INVITATION FOR BID
(IFB) #10-3050-OV
Construction of Wastewater PS 428 Booster Pump Station
East Bradenton, Manatee County, FL / Project No. 6055480

Manatee County, a political subdivision of the State of Florida, (hereinafter the "County") will receive sealed bids from individuals, corporations, partnerships, and other legal entities organized under the laws of the State of Florida or authorized to conduct business in the State of Florida.

NON-MANDATORY INFORMATION CONFERENCE
In order to insure that all prospective bidders have sufficient information and understanding of the County's needs, an **Information Conference** will be held **August 31, 2010 @ 2:00 PM. Location: Manatee County Public Works Department, 1022 26th Avenue East, Conference Room "A", Bradenton, FL 34208.** Attendance is not mandatory, but is highly encouraged.

REF: B.04 An inspection of the project site shall be acknowledged in Section 00300, Bid Form, page 00300-1.

DEADLINE FOR CLARIFICATION REQUESTS: September 17, 2010 at 5:00 PM
(Reference Bid Article A.06)

TIME AND DATE DUE: October 7th at 2:00 PM
Manatee County Purchasing, 1112 Manatee Avenue West, Bradenton, FL 34205

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Important Note: Lobbying is prohibited (reference Bid Article A.08)

FOR INFORMATION CONTACT:
Olga Valcich (941) 708-7527/olga.valcich@mymanatee.org

AUTHORIZED FOR RELEASE:

SECTION 00010
INFORMATION TO BIDDERS

A.01 OPENING LOCATION

These bids will be **publicly opened** at **Manatee County Purchasing, 1112 Manatee Avenue West, Suite 803, Bradenton, Florida 34205** in the presence of County officials at the time and date stated, or soon thereafter. All bidders or their representatives are invited to be present.

Any bids received after the stated time and date will not be considered. It shall be the sole responsibility of the bidder to have their bid delivered to the Manatee County Purchasing Division for receipt on or before the stated time and date. If a bid is sent by U.S. Mail, the bidder shall be responsible for its timely delivery to the Purchasing Division. Bids delayed by mail shall not be considered, shall not be opened at the public opening, and arrangements shall be made for their return at the respondent's request and expense.

A.02 SEALED & MARKED

One original and two copies of your **signed bid** shall be submitted in one sealed package, clearly marked on the outside "**Sealed Bid #10-3050-OV / Construction of Wastewater PS 428 Booster Pump Station, East Bradenton, FL.**

Address package to: Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, Florida 34205

A.03 SECURING OF DOCUMENTS

Complete individual copies of the bidding documents for the project and/or products can be obtained, free of charge, at the Manatee County Public Works Department located at: 1022 26th Avenue East, Bradenton, FL 34208: **941-708-7450, Extension 7420 or 7334** between the hours of 8:00 AM to 4:00 PM, Monday through Friday, exception of holidays. Complete set of the bidding document must be used in preparing bids. The County assumes no responsibility for errors and misinterpretations resulting from the use of incomplete sets of bidding document.

A.04 BID DOCUMENTS

Bids on http://www.mymanatee.org , Bid documents and the Notices of Source Selection related to those Bids are available for download in a portable document format (.PDF) file on the Manatee County web page on the Purchasing tab under "Bids." You may view and print these files using Adobe Acrobat software. You may download a free copy of this software (Adobe) from the County's web page if you do not have it.
Manatee County collaborates with the Manatee Chamber of Commerce on distributing solicitations using the RFP Tool web page on the Chambers website: http://www.Manateechamber.com to post Bid documents in a portable document

A.04 BID DOCUMENTS (Continued)
format (.PDF) file. This step is in addition to the posting on Manatee County Government web pages.

Manatee County may also use an internet service provider to distribute Bids. A link to that service, http://www.DemandStar.com, is provided on this website under the Tab "DemandStar". Participation in the DemandStar system is not a requirement for doing business with Manatee County.

Note: The County posts the Notice of Source Selection seven calendar days prior to the effective date of the award.

IT IS THE RESPONSIBILITY OF EACH VENDOR, PRIOR TO SUBMITTING THEIR BID, TO CONTACT THE MANATEE COUNTY PURCHASING OFFICE (see contact information on page one of this document) TO DETERMINE IF ADDENDA WERE ISSUED AND TO MAKE SUCH ADDENDA A PART OF THEIR BID .

A.05 MODIFICATION OF BID SPECIFICATIONS
If a bidder wishes to recommend changes to the bid specifications, the bidder shall furnish in writing, data and information necessary to aid the County in evaluating the request to modify the specifications. The County is not obligated to make any changes to the bid specifications. Unless an addendum is issued, the bid specifications shall remain unaltered. **Bidders must fully comply with the bid specifications, terms, and conditions.**

A.06 DEADLINE FOR CLARIFICATION REQUESTS
September 17, 2010 at 5:00 PM shall be the deadline to submit all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to the Invitation for Bids to the Manatee County Purchasing Office.

This deadline has been established to maintain fair treatment for all potential bidders, while maintaining the expedited nature of the Economic Stimulus that the contracting of this work may achieve.

A.07 CLARIFICATION & ADDENDA
Each bidder shall examine all Invitation for Bids documents and shall judge all matters relating to the adequacy and accuracy of such documents. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to the Invitation for Bids shall be made through the Manatee County Purchasing Office. The County shall not be responsible for oral interpretations given by any County employee, representative, or others. The issuance of a written addendum is the only official method whereby interpretation, clarification or additional information can be given.

A.07 CLARIFICATION & ADDENDA (Continued)

If any addenda are issued to this Invitation for Bid, the County will Broadcast the addenda on the Demand Star distribution system to "Planholders" on this web service, and post the documents on the Purchasing Division's web page at http://www.mymanatee.org which can be accessed by clicking on the "Purchasing" button and then clicking on the "Bids" button. It shall be the responsibility of each bidder, prior to submitting their bid, to contact Manatee County Purchasing (see contact on page 1) to determine if addenda were issued and to make such addenda a part of their bid.

A.08 LOBBYING

After the issuance of any Invitation For Bid, prospective bidders, or any agent, representative or person acting at the request of such bidder shall not contact, communicate with or discuss any matter relating in any way to the Invitation For Bid with any officer, agent or employee of Manatee County other than the Purchasing Director or as directed in the Invitation For Bid. This prohibition begins with the issuance of any Invitation For Bid, and ends upon execution of the final contract or when the invitation has been canceled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Purchasing Code.

The County reserves the right to amend or to add to the names listed as persons to contact. All amendments or additions to the names listed as persons to contact shall be issued by the Purchasing Division, in writing.

A.09 UNBALANCED BIDDING PROHIBITED

Manatee County recognizes that large and/or complex projects will often result in a variety of methods, sources and prices; however, where in the opinion of the County such variation does not appear to be justified, given bid specifications and industry and market conditions, the bid will be presumed to be unbalanced. Examples of unbalanced bids will include:

1. Bids showing omissions, alterations of form, additions not specified or required conditional or unauthorized alternate bids.
2. Bids quoting prices that substantially deviate, either higher or lower, from those included in the bids of competitive bidders for the same line item unit costs.
3. Bids where the unit costs offered are in excess of or below reasonable cost analysis values.

In the event the County determines that a bid is presumed unbalanced, it will request the opportunity to, and reserves the right to, review all sources quotes, bids, price lists, letters of intent, etc., which the bidder obtained and upon which the bidder relied upon to develop the bid. The County reserves the right to reject as non-responsive any

A.09 UNBALANCED BIDDING PROHIBITED (Continued)
presumptive unbalanced bids where the bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs.

A.10 FRONT END LOADING OF BID PRICING PROHIBITED
Prices offered for performance and/or acquisition activities to occur early in the project schedule, such as: mobilization, clearing and grubbing; or maintenance of traffic, that are substantially higher than pricing of competitive bidders within the same portion of the project schedule, will be presumed to be front end loaded. Front end loaded bids could reasonably appear to be an attempt to obtain unjustified early payments creating a risk of insufficient incentive for the Contractor to complete the work or otherwise creating an appearance of an under-capitalized bidder.

In the event the County determines that a bid is presumed to be front end loaded, it will request the opportunity to, and reserves the right to, review all source quotes, bids, price lists, letters of intent, etc., which the bidder obtained and upon which the bidder relied upon to develop the pricing or acquisition timing for these bid items. The County reserves the right to reject as non-responsive any presumptive front end loaded bids where the bidder is unable to demonstrate the validity and/or necessity of the front end loaded costs.

A.11 WITHDRAWAL OF OFFERS
Vendors may withdraw offers as follows: a) Mistakes discovered before the opening of a solicitation may be withdrawn by written notice from the bidder submitting the offer. This request must be received in the office designated for receipt of offers in the solicitation document prior to the time set for delivery and opening of the offers. A copy of the request shall be retained and the unopened offer returned to that vendor. b) After the responses to a solicitation are opened or a selection has been determined, but before a contract is signed, a vendor alleging a material mistake of fact may be permitted to withdraw their offer if: (1) the mistake is clearly evident on the solicitation document; or (2) the bidder submits evidence which clearly and convincingly demonstrates that a mistake was made. Request to withdraw and offer must be in writing and approved by the Purchasing Official.

A.12 IRREVOCABLE OFFER
Any bid may be withdrawn up until the date and time set for opening of the bid. Any bid not so withdrawn shall, upon opening, constitute an irrevocable offer for a period of 90 days to sell to Manatee County the goods or services set forth in the attached specifications until one or more of the bids have been duly accepted by the County.

A.13 BID EXPENSES
All expenses for making bids to the County are to be borne by the bidder.

A.14 RESERVED RIGHTS

The County reserves the right to accept or reject any and/or all bids, to waive irregularities and technicalities, and to request resubmission. Also, the County reserves the right to accept all or any part of the bid and to increase or decrease quantities to meet additional or reduced requirements of the County. Any sole response received by the first submission date may or may not be rejected by the County depending on available competition and current needs of the County. For all items combined, the bid of the lowest responsive, responsible bidder will be accepted, unless all bids are rejected. The lowest responsible bidder shall mean **that bidder who makes the lowest bid to sell goods and/or services of a quality which** conforms closest to or most exceeds the quality of goods and/or services set forth in the attached specifications or otherwise required by the County, and who is fit and capable to perform the bid as made.

To be responsive, a bidder shall submit a bid which conforms in all material respects to the requirements set forth in the Invitation For Bid. To be a responsible bidder, the bidder shall have the capability in all respects to perform fully the contract requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance. Also, the County reserves the right to make such investigation as it deems necessary to determine the ability of any bidder to furnish the service requested. Information the County deems necessary to make this determination shall be provided by the bidder. Such information may include, but shall not be limited to: current financial statements, verification of availability of equipment and personnel, and past performance records.

A.15 APPLICABLE LAWS

Bidder must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting agreement. Any involvement with any Manatee County procurement shall be in accordance with Manatee County Purchasing Code of Laws as amended. Any actual or prospective bidder who is aggrieved in connection with the solicitation or award of a contract may protest to the Board of County Commissioners of Manatee County as required in Section 2-26/61 of the Purchasing Code.

A protest with respect to this Invitation For Bid shall be submitted in writing prior to the scheduled opening date of this bid, unless the aggrieved person did not know and could not have been reasonably expected to have knowledge of the facts giving rise to such protest prior to the scheduled opening date of this bid. The protest shall be submitted within seven calendar days after such aggrieved person knows or could have reasonably been expected to know of the facts giving rise thereto.

A.16 COLLUSION

By offering a submission to this Invitation For Bid, the bidder certifies that he has not divulged, discussed or compared their bid with other bidder, and has not colluded with any other bidder or parties to this bid whatsoever. Also, bidder certifies, and in the case

A.16 COLLUSION (Continued)
of a joint bid each party thereto certifies as to their own organization, that in connection with this bid:

a. any prices and/or cost data submitted have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices and/or cost data, with any other bidder or with any competitor;

b. any prices and/or cost data quoted for this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder, prior to the scheduled opening, directly or indirectly to any other bidder or to any competitor;

c. no attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition;

d. the only person or persons interested in this bid, principal or principals is/are named therein and that no person other than therein mentioned has any interest in this bid or in the contract to be entered into; and

e. no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding or a commission, percentage, brokerage, or contingent fee excepting bona fide employees or established commercial agencies maintained by bidder for purpose of doing business.

A.17 CODE OF ETHICS
With respect to this bid, if any bidder violates or is a party to a violation of the Code of Ethics of Manatee County per Manatee County Purchasing Code Ordinance 08-43, Article 3, Ethics in Public Contracting, and/or the State of Florida per Florida Statutes, Chapter 112, Part III, Code of Ethics for Public Officers and Employees, such bidder may be disqualified from performing the work described in this bid or from furnishing the goods or services for which the bid is submitted and shall be further disqualified from submitting any future bids for work or for goods or services for Manatee County. The County anticipates that all statements made and materials submitted in a bid will be truthful. If a bidder is determined to be untruthful in its bid or any related presentation, such bidder may be disqualified from further consideration regarding this Invitation For Bid.

A.18 BID FORMS

Bids must be submitted on attached County forms, although additional pages may be attached. **Bidders must fully complete all pages of the Bid Forms for both Bid A and Bid B. Bid Forms must be executed by an authorized signatory who has the legal authority to make the offer and bind the company. Bidders must fully comply with all specifications, terms and conditions**.

A.19 LEGAL NAME

Bids shall clearly indicate the legal name, address and telephone number of the bidder. Bids shall be signed above the typed or printed name and title of the signer. The signer must have the authority to bind the bidder to the submitted bid.

A.20 DRUG FREE WORK PLACE

The Manatee County Board of County Commissioners adopted a policy regarding bidders maintaining a Drug Free Work Place, prohibiting the award of bids to any person or entity that has not submitted written certification to the County that it has complied with those requirements. A Drug Free Work Place Certification Form is attached to this bid for this purpose.

A.21 BE GREEN

All Bidders are encouraged to use as many environmentally preferable "green" products, materials, supplies, etc. as possible in order to promote a safe and healthy environment. Environmentally preferable are products or services that have a reduced adverse effect on the environment. Provide detail of your organization's initiative and its ability to meet the goal of environmental sustainability.

A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES

A person or affiliate who has been placed on the State's convicted vendor list following a conviction for a public entity crime, as that term is defined in Florida Statute § 287.133, may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in Florida Statute § 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted list.

In addition, the Manatee County Code prohibits the award of any contract to any person or entity who/which has, within the past 5 years, been convicted of, or admitted to in court or sworn to under oath, a public entity crime or of any environmental law that, in the reasonable opinion of the purchasing official, establishes reasonable grounds to believe the person or business entity will not conduct business in a responsible matter.

A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES (Continued)

To insure compliance with the foregoing, the Code requires all persons or entities desiring to contract with the County to execute and file with the purchasing official an affidavit, executed under the pain and penalties of perjury, confirming that person, entity and any person(s) affiliated with the entity, does not have such a record and is therefore eligible to seek and be awarded business with the County.

In the case of a business entity other than a partnership or a corporation, such affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, such affidavit shall be executed by the general partner(s). A Public Contracting and Environmental Crimes Certification is attached for this purpose.

A.23 DISCOUNTS

Any and all discounts must be incorporated in the prices contained in the bid and not shown separately. The prices as shown on the bid form shall be the price used in determining award.

A.24 TAXES

Manatee County is exempt from Federal Excise and State Sales Taxes. (F.E.T. Exempt Cert. No. 59-78-0089K; FL Sales Tax Exempt Cert. NO 85-8012622206C-6); therefore, the vendor is prohibited from delineating a separate line item in his bid for any sales or service taxes. Nothing herein shall affect the vendor's normal tax liability.

A.25 DESCRIPTIVE INFORMATION

Unless otherwise specifically provided in the specifications, all equipment, materials and articles incorporated in the work covered by this contract shall be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the specifications, reference to any equipment, material, article or patented process, by trade name, brand name, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

A.26 AMERICANS WITH DISABILITIES ACT

The Board of County Commissioners of Manatee County, Florida, does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of the County's functions including one's access to, participation, employment, or treatment in its programs or activities. Anyone requiring reasonable accommodation for an **Information Conference** or **Bid Opening** should contact the person named on the first page of this bid document at least twenty-four (24) hours in advance of either activity.

A.27 EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

Manatee County, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 and the Regulations of the Department of Commerce (15 CFR, Part 8) issued pursuant to such Act, hereby notifies all vendors that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for an award.

A.28 MBE/WBE

The State of Florida, **Office of Supplier Diversity** provides the certification process and the database for identifying certified MBE/WBE firms. This service may be directly accessed at: http://www.osd.dms.state.fl.us/iframe.htm

If you have any questions regarding this State service, please contact their office at (850) 487-0915.

A.29 MATHEMATICAL ERRORS

In the event of multiplication/extension error(s), the unit price shall prevail. In the event of addition error(s) the extension totals will prevail. All bids shall be reviewed mathematically and corrected, if necessary, using these standards, prior to additional evaluation.

A.30 DISCLOSURE

Upon receipt, all inquires and responses to inquires related to this Invitation for Bid become "Public Records" and are subject to public disclosure consistent with Chapter 119, Florida Statutes.

Bids become "Public Records" ten (10) days after the bid opening or if an award decision is made earlier than this time as provided by Florida Statue 119.071. No announcement or review of the bid documents shall be conducted at the public opening of the bids.

Based on the above, Manatee County will receive bids at the date and time stated, and will make public at the opening the names of the business entities of all that submitted an offer and any amount presented as a total offer without any verification of the mathematics or the completeness of the offer. Upon the expiration of the statutory term for exemption the actual documents may be inspected or copied. When County staff have completed a mathematic validation and inspected the completeness of the offers, tabulation shall be posted on www.mymanatee.org.

NOTE: ANY OR ALL STATEMENTS CONTAINED IN THE FOLLOWING SECTIONS: BASIS OF AWARD, TERMS AND CONDITIONS OF THE CONTRACT, OR SPECIFICATIONS, WHICH VARY FROM THE INFORMATION TO BIDDERS, SHALL HAVE PRECEDENCE.

END OF SECTION

SECTION 00020
BASIS OF AWARD

B.01 BASIS OF AWARD

Award shall be to the most responsive, responsible bidder meeting specifications and having the lowest Total Bid Price for **Bid "A",** or the lowest Total Bid Price for **Bid "B",** for the requirements listed on the Bid Form for the Work as set forth in this Invitation For Bid. Bid Prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work in accordance with and in the manner set forth and described in the Contract Documents to the County's satisfaction within the prescribed time.

Two schedules for Completion of the Work shall be considered. Each bid for completion by the specified stated time shall be offered as a separate "Total Bid Price". The County has the sole authority to select the bid based on the Completion Time which is in the best interest of the County. Only one award shall be made.

In evaluating bids, the County shall consider the qualifications of the bidders; and if required, may also consider the qualifications of the subcontractors, suppliers, and other persons and organizations proposed. County may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work.

Whenever two or more bids are equal with respect to price, quality and service, the bid received from a local business shall be given preference in award. Whenever two or more bids which are equal with respect to price, quality and service are received, and neither of these bids are received from a local business, the award shall be determined by a chance drawing conducted by the Purchasing Office and open to the public.

Local business is defined as a business duly licensed and authorized to engage in the sale of goods and/or services to be procured, which has a place of business in Manatee County with full time employees at that location.

B.02 SUBCONTRACTORS

Subcontractors shall be bound by the terms and conditions of this contract insofar as it applies to their Work, but this shall not relieve the prime contractor from the full responsibility of the County for the proper completion of all Work to be executed under this contract.

The employment of unauthorized aliens by any vendor is considered a violation of Section 274 (e) of the Immigration and Employment Act. If the vendor knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of this agreement.

B.03 QUALIFICATIONS OF BIDDERS

Each bidder must secure all licenses required (in accordance with Chapter 489 Florida Statutes) for the Work which is the subject of this bid; and, upon request, shall submit a true copy of all applicable licenses. The License requirement for this project is: **General Contractor.**

To demonstrate qualifications to perform the Work, each bidder must be prepared to submit within five days of County's request; written evidence such as financial data, previous experience, present commitments and other such data as may be requested. Bidder must be able to provide evidence of Bidder's qualification to do business in the state of Florida. Each bidder shall submit as a portion of their bid, a completed Contractor's Questionnaire included as Section 00430.

A complete list of all subcontractors proposed for any portion of the Work may be requested of any Bidder deemed necessary by the Owner. Subcontracts shall be awarded only to those subcontractors considered satisfactory by the Owner.

B.04 INSPECTION OF SITE

Prior to submission of a bid, each bidder shall visit the site to become familiar with all conditions that may affect services that are required to completely execute the full intent of these specifications. Site visit shall be acknowledged in Section 00300, Bid Form, page 00300-1.

B.05 PREPARATION OF CONTRACT

A written notice confirming award or recommendation thereof will be forwarded to the Successful Bidder accompanied by the required number of unsigned counterparts of the Agreement. Within 10 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement with any other required documents to County. (Note: Contract must be approved in accordance with the Manatee County Code of Laws, Chapter 2-26, Manatee County Purchasing Ordinance and the Standards and Procedures approved by the County Administrator).

END OF SECTION

SECTION 00030
GENERAL TERMS AND CONDITIONS OF THE CONTRACT

C.01 CONTRACT FORMS

The agreement resulting from the acceptance of a bid shall be in the form of the agreement stated in this bid.

C.02 ASSIGNMENT OF CONTRACT

Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due there under to any other person, firm or corporation unless first obtaining the written consent of the County. The giving of such consent to a particular subcontractor assignment shall not dispense with the necessity of such consent to any further or other assignment.

C.03 COMPLETION OF WORK

The Work will be completed and ready for final inspection within the specified calendar days from the date the Contract Time commences to run. Two bids shall be considered based on **Bid "A" 300 calendar days** and **Bid "B"** based on **365 calendar days**. The County has the sole authority to select the bid based on the Completion Time which is in the best interest of the County. Only one award shall be made.

C.04 LIQUIDATED DAMAGES

If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will hinder its completion within the time specified, the County may seek damages. The actual damages for delay will be impossible to determine and in lieu thereof, the Contractor shall pay to the County the sum of **$1,148.00** as fixed, agreed, and liquidated damages for each calendar day of the delay until the Work is finally accepted by the County and the Contractor and his Surety shall be liable for the amount thereof.

C.05 PAYMENT

Contractor may apply for partial payment on monthly estimates, based on the amount of Work done or completed in compliance with the provisions of the Contract. Contractor shall submit an application, on a form provided or approved by the County, of an approximate estimate of the proportionate value of the Work done, items and locations of the Work performed up to and including the last day of the period then ending. The County will then review said estimate and make any necessary revisions so that the estimate can receive approval for payment. If the Contractor and the County do not agree on the approximate estimate of the proportionate value of the Work done for any pay period, the determination of the County will be binding. The amount of said estimate after deducting any required retainage and all previous payments shall be due and payable to the Contractor within 20 days after the pay estimate has been approved by the County. It is the Contractor's responsibility for the care of the materials.

C.05 PAYMENT (Continued)

Any damage to or loss of said materials is the full responsibility of the Contractor. Any Periodical Pay Estimate signed by the Contractor shall be final as to the Contractor for any or all work covered by the Periodical Pay Estimate. Any requests for payment of materials stored on site must be accompanied with a paid receipt. The Contractor warrants and guarantees that title to all work, materials and equipment covered by any application for payment, whether incorporated in the project or not, will pass to the County at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereafter referred to as "Liens").

The Contractor agrees to furnish an affidavit stating that all laborers, material men, and subcontractors have been paid on the project for Work covered by the application for payment and that a partial or complete release of lien, as may be necessary, be properly executed by the material men, laborers, subcontractors on the project for Work covered by the application for payment, sufficient to secure the County from any claim whatsoever arising out of the aforesaid Work.

When the Contractor has completed the Work in compliance with the terms of the Contract Documents, he shall notify the County in writing that the project is ready for final inspection. The County will then advise the Contractor as to the arrangements for final inspection and what Work, if any, is required to prepare the project or a portion thereof for final inspection. When the County determines the project or portion thereof is ready for final inspection, the County shall perform same. Upon completion of final inspection, the County will notify Contractor of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies. When all such errors have been corrected, a final re-inspection will be made. The process will be repeated until, in the opinion of the County, the project has been completed in compliance with the terms of the Contract Documents.

When final acceptance has been made by the County, the County will make final payment of the Contract amount, plus all approved additions, less approved deductions and previous payments made. The Contract will be considered complete when all work has been finished, the final inspection made, approved as-builts received, and the project finally accepted in writing by the County. The Contractor's responsibility shall then terminate except as otherwise stated.

C.06 RETAINAGE

A **retainage** of 2.5% of the total contract amount shall be withheld from payments after 75% completion of the Work. Upon substantial completion, this retainage shall be reduced to 1% of the total contract amount plus such amount as the County may reasonably deem necessary to repair, replace, complete or correct any damaged, defective, incorrect or incomplete work. Upon final acceptance, the remaining retainage shall be included in the final payment.

C.07 WARRANTY AND GUARANTEE PROVISIONS

All work, materials, and equipment furnished as defined herein shall be guaranteed and warranted by the contractor for a minimum period of three (3) years, unless otherwise specified, from final acceptance by the County to be free from defects due either to faulty materials or equipment or faulty workmanship.

All materials, equipment, and workmanship furnished and installed by the contractor is warranted and guaranteed by the contractor to be such as to meet the required standards and to accomplish the purpose and function of the project as defined, detailed, and specified herein.

The County shall, following discovery thereof, promptly give written notice to the contractor of faulty materials, equipment, or workmanship within the period of the guarantee and the contractor shall promptly replace any part of the faulty equipment, material, or workmanship at his own cost. These warranty and guarantee provisions create no limitations on the County as to any claims or actions for breach of guaranty or breach of warranty that the County might have against parties other than the contractor, and do not constitute exclusive remedies of the County against the contractor.

C.08 ROYALTIES AND PATENTS

The contractor shall pay all royalties and license fees for equipment or processes in conjunction with the equipment and/or services being furnished. Contractor shall defend all suits or claims for infringement of any patent, trademark or copyright, and shall save the County harmless from loss on account thereof, including costs and attorney's fees.

C.09 AUTHORIZED PRODUCT REPRESENTATION

The contractor, by virtue of submitting the name and specifications of a manufacturer's product, will be required to furnish the named manufacturer's product. Failure to perform accordingly may, in the County's sole discretion, be deemed a breach of contract, and shall constitute grounds for the County's immediate termination of the contract.

C.10 REGULATIONS

It shall be the responsibility of the bidder to assure compliance with any OSHA, EPA and/or other federal or state of Florida rules, regulations or other requirements, as each may apply.

C.11 CANCELLATION

Any failure of the contractor to furnish or perform the Work (including, but not limited to, commencement of the Work, failure to supply sufficient skilled workers or suitable materials or equipment) in accordance with the contract, the County may order the stop of the Work, or any portion thereof, until the cause for such order has been eliminated. If the contractor persistently fails to perform the Work in accordance with the contract, the County reserves the right to terminate the contract and select the next qualified bidder or re-advertise this procurement in part or in whole. The County reserves the right to cancel all or any undelivered or unexecuted portion of this contract with or without cause.

C.12 INDEMNIFICATION

The contractor covenants and agrees to indemnify and save harmless the County, its agents and employees, from and against all claims, suits, actions, damages, causes of action, or judgments arising out of the terms of the resulting agreement for any personal injury, loss of life, or damage to the property sustained as a result of the performance or non-performance of services or delivery of goods; from and against any orders, judgments, or decrees, which may be entered against the County, its agents or employees; and from and against all costs, attorney's fees, expenses and other liabilities incurred in the defense of any such claim, suit or action, and the investigation thereof. Nothing in the award, resulting agreement, contract or Purchase Order shall be deemed to affect the rights, privileges and immunities of the County as set forth in Florida Statute Section 768.28.

C.13 MANUALS, SCHEMATICS, HANDBOOKS

All manuals, schematics and handbooks shall be provided which are applicable to the equipment delivered. An operators manual, parts manual and technician manual must also be provided. Parts lists (manuals) must include OEM part numbers for items not manufactured by the bidder. Vendor shall furnish two (2) copies of each.

C.14 INSURANCE

The contractor will not commence work under a contract until all insurance under this section and such insurance coverage as might be required by the County has been obtained. The contractor shall obtain, and submit to Purchasing within 10 calendar days of request, at his expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy):

a. Workers' Compensation/Employers' Liability

Part One - There shall be no maximum limit (other than as limited by the applicable statute) for liability imposed by Florida Workers' Compensation Act or any other coverage required by the contract documents which are customarily insured under Part One of the standard Workers' Compensation Policy.

C.14 INSURANCE (Continued)

Part Two - The minimum amount of coverage required by the contract documents which are customarily insured under Part Two of the standard Workers' Compensation Policy shall be:

$100,000	(Each Accident)
$500,000	(Disease-Policy Limit)
$100,000	(Disease-Each Employee)

b. Commercial General Liability

The limits are to be applicable only to work performed under this contract and shall be those that would be provided with the attachment of the Amendment of Limits of Insurance (Designated Project or Premises) endorsement (ISO Form CG 25 03) a Commercial General Liability Policy with the following minimum limits.

General Aggregate:	
Products/Completed Operations Aggregate	$1,000,000
Personal and Advertising Injury	$300,000
Each Occurrence	$300,000
Fire Damage (Any One Fire)	$Nil
Medical Expense (Any One Person)	$Nil

c. Business Auto Policy

Each Occurrence Bodily Injury and Property Damage Liability Combined	$300,000
Annual Aggregate (if applicable):	$1,000,000

d. Owners Protective Liability Coverage

The minimum OPC Policy limits per occurrence and, if subject to an aggregate, annual aggregate to be provided by the contractor shall be the same as the amounts shown above as the minimum per occurrence and general policy aggregate limits respectively required for the Commercial General Liability coverage. The limits afforded by the OPC Policy and any excess policies shall apply only to the County and the County's officials, officers, agents and employees and only to claims arising out of or in connection with the work under this contract.

e. Property Insurance

If this contract includes construction of or additions to above ground buildings or structures, contractor shall provide "**Builder's Risk**" insurance with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

C.14 INSURANCE (Continued)

f. Installation Floater

If this contract does not include construction of or additions to above ground building or structures, **but does involve** the installation of machinery or equipment, contractor shall provide an "**Installation Floater**" with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).

g. Certificates of Insurance and Copies of Polices

Certificates of Insurance in triplicate evidencing the insurance coverage specified in the six above paragraphs a., b., c., d., e., and f., shall be filed with the Purchasing Director before operations are begun. The required certificates of insurance shall name the types of policy, policy number, date of expiration, amount of coverage, companies affording coverage, and also shall refer specifically to the bid number, project title and location of project. Insurance shall remain in force at least one year after completion and acceptance of the project by the County, in the amounts and types as stated herein, with coverage for all products and services completed under this contract.

ADDITIONAL INSURED: The contractor shall name Manatee County as additional insured in each of the applicable policies.

If the initial insurance expires prior to the completion of operations and/or services by the contractor, renewal certificates of insurance and required copies of policies shall be furnished by the contractor and delivered to the Purchasing Official thirty (30) days prior to the date of their expiration.

Nothing herein shall in any manner create any liability of the County in connection with any claim against the contractor for labor, services, or materials, or of subcontractors; and nothing herein shall limit the liability of the contractor or contractor's sureties to the County or to any workers, suppliers, material men or employees in relation to this contract.

C.15 BID BOND/CERTIFIED CHECK

By offering a submission to this Invitation For Bid, the bidder agrees should the bidder's bid be accepted, to execute the form of contract and present the same to Manatee County for approval within 10 days after being notified of the awarding of the contract. The bidder further agrees that failure to execute and deliver said form of contract **within 10 days** will result in damages to Manatee County and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed bid in the amount of five (5%) percent of the total amount of the bid.

C.15 BID BOND/CERTIFIED CHECK (Continued)

The bidder further agrees that in case the bidder fails to enter into a contract, as prescribed by Manatee County, the bid bond/certified check accompanying the bid shall be forfeited to Manatee County as agreed liquidated damages. If the County enters into a contract with a bidder, or if the County rejects any and/or all bids, accompanying bond will be promptly returned.

C.16 PERFORMANCE AND PAYMENT BONDS

The successful bidder shall furnish surety bonds as security for faithful performance of the contract awarded as a result of this bid, and for the payment of all persons performing labor and/or furnishing material in connection therewith. Surety of such bonds shall be in an amount equal to the bid award (100% each) and from a duly authorized and nationally recognized surety company, authorized to do business in Florida, satisfactory to this County. The attorney-in-fact who signs the bonds must file with the bonds a certificate and effective dated copy of power-of-attorney. (Reference Florida Statute 255.05)

Furnishing the performance and payment bonds shall be requisite to execution of a contract with the County. Said performance and payment bonds will remain in force for the duration of the contract with the premiums paid by the contractor. Failure of successful bidder to execute such contract and to supply the required bonds shall be just cause for annulment of the award.

The County may then contract with another acceptable bidder or re-advertise this Invitation For Bid. If another bidder is accepted, and notice given within 90 days after the opening of bids, this acceptance shall bind the bidder as though they were originally the successful bidder.

Failure of the County at any time, to require performance by the contractor of any provisions set out in the contract will in no way affect the right of the County, thereafter, to enforce the provisions. Bonds to remain in effect for one year after final payment becomes due.

C.17 NO DAMAGES FOR DELAY

No claim for damages or any claim other than for an extension of time shall be made or asserted against the County by reason of any delays. The Contractor shall not be entitled to an increase in the Total Contract Price or payment or compensation of any kind from the County or direct, indirect, consequential impact or other costs, expenses for damages, including but not limited to costs of acceleration or inefficiency arising because of delay, disruption, interference or hindrance from any

C.17 NO DAMAGES FOR DELAY (Continued)
cause whatsoever; provided, however, that this provision shall not preclude recovery or damages by the Contractor for hindrance or delays due solely to fraud, bad faith, or active interference on part of the County or its agents. Otherwise, the Contractor shall only be entitled to extensions of the Contract Time as the sole and exclusive remedy for such resulting delay, in accordance with and to the extend specifically provided above.

C.18 NO INTEREST
Any monies not paid by the County when claimed to be due to the Contractor under this Contract shall not be subject to interest including prejudgment interest. Any monies not paid by the County when claimed to be due to the Contractor for damages awarded in the case of construction delays shall not be subject to prejudgment interest.

C.19 CONSTRUCTION OF CONTRACT
This Contract and the rights and responsibilities hereunder shall not be construed more strongly against either party, regardless of the extent to which such party may have participated in the preparation hereof.

END OF SECTION

SECTION 00100
BID SUMMARY

D.01 THE WORK

The Work included in this contract consists of the construction of a 0.11-acre, 4,792 square foot pump station (#428) that will include three (3) pumps, an emergency generator and a fuel tank (all on separate concrete pads), an electrical building, and a 3,760 square foot access drive. The project location is: 7422 41st Avenue East, Bradenton, FL, Section 02, Township 35 South, Range 18 East Manatee County.

The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawing.

The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and / or restoration required as a result of damages caused prior to acceptance by the Owner.

The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

D.02 SUBCONTRACTORS, SUPPLIERS AND OTHERS

The identity of subcontractors, suppliers, and other persons and organizations (including those who are to furnish the principal items of material and equipment) may be requested by the County for each bid item from any of the Bidders; and the Bidder shall respond within five days after the date of such request. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such subcontractor, supplier, persons or organization if requested by County. If County, after due investigation, has reasonable objection to any proposed subcontractor, supplier, other person or organization, County may, before the Notice of Award is given, request the apparent successful Bidder to submit an acceptable substitute without an increase in Contract Price or Contract Time.

If apparent successful Bidder declines to make any such substitution, County may award the contract to the next lowest qualified Bidder that proposes to use acceptable subcontractors, suppliers, and other persons who County does not make written objection to. Contractor shall not be required to employ any subcontractor, supplier, other person or organization who Contractor has reasonable objection to.

Subcontractors shall be bound by the terms and conditions of this contract insofar as it applies to their Work, but this shall not relieve the prime contractor from the full responsibility to the County for the proper completion of all Work to be executed under this contract.

D.03 BIDS

Bids are to be submitted in triplicate, one original and two copies, upon the County supplied forms. All blank spaces must be filled in as noted with amounts extended and totaled and no changes shall be made in the wording of the forms or in the items mentioned therein. In the event a change is made in your submittal, the Bidder shall write its initials by the change. Any bid may be rejected which contains any omissions, alterations, irregularities of any kind, or which shall in any manner fail to conform to bid requirements.

A bid made by an individual, either in his/her own or proper person or under a trade or firm name, shall be executed under the individual's signature. If made by a partnership, the bid shall be executed by two or more of the general partners. If made by a corporation, the bid shall be executed by its President or other legally authorized corporate officer or agent.

D.04 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

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

The accuracy of the existing utility locations shown on the plans is approximate and without express or implied warranty. Each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and data which pertain to the physical conditions at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine his Bid for performing and furnishing the Work in accordance with the time price and other terms and conditions of the Contract Documents

County will provide each Bidder access to the site to conduct such explorations and tests. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and other lands designated for use by Contractor in performing the Work identified in the Contract Documents.

All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by County unless otherwise provided in the Contract Documents.

D.05 MATERIALS AND WORKMANSHIP

All materials and apparatus required for this Work, except as specifically specified otherwise, shall be new, of first class quality, and shall be furnished, delivered, connected and finished in every detail. Construction shall be prescribed by good industry practice and in accordance with manufacturer's recommendations for the type being installed.

Use skilled workman trained and experienced in the necessary trades and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this section.

D.06 REGULATIONS AND MATERIAL DISPOSAL

It shall be the responsibility of the contractor to assure compliance with any OSHA, EPA, federal, state, and/or local rules, regulations or other requirements as each may apply.

D.07 DISCRETIONARY WORK

This Bid Item entails minor increases (that may be directed by staff) to existing bid item quantities or minor modification items not bid which were unforeseen and necessary during the construction to provide a safe, complete project in accordance with Bid Documents. (This will not affect the requirement for change orders involving major modifications to the project.) Payment for all Work under this item shall be made only at the County's discretion in order to satisfactorily complete the project. In general, this item is for unanticipated conflicts and/or design changes required during construction which are necessary to complete the project without changing the initial scope of Work and without costly delays.

END OF SECTION

SECTION 00150

MANATEE COUNTY LOCAL PREFERENCE LAW AND VENDOR REGISTRATION

E.01 Vendor Registration

All vendors are encouraged to register with Manatee County using the on-line "Vendor Registration" web page on www.mymanatee.org.

Enclosed are a copy of the current Manatee County law that details the County's Local Preference and the County's definition of a Local Business.

If you assert that your firm meets the stated definition of a Local Business, we ask that in addition to registering on the County's Web page, you fill out the attached "**Affidavit As To Local Business Form"** that is included in this section, have the completed document notarized, and mail the original to the following address: Manatee County Administration Center, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205.

Your cooperation in registering your business with Manatee County will enhance our opportunities to identify sources for goods and services, plus identify Local Businesses. This information is used for soliciting quotations up to $250,000.00 and for competitive solicitations of larger purchases.

You will note that Manatee County collaborates with the Manatee Chamber of Commerce, posting bids on www.manateechamber.com as well as using the same vendor categories for registration.

Our staff can assist you with your registration as needed. Our office hours are 8:00 A.M. to 5:00 P.M., Monday through Friday on regular business days. Please call (941) 749-3014 if you wish to have a purchasing staff member assist you.

Quick steps to registration: **www.mymanatee.org**

A link to "Purchasing" is listed under "Quick Links" on page one of the County Web Site.

On the left hand side of the Purchasing Web page, click on "Vendor Registration".

This will bring up the Vendor Registration form for on-line input. Please note that the definition of a "Local Business" changed on March 17, 2009. The Web page will be updated to include the current Law which has been provided in this section of the bid.

Thank you for reviewing this information and considering registering your business with Manatee County. Registration is not mandatory; however, by taking the time to register, you are helping the County to provide timely notifications of quotation, bid and proposal opportunities to your business.

E.02 Section 2-26-6. Local preference, tie bids, **local business defined.**

(a) Whenever a responsible local business bidder and a responsible non-local business bidder are found, upon the opening of bids, to have both submitted the lowest responsive bid, the bid of the local bidder shall be awarded the contract. Should more than one responsible local business bidder match the responsible non-local business bidder's lowest responsive bid, or should no responsible local business bidder match the lowest responsive bid but two or more responsible non-local business bidders submit lowest responsive bids for equal amounts, then the award of the contract shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the purchasing office and open to the public. Any bidders seeking to be recognized as local businesses for purposes of this local business preference provision may be required by the terms of the bid announcement to certify they meet the definition of local business set forth in this section, and to register as a local business with the county in the manner prescribed by the county to facilitate the county's ability to track the award of contracts to local businesses and to allow the county to provide future notifications to its local businesses concerning other bidding opportunities.

(b) Nothing herein shall be deemed to prohibit the inclusion of requirements with respect to operating and maintaining a local place of business in any invitation for bids when the bidder's location materially affects the provisions of the services or supplies that are required by the invitation.

(c) Local business is defined as a business legally authorized to engage in the sale of the goods and/or services to be procured, and which certifies within its bid that for at least six (6) months prior to the announcement of the solicitation of bids it has maintained a physical place of business in Manatee, Desoto, Hardee, Hillsborough, Pinellas or Sarasota County with at least one full-time employees at that location.

(d) **Each solicitation for bids made by the county shall contain terms expressly describing the local business preference policies of the county, and shall provide that by electing to submit a bid pursuant to a request for bids, all bidders are deemed to understand and agree to those policies**.

(e) For all contracts for architecture, professional engineering, or other professional services governed by Florida Statute § 287.055, the Consultants' Competitive Negotiation Act, the county shall include the local business status of a firm among the factors considered when selecting which firms are "most highly qualified." In determining which firm is the "most qualified" for purposes of negotiating a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.

(f) Local preference shall not apply to the following categories of contracts:

1. Goods or services provided under a cooperative purchasing agreement or similar "piggyback" contract;

2. Contracts for professional services subject to Florida Statute § 287.055, the Consultants' Competitive Negotiation Act, except as provided for in subsection (e) above;

E.02 Section 2-26-6. Local preference, tie bids, **local business defined.** (Continued)

3. Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference;

4. Purchases or contracts made pursuant to a non-competitive award process, unless otherwise provided by this section;

5. Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county commission or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.

(g) To qualify for local preference under this section, **a local business must certify to the County that it:**

1. Has not within the five years prior to the bid announcement admitted guilt or been found guilty by any court or state or federal regulatory enforcement agency of violation of any criminal law, or a law or administrative regulation regarding fraud;

2. Is not currently subject to an unresolved citation or notice of violation of any Manatee County Code provision, except citations or notices which are the subject of a current legal appeal, as of the date of the bid announcement;

3. Is not delinquent in the payment of any fines, liens, assessments, fees or taxes to any governmental unit or taxing authority within Manatee County, except any such sums which are the subject of a current legal appeal.

Ref: Ordinance 09-21 and 09-23 **PASSED AND DULY ADOPTED** in open session, with a quorum present and voting, on the 17th day of March, 2009.

Contractors Note: Contractors who have previously submitted an **AFFIDAVIT AS TO LOCAL BUSINESS** are not required to resubmit an AFFIDAVIT, provided that any and all information has remained unchanged.

END OF SECTION

MANATEE COUNTY GOVERNMENT
AFFIDAVIT AS TO LOCAL BUSINESS
(Complete and Initial Items B-F)

A. Authorized Representative

I, [name] _____, am the [title] _____

and the duly authorized representative of: [name of business]_____ _____, and that I possess direct personal knowledge to make informed responses to these certifications and the legal authority to make this Affidavit on behalf of myself and the business for which I am acting; and by electing to submit a bid pursuant to this Invitation for Bids, shall be deemed to understand and agree to the local business preference policies of Manatee County; and that I have the direct knowledge to state that this firm complies with all of the following conditions to be considered to be a Local Business as required by the Manatee County Code of Law, Section 2-26-6.

B. Place of Business: I certify that the above business is legally authorized to engage in the sale of goods and/or services and has a physical place of business in Manatee, DeSoto, Hardee, Hillsborough, Pinellas or Sarasota County with at least one (1) fulltime employee at that location. The physical address of the location which meets the above criteria is:_____ [Initial] _____

C. Business History: I certify that business operations began at the above physical address with at least one fulltime employee on [date] _____ [Initial] __

D. Criminal Violations: I certify that within the past five years of the date of this Bid announcement, this business has not admitted guilt nor been found guilty by any court or local, state or federal regulatory enforcement agency of violation of any criminal law or administrative regulation regarding fraud. [Initial]_

E. Citations or Code Violations: I certify that this business is not currently subject to any unresolved citation or notice of violation of any Manatee County Code provision, with the exception of citations or notices which are the subject of a legal current appeal within the date of this bid announcement. [Initial]

F. Fees and Taxes: I certify that within this business is not delinquent in the payment of fines, liens, assessments, fees or taxes to any governmental unit or taxing authority within Manatee County, with the exception of those which are the subject of a legal current appeal. [Initial]_____

Each of the above certifications is required to meet the qualification of "Local Business" under Manatee County Code of Law, 2-26-6.

Signature of Affiant_____

STATE OF FLORIDA

COUNTY OF_____

Sworn to (or affirmed) and subscribed before me this _____ day of _____, 20___, by (name of person making statement).

(Notary Seal) Signature of Notary:_____

Name of Notary (Typed or Printed)_____

Personally Known ____ OR Produced Identification ____ Type of Identification Produced _____

Submit executed copy to Manatee County Purchasing, Suite 803, 1112 Manatee Avenue W., Bradenton, FL 34205.

BID FORM
SECTION 00300

For: IFB #10-3050-OV / Construction of Wastewater PS 428 Booster Pump Station Manatee County, FL (Project No. 6055480)

TOTAL BID PRICE "A": $ _____
Based on a Completion Time of **300** calendar days
TOTAL BID PRICE "B": $ _____
Based on a Completion Time of **365** calendar days

Two schedules for Completion of the Work shall be considered. Each bid for completion by the specified stated time shall be offered as a separate "Total Bid Price". The County has the sole authority to select the bid based on the Completion Time which is the best interest of the County. Only one award shall be made.

We, the undersigned, hereby declare that we have carefully reviewed the bid documents, and with full knowledge and understanding of the aforementioned herewith submit this bid, meeting each and every specification, term, and condition contained in the Invitation for Bids.

We understand that the bid technical specifications, terms, and conditions in their entirety shall be made a part of any agreement or contract between Manatee County and the successful bidder. Failure to comply shall result in contract default, whereupon, the defaulting contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by the County.

Communications concerning this Bid shall be addressed as follows:

Person's Name: _____

Address: _____ Phone:_____

Date: _____ FLContractorLicense#_____

Bidder is a WBE/MBE Vendor? _____ Certification _____

COMPANY'S NAME: _____

AUTHORIZED SIGNATURE(S):_____

Name and Tile of Above Signer(s) _____

CO. MAILING ADDRESS: _____

_____

STATE OF INCORPORATION_____ (if applicable)

TELEPHONE: (___) _____ FAX: (_____) _____

Email address: _____

Acknowledge Addendum No.____ Dated: ____ Acknowledge Addendum No. ____ Dated____

SIGN AND CONFIRM DATE OF PROJECT VISIT: _____ DATE: _____

BID FORM

(Submit in Triplicate)

Section 00300

(BID "A")

Construction of Wastewater PS 428 Booster Pump Station, East Bradenton, Manatee County FL (Project No. 6055480) Based on Completion Time of 300 Calendar Days

ITEM	DESCRIPTION	U/M	EST. QTY.	UNIT PRICE	EXTENDED PRICE
1	Mobilization / Demobilization	LS	1	$	$
2	Temporary Erosion Control	LS	1	$	$
3	Sitework	LS	1	$	$
4	Pump Station / 6 Foot Long Fencing	LS	1	$	$
5	Yard Piping	LS	1	$	$
6	Factory Built Automatic Pump Station	LS	1	$	$
7	Precast Concrete Electrical Building	LS	1	$	$
8	Pump Station Access Drive	LS	1	$	$
9	Electrical, Instrumentation and Control Systems	LS	1	$	$
10	Standby Power Generator	LS	1	$	$
11	Discretionary Work				$145,000.00
TOTAL BID "A" PRICE - Based on Completion Time of 300 Calendar Days					**$**

Authorized Signature:_____

Bidder (Please Print):_____

BID FORM

(Submit in Triplicate)

Section 00300

(BID "B")

Construction of Wastewater PS 428 Booster Pump Station, East Bradenton, Manatee County FL (Project No. 6055480) Based on Completion Time of 365 Calendar Days

ITEM	DESCRIPTION	U/M	EST. QTY.	UNIT PRICE	EXTENDED PRICE
1	Mobilization / Demobilization	LS	1	$	$
2	Temporary Erosion Control	LS	1	$	$
3	Sitework	LS	1	$	$
4	Pump Station / 6 Foot Long Fencing	LS	1	$	$
5	Yard Piping	LS	1	$	$
6	Factory Built Automatic Pump Station	LS	1	$	$
7	Precast Concrete Electrical Building	LS	1	$	$
8	Pump Station Access Drive	LS	1	$	$
9	Electrical, Instrumentation and Control Systems	LS	1	$	$
10	Standby Power Generator	LS	1	$	$
11	Discretionary Work				$145,000.00
TOTAL BID "B" PRICE - Based on Completion Time of 365 Calendar Days					**$**

Authorized Signature:_____

Bidder (Please Print):_____

SWORN STATEMENT
THE FLORIDA TRENCH SAFETY ACT

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

1. This Sworn Statement is submitted with IFB No. **#10-3050-OV**

2. This Sworn Statement is submitted by_____ whose business address is_____ and, if applicable, its Federal Employer Identification Number (FEIN) is_____.If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement _____.

3. Name of individual signing this Sworn Statement is: _____, Whose relationship to the above entity is: _____.

4. The Trench Safety Standards that will be in effect during the construction of this project shall include, but are not limited to: Laws of Florida, Chapters 90-96, TRENCH SAFETY ACT, and OSHA RULES AND REGULATIONS 29 CFR 1926.650 Subpart P, effective October 1, 1990.

5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless the Owner and Engineer, and any of their agents or employees from any claims arising from the failure to comply with said standard.

6. The undersigned has appropriated the following costs for compliance with the applicable standards:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
a. _____	_____	_____	$_____	_____
b. _____	_____	_____	$_____	_____
c. _____	_____	_____	$_____	_____
d. _____	_____	_____	$_____	_____

7. The undersigned intends to comply with these standards by instituting the following procedures:
_____
_____
_____.

THE UNDERSIGNED, in submitting this Bid, represents that they have reviewed and considered all available geotechnical information and made such other investigations and tests as they may deem necessary to adequately design the trench safety system(s) to be utilized on this project.

_____
(AUTHORIZED SIGNATURE / TITLE)

SWORN to and subscribed before me this ___ day of _____, 20___.
(impress official seal)

_____
Notary Public, State of Florida
My commission expires: _____

SECTION 00430

CONTRACTOR'S QUESTIONNAIRE

(Submit in Triplicate)

The Bidder warrants the truth and accuracy of all statements and answers herein contained. (Include additional sheets if necessary.)

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID.

1. LICENSE # and COMPANY'S NAME: _____
   CO. PHYSICAL ADDRESS: _____
   TELEPHONE NUMBER: (___) _____ FAX (_____) _____

2. Bidding as an; individual; a partnership: a corporation; a joint venture; ___

3. If a partnership: list names and addresses of partners; if a corporation: list names of officers, directors, shareholders, and state of incorporation; if joint venture: list names and address of ventures' and the same if any venture are a corporation for each such corporation, partnership, or joint venture:

_____
_____
_____

4. Your organization has been in business (under this firm's name) as a _____
   For how many years? _____

5. Describe and give the date and owner of the last three government projects you've completed which are similar in cost, type, size, and nature as the one proposed (for a public entity). Include contact name and phone number:

_____
_____

6. Have you ever been assessed liquidated damages under a contract during the past five (5) years? If so, state when, where (contact name, address, and phone number) and why.

_____
_____

7. Have you ever failed to complete work awarded to you? If so, state when, where (Contact name, address, phone number) and why?

_____
_____

8. Have you ever been debarred or prohibited from bidding on a governmental entity's construction project? If yes, name the entity and describe the circumstances:

_____
_____
_____

9. Name three individuals, governmental entities, or corporations for which you have performed similar work and to which you refer. Include contact name and phone number:

1._____
2. _____
3. _____

10. What specific steps have you taken to examine the physical conditions at or contiguous to the site, including but not limited to, the location of existing underground facilities?

_____
_____
_____

11. What specific physical conditions, including, but not limited to, the location of existing underground facilities have you found which will, in any manner, affect cost, progress, performance, or finishing of the work?

_____
_____
_____

12. Will you subcontract any part of this Work? If so, describe which major portion(s):

_____
_____

13. If any, list (with contract amount) WBE/MBE to be utilized:

_____
_____

14. What equipment do you own to accomplish this Work?

_____
_____
_____

15. What equipment will you purchase/rent for the Work? (Specify which)

_____
_____
_____

16. Provide detail of your organization's initiative to meet the goal of encouraging and promoting environmentally preferable "green" products. **Reference Article A.22, "Be Green",** Section 00010 "Information To Bidders".

_____

_____

_____

_____

17. List the following in connection with the Surety which is providing the Bond(s):

Surety's Name: _____

Surety's Address: _____

Name, address and phone number of Surety's resident agent for service of process in Florida:

_____

_____

_____

Phone: (_____) _____

SECTION 00491
Drug Free Work Place Certification
DRUG FREE WORK PLACES

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

This sworn statement is submitted to the Manatee County Board of County Commissioners by_____
[Print individual's name and title]
_____for _____

Whose business address is
_____?

and (if applicable) its Federal Employer Identification Number (FEIN) is_____
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement:_____.

