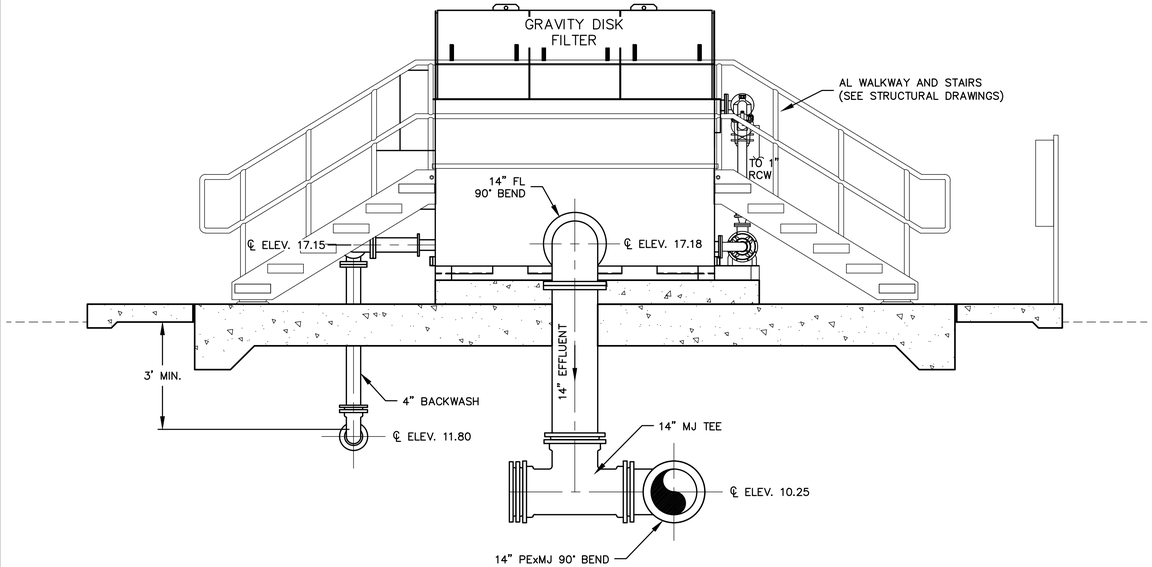
SECTION A/M1

SCALE: 3/8" = 1'-0"



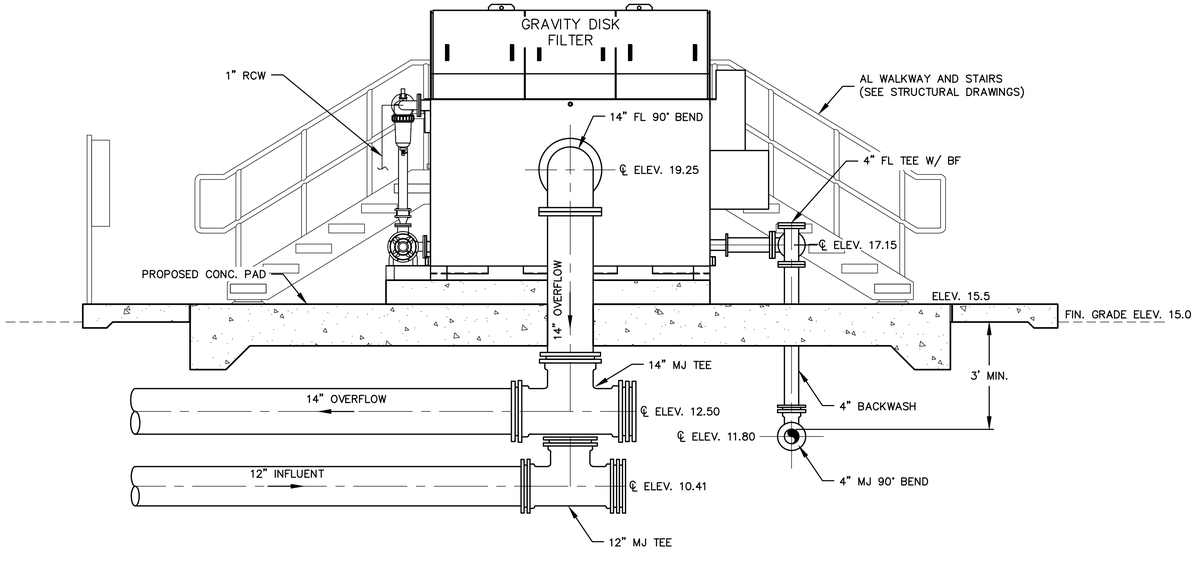
SECTION B/M1

SCALE: 1/2" = 1'-0"



SECTION C/M1

SCALE: 1/2" = 1'-0"



SECTION D/M1

SCALE: 1/2" = 1'-0"

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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EB0006691
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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER SECTIONS

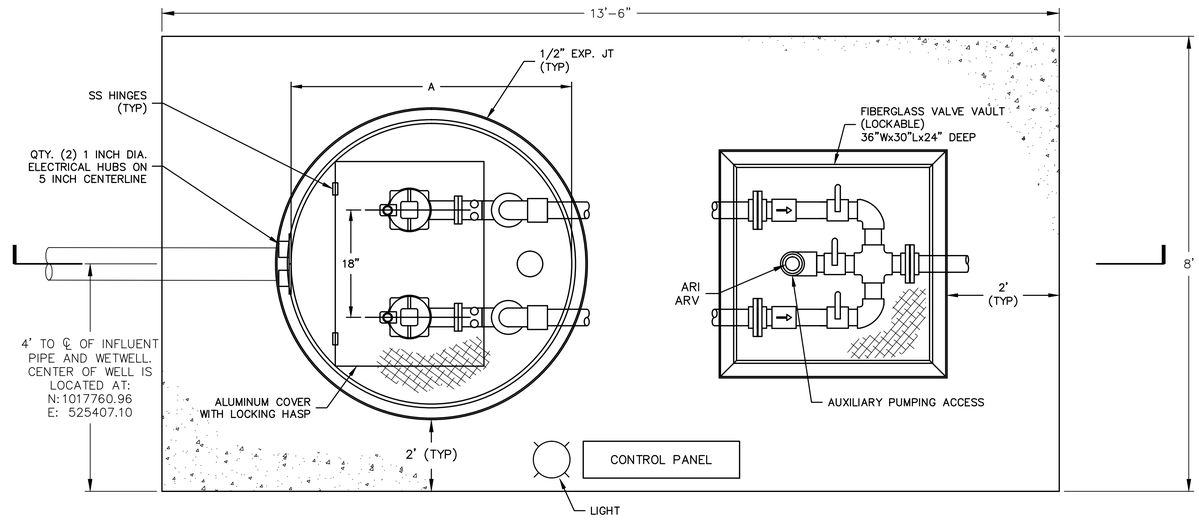
DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

DRAWING NUMBER
M2

STATUS: ISSUED FOR BID
REVISION

S:\5883\0005\04-Drawings\Mechanical\M1\01-5883005.dwg, 3/19/2014 11:58:42 PM, Quint Shelton

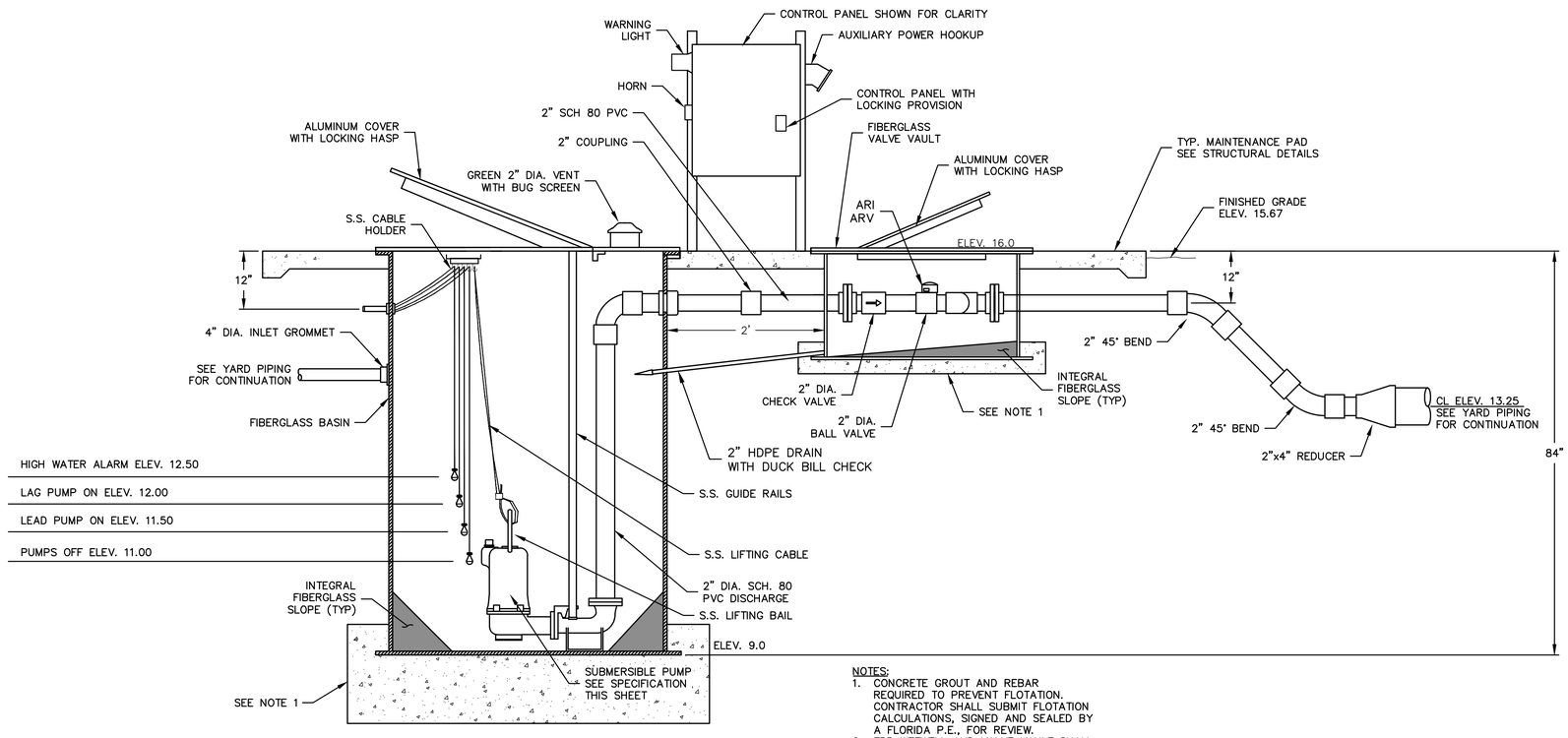


PLAN

PUMP SPECIFICATIONS	
PUMPS REQUIRED	2
MANUFACTURER	HYDROMATIC
MODEL NUMBER	HPGF500M4-4
PUMP SIZE	2" DISCHARGE
CAPACITY EACH (GPM)	80 GPM
TOTAL HEAD (FEET)	70 Ft. TDH
IMPELLER DIAMETER	9.5"
MOTOR HP REQUIRED	5.0 HP
SPEED (RPM)	1750 RPM
ELECTRICAL	460V/3PH/60Hz

WETWELL	
A (DIA.)	B (HEIGHT)
36"	72"
[48"]	[84"]
60"	96"
OTHER _____	108"
	120"
	OTHER

PUMP DATA



SECTION

NOTES:
1. CONCRETE GROUT AND REBAR REQUIRED TO PREVENT FLOTATION. CONTRACTOR SHALL SUBMIT FLOTATION CALCULATIONS, SIGNED AND SEALED BY A FLORIDA P.E., FOR REVIEW.
2. FRP WETWELL AND VALVE VAULT SHALL BE AS MANUFACTURED BY LF MANUFACTURING INC. OR APPROVED EQUAL.
3. THE HATCHES SHALL BE IN ACCORDANCE TO SPECIFICATION 5531 ACCESS HATCHES.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER BACKWASH PUMP STATION PLAN AND SECTION

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
M3

STATUS: ISSUED FOR BID
REVISION

S:\5883\12000\(6)-Drawings\Mechanical\M8WP5101-58830005.dwg, 3/19/2014 1:38:48 PM, Quint Shelton

NOTES:

1. THE CONTRACTOR SHALL SUBMIT FOR REVIEW A DEWATERING PLAN FOR THE STORAGE POND RETURN PUMP STATION WET WELL. THE WET WELL IS DIRECTLY CONNECTED TO THE 35 MG RCW STORAGE POND. THE EXISTING 20" KNIFE GATE LOCATED IN THE WET WELL SHALL BE REPLACED AS A PART OF THIS CONTRACT AND CAN NOT BE UTILIZED AS A MEANS OF ISOLATION.

2. THE CONTRACTOR SHALL PROVIDE A TEMPORARY BYPASS PUMPING SYSTEM THAT INCLUDES PUMPS, PIPING, CONTROLS, POWER AND ALL APPURTENANCES REQUIRED FOR A COMPLETE SYSTEM WITH FIRM PUMPING CAPACITY OF 1 MGD. THE BYPASS PUMPING SYSTEM WILL BE IN PLACE AND READY PRIOR TO BEGINNING ANY WORK WITHIN THE WET WELL.

3. THE CONTRACTOR SHALL REMOVE THE EXISTING PUMPS TO BE CLEANED AND TURNED OVER TO THE CITY. THE CONTRACTOR SHALL REPLACE THE PUMPS IN ACCORDANCE WITH SPECIFICATION 11304 NON-CLOG SUBMERSIBLE PUMPS.

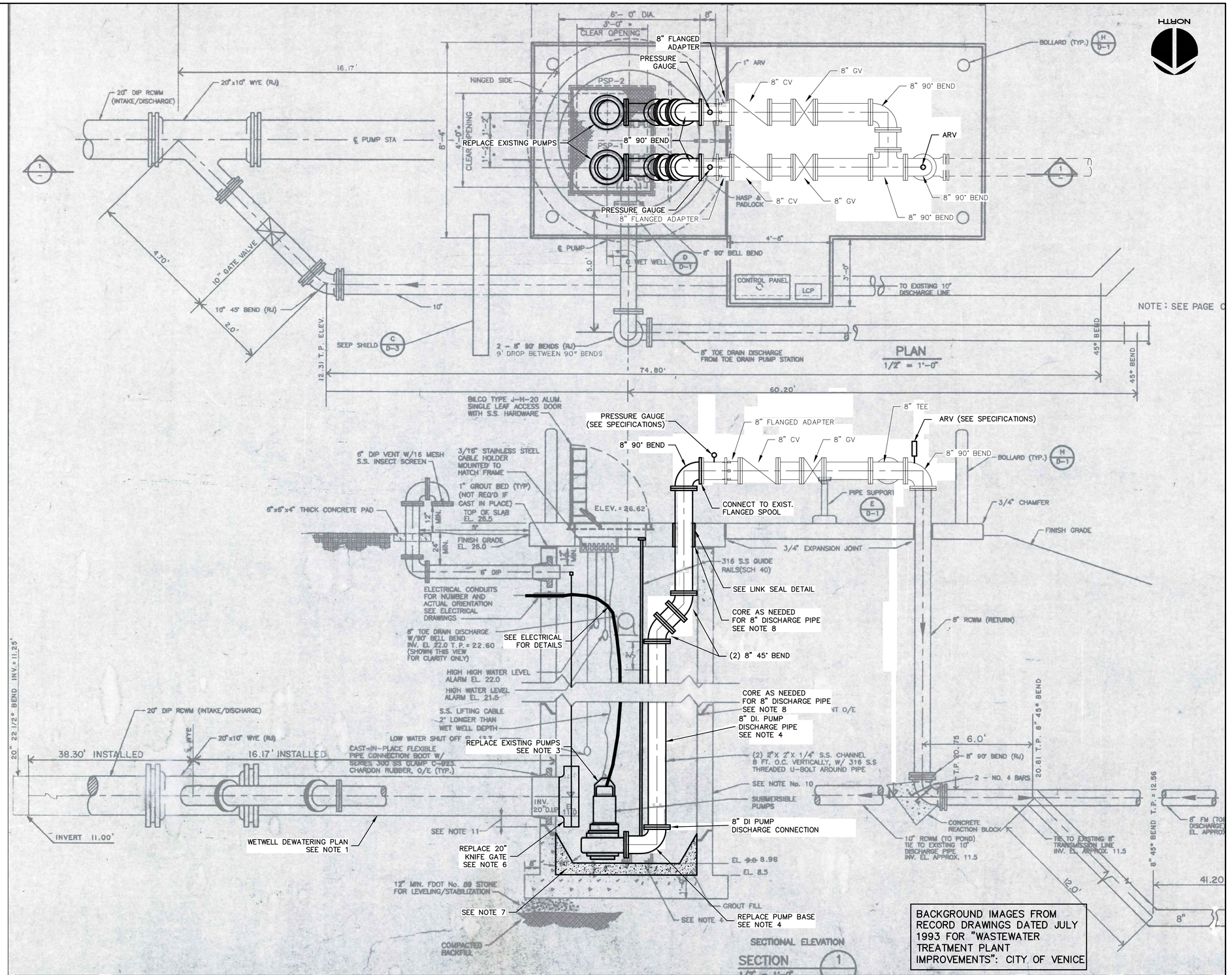
4. THE CONTRACTOR SHALL REMOVE THE EXISTING 6" DISCHARGE HEADERS FROM THE 6" X 8" REDUCING 90° BEND THROUGH AND INCLUDING THE PUMP BASES AND REPLACE WITH 8" HEADERS AS SHOWN. THE NEW PUMP BASE SHALL BE PROVIDED AND INSTALLED PER THE PUMP MANUFACTURER'S RECOMMENDATIONS.

5. THE CONTRACTOR SHALL REMOVE THE EXISTING PUMP GUIDERAILS. THE CONTRACTOR SHALL PROVIDE AND INSTALL NEW 316 SS SCH 40 GUIDE RAILS PER THE PUMP MANUFACTURER'S SPECIFICATIONS.

6. THE CONTRACTOR SHALL REMOVE THE EXISTING 20" KNIFE GATE, STEM AND WALL MOUNTED GUIDES. THE CONTRACTOR SHALL PROVIDE AND INSTALL A NEW 20" KNIFE GATE PER THE SPECIFICATIONS WITH 316 SS STEM AND 316 SS WALL MOUNTED GUIDES.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MINOR REPAIRS TO THE EXISTING WET WELL, GROUT AND COATINGS. THE CONTRACTOR SHALL INSPECT AND CLEAN THE WET WELL PRIOR TO PERFORMING IMPROVEMENTS AND REPORT TO THE CITY ALL DAMAGE CONSIDERED STRUCTURAL OR SIGNIFICANT IN NATURE.

8. THE CONTRACTOR SHALL CORE DRILL THE TOP SLAB FOR THE 8" DISCHARGE PIPE. THE CORE OPENING SHALL BE OF APPROPRIATE SIZE TO ACCOMMODATE THE DISCARGE HEADER AND LINK SEAL.