I understand that no person or entity shall be awarded or receive a county contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of county monies unless such person or entity has submitted a written certification to the County that it will provide a drug free work place by:

(1) providing a written statement to each employee notifying such employee that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance as defined by 893.02(4), Florida Statutes, as the same may be amended from time to time, in the person's or entity's work place is prohibited specifying the actions that will be taken against employees for violation of such prohibition. Such written statement shall inform employees about:

(i) the dangers of drug abuse in the work place;

(ii) the person's or entity's policy of maintaining a drug free environment at all its work places, including but not limited to all locations where employees perform any task relating to any portion of such contract, business transaction or grant;

(iii) any available drug counseling, rehabilitation, and employee assistance programs; and

(iv) the penalties that may be imposed upon employees for drug abuse violations.

2) Requiring the employee to sign a copy of such written statement to acknowledge his or her receipt of same and advice as to the specifics of such policy. Such person or entity shall retain the statements signed by its employees. Such person or entity shall also post in a prominent place at all of its work places a written statement of its policy containing the foregoing elements (i) through (iv).

(3) Notifying the employee in the statement required by subsection (1) that as a condition of employment the employee will:

(i) abide by the terms of the statement; and
(ii) notify the employer of any criminal drug statute conviction for a violation occurring in the work place no later than five (5) days after such a conviction.

(4) Notifying the County within ten (10) days after receiving notice under subsection (3) from an employee or otherwise receiving actual notice of such conviction.

(5) Imposing appropriate personnel action against such employee up to and including termination; or requiring such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.

(6) Making a good faith effort to continue to maintain a drug free work place through implementation of sections (1) through (5) stated above.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR THE COUNTY ADMINISTRATOR DETERMINES THAT:

(1) Such person or entity has made false certification.

(2) Such person or entity violates such certification by failing to carry out the requirements of sections (1), (2), (3), (4), (5), or (6) or Resolution R-01-36 Section 4, E (1) (a) or

(3) Such a number of employees of such person or entity have been convicted of violations occurring in the work place as to indicate that such person or entity has failed to make a good faith effort to provide a drug free work place as required by Resolution R-01-36 Section 4, E (1) (a).

_____
(Signature)

STATE OF FLORIDA
COUNTY OF_____

Sworn to and subscribed before me this _____ day of _____, 2009
by _____.

Personally known _____OR produced identification_____

_____My commission expires_____
Notary Public Signature

[Print, type or stamp Commissioned name of Notary Public]

PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION
SWORN STATEMENT PURSUANT TO ARTICLE 5,
MANATEE COUNTY PURCHASING CODE

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

This sworn statement is submitted to the Manatee County Board of County Commissioners by

_____
[print individual's name and title]

_____ for_____
[print name of entity submitting sworn statement]

Whose business is: _____

and (if applicable) its Federal Employer Identification Number (FEIN) is_____ If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____

I understand that no person or entity shall be awarded or receive a county contract for public improvements, procurement of goods or services (including professional services) or a county lease, franchise, concession or management agreement, or shall receive a grant of county monies unless such person or entity has submitted a written certification to the County that it has not:

(1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or

(2) been convicted of an agreement or collusion among bidders or prospective bidders in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or

(3) been convicted of a violation of an environmental law that, in the sole opinion of the County's Purchasing Director, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or

(4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or

(5) where an officer, official, agent or employee of a business entity has been convicted of or has admitted guilt to any of the crimes set forth above on behalf of such and entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he is an official of the

business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common Board of Directors. For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests among family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.

Any person or entity, who claims that this Article is inapplicable to him/her's/it because a conviction or judgement has been reversed by a court of competent jurisdiction, shall prove the same with documentation satisfactory to the County's Purchasing Director. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with the County.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY CONTRACT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR THE COUNTY ADMINISTRATOR DETERMINES THAT **SUCH PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.**

_____
[Signature]

STATE OF FLORIDA
COUNTY OF _____

Sworn to and subscribed before me this _____ day of _____, 2009 by _____.

Personally known _____ OR produced _____
[Type of identification]

_____My commission expires _____
Notary Public Signature

_____
[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

SECTION 00500
FORM OF AGREEMENT
BETWEEN THE
COUNTY OF MANATEE, FLORIDA
AND THE CONTRACTOR AS IDENTIFIED BELOW
ON THE BASIS OF A STIPULATED UNIT COST CONTRACT PRICE

THIS AGREEMENT is made and entered into by and between the COUNTY OF MANATEE, a political subdivision of the state of Florida, hereinafter referred to as the "COUNTY" and _____, hereinafter referred to as the "CONTRACTOR," duly authorized to transact business in the state of Florida, with offices located at _____.

Article 1. WORK

CONTRACTOR shall furnish all labor, materials, supplies, and other items required to complete the Work for IFB No. **IFB#10-3050-OV / Construction of Wastewater PS 428 Booster Pump Station Bradenton, Manatee County, FL** in strict accordance with Contract Documents and any duly authorized subsequent addenda thereto, all of which are made a part hereof.

Article 2. ENGINEER

The County of Manatee, Project Management Department, is responsible as the COUNTY and **Carollo Engineering** hereinafter referred to as "ENGINEER," designed this project and is responsible for technical/engineering reviews and decisions. The ENGINEER is a member of the COUNTY'S project management team which is collectively responsible in ensuring the Work is completed in accordance with the Contract Documents. All communications involving this project will be addressed to:

County of Manatee
Public Works Department
Project Management Division
Attn: Mr. Michael O'Reilly
IFB#10-3050-OV
1022 26th Avenue East
Bradenton, FL 34208
Phone (941) 708-7450, Ext. 7344

Carollo Engineering
Engineer of Record
401 North Cattlemen Road
Suite 306
Sarasota, FL 34232
Phone (941) 371-9832

Where the terms ENGINEER and/or COUNTY are used in the Contract Documents, it shall mean the COUNTY'S project management team.

Article 3. CONTRACTOR'S REPRESENTATIONS

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

3.1 CONTRACTOR has familiarized itself with the nature and extent of the Bid Documents, Work, site, locality and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

3.2 CONTRACTOR has studied carefully all drawings of the physical conditions upon which CONTRACTOR is entitled to rely.

3.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies which pertain to the physical conditions at or contiguous to the site or which otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Bid Documents; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

3.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Bid Documents with respect to existing underground facilities at or contiguous to the site and assumes responsibility for the accurate location of said underground facilities. Any additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said underground facilities conducted by the CONTRACTOR will be done at the CONTRACTOR'S expense.

3.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Bid.

3.6 CONTRACTOR has given COUNTY written notice of all conflicts, errors or discrepancies that have been discovered in the Bid Documents and the written resolution thereof by OWNER is acceptable to CONTRACTOR.

3.7 CONTRACTOR shall schedule and perform the Work subject to COUNTY'S approval and shall hold COUNTY harmless from all liabilities incurred due to CONTRACTOR'S failure to coordinate with the COUNTY.

Article 4. CONTRACT DOCUMENTS

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

4.1 This Agreement and Bid Document **IFB#10-3050-OV**

4.2 Performance and/or other Bonds and Insurance Certificate(s)

4.3 Drawings (not attached)

4.4 Addendum number 1 inclusive.

4.5 CONTRACTOR'S Bid Form and any other information submitted by Contractor prior to Notice of Award.

4.6 The following which may be delivered or issued after the effective date of the Agreement and are not attached hereto: all written Change Orders and other documents amending, modifying, or supplementing the Contract Documents.

4.7 The documents listed in paragraphs above are attached to this Agreement (except as noted otherwise above). There are no Contract Documents other than those listed above in this Article 4.

Article 5. MISCELLANEOUS

5.1 Terms used in this Agreement are defined in Article 1 of the General Conditions.

5.2 No assignment by a party hereto of any rights under or interest in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law); and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignee from any duty or responsibility under the Contract Documents.

5.3 COUNTY and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

The OWNER will pay, and the CONTRACTOR will accept in full consideration for the performance of the Work (**IFB No. #10-3050-OV / Construction of Wastewater PS 428 Booster Pump Station East Bradenton, Manatee County FL)** subject to additions and deduction as provided therein, the sum of _____Dollars and Cents ($_____) for Bid "____" based on Completion Time of _____ calendar days and the sum of **$1,148.00** as liquidated damages for each calendar day of delay.

_____

CONTRACTOR

BY: _____
Signature

_____
Name and Title of Signer (printed)

Date: _____

MANATEE COUNTY GOVERNMENT

BY: _____For the County
Signature

R. C. "Rob" Cuthbert, CPM, CPPO, Purchasing Official
Name and Title of Signer

Date:_____

SECTION 00700
GENERAL CONDITIONS

ARTICLE I - DEFINITIONS

Whenever used in the Bid Documents, the following terms have the meaning indicated which are applicable to both the singular and plural thereof:

Addendum - Written or graphic instruments issued prior to the opening of bids which clarify or change the bidding documents or the contract documents.

Agreement - The written Agreement between County and Contractor covering the Work to be performed; other contract documents are attached to the Agreement and made a part thereof as provided therein.

Amendment - A written amendment of the contract documents, signed by County and Contractor on or after the effective date of the Agreement and normally dealing with the non-engineering or non-technical rather than strictly work related aspects of the contract documents.

Application for Payment - The form accepted by Project Representative which is to be used by Contractor in requesting progress or final payments and which is to include such supporting documentation as is required by the contract documents.

Award - Acceptance of the bid from the person, firm, or corporation which in the County's sole and absolute judgment will under all circumstances best serve the public interest. Award shall be made by a majority vote of a quorum of Manatee County Board of County Commissioners in open session; or by the Purchasing Official in accordance with Manatee County Code of Laws.

Bid - The offer of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bidder - One who submits a bid directly to the County, as distinct from a sub-bidder, who submits a bid to a Bidder.

Bidding Documents - Consists of the Invitation For Bid, which includes but is not limited to: the bid form, drawings, Contract Documents, terms and conditions, and the proposed contract documents (including all Addenda issued prior to receipt of bids); and becomes a part of the Agreement.

Bonds - Performance and payment bonds and other instruments of security.

Change Order - A document recommended by Project Representative which is signed by Contractor and County and authorizes an addition, deletion, or revision in the Work or an adjustment in the contract price or the contract time, issued on or after the effective date of the Agreement.

Compensable Delay - Any delay beyond the control and without the fault or negligence of the Contractor resulting from County-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by County.

Contract Documents - The Agreement, Addenda (which pertain to the contract documents), Contractor's bid (including documentation accompanying the bid and any post-bid documentation submitted prior to the Notice of Award), the bonds, the specifications and the drawings, together with all amendments, modifications and supplements issued on or after the effective date of the Agreement.

Contract Price - The monies payable by County to Contractor under the contract documents as stated in the Agreement.

Contract Time - The number of days or the date stated in the Notice to Proceed for the completion of the Work.

Contractor - The person, firm or corporation with whom County has entered into an Agreement.

County - Manatee County, Florida, Board of County Commissioners.

Days - All references to days are to be considered calendar days except as specified differently.

Defective - An adjective which when modifying the work refers to work that is unsatisfactory, faulty or deficient, or does not conform to the contract documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the contract documents, or has been damaged prior to Project Representative's recommendation of final payment (unless responsibility for the protection thereof has been assumed by County).

Discretionary – Payment for all work that shall be made only at the County's discretion in order to satisfactorily complete the project in accordance with the Plans and Specifications.

Drawings - The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by Engineer and are referred to in the bidding and contract documents.

Effective Date of the Agreement - The date indicated in the Agreement on which it becomes effective (date of execution).

Excusable Delay - Any delay beyond the control and without the negligence of the Contractor, the County, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of the public enemy, fires, floods, freight embargoes, acts of government other than County, or epidemics. Labor disputes and above average rainfall shall give rise only to excusable delays.

Float or Slack Time - The time available in the progress schedule during which an unexpected activity can be completed without delaying substantial completion of the Work.

Inexcusable Delay - Any delay caused by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight, or diligence on the part of the Contractor.

Non-prejudicial Delay - Any delay impacting a portion of the Work within the available total float or slack time and not necessarily preventing completion of the Work within the contract time.

Notice of Award - The written notice to the successful bidder stating Award has been approved by the Board of County Commissioners; or by the Purchasing Official in accordance with Ordinance 09-52, Manatee County Purchasing Code.

Notice of Intent to Award - The written notice to the apparent low bidder stating Award has been recommended with final Award to be authorized by the Board of County Commissioners.

Notice to Proceed - Written notice by County (after execution of contract) to Contractor fixing the date on which the contract time will commence to run and on which Contractor shall start to perform (ten (10) days from date of such notice) Contractor's obligations under the contract documents.

Preconstruction Conference - Prior to starting the Work, a meeting scheduled by County with Contractor to review the Work schedules, to establish procedures for handling shop drawings and other submissions, for processing periodical pay estimates, and such other matters as may be pertinent to the project.

Prejudicial Delay - Any excusable or compensable delay impacting the Work and exceeding the total float available in the progress schedule, thus preventing completion of the Work within the contract time unless the Work is accelerated.

Pre-operation Testing - All field inspections, installation checks, water tests, performance tests and necessary corrections required of Contractor to demonstrate that individual components of the work have been properly constructed and do operate in accordance with the contract documents for their intended purposes.

Project - The total construction of which the Work to be provided under the contract documents may be the whole or a part as indicated elsewhere in the contract documents.

Project Representative - The authorized representative of County who is assigned to the project or any part thereof.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by Contractor to illustrate material or equipment for some portion of the Work.

Specifications - Those portions of the contract documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor - An individual or corporation having a direct contact with Contractor or with any other subcontractor for the performance of a part of the Work at the site. Such person or firm has contractual relations with the Contractor, not with the County.

Substantial Completion - The Work (or a specified part thereof) has progressed to the point when, in the opinion of the Engineer as evidenced by Engineer's definitive certificate of Substantial Completion, it is sufficiently complete in accordance with contract documents so that the work can be utilized for the purposes for which it is intended; or if there be no such certificate issued, when final payment is due.

Successful Bidder - The lowest qualified, responsible and responsive bidder to whom an award is made.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman or vendor.

Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work - Work to be paid for on the basis of unit prices.

Work - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the contract documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the contract documents.

Work Directive Change - A written directive to contractor, issued on or after the effective date of the Agreement and signed by County and recommended by Project Representative ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or to emergencies. A work directive change may not change the contract price or the contract time; but is evidence that the parties expect that the change directed or documented by a work directive change will be incorporated in a subsequently issued change order following negotiations by the parties as to its effect, if any, on the contract price or contract time.

ARTICLE 2 - PRELIMINARY MATTERS

Computation of Time: When time is referred to in the contract documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or legal holiday, such day will be omitted from the computation.

2.1 The Contractor must submit a proposed schedule of the Work at the preconstruction conference. The purpose of this schedule is to enable the County to govern the Work, to protect the functions of the local government and its citizens and to aid in providing appropriate surveillance. The County shall have the right to reschedule work provided such rescheduling is in accord with the remainder of terms of the contract. The schedule shall show, as a minimum, the approximate dates on which each segment of the work is expected to be started and finished, the proposed traffic flows during each month, the anticipated earnings by the Contractor for each month and the approximate number of crews and equipment to be used. The County, after necessary rescheduling and obtaining additional information for specific purposes, shall review and approve the schedule. The Contractor shall also forward to the County, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the work under the contract, in fabrication and in the field, stating the existing status, estimated time of completion and cause of delay, if any. Together with the summary report, the Contractor shall submit any necessary revisions to the original schedule for the County's review and approval. In addition, more detailed schedules may be required by the County for daily traffic control.

2.2 A Notice to Proceed may be given at any time within thirty (30) days after the effective date of the Agreement. The contract time will commence at the time specified in such notice. Contractor shall start to perform the Work on the date specified in the notice to proceed, but no work shall be done at the site prior to the date on which the contract time commences to run.

2.3 If at any time the materials and appliances to be used appear to the County as insufficient or improper for securing the quality of work required or the required rate of progress, the County may order the Contractor to increase his efficiency or to improve the character of his work and the Contractor shall conform to such an order. The failure of the County to demand any increase of such efficiency of any improvement shall not release the County from his obligation to secure the quality of work or the rate of progress necessary to complete the Work within the limits imposed by the contract. The County may require the Contractor to remove from the Work such employees as the County deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the Work is deemed to be contrary to the County's interest.

2.4 The County reserves the right to let other Contracts in connection with this Work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and execution of their Work, and promptly connect and coordinate the Work with theirs.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, RE-USE

3.1 The contract documents comprise the entire Agreement between County and Contractor concerning the work. The contract documents are complementary; what is called for by one is as binding as if called for by all. The contract documents will be construed in accordance with the laws and ordinances of the State of Florida and the County of Manatee.

Should a conflict exist within the contract documents, the precedence in ascending order of authority are as follows: 1) Standard Printed Contract Documents, 2) Special Conditions, 3) General Conditions and 4) Drawings. Note: Computed dimensions shall govern over scaled dimensions.

3.2 It is the intent of the contract documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the contract documents. Any work, materials or equipment that may reasonably be inferred from the contract documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials, or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the contract documents) shall be effective to change the duties and responsibilities of County, Contractor or Engineer, or any of their agents or employees from those set forth in the Contract Documents.

3.3 The contract documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.3.1 A Formal Written Amendment

3.3.2 A Change Order

3.3.3 Administrative Contract Adjustment (ACA)

3.4 In addition, the requirements of the contract documents may be supplemented and minor variations and deviations in the Work may be authorized in one or more of the following ways:

3.4.1 Discretionary Work – Field Directive
3.4.2 Engineer's approval of a Shop Drawing or sample.

ARTICLE 4 - CONTRACTOR'S RESPONSIBILITIES

4.1 Contractor shall keep on the Work at all times during its progress a competent resident superintendent; who shall be the Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.

4.2 Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the contract documents. Contractor shall at all times maintain good discipline and order at the site. 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 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 legal holiday without County's written consent given after prior notice to Engineer (at least 72 hours in advance).

4.2.1 Contractor shall pay for all additional engineering charges to the County for any overtime work which may be authorized. Such additional engineering charges shall be a subsidiary obligation of Contractor and no extra payment shall be made by County on account of such overtime work. At County's option, overtime costs may be deducted from Contractor's monthly payment request or Contractor's retainage prior to release of final payment.

4.3 Unless otherwise specified, Contractor shall furnish and assume full responsibility for all bonds, insurance, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

4.4 All materials and equipment shall be of good quality and new, except as otherwise provided in the contract documents. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable supplier except as otherwise provided in the contract documents.

4.5 Contractor shall be fully responsible to County for all acts and omissions of the subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between County or Engineer and any such subcontractor, supplier or other person or organization, nor shall it create any obligation on the part of County to pay or to see to the payment of any monies due any such subcontractor, supplier or other person or organization.

4.6 Permits: Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. County shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work.

4.7 During the progress of the Work, Contractor shall keep the premises free from accumulation of waste materials rubbish and other debris resulting from the Work. At the completion of the Work, 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 County. Contractor shall restore to original conditions all property not designated for alteration by the Contract Documents.

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

4.9 Safety and Protection: Contractor shall comply with the Florida Department of Commerce Safety Regulations and any local safety regulations. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:

4.9.1 all employees on the work and other persons and organizations who may be affected thereby;

4.9.2 all the work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

4.9.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for the protection required by public authority or local conditions. Contractor shall provide reasonable maintenance of traffic way for the public and preservation of the County's business, taking into full consideration all local conditions. Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed.

4.10 Emergencies: In emergencies affecting the safety or protection of persons or the work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or County, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give County prompt written notice if Contractor believes that any significant changes in the work or variations from the contract documents have been caused thereby. If County determines that a change in the contract documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variation.

4.11 For substitutes not included with the bid, but submitted after the effective date of the Agreement, Contractor shall make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from review, acceptance and provisions of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by the Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish at Contractor's expense, additional data about the proposed substitute. In rendering a decision, County/Engineer and Contractor shall have access to any available float time in the construction schedule. In the event that substitute materials or equipment not included as part of the bid, but proposed after the effective date of the agreement, are accepted and are less costly than the originally specified materials or equipment, then the net difference in cost shall be credited to the County and an appropriate change order executed.

4.11.1 If a specific means, method, technique, sequence of procedure of construction is indicated in or required by the contract documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Engineer if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the contract documents.

4.11.2 Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Engineer will be the sole judge of acceptability and no substitute will be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a change order or an approved shop drawing. County may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

4.11.3 Contractor shall reimburse County for the charges of Engineer and Engineer's Consultants for evaluating each proposed substitute submitted after the effective date of the Agreement and all costs resulting from any delays in the work while the substitute was undergoing review.

4.12 The Contractor shall furnish, free of charge, all labor, stakes, surveys, batter boards for structures, grade lines and other materials and supplies and shall set construction stakes and batter boards for establishing lines, position of structures, slopes and other controlling points necessary for the proper prosecution of the construction work. Where rights-of-way, easements, property lines or any other conditions which make the lay-out of the project or parts of the project critical are involved, the Contractor will employ a competent surveyor who is registered in the State of Florida for lay-out and staking. These stakes and marks shall constitute the field control by and in accord with which the Contractor shall govern and execute the work. The Contractor will be held responsible for the preservation of all stakes, marks and if for any reason any of the stakes or marks or batter boards become destroyed or disturbed, they will be immediately and accurately replaced by the Contractor.

4.13 The Contractor has, by careful examination, satisfied himself as to the nature and location of the work and all other matters which can in any way affect the work under this contract, including, but not limited to details pertaining to boring, as shown on the drawings, are not guaranteed to be more than a general indication of the materials likely to be found adjacent to holes bored at the site of the work, approximately at the locations indicated. The Contractor shall examine boring data, where available, and make his own interpretation of the subsoil investigations and other preliminary data, and shall base his bid on his own opinion of the conditions likely to be encountered. In no event shall an extension of time be considered for any conditions that existed at the time of bidding, nor shall the Contractor receive extra compensation for completion of the project as intended by the drawings and in keeping with the contact documents. No verbal agreement or conversation with any officer, agent or employee of the County, before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

4.14 If the Contractor, in the course of the work, finds that the drawings and/or Contract Documents cannot be followed, he shall immediately inform the County in writing, and the County shall promptly check the accuracy of the information. Any work done after such discovery, until any necessary changes are authorized, will be done at the Contractor's risk.

ARTICLE 5 - OWNER'S RESPONSIBILITIES

5.1 County shall furnish the data required of County under the contract documents promptly and shall make payments to the Contractor within a reasonable time (no more than 45 days) after the Work has been accepted by the County. The form of all submittals, notices, change orders and other documents permitted or required to be used or transmitted under the contract documents shall be determined by the County/Engineer. Standard County forms shall be utilized.

5.2 The County shall provide the lands upon which the Work under this contract is to be done, except that the Contractor shall provide all necessary additional land required for the erection of temporary construction facilities and storage of his materials, together with right of access to same.

5.3 The County shall have the right to take possession of and use any completed portions of the work, although the time for completing the entire work or such portions may not have expired, but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.

ARTICLE 6 - CHANGES IN THE WORK

6.1 Without invalidating the Agreement and without notice to any surety, County may, at any time, order additions, deletions or revisions in the Work. These will be authorized by a written amendment, a change order, or a work directive change. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the contract documents (except as otherwise specifically provided).

6.2 Contractor shall not be entitled to an increase in the contract price or an extension of the contract time with respect to any Work performed that is not required by the contract documents as amended, modified and supplemented.

6.3 County and Contractor shall execute appropriate change orders (or written amendments) covering changes in the Work which are ordered by County, or which may be required because of acceptance of defective Work.

6.4 At any time Engineer may request a quotation from Contractor for a proposed change in the Work and within twenty-one (21) calendar days after receipt, Contractor shall submit a written and detailed proposal for an increase or decrease in the contract price or contract time for the proposed change. Engineer shall have 21 calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in sufficient detail to reasonably permit an analysis by Engineer of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Notwithstanding the request for quotation, Contractor shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial.

ARTICLE 7 - CHANGE OF CONTRACT PRICE

7.1 The contract price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the contract price.

7.2 The contract price may only be changed by change order or by a written amendment. Any claim for an increase or decrease in the contract price shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within ten (10) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event.

7.3 The value of any Work covered by a change order or of any claim for an increase or decrease in the contract price shall be determined in one of the following ways (at County's discretion):

7.3.1 Where the Work involved is covered by unit prices contained in the contract documents, cost will be determined by application of such unit prices to the quantities of the items involved.

7.3.2 By mutual acceptance of lump sum.

7.3.3 On the basis of the cost of the Work, plus a 20% Contractor's fee for overhead and profit. (Contractor shall submit an itemized cost breakdown together with supporting data.)

7.4 Either County or Contractor may make a claim for an adjustment in the contract price. The unit price of an item of unit price Work shall be subject to re-evaluation and adjustment under the following conditions:

7.4.1 If the total cost of a particular item of unit price Work amounts to 5% or more of the contract price and the variation in the quantity of the particular item of unit price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and

7.4.2 If there is no corresponding adjustment with respect to any other item of Work; and

7.4.3 If a Contractor believes that it has incurred additional expense as a result thereof; or

7.4.4 If County believes that the quantity variation entitles it to an adjustment in the unit price; or

7.4.5 If the parties are unable to agree as to the effect of any such variations in the quantity of unit price Work performed.

ARTICLE 8 - CHANGE OF CONTRACT TIME

8.1 Contract time may only be changed by a change order or a written amendment. Any claim for an extension or shortening of the contract time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event.

8.2 The contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by County or others performing additional work; or to fires, floods, epidemics, abnormal weather conditions or acts of God.

8.3 All time limits stated in the contract documents are of the essence.

ARTICLE 9 - WARRANTY, TEST/INSPECTION, CORRECTION

9.1 Contractor warrants (for a minimum period of three years or as otherwise stated herein) and guarantees to County that all work will be in accordance with the contract documents and will not be defective; that County, representatives of County, governmental agencies with jurisdictional interests will have access to the work at reasonable time for their observation, inspecting and testing (Contractor shall give Engineer timely notice of readiness of the work for all required approvals and shall assume full responsibility, including costs, in obtaining required tests, inspections, and approval certifications and/or acceptance, unless otherwise stated by County).

9.2 If any work (including work of others) that is to be inspected, tested, or approved is covered without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice. Neither observations by Engineer nor inspections, tests, or approvals by others shall relieve Contractor from Contractor's obligations to perform the work in accordance with the contract documents.

9.3 If the work is defective, or Contractor fails to supply sufficient skilled workers, or suitable materials or equipment, or fails to furnish or perform the work in such a way that the completed work will conform to the contract documents, County may order Contractor to stop the work, or any portion thereof and terminate payments to the Contractor until the cause for such order has been eliminated. Contractor shall bear all direct, indirect and consequential costs for satisfactory reconstruction or removal and replacement with non-defective work, including, but not limited to fees and charges of engineers, architects, attorneys and other professionals and any additional expenses experienced by County due to delays to other Contractors performing additional work and an appropriate deductive change order shall be issued. Contractor shall further bear the responsibility for maintaining schedule and shall not be entitled to an extension of the contract time and the recovery of delay damages due to correcting or removing defective work.

9.3.1 If Contractor fails within seven (7) days after written notice to correct defective work, or fails to perform the work in accordance with the contract documents, or fails to comply with any other provision of the contract documents, County may correct and remedy any such deficiency. To the extent necessary to complete corrective and remedial action, County may exclude Contractor from all or part of the site, take possession of all or part of the work, Contractor's tools, construction equipment and machinery at the site or for which County has paid

Contractor but which are stored elsewhere. All direct, indirect and consequential costs of County in exercising such rights and remedies will be charged against Contractor in an amount approved as to reasonableness by Engineer and a change order will be issued incorporating the necessary revisions.

9.3.2 If within three years after the date of completion or such longer period of time as may be prescribed by laws or regulations 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 County and in accordance with County's written instructions, either correct such defective work or if it has been rejected by County, remove it from the site and replace it with non-defective work. If Contractor does not promptly comply with the terms of such instruction, County may have the defective work corrected/removed and all direct, indirect and consequential costs of such removal and replacement will be paid by Contractor.

ARTICLE 10 - SUSPENSION/TERMINATION OF WORK

10.1 County may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety (90) days by written notice to Contractor, which will fix the date on which work will be resumed. Contractor shall be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to any suspension if Contractor makes an approved claim therefore.

10.2 County may terminate the contract if Contractor commences a voluntary case under any chapter of the Bankruptcy Code or any similar action by filing a petition under any other federal or state law relating to the bankruptcy or insolvency; if a petition is filed against the Contractor under any chapter of the Bankruptcy Code or similar relief under any other federal or state law; if Contractor persistently fails to perform the work in accordance with the contract documents; if Contractor disregards laws or regulations of any public body having jurisdiction or the Engineer; or otherwise violates in any substantial way any provisions of the contract.

10.2.1 County may, after giving Contractor (and the surety, if there is one) seven (7) days written notice and to the extent permitted by laws and regulations, terminate the services of Contractor; exclude Contractor from the site and take possession of the work and of all Contractor's tools, construction equipment and machinery at the site and use the same to the full extent they could be used (without liability to Contractor for trespass or conversion); incorporate in the work all materials and equipment stored at the site or for which county has paid Contractor but which are stored elsewhere, and finish the work as County may deem expedient. In such case, Contractor shall not be entitled to receive any further payment beyond an amount equal to the value of material and equipment not incorporated in the work, but delivered and suitably stored, less the aggregate of payments previously made. If the direct and indirect costs of completing the work exceed the unpaid balance of the contract price, Contractor shall pay the difference to County. Such costs incurred by County shall be verified by County and incorporated in

a change order; but in finishing the work, County shall not be required to obtain the lowest figure for the work performed. Contractor's obligations to pay the difference between such costs and such unpaid balance shall survive termination of the Agreement.

10.3 If, through no act or fault of Contractor, the work is suspended for a period of more than ninety (90) days by County or under an order of court or other public authority, or Engineer fails to act on any application or fails to pay Contractor any sum finally determined to be due; then Contractor may, upon seven (7) days written notice to County terminate the Agreement and recover from County payment for all work executed, any expense sustained plus reasonable termination expenses. In lieu of terminating the Agreement, if Engineer has failed to act on any application of payment or County has failed to make any payment as aforesaid, Contractor may upon seven (7) days written notice to County stop the work until payment of all amounts then due.

ARTICLE 11 - CONTRACT CLAIMS

11.1 The rendering of a decision by Engineer with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by County or Contractor of such right or remedies as either may otherwise have under the contract documents or by laws or regulations in respect of any such claim, dispute or other matter. No action, either at law or at equity, shall be brought in connection with any such claim, dispute or other matter later than thirty (30) days after the date on which County/Engineer has rendered such written decision in respect thereof. Failure to bring an action within said thirty (30) day period shall result in Engineer's decision being final and binding on the Contractor. In no event may any such action be brought after the time at which instituting such proceedings would be otherwise barred by the applicable statute of limitations.

11.2 Before bringing any action in court pertaining to any claim, dispute or other matter in question(s) arising out of or relating to the contract documents or the breach thereof, or Engineer's final decision, except for claims which have been waived by the making and acceptance of final payment, the Contractor shall first submit written notice(s) of contract claims to the Purchasing Official for a decision; the Contractor may request a conference with the Purchasing Official. Claims include, without limitation, disputes arising under the contract and those based upon breach of contract, mistake, misrepresentation, or other cause for modification or revision. Contract claims shall use the process detailed in Section 2-26-63, Manatee County Purchase Code, Ordinance 09-52.

ARTICLE 12 - RESIDENT PROJECT REPRESENTATIVE - DUTIES, RESPONSIBILITIES

12.1 Resident Project Representative is Engineer/County's Agent, who will act as directed by and under the supervision of the Engineer, and who will confer with County/Engineer regarding his actions. Resident Project Representative's dealing in matters pertaining to the on-site work shall, in general, be only with the

County/Engineer and Contractor and dealings with subcontractors shall only be through or with the full knowledge of Contractor.

12.2 Resident Project Representative will:

12.2.1 Review the progress schedule, schedule of shop drawing submissions and schedule of values prepared by Contractor and consult with County/Engineer concerning their acceptability.

12.2.2 Attend preconstruction conferences. Arrange a schedule of progress meetings and other job conferences as required in consultation with County/Engineer and notify those expected to attend in advance. Attend meetings and maintain and circulate copies of minutes thereof.

12.2.3 Serve as County/Engineer's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the contract documents. As requested by County/Engineer, assist in obtaining additional details or information when required at the job site for proper execution of the Work.

12.2.4 Receive and record date of receipt of shop drawings and samples, receive samples which are furnished at the site by Contractor and notify County/Engineer of their availability for examination.

12.2.5 Advise County/Engineer and Contractor or his superintendent immediately of the commencement of any work requiring a shop drawing or sample submission if the submission has not been approved by the County/Engineer.

12.2.6 Conduct on-site observations of the work in progress to assist County/Engineer in determining if the work is proceeding in accordance with the contract documents and that completed work will conform to the contract documents.

12.2.7 Report to County/Engineer whenever he believes that any work is unsatisfactory, faulty or defective or does not conform to the contract documents, or does not meet the requirements of any inspections, tests or approvals required or if work has been damaged prior to final payment; and advise County/Engineer when he believes work should be corrected or rejected or should be uncovered of observation or requires special testing, inspection or approval.

12.2.8 Verify that tests, equipment and system start-ups and operating and maintenance instructions are conducted as required by the contract documents and in the presence of the required personnel, and that Contractor maintains adequate records thereof; observe, record and report to Engineer appropriate details relative to the test procedures and start-ups.

12.2.9 Accompany visiting inspectors representing public or other agencies having jurisdiction over the project; record the outcome of these inspections and report to County/Engineer.

12.2.10 Transmit to Contractor, County/Engineer's clarifications and interpretations of the contract documents.

12.2.11 Consider and evaluate Contractor's suggestions or modifications in drawings or Contract Documents and report them with recommendations to County/Engineer.

12.2.12 Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and sample submissions, reproductions of original contract documents including all addenda, change orders, field orders, additional drawings issued subsequent to the execution of the contract, County/Engineer's clarifications and interpretations of the contract documents, progress reports and other project related documents.

12.2.13 Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions; list of visiting officials and representatives or manufacturers, fabricators, suppliers and distributors; daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures. Send copies to County/Engineer.

12.2.14 Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.

12.2.15 Furnish County/Engineer periodic reports as required of progress of the work and Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions.

12.2.16 Consult with County/Engineer in advance of scheduling major tests, inspections or start of important phases of the work.

12.2.17 Report immediately the occurrence of any accident.

12.2.18 Review applications for payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to County/Engineer, noting particularly their relation to the schedule of values, work completed and materials and equipment delivered at the site but not incorporated in the work.

12.2.19 During the course of the work, verify that certificates, maintenance and operations manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed, and deliver this material to County/Engineer for his review prior to final acceptance of the work.

12.2.20 Before County/Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.

12.2.21 Conduct final inspection in the company of County/Engineer and Contractor and prepare a final list of items to be completed or corrected.

12.2.22 Verify that all items on final list have been completed or corrected and make recommendations to County/Engineer concerning acceptance.

12.3 Except upon written instructions of County/Engineer, Resident Project Representative;

12.3.1 Shall not authorize any deviation from the contract documents or approve any substitute materials or equipment;

12.3.2 Shall not exceed limitations on County/Engineer's authority as set forth in the contract documents;

12.3.3 Shall not undertake any of the responsibilities of Contractor, Subcontractors or Contractor's Superintendent, or expedite the work;

12.3.4 Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the contract documents;

12.3.5 Shall not advise on or issue directions as to safety precautions and programs in connection with the work;

12.3.6 Shall not authorize County to occupy the project in whole or in part; and

12.3.7 Shall not participate in specialized field or laboratory tests.

ARTICLE 13 - APPRENTICES

13.1 If Successful Contractor employs Apprentices, he shall be governed and shall fully comply with the provisions of Florida State Statute 446.011.

END OF SECTION

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MANATEE COUNTY PROJECT # 6055480

Technical Specifications

Prepared For:

MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

June 2010

Prepared By:

carollo
Engineers...Working Wonders With Water™

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MANATEE COUNTY PROJECT # 6055480

Technical Specifications

Prepared For:

MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

June 2010

Eric Peters, P.E.
License #61306

GENERAL; CIVIL; MECHANICAL (PROCESS)

6/25/10
Date

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MANATEE COUNTY PROJECT # 6055480

Technical Specifications

Prepared For:

MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

June 2010

Gary Sagehorn, P.E.
License #64189

STRUCTURAL

6/29/10
Date

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MANATEE COUNTY PROJECT # 6055480

Technical Specifications

Prepared For:

MANATEE COUNTY

PUBLIC WORKS DEPARTMENT

June 2010

Robert Garcia, P.E.
License #31103

ELECTRICAL; INSTRUMENTATION

6/25/10
Date

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MANATEE COUNTY PROJECT # 6055480

Technical Specifications

Prepared For:

MANATEE COUNTY

PUBLIC WORKS DEPARTMENT

June 2010

John Petreikis, P.E.
License #23782

HAVAC

7-3-10

Date

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
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SECTION 01005

GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE AND INTENT

A. Description
   1. 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
   1. 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 costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.
   2. The cost of incidental work described in these 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 therefore.
   3. The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.

C. Public Utility Installations and Structures
   1. 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.
   2. The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction

shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor 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.

3. 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 therefore.
4. 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.
5. 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).
6. 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.

1.02 PLANS AND SPECIFICATIONS

A. Plans
   1. 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
   1. 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
   1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, 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
   1. 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 there from 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
   1. 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
   1. 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.
   2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.
   3. 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.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer
   1. The names of proposed manufacturers, material men, suppliers and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings 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.

2. 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.
3. 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
   1. 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
   1. 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.
   2. Spare parts shall be furnished as specified.
   3. Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

D. Installation of Equipment.
   1. 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.
   2. 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.
   3. 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.
   4. 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.
   5. 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

1. 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.

1.04 INSPECTION AND TESTING

A. General
   1. Inspection and testing of materials will be performed by the Owner unless otherwise specified.
   2. 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.
   3. 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.
   4. 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.
   5. 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
   1. 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.
   2. 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.
   3. 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
   1. 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
   1. 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
   1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. 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.
   2. Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.
   3. The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

F. Preliminary Field Tests
   1. 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
   1. 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.

   2. 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

1. 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.
2. 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

1. 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.

1.05 TEMPORARY STRUCTURES

A. Temporary Fences

1. 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.

1.06 TEMPORARY SERVICES

A. First Aid

1. 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.

1.07 LINES AND GRADES

A. Grade
   1. 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
   1. 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 to removing without authorization such established points, stakes and marks.
   2. The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

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

1.08 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility
   1. 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.
   2. 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.
   3. 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.

4. 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
1. 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 the manner described in the Workmanship and Materials Paragraph in Section 02485, Seeding & Sodding.

D. Restoration of Fences
1. 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.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights
1. 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
1. A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.

C. Noise
   1. 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.
   2. 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 the work.

D. Access to Public Services
   1. 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
   1. 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

A. 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
   1. 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.
   2. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

B. Final Cleaning
   1. 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.
   2. 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
   1. 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
   1. 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
   1. 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

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

A. The work included in this contract consists of the construction of:
   1. A fully functional wastewater booster station in accordance with the drawings and specifications.

B. The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.

C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by the Owner.

D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

1.02 CONTRACTS

A. Construct all the Work under a single contract.

1.03 WORK SEQUENCE

A. All work done under this Contract shall be done with a minimum of inconvenience to the users of the system or facility. The Contractor shall coordinate his work with private property owners such that existing utility services are maintained to all users to the maximum extent possible.

B. The Contractor shall, if necessary and feasible, construct the work in stages to accommodate the Owner's use of the premises during the construction period; coordinate the construction schedule and operations with the Owner's Representative.

C. The Contractor shall, where feasible, construct the Work in stages to provide for public convenience and not close off public use of any facility until completion of construction to provide alternative usage.

1.04 CONSTRUCTION AREAS

A. The Contractor shall:
   1. Limit his use of the construction areas for work and for storage, to allow for:
      a. Work by other Contractors.
      b. Owner's Use.
      c. Public Use.

B. Coordinate use of work site under direction of Engineer or Owner's Representative.

C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

D. Move any stored products under the Contractor's control, which interfere with operations of the Owner or separate contractor.

E. Obtain and pay for the use of additional storage of work areas needed for Contractor operations.

1.05 OWNER OCCUPANCY

A. It is assumed that portions of the Work will be completed prior to completion of the entire Work. Upon completion of construction of each individual facility, including testing, if the Owner, at its sole discretion, desires to accept the individual facility, the Contractor will be issued a dated certificate of completion and acceptance for each individual facility. The Owner will assume ownership and begin operation of the individual facility on that date and the three-year guaranty period shall commence on that date. The Owner has the option of not accepting the entire work as a whole until it is completed, tested and approved by the Engineer and Owner.

1.06 PARTIAL OWNER OCCUPANCY

A. The Contractor shall schedule his operations for completion of portions of the Work, as designated, for the Owner's occupancy prior to substantial completion of the entire work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01015

CONTROL OF WORK

PART 1 GENERAL

1.01 WORK PROGRESS

A. 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.

1.02 PRIVATE LAND

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

1.03 WORK LOCATIONS

A. 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.

1.04 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.

1.05 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.

1.06 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.

1.07 TEST PITS

A. 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.

1.08 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.

1.09 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. Detours around construction areas will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic

is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured, will be strictly controlled by the Owner.

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

A. 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

A. 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

A. 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 Manatee County 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

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SECTION 01030

SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 PERMITS

A. Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the Owner to do the work from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the Engineer. The costs for obtaining all permits shall be borne by the Contractor.

1.02 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 all as shown on the Drawings or where directed by the Owner/Engineer. The cost for this work and for the actual connection to the existing systems shall be included in the price bid for the project and shall not result in any additional cost to the Owner. The termination point for each contract shall be as shown on the Contract Drawings.

1.03 RELOCATIONS

A. The Contractor shall be responsible for the coordination of the relocation of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. No relocation of the items under this Contract shall be done without approval from the Engineer.

1.04 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various water, sewer, gas, telephone, electrical, or other utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines as to avoid damage to the existing lines. Cost for relocation of all existing lines shall be included in the price bid for the project. Should damage occur to an existing line, the Contractor shall bear the cost of all repairs.

B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation by the Contractor.

C. 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 picture 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).

D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified, or required. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Engineer of the location of the pipeline or utility and shall reroute or relocate the pipeline or utility as directed. Cost for relocation of existing pipelines or utilities shall be included in the price bid for the project.

E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete 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 as directed by the Engineer and/or the owner of the utility.

F. It is intended that wherever existing utilities such as water, sewer, gas, telephone, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated in the Drawings. However, when in the opinion of the Engineer this procedure is not feasible, he may direct the use of fittings for a utilities crossing as detailed on the Drawings. No deflections will be allowed in gravity sanitary sewer lines or in existing storm sewer lines.

1.05 SUSPENSION OF WORK DUE TO WEATHER

A. Refer to FDOT Standards and Specifications Book, Section 8.

1.06 HURRICANE PREPAREDNESS PLAN

A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and Owner 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 Engineer 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 Engineer, 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.

1.07 POWER SUPPLY

A. Electricity as may be required for construction and permanent power supply shall be secured and purchased by the Contractor.

1.08 SALVAGE

A. Any existing equipment or material, including, but not limited to, valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the Engineer or Owner and if so

shall be protected for a reasonable time until picked up by the Owner. Any equipment or material not worthy of salvaging, as directed by the Engineer, shall be disposed of by the Contractor at no additional cost.

1.09 DEWATERING

A. The Contractor shall do all groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment.

B. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner.

1.10 ADDITIONAL PROVISIONS

A. Before commencing work on any of the existing pipelines, structures or equipment, the Contractor shall notify the Engineer, in writing, at least 10 (ten) calendar days in advance of the date he proposes to commence such work.

B. The Contractor shall provide, at his own expense, all necessary temporary facilities for 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 ordered by the Engineer.

1.11 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.

1.12 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 meet Manatee County Ordinance #87-34, (which amends Ordinance 81-3, The Manatee County Noise Control Ordinance). Sound levels in excess of such ordinance are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Engineer or County 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.

1.13 WARRANTIES

A. All material supplied under these Specifications shall be warranted by the Contractor and the manufacturers for the period as specified within each individual specification

section.

B. The material shall be warranted to be free from defects in workmanship, design and materials. If any part of the system should fail during the warranty period, it shall be replaced at no expense to the Owner.

C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty or guarantee period. No exception to this provision shall be allowed. The Contractor shall be responsible for obtaining warranties from each of the respective suppliers or manufacturers for all the material specified under these contract specifications,

1.14 FUEL STORAGE & FILLING

A. If the contractor is storing fuel on site, or doing his own fuel filling of portable equipment (other than hand-held equipment), he is responsible for any required response, clean-up or reporting required, at no additional cost to the county.

B. The Contractor shall prepare and submit a fuel storage/spill abatement plan prior to start of construction if required.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the work or to:
   1. Make its several parts fit together properly.
   2. Uncover portions of the work to provide for installation of ill-timed work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to requirements of Contract Documents.
   5. Provide penetrations of non-structural surfaces for installation of piping and electrical conduit.

PART 2 PRODUCTS

2.01 MATERIALS

A. Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.

B. After uncovering work, inspect conditions affecting installation of products, or performance of work.

C. Report unsatisfactory or questionable conditions to Engineer. Do not proceed with work until Engineer has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value to integrity of affected portion of work.

B. Provide devices and methods to protect other portions of project from damage.

C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work and maintain excavations free from water.

3.03 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

C. Fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances and finishes.

D. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of the Contract Documents.

E. Replace surfaces airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

END OF SECTION

SECTION 01050

FIELD ENGINEERING AND SURVEYING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall provide and pay for field surveying service required for the project.

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. All survey work required in execution of Project.
   2. All costs of construction layout shall be included in the unit and lump sum prices contained in the respective divisions of the Contract Bid Form.
   3. Civil, structural or other professional engineering services specified or required to execute Contractor's construction methods.

1.02 QUALIFICATION OF SURVEYOR AND ENGINEER

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

1.03 SURVEY REFERENCE POINTS

A. Existing basic horizontal and vertical control points for the Project are designated on the Contract Drawings.

B. Locate and protect all survey monumentation, property corners and project control points prior to starting work and preserve all permanent reference points during construction. All costs associated with the replacement of all survey monumentation, property corners and project control points shall be borne by the Contractor.

C. Make no changes or relocations without prior written notice to Engineer.

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

E. Require Surveyor to replace project control points which may be lost or destroyed.

F. Establish replacements based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

A. The Contractor shall establish temporary bench marks as needed, referenced to data established by survey control points.

1.05 RECORDS

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

B. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings per Section 01720.

1.06 SUBMITTALS

A. Submit name and address of Professional Surveyor and Mapper to Engineer for Owner's approval.

B. A licensed Surveyor and Mapper must verify and certify to the horizontal and vertical measurements of the As-Builts. The accuracy shall be such that it may be determined (by the Engineer) that the improvements are substantially consistent with the planned locations. All marks set or measurements made by the Contractor and incorporated into the As-Built Survey of the Surveyor shall be identified in a distinctly different fashion or method. The Surveyor shall further explain the conditions that prevented them from taking the direct measurements. The Engineer of Record shall determine what actions, if any, are required to verify the data supplied by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS

Abbreviations and acronyms used in Contract Documents to identify reference standards.

A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes established stricter standards.

B. Publication Date: The most recent publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.02 ABBREVIATIONS, NAMES AND ADDRESSES OR ORGANIZATIONS

Obtain copies of reference standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents.

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AASHTO	American Association of State Highway and Transportation Officials 444 North Capital Street, N.W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AISC	American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16th Street NW Washington, DC 20036

ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 179l Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
AWS	American Welding Society 2501 N.W. 7th Street Miami, FL 33125
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street, Suite 2110 Chicago, IL 60601
FDEP	Florida Department of Environmental Protection 3900 Commonwealth Blvd. Tallahassee, Florida 32399
FDOT	Florida Department of Transportation Standards Specifications for Road and Bridge Construction Maps & Publication Sales - Mail Station 12 605 Suwannee St. Tallahassee, FL 32399-0450
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
MCUOD	Manatee County Utility Operations Department 4410 66th St. W. Bradenton, FL 34210
MLSFA	Metal Lath/Steel Framing Association 221 North LaSalle Street Chicago, IL 60601

MMA	Monorail Manufacturer's Association 1326 Freeport Road Pittsburgh, PA 15238
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NEMA	National Electrical Manufacturer's Assoc. 2101 L Street N.W. Washington, DC 20037
OHSA	Occupational Safety and Health Assoc. 5807 Breckenridge Pkwy., Suite A Tampa, FL 33610-4249
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 8224 Old Court House Road Vienna, VA 22180
SSPC	Steel Structures Painting Council 402 24th Street, Suite 600 Pittsburgh, PA 15213
SWFWMD	Southwest Florida Water Management District 2379 Broad Street Brooksville, FL 34604-6899
UL	Underwriter's Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE

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

B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

1.02 ESTIMATED QUANTITIES

A. The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The Owner/Engineer does not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

1.03 WORK OUTSIDE AUTHORIZED LIMITS

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

1.04 MEASUREMENT STANDARDS

A. Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

1.05 AREA MEASUREMENTS

A. In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

1.06 LUMP SUM ITEMS

A. 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 items.

Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum totals.

1.07 UNIT PRICE ITEM

A. Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

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. Final payments shall not be requested by the Contractor or made by the Owner until as-built (record) drawings have been submitted and approved by the Engineer.

1. Shop Drawings, Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering and disposal of surplus water.
5. Structural fill, backfill, and grading.
6. Replacement of unpaved roadways, and shrubbery plots.
7. Cleanup and miscellaneous work.
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 the tests.
11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
12. Maintaining the existing quality of service during construction.
13. Maintaining or detouring of traffic.
14. Appurtenant work as required for a complete and operable system.
15. Seeding and hydromulching.
16. As-built Record Drawings.

Bid Item No. 1: MOBILIZATION/DEMOBILIZATION

MOBILIZATION/DEMOBILIZATION shall be paid for at a lump sum price. The contract lump sum price paid for MOBILIZATION/DEMOBILIZATION shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in MOBILIZATION/DEMOBILIZATION, complete in place, including obtaining bonds, insurance and financing, movement of equipment, materials and personnel, supervision, field office, certificates, permits, submittals, utilities, site maintenance, cleanup, dust control and all other work incidental to the contract not specifically identified under the remaining items or costs incurred prior to the beginning of the work and after completion of the work as shown on the plans, as specified herein, and as directed by the Engineer. The cost for MOBILIZATION/DEMOBILIZATION shall not exceed five (5) percent of the total bid for this project without documented justification.

Bid Item No. 2: TEMPORARY EROSION CONTROL

TEMPORARY EROSION CONTROL shall be paid for at a lump sum price. The contract lump sum price paid for TEMPORARY EROSION CONTROL shall include full compensation for

PER PLAN shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in PRECAST CONCRETE ELECTRICAL BUILDING, PER PLAN, complete in place, including foundation, concrete form work, reinforcement, cast in place concrete, precast concrete walls, finish floor slab, building doors, wall penetrations, stairwell access room, air exhaust louvers, steel support beams, monorail trolley, precast concrete roof, gutter and downspout, compaction, testing, pressure testing, disinfection, soil disposal, as shown on the plans, as specified herein, and as directed by the Engineer.

This Bid Item does NOT include electrical items and conduits.

Bid Item No. 8 PUMP STATION ACCESS DRIVE

PUMP STATION ACCESS DRIVE shall be paid for at a lump sum price The contract price paid for PUMP STATION ACCESS DRIVE shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in PUMP STATION ACCESS DRIVE, complete in place, including AC saw cutting and removal, pavement section excavation, soil disposal, sub base preparation, aggregate base material, concrete material, placement, compaction, testing, as shown on the plans, as specified herein, and as directed by the Engineer.

Bid Item No. 9 ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS

ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS shall be paid for at a lump sum price. ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS is responsible for all aspects of the PLC, SCADA, and telemetry devices. This includes all modifications required at the PS 428 master station and PS 428 BPS site. Coordination with the Owner for integrating the PLC and SCADA systems is required.

ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS work shall include all Work shown on the Drawings, but not be limited to electrical service and all associated costs, automatic transfer switch, motor control center, control panels, lighting transformers and panels, all raceway system and ductbank, coordination with utility companies, and installation, testing, and commissioning of the electrical and control systems, field instrumentation and controls, PLC's, control panels, UPS units, and related items,. The Contractor shall provide labor for engineering, installation, drawings and submittals, testing, start up and training.

The Contractor shall provide all installation, configuration, calibration and testing to provide a fully functional control system.

Bid Item No. 10: STANDBY POWER GENERATOR

The STANDBY POWER GENERATOR shall be paid for at a lump sum price. Include a packaged automatic "standby" diesel engine generator system including diesel engine with batteries and battery charger, generator, liquid coolant system, fuel system and an adjacent stand alone fuel storage tank, exhaust system, fuel venting system, control system, and concrete slabs on grade.

Bid Item No. 11: DISCRETIONARY WORK

Payment for all work under DISCRETIONARY WORK shall be made only at the Owner's discretion in order to satisfactorily complete the project in accordance with the Plans and Specifications.

furnishing all labor, materials, tools, equipment, and incidentals to install, maintain, and remove all required TEMPORARY EROSION CONTROL, including drainage inlet protection, fiber rolls, erosion control fencing, tree protection, construction entrances, and any other temporary erosion control measures as may be required by the Project permits or permitting agencies, as shown on the plans, as specified herein, and as directed by the Engineer.

Bid Item No. 3: SITEWORK

SITEWORK shall be paid for at a lump sum price. The contract lump sum price paid for SITEWORK shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in SITEWORK, including clearing and grubbing, tree removal, excavation, slope stabilization, material handling, material stockpiling, soil import, backfill, revegetation, sodding, compaction, testing, dewatering, complete in place, including system design, permitting, installation of dewatering system (wells, pumps, piping, settling tanks, treatment facilities, etc.), decommissioning, and abandonment, including disposal as required, as shown on the plans, as specified herein, and as directed by the Engineer.

Bid Item No. 4: PUMP STATION 6-FOOT SITE FENCING

PUMP STATION SITE 6-FOOT FENCING shall be paid for at a lump sum price. The contract lump sum price paid for PUMP STATION SITE 6-FOOT FENCING shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in PUMP STATION SITE 6-FOOT FENCING, complete in place, including excavation, concrete footings, steel fence posts, horizontal supports, 6-foot tall chain link fencing, access gates, compaction, soil disposal (as required), to the dimensions as shown on the plans, as specified herein, and as directed by the Engineer.

Bid Item No. 5: YARD PIPING

YARD PIPING shall be paid for at a lump sum price. The contract lump sum price paid for YARD PIPING shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in YARD PIPING, complete in place, including excavation, 20-inch and 18-inch suction piping, 18-inch discharge piping, fittings, shut-off valves, flexible couplings, air release valve and concrete vault, vault foundation aggregate base material, pipe bedding, pipe backfill, warning tape, isolating flanges, backfill, compaction, testing, pressure testing, disinfection, soil disposal, as shown on the plans, as specified herein, and as directed by the Engineer.

Bid Item No. 6: FACTORY BUILT AUTOMATIC PUMP STATION, PER PLAN

FACTORY BUILT AUTOMATIC PUMP STATION, PER PLAN shall be paid for at a lump sum price. The contract lump sum price paid for FACTORY BUILT AUTOMATIC PUMP STATION, PER PLAN shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in FACTORY BUILT AUTOMATIC PUMP STATION, PER PLAN, complete in place, including foundation, concrete form work, reinforcement, cast in place concrete, entrance tube and stairwell, equipment tube and hatch, traveling beam and hoist, suction and discharge piping, valves, lighting, pumps, electrical connections and conduit, and drain piping, as delineated on the plans, as specified herein, and as directed by the Engineer.

Bid Item No. 7: PRECAST CONCRETE ELECTRICAL BUILDING, PER PLAN

PRECAST CONCRETE ELECTRICAL BUILDING, PER PLAN shall be paid for at a lump sum price. The contract lump sum price paid for PRECAST CONCRETE ELECTRICAL BUILDING,

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01152

REQUESTS FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Submit Applications for Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.

1.02 FORMAT AND DATA REQUIRED

A. Submit payment requests in the form provided by the Owner with itemized data typed in accordance with the Bid Form.

B. Provide construction photographs in accordance with Contract Documents.

1.03 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information with a cover letter.

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

1.04 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in application form as specified for progress payments.

1.05 SUBMITTAL PROCEDURE

A. Submit applications for payment at the times stipulated in the Agreement.

B. Number: Three (3) copies of each application; all signed and certified by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01153

CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 DEFINITION

A. Change Order: Major change in contract scope or time that must be approved by the Board.

B. Administrative Change Adjustment: Minor change order under 10% of project cost or 20% time, does not have to be Board approved.

C. Field Directive Change: Change to contract quantity that does not require a change of scope or time extension.

1.02 REQUIREMENTS INCLUDED

A. The Contractor shall promptly implement Change Order procedures:
   1. Provide full written data required to evaluate changes.
   2. Maintain detailed records of work done on a time-and-material/force account basis.
   3. Provide full documentation to Engineer on request.

B. The Contractor shall designate a member of the Contractor's organization who:
   1. Is authorized to accept changes to the Work.
   2. Is responsible for informing others in the Contractor's employ of the authorized changes into the Work.

C. The Board of County Commissioners executes all Change Orders.

1.03 PRELIMINARY PROCEDURES

A. Project Manager may initiate changes by submitting a Request to Contractor. Request will include:
   1. Detailed description of the change, products, costs and location of the change in the Project.
   2. Supplementary or revised Drawings and Specifications.
   3. The projected time extension for making the change.
   4. A specified period of time during which the requested price will be considered valid.
   5. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.

B. Contractor may initiate changes by submitting a written notice to the Project Manager, containing:
   1. Description of the proposed changes.
   2. Statement of the reason for making the changes.
   3. Statement of the effect on the Contract Sum and the Contract Time.
   4. Statement of the effect on the work of separate contractors.

5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.04 FIELD DIRECTIVE CHANGE

A. In lieu of a Change Order, the Project Manager may issue a Field Directive change for the Contractor to proceed with additional work within the original intent of the Project.

B. Field Directive change will describe changes in the work, with attachments of backup information to define details of the change.

C. Contractor must sign and date the Field Directive change to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow the Engineer/Owner to evaluate the quotation.

B. On request, provide additional data to support time and cost computations:
   1. Labor required.
   2. Equipment required.
   3. Products required.
      a. Recommended source of purchase and unit cost.
      b. Quantities required.
   4. Taxes, insurance and bonds.
   5. Credit for work deleted from Contract, similarly documented.
   6. Overhead and profit.
   7. Justification for any change in Contract Time.

C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information.
   1. Name of the Owner's authorized agent who ordered the work and date of the order.
   2. Date and time the work was performed and by whom.
   3. Time record, summary of hours work and hourly rates paid.
   4. Receipts and invoices for:
      a. Equipment used, listing dates and time of use.
      b. Products used, listing of quantities.
      c. Subcontracts.

1.06 PREPARATION OF CHANGE ORDERS

A. Project Manager will prepare each Change Order.

B. Change Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.

C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.07 LUMP SUM/FIXED PRICE CHANGE ORDER

A. Project Manager initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or requests from the Owner, or both.

B. Once the form has been completed, all copies should be sent to Contractor for approval. After approval by Contractor, all copies should be sent to Owner for approval. The Owner will distribute executed copies after approval by the Board of County Commissioners.

1.08 UNIT PRICE CHANGE ORDER

A. Contents of Change Orders will be based on, either:
   1. Owner's definition of the scope of the required changes.
   2. Contractor's Proposal for a change, as approved by the Owner.
   3. Survey of completed work.

B. The amounts of the unit prices to be:
   1. Those stated in the Agreement.
   2. Those mutually agreed upon between Owner and Contractor.

1.09 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

A. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

B. Engineer will determine the allowable cost of such work, as provided in General Conditions and Supplementary Conditions.

C. Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.

D. Owner and Contractor will sign and date the Change Order to indicate their agreement therewith.

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Application for Payment forms to record each change as a separate item of work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub schedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Owner or Engineer shall schedule the pre-construction meeting, periodic progress meetings and special meetings, if required, throughout progress of work.

B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. The Contractor shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 PRE-CONSTRUCTION MEETING

A. Attendance:
   1. Owner's Engineer.
   2. Owner's Project Manager.
   3. Contractor.
   4. Resident Project Representative.
   5. Related Labor Contractor's Superintendent.
   6. Major Subcontractors.
   7. Major Suppliers.
   8. Others as appropriate.

B. Suggested Agenda:
   1. Distribution and discussion of:
      a. List of major subcontractors.
      b. Projected Construction Schedules.
      c. Coordination of Utilities.
   2. Critical work sequencing.
   3. Project Coordination.
      a. Designation of responsible personnel.
      b. Emergency contact persons with phone numbers.
   4. Procedures and processing of:
      a. Field decisions.
      b. Submittals.
      c. Change Orders.
      d. Applications for Payment.
   5. Procedures for maintaining Record Documents.
   6. Use of premises:
      a. Office, work and storage areas.
      b. Owner's requirements.
   7. Temporary utilities.
   8. Housekeeping procedures.
   9. Liquidated damages.
   10. Equal Opportunity Requirements.

11. Laboratory testing.
12. Project / Job meetings: Progress meeting, other special topics as needed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULE & PROJECT RESTRAINTS

PART 1 GENERAL

1.01 GENERAL

A. Construction under this contract must be coordinated with the Owner and accomplished in a logical order to maintain utilization and flow through existing facilities and public properties and rights-of-way and to allow construction to be completed within the time allowed by Contract Documents and in the manner set forth in the Contract.

1.02 CONSTRUCTION SCHEDULING GENERAL PROVISIONS

A. No work shall be done between 7:00 p.m. and 7:00 a.m. nor on weekends or legal holidays without written permission of the Owner. However, emergency work may be done without prior permission.

B. Night work may be established by the Contractor as regular procedure with the written permission of the Owner. Such permission, however, may be revoked at any time by the Owner if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work at night.

C. Due to potential health hazards and requirements of the State of Florida and the U.S. Environmental Protection Agency, existing facilities must be maintained in operation.

D. The Contractor shall be fully responsible for providing all temporary piping, plumbing, electrical hook-ups, lighting, temporary structure, or other materials, equipment and systems required to maintain the existing facility's operations. All details of temporary piping and temporary construction are not necessarily shown on the Drawings or covered in the Specifications. However, this does not relieve the Contractor of the responsibility to insure that construction will not interrupt proper facility operations.

E. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

1.03 PROGRESS OF THE WORK

A. The work shall be executed with such progress as may be required to prevent any delay to the general completion of the work. The work shall be executed at such times and in or on such parts of the project and with such forces, materials and equipment to assure completion of the work in the time established by the Contract and in the manner set forth in the Contract.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Contractor shall submit a critical path schedule as described herein.

B. The planning, scheduling, management and execution of the work is the sole responsibility of the Contractor. The progress schedule requirement is established to allow Engineer to review Contractor's planning, scheduling, management and execution of the work; to assist Engineer in evaluating work progress and make progress payments and to allow other contractors to cooperate and coordinate their activities with those of the Contractor.

2.02 FORM OF SCHEDULES

A. Prepare schedules using the latest version of Microsoft Project, or other Owner approved software, in the form of a horizontal bar chart diagram. The diagram shall be time-scaled and sequenced by work areas. Horizontal time scale shall identify the first work day of each week.

B. Activities shall be at least as detailed as the Schedule of Values. Activity durations shall be in whole working days. In addition, man-days shall be shown for each activity or tabulated in an accompanying report.

C. Diagrams shall be neat and legible and submitted on sheets at least 8-1/2 inches by 11 inches suitable for reproduction. Scale and spacing shall allow space for notations and future revisions.

2.03 CONTENT OF SCHEDULES

A. Each monthly schedule shall be based on data as of the last day of the current pay period.

B. Description for each activity shall be brief, but convey the scope of work described.

C. Activities shall identify all items of work that must be accomplished to achieve substantial completion, such as items pertaining to Contractor's installation and testing activities; items pertaining to the approval of regulatory agencies; contractor's time required for submittals, fabrication and deliveries; the time required by Engineer to review all submittals as set forth in the Contract Documents; items of work required of Owner to support pre-operational, startup and final testing; time required for the relocation of utilities. Activities shall also identify interface milestones with the work of other contractors performing work under separate contracts with Owner.

D. Schedules shall show the complete sequence of construction by activities. Dates for beginning and completion of each activity shall be indicated as well as projected percentage of completion for each activity as of the first day of each month.

E. Submittal schedule for shop drawing review, product data, and samples shall show the date of Contractor submittal and the date approved submittals will be required by the Engineer, consistent with the time frames established in the Specifications.

F. For Contract Change Orders granting time extensions, the impact on the Contract

date(s) shall equal the calendar-day total time extension specified for the applicable work in the Contract Change Orders.

G. For actual delays, add activities prior to each delayed activity on the appropriate critical path(s). Data on the added activities of this type shall portray all steps leading to the delay and shall further include the following: separate activity identification, activity description indicating cause of the delay, activity duration consistent with whichever set of dates below applies, the actual start and finish dates of the delay or, if the delay is not finished, the actual start date and estimated completion date.

H. For potential delays, add an activity prior to each potentially delayed activity on the appropriate critical path(s). Data for added activities of this type shall include alternatives available to mitigate the delay including acceleration alternatives and further show the following: separate activity identification, activity description indicating cause of the potential delay and activity duration equal to zero work days.

2.04 SUPPORTING NARRATIVE

A. Status and scheduling reports identified below shall contain a narrative to document the project status, to explain the basis of Contractor's determination of durations, describe the Contract conditions and restraints incorporated into the schedule and provide an analysis pertaining to potential problems and practical steps to mitigate them.

B. The narrative shall specifically include:
   1. Actual completion dates for activities completed during the monthly report period and actual start dates for activities commenced during the monthly report period.
   2. Anticipated start dates for activities scheduled to commence during the following monthly report period.
   3. Changes in the duration of any activity and minor logic changes.
   4. The progress along the critical path in terms of days ahead or behind the Contract date.
   5. If the Monthly Status Report indicates an avoidable delay to the Contract completion date or interim completion dates as specified in the Agreement, Contractor shall identify the problem, cause and the activities affected and provide an explanation of the proposed corrective action to meet the milestone dates involved or to mitigate further delays.
   6. If the delay is thought to be unavoidable, the Contractor shall identify the problem, cause, duration, specific activities affected and restraints of each activity.
   7. The narrative shall also discuss all Change Order activities whether included or not in the revised/current schedule of legal status. Newly introduced Change Order work activities and the CPM path(s) that they affect, must be specifically identified. All Change Order work activities added to the schedule shall conform with the sequencing and Contract Time requirements of the applicable Change Order.
   8. Original Contract date(s) shall not be changed except by Contract Change Order. A revision need not be submitted when the foregoing situations arise unless required by Engineer. Review of a report containing added activities will not be construed to be concurrence with the duration or restraints for such added activities; instead the corresponding data as ultimately incorporated into the applicable Contract Change Order shall govern.

9. Should Engineer require additional data, this information shall be supplied by Contractor within 10 (ten) calendar days.

2.05 SUBMITTALS

A. Contractor shall submit estimated and preliminary progress schedules (as identified in the Terms and Conditions of the Contract and the General Conditions), monthly status reports, a start-up schedule and an as-built schedule report all as specified herein.

B. All schedules, including estimated and preliminary schedules, shall be in conformance with the Contract Documents.

C. The finalized progress schedule discussed in the Contract Documents shall be the first monthly status report and as such shall be in conformance with all applicable specifications contained herein.

D. Monthly Status Report submittals shall include three copies of a time-scaled (days after notice to proceed) diagram showing all contract activities and supporting narrative. The initial detailed schedule shall use the notice to proceed as the start date. The finalized schedule, if concurred with by Owner, shall be the work plan to be used by the contractor for planning, scheduling, managing and executing the work.

E. The schedule diagram shall be formatted as above. The diagram shall include (1) all detailed activities included in the preliminary and estimated schedule submittals, (2) calendar days prior to substantial completion, and (3) summary activities for the remaining days. The critical path activities shall be identified, including critical paths for interim dates, if possible.

F. The Contractor shall submit monthly progress schedules with each month's application for payment.

G. Contractor shall submit three monthly status reports which will be retained by the Owner and Engineer.

2.06 MONTHLY STATUS REPORTS

A. Contractor shall submit 3 (three) copies of detailed schedule status reports on a monthly basis with the Application for Payment. The first such status report shall be submitted with the first Application for Payment and include data as of the last day of the pay period. The Monthly Report shall include a "marked-up" copy of the latest detailed schedule of legal status and a supporting narrative including updated information as described above. The Monthly Report will be reviewed by Engineer and Contractor at a monthly schedule meeting and Contractor will address Engineer's comments on the subsequent monthly report. Monthly status reports shall be the basis for evaluating Contractor's progress.

B. The "marked-up" diagram shall show, for the latest detailed schedule of legal status, percentages of completion for all activities, actual start and finish dates and remaining durations, as appropriate. Activities not previously included in the latest detailed schedule of legal status shall be added, except that contractual dates will not be changed except by Change Order. Review of a marked-up diagram by

Engineer will not be construed to constitute concurrence with the time frames, duration, or sequencing for such added activities; instead the corresponding data as ultimately incorporated into an appropriate Change Order shall govern.

2.07 STARTUP SCHEDULE

A. At least sixty (60) calendar days prior to the date of substantial completion, Contractor shall submit a time-scaled (days after notice to proceed) diagram detailing the work to take place in the period between 60 days prior to substantial completion, together with a supporting narrative. Engineer shall have 10 calendar days after receipt of the submittal to respond. Upon receipt of Engineer's comments, Contractor shall make the necessary revisions and submit the revised schedule within 10 calendar days. The resubmittal, if concurred with by Owner, shall be the Work Plan to be used by Contractor for planning, managing, scheduling and executing the remaining work leading to substantial completion.

B. The time-scaled diagram shall use the latest schedule of legal status for those activities completed ahead of the last 60 calendar days prior to substantial completion and detailed activities for the remaining 60-day period within the time frames outlined in the latest schedule of legal status.

C. Contractor will be required to continue the requirement for monthly reports, as outlined above. In preparing this report, Contractor must assure that the schedule is consistent with the progress noted in the startup schedule.

2.08 REVISIONS

A. All revised Schedule Submittals shall be made in the same form and detail as the initial submittal and shall be accompanied by an explanation of the reasons for such revisions, all of which shall be subject to review by Engineer and concurrence by Owner. The revision shall incorporate all previously made changes to reflect current as-built conditions. Minor changes to the approved submittal may be approved at monthly meetings; a minor change is not considered a revision in the context of this paragraph.

B. A revised schedule submittal shall be submitted for review when required by Engineer.

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01340

SHOP DRAWINGS, PROJECT DATA AND SAMPLES

PART 1 GENERAL

1.01 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 contact.
   10. Status of O&M manuals submitted.

1.02 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) copy to be returned. The Engineer shall retain four (4) sets.

G. The Contractor shall be responsible for and bear all cost 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.

1.03 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/resubmittal a maximum of two (2) 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.

1.04 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 (5) 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.

1.05 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.

1.06 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

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SECTION 01370

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall submit to the Engineer a Schedule of Values allocated to the various portions of the work, within ten (10) days after date of Notice to Proceed.

B. Upon request of the Engineer, the Contractor shall support the values with data which will substantiate their correctness.

C. The Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Schedule of Values will be considered for approval by Engineer upon Contractor's request. Identify schedule with:
   1. Title of Project and location.
   2. Project number.
   3. Name and address of Contractor.
   4. Contract designation.
   5. Date of submission.

B. Schedule of Values shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.

C. Follow the table of contents for the Contract Document as the format for listing component items for structures:
   1. Identify each line item with the number and title of the respective major section of the specification.
   2. For each line item, list sub values of major products or operations under item.

D. Follow the bid sheets included in this Contract Documents as the format for listing component items for pipelines.

E. The sum of all values listed in the schedule shall equal the total Contract sum.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall employ a competent 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. Preconstruction record information shall consist of video recordings on digital video disks (DVD).

C. Construction progress information shall consist of photographs and digital photographs on a recordable compact disc (CD-R).

1.02 QUALIFICATIONS

A. All photography shall be done by a competent camera operator who is fully experienced and qualified with the specified equipment.

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.

1.03 PROJECT PHOTOGRAPHS

A. Provide two prints of each photograph with each pay application.

B. Provide one CD-R with digital photographs with each pay application.

C. Negatives:
   1. All negatives shall remain the property of photographer.
   2. The Contractor shall require that photographer maintain negatives or 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.

1.04 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 DVD 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. In addition, 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 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Owner shall employ and pay for the services of an independent testing laboratory to perform testing specifically indicated on the Contract Documents or called out in the Specifications. Owner may elect to have materials and equipment tested for conformity with the Contract Documents at any time.
   1. Contractor shall cooperate fully with the laboratory to facilitate the execution of its required services.
   2. Employment of the laboratory shall in no way relieve the Contractor's obligations to perform the work of the Contract.

1.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:
   1. Release, revoke, alter or enlarge on requirements of Contract Documents.
   2. Approve or accept any portion of the Work.
   3. Perform any duties of the Contractor.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel; provide access to Work and/or to Manufacturer's operations.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.

D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor and no extra charge to the Owner shall be allowed on account of such testing and certification.

E. Furnish incidental labor and facilities:
   1. To provide access to work to be tested.
   2. To obtain and handle samples at the project site or at the source of the product to be tested.
   3. To facilitate inspections and tests.

4. For storage and curing of test samples.

F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
   1. When tests or inspections cannot be performed due to insufficient notice, Contractor shall reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.

G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience and as approved by the Engineer.

H. If the test results indicate the material or equipment complies with the Contract Documents, the Owner shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the contractor shall pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01510

TEMPORARY AND PERMANENT UTILITIES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for furnishing all requisite temporary utilities, i.e., power, water, sanitation, etc. The Contractor shall obtain and pay for all permits required as well as pay for all temporary usages. The Contractor shall remove all temporary facilities upon completion of work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code (NEC).

B. Comply with Federal, State and Local codes and regulations and with utility company requirements.

C. Comply with County Health Department regulations.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Materials for temporary utilities may be "used". Materials for electrical utilities shall be adequate in capacity for the required usage, shall not create unsafe conditions and shall not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with the applicable utility company for temporary power supply. Provide service required for temporary power and lighting and pay all costs for permits, service and for power used.

2.03 TEMPORARY WATER

A. The Contractor shall arrange with Manatee County Utilities Customer Service office to provide water for construction purposes, i.e., meter, pay all costs for installation, maintenance and removal, and service charges for water used.

B. The Contractor shall protect piping and fitting against freezing.

2.04 TEMPORARY SANITARY FACILITIES

A. The Contractor shall provide sanitary facilities in compliance with all laws and regulations.

B. The Contractor shall service, clean and maintain facilities and enclosures.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall maintain and operate systems to assure continuous service.

B. The Contractor shall modify and extend systems as work progress requires.

3.02 REMOVAL

A. The Contractor shall completely remove temporary materials and equipment when their use is no longer required.

B. The Contractor shall clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for providing safe and expeditious movement of traffic through construction zones. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the Contractor and which interfere with the driving or walking public.

B. The Contractor shall remove temporary equipment and facilities when no longer required, and restore grounds to original or to specified conditions.

1.02 TRAFFIC CONTROL

A. The necessary traffic control shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, markings, barricades, channelization and hand signaling devices. The Contractor shall be responsible for the installation and maintenance of all devices and detour routes and signage for the duration of the construction period. The Contractor shall utilize the appropriate traffic plan from the FDOT Maintenance of Traffic Standards, Series 600 of the FDOT Roadway & Traffic Design Standards, Latest Edition.

B. Should there be the necessity to close any portion of a roadway carrying vehicles or pedestrians the Contractor shall submit a Traffic Control Plan (TCP) at least five (5) days before a partial or full day closure, and at least eight (8) days before a multi-day closure. TCP shall be submitted, along with a copy of their accreditation, by a certified IMSA or ATSA Traffic Control Specialist.
   1. At no time will more than one (1) lane of a roadway be closed to vehicles and pedestrians without an approved road closure from the County Transportation Department. With any such closings, adequate provision shall be made for the safe and expeditious movement of each.
   2. All traffic control signs must be in place and inspected at least one (1) day in advance of the closure. Multi-day closures notification signs shall be in place at least three (3) days in advance of the closure. All signs must be covered when not in effect, and checked twice a day by the Worksite Traffic Supervisor when they are in effect.

C. The Contractor shall be responsible for the removal, relocation, or replacement of any traffic control device in the construction area which exists as part of the normal preconstruction traffic control scheme. Any such actions shall be performed by the Contractor under the supervision and in accordance with the instructions of the applicable highway department unless otherwise specified.

D. The Engineer shall consult with the Owner immediately on any vehicular or pedestrian safety or efficiency problem incurred as a result of construction of the project.

E. The Contractor shall provide ready access to businesses and homes in the project area during construction. The Contractor shall be responsible for coordinating this work with affected homeowners.

F. When conditions require the temporary installation of signs, pavement markings and traffic barriers for the protection or workers and traffic, the entire array of such devices shall be depicted on working drawings for each separate stage of work. These drawings shall be submitted to the Engineer for review and approval prior to commencement of work on the site.

G. Precast concrete traffic barriers shall be placed adjacent to trenches and other excavations deeper than six inches below the adjacent pavement surface.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish, install and maintain County project identification signs.

B. Remove signs on completion of construction.

C. Allow no other signs to be displayed except for traffic control and safety.

1.02 PROJECT IDENTIFICATION SIGN (COUNTY)

A. One painted sign, of not less than 32 square feet (3 square meters) area, with painted graphic content to include:
   1. Title of Project.
   2. Name of Owner.
   3. Names and titles of authorities as directed by Owner.
   4. Prime Contractor.

B. Graphic design, style of lettering and colors: As approved by the Engineer and subject to approval of the Owner.

C. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by the Engineer and the Owner

1.03 INFORMATIONAL SIGNS

A. Painted signs with painted lettering, or standard products.
   1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
   2. Colors: as required by regulatory agencies, otherwise of uniform colors throughout project.

B. Erect at appropriate locations to provide required information.

1.04 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.

1.05 PUBLIC NOTIFICATION

A. Door Hangers: Manatee County Project Management shall generate and the General Contractor shall distribute door hangers to all residents who will be impacted by project construction.

1. Residents impacted include anyone who resides inside, or within 500 feet of project limits of construction.

B. Door Hangers shall be distributed prior to start of construction of the project. Hangers shall be affixed to doors of residents via elastic bands or tape.

EXAMPLE:

PLEASE PARDON THE INCONVENIENCE WHILE THE ROADWAY IS BEING RECONSTRUCTED IN YOUR NEIGHBORHOOD

This project consists of utility improvements and the reconstruction of ??? Boulevard from U.S. ??? to ??? Street West. The project is expected to begin in August, 200X and be completed in July 200X.

Location Map

WE HOPE TO KEEP ANY INCONVENIENCE TO A MINIMUM. HOWEVER, IF YOU HAVE ANY PROBLEMS, PLEASE CONTACT THE FOLLOWING:

A. Contractor
Contractor Address
Contractor Phone (Site Phone)

B. Project Inspector
Inspector Phone Number

C. Project Manager
PM Address
PM Phone No. & Ext.

AFTER HOURS EMERGENCY NUMBER – (941) 747-HELP
THANK YOU FOR YOUR UNDERSTANDING AND PATIENCE
MANATEE COUNTY GOVERNMENT – PROJECT MANAGEMENT DEPT.

PART 2 PRODUCTS

2.01 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 in the Contract Documents.

PART 3 EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

A. Paint exposed surface or supports, framing and surface material; one (1) coat of primer and one (1) coat of exterior paint.

B. Paint graphics in styles, size and colors selected.

3.02 MAINTENANCE

A. The Contractor shall maintain signs and supports in a neat, clean condition; repair damages to structures, framing or sign.

3.03 REMOVAL

A. The Contractor shall remove signs, framing, supports and foundations at completion of project.

END OF SECTION

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SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. 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 Engineer.
   3. Manufactured and Fabricated Products:
      a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
      b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
      c. Two (2) or more items of the same kind shall be identical and manufactured by the same manufacturer.
      d. Products shall be suitable for service 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 specified.
   5. All material and equipment incorporated into the project shall be new.

1.02 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two (2) copies to Engineer. Maintain one (1) set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer prior to proceeding. Do not proceed with work without clear instructions.

1.03 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.

1.04 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Contractor's Options:
   1. For products specified only by reference standard, select any product meeting that standard.
   2. For products specified by naming one or more products or manufacturers and "or equal", Contractor must submit a request for substitutions of any product or manufacturer not specifically named in a timely manner so as not to adversely affect the construction schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01614

WIND DESIGN CRITERIA GENERAL SUMMARY

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Wind design criteria.

1.02 SYSTEM DESCRIPTION

A. Design requirements:
   1. Building code criteria: Design for wind in accordance with 2007 Florida Building Code, local amendments, and errata. Occupancy category: III.
   2. Basic wind speed: 130 miles per hour.
   3. Exposure category: C.
   4. Topographic factor, K_{tz}: 1.0.
   5. Wind importance factor, I_w: 1.15.
      a. Use anchor bolts, bolts, or welded studs for anchors for resisting wind forces. Anchor bolts used to resist wind forces shall have a standard hex bolt head. Do not use anchor bolts fabricated from rod stock with an L or J shape:
         1) Do not use concrete anchors, sleeve anchors, flush shells, chemical anchors, powder actuated fasteners, or other types of anchor unless indicated on the Drawings or accepted in writing by the Engineer.
         2) Wind forces must be resisted by direct bearing on the anchors used to resist wind forces. Do not use connections which use friction to resist wind forces.

1.03 SUBMITTALS

A. Shop drawings and calculations: Complete shop drawings and wind design calculations where required by Specifications.

B. Calculations shall be signed and stamped by a Civil or Structural Engineer licensed in the state where the work will be installed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01620

STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Provide secure storage and protection for products to be incorporated into the Work and maintenance and protection for products after installation and until completion of Work.

1.02 STORAGE

A. Store products immediately on delivery and protect until installed in the Work, in accordance with manufacturer's instructions, with seals and labels intact and legible.

B. Exterior Storage
   1. Provide substantial platform, blocking or skids to support fabricated products above ground to prevent soiling or staining.
      a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
      b. Prevent mixing of refuse or chemically injurious materials or liquids.

C. Arrange storage in a manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
   1. State of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained on continuous basis.
   3. Surfaces of products exposed to elements are not adversely affected. Any weathering of products, coatings and finishes is not acceptable under the requirements of these Contract Documents.

B. Mechanical and electrical equipment which require servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.
   1. Equipment shall not be shipped until approved by the Engineer. 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 (1) month prior to installation without written authorization from the Engineer.
   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 Engineer 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. 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, at least half load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.

5. Lubricants shall be changed upon completion of installation and as frequently as required, thereafter during the period between installation and acceptance.
6. 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 certifications by the manufacturer shall be deemed to mean that the equipment is judged 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 guaranty 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.

1.04 PROTECTION AFTER INSTALLATION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of Work.

B. Control traffic to prevent damage to equipment and surfaces.

C. Provide coverings to protect finished surfaces from damage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 SUBSTANTIAL COMPLETION

A. The Contractor shall submit the following items when the Contractor considers the Work to be substantially complete:
   1. A written notice that the Work, or designated portion thereof, is substantially complete.
   2. A list of items to be completed or corrected.

B. Within a reasonable time after receipt of such notice, the Engineer and Owner shall make an inspection to determine the status of completion.

C. Project record documents and operations and maintenance manuals must be submitted before the project shall be considered substantially complete.

D. If the Engineer determines that the Work is not substantially complete:
   1. The Engineer shall notify the Contractor in writing, stating the reasons.
   2. The Contractor shall remedy the deficiencies in the Work and send a second written notice of substantial completion to the Engineer.
   3. The Engineer shall reinspect the Work.

E. When the Engineer finds that the Work is substantially complete:
   1. He shall prepare and deliver to the Owner a tentative Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a tentative list of the items to be completed or corrected before final payment.
   2. The Engineer shall consider any objections made by the Owner as provided in Conditions of the Contract. When the Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION

A. When the Contractor considered the Work to be complete, he shall submit written certification stating that:
   1. The Contract Documents have been reviewed.
   2. The Work has been inspected for compliance with Contract Documents.
   3. The Work has been completed in accordance with Contract Documents.
   4. The equipment and systems have been tested in the presence of the Owner's representative and are operational.

5. The Work is completed and ready for final inspection.

B. The Engineer shall make an inspection to verify the status of completion after receipt of such certification.

C. If the Engineer determines that the Work is incomplete or defective:
   1. The Engineer shall promptly notify the Contractor in writing, listing the incomplete or defective Work.
   2. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Engineer that the Work is complete.
   3. The Engineer shall reinspect the Work.

D. Upon finding the Work to be acceptable under the Contract Documents, the Engineer shall request the Contractor to make closeout submittals.

E. For each additional inspection beyond a total of three (3) inspections for substantial and final completion due to the incompleteness of the Work, the Contractor shall reimburse the Owner for the Engineer's fees.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Project Record Documents (prior to substantial completion).

B. Operation and maintenance manuals (prior to substantial completion).

C. Warranties and Bonds.

D. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.

E. Certification letter from Florida Department of Transportation and Manatee County Department of Transportation, as applicable.

F. Certificate of Insurance for Products and Completed Operations.

G. Final Reconciliation, Warranty Period Declaration, and Contractor's Affidavit (Manatee County Project Management Form PMD-9).

1.05 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer.

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
      b. Unit Prices
      c. Penalties and Bonuses
      d. Deductions for Liquidated Damages
      e. Other Adjustments
   3. Total Contract Sum, as adjusted.
   4. Previous payments.
   5. Sum remaining due.

C. Project Management shall prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 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.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01710

CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Execute cleaning during progress of the Work and at completion of the Work, as required by the General Conditions.

1.02 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with all Federal, State and Local codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulation of waste materials, rubbish and wind-blown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

C. Prior to final completion or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire Work is clean.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor shall maintain at the site for the Owner one (1) record copy of:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Engineer's field orders or written instructions.
   6. Approved shop drawings, working drawings and samples.
   7. Field test records.
   8. Construction photographs.

1.02 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 Construction Specifications Institute (CSI) format.

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 Engineer.

1.03 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by the Engineer.

1.04 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. Details not on original Contract Drawings.
5. Equipment and piping relocations.
6. 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 points of intersection (PIs) 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.
7. 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 every point of vertical intersection (PVI) 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.
8. 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.
9. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVIs and at all intersections.
10. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.
11. 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.
12. 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.
13. Elevations shall be provided on the top of operating nuts for all water and force main valves.
14. 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 ± 1/8 inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.
15. Properly prepared record drawings on mylar, together with two (2) 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 (5) sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

1.05 SUBMITTAL

A. Prior to substantial completion and prior to starting the bacteria testing of water lines, deliver signed and sealed Record Documents and Record Drawings to the Engineer. These will be reviewed and verified by the inspector. If there are any required changes or additions, these shall be completed and the entire signed and sealed set resubmitted prior to final pay application.

B. 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(s) (Engineer or Surveyor licensed in Florida), as stipulated by the Land Development Ordinance and submitted on signed and dated mylar drawings together with a recordable compact disk (CD-R).

C. The CD-R shall contain media in AutoCad Version 12 or later, or in any other CAD program compatible with AutoCad in DWG or DXF form. All fonts, line types, shape files or other pertinent information used in the drawing and not normally included in AutoCad shall be included on the media with a text file or attached noted as to its relevance and use.

D. Accompany submittal with transmittal letter, containing:
   1. Date.
   2. Project title and number.
   3. Contractor's name and address.
   4. Title and number of each Record Document.
   5. Signature of Contractor or his authorized representative.

Note: The data required to properly prepare these Record Drawings shall be obtained at the site, at no cost to the County by the responsible design professional or his/her duly appointed representative. The appointed representative shall be a qualified employee of the responsible design professional or a qualified inspector retained by the responsible design professional on a project-by-project basis.

PART 2 STANDARDS

2.01 MINIMUM RECORD DRAWING STANDARDS FOR ALL RECORD DRAWINGS SUBMITTED TO MANATEE COUNTY

A. Record Drawings shall be submitted to at least the level of detail in the contract documents. It is anticipated that the original contract documents shall serve as at least a background for all record information. Original drawings in CAD format may be requested of the Engineer.

B. Drawings shall meet the criteria of paragraph 1.04 D above.

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract.

B. Prepare operating and maintenance data as specified in this and as referenced in other pertinent sections of Specifications.

C. Instruct Owner's personnel in maintenance of products and equipment and systems.

D. Provide three (3) sets of operating and maintenance manuals for each piece of equipment provided within this Contract.

1.02 FORM OF SUBMITTALS

A. Prepare data in form of an instructional manual for use by Owner's personnel.

B. Format:
   1. Size: 8-1/2 inch x 11 inch
   2. Paper: 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. Fold larger drawings to size of text pages.
   5. Provide fly-leaf for each separate product or each piece of operating equipment.
      a. Provide typed description of product and major component parts of equipment.
      b. Provide indexed tabs.
   6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
      a. Title of Project.
      b. Identity of separate structures as applicable.
      c. Identity of general subject matter covered in the manual.

C. Binders:
   1. Commercial quality three-ring binders with durable and cleanable plastic covers.
   2. Maximum ring size: 1 inch.
   3. When multiple binders are used, correlate the data into related consistent groupings.

1.03 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit three (3) 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 reassembly.
      d. Alignment, adjusting and checking.
   4. Servicing and lubricating schedule.
      a. List of lubricants 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. List of predicted 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 system, 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 of panelboards.
      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 reassembly.
      d. Adjustment and checking.
   6. Manufacturer's printed operating and maintenance instructions.
   7. List of original manufacture's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

8. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

D. Prepare and include additional data when the need for such data becomes apparent during instruction on Owner's personnel.

E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.04 SUBMITTAL SCHEDULE

A. Submit one (1) copy of completed data in final form fifteen (15) days prior to substantial completion.
   1. Copy will be returned after substantial completion, with comments (if any).

B. Submit two (2) copies of approved data in final form. Final acceptance will not be provided until the completed manual is received and approved.

1.05 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction.
   1. Review contents of 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

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SECTION 01740

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile specified warranties and bonds.

B. Compile specified service and maintenance contracts.

C. Co-execute submittals when so specified.

D. Review submittals to verify compliance with Contract Documents.

E. Submit to Engineer for review and transmittal to Owner.

1.02 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 or 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 Owner's personnel:
      a. Proper procedure in case of failure.
      b. Instances which might affect the validity of warranty or bond.
   7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:
   1. Size 8-1/2 inch x 11 inch punched sheets for standard 3-ring binder. Fold larger sheets to fit into binders.
   2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
      a. Title of Project.
      b. Name of Contractor.

C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

A. Make submittals within ten (10) days after date of substantial completion and prior to final request for payment.

B. For items of work, where acceptance is delayed materially beyond date of substantial completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

1.05 SUBMITTALS REQUIRED

A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.

B. Approval by the Owner of all documents required under this section is a pre-requisite to requesting a final inspection and final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02064

MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to modify, alter and/or convert existing structures as shown or specified and as required for the installation of piping, mechanical equipment and appurtenances. Existing piping and equipment shall be removed and dismantled as necessary for the performance of facility alterations in accordance with the requirements herein specified.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the Contract Drawings, herein specified, or necessary to permit completion of the Work under this Contract. The Contractor shall dispose of surplus materials resulting from the above Work in an approved manner. The Work shall include all necessary cutting and bending of reinforcing steel, structural steel, or miscellaneous metal Work found embedded in the existing structures.

B. The Contractor shall dismantle and remove all existing equipment, piping, and other appurtenances required for the completion of the Work. Where called for or required, the contractor shall cut existing pipelines for the purpose of making connections thereto. Anchor bolts for equipment and structural steel removed shall be cut off one inch below the concrete surface. Surface shall be finished as specified in the Contract Documents.

C. At the time that a new connection is made to an existing pipeline, additional new piping, extending to and including a new valve, shall be installed. Pipe anchorage, if required, is part of the installation shall also be installed as directed by the Engineer.

D. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and to the extent approved by the Engineer.

E. When removing materials or portions of existing utility pipelines and/or structures or when making openings in walls and partitions, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new Work, and not to damage the structures or contents by falling or flying debris. Unless otherwise permitted, line drilling will be required in cutting existing concrete.

F. Materials and equipment removed in the course of making alterations and additions shall remain the property of the Owner, except that items not salvageable, as determined by the Engineer and the Owner, shall become the property of the Contractor to be disposed of by him off the Work site at his own place of disposal. Operating equipment shall be thoroughly cleaned, lubricated, and greased for protection during prolonged storage.

G. All alterations to existing utility pipes and structures shall be done at such time and in such manner as to comply with the approved time schedule. So far as possible before any part of the Work is started, all tools, equipment, and materials shall be assembled and made ready so that the Work can be completed without delay.

H. All workmanship and new materials involved in constructing the alterations shall conform to the General Specifications for the classes of Work insofar as such specifications are applicable.

I. All cutting of existing concrete or other material to provide suitable bonding to new Work shall be done in a manner to meet the requirements of the respective section of these Specifications covering the new Work. When not covered, the Work shall be carried on in the manner and to the extent directed by the Resident Project Representative.

J. Surfaces of seals visible in the completed Work shall be made to match as nearly as possible the adjacent surfaces.

K. Non-shrink grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown.

L. Where necessary or required for the purpose of making connections, the Contractor shall cut existing pipelines in a manner to provide an approved joint. Where required, he shall use flanges, or provide Dresser Couplings, all as required.

M. The Contractor shall provide flumes, hoses, piping and other related items to divert or provide suitable plugs, bulkheads, or other means to hold back the flow of water or other liquids, all as required in the performance of the Work under this Contract.

N. Care shall be taken not to damage any part of existing buildings or foundations or outside structures.

3.02 CONNECTING TO EXISTING PIPING AND EQUIPMENT

A. The Contractor shall verify exact location, material, alignment, joint, etc. of existing piping and equipment prior to making the connections called out in the Drawings. The verifications shall be performed with adequate time to correct any potential alignment or other problems prior to the actual time of connection. A Manatee County representative must be present for all tie-ins for a visual inspection.

3.03 REMOVAL AND ABANDONMENT OF ASBESTOS CEMENT PIPE AND APPURTENANCES

A. All Work associated with the removal or abandonment of existing asbestos cement pipe and appurtenances shall be performed by a licensed asbestos abatement contractor or subcontractor registered in the State of Florida.

B. The asbestos abatement contractor or subcontractor shall contact the appropriate regulatory agencies prior to removal or abandonment of any asbestos material and shall obtain all required permits and licenses and issue all required notices. The Contractor shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies.

C. All Work associated with removal or abandonment of asbestos cement pipe and appurtenances shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.
   1. Florida Administrative Code, Chapter 17-251, "Asbestos".
   2. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR, Part 61, Subpart M, latest revision.
   3. Occupational Safety and Health Act, 29 CFR
   4. The Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection Rule.
   5. Florida Statute 455.300.

3.04 ASBESTOS CEMENT PIPE REMOVAL

A. All asbestos cement pipe sections shown on the Drawings to be removed, and all related valves, fittings and appurtenances shall be removed in their entirety and disposed of by the Contractor in accordance with this Section. After removal of the facilities, all trenches shall be backfilled in accordance with the Contract Documents. The cost of disposing of the removed materials shall be borne by the Contractor.

B. The Contractor shall make necessary provisions for the Engineer's representative to monitor all removal operations.

C. The cutting of existing asbestos-cement (A/C, aka "Transite") pipe shall be by hand saw only activities by a licensed asbestos abatement contractor. No machine cutting shall be allowed. Removal of all portions of pipe shall be double bagged prior to shipment. Longer sections of pipe removed may be shipped without double bagging. An asbestos manifest form must accompany each and every shipment of such pipe or pipe material waste to the Manatee County Lena Road Landfill. Prior to each shipment, a minimum of 24 hours notice to the Landfill field office (Phone # 941-748-5543) is required.

3.05 IN-PLACE GROUTING OF EXISTING PIPE

A. Where water and wastewater utility pipes are to be abandoned in place, they shall be filled with a sand/cement grout as specified herein. When such pipes are constructed with asbestos cement materials, the abandonment activities shall be performed by a licensed asbestos abatement contractor as specified in these Specifications.

B. Grout shall be injected within the pipe sections indicated on the Drawings. The ends of these sections shall be capped and/or plugged. The grouting program shall consist of pumping sand-cement grout with suitable chemical additives at pressures necessary to fill the pipe sections shown on the Drawings to prevent the potential for future collapse.

C. The pump used for grouting should be a continuous flow, positive displacement model with a pugmill type mixing vat having a minimum shaft speed of 60 rpm and

incorporated as an integral part of the equipment. Alternate equipment may be used subject to the approval of the Engineer. The rate of pumping shall not exceed six (6) cubic feet per minute. The pumping pressures shall be in the range of 100 to 150 psi.

D. The Contractor shall provide standpipes and/or additional means of visual inspection as required by the Engineer to determine if adequate grout material has filled the entire pipe section(s). The Contractor shall make necessary provisions for the Engineer's representative to monitor all grouting operations.

E. All pipe to be abandoned shall be capped or plugged with a fitting or material that will prevent soil or other material from entering the pipe. All caps and plugs shall be subject to approval by the Engineer.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section covers clearing, grubbing and stripping of the project site and/or along the pipeline route.

B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes, but is not limited to utility easements. The width of the area to be cleared shall be reviewed by the Engineer prior to the beginning of any clearing.

C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in Manatee County. The Contractor shall comply with all applicable sections of these ordinances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING

A. The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees shall be preserved as hereinafter specified unless otherwise designated by the Engineer. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, so as to provide for the safety of employees and others. Soil erosion control devices such as hay bales and silt fences shall be installed to satisfy all Federal, State and County requirements.

3.02 GRUBBING

A. Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

A. In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be

protected until it is placed as specified. The Owner shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost to deliver excess topsoil material to a remote site chosen by the Owner within a five (5) mile radius of the construction site. Should Owner not choose to receive any or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to Owner.

3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

3.05 PRESERVATION OF TREES

A. Those trees which are not designated for removal by the Engineer shall be carefully protected from damage. The Contractor shall erect such barricades, guards and enclosures as may be considered necessary by him for the protection of the trees during all construction operation.

3.06 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property adjacent to proposed project site. Trees, shrubbery, gardens, lawns and other landscaping, which are not designated by the Engineer to be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

B. All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.

C. Improvements to the land such as fences, walls, outbuildings and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.

D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the Engineer.

3.07 PRESERVATION OF PUBLIC PROPERTY

A. The appropriate paragraphs of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements and all other damaged areas. This includes, but is not limited to the trimming of trees damaged by contractor's equipment.

END OF SECTION

SECTION 02220

EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.

B. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the Engineer.

C. Structural excavation and backfill shall include the furnishing of all materials, equipment and other facilities which may be necessary to perform the excavations, place and compact the backfill, install sheeting and bracing, and carry out any necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Engineer.

D. 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 County. This includes, but is not limited to, protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 QUALITY ASSURANCE

A. Testing Agency:
   1. In place soil compaction tests shall be performed by a qualified testing laboratory.
   2. Compaction tests shall be taken at the rate of one (1) test per 100 square feet per lift, except in the road crossings or road shoulders. Tests are to be taken according to current FDOT Standards.

B. Reference Standards:
   1. American Society for Testing and Materials (ASTM):
      a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

1.03 JOB CONDITIONS

A. The Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, standing or running water at all times throughout the period of construction.
   1. Dewatering shall maintain groundwater level at least three (3) feet below the lowest level of construction.

2. Maintain dewatering system in operation until backfilling and structures are completed and ready to be placed in service.

B. The Contractor shall assume all responsibility for the security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.

C. Excavated areas shall be cleared of all debris, water, slush, muck, clay and soft or loose earth and shall be conditioned to the entire satisfaction of the Engineer.

D. All excavated material unsuitable for use or which will not be used shall be disposed of in a manner consistent with State and County regulation.

E. All unsuitable organic materials, roots, logs, etc., found during excavation shall be removed by the Contractor and the excavation shall be refilled with compacted fill as specified.

PART 2 PRODUCTS

2.01 MATERIAL FOR CONTROLLED FILL

A. Composition: Only approved granular material free from organic matter and lumps of clay shall be used for backfill. Excavated earth free from debris or organic material may be used for backfill or fill where shown on the Drawings.

B. Crushed stone shall meet or exceed current FDOT Standards.

C. See Drawings for additional requirements and notes regarding fill and backfill materials.

2.02 UNSUITABLE MATERIAL

A. Unsuitable material shall be defined as organic soil per ASTM D2487 Group PT. This includes, but is not limited to, such items as topsoil, roots, vegetable matter, trash, debris, and clays that cannot be dried sufficiently to obtain specified compaction.

PART 3 EXECUTION

3.01 INSPECTION

A. The Contractor shall verify that Work preceding the affected work of this Section has been satisfactorily completed.

B. Conditions adversely affecting the Work of this Section shall be corrected to the satisfaction of the Engineer.

3.02 REMOVAL OF UNSUITABLE MATERIALS

A. The Contractor shall remove unsuitable material from within the limits of the Work.

B. Materials meeting requirements for controlled fill shall be stockpiled as necessary

and in such a manner satisfactory to the Engineer.

C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the Work.

3.03 EXCAVATION

A. When concrete subbase footing is to rest on an excavated surface, care shall be taken not to disturb the natural soil. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete is placed.

B. When any structural excavation is completed, the Contractor shall notify the Engineer who will observe the excavation. No concrete shall be placed until the excavation has been observed by the Engineer.

C. All excavation shall be made within an area bounded by lines at least five (5) feet outside and parallel to the exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls shall not be permitted If the ground is excavated below the grade called for by the Drawings or becomes unstable due to the Contractor's carelessness or operations, the ground shall be excavated to undisturbed native soil and replaced with compacted fill materials designated by the Engineer before continuing concreting operations.

D. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Engineer and replaced by crushed stone or other compacted fill material designated by the Engineer.

3.04 STRUCTURAL BACKFILL

A. Structural backfill shall not be placed until the footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling.

B. A minimum of 1 1/2-inch layer of lean concrete shall be placed as a working mat for the concrete slabs on grade and footings.

C. Soil backfill and fill shall be placed in uniform layers not more than 6 inches thick and compacted to a minimum of 95 percent of the maximum density determined by ASTM D1557, Method A or C, or as directed by the Engineer. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the Engineer.

D. Compaction of structural backfill by ponding and jetting is not permitted.

E. Surplus material not used on-site shall be removed and disposed of off-site by the Contractor. In no case shall surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 6 inches in thickness and shall be compacted to a density equal or greater to that of the surrounding natural ground.

3.05 BACKFILLING AROUND STRUCTURES

A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of six (6) inches in loose state and shall be compacted as specified on the Drawings. No boulders shall be allowed to roll down the slopes and hit the walls.

B. Backfilling shall be carried up evenly around all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval by the Engineer.

C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one (1) foot above the bottom of the pipes:
   1. Place structural fill in such areas for a distance of not less than three (3) feet either side of the center line of the pipe in level layers not exceeding 6 inches in depth.
   2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.
   3. Structural fill shall be of the quality specified under Part 2 of this Section.

D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas shall be allowed in the work.

E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

3.06 FIELD QUALITY CONTROL

A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTMD 1557-70T, Method A or C.

END OF SECTION

SECTION 02221

TRENCHING, BEDDING AND BACKFILL FOR PIPE

PART 1 GENERAL

1.01 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 County. This includes, but is not limited to protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 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 (1) 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 Specification, 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 it desirable 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/Engineer. 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 Engineer 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 inches of excavation for this work in-the-dry and not until the water level is a minimum of 6-inches 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 (2) 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 Engineer

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 base 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 Engineer 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 (1) 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

2.01 MATERIALS

A. General
   1. Materials for use as fill and backfill shall be described below. For each material, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds, at least ten (10) 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 in trenches 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 inches 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. Common Fill
   1. Common fill material shall be free from organic matter, muck or marl and rock exceeding 2-1/2 inches 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 spoiled

as specified herein for disposal of unsuitable materials by the Contractor.

D. Crushed Stone
   1. 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.
   2. Crushed stone shall be size No. 57 with gradation as noted in Table 1 of Section 901 of Florida Department of Transportation, Construction of Roads and Bridges.

PART 3 EXECUTION

3.01 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-inch 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 inches 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.

END OF SECTION

SECTION 02223

EXCAVATION BELOW GRADE AND CRUSHED STONE OR SHELL REFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Engineer and replaced by crushed stone or washed shell.

PART 2 PRODUCTS (NOT USED)

PART 3 MATERIALS

3.01 EXCAVATION AND DRAINAGE

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench stabilization shall be complete and effective.

B. Should the Contractor excavate below the grade shown on the Contract drawings because of negligence or for his own convenience; due to failure in properly dewatering the trench; disturbs the subgrade before dewatering is sufficiently complete; he shall be directed by the Engineer to excavate below grade. The work of excavating below grade and furnishing and placing the approved refill material shall be performed at the Contractor's expense.

3.02 REFILL

A. Should the material at the level of trench bottom consist of fine sand, sand and silt or soft earth, the subgrade material shall be removed as directed by the Engineer and the excavation shall be refilled with crushed stone or washed shell.

END OF SECTION

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SECTION 02240

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Installation and maintenance of dewatering systems.
   2. Disposal of water entering excavation or other parts of the work.

1.02 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Keep excavations reasonably free from water. The static water level shall be drawn down a minimum of two (2) feet below the bottom of excavations; this can be obtained by pumping.
   2. The analysis shall include an evaluation of the anticipated subsurface conditions, required well spacing, diameter of wells, depth screen interval, backfill and filter pack, pump size, drawdown duration, drawdown and steady state flow rates, desilting tank, and settlements.
   3. Dewatering design shall be coordinated with excavation and shoring design. The shoring and excavation design shall recognize the changes in groundwater conditions and earth pressures.
   4. Do not place concrete or masonry foundations or floors in water, nor allow water to rise over them until concrete or mortar has set at least 24 hours.
   5. Maintain operation of the dewatering system until the complete structure has been constructed and the concrete has attained specified strength, and backfill has been completed to finish grade.
   6. Provide standby power to ensure continuous dewatering in case of power failure.

B. Secure written permission from the ENGINEER before locating drain lines for purposes of dewatering within limits of structure foundation.

C. Locate dewatering facilities where they will not interfere with utilities and construction work to be performed by others.

D. Open manholes will not be allowed for discharge piping. Approval of each discharge location shall be obtained from the ENGINEER.

1.03 SUBMITTALS

A. Dewatering Plan:
   1. Arrangement, location, depths of system components.
   2. Type and sizes of filters.
   3. Required permits.

B. Laboratory test results.

C. Qualifications:
   1. Dewatering contractor.
   2. Dewatering design engineer.
   3. Testing laboratory.

1.04 QUALITY ASSURANCE

A. Qualifications of a Dewatering Design Engineer:
   1. Dewatering Plan and Dewatering System Analysis:
      a. Prepared by a registered Civil Engineer, registered in the state where the Project is located. The Civil Engineer shall have at least eight (8) years of experience in designing similar systems.
      b. Submit qualifications of the dewatering contractor, the Dewatering Design Engineer, sampling service, and testing laboratory.