BACKGROUND IMAGES FROM RECORD DRAWINGS DATED JULY 1993 FOR "WASTEWATER TREATMENT PLANT IMPROVEMENTS": CITY OF VENICE

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

EXISTING STORAGE POND RETURN PUMP STATION MODIFICATIONS

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
M4

STATUS: ISSUED FOR BID
REVISION

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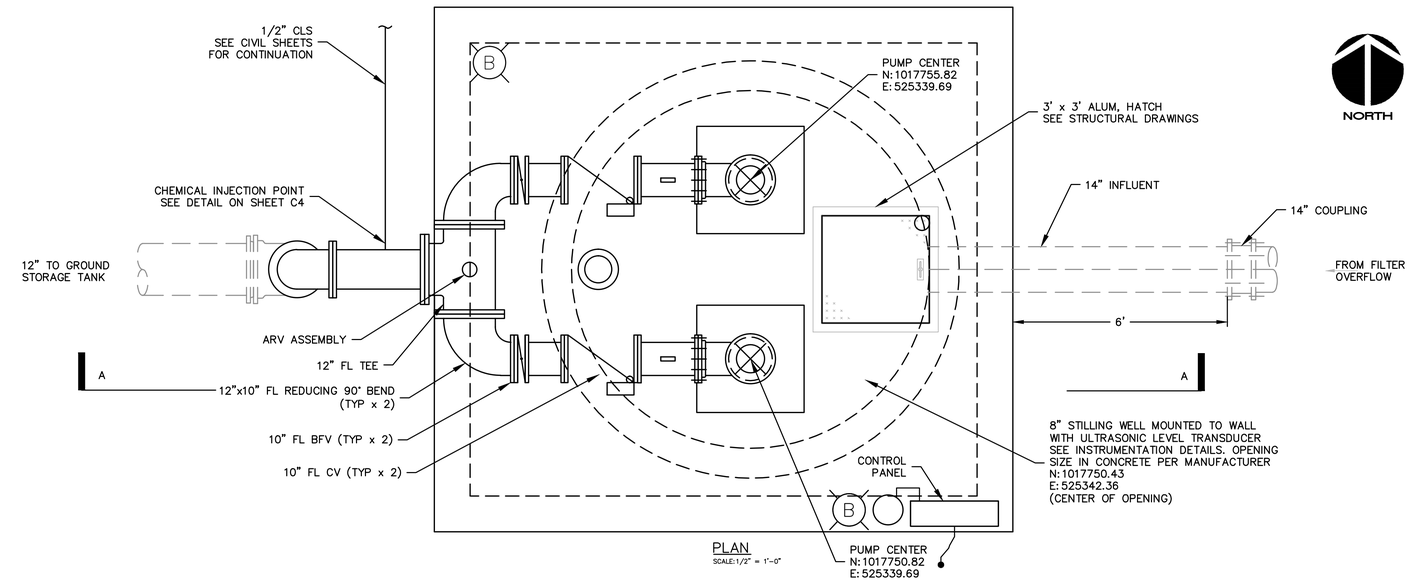
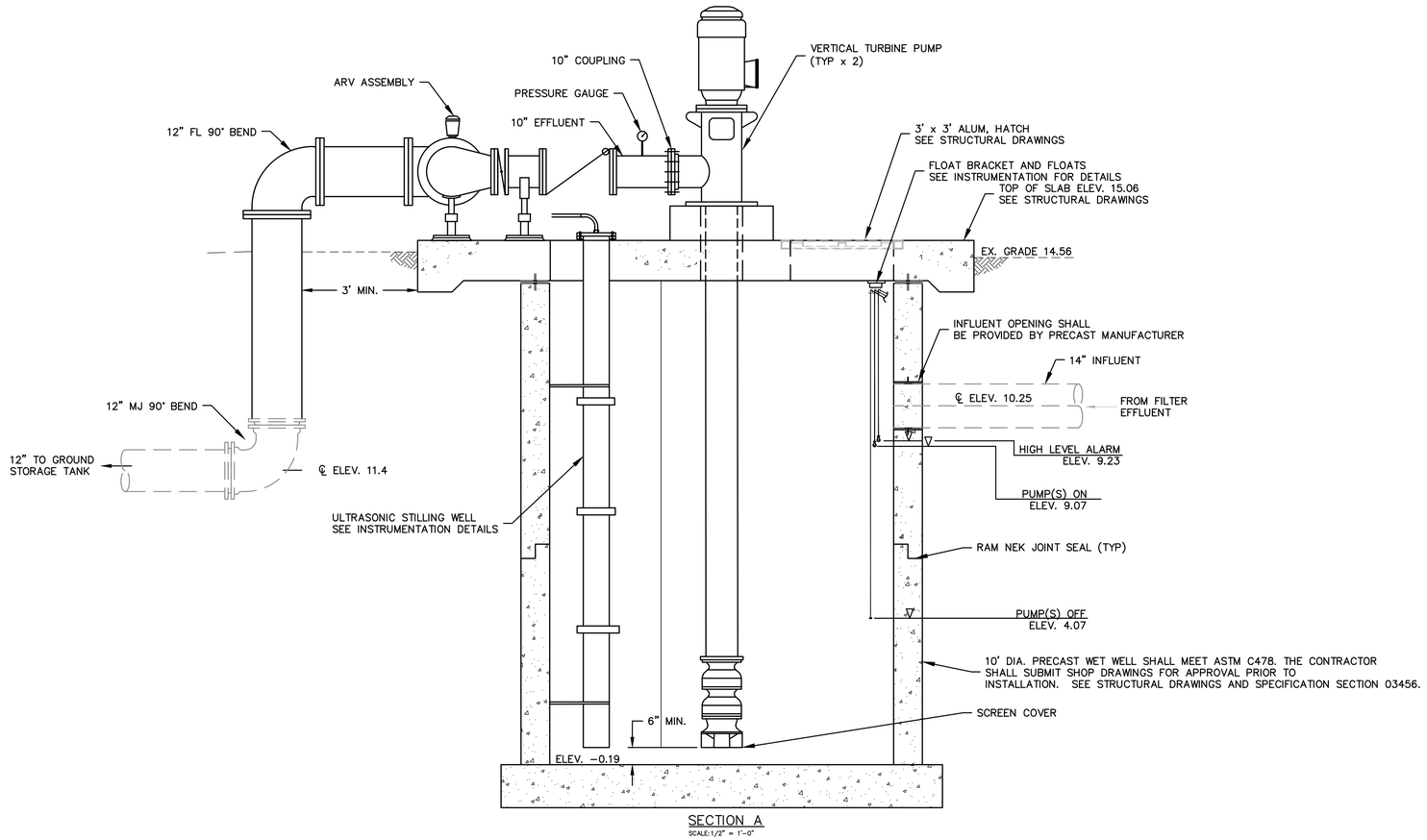


PLAN
SCALE:1/2" = 1'-0"



SECTION A
SCALE:1/2" = 1'-0"

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

TRANSFER STATION PLAN AND SECTION

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1/2" = 1'-0"
VERTICAL: NA

DRAWING NUMBER
M5

STATUS: ISSUED FOR BID
REVISION

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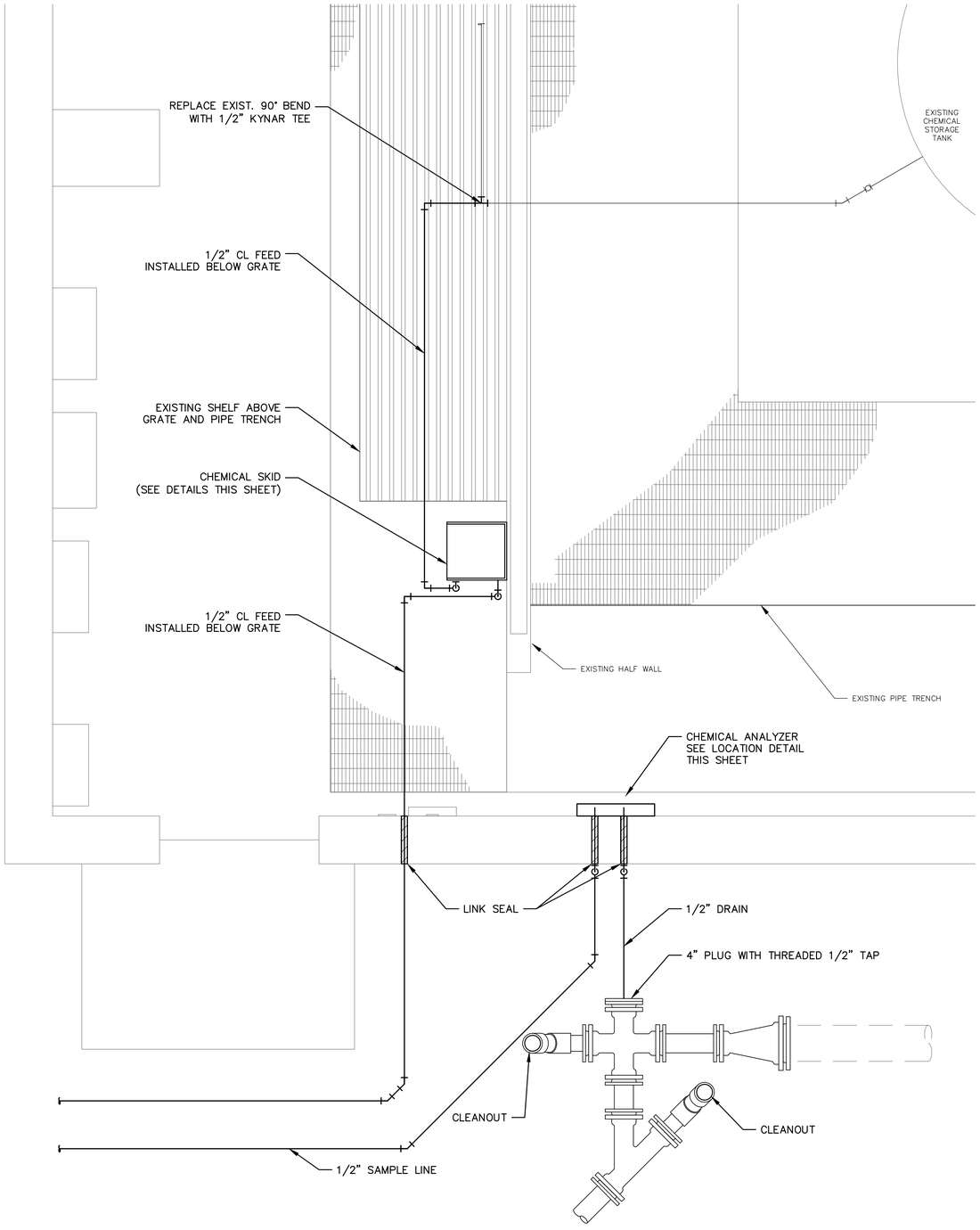
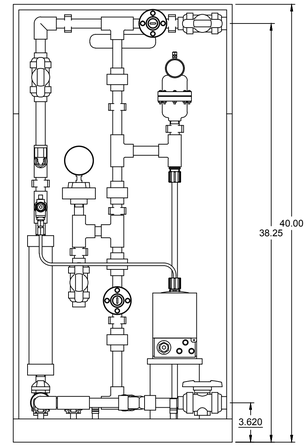
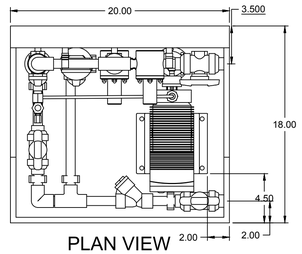


CHEMICAL BUILDING

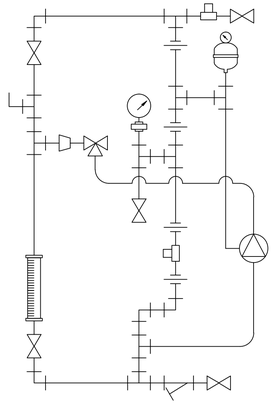
SCALE: 3/4" = 1'



FRONT VIEW



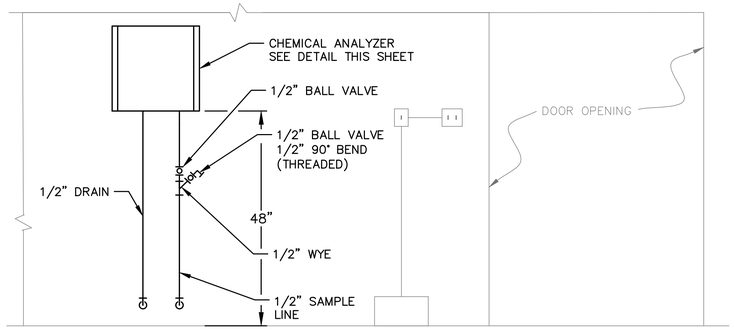
PLAN VIEW



PIPING SCHEMATIC

SIMPLEX CHEMICAL FEED SKID

NOT TO SCALE



CHEMICAL ANALYZER LOCATION DETAIL

SCALE: 3/4" = 1'

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
M6

STATUS: ISSUED FOR BID
REVISION

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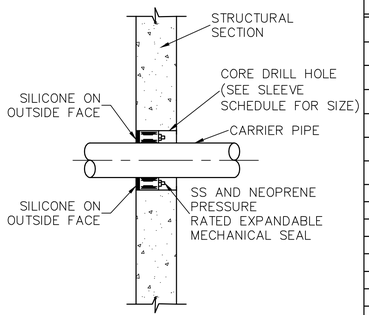
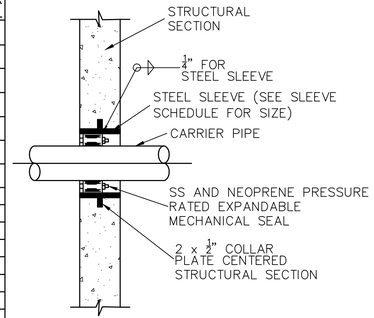


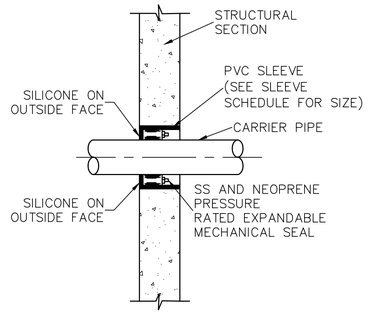
TYPE 1

SLEEVE SCHEDULE				
CARRIER PIPE			STEEL SLEEVE INSIDE DIAMETER (INCHES)	CORE DRILLED HOLE INSIDE DIAMETER (INCHES)
NOMINAL DIAMETER INCHES	MATERIAL	OUTSIDE DIAMETER INCHES		
1/2	SCH. 80 PVC	0.84	2.067	2
3/4	SCH. 80 PVC	1.05	2.067	3.0
1	SCH. 80 PVC	1.315	2.469	2.5
1 1/2	SCH. 80 PVC	1.90	4.026	4
2	SCH. 80 PVC	2.38	4.026	4
3	SCH. 80 PVC	3.50	5.047	5
4	SCH. 80 PVC	4.5	6.065	6
6	D.I.	9.60	10.02	10
8	D.I.	9.05	12.0	12
10	D.I.	11.10	13.25	14
12	D.I.	13.20	15.25	16
16	D.I.	17.40	19.25	20
18	D.I.	19.50	23.25	24
24	D.I.	25.80	29.25	30
36	D.I.	38.30	43.25	43
42	D.I.	44.50	47.25	48

NOTE:
INSTALL SEALS FROM DRY SIDE OF PENETRATION. WET SIDE FILLED WITH WATERPROOF NON-SHRINK GROUT.



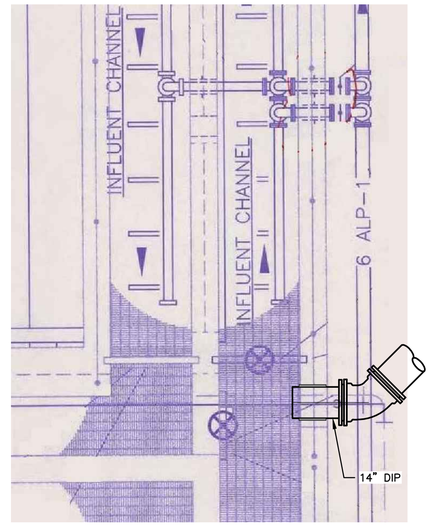
TYPE 2



TYPE 3

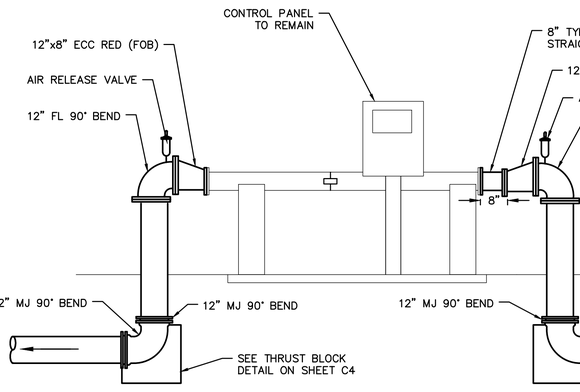
LINK SEAL WALL PENETRATION

NOT TO SCALE



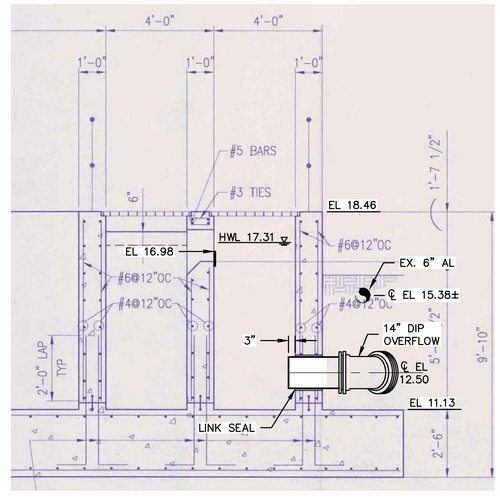
ABW PLAN

SCALE: 3/8"" = 1'-0"



8" RETROFITTED METER ASSEMBLY IMPROVEMENTS

SCALE: NTS



ABW SECTION

SCALE: 3/8"" = 1'-0"

BACKGROUND IMAGES FROM CONFORMED DRAWINGS DATED JANUARY 2001 FOR "EASTSIDE WASTEWATER TREATMENT PLANT EXPANSION": CITY OF VENICE

REV.NO.	DESCRIPTIONS	DATE

REVISIONS

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

MECHANICAL DETAILS

DATE:	MARCH 2014
MCE. PROJ. #	5883-0005
DRAWN	QES
DESIGNED	MSL
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

DRAWING NUMBER
M7

STATUS: ISSUED FOR BID
REVISION

S:\5883\0005\90-Drawings\Mechanical\MD5M01.01-58830005.dwg, 3/24/2014 12:15:08 PM, Quin Shelton

FUNCTION SYMBOL SCHEDULE

	FIRST LETTER		SUCCEEDING–LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	Analysis		Alarm		
B	Burner, Combustion		Programmer		
C	Conductivity (Electrical)			Control	Closed
D	Density or Specific Gravity	Differential			
E	Voltage		Sensor (Primary Element)	Eduction	
F	Flow Rate	Ratio (Fraction)			
G	Gaging		Glass, Viewing Device		
H	Hand				High
I	Current (Electrical)		Indicate		
J	Power	Scan			
K	Time, Time Schedule			Control Station	
L	Level		Light (Pilot)		Low
M	Motor				Middle, Intermediate
N	Vibration				
O	Operation	Offset	Orifice, Restriction		Open
P	Pressure, Vacuum		Point (Test) Connection		
Q	Quantity, Event	Integrate, Totalize	Integrate		
R	Radiation		Record, Print	Regulate	
S	Speed, Frequency	Safety		Switch	
T	Temperature			Transmit	
U	Multivariable	Trend	Multifunction	Multifunction	Multifunction
V	Viscosity	Vacuum		Valve, Damper, Louver, Gate	
W	Weight, Force, Torque		Well		
X	Unclassified		Unclassified	Unclassified	Unclassified
Y				Relay, Compute, Convert	
Z	Position			Final Control Element	Drive, Actuator, Unclassified Final Control Element

BASIC SYMBOLS

MULTIPLE FUNCTION

OR — FIELD MOUNTED INSTRUMENT OR DEVICE

OR — FRONT OF PANEL MOUNTED INSTRUMENT ON UCP OR MCC, VFD

OR — REAR OF PANEL MOUNTED INSTRUMENT ON UCP OR MCC, VFD

OR — FRONT OF PANEL MOUNTED INSTRUMENT ON MAIN PANEL

OR — REAR OF PANEL MOUNTED INSTRUMENT ON MAIN PANEL

OR — PLC AND/OR COMPUTER SOFTWARE COMPONENT (OPERATOR ACCESSIBLE UNDER NORMAL CONDITIONS)

OR — PLC AND/OR COMPUTER GENERATED COMPONENT (NOT OPERATOR ACCESSIBLE UNDER NORMAL CONDITIONS)

OR — PLC INPUT/OUTPUT

LINE CODES

- INSTRUMENT SIGNAL
- ELECTRICAL SIGNAL
- DATA LINK
- PNEUMATIC
- CAPILLARY
- SONIC OR R.F.
- HYDRAULIC
- TELEPHONE
- NO ELECTRICAL CONNECTION
- ELECTRICAL CONNECTIONS (INDICATED BY DOTS)
- HEAT TRACED PROCESS
- LINE OR EQUIPMENT
- MATCHLINE
- SHEET — PROCESS LINE OR ELECTRICAL SIGNAL CONTINUATION TO/FROM SHEET NUMBER INDICATED
- CONTINUATION ON SAME SHEET
- CONTINUATION ON FACILITIES NOT SHOWN ON DRAWINGS

VALVES, PUMPS & METERS

- FLAME ARRESTOR
- PINCH VALVE
- GATE
- NEEDLE
- BUTTERFLY
- BALL OR ROTARY
- GLOBE
- PLUG OR COCK
- DIAPHRAGM
- CHECK
- DIAPHRAGM CHECK
- CONTROL VALVE / POSITIONER
- PRESSURE REGULATING VALVE
- BACKPRESSURE REGULATING VALVE
- PISTON OPERATED S=SOLENOID OPERATED M=MOTOR OPERATED P=PNEUMATIC OPERATED
- DRAIN
- Y=WEIR GATE T=SLIDE SLUICE GATE I =STOP LOG
- BLIND FLANGE
- PULSATION DAMPENER
- PRESSURE RELIEF OR SAFETY
- 3–WAY
- 4–WAY
- TELESCOPING
- REDUCER
- HOSE CONNECTION
- WAFER/CHECK VALVE
- UNION

VALVES, PUMPS & METERS (CONT'D)