B. Regulatory Requirements:
   1. Assume responsibility for obtaining water discharge permits that are required.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide and Maintain During Construction: Ample means and devices with which to promptly remove and properly dispose of water entering excavation or other parts of the work, whether water is surface water or underground water.

B. Intercept and divert precipitation and surface water away from excavations through the use of dikes, curb walls, ditches, pipes, sumps, or other means.

C. Disposing of Water:
   1. Dispose of water from the work in suitable manner without damage to adjacent property.
   2. Do not drain water into work built or under construction.
   3. Dispose of water in such manner as not to be menace to public health.

3.02 CONSTRUCTION

A. Interface with Other Work:
   1. Prior to Release of Groundwater to Its Static Level:
      a. All groundwater pressure relief devices for the structure shall be fully operational.
      b. Construction of structure shall be complete and the concrete shall have reached specified strength.
      c. Backfill of structure shall be complete.
      d. Release of groundwater to its static level shall be controlled to prevent disturbance of the natural foundation soils or compacted backfills and fills and to prevent flotation or movement of structures or pipelines.

END OF SECTION

SECTION 02260

FINISH GRADING

PART 1 GENERAL

1.01 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.

1.02 PROTECTION

A. The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Damage shall be corrected at no cost to the Owner.

PART 2 PRODUCTS

2.01 TOPSOIL

A. Shall be friable loam free from subsoil, roots, grass, excessive amount of weeds or other organics, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. The Contractor may use topsoil stockpiles on site if they conform to these requirements.

PART 3 EXECUTION

3.01 SUB-SOIL PREPARATION

A. The Contractor shall rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Uneven areas and low spots shall be eliminated. Debris, roots, branches or other organics, stones, and sub-soil shall be removed by the Contractor and disposed of in a manner consistent with the latest Manatee County Standards as well as any affected regulatory agency. Should contaminated soil be found, the Contractor shall notify the Engineer.

B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks.

C. The Contractor shall bring sub-soil to required profiles and contour graces gradually; and blend slopes into level areas.

D. The Contractor shall slope the structure grade a minimum of 2 inches in 10 feet unless indicated otherwise on the Drawings.

E. The Contractor shall cultivate sub-grade to a depth of 3 inches where the topsoil is to be placed. He shall repeat cultivation in areas where equipment use has compacted sub-soil.

F. The Contractor shall not make grade changes which causes water to flow onto adjacent lands.

3.02 PLACING TOPSOIL

A. The Contractor shall place topsoil in areas where seeding, sodding and planting is to be performed. He shall place from 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. The Contractor shall use topsoil in a dry state as determined by the Engineer. He shall place the material during dry weather.

C. The Contractor shall use fine grade topsoil eliminating rough and low areas to ensure positive drainage. He shall maintain levels, profiles and contours of the sub-grades.

D. The Contractor shall remove stone, roots, grass, weeds, debris, and other organics or foreign material while spreading the material.

E. The Contractor shall manually spread topsoil around trees, plants and structures to prevent damage which may be caused by grading equipment.

F. The Contractor shall lightly compact and place the topsoil.

3.03 SURPLUS MATERIAL

A. The Contractor shall remove surplus sub-soil and topsoil from site at his expense.

B. The Contractor shall leave stockpile areas and entire job site clean and raked, ready for landscaping operations.

END OF SECTION

SECTION 02276

TEMPORARY EROSION AND SEDIMENTATION CONTROL WORK

PART 1 GENERAL

1.01 DESCRIPTION

A. The Work specified in this Section consists of the design, provision, maintenance and removal of temporary erosion and sedimentation controls as necessary.

B. Temporary erosion controls include, but are not limited to: grassing, mulching, netting, watering, and the reseeding of on-site surfaces and spoil and borrow area surfaces, interceptor ditches at ends of berms and other such work at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner/Engineer.

C. Temporary sedimentation controls include, but are not limited to: silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which shall ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner/Engineer.

D. The Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.02 REFERENCE DOCUMENTS

A. Florida Building Code.

B. FDEP/COE Dredge and Fill Regulations and/or Permit as applicable.

C. SWFWMD Permit Regulations and/or Permit as applicable.

D. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.

PART 2 PRODUCTS

2.01 EROSION CONTROL

A. Netting - fabricated of material acceptable to the Owner.

B. Seed and sod.

2.02 SEDIMENTATION CONTROL

A. Bales - clean, seed free cereal hay type.

B. Netting - fabricated of material acceptable to the Owner.

C. Filter stone - crushed stone conforming to Florida Dept of Transportation specifications.

D. Concrete block - hollow, non-load-bearing type.

E. Concrete - exterior grade not less than one inch thick.

PART 3 EXECUTION

3.01 EROSION CONTROL

A. Minimum procedures for grassing shall be:
   1. Scarify slopes to a depth of not less than 6 inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
   2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
   3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2 inches.
   4. Apply netting over mulched areas on sloped surfaces.
   5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

A. The Contractor shall install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Deteriorated hay bales and dislodged filter stone shall be replaced by the Contractor at his expense.

3.03 PERFORMANCE

A. The Contractor, at his own expense, shall immediately take whatever steps are necessary to correct any deficiencies of the temporary erosion and sediment control measures employed if they fail to produce results or do not comply with the requirements of the State of Florida or any other federal, governmental or regulatory agency.

END OF SECTION

SECTION 02282

TERMITE CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 SUMMARY

A. Provide soil treatment for termite control, as herein specified and as indicated on drawings.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and application instructions.

1.04 QUALITY ASSURANCE

A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work, including preparation of substrate and application.

B. Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.

C. Use only termiticides, which bear a Federal registration number of the U.S. Environmental Protection Agency.

1.05 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

B. To insure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

1.06 SPECIFIC PRODUCT WARRANTY

A. Furnish written warranty certifying that applied soil termiticide treatment will prevent infestation of subterranean termites and, that if subterranean termite activity is discovered during warranty period, Contractor will re treat soil and repair or replace damage caused by termite infestation.
   1. Provide warranty for a period of 5 years from date of treatment, signed by Applicator and Contractor.

PART 2 PRODUCTS

2.01 SOIL TREATMENT SOLUTION

A. Use an emulsible concentrate termiticide for dilution with water, specially formulated to prevent infestation by termites. Fuel oil will not be permitted as a diluent. Provide a solution consisting of one of following chemical elements and concentrations:
   1. Cypermethrin ("Prevail FT Termiticide"); 0.25 percent in water emulsion.
   2. Permathrin ("Dragnet", "Torpedo"); 0.5 percent in water emulsion.
   3. Other solutions may be used as recommended by Applicator if also acceptable to Architect and approved for intended application by jurisdictional authorities. Use only soil treatment solutions, which are not injurious to planting.

PART 3 EXECUTION

3.01 APPLICATION

A. Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

B. Application Rates: Apply soil treatment solution as follows:
   1. Under slab on grade structures, treat soil before concrete slabs are placed, using the following rates of application:
      a. Apply 4 gallons of chemical solution per 10 lin. feet. to soil in critical areas under slab, including entire inside perimeter inside of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.
      b. Apply one gallon of chemical solution per 10 square feet. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1 1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.
      c. Apply 4 gallons of chemical solution per 10 lin. feet.of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6 inch to 8 inch wide along outside of foundation to a depth of not less than 12 inch. Punch holes to top of footing at not more than 12 inch o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.
   2. At hollow masonry foundations or grade beams, treat voids at rate of 2 gallons per 10 lin. feet, poured directly into the hollow spaces.
   3. At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gallons per 10 lin. feet. of penetration.
   4. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.
   5. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

END OF SECTION

SECTION 02444

FENCING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, material, equipment and incidentals necessary for complete installation of chain link fence systems. The fencing shall be installed according to manufacturer's specifications unless otherwise directed or authorized by the Owner/Engineer.

B. The Contractor's security fencing is at his expense and option and is not covered in this Section.

1.02 QUALITY ASSURANCE

A. Standards of Manufacture shall comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and as herein specified.

B. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer, including, but not limited to accessories, fittings, fasteners and appurtenances complete and ready for use.

C. Acceptable Manufacturers: Anchor, Cyclone, or approved equal

D. Erector Qualifications: The Contractor or approved subcontractor, must have a minimum of two (2) years experience in similar fence installation.

1.03 SUBMITTALS

A. Product Data:
   1. For Steel Fences and Gates, the Contractor shall submit for review and approval to the Owner/Engineer, five (5) copies of the manufacturer's technical data, details of fabrication, installation instructions and procedures for steel fences and gates. The Contractor shall be responsible for a copy of each instruction to be given to the Installer.

B. Samples:
   1. The Contractor shall submit two (2) samples approximate size 6-inches long, or 6-inches square of fabric material, framework members and typical accessories to the Owner/Engineer for review and approval.

C. Certificates:
   1. The Contractor shall provide manufacturer's certification that materials meet or exceed the Contract Document requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. The pipe sizes indicated are commercial pipe sizes.

B. The tube sizes indicated are nominal outside dimension.

C. Framework and appurtenances shall be finished with not less than minimum weight of zinc per sq. ft. and shall comply with the following:
   1. Pipe: ASTM A53 (1.8 oz. zinc psf)
   2. Square tubing: ASTM A 123 (2.0 oz. zinc psf)
   3. Hardware and Accessories: ASTM A 153 (zinc weight per Table I).

D. All fence components shall be galvanically compatible.

E. Vinyl coatings for fabric, posts, rails, gates, and all other fittings and components shall be thermally fused polyvinyl chloride; heavy mil coating per ASTM F 668.

2.02 FABRIC

A. Fabric shall be 0.148 inch (9 gage) steel wire, 2-inch diamond mesh and both top and bottom salvages shall be twisted and barbed for fabric over 60-inches high. Finish shall be hot dipped galvanized, ASTM A 392, Class II.

2.03 POSTS, RAILS AND BRACES

A. End, Corner and Pull Posts:
   1. The Contractor shall furnish end, corner and pull posts of the minimum size and weight as follows:
      a. Up to 5-foot fabric height
         1) 2.375-inch OD pipe weighing 3.65 pounds per linear foot.
         2) 2.50-inch square tubing weighing 5.59 pounds per linear foot.
      b. Over 5 foot fabric height
         1) 2.875-inch OD pipe weighing 5.79 pounds per linear foot.
         2) 2.50-inch square tubing weighing 5.59 lbs. per linear foot.

B. Line Post:
   1. The Contractor shall furnish line posts of the minimum sizes and weight as follows. Post shall be spaced 10-foot o.c. (on-center) maximum, unless otherwise indicated:
      a. Up to 5-foot fabric height.
         1) 1.90-inch OD pipe weighing 2.72 pounds per linear foot.
      b. Over 5 foot fabric height.
         1) 2.375-inch OD pipe weighing 3.65 pounds per linear foot.

C. Gate Posts:
   1. The Contractor shall furnish gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:
      a. Up to 6-feet wide.
         1) 2.875-inch OD pipe weighing 5.79 pounds per linear foot.
         2) 2-1/2 inch square tubing weighing 5.59 pounds per linear foot.
      b. Over 6-feet and up to 13-feet wide.

1) 4-inch OD pipe weighing 9.11 pounds per linear foot.

c. Over 13-feet and up to 18-feet wide.
   1) 6.625 inches OD weighing 18.97 pounds per linear foot.

d. Over 18 feet.
   1) 8.625 inches OD weighing 28.55 pounds per linear foot.

D. Top Rails:
   1. The Contractor shall furnish the following top rails unless otherwise indicated:
      a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.

E. Post Brace Assembly:
   1. The Contractor shall furnish bracing assemblies at the end, gate, at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric.
   2. Use 1.660-inch OD pipe weighing 2.27 pounds per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckles for diagonal truss.

F. Tension Wire:
   1. The Contractor shall furnish tension wire consisting of galvanized 0.177 inch (7 gage) coiled spring wire as per ASTM A824 at the bottom of the fabric only.

G. Barbed Wire Supporting Arms:
   1. The Contractor shall furnish pressed steel, wrought iron, or malleable iron barbed wire supporting arms, complete with provisions for anchorage to posts and attaching three rows of barbed wire to each arm. Supporting arms may be attached either to posts or integral with post top weather cap. The Contractor shall provide a single 45 degree arm for each post where indicated.

H. Barbed Wire:
   1. The Contractor shall furnish barbed wire. It shall be 2-strand, 12-1/2 gauge wire with 14 gauge, 4-point barbs spaced 5-inch o.c., galvanized, complying with ASTM A121, Class 3.

I. Post Tops:
   1. The Contractor shall furnish post tops. Tops shall be pressed steel, wrought iron, or malleable iron of ASTM F626 designed as a weathertight closure cap (for tubular posts). The Contractor shall furnish one cap for each post unless equal protection is afforded by a combination of post top cap and barbed wire supporting arm. The Contractor shall furnish caps with openings to permit through passage of the top rail.

J. Stretcher Bars:
   1. The Contractor shall furnish stretcher bars. Bars shall be one piece lengths equal to the full height of the fabric, with a minimum cross-section of 3/16-inch x 3/4-inch. The Contractor shall provide one stretcher bar for each gate and end post and two bars for each corner and pull post, except where fabric is integrally woven into the post.

K. Stretcher Bar Bands:
   1. The Contractor shall furnish stretcher bar bands. Bands shall be steel, wrought iron, or malleable iron, a maximum space of 15-inch o.c. to secure stretcher bars to end, corner, pull and gate posts.

2.04 GATES

A. The Contractor shall provide fabricated gate perimeter frames of tubular members. Additional horizontal and vertical members shall ensure proper gate operation and attachment of fabric, hardware and accessories. The maximum space of the frame members shall not be more than 8-inches apart. Fabrication is as follows:
   1. Up to-5 feet high, or leaf width 8-feet or less.
      a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.
      b. 1.5 inch sq. tubing weighing 2.27 pounds per linear foot.
   2. Over 5-feet high, or leaf width exceeding 8-feet.
      a. 1.90-inch OD pipe weighing 2.72 pounds per linear foot.
      b. 2-inch square tubing weighing 2.60 pounds per linear foot.

B. The Contractor shall assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. He shall use the same fabric width as for the fence, unless otherwise indicated in the Contract Documents or authorized by the Owner/Engineer. He shall install the fabric with stretcher bars at vertical edges. The bars may also be used at the top and bottom edges. The contractor shall attach stretchers to the gate frame at a maximum spacing of 15-inch o.c. He shall attach the hardware with rivets or by other means which will prevent removal or breakage.

C. The Contractor shall install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates as necessary to ensure frame rigidity without sag or twist.

D. The Contractor shall install barbed wire above the gates. He shall extend the end members of gate frames 12-inches above the top member which will be prepared for three strands of wire. The Contractor shall provide necessary clips for securing wire to extensions.

E. Gate Hardware:
   1. The Contractor shall furnish the following hardware and accessories for each gate.
      a. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1-1/2 pair of hinges for each leaf over six feet nominal height.
      b. Latch: Forked type of plunger-bar type to permit operation from either side of gate with padlock eye as integral part of latch.
      c. Keeper: Provide keeper for all vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
      d. Double Gates: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors. Set in concrete to engage the center drip drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.
      e. Where gates are between masonry piers, provide "J" with 4-inch square anchor plate to masonry contractor for building in.

2.05 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Wire Ties: The Contractor shall tie fabric to line posts. He shall use 9 gauge wire ties spaced 12-inches o.c. For tying fabric to rails and braces, he shall use 9 gauge

wire ties spaced 24-inches o.c. For tying fabric to tension wire, he shall use 11 gauge hog rings spaced 24-inches o.c. The finish of ties shall match the fabric finish.

B. Concrete: The Contractor shall provide portland cement concrete in compliance with ASTM C-150 and the Contract Documents. Aggregates shall comply with ASTM C33. The Contractor shall mix the materials to obtain a minimum 28-day compressive strength of 2500 psi, using a minimum of 4 sacks of cement per cubic yard, a maximum size aggregate of 1-inch, a maximum 3-inch slump and air entrainment of 2 percent to 4 percent.

C. Privacy Decorative Slatting (PDS) shall be PVC, bottom locking, non-fin type, sized to match the fabric height and color in both the fence and gates.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall not start the fence installation prior to the final grade completion, and the finish elevations established, unless otherwise authorized by the Owner/Engineer.

B. The Contractor shall repair damaged coatings in the shop or in the field by recoating utilizing manufacturers recommended repair compounds and as applied per manufacturer's recommendations.

C. Excavation:
   1. For post footings, the Contractor shall drill holes in firm, undisturbed or compacted soil of the diameters and spacings shown or called out in the Contract Documents.
      a. For holes not shown or called out on the Contract Documents, the Contractor shall excavate minimum diameters recommended by the fence manufacturer.
      b. Post holes shall be in true alignment and of sufficient size to provide a permanent concrete foundation. Concrete shall be poured against undisturbed earth sides and bottom. All holes shall be 48-inches deep with posts and corner posts placed in the concrete to a depth of 36-inches. The gate posts shall be set in the concrete to a depth of 42-inches below the surface in firm, undisturbed soil. Holes shall be well centered on the posts. A minimum diameter of 12-inches shall be required for all post holes.
      c. Excavated soil shall be removed from the Owner's property.
      d. If solid rock is encountered near the surface, the Contractor shall drill into rock at least 12-inches for line posts and at least 18-inches for end, pull, corner or gate posts. Hole shall be drilled to at least 1-inch greater diameter than the largest dimension of the post to be place.
      e. If the Contractor encounters solid rock below solid overburden, he shall drill to the full depth required; however, rock penetration need not exceed the minimum depths specified.

D. Setting Posts:
   1. The Contractor shall remove loose and foreign materials from the sides and bottoms of holes, and moisten soil prior to placing concrete.

a. Center and align posts in holes above bottom of excavation.
b. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations. The top of concrete shall extend 2-inches above finish grade.
c. Trowel finish tops of footings and slope or dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.
d. Keep exposed concrete surfaces moist for at least seven (7) days after placement, or cure with membrane curing materials, or other acceptable curing method.
e. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.

E. Concrete Strength:
1. The Contractor shall allow the concrete to attain at least 75% of its minimum 28-day compressive strength no sooner than seven (7) days after placement, before rails, tension wires, barbed wire, or fabric is installed. The Contractor shall not stretch and tension fabric or wires and shall not hang gates until the concrete has attained its full design strength.

F. Top Rails:
1. The Contractor shall run the rail continuously through post caps or extension arms and bend to radius for curved runs. He shall provide expansion coupling as recommended by fencing manufacturer.

G. Brace Assemblies:
1. The Contractor shall install braces so that posts are plumb when diagonal rod is under proper tension.

H. Tension Wire:
1. The Contractor shall install tension wires by weaving through the fabric and tying to each post with not less than 0.170 inch galvanized wire, or by securing the wire to the fabric.

I. Fabric:
1. The Contractor shall leave approximately 3-inches between finish grade and bottom salvage, except where the bottom of the fabric extends into the concrete. He shall pull the fabric taut and tie it to posts, rails and tension wires. He shall install fabric on the security side of the fence and anchor it to the framework so that the fabric remains in tension after the pulling force is released.

J. Stretcher Bars:
1. The Contractor shall thread through or clamp the bars to the fabric 4-inches o.c. and secure them to posts with metal bands spaced 15-inches o.c.

K. Barbed Wire:
1. The Contractor shall install three (3) parallel wires on each extension arm on the security side of fence, unless otherwise indicated. He shall pull the wire taut and fasten securely to each extension arm.

L. Gate:
   1. The Contractor shall install gates plumb, level and secure for full opening without interference. He shall install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. He shall adjust hardware for smooth operation and lubricate where necessary.

M. Tie Wires:
   1. The Contractor shall use U-shaped wire, conforming to the diameter of the attached pipe, and shall clasp the pipe and fabric firmly with twisted ends of at least two (2) full turns. He shall bend the end of the wire to minimize hazard to persons or clothing.

N. Fasteners:
   1. The Contractor shall install nuts for tension band and hardware bolts on the side of fence opposite the fabric side. Pen ends of bolts or score threads to prevent removal of nuts.

3.02 INSTALLATION

A. Fence shall be constructed such that each run of fence between corner posts or gate posts has equal spacing between the line posts. Spacing shall not exceed 10 feet, and shall not exceed 8 feet for fabric with privacy decorative slatting.

END OF SECTION

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SECTION 02485

SEEDING AND SODDING

PART 1 GENERAL

1.01 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 Engineer/Owner.

1.02 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.

1.03 QUALITY ASSURANCE

A. 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 eight (8) feet.

B. 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 Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fertilizer: 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 quantitive 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: 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: Sod shall be provided as required on the construction drawings or at locations as directed by the Engineer in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish bahia grass sod or match existing sod. 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 price bid for sodding.

D. Topsoil: 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: 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 that 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.

PART 3 EXECUTION

3.01 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 Engineer.

B. Finish Grading: Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated. The Engineer shall approve the finish grade of all areas to be seeded or sodded prior to seed or sod application.

C. Protection: 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 Engineer.

3.02 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.

3.03 LANDSCAPE MAINTENANCE

A. Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replaced as directed by the Engineer.

B. Maintain landscape work 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.

3.04 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 and sodding, in accordance with these Specifications.

END OF SECTION

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SECTION 02513

ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials and equipment necessary to complete all milling asphalt pavement and asphalt concrete paving (including restoration of driveways) as called out on the Contract Documents or as shown on the Drawings.

1.02 QUALITY ASSURANCE

A. Qualifications of Asphalt Concrete Producer: The only materials permitted shall be furnished by a bulk asphalt concrete producer exclusively engaged in the production of hot-mix, hot-laid asphalt concrete.

B. Qualification of Testing Agency: The Owner may employ a commercial testing laboratory to conduct tests and evaluations of asphalt concrete materials and design. The Contractor shall:
   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: The Contractor shall comply with the applicable requirements of:
   1. Manatee County Utility Operations Department
   2. Manatee County Transportation Department
   3. State of Florida Department of Transportation

1.03 PAVING QUALITY REQUIREMENTS

A. General: In addition to other specified conditions, the Contractor shall comply with the following minimum requirements:
   1. In-place asphalt concrete course shall be tested for compliance with requirements for density, thickness and surface smoothness.
   2. Final surface shall be provided of uniform texture, conforming to required grades and cross sections.
   3. A minimum of 4-inch diameter pavement specimens for each completed course shall be taken from locations as directed by the Engineer.
   4. Holes from test specimens shall be repaved as specified for patching defective work.

B. Density:
   1. When subjected to 50 blows of standard Marshall hammer on each side of an in place material specimen, densities shall be comparable to a laboratory

specimen of same asphalt concrete mixture.

2. The minimum acceptable density of in-place course material shall be 98% of the recorded laboratory specimen density.

C. Thickness: In-place compacted thicknesses shall not be acceptable if less than the minimum thicknesses shown on the Drawings.

D. Surface Smoothness:
   1. Finished surface of each asphalt concrete course shall be tested for smoothness, using a 10-foot straightedge applied parallel to and at right angles to centerline of paved areas.
   2. Surface areas shall be checked at intervals directed by Engineer.
   3. Surfaces shall not be acceptable if they exceed the following:
      a. Base Course: 1/4 inch in 10 feet
      b. Surface Course: 3/16 inch in 10 feet
      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 inch from the template.

1.04 SUBMITTALS

A. Samples: The Contractor may be required to provide samples of materials for laboratory testing and job-mix design.

B. The Contractor shall 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 (AASHO T 27).
      b. Unit Weight of Slag: ASTM C29 (AASHO T 19).
      c. Soundness: ASTM C 88 (AASHO T 104) for surface course aggregates only.
      d. Sand Equivalent: ASTM D 2419 (AASHO T 176).
      e. Abrasion of Coarse Aggregate: ASTM C131 (AASHO T 96), for surface course aggregates only.
   2. Asphalt cement for each penetration grade:
      a. Penetration: ASTM D5 (AASHO T49).
      b. Viscosity (Kinematic): ASTM D2170 (AASHO T201).
      c. Flash Point: ASTM D92 (AASHO T48).
      d. Ductility: ASTM D113 (AASHO T51).
      e. Solubility: ASTM D4 (AASHO T44).
      f. Specific Gravity: ASTM D70 (AASHO T43).
   3. Job-mix design mixtures for each material or grade:
      a. Bulk Specific Gravity for Coarse Aggregate: ASTM C117 (AASHO T85).
      b. Bulk Specific Gravity for Fine Aggregate: ASTM C128 (AASHO T84).
   4. Uncompacted asphalt concrete mix: Maximum Specific Gravity: ASTM D2041 (AASHO T209).
   5. Compacted asphalt concrete mix:
      a. Bulk Density: ASTM D1188 (AASHO T166).
      b. Marshall Stability and Flow: ASTM D1559.
   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 D2172 (AASHO T164).
      2) Penetration of Recovered Asphalt Cement: ASTM D5 (AASHO T49).
      3) Ductibility of Recovered Asphalt Cement: ASTM D113 (AASHO T51).
   b. Compacted asphalt concrete mix:
      1) Bulk Density: ASTM D1188 (AASHO T166).
      2) Marshall Stability and Flow: ASTM D1559.
   c. Perform at least one test for each day's paving.
8. Asphalt plant inspection: ASTM D290.
9. Additional testing:
   a. Retesting shall be required if previous tests indicate insufficient values, or if directed by the Engineer.
   b. Testing shall continue until specified values have been attained.
10. Asphalt concrete materials which do not comply with specified requirements shall not be permitted in the work.

1.05 JOB CONDITIONS

A. Weather Limitations:
   1. Apply bituminous prime and tack coats only when the ambient temperature in the shade is 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

2.01 MATERIALS

A. Soil Cement or Shell Base Course: as specified in FDOT Section 270, "Material for Base and Stabilized Base", and as called for in the Contract Documents.

B. Aggregate for Asphalt Concrete, General:
   1. Sound, angular crushed stone, crushed gravel, or crushed slag: ASTM D692.

2. Sand, stone, or slag screening: ASTM D1073.
3. Provide aggregate in gradations for various courses to comply with local highway standards.

C. Surface Course Aggregates:
1. Provide natural sand, unless sand prepared from stone, slag, or gravel or combinations are required to suit local conditions.

D. Asphalt Cement: Comply with ASTM D946 for 85-100 penetration grade.

E. Prime Coat:
1. Cut-back liquid asphalt.
2. Medium-Curing type: ASTM D2027, Grade MC-70.

2.02 ASPHALT-AGGREGATE MIXTURES

A. Job-mix criteria:
1. Provide job-mix formulas for each required asphalt-aggregate mixture.
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.

2.03 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
1. No Parking Zone - Yellow
2. Parking Dividers - White

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Subbase Preparation:
1. The Contractor shall remove from the area all organic substance encountered to a depth of 6- or 8-inches, 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 D1557, Method D (98 percent maximum density: AASHTO T180).
6. Test density of compacted base course: ASTM D2167.
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.

3.02 MANHOLE FRAME / VALVE BOX ADJUSTMENTS (IF APPLICABLE)

A. Placing Manhole frames:
1. Surround manhole frames set to elevation with a ring of compacted asphalt concrete base prior to paving.
2. Place asphalt concrete mixture up to 1-inch below top of frame, slope to grade, and compact by hand tamping.

B. Adjust manhole 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 manhole frames to grade, flush with surface of adjacent pavement.

3.03 PREPARING THE MIXTURE

A. Comply with ASTM D995 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 shall not be intermixed.

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.

E. 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 D2489.

F. 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.

3.04 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.

3.05 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.

3.06 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 placement.
   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.

3.07 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.

3.08 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)

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SECTION 02575

PAVEMENT REPAIR AND RESTORATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, obtain County or State right-of-way permits and incidentals required and remove and replace pavements over trenches excavated for installation of water or sewer lines and appurtenances as shown on the Contract Drawings.

1.02 GENERAL

A. The Contractor shall take before and after photographs.

B. The Contractor shall repair in a manner satisfactory to the County or State, all damage done to existing structures, pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, utility poles, utility pipe lines, conduits, drains, catch basin, flagstones, or stabilized areas or driveways and including all obstructions not specifically named herein, which results from this Project.

C. The Contractor shall keep the surface of the backfilled area of excavation in a safe traffic bearing condition and firm and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed. The repair shall conform to applicable requirements of Manatee County Transportation Department requirements for pavement repair and as described herein, including all base, subbase and asphalt replacement.

D. All materials and workmanship shall meet or exceed the County requirements as called for in the Contract Documents and nothing herein shall be construed as to relieve the Contractor from this responsibility.

E. All street, road and highway repair shall be made in accordance with the FDOT and County details indicated on the Drawings and in accordance with the applicable requirements and approval of affected County and State agencies.

PART 2 PRODUCTS

2.01 PAVEMENT SECTION

A. Asphaltic concrete shall consist of asphalt cement, coarse aggregate, fine aggregate and mineral filler conforming to FDOT Type S-III Asphalt. Pavement replacement thickness shall match that removed but in no case shall be less than 1-1/2 inches compacted thickness. All asphalt concrete pavement shall be furnished, installed and tested in accordance with FDOT Specifications for Road and Bridge Construction.

B. Asphalt or crushed concrete or approved equal base material shall be furnished and installed under all pavement sections restored under this Contract. Asphalt base shall have a minimum 6-inch compacted thickness, meet requirements for FDOT ABC III (Minimum Marshall Stability of 1000) and be furnished, installed and tested in accordance with the requirements of the FDOT Standards. Crushed concrete base shall be 10-inch minimum compacted thickness. Crushed concrete aggregate material shall have a minimum LBR of 140 compacted to 99% T-180 AASHTO density. Asphalt base and crushed concrete base are acceptable. Other bases shall be submitted for approval.

C. Prime and tack will be required and applied in accordance with Section 300 - FDOT Specifications: Prime and Tack Coat for Base Courses.

PART 3 EXECUTION

3.01 CUTTING PAVEMENT

A. The Contractor shall saw cut in straight lines and remove pavement as necessary to install the new pipelines and appurtenances and for making connections to existing pipelines.

B. Prior to pavement removal, the Contractor shall mark the pavement for cuts nearly paralleling pipe lines and existing street lines. Asphalt pavement shall be cut along the markings with a rotary saw or other suitable tool. Concrete pavement shall be scored to a depth of approximately 2 inches below the surface of the concrete along the marked cuts. Scoring shall be done by use of a rotary saw, after which the pavement may be broken below the scoring with a jackhammer or other suitable equipment.

C. The Contractor shall not machine pull the pavement until it is completely broken and separated along the marked cuts.

D. The pavement adjacent to pipe line trenches shall neither be disturbed or damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, the Contractor shall remove and replace the pavement. In addition, the base and sub-base shall be restored in accordance with these Specifications, Florida Dept. of Transportation Standard Specifications and as directed by the Engineer.

3.02 PAVEMENT REPAIR AND REPLACEMENT

A. The Contractor shall repair, to meet or exceed original surface material, all existing concrete or asphaltic pavement, driveways, or sidewalks cut or damaged by construction under this Contract. He shall match the original grade unless otherwise specified or shown on the Drawings. Materials and construction procedures for base course and pavement repair shall conform to those of the Florida Dept. of Transportation.

B. The Contractor's repair shall include the preparation of the subbase and base, place and maintain the roadway surface, any special requirements whether specifically called for or implied and all work necessary for a satisfactory completion of this work. Stabilized roads and drives shall be finished to match the existing grade. Dirt roads

and drives shall have the required depth of backfill material as shown on the Contract Drawings.

C. The width of all asphaltic concrete repairs shall extend the full width and length of the excavation or to the limits of any damaged section. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other approved method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

3.03 MISCELLANEOUS RESTORATION

A. Sidewalks or driveways cut or damaged by construction shall be restored in full sections or blocks to a minimum thickness of 4 inches. Concrete curb or curb and gutter shall be restored to the existing height and cross section in full sections or lengths between joints. RCP pipe shall be repaired or installed in accordance with manufacturer's specifications. Grassed yards, shoulders and parkways shall be restored to match the existing sections with grass sod of a type matching the existing grass.

3.04 SPECIAL REQUIREMENTS

A. The restoration of all surfaces, as described herein, disturbed by the installation of pipelines shall be completed as soon as is reasonable and practical. The complete and final restoration of both paved and shell stabilized roads within a reasonable time frame is of paramount importance. To this end, the Contractor shall, as part of his work schedule, complete the restoration of any area of road within five (5) weeks after removing the original surface. Successful leak testing shall be performed prior to restoring any area of road. All restoration and replacement or repairs are the responsibility of the Contractor.

3.05 CLEANUP

A. After all repair and restoration or paving has been completed, all excess asphalt, dirt and other debris shall be removed from the roadways. All existing storm sewers and inlets shall be checked and cleaned of any construction debris.

3.06 MAINTENANCE OR REPAIR

A. All wearing surfaces shall be maintained by the Contractor in good order suitable for traffic prior to completion and acceptance of the work.

END OF SECTION

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SECTION 02614

STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install, complete, ready for operation and field test all steel pipe as shown on the drawings and specified herein.

B. Steel pipe shall include black steel, galvanized steel, and stainless steel pipe and fittings.

C. Provide steel pipe only where specifically called out on the drawings.

1.02 DESCRIPTION OF SYSTEM

A. All of the equipment specified herein is intended to be standard steel pipe for use in transporting certain chemicals and liquids as shown on the drawings and specified herein.

1.03 QUALIFICATIONS

A. All steel pipe shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the steel pipe to be furnished. The equipment shall be designed, constructed, installed in accordance with the best practices and methods and shall comply with all these specifications.

B. Steel pipe and fittings shall conform to all applicable standards of ASTM, ANSI and AWWA.

1.04 SUBMITTALS

A. Submit to the Engineer for approval in accordance with the General Conditions and Section 01340, to include dimensioning and technical specifications for all pipe to be furnished.

PART 2 MATERIALS

2.01 STEEL PIPE AND FITTINGS FOR PIPING

A. Black Steel Pipe: All black steel pipe shall be seamless, Grade B and in conformance with ASTM Designation A53 and ANSI B36.10.

B. Galvanized Steel Pipe:
   1. Galvanized steel pipe for plant and potable water service shall be hot-dipped, zinc coated galvanized, Grade A, electric resistance welded, Schedule 40 conforming to ASTM Designation A120. All joints shall be threaded joints.

Threaded joints shall be made up with a stiff mixture of graphite and mineral oil, or an approved, nontoxic, nonhardening, pipe joint compound applied to the male thread only. After having been set up, a joint shall not be backed off unless the joint is completely broken, the threads cleaned and new compound applied. All joints shall be airtight. A sufficient number of unions shall be provided to allow for convenient removal of piping. Fittings for galvanized steel pipe shall be galvanized malleable iron, 150 psi service rating.

2. Where flanged connections are indicated or otherwise required for connection to flanged valves, fittings, and appurtenances, they shall be made up using companion type flanges. Where flanged fittings are indicated or otherwise required, they shall be made up using thread galvanized steel nipples and steel companion type flanges. Companion flanges shall be steel, 150-psi ANSI Standard flat face flanges of the threaded type. Flanges shall be spot-faced on the back around each bolt hole.
3. All exposed threads, wrench marks, or other damage to the zinc coating, shall be protected by the application of two coats of a heavy consistency, bituminous paint, or with two wraps of an approved vinyl or polyvinyl pressure sensitive tape. Bituminous paint shall be equal to Koppers Bitumastic No. 50, brush applied. Tape shall be equal to 3M Company Scotchrap No. 50, 0.010-inch thick, installed as recommended by 3M Company over a primer.

C. Stainless Steel Pipe:
1. Stainless steel pipe shall be provided as shown on the drawings. Pipe shall be Schedule 40S, Type 316L, annealed, white pickle finish and shall be in accordance with ASTM Specification A312 and ANSI B36.19. Where indicated on the Drawings, holes shall be drilled in the pipe at the factory by the manufacture.

D. Steel Pipe Sleeves:
1. Sleeves for pipe that passes through floors and walls shall be galvanized Schedule 40 steel pipe conforming to ASTM Designation A120. Sleeve dimensions shall conform to the details shown on the drawings. Sleeve ends shall be cut and ground smooth. Sleeves shall be flush with walls and ceilings, but shall extend above the floor as shown on the drawings. Sleeves for use with mechanical type seals shall be sized in conformance with the seal manufacturer's requirements.

2.02 STEEL PIPE 4-INCH AND LARGER

A. Except as modified or supplemented herein, all steel pipe, fittings and specials shall conform to the applicable requirements of the following standard specifications latest editions:
1. AWWA Standards
   a. C200Steel Water Pipe 6-Inch and Larger
   b. C203Coal-Tar Protecting Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot-Applied.
   c. C205Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 inches and larger - Shop Applied.
   d. C206Field Welding of Steel Water Pipe
   e. C207Steel Pipe Flanges for Waterworks Service - Sizes 4-inch through 144-inch, Class D.
   f. C208Dimensions for Steel Water Pipe Fittings

B. All steel pipe shall be manufactured and tested in accordance with the standards set forth in AWWA C200 latest edition for fabricated or mill type water pipe. The pipe shall be made from sheet or plate rolled into sections having longitudinal or spirally formed butt-welded seams. Girth seams shall be butt welded and shall be at least 8 feet apart except in specials and fittings. The steel shall conform to the standards established in Section 2 and Section 3 AWWA C200.

1. Minimum Physical Properties of Steel Plate or Sheet:
   a. All steel pipe, specials and fittings shall be manufactured from steel plate or sheet having a specified minimum yield of 35,000 psi and specified minimum tensile of 60,000 psi. Test reports verifying the actual physical and chemical properties of the piping must be submitted to the Engineer as soon as possible after manufacturing and fabrication. The test reports shall state the hydrotest pressure applied to all sections of straight pipe and to straight pipe used in fabrication of specials and fittings.
   b. All steel pipe, specials and fittings shall be manufactured or fabricated to the diameter as shown on the drawings. The normal size shall be the outside diameter of 14-inch and larger. For sizes less than 14-inch, the pipe shall be the normal steel pipe dimensions as listed in ASTM A53 specification. All diameters of steel pipe, specials and fittings shall have minimum nominal wall thicknesses as stated herein below:

Diameter	Minimum Wall Thickness
54"	.375
48"	.375
42"	.375
36"	.375
30"	.375
24" & smaller	.250

C. All fittings and specials shall be provided with ends as required for installation and shall be fabricated to the dimensions as shown on the drawings. All fittings shall be fabricated in accordance with the standards set forth in AWWA C208 latest edition. Fittings and specials shall be fabricated from hydrostatically tested pipe meeting AWWA C200 and will not require any further hydrostatic test in the shop. In reducing sections, the wall thickness will be governed by the largest end. Elimination of joints shown on the drawings must be approved by the Engineer prior to the fabrication process.

D. Flanged and Coupling Standards:

1. All flanges, bolts, nuts and gaskets shall meet standards established in AWWA C207. Flanges shall be Class D suitable for pressure up to and including 150 psi with facing and drilling as stated in Section 3 of C207. Procedure for attachment of flanges shall be in accordance with Section 10 of AWWA C207. Blind flanges shall conform in diameter drilling and thickness to the flanges to which they attach and shall produce a watertight joint under the specified test pressure.
2. Mechanical couplings shall be Dresser Style 38, Rockwell Style 411 or equal. The middle ring of each coupling shall have a minimum thickness at least equal to that specified for the size of pipe on which the coupling is to be used and shall be 7 inches long for pipe 30-inch and smaller, 10 inches long for pipe 36-inch and larger. The pipe stop shall be omitted from the inner surface of the middle rings and the couplings shall be cleaned and shop primed with the manufacturer's standard rust inhibitive primer. The filter backwash header and

where shown on the drawings shall the mechanically coupled joints be restrained with harness bolts and lugs. Joint harnesses, where applicable, shall conform to the details on the drawings. Lugs shall be attached to the pipe in the shop and coated as specified for the adjacent pipe. The dimensions shall be stated in AWWA M011 19.8.

E. Pipe supports, anchors, blocking and hangers shall be fabricated in accordance with the details shown on the drawings and shall be installed complete with all accessories required for proper operation of the system. Should it be necessary to modify the details for proper installation, all such modifications shall be subject to approval by the Engineer. Lugs required for anchorage of the piping system shall be attached in the shop and coated as the adjacent pipe.

F. All steel pipe, fittings, specials and appurtenances shall be prepared, primed, coated and lined as specified herein below:
   1. Exterior surfaces of all steel pipe, fittings, specials, flanges, anchors and pipe supports exposed in above ground or interior locations shall be thoroughly cleaned in the shop by blasting with grit, shot or sand to SSPC SP6. One coat of primer shall be applied to the cleaned dry surface in a proper workmanship like manner and as recommended by the primer manufacturer. The primer shall be subject to approval of the Engineer and compatible to the finish coat as specified in the paid section of the specifications. Field painting of the installed system shall be as specified in the painting section.
   2. Interior surfaces of all steel pipe, fittings, and specials, which are to be installed exposed aboveground or in interior locations shall be thoroughly cleaned in the shop by blasting with grit, shot or sand to SSPC SP6. Two coats of paint shall be applied to the interior of the pipe at the shop. The paint coats shall be Koppers Bitumastic Super Tank Solution applied at a minimum of 8 mils D.F.T. per coat.
   3. Exterior surfaces of all steel pipe, fittings and specials which are to be installed underground and in manholes which will not be encased in concrete shall be coated in the shop with coal tar enamel in accordance with the standards established in AWWA C203-78, except as modified or supplemented herein.
   4. The exterior coating system for below ground steel pipe shall consist of coal tar enamel, fibrous glass mat, asbestos pipelines felt wrap and finally wrapped with kraft paper and shall be applied by the procedure described in AWWA C203. The coating shall be held back 12 inches from ends to be mechanically coupled with uncoated areas primed with coat tar primer. The coating system must be done in the shop by an established pipe coating applicator acceptable to the coating materials manufacture and the Engineer. Repairs of the any damage to the coating system incurred during the shipment and the field coating of couplings and ends where coatings have held back for joints shall be done by experienced and qualified personnel approved by the Engineer. Procedure for such field coating shall be as described in AWWA C203.
   5. The interior surfaces of all steel pipe, fittings, and specials which are to be installed below ground shall be cleaned and lined with cement mortar conforming to the standards set forth in AWWA C205-80. All work performed in the lining process shall be done in a thorough and workmanship like manner by trained personnel under the supervision of experienced men skilled in the operations they supervise. The lining thickness shall be as follows:

Pipe Size	Coating Thickness 140/436	Tolerance
(Inches)	(Inches)	(Inches)
4-10	1/4	-1/32
11-23	5/16	-1/16 + 1/8
24-36	3/8	-1/16 + 1/18
over 36	1/2	-1/16 1/8

Handling and transporting of cement mortar lined pipe shall be in accordance with Section 6 of AWWA C205 and Section 2.14 of AWWA C203.

6. The interior surface of all steel air piping shall be coated with a two part epoxy coating system equivalent to 7.0 mils DFT of Mobil Chemical 78-D-7 followed by 7.0 mils DFT of Mobil Chemical 78-W-3 or equal.

2.03 STEEL PIPE AND FITTING AND CHLORINE GAS PIPING

A. Not Used

PART 3 EXECUTION

3.01 INSTALLATION AND TESTING

A. Steel pipe shall be installed true to alignment and rigidly supported anchors shall be provided where indicated. After installation, the piping shall be tested by undergoing a 4-hour pressure test at 20 percent above the designed operating pressure plant water supply lines. If any joint or pipe proves to be defective, it shall be repaired to the satisfaction of the Engineer.

B. Screwed joints shall be made up with good quality thread compound and applied to the male thread only. After having been set up, a joint must not be backed off unless the joint is completely broken, the threads cleaned and new compound applied. All joints shall be air tight.

C. Stainless steel pipe shall have threaded joints or otherwise as required and shall be installed as shown on the Drawings.

D. Sleeves of the proper size shall be installed for pipes passing through floors and walls as indicated on the drawings. Sleeves shall be given a prime coat of rust inhibitive primer such as Koppers No. 621, or equal.

E. When cutting of pipe is required, the cutting shall be done by machine in a neat workmanlike manner without damage to the pipe. Cut ends shall be smooth and at right angles to the axis of the pipe.

F. All field welding shall be in accordance with the American Welding Society Standards. The strength of the field weld shall develop the strength of the pipe. Welds shall receive a field coating of paint as specified in Section 09900 and as approved by the Engineer.

G. All galvanized steel pipe thread shall be clean, machine cut, and all pipe shall be reamed before erection. Each length of pipe as erected shall be up-ended and

rapped to dislodge dirt and scale.

H. All galvanized steel piping shall have a sufficient number of unions to allow convenient removal of piping. Unions shall be compatible with pipe.

3.02 PAINTING

A. Pipe and fittings exposed to view, except stainless steel, shall receive a prime coating of rust inhibitive primer such as Koppers 621 or equal. Prior to prime coating, all surfaces shall be cleaned of all mill scale, rust, dirt, grease and other foreign matter.

B. All piping and fittings exposed to view except stainless steel pipe shall be painted as specified.

END OF SECTION

SECTION 02615

DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint fittings, complete, as shown on the Drawings and specified in these Standards.

B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve him from laying and jointing different or additional items where required.

C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on joint or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.

D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe installed underground shall be poly wrapped unless noted otherwise on the plans.

1.02 SUBMITTALS

A. The Contractor shall submit to the Engineer, within ten (10) days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.

B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ductile iron pipe shall conform to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51. Thickness of pipe shall be Class 50 or pressure Class 350. All pipe not buried shall be Class 53. All ductile iron pipe shall be clearly marked on the outside of the barrel to readily identify it from cast iron.

B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 feet. Unless otherwise called for in the Contract Documents, unrestrained joint pipe shall be either the rubber-ring type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or approved equal.

C. All fittings shall be pressure rated for 350 psi and meet the requirement of AWWA C110 or AWWA C153. Rubber gaskets shall conform to ANSI A21.11 for mechanical and push-on type joints for diameters up to 14-inch diameter. Gaskets

for 16-inch diameter and larger pipe shall be EPDM (Ethylene-Propylene Dine Monomer) such as the "Fastite Gasket" of American Ductile Iron Pipe Co., or approved equal.

D. Water Mains: All ductile iron pipe and fittings shall have a standard thickness cement lining on the inside in accordance with AWWA/ANSI C104/A21.4 and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. All interior linings shall be EPA/NSF approved.

E. Force Main Fittings: All ductile iron fittings shall have a factory applied fusion bonded epoxy or epoxy and polyethylene lining on the inside in accordance with manufacturer's specifications and a coal tar enamel coating on the outside. The coal tar enamel shall be in accordance with ANSI A21.4. The interior lining is to be based on manufacturer's recommendation for long-term exposure to raw sewage. It shall have a minimum ten (10) year warranty covering failure of the lining and bond failure between liner and pipe.

F. Restrained joints shall be provided at all horizontal and vertical bends and fittings, at casings under roads and railroads and at other locations shown on the Contract Drawings. Restrained joint pipe fittings shall be designed and rated for the following pressures: 350 psi for pipe sizes up to and including 24 inch diameter; 250 psi for pipe sizes 30 inch diameter and above.

2.02 IDENTIFICATION

A. A.Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.

B. Pipe shall be poly wrapped blue for potable water mains, purple for reclaimed water mains and green for sewage force mains. All potable water pipe shall be NSF certified and copies of lab certification shall be submitted to the Engineer.

END OF SECTION

SECTION 02617

INSTALLATION AND TESTING OF PRESSURE PIPE

PART 1 GENERAL

1.01 INSTALLING PIPE AND FITTINGS

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.

1.02 PROCEDURE FOR TESTING WATER LINES, FORCE MAINS AND RECLAIMED WATER LINES

A. 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. Engineer 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 2 hours at full working pressure, but not less than 100 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 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 mains) 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.

P. A punch list must be made at the end of all tests.

Q. A copy of the charge sheet will be given to the Engineer and the Contractor at the end of the test.

1.03 INSPECTION/TESTING PROCEDURE COVERING BORED PIPE LINES OR CASING AND CONDUITS INSTALLED ACROSS PREVIOUSLY TESTED AND/OR COUNTY ACCEPTED WATER AND SEWER PIPE WITHIN DEVELOPMENT PROJECTS UNDER ACTIVE CONSTRUCTION

A. Prior to testing water and sewer lines, every effort will be made to install sleeves for underground utilities that will cross these water and sewer lines or services.

B. Where it has not been possible to pre-install sleeves prior to testing and bores or conduits are required, it is the responsibility of the utility company and/or their Contractor performing the work to provide Manatee County Utility Operations Department or the Engineer of Record with accurate horizontal and vertical as-built information of the sleeves, bores and conduits installed by said utility company. This applies to all bores and conduits crossing water and sewer lines.

C. Procedures to be followed for installation of conduits, pipe lines and bores that will cross, or be closer than 5'-0" horizontally and 18 inches vertically to, previously tested water and sewer lines that are still under the ownership of the developer/contractor.
   1. Notify the Owner and obtain the best as-built information available. Allow sufficient time for the Owner to field locate the existing pipe lines.
   2. Submit drawings of proposed location to the Owner and Manatee County Utility Operations Dept. Utility Locations Section for review.
   3. Obtain a County Right-of-Way Use Permit if the work area is within a dedicated area of right-of-way.
   4. Perform installation in the presence of a County representative. Call (941) 792-8811, ext. 5061 or ext. 5069 with at least two (2) working days notice.
   5. Submit two (2) copies of as-built information to the Owner to incorporate into the record drawings to be submitted to the County.
   6. Failure to follow steps 2 thru 5 will result in additional charges for retesting the previously tested water and sewer lines.

D. Procedures to be followed for installation of conduits, pipe lines and bores crossing or closer than 5'-0" horizontally and 18 inches vertically to previously tested water and sewer lines that have been previously accepted by Manatee County:
   1. Obtain record drawing information from the County.
   2. If roadway has been dedicated to Manatee County, obtain Right-of-Way Use Permit and copy the Project Management Department Locations Section with proposed location drawing.
   3. Follow procedures in "Sunshine State One-Call", paying special attention to the requirements of Section VII.

E. Should water or sewer lines be damaged during the bore pipe line or casing installation, the cost of any repairs and retesting will be paid for by the utility company that installed the bore. The actual clearance between a bored casing crossing a water or sewer pipe should not be less than 18 inches.

END OF SECTION

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SECTION 02619

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install all pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents by Horizontal Directional Drilling (HDD).

1.02 GENERAL

A. All existing structures, water and sewer lines, storm drains, utilities, driveways, sidewalks, signs, mail boxes, fences, trees, landscaping, and any other improvement or facility in the construction area that the Contractor disturbs for his own construction purposes shall be replaced to original condition at no additional cost to the County.

B. For "Navigable Waters of the U.S." reference 33 of the Code of Federal Regulations, Part 329.

C. For "Waters of the U.S." reference 33 of the Code of Federal Regulations, Part 323.

D. For "Waters of the State" reference Section 62-301 of the Florida Administrative Code.

1.03 TESTING

A. In place soil compaction tests shall be performed by a qualified testing laboratory.

B. Compaction tests shall be taken at every excavation, except in the road crossings or road shoulders; tests are to be taken according to current FDOT Standards.

C. All pipe shall be tested in accordance with the appropriate material specifications.

D. Reference Standards: American Society for Testing and Materials (ASTM), D1557, Moisture-Density Relations of Soils Using 10-lb. Rammer and 18-in. Drop.

E. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

1.04 QUALIFICATIONS

A. Pipe Manufacture: All pipe and fittings shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

B. Drilling Supervisor: The Contractor shall provide a competent boring specialist who shall remain on the project site during the entirety of the directional boring operation.

This includes, but is not limited to, drilling fluid preparation, seaming, boring and pulling. The boring specialist shall have a minimum of five (5) years experience in supervising directional bores of similar nature, diameter, materials and lengths.

C. Pipe Fusion: All boring and fusing equipment shall be certified for operation. The Contractor responsible for thermal butt fusing pipe and fittings shall have manufacturer certification for performing such work or a minimum of five (5) years experience performing this type of work. If no certification is available, written documentation of the required work experience shall be submitted for approval.

D. Drilling Fluid Specialist: The personnel responsible for supervising the supply, mixing, monitoring fluid quality, pumping and re-circulation system proposed for the drilling fluid shall have a written certification issued by the Drilling Fluid manufacturer for performing such work or a minimum of five years experience performing this type of work. If no certification is available, written documentation of the required work experience for the proposed personnel shall be submitted for review and approval.

1.05 SUBMITTALS

A. Detailed description including specifications and catalog cuts for:
   1. Shop drawings and catalog data for all HDD equipment.
   2. The pipe manufacturer's maximum degree of radial bending allowed for the pipe when full and when empty and pullback force recommended setting.
   3. Steering and tracking devices including specific tracer wire.
   4. Drilling fluids; the drilling fluid submittal shall include the ratio of mixture to water, including any additives, based on the Contractor's field observations prior to construction, knowledge and experience with drilling in similar conditions, and any soil data provided in the Contract Documents, which shall be verified by the fluid specialist.
   5. Shop drawings for the breakaway swivel, including the method of setting the swivels' break point and set point to be used.
   6. Pipe assembly procedure, details of support devices, and staging area layout including methods to avoid interference with local streets, driveways, and sidewalks.
   7. Details of pipe fusion procedures and copies of the fusion technician qualification certification or documentation.
   8. Drilling fluid technician qualification certification or documentation

B. If the Contractor proposes any changes to the pull-back distance or profile shown on the drawings, he may be required to submit a complete design for the proposed pipe including an analysis for pull-back forces, external loads including full hydrostatic pressure if empty, external forces due to borehole collapse, ovalization during pull-back, thermal stress while exposed to Sun-light, shortening after release of pull-back force, and tensile stress during pull-back.

C. Bore Plan: For all contiguous piping installations over 300 feet in length or any installations for piping larger than 4 inches in diameter, the Contractor shall submit a Bore Plan that includes the following:
   1. Contact information and experience for the drilling fluid specialist.
   2. The number of passes the bore will include to get the product pipe installed.
   3. The pilot bore and all reaming bore sizes including the final pullback with the product pipe.
   4. Drilling rod length in feet.

5. The pilot bore, pre-ream bores (if any) and pullback production rate in minutes per (drilling) rod to maintain adequate mud flow.
6. Details of the entry and exit pit locations along with entry and exit angles for the bore, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.
7. The method of fusing or joining pipe of adjacent bores to ensure that the joint is on grade with the installed pipe.

D. Furnish a Bore Path Report to the Engineer within seven days of the completion of each bore path. Data collected by the County Representative does not relieve the Contractor from the responsibility of recording his own data. Include the following in the report:
1. Location of project, project name and number
2. Name of person collecting data, including title, position and company name
3. Investigation site location (Contract plans station number or reference to a permanent structure within the project right-of-way)
4. Driller's Log & identification of the detection method used
5. Elevations and offset dimensions of installed pipe as referenced to the drawings
6. Data log of pullback force during product pipe installation
7. All failed bores. Include length of pipe left in place and explanation of failed installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Incidental materials that may or may not be used to install the product depending on field requirements are not paid for separately and will be included in the cost of the installed product.

B. Drilling Fluids shall use a mixture of bentonite clay or other approved stabilizing agent mixed with potable water with a pH of 8.5 to 10.0 to create the drilling fluid for lubrication and soil stabilization. Vary the fluid viscosity to best fit the soil conditions encountered. Contractor shall have appropriate additives for drilling fluid available for different soil conditions that may be encountered. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer. Certify to the Engineer in writing that any chemicals to be added are environmentally safe and not harmful or corrosive to the product pipe.

C. For drilling operations that will be below waters of the State of Florida, only bentonite free drilling fluids shall be used. Acceptable products are BioMax, manufactured by M-I Swaco, Inc., Bio-Bore, manufactured by Baroid Drilling Fluids, Inc., or approved equal.

D. Identify the source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water may require a pH test.

E. The tracer wire to be used for all directional drills shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

F. Breakaway connectors shall be supplied by DCD Design & Manufacturing, Condux International, Inc. or approved equal.

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Carry out excavation for entry, exit, recovery pits, slurry sump pits, or any other excavation as specified in the Contract documents. Sump pits are required to contain drilling fluids if vacuum devices are not operated throughout the drilling operation, unless approved by the Engineer.

B. Within 48 hours of completing installation of the boring product, clean the work site of all excess slurry or spoils. Take responsibility for the removal and final disposition of excess slurry or spoils. Ensure that the work site is restored to pre-construction conditions or as identified on the plans.

C. Exposure of product pipe to sunlight shall be limited to 14 consecutive days unless approved by the Engineer.

D. The pipe shall be supported at intervals along its length with rollers or Teflon pads to minimize frictional forces when being pulled, and to hold the pipe above the ground. Surface cuts or scratches greater than or equal to the maximum defect depth in 3.08 E are not acceptable.

3.02 DAMAGE RESTORATION & REMEDIATION

A. The Contractor shall take responsibility for restoration for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid (frac-out), or the directional drilling operation, at no cost to the County.

B. When required by the Engineer, provide detailed plans which show how damage to any roadway facility will be remedied. These details will become part of the Record Drawings Package. Remediation Plans must follow the same guidelines for development and presentation of the Record Drawings. When remediation plans are required, they must be approved by the Engineer before any work proceeds.

C. For HDD operations that will be below waters of the State of Florida, the contractor shall be responsible for any damage caused by the drilling operation, including, but not limited to, fracturing of the channel bottom. Any State or Federal required environmental cleanup due to the release of drilling fluids into State waters shall be at the Contractor's expense. The Contractor may at his own expense increase the depth of his drilling operations upon the approval from the Engineer.

3.03 QUALIFICATIONS FOR REJECTION OF DIRECTIONAL BORE

A. The Engineer may reject any portion of the work that is deemed to be non-responsive to the Contract requirements or not in conformance with approved plans and submittals, and for other factors including the following:
   1. Failed Bore: When there is any indication that the installed product has sustained damage, stop all work, notify the County and investigate damage. The County may require a pressure and / or mandrel test at no additional cost to the County and shall have a County representative present during the test. Perform all testing within 24 hours unless otherwise approved by the Engineer. Furnish a copy of the test results and all bore logs to the Engineer for review and approval. The Engineer is allowed up to five (5) working days to approve or determine if the product installation is not in compliance with the specifications.
   2. Obstructions: If an obstruction is encountered during boring which prevents completion of the installation in accordance with the design location and specification, the pipe may be taken out of service and left in place at the discretion of the Engineer.
   3. Pull-back Failure: If the installed breakaway device should fail during pull back.
   4. Loss of Drilling Fluids: If the drilling fluid is "lost" during the pull back of the product and can not be regained within the required timeframe of the manufacturer or if more than a reasonable amount of fluid is used to fill an unknown void and flow can not be regained. No pipe shall be pulled without visible flow of drilling fluid.
   5. Test Failure: If the pipe shall fail a hydraulic pressure test as specified by the County.
   6. Damaged Pipe: If at any time when the product is pulled back and any exposed areas have a greater than allowable "gouging" or visible marring of the pipe per the table in 3.08 E.
   7. Alignment Tolerance Exceeded: If the vertical and horizontal limits are not within tolerances.
   8. Defective Material: Any other defect in material or workmanship which would affect the quality, performance, or installation life of the installed pipeline.

B. Remediation: All rejected bores shall be at the Contractors expense to correct and provide a satisfactory installed product. The Contractor shall submit to the Engineer a revised installation plan and procedure for approval before resuming work. The Engineer may require non-compliant installations to be filled with excavatable flowable fill or to be completely removed at no additional cost to the County.

3.04 PRODUCT LOCATING AND TRACKING

A. The County recognizes walkover, wire line, and wire line with surface grid verification, or any other system as approved by the Engineer, as the accepted methods of tracking directional bores. Use a locating and tracking system capable of ensuring that the proposed installation is installed as intended. The locating and tracking system must provide information on:
   1. Clock and pitch information
   2. Depth
   3. Transmitter temperature
   4. Battery status
   5. Position (x,y)

6. Azimuth, where direct overhead readings (walkover) are not possible (i.e. sub aqueous)

B. Ensure proper calibration of all equipment before commencing directional drilling operation.

C. Prepare the Driller's Log. Take and record alignment readings or plot points such that elevations on top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Such permanent fixed feature must have prior approval of the Engineer. Provide elevations and dimensions at all bore alignment corrections (vertical and horizontal) with a minimum distance between points of 10 feet. Provide a sufficient number of elevations and offset distances to accurately plot the vertical and horizontal alignment of the installed product.

D. Installation Location Tolerances: The location of the initial bored hole shall be deemed acceptable by the Engineer if the deviations of the bore from the design alignment or approved adjustments do not exceed the following tolerances:
   1. Profile:
      a. 2-feet within a length of 100 feet
      b. No reverse curvature within 200 feet
      c. Total deviation not to exceed 5 feet
   2. Alignment:
      a. 3-feet within a length of 200 feet
      b. No reverse curvature
      c. Total deviation not to exceed 7 feet

3.05 PRODUCT BORE HOLE DIAMETER

A. Minimize potential damage from soil displacement/settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back reaming is required, will be limited relative to the product diameter to be installed as follows:

Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees	
Nominal Inside Pipe Diameter Inches	Bit Diameter Inches
2	4
3	6
4	8
6	10
8	12
10	16
12 and greater	Maximum Product OD plus 6

3.06 EQUIPMENT REQUIREMENTS

A. The HDD equipment selected by the Contractor shall be capable of drilling, steering, tracking, reaming and installing the pipeline through all the subsurface conditions that may be present at the site.

B. Match equipment to the size of pipe being installed. Obtain the Engineer's approval for installations differing from the above chart. Ensure that the drill rod can meet the bend radius required for the proposed installation.

C. All HDD equipment shall have a data logger to record pull back force during all pipe installations.

D. All HDD equipment that has the capability to exceed the maximum recommended pulling force shall have a breakaway swivel properly attached to the product pipe that will release if the pullback force exceeds the pipe manufacturers recommended pulling force.

3.07 THRUST / PULLBACK REQUIREMENTS

A. The Contractor shall provide as part of the required working drawings submittal complete data regarding the operational and maximum thrust or pulling forces to be used for the initial drill head and back-reamer installations, and the final pull-back of the pipe. Gages or other measurement tools shall be used to monitor the forces being used.

3.08 INSTALLATION PROCESS

A. Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming and pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. Obtain the Engineer's approval of the location and all conditions necessary to construct relief holes to ensure the proper disposition of drilling fluids is maintained and unnecessary inconvenience is minimized to other facility users.

B. The Contractor shall determine the pull-back rate in order to allow the removal of soil cuttings without building excess down-hole pressure and to avoid local heaving, or spills. Contain excess drilling fluids at entry and exit points until they are recycled and separated from excavated materials, or removed from the site or vacuumed during drilling operations. Ensure that entry and exit pits and storage tanks are of sufficient size to contain the expected return of drilling fluids and soil cuttings. The bored hole shall always be maintained full of drilling fluids for support of surfaces, and the fluid re-circulation equipment shall operate continuously until the pipe installation is completed and accepted by the Engineer.

C. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, test the drilling fluid for contamination and appropriately dispose of it. Remove any excess material upon completion of the bore. If in the drilling process it becomes evident that the soil is contaminated, contact the Engineer immediately. Do not continue drilling without the Engineer's approval.

D. The timing of all boring processes is critical. Install a product into a bore hole within the same day that the pre-bore is completed to ensure necessary support exists. Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole.

E. All prepared pipe that is being used for installation shall be adequately supported off the ground along the entire length to avoid damaging of the material during pullback due to ground surface conditions. Surface cuts or scratches greater than or equal to the maximum defect depth are not acceptable.

Pipe Size (inches)	Max. Defect Depth (inches)
4	1/16
6	1/11
8	5/32
10	3/16
12	1/4
> 12	Per Pipe Manufacturer's Recommendations

F. The drilling fluid specialist shall remain on the project site during the entirety of the directional boring operation to ensure proper mixture and production of drilling fluids needed for the bore.

G. Upon successful completion of the pilot hole, the borehole shall be reamed to a minimum of 25 percent greater than the outside diameter of the pipe being installed.

H. For bores with more than two radii of curvature (entrance and exit), the borehole should be reamed up to 50 percent larger than the outside diameter of the carrier pipe. Pre-reaming may be necessary dependent on size of material to be pulled.

I. Additional passes for pre-reaming may be required for larger pipe. Incremental increases shall be used as needed until appropriate bore hole size has been achieved.

J. Pre-reaming must be accomplished with no product attached to the reamer head on all bore pipe 6-inch and larger. The bore product maybe pulled back on final pass of pre-reaming upon prior approval from the Engineer.

K. After reaming the borehole to the required diameter, the pipe shall be pulled through the hole. In front of the pipe shall be a breakaway swivel and barrel reamer to compact the borehole walls.

L. The Contractor shall not attempt to ream at a rate greater than the drilling equipment and drilling fluid system are designed to safely handle.

M. Install all piping such that their location can be readily determined by electronic designation after installation. For non-conductive installations, externally attach two (2) tracer wires; see Section 2.01 – Materials, Part I. above, to the product pipe. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap. Tracking conductors must extend 2 feet beyond bore termini. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last 6 inches of the sheath. No deductions are allowed for failed tracking conductors. Upon completion of the directional bore, the Contractor shall demonstrate to the County that the wire is

continuous and unbroken through the entire run of the pipe by providing full signal conductivity (including splices) when energizing for the entire run in the presence of the County Representative. If the wire is broken, the Contractor shall repair or replace it at no additional cost to the County.

END OF SECTION

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SECTION 02640

VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves 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 on the Project shall be from one manufacturer.

C. All valves and appurtenances shall have the name of the manufacturer and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

D. All valves shall have a factory applied, fusion bonded epoxy coating on interior and exterior unless noted otherwise in the plans or this specification.

E. The equipment shall include, but not be limited to, the following:
1. Gate valves (Sec. 2.01)
2. Pressure Sustaining and Check Valves (Sec. 2.02)
3. Ball Valves for PVC Pipe (Sec. 2.03)
4. Butterfly Valves (Sec. 2.04)
5. Plug Valves (Sec. 2.05)
6. Valve Actuators (Sec. 2.06)
7. Air Release Valves (Sec. 2.07)
8. Valves Boxes (Sec. 2.08)
9. Corporation Cocks (Sec. 2.09)
10. Flange Adapter Couplings (Sec. 2.10)
11. Flexible Couplings (Sec. 2.11)
12. Hose Bibs (Sec. 2.12)
13. Slow Closing Air and Vacuum Valves (Sec. 2.13)
14. Surge Anticipator Valve (Sec. 2.14)
15. Check Valves (Sec. 2.15)
16. Hydrants (Sec. 2.16)
17. Restraining Clamps (Sec. 2.17)
18. Tapping Sleeves and Tapping Valves (Sec. 2.18)
19. Single Acting Altitude Valves (Sec. 2.19)

1.02 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, reclaim water, wastewater, etc., depending upon the applications.

1.03 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. Valves shall be as covered under mechanical devices in Section 8 of ANSI/NSF Standard 61.

1.04 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 Specifications.

1.05 TOOLS

A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 GATE VALVES

A. All buried valves shall have cast or ductile iron three (3) piece valve bodies.

B. Where indicated on the Drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.

C. Where required, gate valves shall be provided with a box cast in a concrete slab and a box cover. Length of box shall include slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The floor box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Clow, DeZurik or approved equal.

D. Gate valves with 3"-20" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or C515 and UL/FM 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.

E. Wrench nut shall be provided for operating the valve.

F. Valves shall be suitable for an operating pressure of 200 psi and shall be tested in accordance with AWWA C509 or C515.

G. All bonnet bolts, nuts and studs shall be stainless steel.

2.02 PRESSURE SUSTAINING AND CHECK VALVE

A. Pressure sustaining and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve shall be hydraulically operated, diaphragm type globe valve. The main valve shall have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. The stainless steel stem shall be fully guided at both ends by a bearing in the valve cover, and an integral bearing in the valve seat. It shall be sleeved at both ends with delrin. No external packing glands are permitted and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation cocks to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with seat cut to 5 degrees taper.

B. Valve shall maintain a minimum (adjustable) upstream pressure to a preset (adjustable) maximum. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.

C. Valve shall be cast iron (ASTM A48) with main valve trim of brass (QQB-B-626) and bronze (ASTM B61). The pilot control valves shall be cast brass (ASTM B62) with 303 stainless steel trim. All ferrous surfaces inside and outside shall have a 2-part epoxy coating. Valve shall be similar in all respects to CLA-VAL Company, Model 692G-01ABKG, as manufactured by CLA-VAL Company, , or similar pressure sustaining and check valve as manufactured by Golden Alderson; or approved equal.

2.03 BALL VALVES FOR PVC PIPE

A. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction, 150 psi rated with teflon seat seals and T-handles. PVC ball valves shall be as manufactured by Celanese Piping Systems, Inc., Wallace and Tiernan, Inc., Plastiline, Inc., or approved equal.

B. All valves shall be mounted in such a position that valve position indicators are plainly visible when standing on the floor.

2.04 BUTTERFLY VALVES

A. Butterfly valves shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designated C504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 150A or B, except that valves furnished downstream of the high service pumps shall be Class 250 and equal to those manufactured by Henry Pratt Company, DeZurik, Kennedy, or approved equal. Ductile iron conforming to ASTM A536, Grade 65-45-12 shall be provided for all Class 250 valves. All valves shall be leak tested at 200 psi.

B. The face-to-face dimensions of flanged end valves shall be in accordance with Table 1 of above mentioned AWWA Specification for short-body valve. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance

with ANSI B16.1.

C. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting 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 screws and be capable of the 1/8-inch adjustment. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C 504. Where the EPDM seat is mounted on the valve body, the mating edge of the valve disc shall be 18-8 stainless steel or Nickel-Chrome, 80-20%. Where the EPDM seat is mounted on the valve disc, the valve body shall be fitted with an 18-8 stainless steel seat offset from the shaft, mechanically restrained and covering 360 degrees of the peripheral opening or seating surface.

D. The valve body shall be constructed of ductile iron or close grain cast iron per ASTM A126, Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Butterfly valves of the "wafer" or "spool" type will not be accepted.

E. The 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. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.

F. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve for a period of five minutes. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 230 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. The Class 150 valves shall be tested in conformance with AWWA C-504.

G. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable, and as herein specified.

H. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above-mentioned AWWA Standard Specification.

I. 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.

J. 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 with all requirements of this Specification and the AWWA standard.

K. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.05 PLUG VALVES

A. All plug valves shall be eccentric plug valves capable of sustaining 150 psi in either direction without leaking.

Exception: Single direction plug valves may be used if it is clearly demonstrated they will never be required to resist pressure in both directions either in service or during pipe line testing.

B. Plug valves shall be tested in accordance with current AWWA Standard C-504-80 Section 5. Each valve shall be performance tested in accordance with paragraph 5.2 and shall be given a leakage test and hydrostatic test as described in paragraphs 5.3 and 5.4. The manufacturer shall furnish certified copies of reports covering proof of design testing as described in Section 5.5.

C. Plug 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. Flanged valves shall be faced and drilled to the ANSI 150 lb. standard. Mechanical joint ends shall be to the AWWA Standard C111-72. Bell ends shall be to the AWWA Standard C100-55 Class B. Screwed ends shall be to the NPT standard.

D. Plug valve bodies shall be of ASTM A126 Class B Semi-steel, 31,000 psi tensile strength minimum in compliance with AWWA Standard C507-73, Section 5.1 and AWWA Standard C504-70 Section 6.4. Port areas for valves 20-inches and smaller shall be 80 percent of full pipe area. Valves 24 inch and larger shall have a minimum port area between 80 and 100 percent of full nominal pipe area. All exposed nuts, bolts, springs, washers, etc. shall be zinc or cadmium plated. Resilient plug facings shall be of Hycar or Neoprene.

E. Plug valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. These bearings shall comply with current AWWA Standards.

2.06 VALVE ACTUATORS

A. General
   1. All valve actuators shall conform to Section 3.8 of the AWWA Standard Specification and shall be either manual or motor 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. Butterfly valve actuators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designated C504, insofar as applicable and as herein specified.

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 on 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 2 inch square AWWA operating nut located at ground level and cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

C. Motor Actuators (Modulating)

1. The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal, control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and key-wayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbed teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.
3. Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.
4. The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.
5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically

operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.

6. The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.
7. All units shall have strip heaters in both the motor and limit switch compartments.
8. The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch, and indicating lights, all mounted on the actuator or on a separate locally mounted power control station.
9. The electronics for the electric operator shall be protected against temporary submergence.
10. Actuators shall be Limitorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

1. The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.
    a. The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.
    b. The motor shall be prelubricated and all bearings shall be of the anti-friction type.
3. The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.
4. Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two (2) rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two (2) normally open and two (2) normally closed contacts per toro. Additional switches shall be provided if shown on the control and/or

instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.

5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.
6. Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer, three-phase thermal overload relays and two (2) pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all underground phase conductors.
7. The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.
8. Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120-volt power supply.
9. Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or approved equal.

2.07 AIR RELEASE VALVES

A. The air release valves for use in water or force mains shall be installed as shown on the Drawings. The valves shall have a cast iron body cover and baffle, stainless steel float, bronze water diffuser, Buna-N or Viton seat, and stainless steel trim. The fittings shall be threaded. The air release valves shall be Model 200A or 400A as manufactured by APCO Valve and Primer Corporation or approved equal.

2.08 VALVE BOXES

A. Buried valves shall have cast-iron three (3) piece valve boxes or HDPE adjustable valve boxes. Cast iron valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by the Engineer. The barrel shall be two-piece, screw type, having a 5-1/4 inch shaft. The upper section shall have a flange at the bottom with sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have WATER, SEWER, or RECLAIM, as applicable, cast into the top.

B. All valves shall have actuating nuts extended to within 4 feet of the top of the valve box. All valve extensions will have a centering guide plate 2 inches maximum below the actuating nut. The valve extension shall be fastened to the existing nut with a set screw. Valve boxes shall be provided with a concrete base and a valve nameplate engraved with lettering 1/8-inch deep as shown on the Drawings.

C. HDPE adjustable valve boxes shall be one complete assembled unit composed of the valve box and extension stem. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil. Valve box assembly shall be adjustable to accommodate variable trench depths.

D. The entire assembly shall be made of heavy wall high density polyethylene. All exterior components shall be joined with stainless steel screws. The valve box top section shall be adaptable to fit inside a valve box upper section.

E. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The stem material shall be of plated steel square tubing. The stem assembly shall have a built-in device that keeps the stem assembly from disengaging at its fully extended length. The extension stem must be torque tested to 1000 foot pounds. Covers shall have WATER, SEWER or RECLAIMED clearly and permanently impressed into the top surface.

2.09 CORPORATION COCKS

A. Corporation cocks for connections to cast-iron, ductile iron or steel piping shall be all brass or bronze suitable for 180 psi operating pressure and similar to Mueller Co. H-10046 or approved equal by Clow Corp., and shall be of sizes required and/or noted on the Drawings.

2.10 FLANGE ADAPTER COUPLINGS

A. Flange adapter couplings shall be of the size and pressure rating required for each installation and shall be suitable for use on either cast iron or ductile iron pipe. They shall be similar or approved equal to Dresser Company, Style 128. All couplings shall have a sufficient number of factory installed anchor studs to meet or exceed a minimum test pressure rating of 230 psi minimum.

2.11 FLEXIBLE COUPLINGS

A. Flexible couplings shall be either the split type or the sleeve type as shown on the Drawings.
   1. Split type coupling shall be used with all interior and exterior piping noted on the Drawings. The couplings shall be mechanical type for radius groove piping. The couplings shall mechanically engage and lock grooved pipe ends in a positive couple and allow for angular deflection and contracting and expansion.
   2. Couplings shall consist of malleable iron, ASTM Specification A47, Grade 32510 housing clamps in two or more parts, a single chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track head type bolts with hexagonal heavy nuts conforming to ASTM Specification A183 and A194 to assemble the housing clamps. Bolts and nuts shall be hot dipped galvanized after fabrication.
   3. Victualic type couplings and fittings may be used in lieu of flanged joints. Pipes

shall be radius grooved as specified for use with the Victaulic couplings. Flanged adapter connections at fittings, valves, and equipment shall be Victaulic Vic Flange Style 741, equal by Gustin-Bacon Group, Division of Certain-Teed Products or approved equal.

4. Sleeve type couplings shall be used with all buried piping. The couplings shall be of steel and shall be Dresser Style 38 or 40, as shown on the Drawings, or equal. The coupling shall be provided with hot dipped galvanized steel bolts and nuts unless indicated otherwise.
5. All couplings shall be furnished with the pipe stop removed.
6. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
7. If the Contractor decides to use victaulic couplings in lieu of flanged joints, he shall be responsible for supplying supports for the joints.

2.12 HOSE BIBS

A. Hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

2.13 SLOW CLOSING AIR AND VACUUM VALVES

A. The Contractor shall furnish and install slow closing air and vacuum valves as shown on the Drawings which shall have two (2) independent valves bolted together. The air and vacuum valve shall have all stainless steel float, guided on both ends with stainless shafts. The air and vacuum valve seat shall be Buna-N to insure drop tight closure. The Buna-N seat shall be fastened to the cover stainless shoulder screws in a manner to prevent distortion of the seat. The float shall be guided at both ends with stainless steel bushings.

B. The valve cover shall have a male lip designed to fit into the body register for accurate alignment of the float into the Buna-N seat. The valve cover shall have 250-pound class flanged outlet connection.

C. The surge check valve shall be bolted to the inlet of the air and vacuum valve and consist of a body, seat, disc, and compression spring. A surge check unit shall operate on the interphase between the kinetic energy and relative velocity flows of air and water, so that after air passes through, and water rushes into the surge check, the disc starts to close, reducing the rate of flow of water into the air valve by means of throttling orifices in the disc to prevent water hammer in the air valves. The surge check orifices must be adjustable type for regulation in the field to suit operating conditions. Valve shall be rated for 250-pound class working pressure.

D. The complete slow closing air and vacuum valve with air release valve shall have been flow tested in the field, substantiated with test data to show reduction of surge pressure in the valve. Flow test data shall be submitted with initial shop drawings for approval.

E. Valve exterior to be painted Red Oxide, Phenolic TT-P86, Primer or approved equal for high resistance to corrosion.

F. All materials of construction shall be certified in writing to conform to ASTM specifications as follows:

Air Valve Cover, Body, and Surge Check Body	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Surge Check Seat and Disc	Stainless Steel	ASTM A582
Air Valve Sea	Buna-N	
Spring	Stainless Steel	T302

2.14 SURGE ANTICIPATOR VALVES

A. Surge anticipator valves shall be furnished for the pumping systems as shown on the Drawings. The valve shall be hydraulically operated, pilot controlled, and diaphragm or piston actuated. The main valve shall be cast iron conforming to ASTM A48 with bronze trim conforming to ASTM B61 and flanged ends conforming to ANSI B161.1. The main valve shall be globe type with a single removable seat and a resilient disc.

B. The diaphragm actuated valve shall have a stainless steel stem guided at both ends by a bearing in the valve cover and an integral bearing surface in the seat. No external packing glands shall be permitted. The valve shall be fully serviceable without removing it from the line. The pilot system shall be of non-corrosive construction and provided with isolation cocks.

C. The piston actuated valve shall operate on the differential piston principle. The valve piston shall be guided on its outside diameter. The valve shall be able to operate in any position and shall be fully serviceable without removing it from the line. The pilot system shall be provided with isolation cocks, and be of non-corrosive materials of construction.

D. The valve shall be designed specifically to minimize the effects of water hammer, resulting from power failure at the pumping station, or from normal stopping and starting of pumping operators. The valve shall open hydraulically on a down surge, or low pressure wave created when the pump stops, remain open during the low pressure cycle in order to be open when the high pressure wave returns. The high pressure pilot shall be adjustable over a 20 to 200 psi range and the low pressure pilot shall be adjustable over a 15 to 75 psi range. The valve shall be the 250 Class.

2.15 CHECK VALVES

A. Check valves for cast iron and ductile iron pipe lines shall be swing type and shall meet the material requirements of AWWA Specification C508. The valves shall be iron body, bronze mounted, single disc, 175 psi working water pressure and non-shock. Valves shall be as manufactured by Mueller, Clow, American, Kennedy, M&H, or approved equal. Valves 8" and larger shall be air cushioned to reduce valve slam.

B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.

C. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.

D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. Weights provided and approved by the Engineer shall be installed.

2.16 HYDRANTS

A. Hydrants shall be AVK Series 27 DRX Barrel (nostalgic style with stainless steel bolts) Kennedy Type K-81, American Darling B-84-B or Mueller Super Centurian A423, or approved equal and shall conform to the "Standard Specification for Fire Hydrants for Ordinary Water Works Service", AWWA C502, and UL/FM certified, and shall in addition meet the specific requirements and exceptions which follow:

1. Hydrants shall be according to manufacturer's standard pattern and of standard size, and shall have one (1) 4-1/2 inch steamer nozzle and two (2) 2-1/2 inch hose nozzles.
2. Hydrant inlet connections shall have mechanical joints for 6-inch ductile-iron pipe.
3. Hydrant valve opening shall have an area at least equal to that area of a 5-1/4 inch minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gallons minimum through its two (2) 2-1/2 inch hose nozzles when opened together with a loss of not more than 2 psi in the hydrants.
4. Each hydrant shall be designed for installation in a trench that will provide 5-feet. cover.
5. Hydrants shall be hydrostatically tested as specified in AWWA C502.
6. Hydrants shall be rated at 200 psi.
7. All nozzle threads shall be American National Standard.
8. Each nozzle cap shall be provided with a Buna N rubber washer.
9. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism and without the mechanism obstructing the discharge from any outlet.
10. Hydrants must be capable of being extended without removing any operating parts.
11. Hydrants shall have bronze-to-bronze seatings as per AWWA C502-85.
12. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The resilient seat material shall meet the requirements of AWWA C509 and shall preferably be EPDM Elastomer.
13. Internal and below ground iron parts (bonnet, nozzle section and base) shall have a fusion bonded epoxy coating per AWWA C550. Aboveground external hydrant parts (cap, bonnet and nozzle section) shall be either epoxy coated together with a UV resistant polyester coating or have two shop coats of paint per AWWA C502. The lower stand pipe or barrel shall be protected with asphaltic coatings per AWWA C502.
14. Exterior nuts, bolts and washer shall be stainless steel. Bronze nuts may be used below grade.
15. All internal operating parts shall be removable without requiring excavation.

2.17 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 American Cast Iron Pipe, Star Pipe Products, U.S. Pipe; or approved equal.

2.18 TAPPING SLEEVES AND GATE VALVES

A. Tapping valves shall meet the requirement of AWWA C500. The valves shall be flanged, shall be mechanical joint outlet with nonrising stem, designed for vertical burial and shall open left or counterclockwise. Stuffing boxes shall be the "O-ring" type. Operating nut shall be AWWA Standard 2-inch square for valves 2-inch and up. The valves shall be provided with an overload seat to permit the use of full size cutters. Gaskets shall cover the entire area of flange surfaces and shall be supplied with EPDM wedges up to 30-inch diameter.

B. Tapping sleeves and saddles shall seal to the pipe by the use of a confined "O" ring gasket, and shall be able to withstand a pressure test of 180 psi for one hour with no leakage in accordance with AWWA C110, latest edition. A stainless steel 3/4-inch NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle. Sleeves and saddles shall be protected from corrosion by being fusion applied epoxy coated, or be made of 18-8 Type 304 stainless steel. Saddle straps shall be 18-8 Type 304 stainless steel.

2.19 SINGLE ACTING ALTITUDE VALVES

A. Function
   1. The altitude control valve shall be of the single acting type, closing off tightly when the water reaches the maximum predetermined level in the tank to prevent overflow; and opening to permit replenishing of the tank supply when the water level drops approximately 6 to 12 inches below the maximum level.
   2. A hand operated valve in the power water line to the top of the piston shall permit adjustment of the speed of valve closing. The tank water level control shall be by means of a diaphragm operated, spring loaded, three way pilot which directs power water to or from the top of the main valve piston. The three way pilot shall be of bronze construction. The diaphragm surface exposed to the tank head shall be not less than 57 square inches. It shall be possible to adjust the spring above the diaphragm for water level control approximately 20% above or below the factory setting.

B. Description
   1. The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area on the upper surface of the piston is of a greater area than the underside of the piston.
   2. The valve piston shall be guided on its outside diameter by long stroke stationary Vee ports which shall be downstream of the seating surface to minimize the consequences of throttling. Throttling shall be done by the valve Vee ports and not the valve seating surfaces.
   3. The valve shall be capable of operating in any position and shall incorporate only one flanged cover at the valve top from which all internal parts shall be accessible. There shall be no stems, stem guides, or spokes within the

waterway. There shall be no springs to assist the valve operation.

C. Construction
   1. The valve body shall be of cast iron ASTM A126 with flanges conforming to the latest ANSI Standards. The valve shall be extra heavy construction throughout. The valve interior trim shall be bronze B-62 as well as the main valve operation.
   2. The valve seals shall be easily renewable while no diaphragm shall be permitted within the main valve body.
   3. All controls and piping shall be of non-corrosive construction.
   4. A visual valve position indicator shall be provided for observing the valve piston position at any time.

D. Figure Number
   1. The valves shall be the 20-inch Globe type (Fig. 3200-D) as manufactured by GA Industries or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the Engineer.

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.

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 assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought

to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.

G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". 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.

H. 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 cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.02 HYDRANTS

A. Hydrants shall be set at the locations designated by the Engineer and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6 inches over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.

B. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2 inches less than the inside diameter of the branch line.

C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12 inches in diameter.

D. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30 inches from a pipe joint.

E. Tapping valves shall be set in vertical position and be supplied with a 2-inch square operating nut for valves 2 inches and larger. The valve shall be provided with an oversized seat to permit the use of full sized cutters.

F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be squarely centered on the main to be tapped.

Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30 inches from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.03 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.

3.04 FIELD PAINTING

A. All metal valves and appurtenances specified herein and exposed to view shall be painted.

3.05 INSPECTION AND TESTING

A. Completed pipe shall be subjected to hydrostatic pressure test for two (2) hours at 180 psi. All leaks shall be repaired and lines retested as approved by the Engineer. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION

SECTION 02999

MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes items and operations which are not specified in detail as separate items, but may be sufficiently described as to the kind and extent of work involved. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to complete all work under this Section.

B. The Work of this Section may include, but is not limited to the following:
   1. Restoration of roads, sidewalks, driveways, curbing and gutters, fences, guardrails, lawns, shrubbery and any other existing items damaged or destroyed.
   2. Crossing utilities.
   3. Relocation of existing water, reclaim water, or sewer lines less than four inches diameter, water and sanitary sewer services, low pressure gas lines, telephone lines, electric lines, cable TV lines as shown on the Contract Drawings.
   4. Restoring easements (servitudes) and rights-of-way.
   5. Clean up.
   6. Incidental work (project photographs, testing, shop drawings, traffic control, record drawings, etc.).
   7. Excavation and Embankment - As defined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1991 Edition or latest revision).
   8. Stormwater and erosion control devices.

1.02 SUBMITTAL OF LUMP SUM BREAKDOWN

A. Contractor shall submit to the Owner/Engineer, a breakdown of the lump sum bid for Miscellaneous Work and Cleanup Item in the Proposal within ten (10) days after date of Notice to Proceed.

1.03 WORK SPECIFIED UNDER OTHER SECTIONS

A. All Work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials required for this Section shall equal or exceed materials that are to be restored. The Contractor may remove and replace or reuse existing materials with the exception of paving.

PART 3 EXECUTION

3.01 RESTORING OF SIDEWALKS, ROADS, CURBING, FENCES AND GUARDRAILS

A. The Contractor shall protect existing sidewalks & curbing. If necessary, sidewalks & curbing shall be removed from joint to joint and replaced after backfilling. Curbing damaged during construction because of the Contractor's negligence or convenience, shall be replaced with sidewalks & curbing of equal quality and dimension at no cost to the Owner.

B. At the locations necessary for the Contractor to remove, store and replace existing fences and guardrails during construction, the sections removed shall be only at the direction of the Engineer. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced at no cost to the Owner with fencing equal to or better than that damaged and the work shall be satisfactory to the Engineer.

C. Guardrails in the vicinity of the work shall be protected from damage by the Contractor. Damaged guardrails shall be replaced in a condition equal to those existing

D. Road crossings shall be restored in accordance with the Contract Documents and current FDOT Standards. Compensation for road restoration shall be included under the Road Restoration Bid Item if specified or under Miscellaneous Cleanup if it is not specified.

3.02 CROSSING UTILITIES

A. This item shall include any extra work required in crossing culverts, water courses, drains, water mains and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required or implied for the proposed crossing, whether or not shown on the Drawings.

3.03 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES AND CABLE TV LINES

A. The Contractor shall notify the proper utility involved when relocation of these utility lines is required. The Contractor shall coordinate all relocation work by the utility so that construction shall not be hindered.

3.04 RESTORING THE EASEMENTS AND RIGHTS-OF-WAY

A. The Contractor shall be responsible for all damage to private property due to his operations. He shall protect from injury all walls, fences, cultivated shrubbery, pavement, underground facilities, including water, sewer and reclaimed water lines and services, or other utilities which may be encountered along the easement. If removal and replacement is required, it shall be done in a workmanlike manner, at his expense, so that the replacement are equivalent to that which existed prior to construction.

3.05 STORMWATER AND EROSION CONTROL DEVICES

A. The Contractor shall be responsible for, provide, and install all stormwater and erosion control devices necessary to insure satisfactory compliance with the Florida Department of Environmental Protection Stormwater, Erosion, and Sedimentation Control Inspector's Manual.

END OF SECTION

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SECTION 03071

EPOXIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Epoxy.
   2. Epoxy gel.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D 638 - Test Method for Tensile Properties of Plastics.
   2. D 695 - Test Method for Compressive Properties of Rigid Plastics.
   3. D 790 - Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. Provide epoxy materials that are new and use them within shelf life limitations set forth by manufacturer.
   2. Perform and conduct work of this Section in neat orderly manner.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data completely describing epoxy materials.

B. Quality Control Submittals:
   1. Manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Epoxy: Water-insensitive two-part type low viscosity epoxy adhesive material containing 100 percent solids and meeting or exceeding following characteristics when tested in accordance with standards specified: Manufacturers: One of the following or equal:
   1. BASF, Inc., Concresive Standard LVI.
   2. Sika Chemical Corp.'s, Sikadur 35 Hi-Mod LV.

Physical Characteristic	Test Method	Required Results
Tensile Strength	ASTM D 638	7,500 pounds per square inch at 14 days and 77 degrees Fahrenheit cure.
Flexure Strength	ASTM D 790	11,000 pounds per square inch at 14 days and 77 degrees Fahrenheit cure.
Compressive Strength	ASTM D 695	7,500 pounds per square inch at 24 hours and 77 degrees Fahrenheit cure.
Bond Strength	____	Concrete shall fail before failure of epoxy.
Gel Time In 5-Mil Film	____	Four hours maximum at 77 degrees Fahrenheit.
Elongation	ASTM D 638	1 percent minimum at 14 days and 77 degrees Fahrenheit.

B. Epoxy Gel: Manufacturers: One of the following or equal:
   1. Sika Chemical Corp.'s, Sikadur 31, Hi-Mod Gel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install and cure epoxy materials in accordance with manufacturer's installation instructions.

B. Epoxy:
   1. Apply in accordance with manufacturer's installation instructions.

C. Epoxy Gel:
   1. Apply in accordance with manufacturer's installation instructions.
   2. Use for vertical or overhead work, or where high viscosity epoxy is required.
   3. Epoxy gel used for vertical or overhead work may be used for horizontal work.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Concrete reinforcement.

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. 315 - Detailing Manual: Details and Detailing of Concrete Reinforcement.
   2. 318 - Building Code Requirements for Structural Concrete.
   3. 350 - Code Requirements for Environmental Engineering Concrete Structures.

B. American Society for Testing and Materials (ASTM):
   1. A 143 - Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
   2. A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
   3. A 615 - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
   4. A 706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
   5. A 767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

C. American Welding Society (AWS):
   1. D1.4 - Structural Welding Code - Reinforcing Steel.

1.03 DEFINITIONS

A. Give Away Bars: Bars that are not required by Contract Documents, that are installed by the CONTRACTOR to support the reinforcing bar.

1.04 SYSTEM DESCRIPTION

A. The Drawings contain general notes concerning amount of reinforcement and placing, details of reinforcement at wall corners and intersections, and details of extra reinforcement around openings in concrete.

1.05 SUBMITTALS

A. Shop Drawings:
   1. Changes to Reinforcing Steel Contract Drawing Requirements:
      a. Indicate in separate letter submitted with shop drawings any changes of requirements indicated on the Drawings for reinforcing steel.

2. Such changes will not be acceptable unless the ENGINEER has accepted such changes in writing. Reinforcement Detail Drawings:
   a. Review of reinforcement shop drawings by the ENGINEER will be limited to general compliance with the Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
   1. Deliver bars bundled and tagged with identifying tags.

B. Acceptance at Site:
   1. Reinforcing Bars: Deliver reinforcing bars lacking grade identification marks accompanied by manufacturer's guarantee of grade.

1.07 SEQUENCING AND SCHEDULING

A. Bar Supports: Do not place concrete until samples and attached data of bar supports has been accepted by the ENGINEER.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcement:
   1. General: Provide reinforcing steel that is of quality specified, free from excessive rust or scale or any defects affecting its usefulness.

B. Reinforcing Bars:
   1. Reinforcing Bars to Be Embedded in Concrete or Masonry: Grade 60 deformed bars in accordance with ASTM A 615 except as specified in the next 2 subparagraphs. Reinforcing bars that are required to be welded shall be low alloy Grade 60 deformed bars in accordance with ASTM A 706. Filler metal shall be ASTM A 615 Grade 60 reinforcing may be used in lieu of ASTM A 706 Grade 60 provided the following requirements are met:
      a. Weld procedures shall be submitted for review by the ENGINEER. Such weld procedures shall meet the requirements of AWS D1.4. The minimum preheat and interpass temperature requirements shall be adhered to.
      b. Mill certificates are submitted to the ENGINEER for review.
      c. The specific location for the proposed substitution is approved by the ENGINEER.
   2. Hot-Dip Galvanized Reinforcing Bars:
      a. When hot-dip galvanized reinforcing bars are indicated on the Drawings, galvanize in accordance with ASTM A 767 and ASTM A 143.
      b. Galvanize bars in accordance with Class 1 coating and perform galvanizing after fabrication and shearing.

C. Bar Supports:
   1. Reinforcement Support Chairs:
      a. Provide Type 304 stainless steel reinforcement support chairs.

D. Tie Wires: Annealed steel.

E. Welded Wire Fabric Reinforcement:
   1. In accordance with ASTM A 185.
   2. Fabric may be used in place of reinforcing bars if accepted by the ENGINEER.
   3. Provide welded wire fabric in flat sheet form.
   4. Provide welded wire fabric having cross-sectional area per linear foot of not less than cross-sectional area per linear foot of reinforcing bars indicated on the Drawings.

2.02 FABRICATION

A. Shop Assembly:
   1. Cut and bend bars in accordance with provisions of ACI 315, ACI 318, and ACI 350.
   2. Bend bars cold.
   3. Provide bars free from defects and kinks and from bends not **indicated on the Drawings**.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Reinforcing Bars:
      a. Verify that bars are new stock free from rust scale, loose mill scale, excessive rust, dirt, oil, and other coatings which adversely affect bonding capacity when placed in the work.

3.02 PREPARATION

A. Surface Preparation:
   1. Reinforcing Bars: Thin coating of red rust resulting from short exposure will not be considered objectionable. Thoroughly clean any bars having rust scale, loose mill scale, or thick rust coat.
   2. Cleaning of Reinforcement Materials: Remove concrete or other deleterious coatings from dowels and other projecting bars by wire brushing or sandblasting before bars are embedded in subsequent concrete placement.

3.03 INSTALLATION

A. Reinforcing Bars:
   1. No field bending of bars will be allowed.
   2. Welding:
      a. Weld reinforcing bars where indicated on the Drawings or acceptable to the ENGINEER.
      b. Perform welding in accordance with AWS D1.4.
      c. Do not tack weld reinforcing bars.

B. Placing Reinforcing Bars:
   1. Accurately place bars and adequately secure them in position.
   2. Overlap bars at splices as indicated on the Drawings or specified.
   3. Unless specifically otherwise indicated on the Drawings, install bars at lap splices in contact with each other and fasten bars together with tie wire.

4. If lap splice length for bars in concrete is not specified or indicated on the Drawings, bars shall be lap spliced in accordance with ACI 318 and ACI 350.
5. If not indicated on the Drawings and not specified in Division 4, lap splice bars in masonry in accordance with the building code as specified in Section 01410.
6. Bar Supports:
   a. Provide in sufficient number to prevent sagging and to support loads during construction, but in no case less than quantities and at locations as indicated in ACI 315.
   b. Support reinforcing for concrete placed on ground by standard manufactured chairs supported on stainless steel plates.
   c. Do not use brick, broken concrete masonry units, spalls, rocks, or similar material for supporting reinforcing steel.
   d. Do not use give away bars that have less cover than required by the Contract Documents. Do not adjust location of reinforcement required by the Contract Documents to provide cover to the give away bars.
7. If not indicated on the Drawings, provide protective concrete cover in accordance with ACI 318 and ACI 350.

C. Tying of Bar Reinforcement:
1. Fasten bars securely in place with wire ties.
2. Tie bars sufficiently often to prevent shifting.
3. There shall be at least 3 ties in each bar length (does not apply to dowel lap splices or to bars shorter than 4 feet, unless necessary for rigidity).
4. Tie slab bars at every intersection around periphery of slab.
5. Tie wall bars and slab bar intersections other than around periphery at not less than every fourth intersection, but at not greater than following maximum spacings:

Bar Size	Slab Bars Spacing Inches	Wall Bars Spacing Inches
Bars Number 5 and Smaller	60	48
Bars Number 6 through Number 9	96	60
Bars Number 10 and Number 11	120	96

6. After tying wire ties, bend ends of wire ties in towards the center of the concrete section. Wire ties shall conform to the cover requirements of the reinforcing bars.
7. Above tying requirements do not apply to reinforcement for masonry. Refer to Division 4 for tying requirements for masonry.

D. Lap Splices of Reinforcing Bars:
1. Where bars are to be lapped spliced at joints in concrete, ensure bars project from concrete first placed, minimum length equal to lap splice length indicated on the Drawings.
2. Where lap splice length is not indicated on the Drawings, then provide lap splice length in accordance with ACI 318, ACI 350, and as specified in this Division.

E. Welded Wire Fabric Reinforcement:
1. Install necessary wiring, spacing chairs, or supports to keep welded wire fabric in place while concrete is being placed.

2. Bend fabric as indicated on the Drawings or required to fit work.
3. Unroll or otherwise straighten fabric to make perfectly flat sheet before placing in the Work.
4. Lap splice welded wire fabric as indicated on the Drawings.
5. If lap splice length is not indicated on the Drawings, splice fabric in accordance with ACI 318 and ACI 350.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Cast-in-place concrete.

B. Related Sections:
   1. Section 03071 - Epoxies.

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. 318 - Building Code Requirements for Structural Concrete and Commentary.
   2. 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.
   3. Manual of Concrete Practice.
   4. Recommended Practices.

B. American Society for Testing and Materials (ASTM):
   1. C 31 - Practice for Making and Curing Concrete Test Specimens in the Field.
   2. C 33 - Specification for Concrete Aggregates.
   3. C 39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
   4. C 40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
   5. C 42 - Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
   6. C 88 - Test Method of Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   7. C 94 - Specification for Ready-Mixed Concrete.
   8. C 114 - Test Methods for Chemical Analysis of Hydraulic Cement.
   9. C 117 - Test Method for Martial Finer that 75µm (No. 200) Sieve in Mineral Aggregates by Washing.
   10. C 123 - Test Method for Lightweight Particles in Aggregate.
   11. C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
   12. C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   13. C 142 - Test Method for Clay Lumps and Friable Particles in Aggregate.
   14. C 143 - Test Method for Slump of Hydraulic-Cement Concrete.
   15. C 150 - Specification for Portland Cement.
   16. C 156 - Test Method for Water Retention by Concrete Curing Materials.
   17. C 157 - Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
   18. C 171 - Specifications for Sheet Materials for Curing Concrete.
   19. C 172 - Practice for Sampling Freshly Mixed Concrete.
   20. C 173 - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

21. C 227 - Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
22. C 260 - Specification for Air-Entraining Admixtures for Concrete.
23. C 289 - Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
24. C 295 - Guide to Petrographic Examination of Aggregates for Concrete.
25. C 309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
26. C 311 - Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
27. C 469 - Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
28. C 494 - Specification for Chemical Admixtures for Concrete.
29. C 595 - Specification for Blended Hydraulic Cements.
30. C 618 - Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
31. C 1260 - Mortar Bar Test Method for Potential Alkali Reactivity of Aggregate.
32. C 1293 - Concrete Prism Test for Alkali Silica Reactivity
33. D 75 - Practice for Sampling Aggregates.
34. D 2103 - Specification for Polyethylene Film and Sheeting.

1.03 DEFINITIONS

A. Alkali: Is defined as the sum of sodium oxide and potassium oxide calculated as sodium oxide.

B. Hairline Crack: Crack with a crack width of less than 4 thousandths of an inch.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. General:
      a. Except as otherwise specified, provide concrete composed of portland cement, fine aggregate, coarse aggregate, and water so proportioned and mixed as to produce plastic, workable mixture in accordance with requirements as specified in this Section and suitable to specific conditions of placement.
      b. Proportion materials in a manner such that will secure lowest water-cement ratio which is consistent with good workability, plastic, cohesive mixture, and one which is within specified slump range.
      c. Proportion fine and coarse aggregates in manner such as not to produce harshness in placing or honeycombing in structures.
   2. It is the intent of this Section to secure for every part of the Work concrete and grout of homogeneous structure, which when hardened will have required strength, watertightness, and durability.
      a. It is recognized that some surface hairline cracks and crazing will develop in the concrete surfaces.
      b. Construction contraction, and expansion joints have been specified and positioned in structures as indicated on the Drawings, and curing methods specified, for purpose of reducing number and size of cracks, due to normal expansion and contraction expected from specified concrete mixes.

c. Class A and Class B Concrete: Watertight: Repair cracks which develop in walls or slabs and repair cracks which show any signs of leakage until all leakage is stopped.
d. Pressure inject visible cracks, other than hairline cracks and crazing, in following areas with epoxy as specified in Section 03931.
   1) Floors and walls of water bearing structures.
   2) Walls and overhead slabs of passageways or occupied spaces, outsides of which are exposed to weather or may be washed down and are not specified to receive separate waterproof membrane.
   3) Other Items Not Specified to Receive Separate Waterproof Membrane: Slabs over water channels, wet wells, reservoirs, and other similar surfaces.
e. Grouting and Sealing: Continue as specified above until structure is watertight and remains watertight for not less than one year after final acceptance or date of final repair, whichever occurs later in time.

3. Workmanship and Methods: Provide concrete work, including detailing of reinforcing, conforming with best standard practices and as set forth in ACI 318, ACI 350, Manuals, and Recommended Practices.

1.05 SUBMITTALS

A. Product Data: Submit data completely describing products.

B. Information on Heating Equipment to Be Used for Cold Weather Concreting: Submit information on type of equipment to be used for heating materials and/or new concrete in process of curing during excessively cold weather.

C. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Submit corrective measures proposed for use prior to placing concrete.

D. Copies of Tests of Concrete Aggregates: Submit certified copies of commercial laboratory tests reports documenting the following properties not more than 90 days old, for all concrete aggregates to be used in the Work. Before construction, submit reports of testing conducted not more than 90 days before the date of the submittal. During construction, submit reports every 21 days; any time there is a significant change in the characteristics or grading of the materials; and when requested by the ENGINEER.
   1. Fine Aggregate:
      a. Source.
      b. General characteristics
         (e.g.: natural, manufactured, or blended sand).
      c. Gradation.
      d. Deleterious substances.
         1) Maximum percentage of the following in sample(s).
            a) Clay lumps and friable particles.
            b) Material finer than 75-μm (No. 200) sieve.
            c) Coal and lignite.
            d) Shale and chert.
         2) Results of color test for organic impurities
      e. Soundness.

2. Coarse Aggregate:
    a. Source.
    b. General characteristics
       (e.g.: gravel, crushed gravel or stone, blended, or other).
    c. Gradation.
    d. Deleterious substances.
        1) Maximum percentage of the following in samples.
            a) Clay lumps and friable particles.
            b) Chert.
            c) Sum of clay lumps, friable particles, and chert.
            d) Material finer than 75-μm (No. 200) sieve.
            e) Coal and lignite.
    e. Abrasion loss.
    f. Soundness.

E. Concrete Mixes: Submit full details, including mix design calculations for concrete mixes proposed for use for each class of concrete.
    1. Include information on correction of batching for varying moisture contents of fine aggregate.
    2. Submit source quality test records with mix design submittal.
        a. Include calculations for f'_{cr} based on source quality test records.

F. If there is change in aggregate quality from same source, submit a new set of design mixes covering each class of concrete.

G. Test Batch Test Data:
    1. Submit data for each test cylinder.
    2. Submit data that identifies mix and slump for each test cylinder.

H. Sequence of Concrete Placing: Submit proposed sequence of placing concrete showing proposed beginning and ending of individual placements.

I. Curing Compound Other than Specified Compound: Submit complete data on proposed compound.

J. If Either Fine or Coarse Aggregate Is Batched from More than One Bin: Submit analyses for each bin, and composite analysis made up from these, using proportions of materials to be used in mix.

K. Cement Mill Tests: Include alkali content, representative of each shipment of cement for verification of compliance with specified requirements.

L. Pozzolan Certificate of Compliance: Identify source of pozzolan and certify compliance with requirements of ASTM C 618.

M. Information on mixing equipment.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
    1. Deliver, store, and handle concrete materials in manner that prevents damage and inclusion of foreign substances.
    2. Deliver and store packaged materials in original containers until ready for use.

3. Deliver aggregate to mixing site and handle in such manner that variations in moisture content will not interfere with steady production of concrete of specified degree of uniformity and slump.

B. Acceptance at Site: Reject material containers or materials showing evidence of water or other damage.

1.07 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Hot Weather Concreting:
      a. When Ambient Air Temperature Is above 90 Degrees Fahrenheit: Prior to placing concrete, cool forms and reinforcing steel to by water cooling to below 90 degrees Fahrenheit.
      b. Temperature of Concrete Mix at Time of Placement: Keep temperature below 90 degrees Fahrenheit by methods which do not impair quality of concrete.
   2. Cold Weather Concreting:
      a. Concrete placed below ambient air temperature of 45 degrees Fahrenheit and falling or below 40 degrees Fahrenheit: Make provision for heating water.
      b. If materials have been exposed to freezing temperatures to degree that any material is below 35 degrees Fahrenheit: Heat such materials.
      c. Heating Water, Cement, or Aggregate Materials:
         1) Do not heat in excess of 160 degrees Fahrenheit.
      d. Protection of Concrete in Forms:
         1) Protect by means of covering with tarpaulins, or other acceptable covering acceptable to ENGINEER.
         2) Provide means for circulating warm moist air around forms in manner to maintain temperature of 50 degrees Fahrenheit for at least 5 days.
   3. For conditions that promote rapid drying of freshly placed concrete such as low humidity, high temperature, and wind: Take corrective measures to minimize rapid water loss from concrete.
      a. Furnish and use sufficient number of maximum and minimum self-recording thermometers to adequately measure temperature around concrete.