- FLOAT SWITCH OR FLOAT
- (ARV) AIR RELEASE VALVE (ARVV) AIR VACUUM RELEASE VALVE
- ELECTRIC MOTOR
- ORIFICE/ANNUBAR
- PADDLE WHEEL FLOW METER
- POSITIVE DISPLACEMENT METER
- CAPACITANCE METER
- REGULATOR/FILTER
- SUBMERSIBLE PUMP
- MAGNETIC METER (INLINE/INSERT)
- ULTRASONIC METER
- VENTURI OR FLOW TUBE
- PROPELLER OR TURBINE METER
- DOPPLER OR TRANSIT TIME FLOW METER
- ROTAMETER
- PROGRESSIVE CAVITY PUMP
- CENTRIFUGAL PUMP
- VERTICAL TURBINE PUMP
- WELL PUMP
- POSITIVE DISPLACEMENT PUMP
- DIAPHRAGM OR METERING PUMP
- EDUCTOR
- STRAINER
- DIAPHRAGM ISOLATOR
- HORN
- GRADUATED MEASURING CYLINDER
- LATERAL WYE
- RUPTURE DISK
- RESTRAINED FLEX CONN.
- FLEX CONN.
- FILTER AIR/WATER
- CENTRIFUGAL BLOWER
- POSITIVE DISPLACEMENT BLOWER
- MIXER
- SUBMERSIBLE AERATOR/MIXER (ELECTRIC MOTOR DRIVEN)

MISCELLANEOUS SYMBOLS

- PURGE CONNECTION
- SAMPLE POINT
- INTERLOCK
- MULTIPLY
- DIVIDE
- HIGH SELECT
- LOW SELECT
- SQUARE ROOT
- SUM (ALGEBRAIC)
- SPECIAL FUNCTION
- R+B — RATIO PLUS BIAS
- dL/dt — RATE OF RISE (LEVEL)

EQUIPMENT NOTATION

B = BLOWER OR FAN
E = ENGINE
G = GENERATOR
F = FILTER
GS = GRINDER/SCREEN
K = COMPRESSOR
H = HOIST
ME = MECHANICAL EQUIPMENT
MX = MIXER
P = PUMP
R = HEAT EXCHANGER
T = TANK OR SUMP

VALVE DESIGNATIONS

HV = HAND VALVE
FCV = FLOW CONTROL VALVE
PRV = PRESSURE REGULATING VALVE
LCV = LEVEL CONTROL VALVE
FV = FLOW VALVE (NON–MODULATING)
(MODULATING)
MV = MUD VALVE
TV = TELESCOPING VALVE
CV = CHECK VALVE
MOV = MOTOR OPERATED VALVE

INSTRUMENT TAG NOTATION

FIC 0 1 01 A

- A — INSTRUMENT QUANTITY SUFFIX
- 01 — INSTRUMENT NUMBER
- 1 — PROCESS AREA
- 0 — PLANT AREA
- FIC — ISA INSTRUMENT FUNCTION

VALVE OPERATION NOTATION

EFC = ELECTRIC FAIL CLOSE
AFC = AIR FAIL CLOSE
EFO = ELECTRIC FAIL OPEN
AFO = AIR FAIL OPEN
AFS = AIR FAIL STATIC
EFS = ELECTRIC FAIL STATIC

CONTROLLER NOTATION

PV = PROCESS VARIABLE INPUT
SP = SET POINT INPUT
C = CONTROL OUTPUT

PLC NOTATIONS

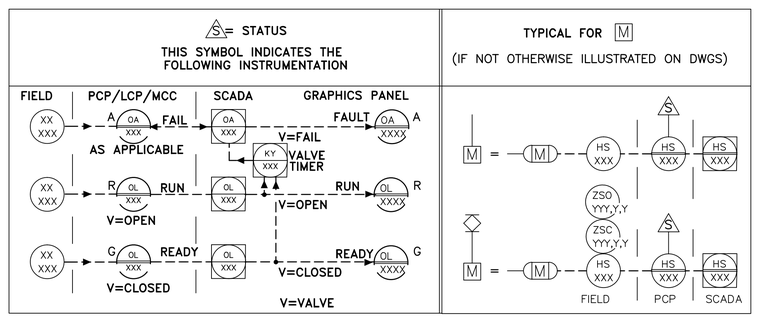
AI = ANALOG INPUT
AO = ANALOG OUTPUT
DI = DISCRETE INPUT
DO = DISCRETE OUTPUT
D/A = DISCRETE TO ANALOG CONVERTOR
SSDC = SURGE SUPPRESSION DEVICE

HAND SWITCH NOTATION

HOA = HAND–OFF–AUTO
S/S = START/STOP
SEL = SELECTOR
O/C = OPEN/CLOSE
O/O = ON/OFF
LOS = LOCKOUT–START
D/S = DUTY/STANDBY
FOS = FAST–OFF–SLOW
OAC = OPEN–AUTO–CLOSE
OOCA = OPEN–OFF–CLOSE–AUTO
ROF = REVERSE–OFF–FORWARD
ROL = RAISE–OFF–LOWER
F/R = FORWARD/REVERSE
HOR = HAND–OFF–REMOTE
LOR = LOCAL–OFF–REMOTE
SAR = SILENCE–AUTO–RESET

MISCELLANEOUS NOTATIONS

S/D = SHUTDOWN
O/R = OVERRIDE
MCC = MOTOR CONTROL CENTER
VFD = VARIABLE FREQUENCY DRIVE
UCP = UNIT CONTROL PANEL
LCP = LOCAL CONTROL PANEL
MCP = MASTER CONTROL PANEL
ES = ELECTRICAL SUPPLY
IS = INLET SILENCER
DS = DISCHARGE SILENCER
SEQ = SEQUENCER/ALTERNATOR
SA = SURGE ARRESTOR
DO = DISSOLVED OXYGEN
ETM = ELAPSED TIME METER
TURB = TURBIDITY
US = ULTRASONIC



REVISIONS

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RCW FILTRATION SYSTEM IMPROVEMENTS

INSTRUMENTATION & CONROL GENERAL NOTES, LEGENDS AND ABBREVIATIONS

DATE:	MARCH 2014
MCE PROJ. #	5883–0005
DRAWN	NMH
DESIGNED	NMH
CHECKED	MDT
PROJ. MGR.	MSL

SCALE
HORIZONTAL:
VERTICAL: NA

DRAWING NUMBER: I1

STATUS: ISSUED FOR BID
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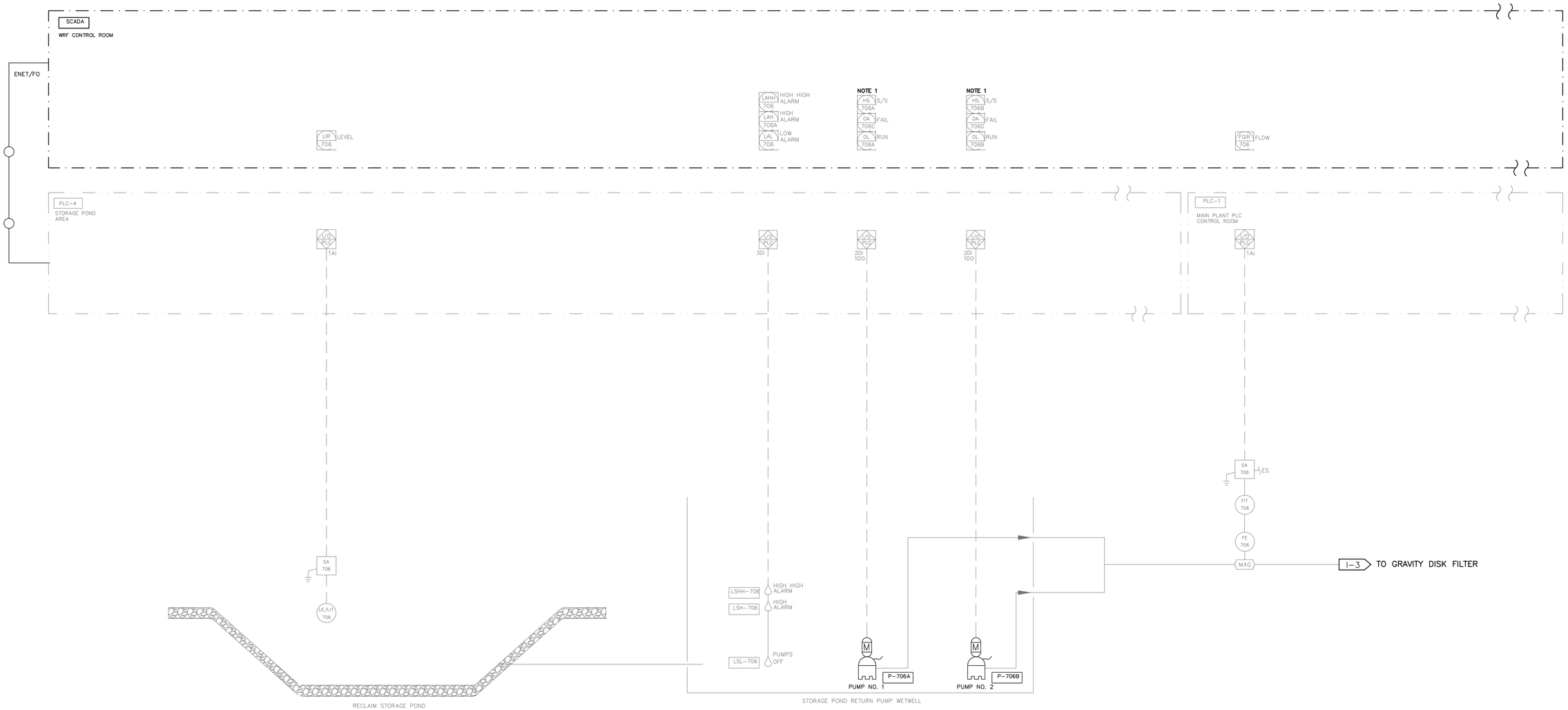

NOTES:
1. EXISTING FUNCTIONALITY OF RETURN PUMP STATION TO BE MODIFIED SUCH THAT THE STATION IS SHUT DOWN ON TRANSFER PUMP STATION WETWELL HIGH LEVEL ALARM.

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CITY OF VENICE
EASTSIDE WRF RCW FILTRATION SYSTEM IMPROVEMENTS
PROCESS & INSTRUMENTATION DIAGRAM EXISTING STORAGE POND RETURN PUMPING STATION

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
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I2

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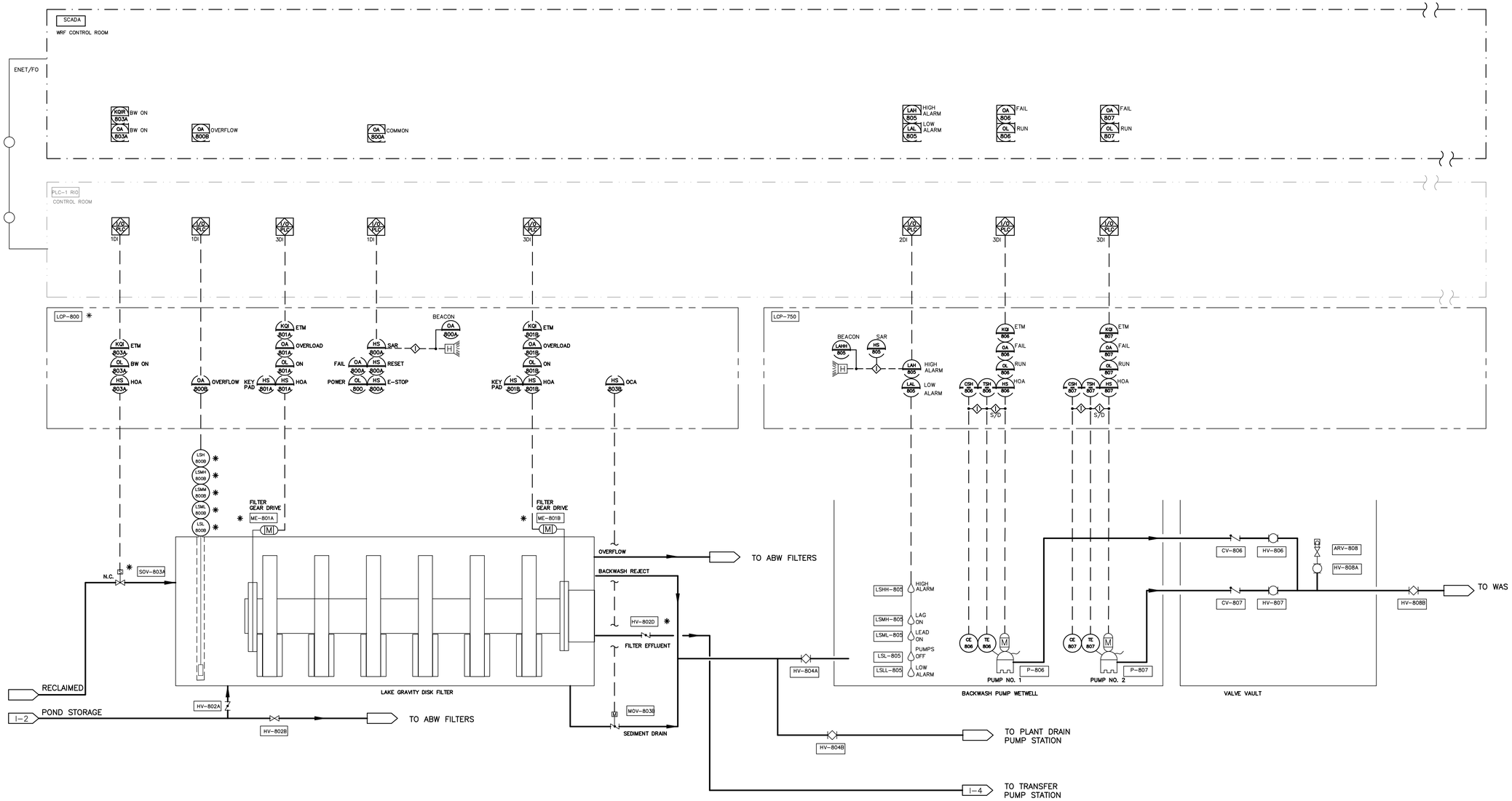

NOTES:
1. ALL EQUIPMENT DESIGNATED WITH ASTERISK (*) TO BE PROVIDED BY LAKE GRAVITY DISK FILTER EQUIPMENT SUPPLIER.

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EASTSIDE WRF RCW FILTRATION SYSTEM IMPROVEMENTS
PROCESS & INSTRUMENTATION DIAGRAM GRAVITY DISK FILTER AND BACKWASH PUMP STATION

DATE:	MARCH 2014
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SCALE
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VERTICAL: NA

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I3

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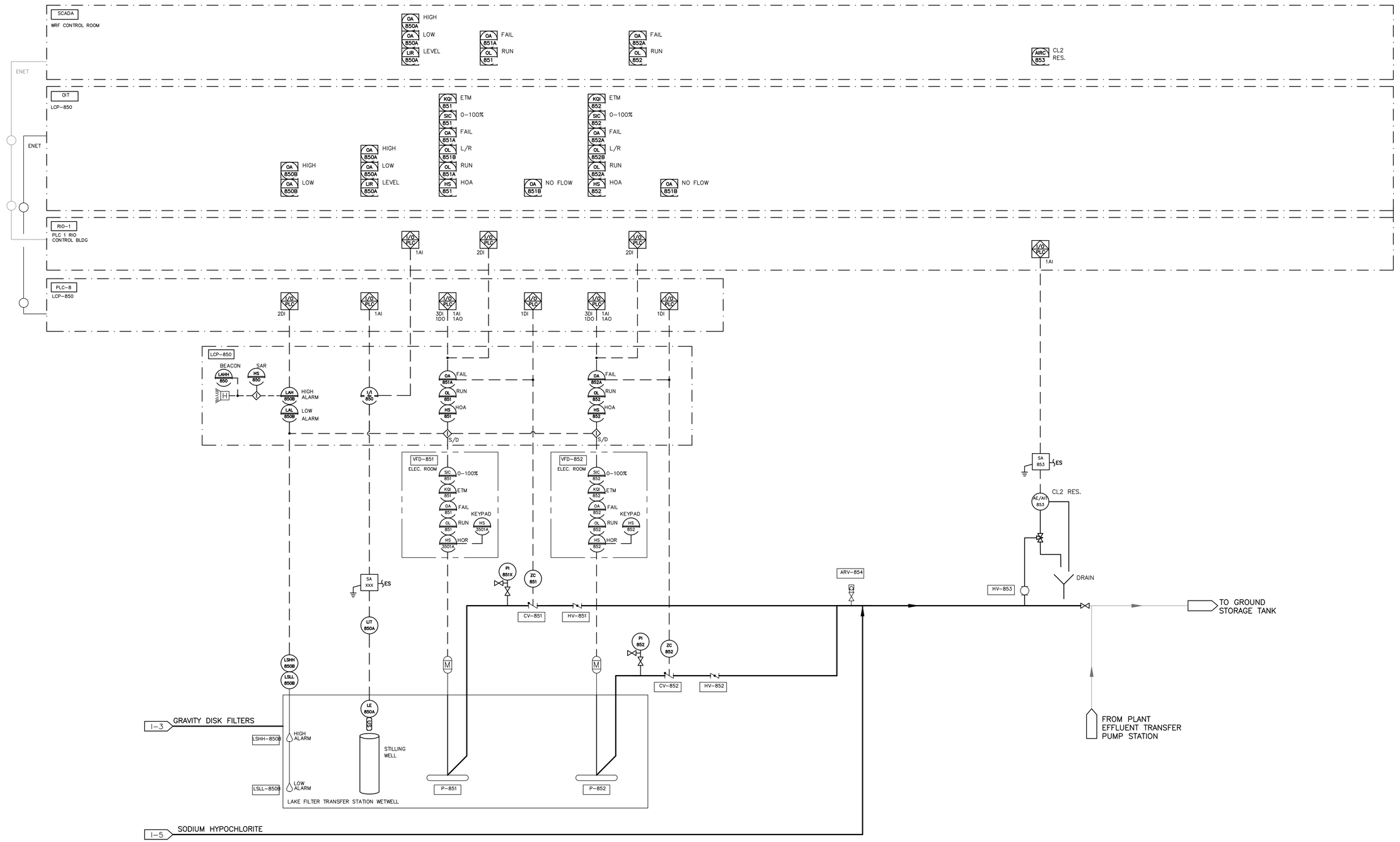

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EASTSIDE WRF RCW FILTRATION SYSTEM IMPROVEMENTS
PROCESS & INSTRUMENTATION DIAGRAM LAKE FILTER TRANSFER PUMP STATION

DATE:	MARCH 2014
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SCALE
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VERTICAL: NA

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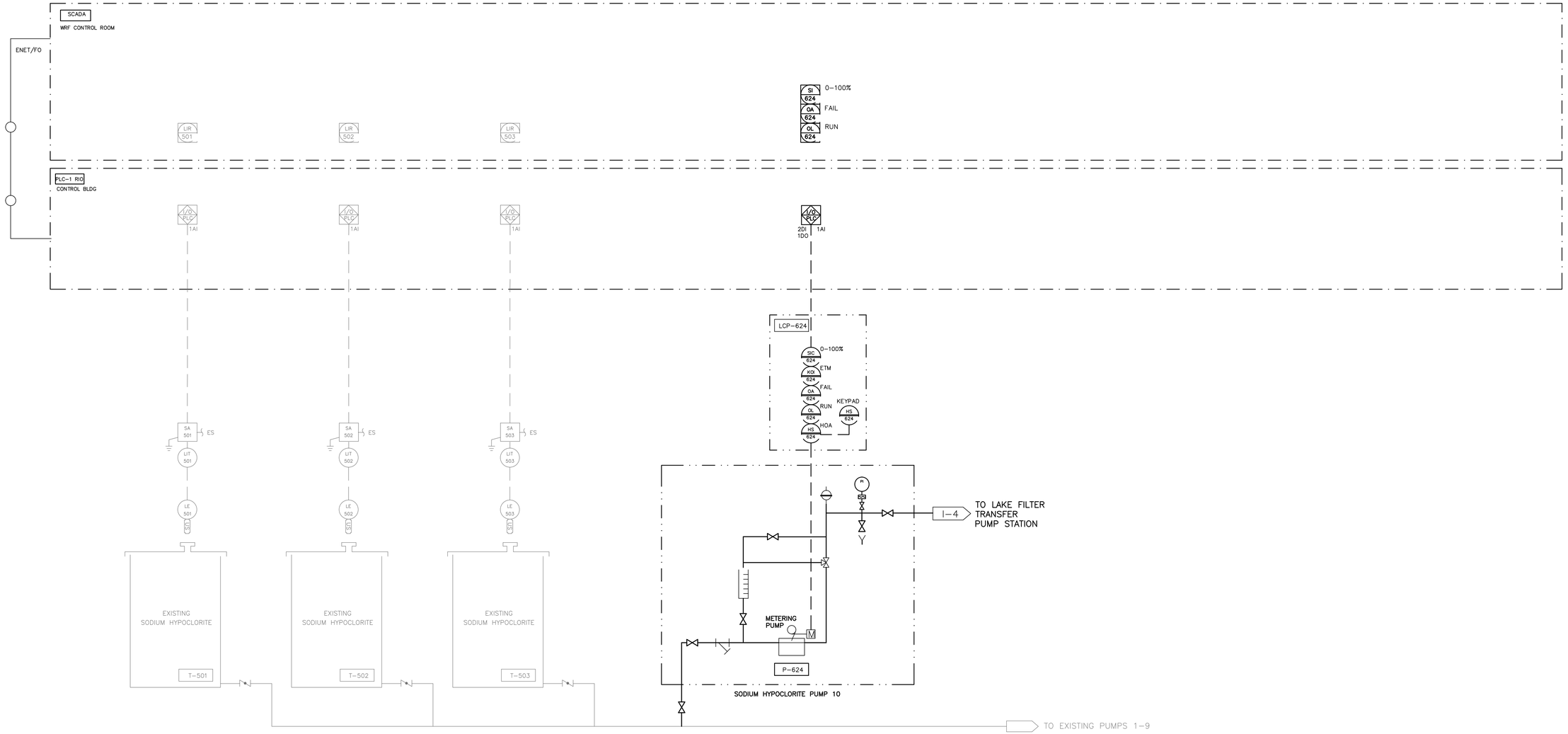

NOTES:
1. IN AUTO MODE, PUMP OPERATES WHEN EITHER TRANSFER PUMP IS RUNNING USING SPEED SET AT VFD.