1.08 SEQUENCING AND SCHEDULING

A. Schedule placing of concrete in such manner as to complete any single placing operation to construction, contraction, or expansion joint.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate:
   1. General:
      a. Provide concrete aggregates that are sound, uniformly graded, and free of deleterious material in excess of allowable amounts specified.
      b. Grade aggregate in accordance with ASTM C 136 and D 75.

c. Provide unit weight of fine and coarse aggregate that produces in place concrete with weight of not less than 140 pounds per cubic foot.

2. Alkali-silica reactivity. Non-reactive when tested using ASTM C 1260 or ASTM C 1293.

B. Fine Aggregate:

1. Provide fine aggregate for concrete or mortar consisting of clean, natural sand or of sand prepared from crushed stone or crushed gravel.
2. Do not provide aggregate having deleterious substances in excess of following percentages by weight of contaminating substances. In no case shall total exceed percent listed.

Item	Test Method	Percent
Removed by decantation (dirt, silt, etc.)	ASTM C 117	3
Shale or Chert	ASTM C 295	1
Clay Lumps	ASTM C 142	1

3. Except as otherwise specified, grade fine aggregate from coarse to fine in accordance with requirements of ASTM C 33.

C. Coarse Aggregate:

1. General: Provide coarse aggregate consisting of gravel or crushed stone made up of clean, hard, durable particles free from calcareous coatings, organic matter, or other foreign substances.
   a. Class 5M or better, as specified in ASTM C 33.
2. Weight: Not exceeding 15 percent, for thin or elongated pieces having length greater than 5 times average thickness.
3. Deleterious Substances: Not in excess of following percentages by weight, and in no case having total of all deleterious substances exceeding 2 percent.

Item	Test Method	Percent
Clay lumps and friable particles	ASTM C 142	3.0
Chert	ASTM C123	3.0
Materials finer than Number 200 sieve	ASTM C 117	1.0
Coal and lignite	ASTM C 123	0.5

4. Grading:
   a. Aggregate for Class A, B, C, and D Concrete: As specified in ASTM C 33, Size Number 57, except as otherwise specified or authorized in writing by the ENGINEER.
   b. Aggregate for Class CE Concrete for Encasement of Electrical Conduits:
      1) Graded as specified in ASTM C 33, Size Number 8.
      2) Provide concrete utilizing this aggregate equal to Class C concrete in all other respects.

D. Portland Cement:

1. General: Conform to specifications and tests for ASTM C 150, Types I, II or III, Low Alkali, except as specified otherwise.

2. Low Alkali Portland: Have total alkali containing not more than 0.60 percent.
3. Exposed Concrete in Any Individual Structure: Use only one brand of portland cement.
4. Cement for Finishes: Provide cement from same source and of same type as concrete to be finished.

E. Admixtures:
1. General:
   a. Do not use admixtures of any type, except as specified, unless written authorization has been obtained from the ENGINEER.
   b. Compatible with concrete and other admixtures.
   c. Do not use admixtures containing chlorides calculated as chloride ion in excess of 0.5 percent by weight.
   d. Use in accordance with manufacturer's recommendations and add each admixture to concrete mix separately.
2. Air Entraining Admixture:
   a. Provide all concrete with 5 percent, plus or minus 1 percent, entrained air of evenly dispersed air bubbles at time of placement.
   b. Conform to ASTM C 260.
3. Pozzolan Admixture:
   a. Pozzolan:
      1) Conforming to requirements of ASTM C 618, Class F or Class C, may be used as admixture in concrete made with Type II portland cement.
      2) Pozzolan may replace portland cement at ratio of 1/2 pound pozzolan admixture for each pound of portland cement replaced.
      3) Maximum of 20 percent by weight of minimum quantities of portland cement listed in Table A under paragraph 2.03E may be replaced with pozzolan.
      4) Do not use pozzolan as an admixture in concrete made with portland-pozzolan cement.
   b. Loss on Ignition for Pozzolan: Not exceed 4 percent.
4. Water Reducing Admixture:
   a. May be used at the CONTRACTOR's option.
   b. Conform to ASTM C 494, Type A or Type D.
   c. Not contain air entraining agents.
   d. Liquid form before adding to the concrete mix.
   e. No decrease in cement is permitted as result of use of water reducing admixture.
5. Superplasticizers: Are not to be used without acceptance by ENGINEER.

F. Water:
1. Water for Concrete, Washing Aggregate, and Curing Concrete: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.
2. Chlorides and Sulfate Ions:
   a. Water for Conventional Reinforced Concrete: Use water not containing more than 1,000 milligrams per liter of chlorides calculated as chloride ion, nor more than 1,000 milligrams per liter of sulfates calculated as sulfate ion.

G. Conduit Encasement Coloring Agent:

1. Color: Red color concrete used for encasement of electrical ducts, conduits, and similar type items.
2. Manufacturers: One of the following or equal.
   a. Frank D. Davis Company, Red Oxide Number 1117.
   b. I. Reiss Company, Inc., equivalent product.
3. Conduit Encasement Concrete: Mix into each cubic yard of concrete 10 pounds of coloring agent.

H. Keyway Material: Steel, plastic, or lumber.

I. Sprayed Membrane Curing Compound: Clear type with fugitive dye conforming to ASTM C 309, Type 1D.

J. Evaporation Retardant:
1. Manufacturers: One of the following or equal:
   a. Master Builders Technologies, Cleveland, Ohio, Confilm.
   b. Eucid Chemical Company, Cleveland, Ohio, Eucobar.

K. Plastic Membrane Curing: Use polyethylene film in accordance with ASTM C 171.
1. Color: White
2. Thickness: Nominal thickness of polyethylene film shall not be less than 0.0040 inches when measured in accordance with ASTM D 2103. Thickness of polyethylene film at any point shall not be less than 0.0030 inches.
3. Loss of Moisture: Not exceed 0.055 grams per square centimeter of surface when tested in accordance with ASTM C 156.

2.02 EQUIPMENT

A. Mixing Concrete:
1. Mixers may be of stationary plant, paver, or truck mixer type.
2. Provide adequate equipment and facilities for accurate measurement and control of materials and for readily changing proportions of material.
3. Mixing Equipment:
   a. Capable of combining aggregates, cement, and water within specified time into thoroughly mixed and uniform mass and discharging mixture without segregation.
   b. Maintain concrete mixing plant and equipment in good working order and operated at loads, speeds, and timing recommended by manufacturer or as specified.
   c. Proportion cement and aggregate by weight.

B. Machine Mixing:
1. Batch plant shall be capable of controlling delivery of all material to mixer within 1 percent by weight of individual material.
2. If bulk cement is used, weigh it on separate visible scale which will accurately register scale load at any stage of weighing operation from zero to full capacity.
3. Prevent cement from coming into contact with aggregate or with water until materials are in mixer ready for complete mixing with all mixing water.
4. Procedure of mixing cement with sand or with sand and coarse aggregate for delivery to project site, for final mixing and addition of mixing water will not be permitted.
5. Retempering of concrete will not be permitted.

6. Discharge entire batch before recharging.
7. Volume of Mixed Material Per Batch: Not exceed manufacturer's rated capacity of mixer.
8. Mixers:
    a. Perform mixing in batch mixers of acceptable type.
    b. Equip each mixer with device for accurately measuring and indicating quantity of water entering concrete, and operating mechanism such that leakage will not occur when valves are closed.
    c. Equip each mixer with device for automatically measuring, indicating, and controlling time required for mixing.
        1) Interlock device to prevent discharge of concrete from mixer before expiration of mixing period.

C. Transit-mixed Concrete:
1. Mix and deliver in accordance with ASTM C 94.
2. Total Elapsed Time Between Addition of Water at Batch Plant and Discharging Completed Mix: Not to exceed 90 minutes. Elapsed time at project site shall not exceed 30 minutes.
3. Under conditions contributing to quick setting, total elapsed time permitted may be reduced by the ENGINEER.
4. Equip each truck mixer with device interlocked to prevent discharge of concrete from drum before required number of turns and furnish such device that is capable of counting number of revolutions of drum.
5. Continuously revolve drum after it is once started until it has completely discharged its batch.
    a. Do not admit water until drum has started revolving.
    b. Right is reserved to increase required minimum number of revolutions or to decrease designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing. The CONTRACTOR will not be entitled to additional compensation because of such increase or decrease.

D. Other Types of Mixers: In case of other types of mixers, mixing shall be as follows:
1. Mix concrete until there is uniform distribution of materials, and discharge mixer completely before recharging.
2. Neither speed nor volume loading of mixer shall exceed manufacturer's recommendations.
3. Continue mixing for minimum of 1-1/2 minutes after all materials are in drum, and for batches larger than one cubic yard increase minimum mixing time 15 seconds for each additional cubic yard or fraction thereof.

2.03 MIXES

A. Measurements of Materials:
1. Measure materials by weighing, except as otherwise specified or where other methods are specifically authorized in writing by the ENGINEER.
2. Furnish apparatus for weighing aggregates and cement that is suitably designed and constructed for this purpose.
3. Accuracy of Weighing Devices: Furnish devices that have capability of providing successive quantities of individual material that can be measured to within 1 percent of desired amount of that material.
4. Measuring or Weighing Devices: Subject to review by the ENGINEER. Shall bear valid seal of the Sealer of Weights and Measures having jurisdiction.

5. Weighing Cement:
   a. Weigh cement separately.
   b. Cement in Unbroken Standard Packages (Sacks): Need not be weighed.
   c. Bulk Cement and Fractional Packages: Weigh such cement.
6. Mixing Water: Measured by volume or by weight.

B. Concrete Proportions and Consistency:
1. Concrete Consistency and Composition:
   a. Provide concrete that can be worked readily into corners and angles of forms and around reinforcement without excessive vibration and without permitting materials to segregate or free water to collect on surface.
   b. Prevent unnecessary or haphazard changes in consistency of concrete.
2. Ratio of Coarse Aggregate to Fine Aggregate: Not less than 1.0 or more than 2.0 for all concrete Classes, with exception of Class CE.
3. Aggregate:
   a. Obtain aggregate from source that is capable of providing uniform quality, moisture content, and grading during any single day's operation.
4. Concrete Mix Water to Cement Ratio, Minimum Cement Content, and Slump Range: Conform to values specified in Table A in this Section.
5. Concrete Batch Weights: Control and adjust to secure maximum yield. At all times, maintain proportions of concrete mix within specified limits.
6. Mix Modification: If required, by the ENGINEER, modify mixture within limits set forth in this Section.

C. Concrete Mixes:
1. Proportioning of Concrete Mix: Proportion mixes based on required average on compressive strength f'_{cr}.
2. Mixes:
   a. Adjusting of Water: After acceptance, do not change mixes without acceptance by ENGINEER, except that at all times adjust batching of water to compensate for free moisture content of fine aggregate.
   b. Total Water Content of Each Concrete Class: Not exceed those specified in Table A in this Section.
   c. Checking Moisture Content of Fine Aggregate: Furnish satisfactory means at batching plant for checking moisture content of fine aggregate.
3. Change in Mixes: Submit new mix design and undertake new trial batch and test program as specified in this Section.

D. Hand Mixed Concrete:
1. Hand mix concrete only when acceptable to the ENGINEER.
2. Prepare hand mixed concrete on watertight, level platform in batches not to exceed 1/3 cubic yard each.
3. Aggregate:
   a. First, spread required amount of coarse aggregate on platform in an even and uniform layer. Then over coarse aggregate spread proper proportion of fine aggregate.
   b. Combined Depth of Combined Coarse and Fine Aggregate Layers: Not be greater than 1foot.
4. Cement:
   a. First, evenly spread required quantity of cement over fine aggregate.
   b. Then turn entire batch with shovels at least two times before adding water.

5. Water:
   a. Then uniformly sprinkle or spray proper amount of water over batched materials.
   b. Then turn with shovels not less than 3 times before concrete is removed from platform.

E. Classes of Concrete:
1. Provide concrete consisting of 5 classes, referred herein as Classes A, B, C, D, and CE as specified in this Section. Use where specified or indicated on the Drawings.
2. Weight of Concrete Classes: Provide classes of concrete having minimum weight of 140 pounds per cubic foot.
3. Class B Concrete: Class B concrete may be substituted for Class A concrete, when high-early strength concrete is needed in areas specifically accepted by the ENGINEER and that do not require sulfate resistant concrete.
4. Class C Concrete: Class C concrete may be used for fill for unauthorized excavation, for thrust blocks and ground anchors for piping, for bedding of pipe, and where indicated on the Drawings.
5. Class D Concrete: Use Class D for precast concrete items.
6. Class CE Concrete: Use Class CE for electrical conduit encasements.
7. All other concrete, unless specified or otherwise indicated on the Drawings: Use Class A concrete.

TABLE A
CONCRETE
WITH AIR ENTRAINMENT

Class	Specified Compressive Strength f'_c at 28 Days (Pounds per Square Inch)	Maximum Water to Cement Ratio,	Minimum Cement per Cubic Yard of Concrete by Weight (Pounds)	Slump Range (Inches)
A	4,000	0.45	564	2 to 4
B (Type III cement)	4,000	0.45	564	2 to 4
C	2,500	0.62	423	3 to 6
D	4,500	0.45	658	2 to 4
CE	2,500	0.62	564	3 to 6

8. Do not place concrete with slump outside limits indicated in Table A.
9. Classes:
   a. Classes A, C, D, and CE Concrete: Make with Type II low alkali portland cement.
   b. Class B Concrete: Make with Type III low alkali portland cement.
   c. Admixtures: Provide admixtures as specified in this Section.

F. Air Entraining Admixture:
1. Add agent to batch in portion of mixing water.
2. Batch solution by means of mechanical batcher capable of accurate measurement.

2.04 SOURCE QUALITY CONTROL

A. Tests:
   1. Trial Batches:
      a. After concrete mixes have been accepted by ENGINEER, have trial batches of the accepted Class A, Class B, and Class D concrete mix designs prepared by testing laboratory acceptable to the ENGINEER.
      b. Prepare trial batches using specified cement and aggregates proposed to be used for the Work.
      c. Provide batches of sufficient quantity to determine slump, workability, consistency, and finishing characteristics, and to provide sufficient test cylinders.
      d. Test Cylinders: Provide cylinders having 6 inch diameter by 12 inch length and that are prepared in accordance with ASTM C 31 for tests specified in this Section.
      e. Determine slump in accordance with ASTM C 143.
      f. Test Cylinders from Trial Batch:
         1) Test 8 cylinders for compressive strength in accordance with ASTM C 39.
            a) Test 4 cylinders at 7 days and 4 at 28 days.
            b) Establish ratio between 7 day and 28 day strength for mix. Seven day strength may be taken as satisfactory indication of 28 day strength provided effects on concrete of temperature and humidity between 7 day and 28 day are taken into account.
         2) Average Compressive Strength of 4 Test Cylinders Tested At 28 Days: Equal to or greater than required average compressive strength f'_{cr} on which concrete mix design is based.
      g. Drying Shrinkage:
         1) Prepare 5 drying shrinkage specimens in accordance with ASTM C 157, except as modified herein.
         2) Remove drying shrinkage specimens from molds at age of 23 hours plus or minus 1 hour after trial batching, then immediately place them in water at 73 degrees Fahrenheit plus or minus 3 degrees for at least 30 minutes and then measure specimens within 30 minutes thereafter to determine original length. Then submerge specimens in saturated lime water at 73 degrees Fahrenheit plus or minus 3 degrees for moist curing.
         3) Make measurement to determine expansion expressed as percentage of original length at age 7 days. Use length at age 7 days as base length for drying shrinkage calculations.
         4) Immediately store specimens in humidity controlled room maintained at 73 degrees Fahrenheit plus or minus 3 degrees and 50 percent plus or minus 4 relative humidity for remainder of test.
         5) Make and report measurements to determine shrinkage expressed as percentage of base length separately for 7, 14, 21, and 28 days of drying after 7 days of moist curing.
      h. If trial batch tests do not meet specified requirements for slump, strength, workability, consistency, and finishing, change concrete mix design proportions and, if necessary, source of aggregate. Make additional trial batches and tests until an acceptable trial batch is produced that meets requirements of this Section.

i. Perform test batches and tests required to establish trial batches and acceptability of materials without change in Contract Price.
j. Do not place concrete until the concrete mix design and trial batch have been accepted by ENGINEER.

2. Required Average Compressive Strength:
   a. Determine required average compressive strength (f'_{cr}) for selection of concrete proportions for mix design, for each class of concrete, using calculated standard deviation and its corresponding specified compressive strength f'_c, in accordance with ACI 318 and ACI 350.
   b. When test records of at least 30 consecutive tests that span period of not less than 45 calendar days are available, establish standard deviation as described in ACI 318 and as modified as follows herein.
   c. Provide test records from which to calculate standard deviation that represent materials, quality control procedures, and conditions similar to materials, quality control procedures, and conditions expected to apply in preparation of concrete for the Work.
   d. Provide changes in materials and proportions within test records that are more restricted than those for the Work.
   e. Specified Compressive Strength (f'_c) of Concrete Used in Test Records: Within 1,000 pounds per square inch of that specified for the Work.
   f. When lacking adequate test records for calculation of standard deviation meeting requirements, determine required average compressive strength f'_{cr} from following Table B.

TABLE B	
Specified Compressive Strength f'_c (pounds per square inch)	**Required Average Compressive Strength f'_{cr} (pounds per square inch)**
Less than 3,000	f'_c + 1,000
3,000 to 5,000	f'_c + 1,200
Over 5,000	f'_c + 1,400

3. Pozzolan Admixture:
   a. Sampling and Testing:
      1) Sample and test pozzolan admixture in accordance with ASTM C 311.
      2) In Computing Water to Cement Ratio And Cement Content Per Cubic Yard Of Concrete: Consider cement weight to be weight of portland cement plus 100 percent of weight of pozzolan admixture.
4. Aggregate:
   a. Testing of concrete aggregate is at CONTRACTOR's expense.
   b. Sieves:
      1) Use sieves with square openings for testing grading of aggregates.
      2) Sieve Analyses: If sieve analyses indicate significant change in materials, the ENGINEER may require that new mix design and trial batch be submitted and accepted before further placing of concrete.
   c. Sample aggregate in accordance with ASTM C 136 and D 75.
   d. Fine Aggregate:
      1) Provide fine aggregate that does not containing strong alkali nor organic matter which gives color darker than standard color when tested in accordance with ASTM C 40.

2) Provide aggregate having soundness complying with requirements of ASTM C 33 when tested in accordance with ASTM C 88.

e. Coarse Aggregate:
   1) Soundness when tested in accordance with ASTM C 88: Have loss not greater than 10 percent when tested with sodium sulfate.
   2) Abrasion Loss: Not exceed 45 percent after 500 revolutions when tested in accordance with ASTM C 131.

f. Portland Cement:
   1) Determination Alkali Content: Determine by method set forth in ASTM C 114.

PART 3 EXECUTION

3.01 INSTALLATION

A. Liquid Evaporation Retardant: Under conditions which result in rapid evaporation of moisture from the surface of the concrete, immediately after the concrete has been screeded, coat the surface of the concrete with a liquid evaporation retardant. Apply the evaporation retardant again after each work operation as necessary to prevent drying shrinkage cracks. Conditions which result in rapid evaporation of moisture may include one or more of the following:
   1. Low humidity.
   2. Windy conditions.
   3. High temperature.

B. Joints and Bonding:
   1. As far as practicable construct concrete work as monolith.
   2. Locations of contraction, construction, expansion, and other joints are indicated on the Drawings or as specified in this Section.
   3. Construction Joints:
      a. Where construction joints are not indicated on the Drawings, provide construction joints in slabs and walls at intervals not greater than 35 feet.
      b. In order to preserve strength and watertightness of structures, make no other joints, except as authorized the ENGINEER.
      c. At construction joints, thoroughly clean concrete of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter by means of heavy sandblasting, and wash surfaces just prior to succeeding concrete placement.
      d. At Horizontal Joints: Immediately prior to resuming concrete placing operations, thoroughly spread bed of grout not less than 1/2 inch in thickness nor more than 1 inch in thickness over horizontal joint surfaces.
   4. Keyways in Joints:
      a. Provide keyways in joints as indicated on the Drawings.
      b. Treat lumber keyway material with form release coating, applied in accordance with manufacturer's instructions.
   5. Take special care to ensure that concrete is well consolidated around and against waterstops and waterstops are secured in proper position.
   6. Cleaning of Construction Joints:
      a. Wash construction joints free of sawdust, chips, and other debris after forms are built and immediately before concrete or grout placement.

b. Should formwork confine sawdust, chips, or other loose matter in such manner that it is impossible to remove them by flushing with water, use vacuum cleaner for their removal, after which flush cleaned surfaces with water.
c. Provide cleanout hole at base of each wall and column for inspection and cleaning.

7. Expansion Contraction, and Construction Joints
   a. Constructed where and as indicated on the Drawings.

C. Conveying and Placing Concrete:
1. Convey concrete from mixer to place of final deposit by methods that prevent separation or loss of materials.
2. Use equipment for chuting, pumping, and conveying concrete of such size and design as to ensure practically continuous flow of concrete at delivery end without separation of materials.
3. Design and use chutes and devices for conveying and depositing concrete that direct concrete vertically downward when discharged from chute or conveying device.
4. Keep equipment for conveying concrete thoroughly clean by washing and scraping upon completion of any day's placement.

D. Placing Concrete:
1. Place no concrete without prior authorization of the ENGINEER.
2. Do Not Place Concrete Until:
   a. Reinforcement is secure and properly fastened in its correct position and loose form ties at construction joints have been retightened.
   b. Dowels, bucks, sleeves, hangers, pipes, conduits, anchor bolts, and any other fixtures required to be embedded in concrete have been placed and adequately anchored.
   c. Forms have been cleaned and oiled as specified.
3. Placement of concrete in which initial set has occurred, or of retempered concrete, will not be permitted.
4. Place no concrete during rainstorms or high velocity winds.
5. Protect concrete placed immediately before rain to prevent water from coming in contact with such concrete or winds causing excessive drying.
6. Keep sufficient protective covering on hand at all times for protection of concrete.
7. After acceptance, adhere to proposed sequence of placing concrete, except when specific changes are requested and accepted by the ENGINEER.
8. Notify the ENGINEER in writing of readiness, not just intention, to place concrete in any portion of the work.
   a. Provide this notification in such time in advance of operations, as the ENGINEER deems necessary to make final inspection of preparations at location of proposed concrete placing.
   b. Place forms, reinforcement, screeds, anchors, ties, and inserts in place before notification of readiness is given to the ENGINEER.
   c. Depositing Concrete:
      1) Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing.
      2) Do not deposit concrete in large quantities in one place and work along forms with vibrator or by other methods.
      3) Do not drop concrete freely into place from height greater than 5 feet.

4) Use tremies for placing concrete where drop is over 5 feet.
5) Commence placement of concrete on slopes, at bottom of slope.

9. Place concrete in approximately horizontal layers not to exceed 24 inches in depth and bring up evenly in all parts of forms.
10. Continue concrete placement without avoidable interruption, in continuous operation, until end of placement is reached.
11. After placement begins, it should continue without significant interruption. Precautions should be planned and implemented to prevent any delay from exceeding 20 minutes.
12. If concrete is to be placed over previously placed concrete and more than 20 minutes have elapsed, then spread layer of grout not less than 1/2 inch in thickness nor more than 1 inch in thickness over surface before placing additional concrete.
13. Placement of Concrete for Slabs, Beams, or Walkways:
    a. If cast monolithically with walls or columns, do not commence until concrete in walls or columns has been allowed to set and shrink.
    b. Allow set time of not less than one hour for shrinkage.

E. Consolidating Concrete:
1. Place concrete with aid of acceptable mechanical vibrators.
2. Thoroughly consolidate concrete around reinforcement, pipes, or other shapes built into the work.
3. Provide sufficiently intense vibration to cause concrete to flow and settle readily into place and to visibly affect concrete over radius of at least 18 inches.
4. Vibrators:
    a. Keep sufficient vibrators on hand at all times to vibrate concrete as placed.
    b. In addition to vibrators in actual use while concrete is being placed, have on hand minimum 1 spare vibrator in serviceable condition.
    c. Place no concrete until it has been ascertained that all vibrating equipment, including spares, are in serviceable condition.
5. Take special care to place concrete solidly against forms to leave no voids.
6. Take every precaution to make concrete solid, compact, and smooth, and if for any reason surfaces or interiors have voids or are in any way defective, repair such concrete in manner acceptable to the ENGINEER.

F. Footings and Slabs on Grade:
1. Do not place concrete on ground or compacted fill until subgrade is in moist condition acceptable to the ENGINEER.
2. If necessary, sprinkle subgrade with water not less than 6 or more than 20 hours in advance of placing concrete.
3. If it becomes dry prior to actual placing of concrete, sprinkle again, without forming pools of water.
4. Place no concrete if subgrade is muddy or soft.

G. Loading Concrete:
1. Green Concrete:
    a. No heavy loading of green concrete will be permitted.
    b. Green concrete is defined as concrete with less than 100 percent of the specified strength.

2. No backfill shall be placed against concrete walls, connecting slabs, or beams until the concrete has reached the specified strength.
3. Use construction methods, sequencing, and allow time for concrete to reach adequate strength to prevent overstress of the concrete structure during construction.

H. Curing Concrete:
1. General:
   a. Cure concrete by methods specified in this Section.
   b. Cure concrete minimum of 7 days.
   c. Cure concrete to be painted with water or plastic membrane.
   d. Do not use curing compound on concrete surfaces that are to receive paint or upon which any material is to be bonded.
   e. Water cure or plastic membrane cure concrete slabs that are specified to be sealed by concrete sealer.
   f. Cure other concrete by water curing or sprayed curing membrane at the CONTRACTOR's option.
   g. Floor slabs may be cured using plastic membrane curing.
2. Water Curing:
   a. Keep surfaces of concrete being water cured constantly and visibly moist day and night for period of not less than 7 days.
   b. Each day forms remain in place may count as 1 day of water curing.
   c. No further curing credit will be allowed for forms in place after contact has once been broken between concrete surface and forms.
   d. Do not loosen form ties during period when concrete is being cured by leaving forms in place.
   e. Flood top of walls with water at least 3 times per day, and keep concrete surfaces moist at all times during 7 day curing period.
3. Sprayed Membrane Curing:
   a. Apply curing compound to concrete surface after repairing and patching, and within 1 hour after forms are removed.
   b. If more than 1 hour elapses after removal of forms, do not use membrane curing compound, but use water curing for full curing period.
   c. If surface requires repairing or painting, water cure such concrete surfaces.
   d. Curing Compound:
      1) Do not remove curing compound from concrete in less than 7 days.
      2) Curing compound may be removed only upon written request by the CONTRACTOR and acceptance by the ENGINEER, stating what measures are to be performed to adequately cure structures.
      3) Take care to apply curing compound in area of construction joints. See that curing compound is placed within construction joint silhouette.
      4) After curing period is complete, remove curing compound placed within construction joint silhouette by heavy sandblasting prior to placing any new concrete.
      5) CONTRACTOR's Option: Instead of using curing compound for curing of construction joints, such joints may be water cured.
      6) Apply curing compound by mechanical, power operated sprayer and mechanical agitator that will uniformly mix all pigment and compound.
      7) Apply compound in at least 2 coats.

8) Apply each coat in direction 90 degrees to preceding coat.
9) Apply curing compound in sufficient quantity so that concrete has uniform appearance and that natural color is effectively and completely concealed at time of spraying.
10) Continue to coat and recoat surfaces until specified coverage is achieved and until coating film remains on concrete surfaces.
11) Thickness and Coverage of Curing Compound: Provide compound having film thickness that can be scraped from surfaces at any and all points after drying for at least 24 hours.
12) The CONTRACTOR is cautioned that method of applying curing compound specified herein may require more compound than normally suggested by manufacturer of compound and also more than is customary in the trade.
13) Apply amounts specified herein, regardless of manufacturer's recommendations or customary practice, if curing compound is used in place of water curing.
14) If the CONTRACTOR desires to use curing compound other than specified curing compound, coat sample areas of concrete wall with proposed curing compound and also similar adjacent area with specified compound in specified manner for comparison.
    a) If proposed sample is not equal or better, in opinion of the ENGINEER, in all features, proposed substitution will not be allowed.
15) Prior to final acceptance of the work, remove, by sandblasting or other acceptable method, any curing compound on surfaces exposed to view, so that only natural color of finished concrete is visible uniformly over entire surface.

4. Plastic Membrane Curing:
   a. Polyethylene film may be used to cure slabs. Seal joints and edges with small sand berm.
   b. Install plastic membrane as soon as concrete is finished and can be walked on without damage.
   c. Keep concrete moist under plastic membrane.

3.02 CONCRETE FINISHING

A. Edges of Joints:
   1. Provide joints having edges as indicated on the Drawings.
   2. Protect wall and slab surfaces at edges against concrete spatter and thoroughly clean upon completion of each placement.

3.03 FIELD QUALITY CONTROL

A. Testing of Concrete:
   1. During progress of construction, the OWNER will have tests made to determine whether the concrete, as being produced, complies with requirements specified.
   2. Tests will be performed in accordance with ASTM C 31, ASTM C 39, and ASTM C 172.
   3. The ENGINEER will make and deliver test cylinders to the laboratory and testing expense will be borne by the OWNER.
   4. Required Number Cylinders:

a. Not less than 3 cylinder specimens, 6 inch diameter by 12 inch long, will be tested for each 150 cubic yards of each class of concrete with minimum of 3 three specimens for each class of concrete placed and not less than 3 specimens for each half day's placement.
b. One cylinder will be broken at 7 days and 2 at 28 days.

5. The CONTRACTOR shall:
   a. Test slump of concrete using slump cone in accordance with requirements of ASTM C 143.
   b. Furnish test equipment.
   c. Do not use concrete that does not meet specification requirements in regards to slump. Remove such concrete from project site.
   d. Test slump at the beginning of each placement, as often as necessary to keep slump within the specified range, and when requested to do so by the ENGINEER.
   e. Make provisions for and furnish concrete for test specimens, and provide manual assistance to the ENGINEER in preparing said specimens.
   f. Assume responsibility for care of and providing of curing conditions for test specimens in accordance with ASTM C 31.

B. Air Entraining Admixture:
   1. Test percent of entrained air in concrete at beginning of each placement, as often as necessary to keep entrained air within specified range, and when requested to do so by the ENGINEER.
   2. Provide test equipment.
   3. Do not use concrete that does not meet Specification requirements for air entrainment. Remove such concrete from project site.
   4. Test air entrainment in concrete in accordance with ASTM C 173.
   5. The ENGINEER may at any time test percent of entrained air in concrete received on project site.

C. Enforcement of Strength Requirement:
   1. Concrete is expected to reach higher compressive strength than that which is indicated in Table A as specified compressive strength f'_c.
   2. Strength Level of Concrete: Will be considered acceptable if following conditions are satisfied.
      a. Averages of all sets of 3 consecutive strength test results is greater or equal to specified compressive strength f'_c.
      b. No individual strength test (average of 2 cylinders) falls below specified compressive strength f'_c by more than 500 pounds per square inch.
      c. Whenever one, or both, of 2 conditions stated above is not satisfied, provide additional curing of affected portion followed by cores taken in accordance with ASTM C 42, ACI 318, and ACI 350 and comply with following requirements:
         1) If additional curing does not bring average of 3 cores taken in affected area to at least specified compressive strength f'_c, designate such concrete in affected area as defective.
         2) The ENGINEER may require the CONTRACTOR to strengthen defective concrete by means of additional concrete, additional reinforcement, or replacement of defective concrete, all of the CONTRACTOR's expense.

3.04 ADJUSTING

A. Repair of Defective Concrete:
   1. Remove and replace or repair defective work.
   2. Correct defective work as specified in this Article.
   3. Do not patch, repair, or cover defective work without inspection by the ENGINEER.
   4. Provide repairs having strength equal to or greater than specified concrete for areas involved.
      a. Chip out and key imperfections in the work and make them ready for repair.
   5. Preparation of Surface for Repair:
      a. Make no repair until ENGINEER has accepted method for preparing surface for repair.
      b. Method of Repair for Surfaces of Set Concrete to Be Repaired: First coat with epoxy bonding agent.
   6. Methods of Repair:
      a. Dry Pack Method:
         1) Use for holes having depth nearly equal to or greater than least surface dimension of hole, for cone-bolt holes, and for narrow slots cut for repair.
         2) Smooth Holes: Clean and roughen by heavy sandblasting before repair.
      b. Mortar Method of Replacement:
         1) Use for holes too wide to dry pack and too shallow for concrete replacement.
         2) Comparatively shallow depressions, large or small, which extend no deeper than nearest surface reinforcement.
      c. Concrete Replacement:
         1) Use when holes extend entirely through concrete section or when holes are more than 1 square foot in area and extend halfway or more through the section.

END OF SECTION

SECTION 03366

TOOLED CONCRETE FINISHES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Tooled concrete finishes.

1.02 QUALITY ASSURANCE

A. Mock-Ups: Test Panels for Concrete Finishes:
   1. Prepare test panels for F4 finish and tie-hole repairs for review by ENGINEER.
   2. Accepted panels shall serve as standard of quality and workmanship for project.
      a. Test Panels Showing Horizontal and Vertical Joints: Prepare test panel showing horizontal and vertical joints proposed for project for review by the ENGINEER. Refer to finishes as specified in this Section.
      b. Test Panels Indicating Methods for Making Concrete Repairs: Prepare test panels for proposed repairs at beginning of project for review by ENGINEER:
         1) Panels shall serve as standard for repairs during the project.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
   1. Deliver and store packaged materials in original containers until ready for use.

PART 2 PRODUCTS

2.01 MIXES

A. Mortar Mix for F4 Finish: Consist of 1 part cement and 1-1/2 parts of fine sand passing Number 100 screen, mixed with enough water and emulsified bonding agent to have consistency of thick cream.

2.02 EXECUTION CONCRETE FINISHING

A. Cement for Finishes:
   1. Addition of white cement may be required to produce finish which matches color of concrete to be finished.

B. Vertical Concrete Surfaces: Use Following Finishes for Vertical Concrete Surface per Article 2.03:
   1. F1 Finish: No special treatment other than repair defective work and fill depressions 1 inch or deeper and tie holes with mortar after removal of curing membrane.

2. F2 Finish: No special treatment other than repair defective work, remove fins, fill depressions 1/2 inch or deeper and tie holes with mortar after removal of curing membrane.
3. F3 Finish: Repair defective work, remove fins, offsets, and curing membrane, and grind projections smooth. Fill depressions 1/4 inch or larger in depth or width and tie holes with mortar after removal of curing membrane.
4. F4 Finish:
   a. Same as specified for F3 Finish, and, in addition fill depressions and holes 1/16 inch or larger in width with mortar.
   b. "Brush-Off" sandblast surfaces prior to filling holes to expose all holes near surface of the concrete.
   c. Thoroughly wet surfaces and commence filling of pits, holes, and depressions while surfaces are still damp.
   d. Perform filling by rubbing mortar over entire area with clean burlap, sponge rubber floats, or trowels.
   e. Do not let any material remain on surfaces, except that within pits and depressions.
   f. Wipe surfaces clean and moist cure.

C. Horizontal Concrete: After proper and adequate vibration and tamping, use following finishes for horizontal concrete surfaces as indicated in Article 2.03:
1. S1 Finish: Screeded to grade and leave without special finish.
2. S2 Finish: Smooth steel trowel finish with minimum two trowelings.
3. S3 Finish: Steel trowel finish free from trowel marks with minimum two trowelings. Provide smooth finish free of all irregularities.
4. S4 Finish: Steel trowel finish with minimum two trowelings, without local depressions or high points, followed by light hairbroom finish. Do not use stiff bristle brooms or brushes. Perform brooming parallel to slab-drainage. Provide resulting finish that is rough enough to provide nonskid finish. Finish shall be subject to review and acceptance by the ENGINEER.

2.03 CONCRETE FINISHING

A. Finish concrete surfaces as follows:
1. F4 Finish for Following Vertical Surfaces:
   a. Concrete surfaces specified or indicated to be painted.
   b. Concrete surfaces, interior or exterior, exposed to view.
2. Surfaces in Open Channels, Basins, and Similar Structures:
   a. F3 Finish for vertical surfaces which are normally below water surface.
   b. F4 Finish for vertical surfaces located above normal water surface and exposed to view.
   c. Remove fins and fill tie holes from concrete surfaces located in closed boxes or channels where there is normally no access or passageway.
3. S4 Finish for Following Surfaces:
   a. Exterior walkways and slabs.
   b. Tops of exterior walls or beams which are to serve as walkways.
   c. Tops of exterior walls or beams which are to support gratings.
4. S1 Finish for Following Surfaces:
   a. Basin bottoms to which layer of grout is to be applied.
   b. Projecting footings which are to be covered with dirt.
   c. Slab surfaces which are to be covered with concrete fill.
5. S2 Finish for Following Surfaces:

a. Tops of walls and beams not covered above in this Section.
b. Tops of slabs not covered above in this Section.
c. All other surfaces not specified to be finished otherwise.

6. S3 Finish for Following Surfaces:
   a. Building and Machine Room Floors Which Are Not Covered with Surfacing Material: Provide floors that are free from trowel marks.

END OF SECTION

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SECTION 03420

PRECAST CONCRETE BUILIDNG

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Precast concrete structure affixed to a cast-in-place foundation slab. The superstructure shall be comprised of precast concrete wall panels and a roof panel.
   1. Architectural and structural components are included in this Section.

B. Definitions:
   1. Supplier- A manufacturer with whom Contractor will enter into a subcontract with to supply Contractor with equipment as specified herein for incorporation into the Manatee County PS428 Booster Pump Station Project Electrical Building.
   2. Contractor - The person, firm, or corporation, with whom OWNER will enter into a Contract for furnishing all labor, materials, equipment, and incidentals required to provide a complete and working precast concrete building as required by the Contract Documents.

C. Related Sections:
   1. Section 01010 - Summary of Work
   2. Section 01340 - Submittal Procedures
   3. Section 01600 - Material and Equipment
   4. Section 01614 - Wind Design Criteria
   5. Section 02220 - Excavation, Backfill, Fill and Grading for Structures
   6. Section 03300 - Cast-in-Place Concrete

1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. 318-05 - Building Code Requirements for Structural Concrete and Commentary.
   2. Manual of Concrete Practice.

B. American Society of Civil Engineers (ASCE):
   1. ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures.

C. American Society for Testing and Materials (ASTM):
   1. A 36 - Specification for Structural Steel.
   2. A 123 - Specification for Zinc (Hot Dip Galvanized) Coating on Iron and Steel Products.
   3. A 153 - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
   4. A 283 - Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
   5. A 307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

D. American Welding Society:
   1. AWS D1.3 - Structural Welding Code - Sheet Steel.

E. International Code Council (ICC)
   1. Florida Building Code (FBC-2007).

1.03 PERFORMANCE AND DESIGN REQUIREMENTS

A. Electrical Building Requirements:
   1. General Description:
      a. The Electrical Building shall consist of precast concrete wall and roof panels attached to each other and to a cast-in-place base slab.
      b. Seal the joints, and provide coatings or membranes as necessary to provide a watertight and wind-tight structure.
   2. Layout: As shown on the Drawings and specified.
      a. Locate building on the site as indicated on the Drawings.
      b. Align locations and layout of interior equipment and connections for electrical service with duct banks indicated on the Drawings.
      c. The building layout included in these Contract Drawings includes minimum dimensions for the building. The Supplier is required to confirm that the dimensions shown on the Drawings are correct for the equipment selected. Modify the Electrical Building dimensions as needed.
   3. Design of Structure (including foundations and supports for equipment):
      a. Conform to the requirements of the 2007 Florida Building Code (2007 FBC) as adopted by Manatee County, and the requirements of these Contract Documents.
         1) Where requirements are in conflict, the more restrictive requirements shall apply.
      b. Building Code Occupancy and Area Information:
         1) Occupancy Classification: F-2.
         2) Construction Type: II-B.
         3) Stories: Basic Allowable - 3 / Actual - 1.
         4) Area Per Floor: Basic Allowable: 23,000 sf / Actual: 442 sf
         5) Automatic Sprinklers Provided: No.
      c. Structural Design Loadings (unless more specific criteria is specified for a particular structure or piece of equipment.
         1) FBC Occupancy Category III.
            (FBC Table 1604.5 - *"Wastewater treatment facilities."*)
         2) Dead Loads: As required for materials and details of construction.
         3) Live Loads: Not less than those specified in the 2007 FBC.
            a) Floor Load: Minimum 50 pounds per square foot.
               (1) Include the effects of concentrated loads likely to occur during equipment installation and maintenance.
               (2) Treat weight of equipment as a live load to account for possible variations over the life of the structure.
         4) Roof Loads:
            a) Reduction of load based on tributary area or roof slope is not permitted.
            b) Live Load: Minimum 20 pounds per square foot assumed to act vertically on the horizontally projected area of the roof.
            c) Ponding Instability Load: Not required.

d) Collateral Load: Minimum 10 pounds per square foot to ceiling structure to account for support of minor, lightweight equipment including lights, conduits, and small-diameter piping.

e) Auxiliary Loads:
   (1) Roof: Design roof to resist a concentrated load of 250 pounds located at any point, in addition to the minimum uniform roof live load.
   (2) Where cable trays supported by structures induce concentrated loads into the structure, design shall account for the effects of such loads.

f) Do not include the effects of collateral or auxiliary loads in load combinations where they would offset the effects of other loads (such as uplift due to wind load). Include collateral or auxiliary loads where such loads increase the effects of other loads.

g) Combine Collateral and Axial load for the maximum roof load combination.

5) Wind Loads:
   a) Basic wind speed = 130 mph (3-second gust).
   b) Exposure category: "C".
   c) Importance Factor (minimum for wind loads): $I_w = 1.15$.

6) Flood Loads: Not required - Electrical Building is at grade.

7) Transportation, Handling, and Erection Loads: As likely to be experienced during delivery and installation of the pump station.

8) Load Combinations: As required by FBC 2007 and as likely to occur during normal operation of the facility.

4. Climatic Conditions:
   a. Thermal: Provide structure to accommodate - without detrimental effects - movements, expansion, and or contraction caused by a range in ambient temperature of 70 degrees Fahrenheit.
   b. Rainfall criteria - Building shall be supplied with gutters. The gutters shall be sized for a 5-inch/hour rainfall over a 10-minute period.

1.04 SUBMITTALS

A. General
   1. Submit in accordance with Section 01340.
   2. Submit Supplier's detailed schedule for fabrication, shipping, and installation of the precast concrete Electrical Building.

B. Product Data
   1. General:
      a. Provide data confirming compliance with these Specifications for all items furnished.
   2. Structure:
      a. Material specifications and details of construction for the following items: doors and hardware, and gutters and downspouts; moisture protection including flashing and sealants.
      b. Provide one-inch minimum concrete cover on reinforcing bars in the precast concrete roof and wall panels.
      c. Except where concrete is cast directly against soil, provide two-inch minimum concrete cover. Provide three-inch minimum cover on the

reinforcing bars in cast-in-place base slab where the slab is cast directly against soil.

C. Shop Drawings:
   1. Complete layout and fabrication drawings, including:
      a. Plan, elevation, and sectional views of the structure with overall and detailed dimensions and total weight shown.
      b. Structure: Show member sizes and locations, materials, and finishes; and details of connections for the following structural elements:
         1) Include details of anchors and anchor bolts connecting structure to the supporting foundation.
         2) Walls:
            a) Include locations and sizes of openings with details of additional reinforcement at openings.
            b) Submit details of flashing and sealing of openings and joints.
         3) Shop drawings for the structure and cast-in-place base slab shall bear the seal and signature of a professional engineer qualified in the design of structures and currently registered in the State of Florida.
      c. Product data and details of construction and installation for building accessories including doors, louvers, gutters and downspouts, membranes and sealants, and other items shown on the Drawings or specified.
      d. Schedule of finish hardware to be provided for the building.

D. Design Data
   1. Structure: Submit structural calculations for record for the building structure and its foundation slab. Calculations shall be sealed by a professional engineer qualified in the design of structures and currently licensed in the State of Florida
      a. Structural calculations for design and anchorage of the precast concrete Electrical Building to the cast-in-place base slab.
      b. Structural calculations for design and anchorage of the precast concrete Electrical Building roof structure to the walls.
      c. Structural calculations for design and connection of wall panels to each other.

E. Closeout Documents
   1. Project Record Documents
   2. Guarantees: As indicated in this Section.

1.05 QUALIFICATIONS

A. The precast concrete building provided shall be designed, constructed, and installed in accordance with best practices and shall operate satisfactorily when installed as show on the contract drawing.

B. The precast concrete building Supplier shall hold current approval by the Florida Department of Community Affairs for buildings of the size and type and with the details proposed for use on this Work..

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products in accordance with the provisions of Section 01600.

B. Inspect for damage. Report any damage to ENGINEER before proceeding with installation.

C. Protect components from physical damage, including effects of weather, dust, water, and construction debris.

1.07 QUALITY ASSURANCE AND GUARANTEE

A. Performance Guarantee: The Supplier guarantees the following performance:
   1. Supplier shall guarantee the specified performance for a minimum period of three (3) years following substantial completion of the project.
      a. If the Electrical Building fails to meet the performance guarantee requirements, the Supplier shall modify or change the building as necessary to meet the performance requirements. Such modifications shall be at the Supplier's sole expense, including installation costs.

PART 2 PRODUCTS

2.01 SUPPLIERS

A. Electrical Building Supplier shall be a manufacturer of precast concrete building holding current approval by the Department of Community Affairs in the State of Florida. Approval shall be for the specific type and details of the building to be provided. : The following or equal:
   1. Concrete Modular Systems, St. Petersburg, FL

2.02 MATERIALS

A. General
   1. The materials of construction and detailing of the precast concrete building and its connections shall be maintainable and resistant to degradation by moisture, exterior exposure (including the effects of ultraviolet radiation), and infestation by insects and varmints.
   2. The precast concrete building's components shall be designed for over-the-road delivery to the site. The conveyance vehicle shall be provided with an adjustable spreader device for lifting and installation after delivery. This spreader device shall allow for lifting of the components without damage and shall be provided by the Supplier.
   3. This Section assumes that the Supplier will perform on-site installation of the building components.

B. Precast Concrete Building:
   1. Foundation. The substructure shall be a cast-in-place concrete slab.
      a. The substructure shall be designed to support the building along with forces from dead, live, and wind loads plus all handling forces imposed by loading, transporting and unloading of the pump station.

b. The building superstructure components shall be securely connected to the floor structure to transfer all loads imposed on the structure to the foundation, and to maintain structural stability.
c. The building shall be attached to the foundation slab using galvanized or stainless steel anchors and fasteners. Size, number, and location of anchors, fasteners, and welds shall be as determined by structural analysis and as required to resist the loads specified as well as any forces associated with transporting and placing the precast concrete components. All anchors, fasteners, and welds shall be designed, supplied, and installed by the Supplier.

2. Building panels.
   a. The wall construction shall consist of precast concrete panels. Reinforce walls with additional framing or stiffeners as required to permit attachment of equipment and fixtures indicated on the Drawings without deformation or damage to the structure. Finish the walls to resemble stucco.
3. The roof shall be a precast concrete panel, sloped at least 1/4 inch per foot to drain to sides. Reinforce roof with additional framing or stiffeners as required to permit attachment of equipment and fixtures indicated on the Drawings without deformation or damage to the structure.
4. Miscellaneous Building Accessories:
   a. Roof membrane. Provide if required to ensure watertight construction.
   b. Exterior finish: painted. Interior finish: uncoated concrete.
      1) Primer: as recommended by finish coat manufacturer.
      2) Finish coat: 2 coats, minimum 2.5-3.5 mils dry film thickness aliphatic or aliphatic-acrylic polyurethane. Color selected by OWNER from manufacturer's standard color charts.
   c. Sealants: Multi-part polyurethane conforming to Federal Specification FS TT-S-00227e:
      1) Type 1 pourable grade.
         a) Manufacturers: One of the following or equal:
            (1) SikaFlex 1c SL by Sika
            (2) PSI 270SL by Polymeric Systems Inc.;
            (3) Elastothane 227R by Pacific Polymers.
      2) Type 2, non-sag Class A.
         a) Manufacturers: One of the following or equal:
            (1) SikaFlex 2c NS by Sika
            (2) Dymonic FC by Tremco
            (3) PSI 270 by Polymeric Systems Inc.
   d. Gutters and downspouts: Pre-painted aluminum or galvanized steel. Install with tight-fitting joints and closures. Provide cast-in reglets and sealants required to prevent water from seeping between panels or into joints.
   e. Doors and Door Hardware
      1) General
         a) In the following paragraphs, where manufacturers or model numbers are indicated they are presented as a basis for establishing configuration and quality of the item. Equivalent items from alternate manufacturers may be submitted with Shop Drawings for ENGINEER's review. Materials installed shall be as accepted on the Shop Drawings.
         b) Doors: Furnish doors as shown on the Drawings and specified. Minimum 16-gage steel 1 3/4 inches thick, Grade III, extra

heavy-duty steel panels with flush top channel and inverted bottom channel. Internal insulation to exceed R-15.

c) Frames: 14-gage steel with 2-inch thickness and depth suitable for wall thickness.

d) Hardware - General
   (1) Material: as noted.
   (2) Finish (unless otherwise noted)
      (a) Stainless Steel: BHMA A156.18.630 (US32D) satin.
      (b) Aluminum: BHMA A156.18.628 (US28)

e) Hardware - Hinges:
   (1) Material: Stainless steel.
   (2) Construction: Full mortise, 4 1/2 inches high, heavy-duty, minimum 5 knuckles, ball bearings, flat button tips.
   (3) Width: Sufficient to clear trim projection when door swings 180-degrees, unless otherwise specified.
   (4) Quantity per door:
      (a) Doors less than 90 inches high: provide minimum one and one-half pairs of heavy-duty stainless steel hinges per leaf.
      (b) Doors greater than 90 inches high: provide minimum two pairs of heavy-duty stainless steel hinges per leaf.

f) Hardware - Locksets
   (1) Keying: Removable core system.
      (a) Coordinate with Owner to provide a locking device compatible with the Plant's master key system.
      (b) At completion, remove construction keying core, and provide permanent core with 2 keyblanks for each cylinder.
   (2) Trim: Stainless steel, unless otherwise noted.
   (3) Backset: 2-3/4 inches.
   (4) Cylinders:
      (a) Number of pins: Minimum 6.
      (b) Interior parts: Non-corrosive with non-plastic, non-die-cast metal, non-aluminum mechanisms.
      (c) Cores: removable without requiring removal of lockset from door.
   (5) Strike:
      (a) Material: same as lock trim.
      (b) Lock and latch boxes: wrought.
      (c) Lips: Extended to protect trim from marring by latch bolt.
      (d) Cutouts at metal frames: Per AISI, unless otherwise specified.

2) Exterior Doors
   a) Doors: Heavy-duty double exterior door 6-foot-0-inch wide opening with height as shown on Drawings
   b) Frame: As noted above.
   c) Hardware - Hinges:
      Stanley, FBB199, US32D, non-removable pins.
   d) Hardware - Closer:
      (1) DORMA 8956DST8 series heavy-duty parallel arm door closer with auxiliary stop at 110 degrees for both doors, or

equal. Auxiliary stop shall be adequate to resist design wind loads.

(2) Door closure device shall be equipped with a DORMA SNB assembly for attaching closer to door, or equal. Provide door closer with a DORMA NFHD bracket, or equal.

e) Hardware - Lockset and flush bolts:
   (1) The left hand door shall include flush bolts top and bottom, and shall be lever-pinned to the frame and threshold. The right hand door shall hold the mortise lockset, knob and top mounted closer.
   (2) Lockset (active leaf): 1 - Sargent, 9G05 OB 26D:
   (3) Flush bolts (inactive leaf): 2 - Quality, 1358, US26D.
   (4) Dust-proof strike (inactive leaf): 1 - Quality, 1226, US26D.

f) Hardware - Threshold:
   (1) 1 - Pemko, 172A.

g) Hardware - Door bottom:
   (1) 2 - Pemko, 222AV.

h) Hardware - Weatherstrip:
   (1) 1 - Pemko, 303AS.

i) Hardware - Top Weatherstrip:
   (1) 1 - Pemko, 347A, 68AR.

j) Hardware - Astragal (active leaf)
   (1) 1 - Pemko, 375CR.

3) Interior Door.
   a) Door: Heavy-duty single interior door 3-foot-0-inch wide opening with height as shown on the Drawings.
   b) Frame: As noted above.
      (1) Interior doorframe shall be anchored at jambs to double studs and at floor with concrete anchors.
   c) Hardware - Hinges:
      (1) Stanley, FBB199, NRP, US32D, non-rising pins.
   d) Hardware - Closer:
      (1) 1 - Sargent, EN-351, parallel arm without hold-open.
   e) Hardware - Lockset:
      (1) Lockset: 1 - Sargent 9G05 OB 26D.
   f) Hardware - Threshold:
      (1) 1 - Pemko, 172A.
   g) Hardware - Door bottom:
      (1) 1 - Pemko, 222AV.
   h) Hardware - Weatherstrip
      (1) 1 - Pemko, 303AS (3 sides).

2.03 FABRICATION AND MANUFACTURE

A. All welds to be continuous, sharp corners to be dulled with power grinder.

2.04 FINISHES

A. Owner will select interior and exterior concrete finishes from those available from the precast concrete Supplier.

PART 3 EXECUTION

3.01 PREPARATION

A. Carefully place underground duct banks and conduits to align with connection points for the electrical equipment.

B. Prepare foundation in accordance with the Drawings and the provisions of Section 02220 - Excavation, Backfill, Fill and Grading for Structures. The cast-in-place concrete foundation slab shall have achieved its minimum specified 28-day compressive strength (f'c) before installation of the precast concrete structure.

END OF SECTION

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SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Structural steel shapes and plate.
   2. Fasteners:
      a. Anchor bolts.
      b. Assembly bolts.
      c. Chemical anchors.
      d. Concrete anchors.
      e. Concrete inserts.
      f. Flush shells.
      g. High strength bolts.
   3. Isolation sleeves and washers.
   4. Welding.

B. Related Sections:
   1. Section 09900 - Paints.
   2. Section 09960 - Coatings.

1.02 REFERENCES

A. American Institute of Steel Construction (AISC):
   1. Specification for Structural Steel Buildings.

B. American Society for Testing and Materials (ASTM):
   1. A 29 - Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for.
   2. A 36/A 36M - Standard Specification for Carbon Structural Steel.
   3. A 108 - Standard Specification for Steel Bars, Carbon, Cold Finished.
   4. A 193 - Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service and Other Special Purpose Applications.
   5. A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
   6. A 276 - Standard Specification for Stainless Steel Bars and Shapes.
   7. A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
   8. A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
   9. A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   10. A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

11. A 992/A 992M - Standard Specification for Structural Steel Shapes.
12. F 593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. F 959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

C. American Welding Society (AWS):
1. A 5.1 - Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
2. A 5.17 - Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
3. A 5.20 - Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.
4. D 1.1 - Structural Welding Code - Steel.
5. D 10.4 - Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing.

1.03 SUBMITTALS

A. Quality Control Submittals:
1. Submit shop drawings of members to be fabricated before starting their fabrication.
2. Welder's certificates.
3. Submit steel fabricator's certification.

B. Test Reports:
1. Certified copies of mill tests and analyses made in accordance with applicable ASTM standards, or reports from a recognized commercial laboratory, including chemical and tensile properties of each shipment of structural steel or part thereof having common properties.
2. Current International Code Council ES Report for chemical anchors.
3. Concrete anchor installation test report.

1.04 QUALITY ASSURANCE

A. Qualifications:
1. Perform welding of structural metals with welders who have current American Welding Society certificate for the type of welding to be performed.
2. Steel fabricators shall be certified by the American Institute of Steel Construction (AISC) or other certification as recognized and accepted by the local building official having jurisdiction
3. Notify ENGINEER 24 hours minimum before starting shop or field welding.
4. ENGINEER may check materials, equipment, and qualifications of welders.
5. Remove welders performing unsatisfactory Work, or require to requalify.
6. ENGINEER may use gamma ray, magnetic particle, dye penetrant, trepanning, or other aids to visual inspection to examine any part of welds or all welds.
7. CONTRACTOR shall bear costs of retests on defective welds.
8. CONTRACTOR shall also bear costs in connection with qualifying welders.
9. Special inspection for the installation of chemical anchors as specified in Section 01455 is required.

B. Concrete Anchor Installation Test:
1. Prior to Installation or Use of Concrete Anchors, Perform the Following Test:

a. Furnish not less than four 5/8-inch diameter Type 304 or Type 316 stainless steel concrete anchors of type proposed for use, and install anchors in a test block of concrete to specified embedment length.
b. Furnish and install one 5/8-inch nut on each concrete anchor and tighten each with an applied torque of 10 foot-pounds.
c. Loosen each nut and then retighten with an applied torque load of 10 foot-pounds.
d. Visible evidence of turning by a concrete anchor will be cause for ENGINEER to reject concrete anchors.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver structural steel free from mill scale, rust, and pitting.

B. Storage and Protection: Until erection and painting, protect from weather items not galvanized or protected by a shop coat of paint.

PART 2 PRODUCTS

2.01 MATERIALS

A. Unless Otherwise Specified or Indicated on the Drawings, Materials Shall Conform to the Following:

Item	ASTM Standard	Class, Grade, Type, or Alloy Number
Steel		
Plate, bars, rolled shapes (except W and WT shapes), and miscellaneous items	A 36	--
Rolled W and WT shapes	A 992	Grade 50
Hollow structural sections (HSS): round, square, or rectangular	A 500	Grade B
Tubing, hot-formed	A 501	--
Round HSS	A 500	Grade B
Steel pipe	A 53	Grade B
Stainless steel		
Plate, sheet, and strip	A 240	Type 304* or 316**
Bars and shapes	A 276	Type 304* or 316**
* Use Type 304L if material will be welded. ** Use Type 316L if material will be welded.		

B. Where stainless steel is welded, use low-carbon stainless steel.

2.02 FASTENERS

A. General: Furnish threaded fasteners, except high strength bolts, with flat washers, and self-locking nuts, or lock washers and nuts:
   1. Bolt Heads and Nuts: Hex-type.
   2. Bolts, Nuts, and Washers: Of domestic manufacture.
   3. Where bolts, including anchor bolts, nuts, washers, and similar fasteners are specified to be galvanized, galvanize in accordance with ASTM A 153.

B. All Thread Rods:
   1. Type 316 Stainless Steel in Accordance with ASTM F 593 for use in Wet and Moist Locations, Including:
      a. Water-Containing Structures:
         1) Below and at water level.
         2) Above Water Level:
            a) Below top of walls of water-containing structures.
            b) Under the roof, slab, beam, or walkway of enclosed water-containing structures.
         3) Dry side of walls of water-containing structures.
      b. Pump bases.
   2. Type 304 or Type 316 stainless steel in accordance with ASTM F 593 for aluminum assemblies.
   3. ASTM A 36 meeting the mechanical requirements of ASTM A 307. Hot-dip galvanize for galvanized assemblies and for applications other than those specified.

C. Anchor Bolts:
   1. Anchor Bolts, Nuts, and Washers: Type 316 Stainless Steel in Accordance with ASTM F 593 for use in Wet and Moist Locations, Including:
      a. Water-Containing Structures:
         1) Below and at water level.
         2) Above Water Level:
            a) Below top of walls of water-containing structures.
            b) Under the roof, slab, beam, or walkway of enclosed water-containing structures.
         3) Dry side of walls of water-containing structures.
      b. Pump bases.
   2. Anchor Bolts, Nuts, and Washers: Type 304 or Type 316 stainless steel for fastening aluminum to concrete or steel.

D. Assembly Bolts:
   1. Bolts, Nuts, and Washers for Wood Baffles, Collectors, and Other Field-Assembled Construction: Type 316 stainless steel in accordance with ASTM F 593 for use in wet and moist locations, including:
      a. Water-Containing Structures:
         1) Below and at water level.
         2) Above Water Level:
            a) Below top of walls of water-containing structures.
            b) Under the roof, slab, beam, or walkway of enclosed water-containing structures.
            c) Dry side of walls of water-containing structures.
      b. Pump bases.

2. Type 304 or Type 316 stainless steel in accordance with ASTM F 593 for aluminum assemblies.
3. Hot-dip galvanized ASTM A 307 steel for galvanized assemblies and for applications other than those specified.

E. Chemical Anchors:
1. Chemical anchors shall have vinyl ester resin in the composition of the adhesive.
2. All-thread rods shall be either ASTM A 36 steel or stainless steel.
3. Hot-dip galvanize or zinc plate ASTM A 36 steel all-thread rods.
4. Stainless steel all-thread rod shall conform with ASTM F 593 and shall be used for corrosive conditions where indicated on the Drawings.
5. All-thread rods used with the adhesive capsule shall have chisel points and shall be free of oil or coatings that may reduce bond.
6. Do not use chemical anchors to resist tension in overhead positions.
7. Chemical Anchors:
   a. Manufacturers: One of the following or equal:
      1) Hilti Incorporated, Hilti Hit RE 500 Adhesive Anchor System.

F. Concrete Anchors:
1. Manufacturers: One of the following or equal:
   a. Hilti Incorporated, Kwik Bolt TZ Anchor.
   b. Simpson Strong Tie, Strong Bolt Wedge Anchor.
2. Do not use Slug-in, lead cinch, and similar systems relying on deformation of lead alloy or similar materials in order to develop holding power.

G. Flush Shells:
1. Manufacturers: One of the following or equal:
   a. ITW Red Head, Multi-Set II Drop-In.
   b. Hilti Incorporated, HDI Drop-In.
2. Bolts, Flush Shells, Threaded Rods, Washers, and Nuts: Type 303 stainless steel in accordance with ASTM F 593.

H. High Strength Bolts: High strength bolts, nuts, and hardened flat washers shall be in accordance with ASTM A 325 or ASTM A 490, as indicated on the Drawings.

2.03 ISOLATING SLEEVES AND WASHERS

A. Manufacturers: One of the following or equal:
1. Central Plastics Company, Shawnee, Oklahoma.
2. Corrosion Control Products, PSI Inc., Gardena, CA.

B. Sleeves: Mylar, 1/32 inch thick, 4,000 volts per mil dielectric strength, of proper size to fit bolts and extending half way into both steel washers.
1. One sleeve required for each bolt.

C. Washers: The inside diameter of all washer shall fit over the isolating sleeve and both the steel and isolating washers shall have the same inside diameter and outside diameter:
1. Proper size to fit bolts. Two insulating washers are required for each bolt.
2. Two 1/8-inch thick steel washers for each bolt.
3. G3 Phenolic:
   a. Thickness: 1/8 inch.

b. Base Material: Glass.
c. Resin: Phenolic.
d. Water Absorption: 2 percent.
e. Hardness (Rockwell): 100.
f. Dielectric Strength: 450 volts per mil.
g. Compression Strength: 50,000 pounds per square inch.
h. Tensile Strength: 20,000 pounds per square inch.
i. Maximum Operating Temperature: 350 degrees Fahrenheit.

2.04 SUPPLEMENTARY PARTS

A. Furnish as required for complete structural steel erection, whether or not such parts and Work are specified or indicated on the Drawings.

2.05 FABRICATION

A. Shop Assembly:
1. Fabricate structural steel in conformance with AISC "Specification for the Structural Steel Buildings - Allowable Stress Design and Plastic Design," unless otherwise specified or modified by applicable regulatory requirements.
2. Where anchors, connections, or other details of structural steel are not specifically indicated on the Drawings or specified, their material, size and form shall be equivalent in quality and workmanship to items specified.
3. For Structural members such as W shapes, S shapes, channels, angles, and similar members not available in quantity, size, and type of stainless steel specified or indicated on the Drawings:
   a. Fabricate by welding together pieces of low carbon stainless steel plate, such as Type 316L.
   b. Make full penetration welds between pieces of plate to attain same or higher section modulus and moment of inertia as members indicated on the Drawings.
4. Where galvanizing is required, hot-dip galvanize structural steel after fabrication in accordance with ASTM A 123:
   a. Do not electro-galvanize or mechanically-galvanize unless specified or accepted by ENGINEER.
   b. Restraighten galvanized items that bend or twist during galvanizing.
5. Round off sharp and hazardous projections and grind smooth.
6. Take measurements necessary to properly fit work in the field. Take responsibility for and be governed by the measurements and proper working out of all the details.
7. Take responsibility for correct fitting of all metal work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine Work in place to verify that it is satisfactory to receive the Work of this Section. If unsatisfactory conditions exist, do not begin this Work until such conditions have been corrected.

3.02 ERECTION

A. General:
   1. Fabricate structural and foundry items to true dimensions without warp or twist.
   2. Form welded closures neatly, and grind off smooth where weld material interferes with fit or is unsightly.
   3. Install structural items accurately and securely, true to level, plumb, in correct alignment and grade, with all parts bearing or fitting structure or equipment for which intended.
   4. Do not cock out of alignment, redrill, reshape, or force fit fabricated items.
   5. Place anchor bolts or other anchoring devices accurately and make surfaces that bear against structural items smooth and level.
   6. Rigidly support and brace structural items needing special alignment to preserve straight, level, even, and smooth lines. Keep structural items braced until concrete, grout, or dry pack mortar has hardened for 48 hours minimum.
   7. Erect structural steel in conformance with AISC "Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design," unless otherwise specified or modified by applicable regulatory requirements.
   8. Where anchors, connections, and other details of structural steel erection are not specifically indicated on the Drawings or specified, form, locate, and attach with equivalent in quality and workmanship to items specified.
   9. Round off sharp or hazardous projections and grind smooth.
   10. Paint or coat steel items as specified in Sections 09910 and 09960.

B. Welding - General:
   1. Make welds full penetration type, unless otherwise indicated on the Drawings.
   2. Remove backing bars and weld tabs after completion of weld. Repair defective welds observed after removal of backing bars and weld tabs.

C. Welding Stainless Steel:
   1. General: Comply with AWS D1.1.
      a. Perform with electrodes and techniques in accordance with AWS D10.4.

D. Welding Carbon Steel:
   1. General: Comply with AWS D1.1:
      a. Weld ASTM A 36 and A 992 structural steel, ASTM A 500 and A 501 structural tubing, and ASTM A 53 pipe with electrodes conforming to AWS A5.1, using E70XX electrodes; AWS A5.17, using F7X-EXXX electrodes; or AWS A5.20, using E7XT-X electrodes:
         1) Field repair cut or otherwise damaged galvanized surfaces to equivalent original condition using a galvanized surface repair.

E. Interface With Other Products:
   1. Where steel fasteners come in contact with aluminum or other dissimilar metals, bolt with stainless steel bolts and separate or isolate from dissimilar metals with isolating sleeves and washers:
      a. Prior to installing nuts, coat threads of stainless steel fasteners with thread coating to prevent galling of threads.

F. Fasteners:
   1. General:

a. Install bolts, including anchor bolts and concrete anchors, to project 2 threads minimum, but 1/2 inch maximum beyond nut.
b. Unless otherwise specified, tighten bolts, including anchor bolts and concrete anchors, to the "snug-tight" condition, defined as tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.

2. Anchor Bolts:
   a. Cast-in-place when concrete is placed.
   b. Accurately locate anchor bolts embedded in concrete with bolts perpendicular to surface from which they project.
   c. Do not allow anchor bolts to touch reinforcing steel.
   d. Where anchor bolts are within 1/4 inch of reinforcing steel, isolate with a minimum of 4 wraps of 10-mil polyvinyl chloride tape in area adjacent to reinforcing steel.
   e. In anchoring machinery bases subject to heavy vibration, use 2 nuts, with 1 serving as a locknut.
   f. Where bolts are indicated on the Drawings for future use, first coat thoroughly with nonoxidizing wax, then turn nuts down full depth of thread and neatly wrap exposed thread with waterproof polyvinyl tape.
   g. Furnish anchor bolts with standard hex bolt head or an equivalent head acceptable to ENGINEER unless otherwise indicated on the Drawings. "L" or "J" anchor bolts are not equivalent to an anchor bolt with a hex bolt head.
   h. Minimum Anchor Bolt Embedment: 10-bolt diameters, unless longer embedment is indicated on the Drawings.
   i. Where indicated on the Drawings, set anchor bolts in metal sleeves having inside diameter approximately 2 inches greater than bolt diameter and minimum 10-bolt diameters long.
   j. Anchor bolts may be cast in concrete in lieu of using concrete anchors.

3. Chemical Anchors:
   a. Accurately locate concrete anchors and set perpendicular to surfaces from which they project.
   b. Drilling Holes:
      1) Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without acceptance by ENGINEER.
      2) Determine location of reinforcing bars, or other obstructions with a non-destructive indicator device.
   c. Hole Drilling Equipment:
      1) Electric or pneumatic rotary type with light or medium impact.
      2) Drill Bits: Carbide-tipped in accordance with ANSI B212-15.
      3) Hollow drills with flushing air systems are preferred. Air shall be free of oil, water, or other contaminants which will reduce bond.
      4) Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.
   d. Hole Diameter:
      1) As recommended by chemical anchor cartridge manufacturer.
   e. Install all thread rods to depth, spacings, and locations as indicated on the Drawings.
   f. Cleaning Holes:

1) Insert long air nozzle into hole and blow out loose dust. Use air which is free of oil, water, or other contaminants which will reduce bond.
2) Use a stiff bristle brush to vigorously brush hole to dislodge compacted drilling dust.
3) Repeat step 1.
4) Repeat above steps as required to remove drilling dust or other material which will reduce bond. The hole shall be clean and dry.

4. Concrete Anchors:
   a. Do not use concrete anchors in lieu of anchor bolts.
   b. Accurately locate concrete anchors and set perpendicular to surfaces from which they project.
   c. Minimum Embedment Lengths:

Diameter Inches	Embedment Length Inches
1/4	2
3/8	2-1/2
1/2	4-1/8
5/8	4-1/2
3/4	6-1/2

   d. Drilling Holes:
      1) Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without acceptance by ENGINEER.
      2) Determine location of reinforcing bars, or other obstructions with a non-destructive indicator device.
      3) Remove dust and debris from hole using compressed air.
   e. Hole Drilling Equipment:
      1) Electric or pneumatic rotary type with light or medium impact.
      2) Drill Bits: Carbide-tipped in accordance with ANSI B212-15.
      3) Hollow drills with flushing air systems are preferred.
      4) Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.
5. Deformed Bar Anchors:
   a. Butt weld with automatic stud welding gun as recommended by manufacturer.
   b. Ensure butt weld develops full strength of the anchor.
6. Flush Shells:
   a. Use only where specifically indicated on the Drawings.
   b. Accurately locate and set perpendicular to surfaces from which they project.
   c. Drilling Holes:
      1) Do not damage or cut existing reinforcing bars, electrical conduits, or other items embedded in the existing concrete without acceptance by ENGINEER.
      2) Determine location of reinforcing bars, or other obstructions with a non-destructive indicator device.
      3) Remove dust and debris from hole using compressed air.
   d. Hole Drilling Equipment:

1) Electric or pneumatic rotary type with light or medium impact.
2) Drill Bits: Carbide-tipped in accordance with ANSI B212-15.
3) Hollow drills with flushing air systems are preferred.
4) Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.

7. High Strength Bolts:
   a. Consider connections with high strength bolts to be slip critical structural connections, unless otherwise indicated on the Drawings.
   b. Connections with high strength bolts shall conform to AISC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
   c. Furnish Hardened Flat Washer:
      1) Under element, nut, or bolt head, turned in tightening.
      2) On outer plies for short slotted holes.

Verify adequate tightening of bolts by means of tension indicator washers placed as indicated in ASTM F 959, Figure 1.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Miscellaneous metals.
   2. Associated accessories to the above items.

1.02 REFERENCES

A. Aluminum Association (AA):
   1. Specification M12-C22-A41 - Aluminum Finishes.

B. American Society for Testing and Materials (ASTM):
   1. A 36/A 36M - Standard Specification for Structural Steel.
   2. A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   4. A 325 - Standard Specification for High-Strength Bolts for Structural Steel Joints.
   5. A 489 - Standard Specification for Carbon Steel Lifting Eyes.
   6. A 490 - Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
   7. A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   8. A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
   9. A 569 - Standard Specification for Steel, Carbon (0.15 Maximum, Percent) Hot-Rolled Sheet and Strip Commercial Quality.
   10. A 570/A 570M - Standard Specification for Steel, Sheet and Strip, Carbon. Hot-Rolled, Structural Quality.
   11. A 635/A 635M - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled.
   12. A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   13. A 992/A 992M - Standard Specification for Structural Steel Shapes.
   14. B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   15. B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   16. B 308 - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
   17. B 429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

18. F 593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.

C. American Welding Society (AWS):
   1. Standard Symbols for Welding, Brazing, and Nondestructive Examination.

D. National Association of Architectural Metal Manufacturers (NAAMM):
   1. Metal Finishes Manual.

E. Occupational Safety and Health Administration (OSHA).
   1. Code of Federal Regulations (CFR), Title 29, Labor, Pt. 1900-1990.

1.03 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.

1.04 SUBMITTALS

A. Ship Drawings:
   1. Miscellaneous metals.

B. Quality Control Submittals:
   1. Design data.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Unless otherwise specified or indicated on the Drawings, structural and miscellaneous metals shall conform with the standards of the ASTM, including the following:

Item	ASTM Standard No.	Class, Grade Type or Alloy No.
Cast Iron		
Cast Iron	A 48	Class 40B
Steel		
Galvanized sheet iron or steel	A 653	Coating G90
Black steel, sheet or strip	A 569 A 570	--
Coil (plate)	A 635	--

Item	ASTM Standard No.	Class, Grade Type or Alloy No.
Structural plate, bars, rolled shapes, and miscellaneous items (except W shapes).	A 36	--
Rolled W shapes	A 992	Grade 50
Standard bolts, nuts, and washers	A 307	--
High strength bolts, nuts, and hardened flat washers	A 325 A 490	--
Eyebolts	A 489	Type 1
Tubing, cold-formed	A 500	--
Tubing, hot-formed	A 501	--
Steel pipe	A 53	Grade B
Stainless steel		
Plate, sheet, and strip	A 240	Type 304* or 316**
Bars and shapes	A 276	Type 304* or 316**
Bolts (Type 304)	F593	Group 1 Condition CW
Bolts (Type 316)	F593	Group 2 Condition CW
Aluminum		
Flashing sheet aluminum	B 209	Alloy 5005-H14, 0.032 inches minimum thickness
Structural sheet aluminum-	B 209	Alloy 6061-T6
Structural aluminum	B 209 B 308	Alloy 6061-T6
Extruded aluminum	B 221	Alloy 6063-T42
* Use Type 304L if material will be welded. ** Use Type 316L if material will be welded.		

1. Stainless steels are designated by type or series defined by ASTM.
2. Where stainless steel is welded, use low-carbon stainless steel.

2.02 MANUFACTURED UNITS

A. Metal Gratings:

B. Miscellaneous Aluminum: Fabricate aluminum products, not covered separately herein, in accordance with the best practices of the trade and field assemble by riveting or bolting. Do not weld or flame cut.
   1. Miscellaneous Cast Iron:
      a. General:
         1) Tough, gray iron, free from cracks, holes, swells, and cold shuts.
         2) Quality such that hammer blow will produce indentation on rectangular edge of casting without flaking metal.

3) Before leaving the foundry, clean castings and apply 16-mil dry film thickness coating of coal-tar epoxy, unless otherwise specified or indicated on the Drawings.

2. Miscellaneous Stainless Steel:
   a. Provide miscellaneous stainless steel items not specified herein as indicated on the Drawings or specified elsewhere. Fabricate and install in accordance with the best practices of the trade.
3. Miscellaneous Structural Steel:
   a. Provide miscellaneous steel items not specified herein as indicated on the Drawings or specified elsewhere. Fabricate and install in accordance with the best practices of the trade.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine work in place to verify that it is satisfactory to receive the work of this Section. If unsatisfactory conditions exist, do not begin this work until such conditions have been corrected.

3.02 INSTALLATION

A. General: Install products as indicated on the Drawings, and in accordance with shop drawings and manufacturer's printed instructions, as applicable except where specified otherwise.

END OF SECTION

SECTION 05550

AIR RELEASE ENCLOSURE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install the above ground air release enclosure as listed in the specifications and as shown on the Drawings.

1.02 RELATED WORK

A. The contractor shall be responsible for any related work necessary for the proper installation of enclosure. This shall include, but is not limited to, any required bypass pumping, any required earthwork and any required concrete work.

1.03 SUBMITTALS

A. Submit to the Engineer shop drawings and schedules of all enclosure systems and appurtenances required. Submit design data and specification data sheets listing all parameters used in the enclosure system design.

B. Submit to the Engineer the name of the enclosure supplier and a list of materials to be furnished.

1.04 REFERENCE STANDARDS

A. American Water Works Association (AWWA).

B. American Society for Testing and Materials (ASTM).

C. Where reference is made to the above standard, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. The enclosure manufacturer shall be a company specializing in the manufacture of such enclosures with at least five (5) years of successful field experience and being lab certified as meeting A.S.S.E 1060 requirements.

1.06 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in shipping, handling and placing to avoid damaging. Any material damaged in shipment shall be replaced as directed by the Engineer.

B. Any material showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

PART 2 PRODUCTS

2.01 GENERAL

A. All enclosures shall comply with the standard detail for shape and size and shall include a 24 inch wide x 30 inches length access door with a hasp for a padlock. The enclosure shall be securely attached to a concrete base with anchor brackets installed on the interior of the enclosure, through the flange base of the enclosure itself or through a stainless steel anchor hinge.

2.02 ALUMINUM ENCLOSURE

A. The roof, walls and access panels shall be constructed of mill finish aluminum, ASTM B209, solid sheet construction, with a wall thickness of 1/8-inch.

B. All structural members shall be aluminum. No wood or "particle board" shall be allowed in assembly.

C. Multi-sectional enclosures shall fit together with overlapping "tongue and groove" joints and be secured internally with mechanical fasteners.

D. All assembly fasteners shall be stainless steel or aluminum.

2.03 STAINLESS STEEL ENCLOSURE

A. The roof, walls and access panels shall be constructed stainless steel, type 316, solid sheet construction, with a wall thickness of 1/8-inch.

B. All structural members shall be stainless steel. No wood or "particle board" shall be allowed in assembly.

C. Multi-sectional enclosures shall fit together with overlapping "tongue and groove" joints and be secured internally with mechanical fasteners.

D. All assembly fasteners shall be stainless steel.

2.04 FIBERGLASS ENCLOSURE

A. Enclosure shall be a one (1) piece molded fiberglass enclosure with a base flange for mounting to the concrete slab and a full recessed door opening with a lip. Enclosure shall be by Allied Molded Products or approved equal. Color shall be as directed by the Engineer.

B. Full length piano style hinge, door latch, padlock hasp and all bolts and other hardware shall be of stainless steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Enclosure shall be assembled and mounted on the concrete pad according to the manufacturer's instructions and the contract drawings.

B. Enclosure shall be installed plumb, level and square.

END OF SECTION

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SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Acrylic-Latex sealant.
   2. Silicone sealant.
   3. Synthetic rubber sealing compound.
   4. Synthetic sponge rubber filler.
   5. Related materials.

B. Related Sections:
   1. Section 03420 Precast Concrete Electrical Building

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):
   1. M 198 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

B. ASTM International (ASTM):
   1. C 920 - Standard Specification for Elastomeric Joint Sealants.
   2. D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
   3. D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

C. Federal Specification (FS):
   1. FS TT-S-00227e - Sealing Compound, Elastomeric Type, Multi-Component.

1.03 SUBMITTALS

A. Product data.

B. Samples, include color selections.

C. Manufacturer's Installation Instructions.

D. Warranty.

1.04 QUALITY ASSURANCE

A. Manufacturer qualifications: Manufacturer of proposed product for minimum 5 years with satisfactory performance record.

B. Installer qualifications: Manufacturer approved installer of products similar to specified products on minimum 5 projects of similar scope as Project with satisfactory performance record.

1.05 PROJECT/SITE CONDITIONS

A. Environmental requirements: Do not apply sealant on wet or frosty surfaces or when surface temperature is higher than 120 degrees Fahrenheit or lower than recommended by the manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products in accordance with manufacturer's recommendations.

B. Code date packages. Do not use material older than 6 months old. Store materials at temperatures lower than 80 degrees Fahrenheit.

1.07 SEQUENCING AND SCHEDULING

A. Caulk joints prior to painting.

1.08 WARRANTY

A. Warrant to correct defective products for minimum 5 years in accordance with manufacturer's standard warranty.

PART 2 PRODUCTS

2.01 ACRYLIC-LATEX SEALANT

A. Permanently flexible, nonstaining, and nonbleeding latex modified acrylic sealant compound, colors as selected by ENGINEER from manufacturer's standard options. Manufacturers: One of the following or equal:
   1. Tremco, Mono.
   2. Pecora Corp., Number AC-20.
   3. Sonneborn, Sonolac.

2.02 PRECAST CONCRETE JOINT SEALANT

A. Refer to Section 03420 for sealants required at Precast Concrete Building joints.

2.03 SILICONE SEALANT

A. ASTM C 920, Type S, Grade NS, Class 25, single component silicone sealant. Manufacturers: One of the following or equal:
   1. Tremco, Proglaze.
   2. Pecora Corp., Number 864.
   3. Dow Corning, Number 795.
   4. General Electric, Number 1200 Series.

2.04 SYNTHETIC RUBBER SEALING COMPOUND

A. Manufacturer: One of the following or equal:
   1. Polymeric Systems, Inc., PSI 270 or PSI 270 SL.
   2. Pacific Polymers, Garden Grove, CA, Elastothane 227R.

B. Material: In accordance with FS TT-S-00227e, Type I, pourable grade, and Type II, non-sag, Class A; multi-part polyurethane; able to cure at room temperature to firm, highly resilient rubber; able to perform satisfactory when continuously submerged in water or sewage and exposed to direct sunlight in dry condition; with the following properties determined at 75 degrees Fahrenheit and 50 percent relative humidity:
   1. Base: Polyurethane rubber.
   2. Solids: Minimum 97 percent.
   3. Application time: Minimum 2 hours.
   4. Cure time: Maximum 3 days.
   5. Tack free time: 24 hours.
   6. Ultimate hardness: 35, within 5 Shore A.
   7. Tensile strength: Minimum 170 pounds per square inch when tested in accordance with ASTM D 412.
   8. Ultimate elongation: Minimum 490 percent when tested in accordance with ASTM D 412.
   9. Tear resistance: Minimum 85 pounds per inch when tested in accordance with ASTM D 624, Die C.
   10. Service temperature range: Minus 25 degrees to 158 degrees Fahrenheit.

C. Color: Gray to match concrete, unless indicated on the Drawings.

2.05 SYNTHETIC SPONGE RUBBER FILLER

A. Closed-cell expanded sponge rubber manufactured from synthetic polymer neoprene base, or resilient polyethylene foam backer rod. Manufacturers: One of the following or equal:
   1. Presstite, Number 750.3 Ropax Rod Stock.
   2. Rubatex Corp., Rubatex-Cord.

B. Characteristics:
   1. Suitable for application intended.
   2. Strength: As necessary for supporting sealing compound during application.
   3. Resiliency: Sufficient resiliency to prevent significant load transfer across joint.
   4. Resistance to environmental conditions of installation.
   5. Bonding: No bonding to the sealing compound.
   6. Structure: Cellular, prevents wicking or absorption of water.
   7. Compatibility with other materials in joint and acceptance by manufacturer of sealing compound.
   8. Size: Minimum 25 percent greater than nominal joint width.

2.06 RELATED MATERIALS

A. Primer: Nonstaining type, recommended by sealant manufacturer to suit application.

B. Joint cleaner: Noncorrosive, nonstaining, compatible with joint forming materials and as recommended by sealant manufacturer.

C. Bond breaker tape: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify acceptability of joint dimensions, physical, and environmental conditions.

B. Verify that surfaces are dry, clean, and free of dirt, grease, curing compound, and other residue which might interfere with adhesion of sealants.

3.02 PREPARATION

A. Allow concrete to cure thoroughly before caulking.

B. Synthetic sponge rubber filler:
   1. Prepare surfaces designated to receive filler in accordance with manufacturer's installation instructions.
   2. Do not stretch filler beyond its normal length during installation.

C. Caulking:
   1. Verify that surfaces are dry, clean, and free of dirt, grease, curing compounds, and other residue that might interfere with adhesion of caulking compound.
   2. Concrete, masonry, wood, and steel surfaces: Clean and prime in accordance with manufacturer's instructions prior to caulking.

D. Synthetic rubber sealing compound:
   1. Ensure surfaces to which synthetic rubber must bond are dry and free of dust, dirt, and other foreign residue.
   2. Heavy sandblasted caulking groove to sound surface, and prime with manufacturer's recommended primer for particular surface.

E. For sidewalks, pavements, and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to depth equal to 75 percent of joint width, but neither more than 5/8 inches deep nor less then 3/8 inches deep.

F. For normal moving building joints sealed with elastomeric sealants not subject to traffic, fill joints to depth equal to 50 percent of joint width, but neither more than 1/2 inch deep nor less than 1/4 inch deep.

G. For joints sealed with acrylic-latex sealants, fill joints to depth in range of 75 percent to 125 percent of joint width.

H. Use joint filler to achieve required joint depths, to allow sealants to perform properly.

I. Prepare surfaces and install synthetic sponge rubber filler in accordance with manufacturer's recommendations.

J. Do not stretch filler beyond normal length during installation.

K. Apply bond breaker when recommended by joint sealer manufacturer.

3.03 INSTALLATION

A. Synthetic sponge rubber filler: Install filler in accordance with manufacturer's installation instructions.

B. Caulking, joints, and sealing:
   1. Construct expansion, contraction, and construction joints as indicated on the Drawings.
   2. Install pipe and conduit in structures as indicated on the Drawings.
   3. Caulk doors, windows, louvers, and other items installed in or over concrete openings inside and out.
   4. Use synthetic rubber sealing compound for caulking where indicated on the Drawings or as specified, except for masonry construction and where specified otherwise.
   5. Complete caulking prior to painting.
   6. Verify that concrete is thoroughly cured prior to caulking.
   7. When filler compressible material is used, use untreated type.
   8. Apply caulking with pneumatic caulking gun.
   9. Use nozzles of proper shape and size for application intended.
   10. Maintain continuous bond between caulking and sides of joint to eliminate gaps, bubbles, or voids and fill joint in continuous operation without layering of compound.
   11. Employ experienced applicators to caulk joints and seams in neat workmanlike manner.
   12. To hasten curing of compound when used on wide joints subject to movement, apply heat with infrared lamps or other convenient means.
   13. Apply synthetic rubber sealing compound with pneumatic caulking tool or other acceptable method.

3.04 CLEANING

A. Clean surfaces adjacent to sealant as work progresses.

B. Remove excess uncured sealant by soaking and scrubbing with sealant cleaning solvent.

C. Remove excess cured sealant by sanding with Number 80 grit sandpaper.

D. Leave finished work in neat, clean condition.

3.05 SCHEDULE

A. Synthetic rubber sealing compound, non-sag Type II:
   1. Use where indicated on the Drawings.
   2. Water-bearing and earth-bearing concrete structures.
   3. Joints in masonry, concrete vertical surfaces, and metal-faced panels in vertical surfaces.
   4. Joints between sheet metal flashing and trim.
   5. Joints between sheet metal flashing and trim, and vertical wall surfaces.
   6. Small voids between materials requiring filling for weathertight performance in vertical surfaces.

7. Surfaces in contact with bituminous materials in vertical surfaces.
8. Perimeters of frames of doors, windows, louvers, and other openings where bonding is critical to airtight performance.
9. Expansion and control joints in masonry vertical surfaces.

B. Synthetic rubber sealing compound, self-leveling Type I:
1. Use where indicated on the Drawings.
2. Expansion and control joints in masonry, concrete horizontal surfaces, and metal panels in horizontal surfaces.
3. Small voids between materials requiring filling for weathertight performance in horizontal surfaces.
4. Surfaces in contact with bituminous materials.
5. Pavement joints.
6. Perimeters of frames of doors, windows, louvers, and other openings in horizontal surfaces where bonding is critical to airtight performance.

C. Silicone:
1. Use where indicated on the Drawings.
2. Joints and recesses formed where window, door, louver and vent frames, and sill adjoin masonry, concrete, stucco, or metal surfaces.
3. Door threshold bedding.
4. Moist or wet locations, including joints around plumbing fixtures.
5. Stainless steel doors and frames, including joints between applied stops and frames, and around anchor bolts.
6. Plenum joints.

D. Acrylic latex:
1. Use where indicated on the Drawings.
2. Interior joints with movement less than 7.5 percent and not subject to wet conditions.

END OF SECTION

SECTION 09865

SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required for the surface preparation and application of shop primers on ferrous metals, excluding stainless steels, as specified herein.

1.02 SUBMITTALS

A. Submit to the Engineer for approval, as provided in the Contract Drawings for shop drawings, manufacturer's specifications and data on the proposed primers and detailed surface preparation, application procedures and dry mil thickness.

B. Submit representative physical samples of the proposed primers, if required by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Submerged Services: Shop primer for ferrous metals which will be subject to splash action or which are specified to be considered submerged service shall be sprayed with one coat of Koppers 654 epoxy Primer or Koppers Inertol Primer 621-FDA, dry film thickness 3.5 to 4.5 mils by Koppers Co., Inc., or equal.

B. Nonsubmerged Services: Shop primer for ferrous metals other than those covered by paragraph 2.01 A shall be sprayed with one coat of Koppers Pug Primer, dry film thickness 3.0 to 4.0 mils by Koppers Co., Inc. or equal.

C. Nonprimed Surfaces: Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during all periods of storage and erection and shall be satisfactory to the Engineer up to the time of the final acceptance.

D. Compatibility of Coating Systems: Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats specified in the Contract Documents for use in the field and which are recommended for use together.

PART 3 EXECUTION

3.01 APPLICATION

A. Surface Preparation and Priming:
   1. Non-submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming. Submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-10. Near White, immediately prior to priming.
   2. Surfaces shall be dry and free of dust, oil, grease, dirt, rust, loose mill scale and other foreign material before priming.
   3. Shop prime in accordance with approved paint manufacturer's recommendations.
   4. Priming shall follow sandblasting before any evidence of corrosion has occurred and within 24 hours.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, tools, materials, equipment, scaffolding or other structures and incidentals necessary to complete this Contract in its entirety.

B. The work includes painting and finishing of all new interior and exterior exposed items above and below grade and surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, transoms, roof fans, construction signs, guardrails, posts, fittings, valves, tanks, equipment and all other work obviously required to be painted unless otherwise specified herein or on the Drawings. The omission of minor items in the Schedule of Work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specification as stated herein.

C. The following items shall not be painted:
   1. Any code-requiring labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
   2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.
   3. Aluminum handrails (except where in contact with concrete) walkways, windows, louvers and grating unless otherwise specified herein.
   4. Signs and nameplates.
   5. Finish hardware.
   6. Chain link fence.
   7. Piping buried in the ground or embedded in concrete.
   8. Concealed surfaces of pipe or crawl space.
   9. Nonferrous metals, unless specifically noted otherwise.
   10. Electrical switchgear and motor control centers.
   11. Stainless steel angles, tubes, pipe, etc.
   12. Products with polished chrome, aluminum, nickel or stainless steel finish.
   13. Plastic switch plates and receptacle plates.
   14. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.
   15. Sprinkler heads.
   16. Lifting chain on cranes and hoists
   17. Electrical cable, festooned conductor system, cables, collector pole brackets, etc.

D. All work shall be done in strict accordance with this Specification, the Design Drawings and the painting package, including manufacturer's printed instructions.

E. The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules and regulations promulgated

by authorities having jurisdiction which may bear on the Work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970".

1.02 DEFINITIONS

A. Field Painting is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.

B. Shop Painting is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.

C. Abbreviations The abbreviations and definitions listed below, when used in this specification, shall have the following meanings:
   1. SSPC - Steel Structures Painting Council
   2. Exterior - Outside, exposed to weather
   3. Interior Dry - Inside, concealed or protected from weather
   4. Interior Wet - Inside, subject to immersion services
   5. ASTM - American Society of Test Materials
   6. NACE - National Association of Corrosion Engineers
   7. NSF - National Sanitation Foundation
   8. AWWA - American Water Works Association

D. Dry Film Thickness shall be in Mils.

1.03 RESOLUTION OF CONFLICTS

A. It shall be the responsibility of the Contractor to arrange a meeting prior to the start of painting, or flooring installation between the Contractor, the Paint Manufacturer, whose products are to be used, and the Engineer. All aspects of surface preparation, application and coating systems as covered by this Specification will be reviewed at this meeting.

B. Clarification shall be requested promptly from the Engineer when instructions are lacking, conflicts occur in the Specifications, or the procedure seems improper or inappropriate for any reason.

C. Copies of all manufacturer's instructions and recommendations shall be furnished to the Engineer by the Painting Contractor.

D. It shall be the responsibility of the Coating Manufacturer to have their factory representative meet in person with the Contractor and Engineer a minimum of three times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the Engineer.

1.04 SUBMITTALS

A. Contractor shall submit catalog data and cut sheets for the painting system being used if not the TNEMEC materials specified.

B. Samples as detailed in 3.01 B shall be submitted regardless of system being used, showing each color to be used.

C. Hazardous Material Disposal documentation shall be submitted if applicable.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practicable from the compressor.

B. All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the paint manufacturer.

C. Contractor will provide free of charge to the Engineer a "Nordson-Mikrotest" or "Positest" dry film thickness gauge for ferrous metal and an OG232 "Tooke" gauge or equal for non-ferrous and cementitious surface, to be used to inspect coatings by the Engineer and Contractor. The gauges may be used by the Contractor and returned each day to the Engineer. Engineer will return gauges to Contractor at completion of job.

2.02 MATERIALS

A. All materials specified herein are manufactured by the TNEMEC Company, Inc., North Kansas City, Missouri. These products are specified to establish standards of quality and are approved for use on this Project.

B. Equivalent materials of other manufacturers may be substituted on approval of the Engineer. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance and an independent laboratory certification that their product meets the performance criteria of the specified materials.

C. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.

D. Adhesion - Elcometer Adhesion Tester.

E. Exterior Exposure - Exposed at 45 degrees facing the ocean (South Florida Marine Exposure)

F. Hardness - ASTM D3363-74

G. Humidity - ASTM D2247-68

H. Salt Spray (Fog) - ASTM B117-73

I. Substitutions which decrease the total film thickness, change the generic type of coating, or fail to meet the performance criteria of the specified materials shall not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.

J. All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 3.5 lbs/gallon after thinning.

K. Colors, where not specified, shall be as selected by the Owner or their Representative.

L. All coatings in contact with potable water need to be NSF Certified in accordance with ANSI/NSF Standard 61.

PART 3 EXECUTION

3.01 INSPECTION OF SURFACES

A. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the Engineer. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.

B. Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the Engineer.

C. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the Engineer, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be adhered to.

D. Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "Tooke" gauge is classified as a destructive test.

3.02 SURFACE PREPARATION

A. The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Steel Structures Painting Council's Surface Preparation Specification, unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

3.03 STANDARDS FOR SURFACE PREPARATION

A. Chemical and/or Solvent Cleaning: Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter and contaminates, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.

B. Hand Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by hand chipping, scraping, sanding and wire brushing.

C. Power Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a

clean sound substrate by power tool chipping, descaling, sanding, wire brushing and grinding.

D. Flame Cleaning: Dehydrating and removal of rust, loose mill scale and some light mill scale by use of flame, followed by wire brushing.

E. White Metal Blast Cleaning: Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.

F. Commercial Grade Blast Cleaning: Complete removal of all dirt, rust scale, mill scale, foreign matter and previous coating, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.

G. Brush-Off Blast Cleaning: Removal of rust scale, loose mill scale, loose rust and loose coatings, leaving tightly-bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils and solid contaminates. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bugholes, air pockets and other subsurface irregularities, but so as not to expose underlying aggregate.

H. Pickling: Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).

I. Near-White Blast Cleaning: Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale and small specks of previous coating. At least 95% of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.

J. Power Tool Cleaning to Bare Metal: Complete removal of rust, rust scale, mill scale, foreign matter and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP-6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.

K. Visual standards "Pictorial Surface Preparation Standards for Painting Steel Surfaces", and the National Association of Corrosion Engineer, "Blasting Cleaning Visual Standards" TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.

L. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to Solvent Cleaning under this Specification.

M. Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per these Specifications.

N. All weld seams, sharp protrusions and edges shall be ground smooth prior to surface preparation or application of any coatings.

O. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the Engineer.

P. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in these Specifications.

Q. Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the Engineer's attention; otherwise, Contractor assumes full responsibility.

3.04 PRETREATMENTS

A. When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

3.05 STORAGE

A. Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutilated labels attached. Packages shall not be opened until they are inspected by the Engineer and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by himself at the job site. Empty coating cans shall be required to be neatly stacked in an area designated by the Engineer and removed from the job site on a schedule determined by the Engineer. Engineer may request a notarized statement from Contractor detailing all materials used on the Project.

3.06 PREPARATION OF MATERIALS

A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.

B. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

3.07 APPLICATION

A. Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is below 50deg F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.

B. No coatings shall be applied unless surface temperature is a minimum of 5deg above dew point; temperature must be maintained during curing.

C. See coating schedule for actual coating systems to be used on this project.

3.08 DEW POINT CALCULATION CHART

DEW POINT CALCULATION CHART

Ambient Air Temperature - Fahrenheit

Relative Humidity	20	30	40	50	60	70	80	90	100	110	120
90%	18	28	37	47	57	67	77	87	97	107	117
85%	17	26	36	45	55	65	76	84	95	104	113
80%	16	25	34	44	54	63	73	82	93	102	110
75%	15	24	33	42	52	62	71	80	91	100	108
70%	13	22	31	40	50	60	68	78	88	96	105
65%	12	20	29	38	47	57	66	76	85	93	103
60%	11	29	27	36	45	55	64	73	83	92	101
55%	9	17	25	34	43	53	61	70	80	89	98
50%	6	15	23	31	40	50	59	67	77	86	94
45%	4	13	21	29	37	47	56	64	73	82	91
40%	1	11	18	26	35	43	52	61	69	78	87
35%	-2	8	16	23	31	40	48	57	65	74	83

SURFACE TEMPERATURE AT WHICH CONDENSATION OCCURS

Dew Point

Temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5deg above this point. Temperature must be maintained during curing.

Example

If air temperature is 70deg F and relative humidity is 65%, the dew point is 57deg F. No coating should be applied unless surface temperature is 62deg F minimum.

A. No coating shall be applied unless the relative humidity is below 85%.

B. Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.

C. Field painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the Engineer.

D. Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not

be affected.

E. The Contractor's scaffolding shall be erected, maintained and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observation shall be cleaned immediately after paint application.

F. Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the Engineer.

G. The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint manufacturer.

H. Each coat of paint shall be recoated as per manufacturer's instructions. Paint shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.

I. Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.

J. Finish colors shall be in accordance with the COLOR SCHEDULE and shall be factory mixed (i.e., there shall be no tinting by the Contractor, unless authorized by the Engineer).

K. All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 2nd coat prior to application of the full 2nd coat.

L. All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

3.09 WORKMANSHIP

A. The Contractor must show proof that all employees associated with this Project shall have been employed by the Contractor for a period not less than six (6) months.

B. Painting shall be performed by experienced painters in accordance with the recommendations of the paint manufacturer. All paint shall be uniformly applied without sags, runs, spots, or other blemishes. Work which shows carelessness, lack of skill, or is defective in the opinion of the Engineer, shall be corrected at the expense of the Contractor.

C. The Contractor shall provide the names of at least three other projects of similar size and scope that they have successfully completed under their current company name.

3.10 APPLICATION OF PAINT

A. By Brush and/or Rollers

1. Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenol core shall be utilized.
2. The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.
3. Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.
4. It may require two coats to achieve the specified dry film thickness if application is by brush and roller.

B. Air, Airless or Hot Spray
1. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
2. Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.
3. High build coatings should be applied by a cross-hatch method of spray application to ensure proper film thickness of the coating.
4. Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.
5. Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.
6. Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.
7. The first coat on concrete surfaces in immersion service should be sprayed and back rolled.

3.11 PROTECTION AND CLEANUP

A. It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting work.

B. At the option of the Engineer during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the Engineer, including, but not limited to, full shrouding of the area.

C. If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.

D. At completion of the work, remove all paint where spilled, splashed, spattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted and unpainted surfaces.

E. After completion of all painting, the Contractor shall remove from job site all painting equipment, surplus materials and debris resulting from this work.

F. The Contractor is responsible for the removal and proper disposal of all hazardous materials from the job site in accordance with Local, State and Federal requirements

as outlined by the Environmental Protection Agency.

G. A notarized statement shall be presented to the Engineer that all hazardous materials have been disposed of properly including, but not limited to: name of disposal company, disposal site, listing of hazardous materials, weights of all materials, cost per pound and EPA registration number.

3.12 TOUCH-UP MATERIALS

A. The Contractor shall provide at the end of the Project at least one (1) gallon of each generic topcoat in each color as specified by the Engineer for future touch-up. Two gallons may by required for (2) component materials.

3.13 ON-SITE INSPECTION

A. During the course of this Project, the Engineer will reserve the option of incorporating the services of a qualified inspection service. The inspection service will be responsible for assuring the proper execution of this Specification by the successful Contractor.

3.14 TEEL - STRUCTURAL, TANKS, PIPES AND EQUIPMENT

A. EXTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 73-1: Epoxy/High Build Urethane

This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. Second coat to be same color or close to finish color. Specify Series 74 Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 66-1211 Epoxoline Primer	3.0 - 4.0
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 73-Endura-Shield III	2.0 - 3.0
Dry Film Thickness	7.0 - 10.0
Minimum	8.0 Mils

2. System No. 73-2: High Build Urethane for Marginally Cleaned Surfaces or Topcoating Existing System

This system can be used over factory finish paint or cover non-sandblasted steel and offer the high performance of a urethane coating. Specify Series 74 Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning or SSPC-SP3 Power Tool Cleaning

Shop Coat: Manufacturer Standard Primer (or existing coating)	1.5 - 2.0
2nd Coat: 135 Chembuild	3.0 - 5.0
3rd Coat: 73-Color Endura-Shield	2.0 - 3.0
Dry Film Thickness	6.5 - 10.0
Minimum	7.5 Mils

3. System No. 82-1: Silicone Alkyd Enamel - Gloss

Coating system for outstanding color and gloss retention and weatherability. This system will provide better performance than alkyd enamel, but not as good as a urethane. Series 82 includes a minimum of 30% silicone resin and conforms to SSPC-Paint 21-78, Type 1.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 37H-77 Chem Prime	2.0 - 3.5
2nd Coat: 23-Color Enduratone	2.0 - 3.0
3rd Coat: 82-Color Silicone Alkyd Enamel	1.0 - 2.0
Dry Film Thickness	5.0 - 8.5
Minimum	6.0 Mils

4. System 90-97: Zinc/Epoxy/Urethane

This system offers the added corrosion protection of a zinc rich primer. Series 90-97 Tneme-Zinc is an organic zinc-rich primer that can be used for field touch up of a zinc primer or for touch up of galvanized surfaces that are damaged.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 90-97 Tneme-Zinc	2.5 - 3.5
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 73 Endurashield III	2.0 - 3.0
Dry Film Thickness	6.5 - 9.5
Minimum	8.0 Mils

B. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 69.1: High Solids Epoxy

This coating will provide maximum protection. It offers chemical and corrosion resistance for long-term protection against salt spray, moisture, corrosive fumes, and chemical attack. Series 69 is a polyamidoamine cured epoxy. Primer coat must be touched-up before second coat is applied.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 69-1211 Epoxoline Primer II	3.0 - 5.0
2nd Coat: 69-Color Hi-Build Expoxoline II	4.0 - 6.0
Dry Film Thickness	7.0 - 11.0
Minimum	9.0 Mils

2. System No.66-2: High Build Epoxy

This system will provide chemical and corrosion resistance against abrasion, moisture, corrosion fumes, chemical contact and immersion in non-potable

water. Primer coat must be touched-up before second coat is applied. Substitute Series 161 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 69-1211 Epoxoline Primer	3.0 - 5.0
2nd Coat: 69-Color Hi-Build Expoxoline	4.0 - 6.0
Dry Film Thickness	7.0 - 11.0
Minimum	9.0 Mils

3. System No. 66-6: High Build Epoxy (Over OEM Finishes)

This system is to be used over standard manufacturer's primer to offer a high performance epoxy finish. Excellent for areas of rust not able to be completely cleaned.

Surface Preparation: Spot SSPC-SP6 Commercial Blast Cleaning or SSPC-SP11 Power Tool Cleaning to Bare Metal

Shop Coat: Manufacturer's Standard (or existing coating)	1.0 - 2.0
2nd Coat: 50-330 Poly-Ura-Prime	2.0 - 3.0
3rd Coat: 66-Color Hi-Build Expoxoline	2.0 - 4.0
Dry Film Thickness	5.0 - 9.0
Minimum	7.0 Mils

C. IMMERSION

1. System No. 69-2: High Solids Epoxy (Non-Potable Water)

This system provides maximum protection in immersion service. Scarify the surface before topcoating if the Series 69 has been exterior-exposed for 90 days or longer. If primer coat is damaged, it must be touched-up before second coat is applied.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 69-1211 Hi-Build Epoxoline II	3.0 - 5.0
2nd Coat: 69-Color Hi-Build Expoxoline II	6.0 - 8.0
Dry Film Thickness	9.0 - 13.0
Minimum	11.0 Mils

2. System No. 66-2: High Solids Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion. Primer coat must be touched-up before second coat is applied. Scarify the surface before topcoating if the Series 66 has been exterior-exposed for 60 days or longer. Substitute Series 161 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 66-1211 Epoxoline Primer	3.0 - 5.0
2nd Coat: 66-Color Hi-Build Expoxoline	3.0 - 5.0
3rd Coat: 66-Color Hi-Build Expoxoline	3.0 - 5.0
Dry Film Thickness	9.0 - 15.0
Minimum	11.0 Mils

3. System No. 20-1: Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside Paint System Number 1. Series 20 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Substitute Series FC20 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat:	
20-WH02 Pota-Pox (Tank White)	3.0 - 5.0
2nd Coat: 20-1255 Pota-Pox (Beige)	4.0 - 6.0
3rd Coat: 20-WH02 Pota-Pox (Tank White)	4.0 - 6.0
Dry Film Thickness	11.0 - 17.0
Minimum	12.0 Mils

4. System No. 140: High Solids Epoxy (Potable Water)

Series 140 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 140-1255 Pota-Pox II (Beige)	6.0 - 8.0
2nd Coat:	
140-WH02 Pota-Pox II (Tank White)	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

5. System No. 46-30: Coal Tar-Epoxy (Non-Potable Water Only)

May be applied in a two-coat application. Review critical recoat time if utilized.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning*

One Coat: 46H-413 Hi-Build Tneme Tar	
Minimum Dry Film Thickness	14.0 - 20.0

*SSPC-SP-6 Commercial Blast Cleaning may be used for non-immersion service.