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PROCESS & INSTRUMENTATION DIAGRAM CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM

DATE:	MARCH 2014
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VERTICAL: NA

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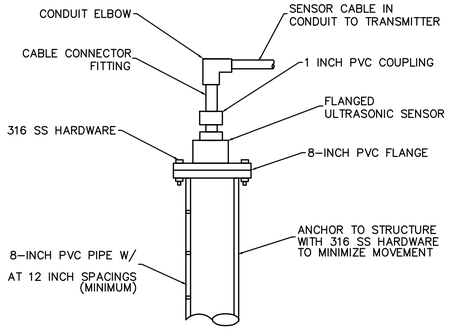
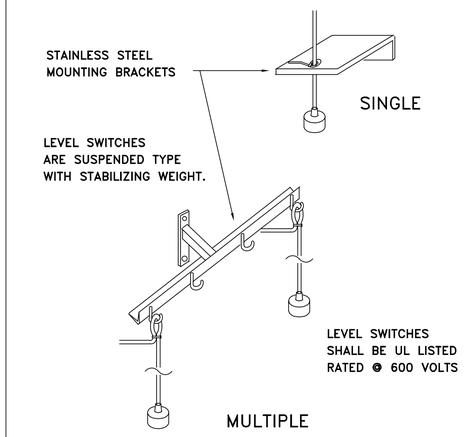
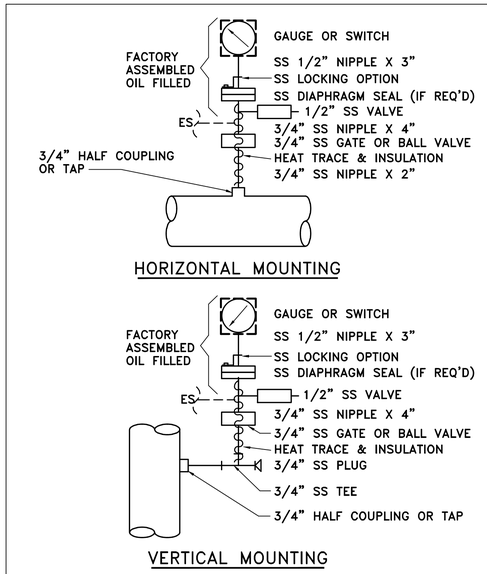


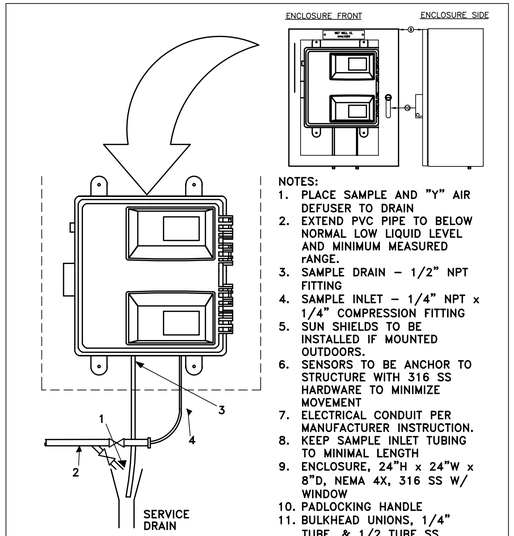
ULTRASONIC SENSOR MOUNTING
WITH STILLING WELL



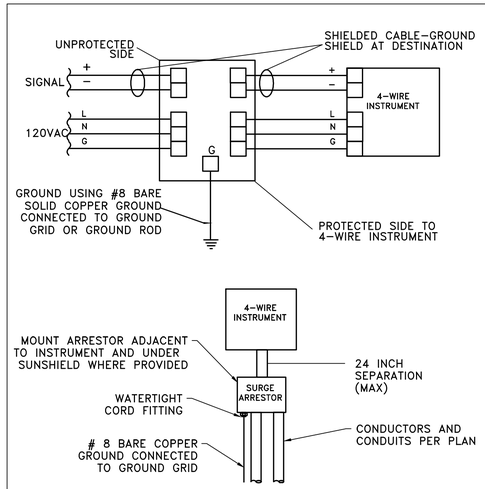
TYPICAL LEVEL SWITCH MOUNTING DETAIL



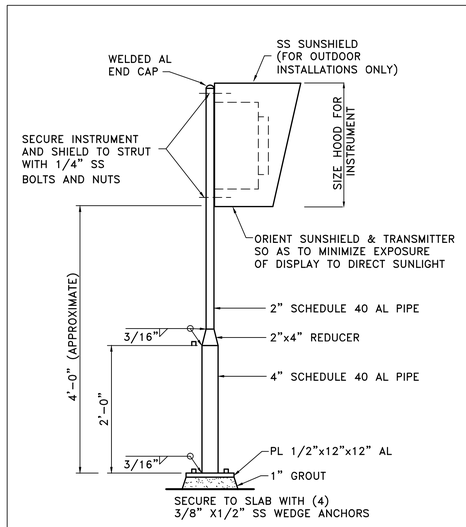
TYPICAL PRESSURE INDICATOR/
SWITCH PIPING DETAIL



CHLORINE ANALIZER MOUNTING
WITH SAMPLING TUBING



4-WIRE INSTRUMENT SURGE
ARRESTOR INSTALLATION



SINGLE INSTRUMENT
STANCHION MOUNT DETAIL

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CITY OF VENICE
EASTSIDE WRF RCW FILTRATION SYSTEM IMPROVEMENTS

INSTRUMENTATION DETAILS

DATE:	MARCH 2014
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DEVICE SYMBOLS

- (FS) FLOAT/FLOW SWITCH
- (LS) LIMIT SWITCH
- (PS) PRESSURE SWITCH
- (T) THERMOSTAT
- PULL BOX, SIZE PER NEC
- (JB) JUNCTION BOX, SIZE PER NEC
- (E) ELECTRICAL EQUIPMENT CONNECTION
- GROUND ROD
- CONTROL STATION
- STOP–START STATION
- LOCK–OUT–STOP SWITCH
- (R) RED STOPPED LIGHT
- FUSE
- MOTOR OL RELAY
- HEATER
- CLASS 1/DIVISION I/II CONDUIT SEAL–OFF FITTING
- LOCATED AT FIELD DEVICE
- △ LOCATED AT MAIN CONTROL PANEL
- ◕ LOCATED AT LOCAL CONTROL PANEL
- ○ MOUNTED ON DOOR
- CIRCUIT BREAKER
- (A) AMMETER
- (AS) AMMETER SWITCH
- (V) VOLTMETER
- (VS) VOLTMETER SWITCH
- (HP) MOTOR (HP=RATED HORSEPOWER)
- VACUUM STARTER
- 52 ANSI/IEEE TYPE–52 AC POWER CIRCUIT BREAKER
- INDUSTRIAL BATTERY SET W/MOUNTING RACK
- PM POWER MONITOR
- (27) UNDER VOLTAGE
- (46) PHASE UNBALANCE
- (48) INCOMPLETE SEQUENCE
- (49) OVER TEMPERATURE
- (51) TIMED OVERCURRENT
- (51G) TIMED GROUND FAULT
- (74) ALARM RELAY
- (81) FREQUENCY
- (86) LOCK OUT
- (87) DIFFERENTIAL
- (E110) DUCTBANK CALLOUT
- 042000 CONDUIT OR CABLE NUMBER

TYPICAL ABBREVIATIONS

A, AMP	AMPERE
AFD	ADJUSTABLE FREQUENCY DRIVE
AFG	ABOVE FINISHED GRADE
AIT	ANALYTICAL INDICATION TRANSMITTER
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
BKR	BREAKER
C	CONDUIT
CAB	CABINET
CAT	CATALOG
CL	CHLORINE
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CKT	CIRCUIT
CLG	CEILING
CP	CONTROL PANEL
CR	CONTROL RELAY, CORROSION RESISTANT
CS	CONTROL SWITCH
CV	CONTROL VALVE
CT	CURRENT TRANSFORMER
CU	COPPER
EF	EXHAUST FAN
EMER	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EPRF	EXPLOSION PROOF
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FLA	FULL LOAD AMPS
FVNR	FULL VOLTAGE NON–REVERSING STARTER
FLOUR	FLUORESCENT
FLR	FLOOR
FMC	FLEXIBLE METAL CONDUIT
FWE	FURNISHED WITH EQUIPMENT
GEN	GENERATOR
G, GND	GROUND
GFIC	GROUND FAULT CIRCUIT INTERRUPTER
HH	HANDHOLE
HID	HIGH INTENSITY DISCHARGE
HOA	HAND–OFF–AUTO
HP	HORSE POWER
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HV	HIGH VOLTAGE
Hz	HERTZ
IMC	INTERMEDIATE METALLIC CONDUIT (GALVANIZED)
INCAND	INCANDESCENT
JB	JUNCTION BOX
k	THOUSAND
kCMIL	THOUSAND CIRCULAR MILLS
kA	KILOVOLT AMPERE
kW	KILOWATTS
kWH	KILOWATT–HOURS
LFMC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
LFNC	LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT
LIT	LEVEL INDICATION TRANSMITTER
LP	LIGHTING PANEL, LIGHT POLE
LTG	LIGHTING
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE
MLO	MAIN LUGS ONLY
MSB	MAIN SWITCHBOARD
MTD	MOUNTED/MOUNTING
MTS	MANUAL TRANSFER SWITCH
MV	MEDIUM VOLTAGE
NEC	NATIONAL ELECTRIC CODE
N, NEU	NEUTRAL
NA	NOT APPLICABLE
NC	NORMALLY CLOSE
NO	NORMALLY OPEN
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
P	POLE
PA	PUBLIC ADDRESS
PB	PULL BOX, PUSH–BUTTON
PCP	PUMP CONTROL PANEL
PF	POWER FACTOR
ϕ, PH	PHASE
PIT	PRESSURE INDICATION TRANSMITTER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANEL
PP	POWER PANEL, POWER POLE
PT	POTENTIAL TRANSFORMER
PWR	POWER
RECEP	RECEPTACLE
RVSS	REDUCED VOLTAGE SOFT STARTER
REQ	REQUIRED
RM	ROOM
RMC	RIGID METAL CONDUIT (GALVANIZED)
RTU	REMOTE TELEMETRY UNIT
SCR	DC MOTOR DRIVE
SH	SHEET
SPEC	SPECIFICATION
SS	SELECTOR SWITCH
SST.	STAINLESS STEEL
STP	SHIELDED TWISTED PAIR
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCH GEAR
TEL	TELEPHONE
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
UTIL	UTILITY
UTP	UNSHIELDED TWISTED PAIR
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
W	WIRE, WATT
WH	WATT–HOUR
WP	WEATHERPROOF
XFMR	TRANSFORMER

GENERAL ELECTRICAL SYMBOLS

- LP–3 CONDUIT HOMERUN TO EQUIPMENT SHOWN. LINE TYPE DESIGNATES CONCEALED, EXPOSED, ETC. NUMBERS/TEXT DESIGNATE HOMERUN EQUIPMENT (I.E. PANEL BOARD CIRCUIT NUMBER).
- GENERAL CONDUIT RUN EXPOSED
- CONCEALED CONDUIT IN FLOOR SLAB, UNDERGROUND, ETC.
- EXISTING CABLE OR CONDUIT
- CONDUIT TURNED DOWN
- CONDUIT TURNED UP
- E SITE ELECTRICAL
- E EXISTING SITE ELECTRICAL
- T SITE TELEPHONE
- T EXISTING SITE TELEPHONE
- OHE OVERHEAD ELECTRICAL UTILITY
- OHT OVERHEAD TELEPHONE UTILITY
- UGE UNDERGROUND ELECTRICAL UTILITY
- UGT UNDERGROUND TELEPHONE UTILITY
- G SITE GROUND
- G EXISTING SITE GROUND
- ELECTRICAL INTERLOCK
- ELECTRICAL BUSS
- ELECTRICAL BUSS DUCT

- 0A 0F 3R — DISCONNECT SWITCH. TOP NUMBER DENOTES FUSE SIZE (NF=NON–FUSED). BOTTOM NUMBER DENOTES FRAME SIZE. RIGHT NUMBER DENOTES NEMA ENCLOSURE RATING.
- CB 0A 0F 3R — CIRCUIT BREAKER. TOP NUMBER DENOTES TRIP. BOTTOM NUMBER DENOTES FRAME SIZE. RIGHT NUMBER DENOTES NEMA ENCLOSURE RATING.
- 0A 0F 3R — COMBINATION MAGNETIC MOTOR STARTER AND DISCONNECT SWITCH OR MOTOR CIRCUIT PROTECTOR. LEFT NUMBER DENOTES NEMA STARTER SIZE. TOP NUMBER DENOTES FUSE SIZE OR MCP. BOTTOM NUMBER DENOTES FRAME SIZE. RIGHT NUMBER DENOTES NEMA ENCLOSURE.
- 2 FVNR — FULL VOLTAGE NON–REVERSING MOTOR STARTER. LEFT NUMBER DENOTES NEMA STARTER SIZE.
- 3 RVSS — REDUCED VOLTAGE SOLID–STATE MOTOR STARTER.
- VFD — VARIABLE FREQUENCY MOTOR CONTROLLER.

- $ 4 LIGHTING CONTROL SWITCH: {LOWERCASE LETTER} – CONTROL SWITCHING
  - M – MOTOR RATED SWITCH
  - D – DIMMER CONTROL
  - OS – OCCUPANCY SENSOR
  - 3 – THREE–WAY SWITCHING
  - 4 – FOUR–WAY SWITCHING

OUTLETS: NUMBER DENOTES PANEL BOARD CIRCUIT FOR POWER OUTLETS. IF SHOWN, LOWERCASE LETTER DENOTES CONTROL SWITCHING FOR POWER OUTLETS.

- SIMPLEX RECEPTACLE
- DUPLEX RECEPTACLE
- QUADRAPLEX RECEPTACLE
- VOICE (PHONE) OUTLET
- DATA OUTLET
- VOICE/DATA COMBINATION OUTLET

GENERAL NOTES

1. REFERENCE ALL SPECIFICATIONS AND CONTRACT DRAWINGS FOR ADDITIONAL REQUIREMENTS AND CONTRACT RESPONSIBILITIES PRIOR TO COMMENCING WORK.
2. THE GENERAL NOTES STATED ON THIS DRAWING ARE APPLICABLE TO ALL ELECTRICAL WORK UNLESS NOTED OTHERWISE.
3. ALL ELECTRICAL WORK SHALL COMPLY WITH THE CURRENT NEC, NESC AND LOCAL CODES INCLUDING OWNERS STANDARDS AND REQUIREMENTS.
4. THE ELECTRICAL INSTALLATION SHALL COMPLY THE REQUIREMENTS OF NECA–1 2006: (STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION).
5. THE SCHEDULING AND DURATION OF ANY SHUTDOWN OF ANY PLANT PROCESS FOR THE REMOVAL OF EXISTING EQUIPMENT OR INSTALLATION OF NEW EQUIPMENT SHALL BE COORDINATED IN ADVANCE WITH THE OWNER.
6. ALL SYMBOLS AND ABBREVIATION MAY NOT BE UTILIZED FOR THIS PROJECT.
7. ADDITIONAL SYMBOLS NOT SHOWN ON THIS DRAWING MAY BE SHOWN ELSEWHERE ON THE ELECTRICAL DRAWINGS.
8. ELECTRICAL DRAWINGS SHOW MAJOR CABLE AND CONDUIT REQUIREMENTS. REFERENCE EQUIPMENT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
9. ALL 480V ELECTRICAL EQUIPMENT SHALL HAVE A MINIMUM RATING OF 22K AIC. OR AS SHOWN ON THE DRAWINGS.
10. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED SO THAT ALL CODE–REQUIRED AND MANUFACTURER–RECOMMENDED SERVICING CLEARANCES ARE MAINTAINED. INSTALLATIONS SHALL COMPLY WITH NEC 110–26 FOR CLEARANCE REQUIREMENTS.
11. ALL POWER AND CONTROL WIRING OR CABLES SHALL BE 600V RATED THWN STRANDED COPPER, UNLESS OTHERWISE NOTED ON DRAWINGS.
12. ALL AMPACITIES ARE BASED ON 75°C RATING. THE CONTRACTOR IS RESPONSIBLE FOR THE INCREASING OF CONDUCTOR SIZES AS NECESSARY TO MEET THE REQUIREMENTS OF NEC 110–14(C) WHERE TERMINATIONS ARE NOT LISTED AND LABELED FOR USE AT 75°C. THIS REQUIREMENT APPLIES TO TERMINATIONS IN BOTH NEW EQUIPMENT AND IN EXISTING EQUIPMENT TO WHICH TERMINATIONS ARE MADE AS PART OF THIS PROJECT.
13. NO SPLICES OR JUNCTIONS TO FEEDER CABLES SHALL BE MADE WITHOUT ENGINEERS APPROVAL.
14. ALL EXPOSED CONDUIT SHALL BE RIGID GALVANIZED STEEL..
15. ALL CONDUIT BELOW GRADE SHALL BE INSTALLED IN NON–REINFORCED CONCRETE DUCTBANK, UNLESS NOTED OTHERWISE. REFERENCE DETAIL SHEETS.
16. ALL DUCTBANKS CROSSING ROADWAYS SHALL BE REINFORCED CONCRETE AND EXTEND 5–FEET FROM EDGE OF PAVEMENT. DUCTBANKS SHALL CROSS PROCESS PIPING AT 90° ANGLE WHERE POSSIBLE. REFERENCE DETAIL SHEETS.
17. ALL CONDUIT TRANSITIONS THROUGH FINISHED GRADE OR CONCRETE SHALL BE PVC–COATED RGS 6" MIN. ABOVE AND BELOW TRANSITION.
18. ROUGH–IN CONDUIT AS REQUIRED FOR DIRECT CONNECTION TO EQUIPMENT AS SHOWN. PROVIDE FLEXIBLE CONNECTIONS TO ALL EQUIPMENT AND MAKE ALL CONNECTIONS COMPLETE AND IN ACCORDANCE WITH THE SPECIFICATIONS.
19. ALL CONDUIT SHALL RUN CONCEALED UNLESS OTHERWISE NOTED OR SHOWN. THE CONDUITS SHALL RUN PARALLEL TO LANDSCAPE AND STRUCTURAL FEATURES, AND THE BENDS AND TURNS SHALL BE MADE BY MEANS OF CONDUIT FITTINGS. MOST CONDUIT LAYOUTS ARE NOT AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL PROPOSE LOGICAL GROUPINGS, MARSHALLING AND ROUTING OF CONDUITS AND WIRING FOR APPROVAL BY ENGINEER PRIOR TO INSTALLATION.
20. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED PULL BOXES, TERMINAL BOXES AND JUNCTION BOXES FOR INSTALLATION OF THE WIRING IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS THOUGH THE BOXES MAY NOT BE INDICATED ON THE DRAWINGS.
21. CONDUIT AND WIRING FOR LIGHTING, RECEPTACLES AND OTHER SINGLE PHASE POWERED DEVICES ARE GENERALLY NOT SHOWN BUT SHALL BE PROVIDED AS REQUIRED FOR PROPER SERVICE. MULTI–PHASE CIRCUITS SHALL BE PROVIDED WITH DEDICATED NEUTRAL CONDUCTORS.
22. ALL SPARE CONDUITS SHALL BE CAPPED OR PLUGGED AND SHALL INCLUDE 200# TEST POLYPROPYLENE PULL STRING.
23. STRUT–CHANNEL SHALL NOT BE BENT, DRILLED, CUT OR OTHERWISE MODIFIED TO PRODUCE FITTINGS, BRACES OR BRACKETS FOR CONDUIT AND EQUIPMENT SUPPORTS.
24. MANUFACTURED STRUT–CHANNEL BRACES, BRACKETS, FITTINGS OR POST BASES SHALL BE PROVIDED AND INSTALLED WITH ASSOCIATED HARDWARE AND FASTENERS FOR CONDUIT AND EQUIPMENT SUPPORTS.
25. CONTRACTOR SHALL PROVIDE AUXILIARY SUPPORTS FOR SWITCHBOARDS, PANELBOARDS, TRANSFORMERS, CONTROL PANELS, ETC., AS REQUIRED.
26. CONTRACTOR SHALL PROVIDE AND INSTALL CONCRETE EMBEDDED LEVELING CHANNEL SUPPORTS FOR FLOOR MOUNTED EQUIPMENT.
27. STRUCTURAL MEMBERS SHALL NOT BE DRILLED, CUT, WELDED OR OTHERWISE MODIFIED WITHOUT PRIOR APPROVAL OF THE ENGINEER OF RECORD.
28. ALL NEW EQUIPMENT SHALL FIT INTO EXISTING AVAILABLE SPACE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE EQUIPMENT WHICH MEETS THE SPACE REQUIREMENTS.
29. THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUITS ARE BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS APPROVED BY THE ENGINEER MAY BE MADE BY THE CONTRACTOR AT HIS EXPENSE TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED.
30. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY COMPONENTS REQUIRED FOR MAKING FINAL CONNECTION OF ALL EQUIPMENT INSTALLED OR MODIFIED AS PART OF THIS CONTRACT.
31. NOT ALL MOISTURE AND HAZARDOUS AREA CONDUIT SEALS ARE SHOWN ON THE DRAWINGS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONFIRM WITH THE CODE, SPECIFICATION, AND DRAWING REQUIREMENTS FOR THEIR LOCATION.
32. CONTRACTOR SHALL PROVIDE BLACK TEXT ON WHITE HEAT–SHRINKABLE CABLE/WIRE IDENTIFICATION LABEL AT BOTH ENDS OF POWER, CONTROL AND DATA WIRING.
33. GROUND FAULT CURRENT INTERRUPTING (GFCI) RECEPTACLES:
    A. SHALL BE RATED FOR 20A AT 120V WITH LED POWER INDICATOR
    B. INSTALLED IN INTERIOR SPACES WHERE EXPOSED TO WATER SOURCES SUCH AS TOILET ROOMS, SHOWER AREAS, KITCHENS, ETC., INDIVIDUAL GFCI RECEPTACLES SHALL BE PROVIDED.
    C. INSTALLED OUTDOORS OR IN PROCESS AREAS, ALL RECEPTACLES SHALL BE WEATHER PROOF, CORROSION RESISTANT, AND SHALL BE INDIVIDUAL GFCI DEVICES.

TYPICAL DEVICE MOUNTING HEIGHTS

RECEPTACLES (INTERIOR PROCESS AREAS)	16" AFF
RECEPTACLES (EXTERIOR PROCESS AREAS)	48" AFF
LIGHT SWITCHES	48" AFF
PHONE OUTLETS	16" AFF
PHONE OUTLETS (WALL MOUNT)	64" AFF
DATA OUTLETS	16" AFF
FIRE ALARM PULL STATION	48" AFF
FIRE ALARM AUDIO/VISUAL ALARM	80" AFF
FIRE ALARM VISUAL ALARM ONLY	80" AFF
EXIT LIGHTS (WALL MOUNT)	16" ABOVE DOOR
EMERGENCY LIGHTS (WALL MOUNT)	96" AFF

NOTE: DIMENSIONS ARE TO DEVICE TOP UNLESS NOTED OTHERWISE.

LIGHTING SYMBOLS

- PP–C/1 / B1:a — LIGHT FIXTURES (VARIOUS TYPES) – UPPERCASE LETTER DENOTES FIXTURE TYPE, REFER TO LIGHTING SCHEDULE OR NOTES. NUMBER DENOTES LIGHTING PANEL CIRCUIT. LOWERCASE LETTER DENOTES CONTROL SWITCH.
- PP–C/3 / E2 — EMERGENCY LIGHT – BATTERY EQUIPPED, CIRCUIT AHEAD OF CONTROL SWITCHES. ADDITIONAL FIXTURE HEADS MAY BE SHOWN CONNECTED TO UNIT.
- PP–C/1 / E3 — EMERGENCY EXIT LIGHT – BATTERY EQUIPPED.
- PC — PHOTOELECTRIC CONTROL DEVICE
- LC — LIGHTING CONTACTOR

REV.NO.	DESCRIPTIONS	DATE

REVISIONS

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

ELECTRICAL NOTES, SYMBOLS, AND LEGENDS

DATE:	MARCH 2014
MCE PROJ. #	5883–0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E1

STATUS: ISSUED FOR BID
REVISION

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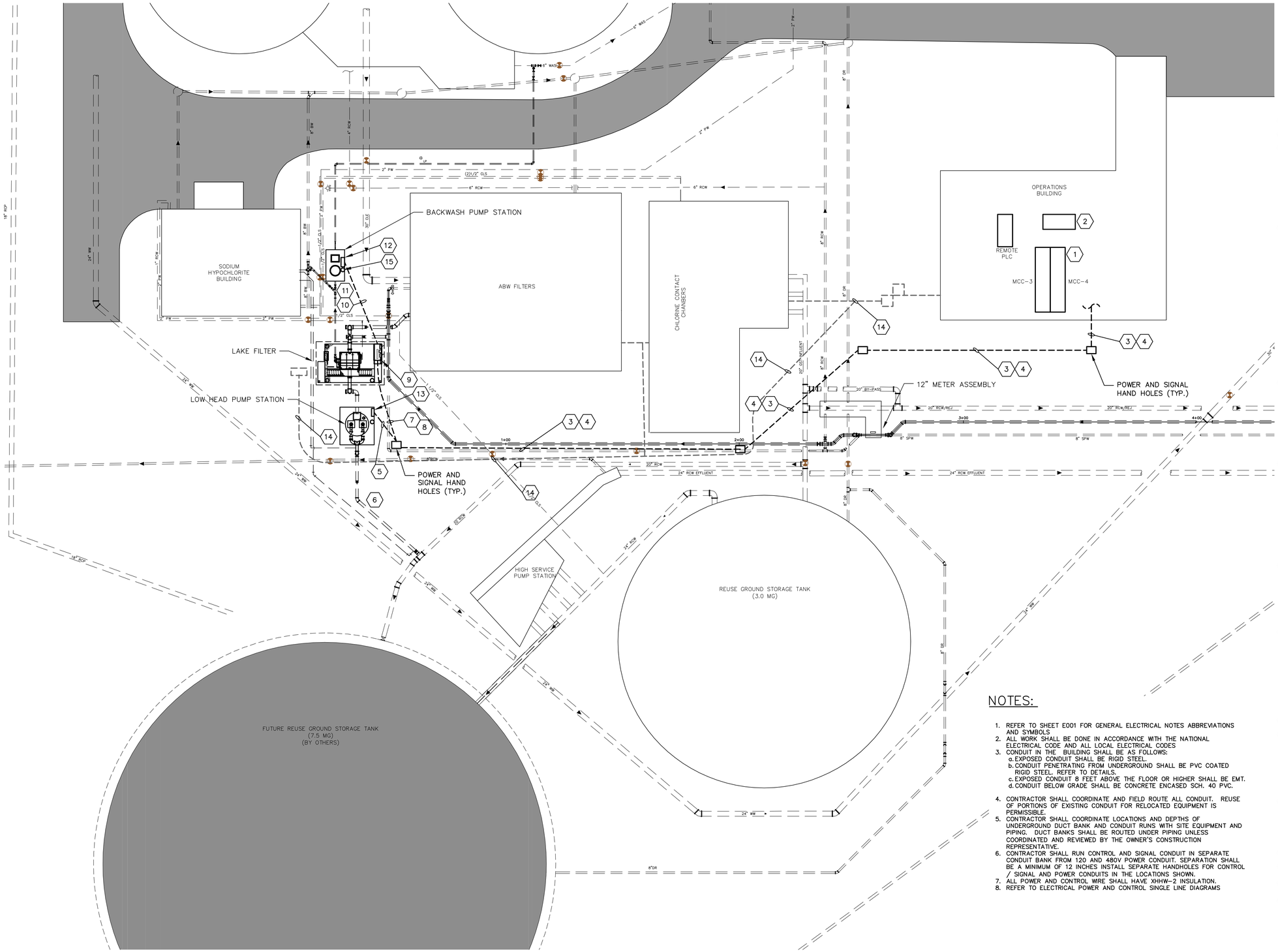

KEYNOTES:

1. APPROXIMATE LOCATION OF MCC-3 AND MCC-4.
2. APPROXIMATE LOCATION OF EXISTING PLC-1.
3. INSTALL THE FOLLOWING POWER WIRE AND CONDUIT
   - A. 3 #2, 1 #6G, 2" CONDUIT (480V POWER TO PP-201)
   - B. 3 #8 WITH GROUND VFD CABLE, 2 INCH CONDUIT (TRANSFER PUMP 1 480V POWER)
   - C. 3 #8 WITH GROUND VFD CABLE, 2 INCH CONDUIT (TRANSFER PUMP 2 480V POWER)
   - D. PULLSTRING, 2 INCH CONDUIT (SPARE)
   - E. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
   - F. PULLSTRING, 1 INCH CONDUIT (SPARE)
4. INSTALL THE FOLLOWING CONTROL / SIGNAL WIRE AND CONDUIT
   - A. 20 #14, 1 #14G, 1.5 INCH CONDUIT (LAKE FILTER NO. 1 TERMINATION PANEL TO PLC-1-RIO)
   - B. PULLSTRING (FUTURE LAKE FILTER NO. 2 CONTROL TERMINATION PANEL TO PLC-1-RIO)
   - C. 18 #14, 1#14G,1.5 INCH CONDUIT (STATUS FROM BACKWASH PUMP STATION LCP-750 TO PLC-1-RIO)
   - D. 8 #14, 1#14G, 1 INCH CONDUIT (CONTROLS FROM TRANSFER PUMP STATION LCP-850 TO PLC-1-RIO)
   - E. 2 TSP, 1 INCH CONDUIT SIGNALS FROM TRANSFER PUMP STATION LCP-850 TO PLC-1-RIO)
   - F. 16 #14, 1#14G, 1 INCH CONDUIT (CONTROLS FROM TRANSFER PUMP STATION LCP-850 TO VFD-851, VFD-852)
   - G. 4 TSP, 1 INCH CONDUIT SIGNALS FROM TRANSFER PUMP STATION LCP-850 TO VFD-851, VFD-852)
   - H. PULLSTRING, 2 INCH CONDUIT (SPARE)
   - I. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
   - J. PULLSTRING, 1 INCH CONDUIT (SPARE)
5. INSTALL THE FOLLOWING POWER WIRE AND CONDUIT
   - A. 3 #8 WITH GROUND VFD CABLE, 2 INCH CONDUIT (TRANSFER PUMP 1 480V POWER)
   - B. 3 #8 WITH GROUND VFD CABLE, 2 INCH CONDUIT (TRANSFER PUMP 2 480V POWER)
   - C. 6 #10, 1 #10G, 1 INCH CONDUIT, (120V POWER FROM LP-202)
   - D. PULLSTRING, 2 INCH CONDUIT (SPARE)
   - E. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
   - F. PULLSTRING, 1 INCH CONDUIT (SPARE)
6. INSTALL THE FOLLOWING CONTROL / SIGNAL WIRE AND CONDUIT
   - A. 8 #14, 1#14G, 1 INCH CONDUIT (CONTROLS FROM TRANSFER PUMP STATION LCP-850 TO PLC-1-RIO)
   - B. 2 TSP, 1 INCH CONDUIT SIGNALS FROM TRANSFER PUMP STATION LCP-850 TO PLC-1-RIO)
   - C. 16 #14, 1#14G, 1 INCH CONDUIT (CONTROLS FROM TRANSFER PUMP STATION LCP-850 TO VFD-851, VFD-852)
   - D. 4 TSP, 1 INCH CONDUIT SIGNALS FROM TRANSFER PUMP STATION LCP-850 TO VFD-851, VFD-852)
   - E. PULLSTRING, 2 INCH CONDUIT (SPARE)
   - F. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
   - G. PULLSTRING, 1 INCH CONDUIT (SPARE)
7. INSTALL THE FOLLOWING POWER WIRE AND CONDUIT
   - A. 3 #2, 1 #6G, 2" CONDUIT (480V POWER TO PP-201)
   - B. 6 #10, 1 #10G, 1 INCH CONDUIT, (120V POWER FROM LP-202)
   - C. PULLSTRING, 2 INCH CONDUIT (SPARE)
   - D. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
   - E. PULLSTRING, 1 INCH CONDUIT (SPARE)
8. INSTALL THE FOLLOWING CONTROL / SIGNAL WIRE AND CONDUIT
   - A. 20 #14, 1 #14G, 1.5 INCH CONDUIT (LAKE FILTER NO. 1 TERMINATION PANEL TO PLC-1-RIO)
   - B. PULLSTRING (FUTURE LAKE FILTER NO. 2 CONTROL TERMINATION PANEL TO PLC-1-RIO)
   - C. 18 #14, 1#14G,1.5 INCH CONDUIT (STATUS FROM BACKWASH PUMP STATION LCP-750 TO PLC-1-RIO)
   - D. PULLSTRING, 2 INCH CONDUIT (SPARE)
   - E. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
   - F. PULLSTRING, 1 INCH CONDUIT (SPARE)
9. EQUIPMENT RACK AT LAKE FILTER
10. INSTALL THE FOLLOWING POWER WIRE AND CONDUIT
    - A. 3 #10, 1 #10G, 1 INCH CONDUIT (480V POWER TO BACKWASH PUMP STATION)
    - B. 4 #10, 1 #10G, 1 INCH CONDUIT (120V POWER FROM LP-202)
    - C. PULLSTRING, 2 INCH CONDUIT (SPARE)
    - D. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
    - E. PULLSTRING, 1 INCH CONDUIT (SPARE)
11. INSTALL THE FOLLOWING CONTROL / SIGNAL WIRE AND CONDUIT
    - A. 18 #14, 1#14G,1.5 INCH CONDUIT (STATUS FROM BACKWASH PUMP STATION LCP-750 TO PLC-1-RIO)
    - B. PULLSTRING, 2 INCH CONDUIT (SPARE)
    - C. PULLSTRING, 1.5 INCH CONDUIT (SPARE)
    - D. PULLSTRING, 1 INCH CONDUIT (SPARE)
12. BACKWASH PUMP STATION CONTROL PANEL
13. TRANSFER PUMP STATION CONTROL PANEL
14. APPROXIMATE LOCATION OF EXISTING DUCT BANK PER SCANNED RECORD DRAWINGS
15. TYPE "B" AREA LIGHT

NOTES:

1. REFER TO SHEET E001 FOR GENERAL ELECTRICAL NOTES ABBREVIATIONS AND SYMBOLS
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL LOCAL ELECTRICAL CODES
3. CONDUIT IN THE BUILDING SHALL BE AS FOLLOWS:
   - a. EXPOSED CONDUIT SHALL BE RIGID STEEL.
   - b. CONDUIT PENETRATING FROM UNDERGROUND SHALL BE PVC COATED RIGID STEEL. REFER TO DETAILS.
   - c. EXPOSED CONDUIT 8 FEET ABOVE THE FLOOR OR HIGHER SHALL BE EMT.
   - d. CONDUIT BELOW GRADE SHALL BE CONCRETE ENCASED SCH. 40 PVC.
4. CONTRACTOR SHALL COORDINATE AND FIELD ROUTE ALL CONDUIT. REUSE OF PORTIONS OF EXISTING CONDUIT FOR RELOCATED EQUIPMENT IS PERMISSIBLE.
5. CONTRACTOR SHALL COORDINATE LOCATIONS AND DEPTHS OF UNDERGROUND DUCT BANK AND CONDUIT RUNS WITH SITE EQUIPMENT AND PIPING. DUCT BANKS SHALL BE ROUTED UNDER PIPING UNLESS COORDINATED AND REVIEWED BY THE OWNER'S CONSTRUCTION REPRESENTATIVE.
6. CONTRACTOR SHALL RUN CONTROL AND SIGNAL CONDUIT IN SEPARATE CONDUIT BANK FROM 120 AND 480V POWER CONDUIT. SEPARATION SHALL BE A MINIMUM OF 12 INCHES INSTALL SEPARATE HANDHOLES FOR CONTROL / SIGNAL AND POWER CONDUITS IN THE LOCATIONS SHOWN.
7. ALL POWER AND CONTROL WIRE SHALL HAVE XHHW-2 INSULATION.
8. REFER TO ELECTRICAL POWER AND CONTROL SINGLE LINE DIAGRAMS

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

ELECTRICAL SITE PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: 1" = 60'
VERTICAL: NA

DRAWING NUMBER
E2

STATUS: ISSUED FOR BID
REVISION

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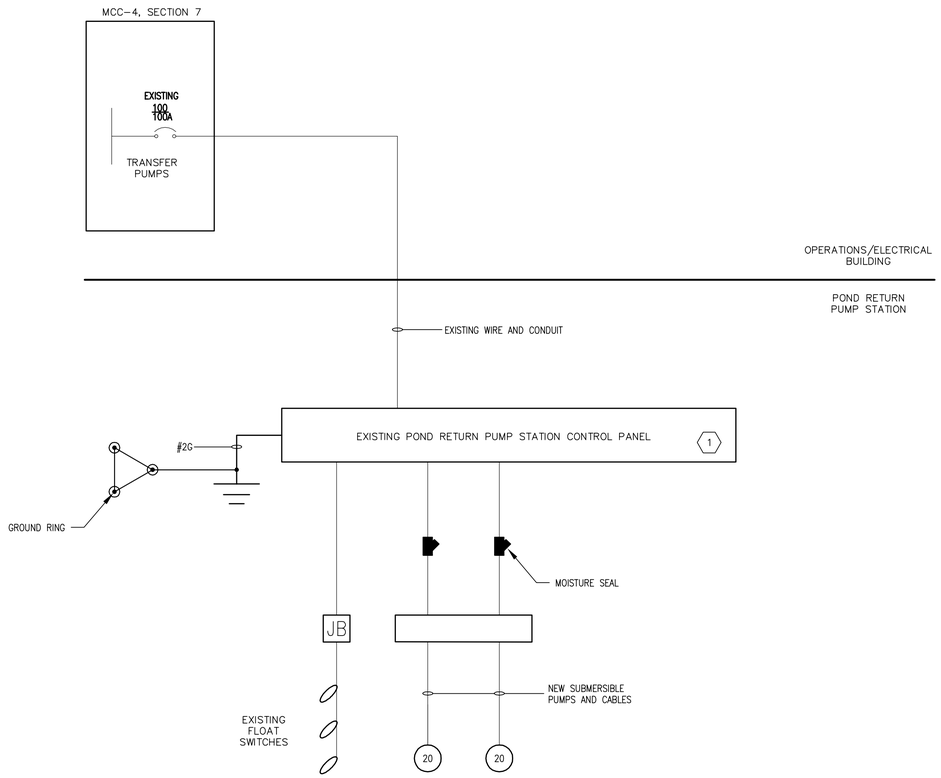
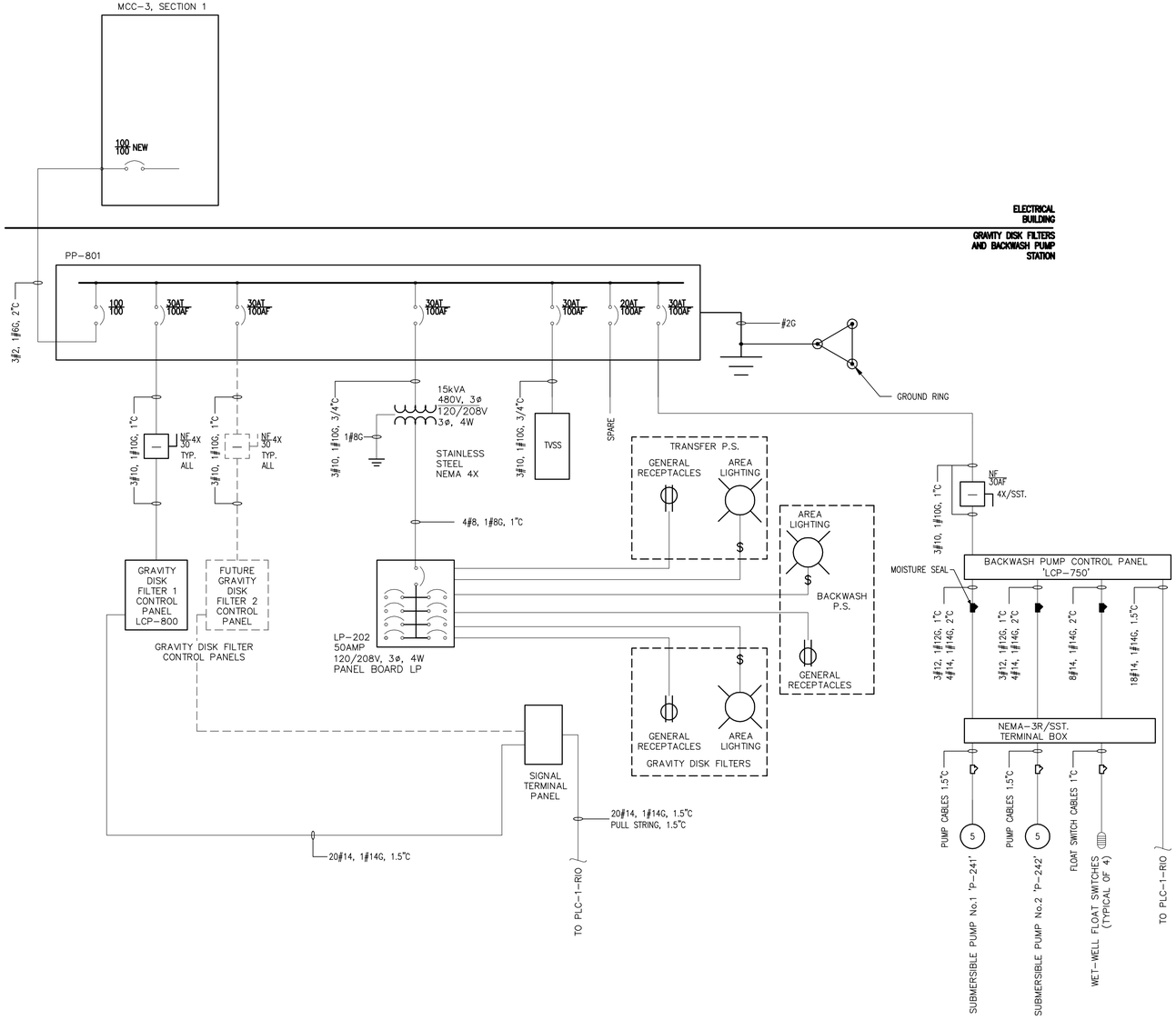


POND RETURN PUMP STATION
N.T.S.

KEYNOTES:

1. EXISTING POND RETURN PUMP STATION CONTROL PANEL SHALL BE MODIFIED TO ACCOMMODATE NEW PUMPS. WORK REQUIRES INCLUDES THE FOLLOWING ITEMS:
   a. EXISTING MOTOR STARTER BREAKERS ARE 80 AMPS WITH NEMA SIZE 3 CONTACTORS. EXISTING MOTOR OVERLOADS SHALL BE REPLACED WITH NEW ONES SUITABLE TO PROVIDE OVERCURRENT PROTECTION FOR THE NEW PUMPS.
   b. INSTALL NEW OVER TEMPERATURE / MOISTURE INTERFACE UNIT FOR EACH PUMP AND RECONNECT TO THE PUMP CONTROL AND MONITORING CIRCUITS.



GRAVITY DISK FILTERS AND BACKWASH PUMP STATION
N.T.S.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

SINGLE LINE DIAGRAMS 1

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E3

STATUS: ISSUED FOR BID
REVISION

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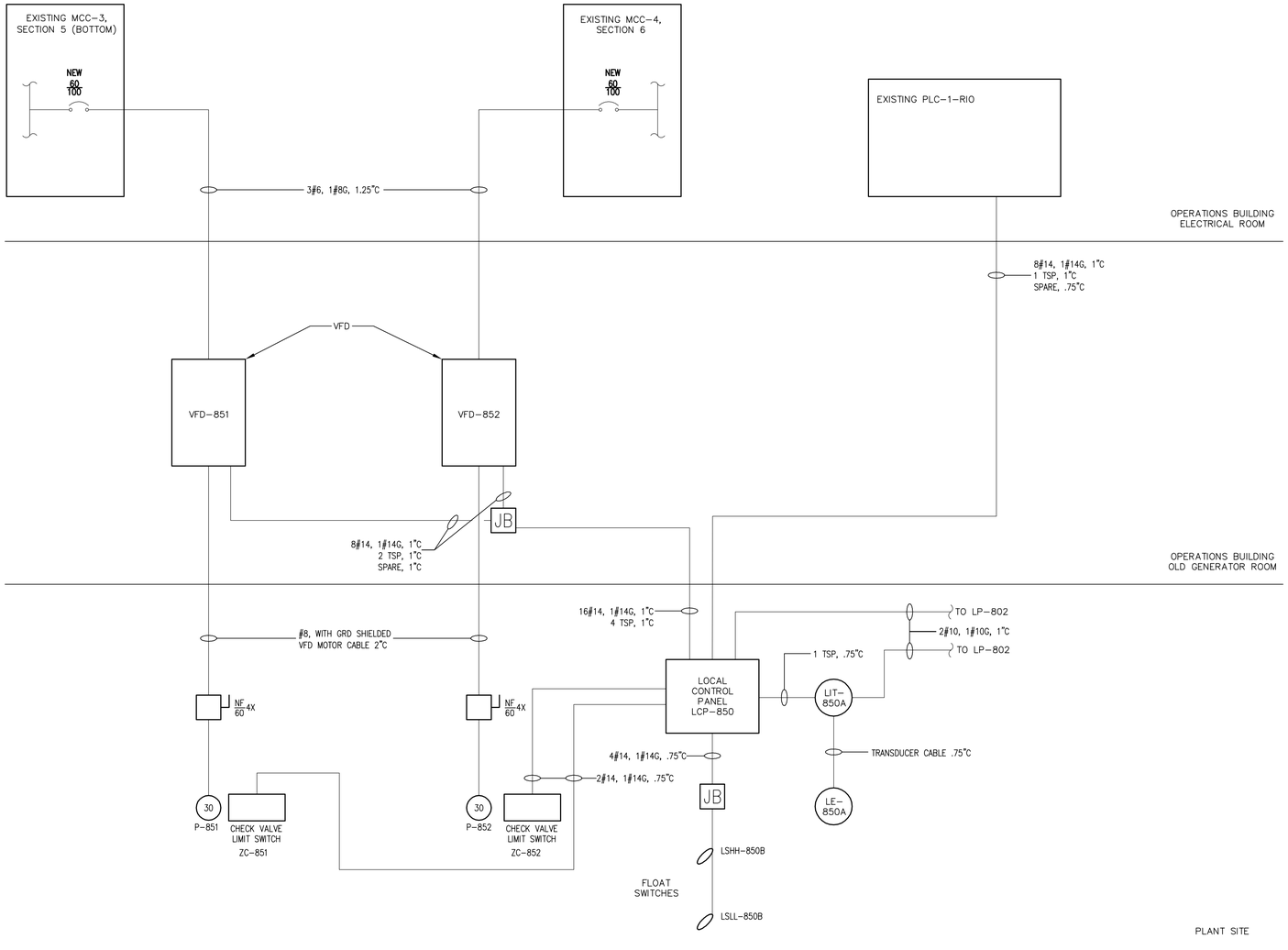

TRANSFER PUMP STATION
N.T.S.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

SINGLE LINE DIAGRAM 2

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E4

STATUS: ISSUED FOR BID
REVISION

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PANEL: PP-801

ENCLOSURE: NEMA: 4X MOUNTING: SURFACE | MAIN: 100A | MB ☒ MLO ☐

VOLTS: 480V, 3 PHASE, 3 WIRE | NEUTRAL: | 100% ☒ 200% ☐

LOCATION: AT GRAVITY FILTERS | BRACING: 22,000A FULLY RATED | FEED: BOTTOM

LOAD SERVED	LOAD (KVA) A	B	C	BREAKER AMP	POLE	BRANCH CIRCUIT CONDUIT & WIRING	CKT	PH	CKT	BRANCH CIRCUIT CONDUIT & WIRING	BREAKER AMP	POLE	LOAD (KVA) A	B	C	LOAD SERVED
	5.60						1	A	2				5.00			
GRAVITY DISK FILTER 1		5.60		30	3	3#10, 1#10G, 1"C	3	B	4	3#10, 1#10G, .75"C	30	3		5.00		PANEL LP-802 TRANSFORMER
			5.60				5	C	6						5.00	
	5.60						7	A	8				0.00			
GRAVITY DISK FILTER 2		5.60		30	3	3#10, 1#10G, 1"C	9	B	10		30	3		0.00		SPARE
(FUTURE)			5.60				11	C	12						0.00	
	0.00						13	A	14				0.00			
SPARE		0.00		30	3		15	B	16		30	3		0.00		SPARE
			0.00				17	C	18						0.00	
	3.00						19	A	20				0.00			
BACKWASH PUMP CONTROL PANEL (CP-750)		3.00		30	3	3#10, 1#10G, 1"C	21	B	22	3#10, 1#10G, .75"C	30	3		0.00		TVSS
			3.00				23	C	24						0.00	
TOTAL(S):	14.20	14.20	14.20										5.00	5.00	5.00	

TOTAL BUS A LOAD: 19.20 KVA

TOTAL BUS B LOAD: 19.20 KVA

TOTAL CONNECTED KVA: 57.60 TOTAL BUS C LOAD: 19.20 KVA

SCHEDULE NOTES:

1. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. ALL BUSSES SHALL BE PLATED COPPER.
3. ALL BREAKERS SHALL BE FULLY RATED.

PANEL: LP-802

ENCLOSURE: NEMA 4X MOUNTING: SURFACE | MAIN: 50A | MB ☒ MLO ☐

VOLTS: 120/208V, 3 PHASE, 4 WIRE | NEUTRAL: | 100% ☒ 200% ☐

LOCATION: AT GRAVITY FILTERS | BRACING: 10,000A FULLY RATED | FEED:

LOAD SERVED	LOAD (KVA) A	B	C	BREAKER AMP	POLE	BRANCH CIRCUIT CONDUIT & WIRING	CKT	PH	CKT	BRANCH CIRCUIT CONDUIT & WIRING	BREAKER AMP	POLE	LOAD (KVA) A	B	C	LOAD SERVED
LCP-850, LIT-850A	0.15			20	1	2#10, 1#10G, 1"C	1	A	2	2#12, 1#12G, .75"C	20	1	0.36			RECEPTACLES ON EQUIPMENT RACK
SPARE		0.00		20	1		3	B	4	2#12, 1#12G, .75"C	20	1		0.06		LIGHTS ON EQUIPMENT RACK
SPARE			0.00	20	1		5	C	6	2#12, 1#12G, .75"C	20	1			0.18	LIGHTS AT DISK FILTER
SPARE	0.00			20	1		7	A	8	2#10, 1#10G, 1"C	20	1	0.06			LIGHT AT BACKWASH RETURN PS
SPARE		0.00		20	1		9	B	10	2#10, 1#10G, 1"C	20	1		0.12		LIGHTS AT TRANSFER PS
SPARE			0.00	20	1		11	C	12	2#10, 1#10G, 1"C	20	1			0.18	RECEPTACLE AT TRANSFER PS
SPARE	0.00			20	1		13	A	14	2#10, 1#10G, 1"C	20	1	0.18			RECEPTACLE AT BACKWASH RETURN PS
SPARE		0.00		20	1		15	B	16		20	1		0.00		SPARE
SPARE			0.00	20	1		17	C	18		20	1			0.00	SPARE
SPARE	0.00			20	1		19	A	20				0.00			
SPARE		0.00		20	1		21	B	22	4#10, 1#10G, .75"C	30	3		0.00		TVSS
SPARE			0.00	20	1		23	C	24						0.00	
TOTAL(S):	0.150	0.000	0.000										0.600	0.180	0.360	

TOTAL BUS A LOAD: 0.750 KVA

TOTAL BUS B LOAD: 0.180 KVA

TOTAL CONNECTED KVA: 1.290 TOTAL BUS C LOAD: 0.360 KVA

SCHEDULE NOTES:

1. REFER TO SPECIFICATION SECTION 16470 PANELBOARDS FOR ADDITIONAL REQUIREMENTS.
2. ALL BUSSES SHALL BE PLATED COPPER.
3. ALL BREAKERS SHALL BE FULLY RATED.

LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	LAMP DATA NO.	TYPE	BALLAST NO.	TYPE	VOLTS	WATTS	MOUNTING	MANUFACTURER	CATALOG/SERIES NO.	REMARKS
A	LED STRIP	1	24W	1	DRIVER	120		SURFACE	LITHONIA	XWMLED	MOUNT AS INDICATED OR NEEDED
		ARRAY	LED				30				
B	LED AREA LIGHT	1	54W	1	DRIVER	120		POLE	LITHONIA	KAD LED 49B 530/50K SR5 120 SPD09 WGDBLXD	MOUNT ON 10 FOOT HEAVY DUTY ALUMINUM POLE, BRONZE
	PROCESS AREA	ARRAY	LED				60				

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

PANELBOARD SCHEDULES

DATE: MARCH 2014
MCE PROJ. # 5883-0005
DRAWN JZM
DESIGNED ALA
CHECKED JSL
PROJ. MGR. MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E5

STATUS: ISSUED FOR BID
REVISION

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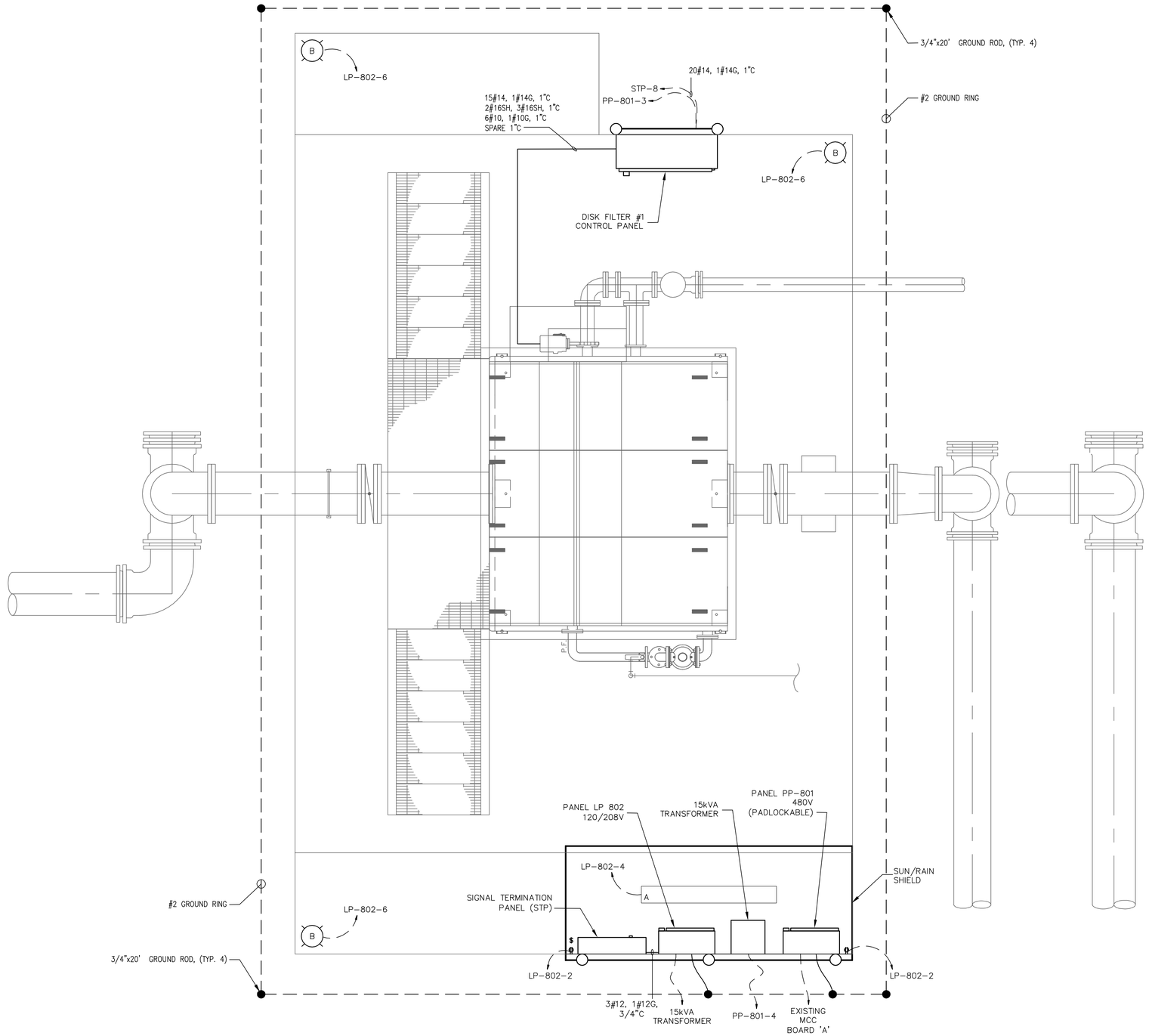

NORTH

PLAN

SCALE: 5/8" = 1'-0"

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER ELECTRICAL PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

DRAWING NUMBER
E6

STATUS: ISSUED FOR BID
REVISION

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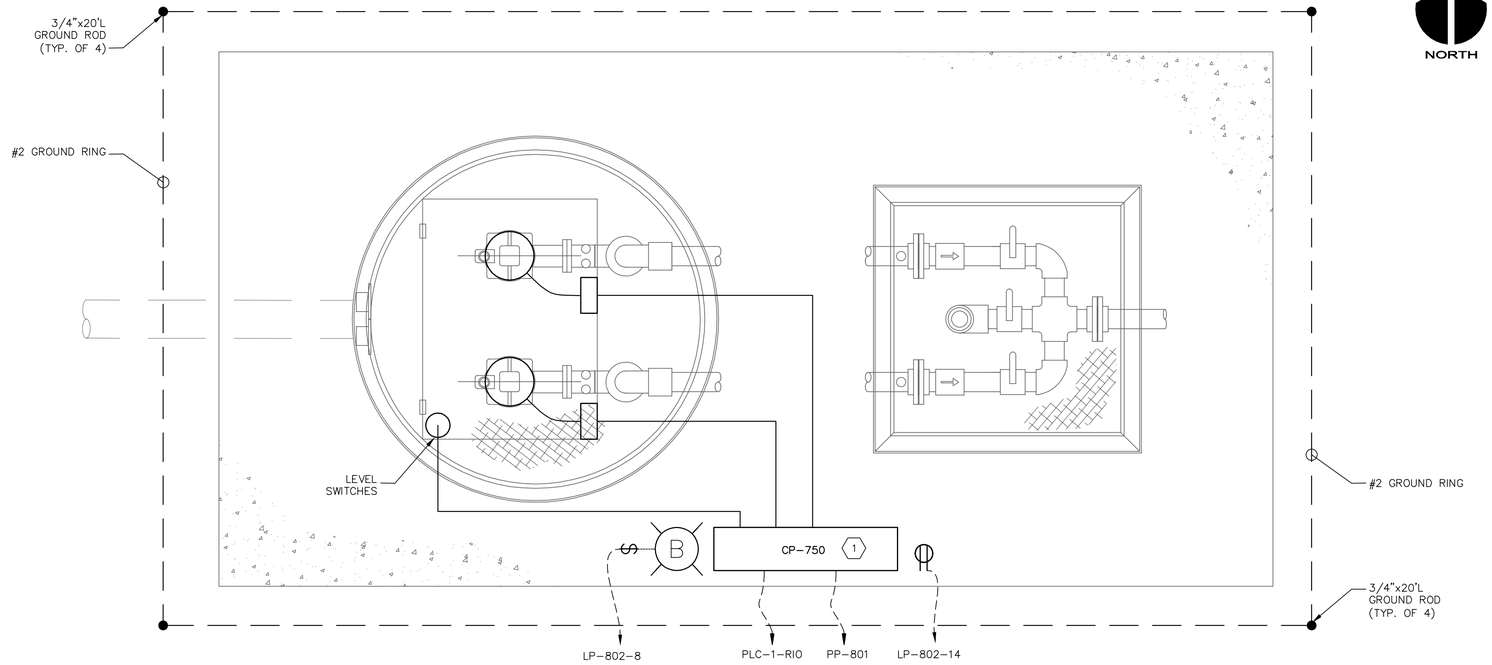

NORTH

NOTES:

1. REFER TO SHEET E001 FOR GENERAL ELECTRICAL NOTES ABBREVIATIONS AND SYMBOLS
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL LOCAL ELECTRICAL CODES
3. CONDUIT SHALL BE AS FOLLOWS:
   a. EXPOSED CONDUIT SHALL BE RIGID STEEL.
   b. CONDUIT PENETRATING FROM UNDERGROUND SHALL BE PVC COATED RIGID STEEL. REFER TO DETAILS.
   c. CONDUIT BELOW GRADE SHALL BE CONCRETE ENCASED SCH. 40 PVC.
4. CONTRACTOR SHALL COORDINATE AND FIELD ROUTE ALL CONDUIT.
5. CONTRACTOR SHALL RUN CONTROL AND SIGNAL CONDUIT IN SEPARATE CONDUIT BANK FROM 120 AND 480V POWER CONDUIT.
6. ALL POWER AND CONTROL WIRE SHALL HAVE XHHW-2 INSULATION.
7. REFER TO ELECTRICAL POWER AND CONTROL SINGLE LINE DIAGRAMS
8. ALL RECEPTACLES SHALL BE WP GFIC

KEYNOTES:

1. INSTALL NEW EQUIPMENT RACK FOR DISK FILTER BACKWASH PUMP STATION CONTROL PANEL CP--750.

GRAVITY DISK FILTER BACKWASH PUMP STATION - ELECTRICAL PLAN
N.T.S.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

GRAVITY DISK FILTER BACKWASH PUMP STATION
ELECTRICAL PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E7

STATUS: ISSUED FOR BID
REVISION

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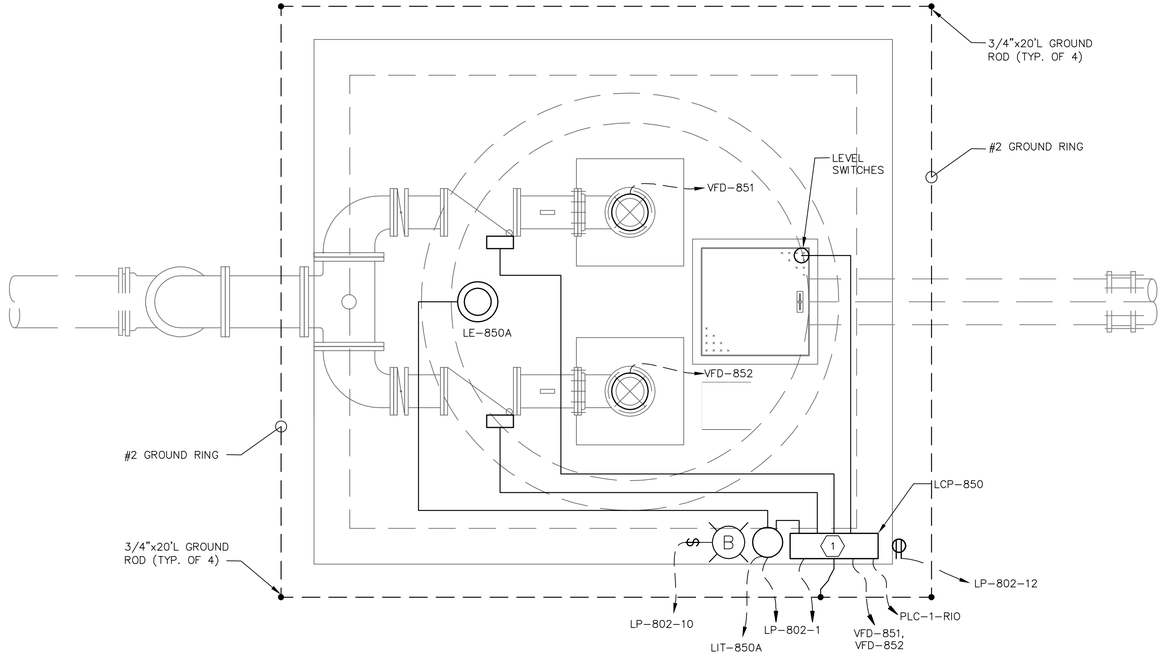

NORTH

NOTES:

1. REFER TO SHEET E001 FOR GENERAL ELECTRICAL NOTES ABBREVIATIONS AND SYMBOLS
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL LOCAL ELECTRICAL CODES
3. CONDUIT SHALL BE AS FOLLOWS:
   a. EXPOSED CONDUIT SHALL BE RIGID STEEL.
   b. CONDUIT PENETRATING FROM UNDERGROUND SHALL BE PVC COATED RIGID STEEL. REFER TO DETAILS.
   c. CONDUIT BELOW GRADE SHALL BE CONCRETE ENCASED SCH. 40 PVC.
4. CONTRACTOR SHALL COORDINATE AND FIELD ROUTE ALL CONDUIT.
5. CONTRACTOR SHALL RUN CONTROL AND SIGNAL CONDUIT IN SEPARATE CONDUIT BANK FROM 120 AND 480V POWER CONDUIT.
6. ALL POWER AND CONTROL WIRE SHALL HAVE XHHW-2 INSULATION.
7. REFER TO ELECTRICAL POWER AND CONTROL SINGLE LINE DIAGRAMS
8. ALL RECEPTACLES SHALL BE WP GFIC

KEYNOTES:

(1) INSTALL NEW EQUIPMENT RACK FOR TRANSFER PUMP STATION CONTROL PANEL CP--850 AND WETWELL LEVEL TRANSMITTER LIT-850A.

TRANSFER STATION - ELECTRICAL PLAN
N.T.S.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

TRANSFER STATION ELECTRICAL PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E8

STATUS: ISSUED FOR BID
REVISION

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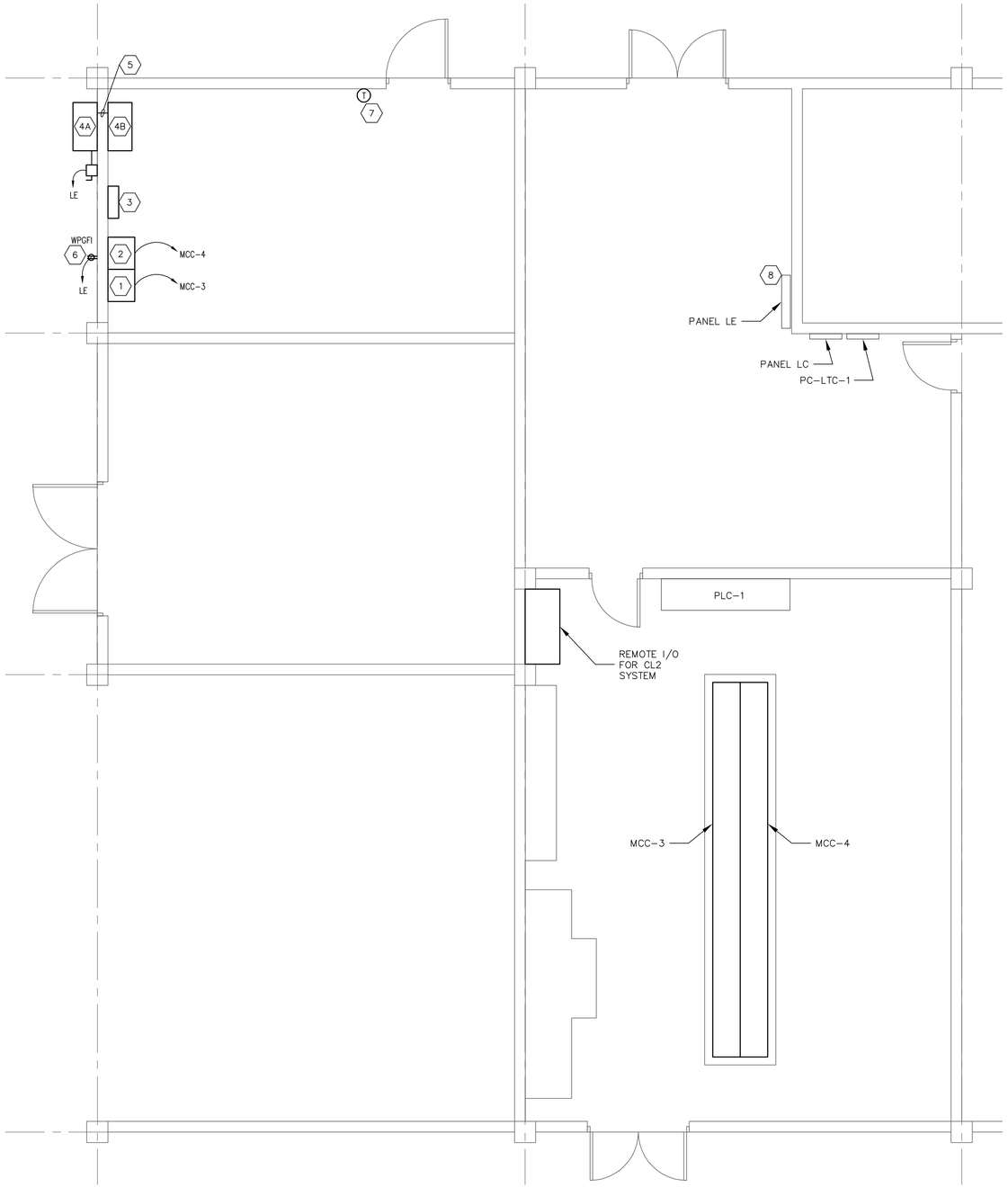

PLAN

SCALE: 1/4" = 1'-0"

NOTES:

1. REFER TO SHEET E001 FOR GENERAL ELECTRICAL NOTES ABBREVIATIONS AND SYMBOLS
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL LOCAL ELECTRICAL CODES
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   a. EXPOSED CONDUIT SHALL BE RIGID STEEL.
   b. CONDUIT PENETRATING FROM UNDERGROUND SHALL BE PVC COATED RIGID STEEL. REFER TO DETAILS.
   c. EXPOSED CONDUIT 8 FEET ABOVE THE FLOOR OR HIGHER SHALL BE EMT.
   d. CONDUIT BELOW GRADE SHALL BE CONCRETE ENCASED SCH. 40 PVC.
4. CONTRACTOR SHALL COORDINATE AND FIELD ROUTE ALL CONDUIT.
5. CONTRACTOR SHALL RUN CONTROL AND SIGNAL CONDUIT IN SEPARATE CONDUIT BANK FROM 120 AND 480V POWER CONDUIT.
6. ALL POWER AND CONTROL WIRE SHALL HAVE XHHW-2 INSULATION.
7. REFER TO ELECTRICAL POWER AND CONTROL SINGLE LINE DIAGRAMS

KEYNOTES:

1. TRANSFER PUMP NO. 1 VFD-851.
2. TRANSFER PUMP NO. 2 VFD-852.
3. SIGNAL TERMINATION BOX FOR CONTROLS AND SIGNALS FROM VFDS TO LCP-850 AT TRANSFER PUMP STATION.
4. SPLIT SYSTEM HEAT PUMP FOR STORAGE ROOM SHALL CONSIST OF THE FOLLOWNG:
   a. OUTDOOR UNIT: 18 MBH, 208V SINGLE PHASE, MITSUBISHI PUZA18NAHHA4 OR EQUAL BY DAIKIN, OR LG.
   b. INDOOR UNIT: WALL MOUNTED, DUCTLESS, 208V SINGLE PHASE, MITSUBISHI PKA-A18H4, OR EQUAL BY DAIKIN, OR LG.
5. INTERCONNECTING WIRE BETWEEN INDOOR AND OUTDOOR UNITS, .75 INCH CONDUIT. INTERCONNECTING REFRIGERANT PIPING. INSTALL PER LOCAL CODES AND MANUFACTUER'S REQUIREMENTS.
6. WPGFI SERVICE RECEPTACLE
7. THERMOSTAT FOR HEAT PUMP
8. INSTALL THE FOLLOWING BREAKERS IN EXISTING 120/208V PANELBOARD LE. UPDATE PANELBOARD SCHEDULE.
   a. 2 POLE, 20A (208V POWER TO SPLIT SYSTEM HEAT PUMP
   b. 1 POLE 15 AMP (120V POWER TO HVAC SERVICE RECEPTACLE)

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

OPERATIONS BUILDING PARTIAL PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: AS SHOWN
VERTICAL: NA

DRAWING NUMBER
E9

STATUS: ISSUED FOR BID
REVISION

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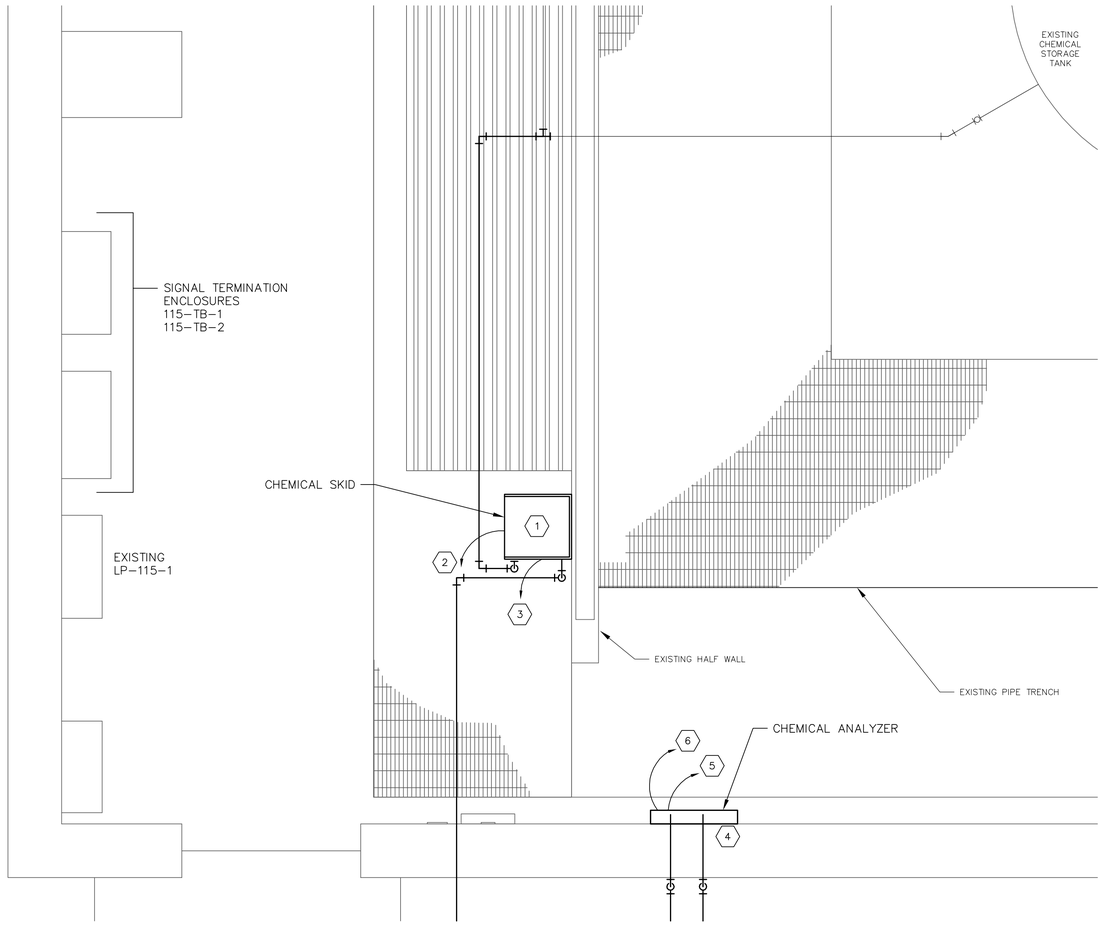

CHEMICAL BUILDING

SCALE: 3/4" = 1'

PANEL: 115-LP-1 (EXISTING)

ENCLOSURE: NEMA: 1 MOUNTING: SURFACE — MAIN: 80A — MB ☒ MLO ☐

VOLTS: 120/208V, 3 PHASE, 4 WIRE — NEUTRAL: — 100% ☒ 200% ☐

LOCATION: — BRACING: 10,000A FULLY RATED — FEED:

LOAD SERVED	LOAD (KVA) A	LOAD (KVA) B	LOAD (KVA) C	BREAKER AMP	BREAKER POLE	BRANCH CIRCUIT CONDUIT & WIRING	CKT	PH	CKT	BRANCH CIRCUIT CONDUIT & WIRING	BREAKER AMP	BREAKER POLE	LOAD (KVA) A	LOAD (KVA) B	LOAD (KVA) C	LOAD SERVED
INTERIOR OVERHEAD LTG.	0.75			20	1	(EXISTING)	1	A	2	(EXISTING)	20	1	0.00			SURGE ARRESTOR
INTERIOR OVERHEAD LTG.		0.75		20	1	(EXISTING)	3	B	4	(EXISTING)	20	1		0.00		SURGE ARRESTOR
EXTERIOR LIGHTING			0.75	20	1	(EXISTING)	5	C	6	(EXISTING)	20	1			0.72	INTERIOR RECEPTACLES
LIT-115-1, 2, & 3	0.20			20	1	(EXISTING)	7	A	8	(EXISTING)	20	1	0.54			EXTERIOR RECEPTACLES
EMERGENCY EYEWASH		0.10		20	1	(EXISTING)	9	B	10	(EXISTING)	20	1		0.20		EXIT LIGHTS
AIT-853			**0.20**	20	1	2#12, 1#12G, .75"C	11	C	12	(EXISTING)	20	1			0.10	GAS DETECTOR
SPARE	0.00			20	1		13	A	14		20	1	0.00			SPARE
CL2 FEED PUMP NO.10 (P-624)		**0.50**		20	1	2#12, 1#12G, .75"C	15	B	16		20	1		0.00		SPARE
SPARE			0.00	20	1		17	C	18		20	1			0.00	SPARE
TOTAL(S):	0.95	1.35	0.95										0.54	0.20	0.82	

TOTAL BUS A LOAD: 1.49 KVA

TOTAL BUS B LOAD: 1.55 KVA

TOTAL CONNECTED KVA: 4.81 — TOTAL BUS C LOAD: 1.77 KVA

SCHEDULE NOTES:

1. PANELBOARD 115-LP-1 IS EXISTING.
2. UTILIZE SPARE BREAKERS FOR NEW CIRCUITS SHOWN.

NOTES:

1. REFER TO SHEET E001 FOR GENERAL ELECTRICAL NOTES ABBREVIATIONS AND SYMBOLS
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL LOCAL ELECTRICAL CODES
3. CONDUIT IN THE BUILDING SHALL BE AS FOLLOWS:
   a. EXPOSED CONDUIT SHALL BE RIGID STEEL.
   b. CONDUIT PENETRATING FROM UNDERGROUND SHALL BE PVC COATED RIGID STEEL. REFER TO DETAILS.
   c. EXPOSED CONDUIT 8 FEET ABOVE THE FLOOR OR HIGHER SHALL BE EMT.
   d. CONDUIT BELOW GRADE SHALL BE CONCRETE ENCASED SCH. 40 PVC.
4. CONTRACTOR SHALL COORDINATE AND FIELD ROUTE ALL CONDUIT.
5. CONTRACTOR SHALL RUN CONTROL AND SIGNAL CONDUIT IN SEPARATE CONDUIT BANK FROM 120 AND 480V POWER CONDUIT.
6. ALL POWER AND CONTROL WIRE SHALL HAVE XHHW-2 INSULATION.
7. REFER TO ELECTRICAL POWER AND CONTROL SINGLE LINE DIAGRAMS.

KEYNOTES:

1. NEW SODIUM HYPOCHLORITE FEED PUMP 10 AND SKID.
2. INSTALL 2 #12, 1 #12G IN .75" CONDUIT TO EXISTING 120/208V PANELBOARD LP-115-1 FOR SODIUM HYPOCHLORITE FEED PUMP 10 (P-624).
3. INSTALL 4 #14, 1 #14G IN .75" CONDUIT TO 115-TB-1 AND 2-TSP IN .75" CONDUIT TO 115-TB-2 FROM SODIUM HYPOCHLORITE FEED PUMP 10 (P-624).
4. NEW CHLORINE ANALYZER AIT-853.
5. INSTALL 2 #12, 1 #12G IN .75" CONDUIT TO EXISTING 120/208V PANELBOARD 115-LP-1 FOR AIT-853.
6. INSTALL 4 #14, 1 #14G IN .75" CONDUIT 115-TB-1 AND 2-TSP IN .75" CONDUIT TO 115-TB-2 FROM AIT-853.

REV.NO.	DESCRIPTIONS	DATE

REVISIONS

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

CHEMICAL BUILDING WITH IMPROVED CHEMICAL SYSTEM ELECTRICAL PLAN

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE — HORIZONTAL: NTS — VERTICAL: NTS

DRAWING NUMBER: E10

STATUS: ISSUED FOR BID — REVISION

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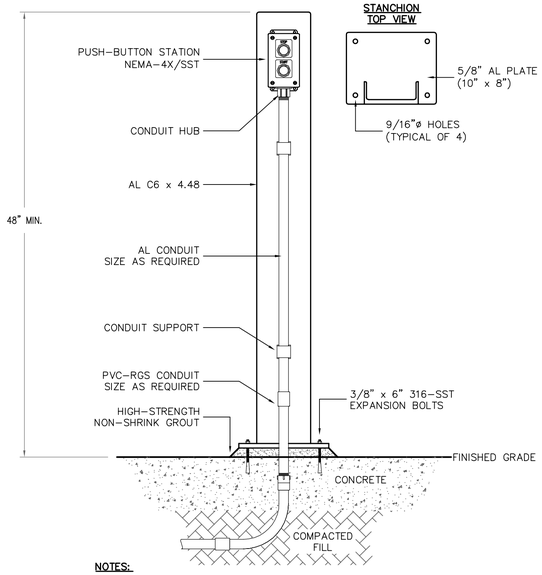
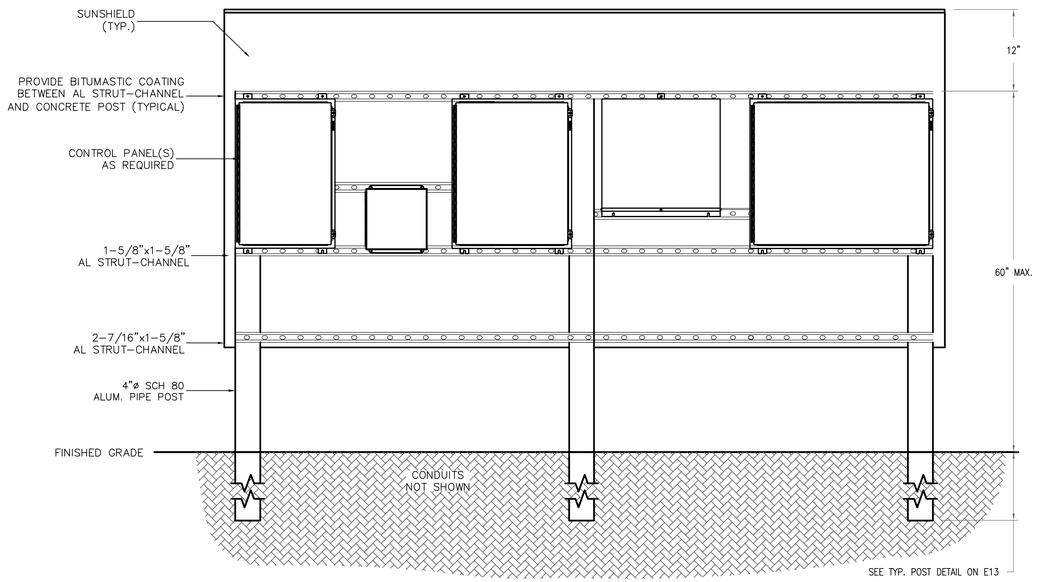


NOTES:

1. FILE AND ROUND ALL CORNERS SMOOTH, REAM ALL HOLES AND REMOVE ALL SLAG.
2. USE 316-SST FASTENERS, HARDWARE AND CONDUIT STRAPS.
3. PROVIDE AND INSTALL 18"ø X 30" DEEP CONCRETE FOUNDATION WHERE MOUNTING SURFACE IS NOT AVAILABLE.
4. NYLON SPACERS SHALL BE USED ON ALL ALUMINUM MATERIALS IN CONTACT WITH CONCRETE OR COATED WITH BITUMASTIC PAINT.

PUSH-BUTTON STANCHION DETAIL

N.T.S.

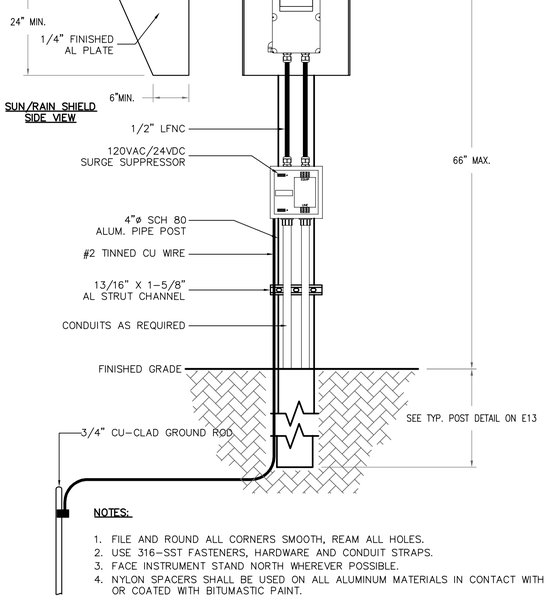


ELECTRICAL EQUIPMENT RACK FIELD MOUNTING DETAIL

N.T.S.

GENERAL NOTES:

1. CONTRACTOR SHALL SUBMIT LAYOUT OF ELECTRICAL EQUIPMENT RACK.
2. CONTRACTOR SHALL NOT CONSTRUCT ELECTRICAL EQUIPMENT RACK PRIOR TO RECEIVING APPROVED SUBMITTAL, INCLUDING ORDERING AND FABRICATION OF MATERIALS.
3. ALL EQUIPMENT MOUNTING HARDWARE SHALL BE 316 STAINLESS-STEEL.
4. CONCRETE SHALL BE 3000psi. CONCRETE PADS SHALL BE REINFORCED WITH 6x6-1.4Wx1.4W WWF. PAD SHALL EXTEND 36" OUT FROM DEEPEST PANEL AND 6" OUT FROM SIDES OF SUN/RAIN HOOD.
5. PROVIDE ADDITIONAL VERTICAL 6" 'I-BEAM' POSTS AND BASES LIKE THOSE SHOWN ON PLANS TO SPAN GREATER DISTANCES GREATER THAN 96".
6. ALARM STROBE SHALL BE MOUNTED, WATER-TIGHT, ATOP PUMP CONTROL PANEL 'POP'.
7. PROVIDE WEATHERPROOF CORROSION RESISTANT FLUORESCENT FIXTURE MOUNTED UNDERNEATH SUN/RAIN HOOD, LIGHT SWITCH AND GFIC RECEPTACLE.
8. STRUT-CHANNEL SHALL BE MOUNTED TO 'I-BEAM' POSTS WITH STAINLESS-STEEL FASTENERS AND GALVANIZED CLAMPING HARDWARE.
9. THE BOTTOM OF EQUIPMENT SHALL BE MOUNTED NO LESS THAN 20" ABOVE FINISHED CONCRETE PERSONNEL PAD.
10. CONDUITS SHALL BE INSTALLED UNBROKEN (NO FITTINGS, COUPLINGS, UNIONS, ETC.) THROUGH CLASS-1/DIV-II BOUNDARY.
11. REFER TO SHEET E-0.01 FOR GENERAL ELECTRICAL NOTES, ABBREVIATIONS AND SYMBOLS.

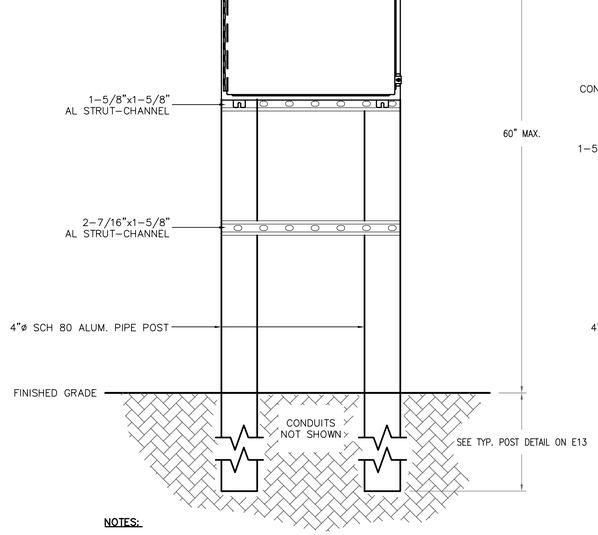


NOTES:

1. FILE AND ROUND ALL CORNERS SMOOTH, REAM ALL HOLES.
2. USE 316-SST FASTENERS, HARDWARE AND CONDUIT STRAPS.
3. FACE INSTRUMENT STAND NORTH WHEREVER POSSIBLE.
4. NYLON SPACERS SHALL BE USED ON ALL ALUMINUM MATERIALS IN CONTACT WITH CONCRETE OR COATED WITH BITUMASTIC PAINT.

INSTRUMENT STAND - 4" ALUM. PIPE DETAIL

N.T.S.

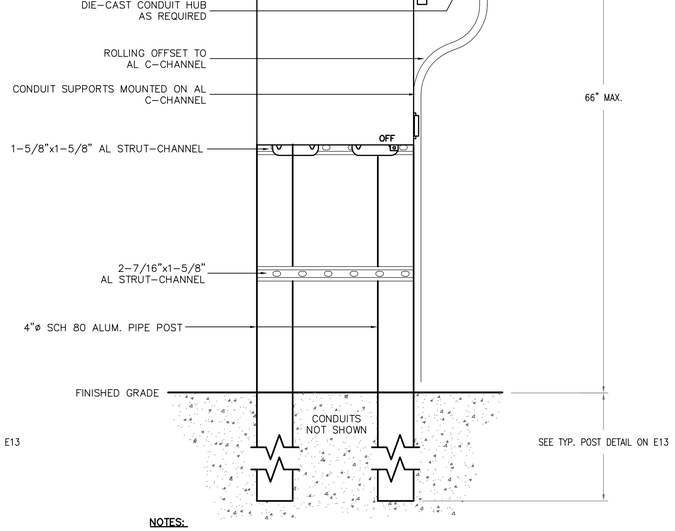


NOTES:

1. FILE AND ROUND ALL CORNERS SMOOTH, REAM ALL HOLES.
2. USE 316-SST FASTENERS, HARDWARE AND CONDUIT STRAPS.
3. PROVIDE ADDITIONAL CONCRETE POSTS FOR SPANS GREATER THAN 60".
4. NYLON SPACERS SHALL BE USED ON ALL ALUMINUM MATERIALS IN CONTACT WITH CONCRETE OR COATED WITH BITUMASTIC PAINT.

ELECTRICAL/CONTROL PANEL FIELD MOUNTING DETAIL

N.T.S.



NOTES:

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2. USE 316-SST FASTENERS, HARDWARE AND CONDUIT STRAPS.
3. PROVIDE ADDITIONAL CONCRETE POSTS FOR SPANS GREATER THAN 60".
4. NYLON SPACERS SHALL BE USED ON ALL ALUMINUM MATERIALS IN CONTACT WITH CONCRETE OR COATED WITH BITUMASTIC PAINT.

PANEL/DISCONNECT CONCRETE FLOOR MOUNTING DETAIL

N.T.S.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

ELECTRICAL DETAILS 1

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E11

STATUS: ISSUED FOR BID
REVISION

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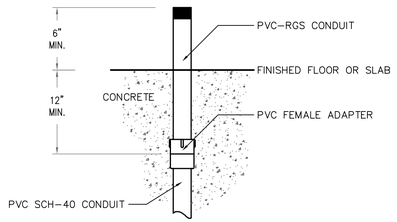
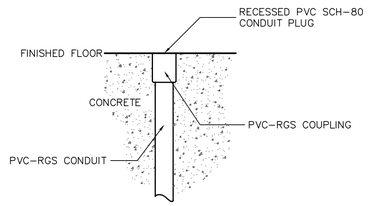
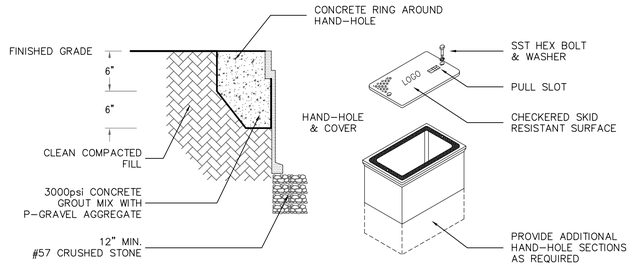


CONDUIT STUB–UP DETAIL (NEW)
N.T.S.



CONDUIT STUB–UP DETAIL (FUTURE)
N.T.S.



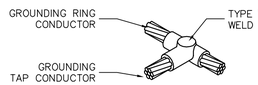
NOTES:

1. HOUSING SHALL BE REINFORCED CONCRETE AND SHALL HAVE A COMPRESSIVE STRENGTH NO LESS THAN 10,000psi.
2. HAND–HOLE AND COVER SHALL BE RATED FOR AASHTO H20 LOADING.
3. PROVIDE STAINLESS STEEL BOLTS, WASHERS AND INSERTS.
4. PROVIDE COVER LOGO "ELECTRICAL" "CONTROLS" OR "COMMUNICATIONS" AS APPLICABLE OR INDICATED ON THE DRAWINGS.
5. MINIMUM BOX SIZE SHALL BE 24" LONG x 24" WIDE x 24" DEEP.

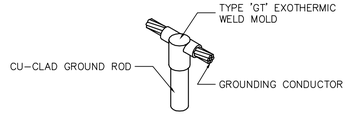
TRAFFIC RATED HAND–HOLE DETAIL
N.T.S.

GENERAL NOTES:

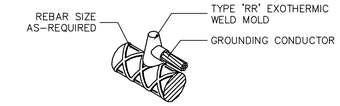
1. REFER TO SHEET E–0.1 FOR GENERAL ELECTRICAL NOTES, ABBREVIATIONS AND SYMBOLS.



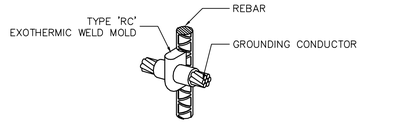
EXOTHERMIC WELD 'TA' CONNECTION
N.T.S.



EXOTHERMIC WELD 'GT' CONNECTION
N.T.S.



EXOTHERMIC WELD 'RR' CONNECTION
N.T.S.



EXOTHERMIC WELD 'RC' CONNECTION
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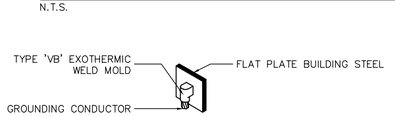
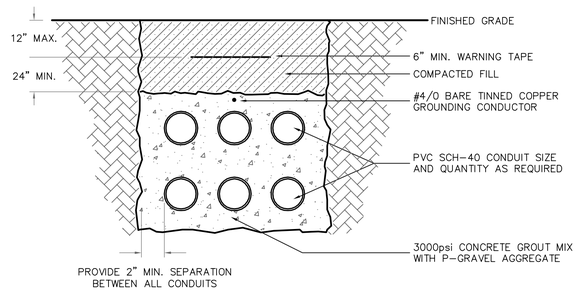
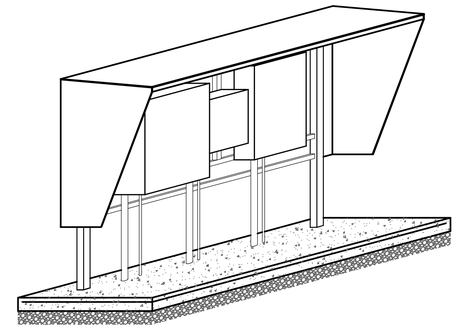


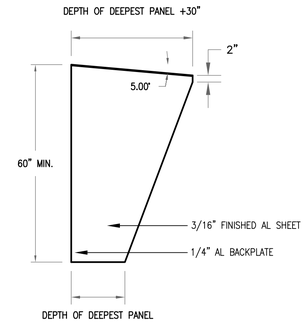
EXOTHERMIC WELD 'VB' CONNECTION
N.T.S.



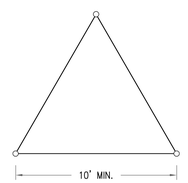
NON–REINFORCED CONCRETE DUCTBANK (YARD PIPING)
N.T.S.



SUN/RAIN HOOD TYPICAL (ISOMETRIC)
N.T.S.

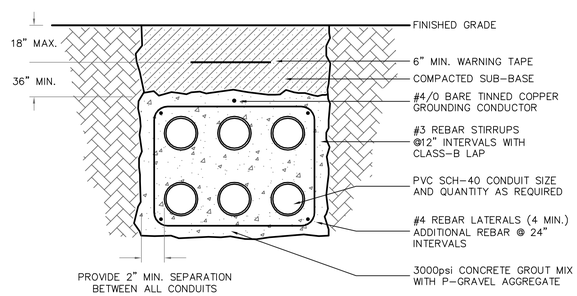


SUN/RAIN HOOD DETAIL (SIDE–VIEW)
N.T.S.

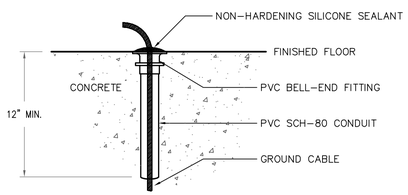


TOP VIEW

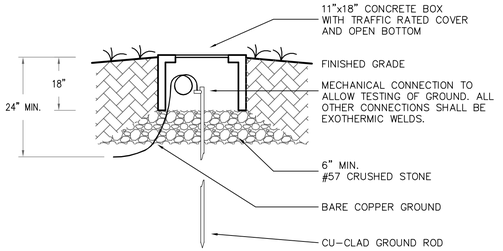
GROUND ROD TRIODE DETAIL
N.T.S.



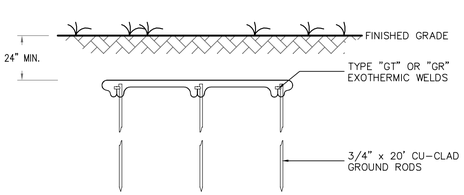
REINFORCED CONCRETE DUCTBANK (ROADWAY CROSSING)
N.T.S.



GROUND CABLE SLEEVE DETAIL
N.T.S.



GROUND ROD TEST WELL DETAIL
N.T.S.



GROUND ROD TRIODE DETAIL
N.T.S.

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REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

ARTHUR L. ANCHORS, P.E.
No. 39804

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EB0006691
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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

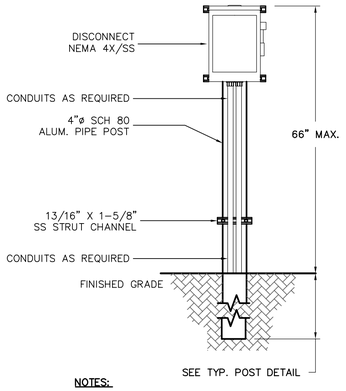
ELECTRICAL DETAILS 2

DATE:	MARCH 2014
MCE PROJ. #	5883–0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E12

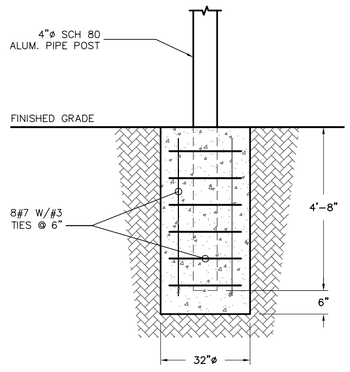
STATUS: ISSUED FOR BID
REVISION



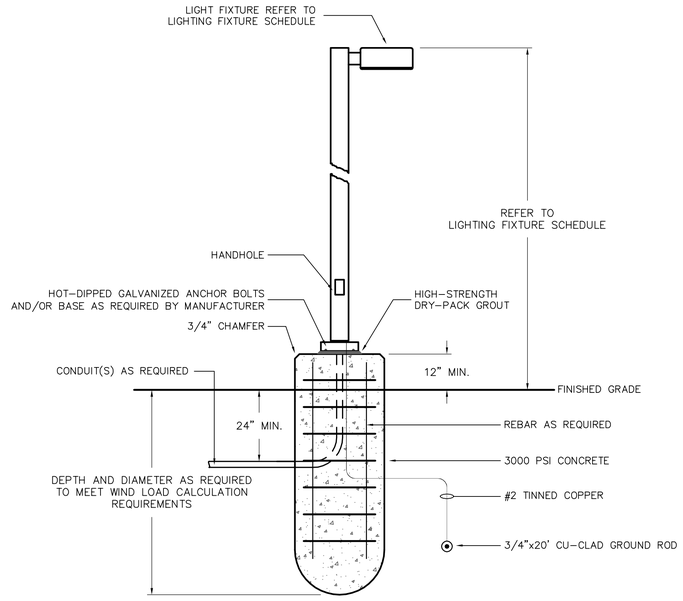
NOTES:

1. FILE AND ROUND ALL CORNERS SMOOTH, REAM ALL HOLES.
2. USE 316-SST FASTENERS, HARDWARE AND CONDUIT STRAPS.
3. NYLON SPACERS SHALL BE USED ON ALL ALUMINUM MATERIALS IN CONTACT WITH CONCRETE OR COATED WITH BITUMASTIC PAINT.

DISCONNECT DETAIL
N.T.S



TYPICAL 4"ø POST BASE DETAIL
N.T.S



DETAIL NOTES:

1. LIGHT-POLE CONCRETE ANCHOR BASE SHALL BE PROVIDED AND INSTALLED PER LIGHT-POLE FIXTURE MANUFACTURER INSTRUCTIONS.
2. CONTRACTOR SHALL SUBMIT SIGNED AND SEALED DRAWINGS AND DESIGN CALCULATIONS FOR THE CONCRETE ANCHOR BASE IN ACCORDANCE WITH THE LATEST EDITION OF THE FLORIDA BUILDING CODE.
3. DESIGN SUBMITTAL SHALL BE FROM A CURRENTLY LICENSED STRUCTURAL ENGINEER BY THE STATE OF FLORIDA.
4. CONCRETE ANCHOR BASE DESIGN SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE PROJECT GEOTECHNICAL REPORT.
5. CONTRACTOR SHALL PROVIDE GEOTECHNICAL REPORT(S) FOR THE PROJECT SITE(S) IF NOT ALREADY REQUIRED BY CONTRACT DOCUMENTS.
6. CONTRACTOR SHALL NOT CONSTRUCT CONCRETE ANCHOR BASE PRIOR TO RECEIVING APPROVED SUBMITTAL, INCLUDING ORDERING AND FABRICATION OF MATERIALS.
7. PROVIDE ANCHORS, HARDWARE, SUPPORTS, ETC., AS NEEDED TO LIGHT-POLE FIXTURE.

LIGHT-POLE & CONCRETE ANCHOR BASE DETAIL
N.T.S.

REV.NO.	DESCRIPTIONS	DATE
	REVISIONS	

SEAL

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City Of Venice

CITY OF VENICE
EASTSIDE WRF RECLAIMED WATER FILTRATION SYSTEM IMPROVEMENTS

ELECTRICAL DETAILS 3

DATE:	MARCH 2014
MCE PROJ. #	5883-0005
DRAWN	JZM
DESIGNED	ALA
CHECKED	JSL
PROJ. MGR.	MSL

SCALE
HORIZONTAL: NTS
VERTICAL: NTS

DRAWING NUMBER
E13

STATUS: ISSUED FOR BID
REVISION

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