6. System No. 46-26: Coal Tar Epoxy (Non-Potable Water Only)

Must be recoated within four days at 75deg F. Higher temperature will shorten recoat time.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning*

1st Coat: 46-413 Tneme Tar	8.0 - 10.0
2nd Coat: 46-413 Tneme Tar	8.0 - 10.0
Dry Film Thickness	16.0 - 20.0
Minimum	16.0 Mils

*SSPC-6 Commercial Blast Cleaning may be used for non-immersion service.

3.15 OVERHEAD METAL DECKING, JOIST

A. INTERIOR EXPOSURE
1. System No. 15-1: Uni-Bond

This system should be used on ceiling areas where a one-coat system is desired. Can be applied over steel, galvanized and aluminum decking, joist, beams, conduits and concrete.

Surface Preparation: Surfaces must be dry, clean and free of oil, grease and other contaminates. Allow concrete to cure 28 days.

Coating:15-Color Uni-Bond Dry Film Thickness 2.5 - 3.5

B. EXTERIOR EXPOSURE
1. System No. 135-1: Chembuild

This system can be applied over a wide variety of coatings and factory finishes. It can also be applied direct to galvanized aluminum decking, joists, conduits and tight rust.

Surface Preparation: Pressure clean to remove all dirt, oil, grease, chemicals and foreign contaminates. Remove loose paint and all rust by hand and power tool cleaning (SSPC-SP 2 & 3)

Coating:135-Color Chembuild Dry Film Thickness 3.0 - 5.0

3.16 MILL COATED STEEL PIPE

A. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)
1. System No. 66-3: Epoxy-Polyamide

This system can be applied directly to mill coated steel pipe without sandblasting for use in non-immersion. There may be some bleed through with the 1st coat. Do not apply over glossy varnish type mill coatings.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 66-1211 Epoxoline Primer	3.0 - 4.0
2nd Coat: 66-Color Hi-Build Expoxoline	4.0 - 6.0
3rd Coat: (If required)	(4.0 - 6.0)
Dry Film Thickness	11.0 - 16.0
Minimum	11.0 Mils

3.17 GALVANIZED STEEL - PIPE AND MISCELLANEOUS FABRICATIONS

A. EXTERIOR / (NON-IMMERSION)
1. System No. 73-1: Epoxy/High Build Urethane

Series 66 has excellent adhesion to galvanized steel. This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. First coat to be same color as or close to the finish color. Specify Series 74 Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP1 Solvent Cleaning

1st Coat: 66-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 73-Color Endura-Shield	2.0 - 4.0
Dry Film Thickness	4.0 - 8.0
Minimum	5.0 Mils

B. INTERIOR EXPOSURE (NON IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE
1. System No. 66-6: Polyamide Epoxy

Surface Preparation: SSPC-SP1 Solvent Cleaning

1st Coat: 66-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 4.0
Dry Film Thickness	4.0 - 8.0
Minimum	5.0 Mils

C. IMMERSION (POTABLE WATER)
1. System No. 20-1: Epoxy-Polyamide (Potable Water)

Series 20 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Substitute Series FC20 for low temperature cure of quick recoat.

Surface Preparation: SSPC-SP 7 Brush Off Blast Cleaning

1st Coat: 20-1255 Pota-Pox Primer	3.0 - 5.0
2nd Coat: 20-WH02 Pota-Pox Finish	4.0 - 6.0
Dry Film Thickness	7.0 -11.0
Minimum	9.0 Mils

3.18 CHAIN-LINK FENCES

A. GALVANIZED STEEL & NON-FERROUS METAL
1. System No. 22-1: Oil-Cementitious

Surface Preparation: Surface shall be clean and dry

One Coat: 22-Color Galv-Gard Dry Film Thickness 3.0 - 4.0

3.19 CONCRETE

A. EXTERIOR - ABOVE GRADE

1. System No. 52-1 Modified Epoxy - Sand Texture

Series 52 is a high build, decorative sand texture finish that hides minor surface irregularities and gives long-term protection against weather, driving rain, ultraviolet exposure, alternate freezing and thawing. Series 52 will actually become part of the concrete. Available in Series 55, Tneme-Crete smooth finish. For porous substrates, a second coat of Series 52 is required. Substitute Series 180 or 181 W.B. Tneme-Crete when specified over existing acrylic or latex coatings.

Surface Preparation: Surface shall be clean and dry.

One Coat: 52-Color Tneme-Crete Dry Film Thickness 8.0 - 10.0

2. System No. 6-1: Acrylic Emulsion Low Sheen

If semi-gloss finish is desired, use Series 7 Tneme-Cryl SG as the second coat.

Surface Preparation: Surface must be clean and dry.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3. System No. 156-1: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX (medium texture) or 159 Enviro-Crete XTX (coarse texture). For application over previously applied coatings, use TNEMEC Series 151 Elasto-Grip at 1.0 - 2.5 mils DFT prior to the application of Series 156 Enviro-Crete.

Surface Preparation: Surface must be clean and dry.

1st Coat: 156-Color Enviro-Crete	4.0 - 8.0
2nd Coat: 156-Color Enviro-Crete	4.0 - 8.0
Dry Film Thickness	8.0 - 16.0
Minimum	10.0 Mils

B. EXTERIOR - BELOW GRADE

1. System No. 46-61: Coal Tar Pitch Solution

Surface Preparation: Surface must be clean and dry, Level all protrusions.

1st Coat: 46-465 H.B. Tnemecol	8.0 - 12.0

2nd Coat: 46-465 H.B. Tnemecol	8.0 - 12.0
Dry Film Thickness	16.0 - 24.0
Minimum	16.0 Mils

2. System No. 46-31: Coal Tar-Epoxy

   Surface Preparation: Surface shall be clean and dry.

   One Coat: 46H-413 Hi-Build Tneme-Tar Dry Film Thickness 14.0 - 20.0

3. System No. 100-1: Crystaline Waterproofing

   This system can be applied to concrete that is still wet or has not developed final cure. It can be used where wet surface conditions exist or where there is the potential for water intrusion due to hydrostatic pressure. Application shall be per Xypex specification manual.

   Surface Preparation: Surface to be clean and roughened by Brush Blasting or Acid Etching.

   1st Coat: XYPEX Concentrate at 1.5 lbs/SY
   2nd Coat: XYPEX Modified at 1.5 lbs/SY

C. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 6-1: Acrylic Emulsion, Low Sheen (Interior/Exterior)

   This system will provide a decorative coating with good exterior durability, color retention, and a high vapor transmission rate. For Semi-Gloss finish, use 7-Color Tneme-Cryl S/G.

   Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

2. System No. 66-4: Epoxy-Polyamide (Interior/Exterior)

   Series 66 provides excellent protection from abrasion, moisture, corrosive fumes and chemical contact. For exterior exposures, topcoat with Series 73, or 74 Endura-Tone for gloss and color retention.

   Surface Preparation: Surfaces shall be clean and dry. Allow concrete to cure for 28 days. SSPC-SP-7 Brush-Off Blast Clean.

1st Coat: 66-Color Hi-Build Epoxoline	3.0 - 5.0
2nd Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
Dry Film Thickness	7.0 -11.0
Minimum	9.0 Mils

3. System No. 83-1: High Solids Catalyzed Epoxy

(Interior)

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days. SSPC-SP-7 Brush Off Blast Clean. Concrete block surfaces: Allow to cure 28 days. Level fins, protrusions and mortar splatter.

1st Coat: 83-Color Ceramlon II	6.0 - 10.0
2nd Coat: 83-Color Ceramlon II	6.0 - 10.0
Dry Film Thickness	12.0 - 20.0
Minimum	14.0 Mils

D. IMMERSION - POTABLE & NON-POTABLE WATER

1. System No. 66-4: Epoxy Polyamide (Non-Potable Water)

Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer.

Surface Preparation: SSPC-SP-7 Brush-Off Blast Cleaning

1st Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
2nd Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
Dry Film Thickness	8.0 -12.0
Minimum	10.0 Mils

2. System No. 104-5: High Solids Epoxy (Non-Potable Water)

Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer.

Surface Preparation: SSPC-SP-7 Brush-Off Blast Cleaning

1st Coat: 104-1255 H.S. Epoxy Primer	6.0 - 10.0
2nd Coat: 104 Color H.S. Epoxy	6.0 - 10.0
Dry Film Thickness	12.0 - 20.0
Minimum	14.0 Mils

3. System No. 46-31: Coal Tar-Epoxy (Non-Potable Water)

May be applied in a two-coat application. Review critical recoat time is utilized. Surface irregularities and bugholes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer.

Surface Preparation: Brush-Off Blast Cleaning

One Coat: 46H-413 Hi-Build Tneme-Tar Dry Film Thickness14.0-20.0

4. System No. 45-27: Coal Tar Epoxy (Non-Potable Only)

Must be recoated within four days at 75deg F. Higher temperature will shorten recoat time.

Surface Preparation: Brush-Off Blast Cleaning

1st Coat: 46-413 Tneme Tar	8.0 - 10.0
2nd Coat: 46-413 Tneme Tar	8.0 - 10.0
Dry Film Thickness	16.0 - 20.0
Minimum	16.0 Mils

5. System No. 20-2 Epoxy-Polyamide (Potable Water)

   This system meets American Water Works Association AWWA D 102 Inside System No. 1. Series 20 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer. (NSF Standard 61 approved). Substitute Series FC20 for low temperature cure or quick recoats.

   Surface Preparation: SSPC-SP10 Near White Blast Cleaning

1st Coat: 20-1255 Pota-Pox	4.0 - 6.0
2nd Coat: 20-WH02 Pota-Pox Finish	4.0 - 6.0
Dry Film Thickness	8.0 - 12.0
Minimum	10.0 Mils

6. System No. 139-2: Epoxy-Polyamine (Potable Water)

   Series 139 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer. (NSF Standard 61 approved.)

   Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

1st Coat: 139-1255 Pota-Pox II	6.0 - 8.0
2nd Coat: 139-WH02 Pota-Pox II	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

E. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 104-3: High Solids Expoxy

   This system will produce a slick, tile-like finish that has excellent chemical and water resistance. Surface will be easy to clean.

   Surface Preparation: Surface to be clean and dry.

1st Coat: 104-Color H.S. Epoxy	6.0 - 8.0
2nd Coat: 104-Color H.S. Epoxy	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

2. System No. 113-1: Acrylic-Epoxy Semi-Gloss

This system will provide high performance and can be applied directly over existing coatings without lifting. Can be used when low odor is required during application. Specify Series 114 Tneme-Tuffcoat for Gloss Finish.

Surface Preparation: Surface must be clean and dry.

One Coat: 113-Color Tneme-Tuffcoat Dry Film Thickness4.0 - 6.0

3.20 CONCRETE FLOORS

A. EPOXY FLOOR COATINGS

1. System No. 67-1: Epoxy-Polyamide

This system will provide a durable, long-wearing coating that bonds tightly to concrete and stands up under heavy foot traffic, frequent cleaning and spillage of water, oil, grease, or chemical.

Surface Preparation: Acid Etch or Brush-Off Blast Cleaning

1st Coat: 67-Color Tnema-Tread	2.0 - 3.0
2nd Coat: 67-Color Tnema-Tread	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

2. System No. S67-1: Epoxy-Polyamide (Non-Skid)

This system will provide the same protection and durability as System 67-1 with the addition of a non-skid finish.

Surface Preparation: Acid Etch or Brush-Off Blast Cleaning

1st Coat: S67-Color Tneme-Tread	2.0 - 3.0
2nd Coat: 67-Color Tneme-Tread	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3. System No. 73-12: Epoxy/Urethane

This system will provide maximum protection against chemical splash and spillage, wet conditions and abrasion. Specify Series 70 Endura-Shield for Gloss finish. First coat must be thinned 20% prior to application. For non-skid finish, specify Series S67 Tneme-Tread for the first and second coat.

Surface Preparation: Acid Etch or Brush-Off Blast Cleaning

1st Coat: 67-Color Tneme-Tread	2.0 - 3.0
2nd Coat: 67-Color Tneme-Tread	2.0 - 3.0
3rd Coat: 71-Color Endura-Shield	1.5 - 2.5
Dry Film Thickness	5.5 - 8.5
Minimum	6.5 Mils

4. System No. 281-1: High Build Polyamine-Epoxy Floor

Please refer to manufacturer's Installation Guide and Technical Data for proper installation.

Surface Preparation: Abrasive blast cleaning (refer to Installation Guide of manufacturer.

1st Coat: 201 Epoxoprime	6.0 - 8.0
2nd Coat: 281 Tneme-Glaze	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

5. System No. 221/281: Functional Flooring (Non-Slip)

Please refer to manufacturer's Installation Guide and Technical Data for proper installation.

Surface Preparation: Abrasive blast cleaning (refer to Installation Guide of manufacturer.

1st Coat: 201 Epoxoprime	6.0 - 8.0
2nd Coat: 221 Lami-Tread	1/8" (2 cts. @ 1/16" ea.)
3rd Coat: 281 Tneme-Glaze	8.0 - 12.0
Minimum Dry Film Thickness	1/4"+

3.21 POROUS MASONRY

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 52-2: Modified Epoxy - Sand Texture

First coat of Tneme-Crete will act as a filler coat while the second coat will completely seal and finish. Long-term life and high performance. Available in Series 55 Tneme-Crete smooth finish.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 52-Color Tneme-Crete 60 - 80 SF
2nd Coat: 52-Color Tneme-Crete Per Gal/Per Coat

2. System No. 6-2: Acrylic Emulsion, Low Sheen

This system will fill the block and provide a sealed surface. For Semi-Gloss Finish, use 7-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 54-562 Modified Epoxy Masonry Filler
80 SF Gal

2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
3rd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
	*4.0 - 6.0

*Total Dry Film Thickness of Topcoats Only.

3. System No. 66-15: Epoxy-Polyamide (Interior)

Block Filler is a modified epoxy designed for high moisture.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 54-660 Epoxy Masonry Filler	100 SF/Gal
2nd Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
3rd Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
	*8.0 - 12.0

*Total Dry Film Thickness of Topcoats Only.

4. System No. 104-6: High Solids Epoxy (Interior Only)

This system will produce a film thickness of 16 mils. The surface will be tile-like for easy cleaning and will provide protection against chemical attack, corrosive fumes, high humidity and wash down. Backfold first coat to fill porosity.

Surface Preparation: Surface to be clean and dry.

1st Coat: 104-Color H.S. Epoxy	6.0 - 10.0
2nd Coat: 104-Color H.S. Epoxy	6.0 - 10.0
Dry Film Thickness	12.0 - 20.0
Minimum	14.0 Mils

5. System No. 113-1: Acrylic-Epoxy Semi-Gloss (Interior Only)

Series 113 Tneme-Tufcoat has very low odor and can be used when painting in occupied areas. Specify Series 114 Tneme-Tufcoat for a gloss finish.

Surface Preparation: Surface must be clean and dry.

1st Coat: 130 Envirofill	100 SF/Gal
2nd Coat: 113-Color Tnema-Tufcoat*	4.0 - 6.0
	**4.0 - 6.0

* Two coats may be required if applied by roller
** Total Dry Film Thickness of Topcoats Only

6. System No. 156-1: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX (medium texture of 159 Enviro-Crete XTX - coarse texture). For application over previously applied coatings, use TNEMEC 151 Elasto-Grip at 1.0 - 2.5 mils DFT.

Surface Preparation: Surfaces must be clean and dry.

1st Coat: 130 Envirofil	100 SF/Gal
2nd Coat: 156-Color Enviro-Crete	4.0 - 8.0
3rd Coat: 156-Color Enviro-Crete	4.0 - 8.0

Dry Film Thickness	8.0 - 16.0
Minimum	10.0 Mils (For 2nd & 3rd Coats)

3.22 GYPSUM WALLBOARD

A. INTERIOR EXPOSURE

1. System No. 111-5: Acrylic-Epoxy

Surface Preparation: Surface must be clean and dry.

1st Coat: 51-792 PVA Sealer	1.0 - 2.0
2nd Coat: 113 H.B. Tnemetufcoat*	4.0 - 5.0
Dry Film Thickness	5.0 - 7.0
Minimum	6.0 Mils

*Two coats may be required if application is by brush and roller.

2. System No. 66-22: Hi-Build Epoxoline

Surface Preparation: Surface must be clean and dry.

1st Coat: 51-792 PVA Sealer	1.0 - 2.0
2nd Coat: 66-Color Hi-Build Epoxoline*	4.0 - 6.0
Dry Film Thickness	5.0 - 8.0
Minimum	5.0 Mils

*Two coats may be required if applied by roller

3. System No. 6-1: Acrylic Emulsion, Low Sheen (Interior/Exterior Exposure)

This system is designed for mild use areas like office walls, laboratory ceilings, stairwells, etc. For Semi-Gloss finish, use 7-color Tneme-Cryl S/G.

Surface Preparation: Surface must be dry and clean.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.23 WOOD

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 23-4: Alkyd Semi-Gloss

Specify Series 2H Hi-Build Tneme-Gloss for High Gloss finish.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 36-603 Undercoater	2.5 - 3.5
2nd Coat: 23 Enduratone	1.5 - 3.5

3rd Coat: 23 Enduratone	1.5 - 3.5
Dry Film Thickness	5.5 - 10.5
Minimum	6.0 Mils

2. System No. 6-5: Acrylic Latex

Substitute Series 7 if semi gloss finish is desired.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 36-603 Undercoater	2.0 - 3.5
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
3rd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	6.0 - 9.5
Minimum	7.5 Mils

3.24 PVC PIPE

A. EXTERIOR OR INTERIOR
1. System No. 66-23: Epoxy-Polyamide

Optional topcoat of Series 73/74 Endura-Shield would give long-term color and gloss retention for exterior exposure.

Surface Preparation: Surface shall be clean and dry.

One Coat: 66-Color Hi-Build Epoxoline Dry Film Thickness4.0 - 6.0

3.25 INSULATED PIPE

A. INTERIOR EXPOSURE
1. System No. 6-1: Acrylic Emulsion, Low Sheen

For semi-gloss finish, use 7-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.26 HIGH HEAT COATING

A. EXTERIOR/INTERIOR EXPOSURE
1. System No. 39-2: Silicone Aluminum (1200deg F Maximum)

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning - 1.0 Mil Surface Profile

1st Coat: 39-1261 Silicone Aluminum	1.0 - 1.5
2nd Coat: 39-1261 Silicone Aluminum	1.0 - 1.5
Dry Film Thickness	2.0 - 3.0

Minimum	2.0 Mils

2. System No. 39-4: Silicone Aluminum (600deg F Maximum)

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning - 1.0 Mil Surface Profile

1st Coat: 39-661 Silicone Aluminum	1.0 - 1.5
2nd Coat: 39-661 Silicone Aluminum	1.0 - 1.5
Dry Film Thickness	2.0 - 3.0
Minimum	2.0 Mils

3.27 SURFACES EXPOSED TO H2S/H2SO4 (SEVERE EXPOSURE/IMMERSION)

A. CEMENTITIOUS SURFACES

1. System No. 120-1: Vinester

Surface Preparation: Abrasive blast clean to remove all laitance, fines and contamination.

1st Coat: 120-5002 Vinester	6.0 - 10.0*
2nd Coat: 120-5003 Vinester F&S	As Required**
3rd Coat: 120-5002 Vinester	12.0 - 18.0
4th Coat: 120-5001 Vinester	12.0 - 18.0
Dry Film Thickness	30.0 - 46.0
Minimum	36.0 Mils+

*First coat is to be applied by roller application or spray applied followed by backrolling.

**All surface voids, cracks, pinholes and other defects must be filled flush with the adjacent surfaces by putty knife, trowel, float, squeegee, or other suitable method.

B. FERROUS METAL SURFACES

1. System No. 120-2: Vinyl Ester

Surface Preparation: SSPC-SP-5 White Metal Blast Cleaning (3.0 Mil Profile)

1st Coat: 120-5002 Vinester	12.0 - 18.0
2nd Coat: 120-5001 Vinester	12.0 - 18.0
Dry Film Thickness	24.0 - 36.0
Minimum	30.0 Mils

3.28 EXTERIOR OF PRESTRESSED CONCRETE TANKS

A. System No. 156-1: New Tanks

Surface Preparation: Surface to be clean and dry.

1st Coat: 156-Color Envirocrete	4.0 - 6.0
2nd Coat: 156-Color Envirocrete	4.0 - 6.0
Dry Film Thickness	8.0 - 12.0
Minimum	10.0 Mils

B. System No. 156-2: Existing Tanks (Previously Painted)

Major cracks (wider than 1/64") can be repaired with TNEMEC Series 152 Tneme-Tape per instructions.

Surface Preparation: Remove all dirt, oil, grease, chalk, and loose paint per high pressure water blast (min. 3500 psi).

1st Coat: 151 Elasto-Grip	1.0 - 2.5
Stripe Coat: Stripe all hairline cracks	3.0 - 5.0 with a brushed coat of Series 156 Envirocrete
Topcoat: 156-Envirocrete	4.0 - 6.0
Dry Film Thickness (Cracks)	8.0 - 13.5
Dry Film Thickness (Other)	5.0 - 8.5

3.29 SECONDARY CONTAINMENT AREAS

A. System No. 66-4: Epoxy Polyamide

This system will provide excellent resistance to most chemicals including petrochemicals.

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast)

Primer: 66-Color Hi-Build Epoxoline	4.0 - 6.0
Topcoat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
Dry Film Thickness	8.0 - 12.0
Minimum	10.0 Mils

B. System No. 61-1: Amine Epoxy

This system offers superior chemical resistance to a wide range of chemicals. Use TNEMEC Series 63-1500 between coats as a filler and surfacer wherever it is required.

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast).

Primer: 61-5002 Tneme-Liner (Beige)	8.0 - 12.0
Topcoat: 61-5001 Tneme-Liner (Gray)	8.0 - 12.0
Dry Film Thickness	16.0 - 24.0

C. System 262-1: Flexible Polyurethane

Multiple passes may be required to achieve recommended film thickness. See Elasto-Shield application guide for additional instructions. This product is only available in black.

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast)

Coating: 262 Elasto Shield (Black) Minimum Dry Film Thickness50.0

3.30 CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK

A. Silane Sealer (Min. 20% Solids)

Surface Preparation: Allow new concrete to cure 28 days. Clean surfaces to be sealed by abrasive blasting or waterblasting.

COATING: BRICK, CONCRETE
HULS Chem-Trete BSM 20....75-200 SF/GAL

SPLIT FACED OR POROUS MASONRY
HULS Chemtrete PB.....35-100 SF/GAL

3.31 MANHOLES, WET WELLS AND LIFT STATIONS

A. System No. 120-1: Vinester

Surface Preparation: Abrasive blast clean to remove all laitance, fines and contamination.

1st Coat: 120-5002 Vinester	6.0 - 10.0*
2nd Coat: 120-5003 Vinester F&S	As Required**
3rd Coat: 120-5002 Vinester	12.0 - 18.0
4th Coat: 120-5001 Vinester	12.0 - 18.0
Dry Film Thickness	30.0 - 46.0
Minimum	36.0 Mils+

*First coat to be applied by roller application or spray applied followed by backrolling.

**All surface voids, cracks, pinholes and other defects must be filled flush with the adjacent surfaces by putty knife, trowel, float, squeegee, or other suitable method.

B. System No. 100-1: Crystaline Waterproofing

This system can be applied to concrete that is still wet or has not developed final cure. It can be used where wet surface conditions exist or where there is the potential for water intrusion due to hydrostatic pressure.

Surface Preparation: Surface to be clean and roughened by Brush Blasting or Acid Etching.

1st Coat: XYPEX Concentrate @ 1.5 lbs./SY
2nd Coat: XYPEX Modified @ 1.5 lbs./SY

3.32 CANAL PIPE CROSSINGS

A. System 90-97: Zinc/Epoxy/Urethane for New Pipe or Pipe Requiring Removal of Existing Coatings

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Primer: 90-97 Tneme-Zinc	2.5 - 3.5
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 74-Color Endurashield	2.0 - 3.0
Dry Film Thickness	6.5 - 9.5
Minimum	8.0 Mils

B. System No. 135-2: High Build, High Gloss Urethane for Marginally Cleaned Surfaces or Topcoating Over Existing Systems

Surface Preparation: High Pressure Water Blast (min. 3500 psi) or Solvent Clean (SSPC-SP1) and Spot Hand and Power Tool Clean (SSPC-SP 2 & 3) or Brush Blast (SSPC-SP7). Existing coatings must be clean, dry and tightly adhering prior to application of coatings.

1st Coat: 135-Color Chembuild	3.0 - 4.0
2nd Coat: 74-Color Endurashield	2.0 - 3.0
Minimum Dry Film Thickness	5.0

C. Ductile Iron Pipe (Above grade)

A test patch is always recommended to insure proper adhesion to existing coatings without lifting of existing coatings.

Surface Preparation: Clean and dry. (Do not solvent clean.)

1st Coat: TNEMEC Series 66*	3.0 - 5.0
2nd Coat: TNEMEC Series 66	3.0 - 5.0
Minimum Dry Film Thickness	6.0 - 10.0

*Allow the black asphaltic coating to "bleed" through the first coat. After the first coat is cured, apply second coat.

3.33 PROJECT DESIGNER SYSTEMS REFERENCE GUIDE

A. STEEL
   1. EXTERIOR (NON-IMMERSION)
      a. System No. 73-1: Epoxy/High Build Urethane
      b. System No. 73-2: High Build Urethane
      c. System No. 2H-3: Alkyd Gloss
      d. System 90-97: Zinc/Epoxy/Urethane
   2. INTERIOR EXPOSURE (NON-IMMERSION)
      a. System No. 69-1: High Solids Epoxy
      b. System No. 66-2: High Build Epoxy

c. System No. 66-6: High Build Epoxy

3. IMMERSION
   a. System No. 69-2: High Solids Epoxy (Non-Potable)
   b. System No. 66-2: High Build Epoxy (Non-Potable)
   c. System No. 20-1: Epoxy-Polyamide (Potable)
   d. System No. 140: High Solids Epoxy (Potable Water)
   e. System No. 46-30: High Build Coat Tar Epoxy (Non-Potable Only)
   f. System No. 46-26: Coal Tar Epoxy (Non Potable Water Only)

B. OVERHEAD METAL DECKING, JOIST (INTERIOR EXPOSURE)
   1. System No. 15-1: Uni-Bond

C. OVERHEAD METAL DECKING, JOINT (EXTERIOR EXPOSURE)
   1. System No. 135-1: Chembuild

D. MILL COATED STEEL PIPE
   1. System No. 66-3: Epoxy Polyamide

E. GALVANIZED STEEL-PIPE AND MISCELLANEOUS FABRICATORS
   1. System No. 73-1: Epoxy/High Build Urethane

F. GALVANIZED STEEL-INTERIOR EXPOSURE (NON-IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE
   1. System No. 66-6: Polyamide Epoxy

G. GALVANIZED STEEL - IMMERSION (POTABLE WATER)
   1. System No. 20-1: Epoxy Polyamide (Potable Water)

H. CHAIN LINK FENCES
   1. System No. 22-1: Oil-Cementitious

I. CONCRETE
   1. EXTERIOR-ABOVE GRADE
      a. System No. 52-1: Modified Epoxy-Sand Texture
      b. System No. 6-1: Acrylic Emulsion Low Sheen
      c. System No. 156-1: Modified Acrylic Elastomer
   2. EXTERIOR-BELOW GRADE
      a. System No. 46-61: Coal Tar Pitch Solution
      b. System No. 46-31: Coal Tar Epoxy
      c. System No. 100-1: Crystaline Waterproofing
   3. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)
      a. System No. 6-1: Acrylic Emulsion Low Sheen
      b. System No. 66-4: Epoxy-Polyamide
      c. System No. 83-1: High Solids Catalyzed Epoxy
   4. IMMERSION (POTABLE & NON-POTABLE)
      a. System No. 66-4: Epoxy-Polyamide (Non-Potable)
      b. System No. 104-5: High Solids Epoxy (Non-Potable)
      c. System No. 46-31: High Build Coal Tar Epoxy (Non-Potable Only)
      d. System No. 46-27: Coal Tar Epoxy (Non Potable Only)
      e. System No. 20-2: Epoxy Polyamide (Potable)
      f. System No. 139-2: Epoxy Polyamide (Potable)
   5. INTERIOR EXPOSURE (NON-IMMERSION)
      a. System No. 104-3: High Solids Epoxy

b. System No. 113-1: Acrylic Epoxy Semi-Gloss

J. CONCRETE FLOORS
1. System No. 67-1: Epoxy-Polyamide
2. System No. S67-1: Epoxy-Polyamide (Non-Skid)
3. System No. 73-12: Epoxy/Urethane
4. System No. 281-1: High Build Polyamide-Epoxy Flooring
5. System No. 221/281: Functional Flooring (Non-Slip)

K. POROUS MASONRY - EXTERIOR/INTERIOR EXPOSURE
1. System No. 52-2: Modified Epoxy-Sand Texture
2. System No. 6-2: Acrylic Emulsion, Low Sheen
3. System No. 66-15: Epoxy-Polyamide (Interior)
4. System No. 104-6: High Solids Epoxy (Interior Only)
5. System No. 113-1: Acrylic Epoxy Semi-Gloss (Interior Only)
6. System No. 156-1: Modified Acrylic Elastomer

L. GYPSUM WALLBOARD
1. System No. 111-5: Acrylic Epoxy
2. System No. 66-22: Hi-Build Epoxoline
3. System No. 6-1: Acrylic Emulsion, Low Sheen

M. WOOD EXTERIOR/INTERIOR EXPOSURE
1. System No. 23-4: Alkyd Semi-Gloss
2. System No. 6-5: Acrylic Latex

N. PVC PIPE EXTERIOR/INTERIOR EXPOSURE
1. System No. 66-23: Epoxy-Polyamide

O. INSULATED PIPE-INTERIOR EXPOSURE
1. System No. 6-1: Acrylic Emulsion, Low Sheen

P. HIGH HEAT SURFACES-FERROUS METAL
1. System No. 39-2: Silicone Aluminum (1200deg F Maximum)
2. System No. 39-4: Silicone Aluminum (600deg F Maximum)

Q. SURFACES EXPOSED TO H2S/H2SO4 (SEVERE EXPOSURE/IMMERSION)
1. System No. 120-1: Vinester

R. EXTERIOR OF PRESTRESSED CONCRETE TANKS
1. System 156-1: New Tanks
2. System 156-2: System 156-2 Existing Tanks (Previously Painted)

S. SECONDARY CONTAINMENT AREAS
1. System No. 64-4: Epoxy Polyamide
2. System No. 61-1: Amine Epoxy
3. System No. 262-1: Flexible Polyurethane

T. CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK
1. Silane Sealer (Min. 20% Solids)

U. MANHOLES, WET WELLS & LIFT STATIONS

1. System No. 120-1: Vinester
2. System No. 100-1: Crystaline Waterproofing

V. CANAL PIPE CROSSINGS
1. System No. 90-97: Zinc/Epoxy/Urethane
2. System No. 135-2: High Build/High Gloss Urethane
3. Ductile Iron Pipe Above Grade: Series 66 High Build Epoxy

3.34 COATING SCHEDULE - TO BE DEVELOPED BY PROJECT AS NEEDED

END OF SECTION

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SECTION 09960

COATINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Field applied coatings.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D 4262 - Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
   2. D 4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
   3. D 4285 - Standard Test Method for Indicating Oil or Water in Compressed Air.
   4. D 4541 - Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.

B. NACE International, The Corrosion Society (NACE):
   1. RPO188-99 - Discontinuity (Holiday) Testing of Protective Coatings.

C. National Association of Pipe Fabricators (NAPF):
   1. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.

D. NSF International (NSF):
   1. 61 - Drinking Water System Components - Health Effects.

E. SSPC - Society for Protective Coatings:
   1. SP1 - Solvent Cleaning.
   2. SP2 - Hand Tool Cleaning.
   3. SP3 - Power Tool Cleaning.
   4. SP5 - White Metal Blast Cleaning.
   5. SP6 - Commercial Blast Cleaning.
   6. SP7 - Brush-Off Blast Cleaning.
   7. SP10 - Near-White Blast Cleaning.
   8. SP 11 - Power Tool Cleaning to Bare Metal.
   9. SP 12 - Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.

F. Underwriters' Laboratory, Inc. (UL):
   1. 3P83 - Drinking Water System Components - Health Effects.

1.03 DEFINITIONS

A. Submerged Metal: Steel or iron surfaces below tops of channel or structure walls which will contain water even when above expected water level.

B. Submerged Concrete and Masonry Surfaces: Surfaces which are or will be:
   1. Underwater.
   2. In structures which normally contain water.
   3. Below tops of walls of water containing structures.

C. Exposed Surface: Any metal or concrete surface, indoors or outdoors that is exposed to view.

D. Dry Film Thickness (DFT): Thickness of fully cured coating, measured in mils.

E. Volatile Organic Compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon, as determined by EPA Method 24.

F. Ferrous: Cast iron, ductile iron, wrought iron, and all steel alloys except stainless steel.

G. Where SSPC surface preparation standards are specified or implied for ductile iron pipe or fittings, the equivalent NAPF surface preparation standard shall be substituted for the SSPC standard.

1.04 PERFORMANCE REQUIREMENTS

A. Coating materials for concrete and metal surfaces shall be especially adapted for use in wastewater treatment plants.

B. Coating for final coats shall be fume resistant, compounded with pigment suitable for exposure to sewage gases, especially to hydrogen sulfide and to carbon dioxide.

C. Pigments shall be materials that do not darken, discolor, or fade due to action of sewage gases.

1.05 SUBMITTALS

A. General: Submit in accordance with Section 01730.

B. Shop Drawings: Include schedule of where and for what use coating materials are proposed in accordance with requirements for Product Data.

C. Product Data: Include description of physical properties of coatings including solids content and ingredient analysis, VOC content, temperature resistance, typical exposures and limitations, and manufacturer's standard color chips:
   1. Regulatory Requirements: Submit data concerning the following:
      a. Volatile organic compound limitations.
      b. Coatings containing lead compounds and PCBs.
      c. Abrasives and abrasive blast cleaning techniques, and disposal.
      d. NSF or UL certification of coatings for use in potable water supply systems.

D. Samples: Include 8-inch square drawdowns or brush-outs of topcoat finish when requested. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.

E. Certificates: Submit in accordance with requirements for Product Data.

F. Manufacturer's Instructions: Include the following:
1. Special requirements for transportation and storage.
2. Mixing instructions.
3. Shelf life.
4. Pot life of material.
5. Precautions for applications free of defects.
6. Surface preparation.
7. Method of application.
8. Recommended number of coats.
9. Recommended dry film thickness (DFT) of each coat.
10. Recommended total dry film thickness (DFT).
11. Drying time of each coat, including prime coat.
12. Required prime coat.
13. Compatible and non-compatible prime coats.
14. Recommended thinners, when recommended.
15. Limits of ambient conditions during and after application.
16. Time allowed between coats (minimum and maximum).
17. Required protection from sun, wind and other conditions.
18. Touch-up requirements and limitations.
19. Material Safety Data Sheet.

G. Manufacturer's Representative's Field Reports.

H. Operations and Maintenance Data: Submit as specified in Section 01770.
1. Reports on visits to project site to view and approve surface preparation of structures to be coated.
2. Reports on visits to project site to observe and approve coating application procedures.
3. Reports on visits to coating plants to observe and approve surface preparation and coating application on items that are "shop coated."

I. Quality Assurance Submittals:
1. Quality Assurance plan.
2. Qualifications of coating applicator including List of Similar Projects.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications:
1. Minimum of 5 years experience applying specified type or types of coatings under conditions similar to those of the Work:
a. Provide qualifications of applicator and references listing 5 similar projects completed in the past 2 years.
2. Manufacturer approved applicator when manufacturer has approved applicator program.
3. Approved and licensed by polymorphic polyester resin manufacturer to apply polymorphic polyester resin coating system.
4. Approved and licensed by elastomeric polyurethane (100 percent solids) manufacturer to apply 100 percent solids elastomeric polyurethane system.

5. Applicator of off-site application of coal tar epoxy shall have successfully applied coal tar epoxy on similar surfaces in material, size, and complexity as on the Project.

B. Regulatory Requirements: Comply with governing agencies regulations by using coatings that do not exceed permissible volatile organic compound limits and do not contain lead.

C. Certification: Certify that applicable pigments are resistant to discoloration or deterioration when exposed to hydrogen sulfide and other sewage gases and product data fails to designate coating as "fume resistant."

D. Compatibility of Coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise.

E. Services of Coating Manufacturers Representative: Arrange for coating manufacturers representative to attend pre-installation conferences. Make periodic visits to the project site to provide consultation and inspection services during surface preparation and application of coatings, and to make visits to coating plants to observe and approve surface preparation procedures and coating application of items to be "shop primed and coated".

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products in accordance with Section 01600.

B. Remove unspecified and unapproved paints from Project site immediately.

C. Deliver containers with labels identifying the manufacturer's name, brand name, product type, batch number, date of manufacturer, expiration date or shelf life, color, and mixing and reducing instructions.

D. Store coatings in well-ventilated facility that provides protection form the sun weather, and fire hazards. Maintain ambient storage temperature between 45 and 90 degrees Fahrenheit, unless otherwise recommended by the manufacturer.

E. Take precautions to prevent fire and spontaneous combustion.

1.08 PROJECT CONDITIONS

A. Surface Moisture Contents: Do not coat surfaces that exceed manufacturer specified moisture contents, or when not specified by the manufacturer, the following moisture contents:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete and Concrete Block: 12 percent.
   3. Interior Located Wood: 15 percent.
   4. Concrete Floors: 7 percent.

B. Do Not Apply Coatings:
   1. Under dusty conditions, unless tenting, covers, or other such protection is provided for structures to be coated.
   2. When light on surfaces measures less than 15 foot-candles.

3. When ambient or surface temperature is less than 50 degrees Fahrenheit unless manufacturer allows a lower temperature.
4. When relative humidity is higher than 85 percent.
5. When surface temperature is less than 5 degrees Fahrenheit above dew point.
6. When surface temperature exceeds the manufacturer's recommendation.
7. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.
8. Apply clear finishes at minimum 65 degrees Fahrenheit.

C. Provide fans, heating devices, dehumidifiers, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.

D. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 50 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes.

1.09 SEQUENCING AND SCHEDULING

A. Not Used.

1.10 MAINTENANCE

A. Extra Materials: Include minimum 1 gallon of each type and color of coating applied:
1. When manufacturer packages material in gallon cans, deliver unopened labeled cans as comes from factory.
2. When manufacturer does not package material in gallon cans, deliver material in new gallon containers, properly sealed and identified with typed labels indicating brand, type and color.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Special Coatings: One of the following or equal:
1. Ameron: Ameron International, Brea, CA.
2. Carboline: Carboline, St. Louis, MO.
3. Ceilcote: Ceilcote Corrosion Control, Brecksville, OH.
4. Dampney: The Dampney Company, Everett, MA.
5. Devoe: Devoe Coatings, Louisville, KY.
6. Dudick: Dudick, Inc., Streetsboro, OH.
7. Enduraflex: Global Eco Technologies, Pittsburg, CA.
8. IET: Integrated Environmental Technologies, Santa Barbara, CA.
9. PPC: Polymorphic Polymers Corp., N. Miami, FL.
10. Sanchem: Sanchem, Chicago, IL.
11. Superior: Superior Environmental Products, Inc., Addison, TX.
12. S-W: Sherwin-Williams Co., Cleveland, OH.
13. Tnemec: Tnemec Co., Kansas City, MO.
14. Wasser: Wasser High Tech Coatings, Kent, WA.

2.02 PREPARATION AND PRETREATMENT MATERIALS

A. Metal Pretreatment: As manufactured by one of the following or equal:
   1. Ameron: Galvaprep.
   2. International: Galvaprep 5 or Alumiprep 33.
   3. S-W: P60G2, Wash Primer.
   4. Tnemec: Series N69 Hi-Build Epoxoline II.

B. Surface Cleaner and Degreaser: As manufactured by one of the following or equal:
   1. Carboline Surface Cleaner No.3.
   2. Devoe: Devprep 88.
   3. S-W: Clean and Etch.

2.03 COATING MATERIALS

A. Alkali Resistant Bitumastic: As manufactured by one of the following or equal:
   1. Carboline: Bitumastic Super Service Black.
   2. S-W: Corothane I Coal Tar, B65B11.
   3. Tnemec: 46-465.
   4. Wasser: MC-Tar.

B. Wax Coating: As manufactured by one of the following or equal:
   1. Sanchem: No-Ox-Id A special.

C. High Solids Epoxy Primer Not less than 80 Percent Solids by Volume: As manufactured by one of the following or equal:
   1. Ameron: Amerlock 2.
   2. Carboline: Carbogard 891.
   3. Devoe: Bar Rust 233H.
   4. S-W: Macropoxy HS.
   5. Tnemec:
      a. Series 135 Chembuild (non-immersion service).
      b. Series 104 HS (immersion service).

D. High Solids Epoxy Not less than 80 Percent Solids by Volume: As manufactured by one of the following or equal:
   1. Ameron: Amerlock 2.
   2. Carboline: Super Hi-Gard 891.
   3. Devoe: Bar Rust 233H.
   4. S-W: Macropoxy HS.
   5. Tnemec:
      a. Series 135 Chembuild (non-immersion service).
      b. Series 104 HS (immersion service).

E. Aliphatic or Aliphatic-Acrylic Polyurethane: As manufactured by one of the following or equal:
   1. Ameron: Amercoat 450HS.
   2. Carboline: Carbothane 134HG.
   3. Devoe: Devthane 379.
   4. S-W: High Solids Polyurethane.
   5. Tnemec:Series 1075 (U) Endura-Shield II.

F. Polymorphic Polyester Resin Coating System: 2 component, modified styrene based thermoset resin, EPA approved for potable water, with 100 percent solids and maximum 10 grams per liter volatile organic compounds. Final coat color as selected by ENGINEER. As manufactured by one of the following or equal:
   1. IET: IET Prime Coat DS-101, Intermediate Coat DS-301, and Finish Coat DS-401.
   2. PPC: PPC Prime Coat, IC-Filler Coat, and FC-Final Coat.

G. High Temperature Coating 150 to 350 Degrees Fahrenheit: As manufactured by one of the following or equal:
   1. Ameron: Amerlock 2/400 GFK.
   2. Carboline: Thermaline 4900.
   3. Dampney: Thermalox 245 Silicone - Zinc Dust.
   4. Devoe: Derflex 659.
   5. S-W: EPO-PHEN.

H. High Temperature Coating 400 to 1,000 Degrees Fahrenheit (Dry): As manufactured by one of the following or equal:
   1. Ameron: Amercoat 892HS.
   2. Carboline: Thermaline 4700.
   3. Dampney: Thermalox 230 Series Silicone, or Thermolox 230 Series Silicone.
   4. Devoe: HT-12, High Heat Silicone.
   5. S-W: B59S8, Silver-Brite.
   6. Tnemec: Series 39, Silicone Aluminum.

I. High Temperature Coating Up to 1,400 Degrees Fahrenheit: As manufactured by the following or equal:
   1. Dampney: Thermalox 240 Silicone Ceramix.

J. Asphalt Varnish: AWWA C 500.

K. Protective Coal Tar: As manufactured by one of the following or equal:
   1. Carboline: Bitumastic No. 50.
   2. S-W: Cooper Black, No. 750.
   3. Tapecoat Co.: T.C. Mastic.

L. Coal Tar Epoxy: As manufactured by one of the following or equal:
   1. Ameron: 78HB.
   2. Ceilcote: Flexetar 661.
   3. Carboline: 300-M, Bitumastic.
   4. Devoe: Devtar 247.
   5. S-W: B69B60 Tar Guard.
   6. Tnemec: Series 46H-413.

M. Vinyl Ester: Glassmat reinforced, total system 125 mils DFT. As manufactured by one of the following or equal:
   1. Carboline: Semstone 870.
   2. Ceilcote: 664 Ceilcrete.
   3. Dudick: Protecto-Line 800.

N. Elastomeric Polyurethane, 100 Percent Solids, ASTM D16, Type V, (Urethane P): As manufactured by one of the following or equal:
   1. Endura-Flex: Endura-Flex EF-1988.

O. Concrete Floor Coatings: As manufactured by one of the following or equal:
   1. Carboline: Semstone 140SL..
   2. Devoe: Derran 124.
   3. Dudick: Polymer Alloy 1000.

2.04 MIXES

A. Mix epoxy parts in accordance with manufacturer's instructions.

B. Mix coal tar epoxy in containers furnished by manufacturer for mixing purposes. Mix unit quantities only. Use power mixer for minimum time recommended by manufacturer. Do not include time during pouring or stirring in mixing time.

PART 3 EXECUTION

3.01 GENERAL PROTECTION

A. Protect adjacent surfaces from coatings and damage. Repair damage resulting from inadequate or unsuitable protection:

B. Protect adjacent surfaces not to be coated from spatter and droppings with drop cloths and other coverings:
   1. Mask off surfaces of items not to be coated or remove items from area.

C. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being coated and in particular, surfaces within storage and preparation area.

D. Place cotton waste, cloths and material which may constitute fire hazard in closed metal containers and remove daily from site.

E. Remove electrical plates, surface hardware, fittings and fastenings, prior to application of coating operations. Carefully store, clean and replace on completion of coating in each area. Do not use solvent or degreasers to clean hardware that may remove permanent lacquer finish.

3.02 GENERAL PREPARATION

A. Prepare surfaces in accordance with coating manufacturer's instructions, unless more stringent requirements are specified in this Specification.

B. Protect Following Surfaces from Abrasive Blasting by Masking, or Other Means:
   1. Threaded portions of valve and gate stems.
   2. Machined surfaces for sliding contact.
   3. Surfaces to be assembled against gaskets.
   4. Surfaces of shafting on which sprockets are to fit.
   5. Surfaces of shafting on which bearings are to fit.
   6. Machined surfaces of bronze trim, including those slide gates.
   7. Cadmium-plated items except cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment requiring abrasive blasting.
   8. Galvanized items, unless scheduled to be coated.

C. Protect installed equipment, mechanical drives, and adjacent coated equipment from abrasive blasting to prevent damage caused by entering sand or dust.

D. Concrete:
   1. Allow new concrete to cure for minimum of 28 days before coating.
   2. Clean concrete surfaces of dust, mortar, fins, loose concrete particles, form release materials, oil, and grease. Fill voids so that surface is smooth. Etch or brush off-blast clean in accordance with SSPC SP-7 to provide surface profile similar to 60 grit sandpaper, or as recommended by coating manufacturer.

E. Ferrous Metal Surfaces:
   1. Remove grease and oil in accordance with SSPC SP-1.
   2. Remove rust, scale, and welding slag and spatter, and prepare surfaces in accordance with appropriate SSPC standard as specified herein.
   3. Abrasive blast surfaces prior to coating.
   4. When abrasive blasted surfaces rust or discolor before coating, abrasive blast surfaces again to remove rust and discoloration.
   5. When metal surfaces are exposed because of coating damage, abrasive blast surfaces before touching-up.

F. Ferrous Metal Surfaces Not to be Submerged: Abrasive blast in accordance with SSPC SP-10, unless blasting may damage adjacent surfaces, prohibited or specified otherwise. Where not possible to abrasive blast, power tool clean surfaces in accordance with SSPC SP-3.

G. Ferrous Metal Surfaces to be Submerged: Unless specified otherwise, abrasive blast in accordance with SSPC SP-5 to clean and provide roughened surface profile of not less than 2 mils and not more than 4 mils in depth when measured with Elcometer 123, or as recommended by the coating manufacturer.

H. Ductile Iron Pipe and Fittings to be Lined or Coated: Abrasive blast clean in accordance with NAPF 500-03.

I. Sherardized, Aluminum, Copper, and Bronze Surfaces: Prepare in accordance with coating manufacturer's instructions.

J. Galvanized Surface:
   1. Degrease or solvent clean to remove oily residue.
   2. Power tool or hand tool clean or whip abrasive blast.
   3. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded physically, such as bolts, nuts, or preformed channels.

K. Shop Primed Metal:
   1. Certify that primers applied to metal surfaces in the shop are compatible with coatings to be applied over such primers in the field.
   2. Remove shop primer from metal to be submerged by abrasive blasting in accordance with SSPC SP-10, unless greater degree of surface preparation is required by coating manufacturer's representative.
   3. Correct abraded, scratched or otherwise damaged areas of shop prime coat by sanding or abrasive blasting in accordance with SSPC SP-6.
   4. When entire shop priming fails or has weathered excessively, or when recommended by coating manufacturer's representative, abrasive blast shop

prime coat to remove entire coat and prepare surface in accordance with SSPC SP-10.

5. When incorrect prime coat is applied, remove incorrect prime coat by abrasive blasting in accordance with SSPC SP-10.
6. When prime coat not authorized by ENGINEER is applied, remove unauthorized prime coat by abrasive blasting in accordance with SSPC SP-10.
7. Shop Applied Bituminous Paint or Asphalt Varnish: Abrasive blast clean shop applied bituminous paint or asphalt varnish from surfaces scheduled to receive non-bituminous coatings.

L. Abrasive blast cadmium-plated, zinc-plated, or sherardized fasteners in same manner as unprotected metal when used in assembly of equipment designated for abrasive blasting .

M. Abrasive blast components to be attached to surfaces which cannot be abrasive blasted before components are attached.

N. Grind sharp edges to approximately 1/16 inch radius before abrasive blast cleaning.

O. Remove and grind smooth all excessive weld material and weld spatter before blast cleaning.

P. PVC and FRP Surfaces:
   1. Prepare surfaces to be coated by light sanding and wipe-down with clean cloths, or by solvent cleaning in strict accordance with coating manufacturer's instructions.

Q. Cleaning of Previously Coated Surfaces:
   1. Utilize cleaning agent to remove soluble salts such as chlorides and sulfates from concrete and metal surfaces:
      a. Cleaning Agent: Biodegradable non-flammable and containing no volatile organic compounds.
      b. Manufacturer: Chlor-Rid International, Inc., or accepted equal.
   2. Cleaning of surfaces utilizing the decontamination cleaning agent may be accomplished in conjunction with abrasive blast cleaning, high pressure, washing, or hand washing as approved by the coating manufacturer's representative and the ENGINEER.
   3. Test cleaned surfaces in accordance with the cleaning agent manufacturer's instructions to ensure all soluble salts have been removed. Additional cleaning shall be carried out as necessary.
   4. Final surface preparation prior to application of new coating system shall be made in strict accordance with coating manufacturer's printed instructions.

3.03 MECHANICAL AND ELECTRICAL EQUIPMENT

A. Remove grilles, covers and access panels for mechanical and electrical system from location and coat separately.

B. Finish coat primed equipment with color selected by the OWNER.

C. Prime and coat insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with prefinished coating.

D. Replace identification markings on mechanical or electrical equipment when coated over or spattered.

E. Coat interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grilles and louvers with 1 coat of flat black paint, to limit of sight line.

F. Coat dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels.

G. Coat exposed conduit and electrical equipment occurring in finished areas with color and texture to match adjacent surfaces.

H. Coat both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.

I. Color code equipment, piping, conduit and exposed ductwork and apply color banding and identification, such as flow arrows, naming and numbering, in accordance with Divisions 15 and 16.

3.04 GENERAL APPLICATION REQUIREMENTS

A. Apply coatings in accordance with manufacturer's instructions.

B. Coat Metal Unless Specified Otherwise:
   1. Aboveground piping to be coated shall be empty of contents during application of coatings.

C. Verify metal surface preparation immediately before applying coating in accordance with SSPC Pictorial Surface Preparation Standard.

D. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.

E. Wash coat and prime sherardized, aluminum, copper, and bronze surfaces, or prime with manufacturer's recommended special primer.

F. Prime shop primed metal surfaces. Spot prime exposed metal of shop primed surfaces before applying primer over entire surface.

G. Apply minimum number of specified coats.

H. Apply coats to thicknesses specified, especially at edges and corners.

I. Apply additional coats when necessary to achieve specified thicknesses.

J. Coat surfaces without drops, ridges, waves, holidays, laps, or brush marks.

K. Remove spatter and droppings after completion of coating.

L. When multiple coats of same material are specified, tint prime coat and intermediate coats with suitable pigment to distinguish each coat.

M. Dust coatings between coats. Lightly sand and dust surfaces to receive high gloss finishes, unless instructed otherwise by coating manufacturer.

N. Apply coating by brush, roller, trowel, or spray, unless particular method of application is required by coating manufacturer's instructions or these Specifications.

O. Spray Application:
   1. Stripe coat edges by brush before beginning spray application, as necessary, to ensure specified coating thickness along edges.
   2. When using spray application, apply coating to thickness not greater than that recommended in coating manufacturer's instructions for brush coat application.
   3. Use airless spray method, unless air spray method is required by coating manufacturer's instruction or these Specifications.
   4. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist or spray.

P. Drying and Recoating:
   1. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
   2. Limit drying time to that required by these Specifications or coating manufacturer's instructions.
   3. Do not allow excessive drying time or exposure which may impair bond between coats.
   4. Recoat epoxies within time limits recommended by coating manufacturer.
   5. When time limits are exceeded, abrasive blast clean prior to applying another coat.
   6. When limitation on time between abrasive blasting and coating cannot be met before attachment of components to surfaces which cannot be abrasive blasted, coat components before attachment.
   7. Ensure primer and intermediate coats of coating are unscarred and completely integral at time of application of each succeeding coat.
   8. Touch up suction spots between coats and apply additional coats where required to produce finished surface of solid, even color, free of defects.
   9. Leave no holidays.
   10. Sand and recoat scratched, contaminated, or otherwise damaged coating surfaces so damages are invisible to naked eye.

Q. Concrete:
   1. Apply first coat (primer) only when surface temperature of concrete is decreasing in order to eliminate effects of off-gassing on coating.

3.05 ALKALI RESISTANT BITUMASTIC

A. Preparation:
   1. Prepare surfaces in accordance with general preparation requirements.

B. Application:
   1. Apply in Accordance with General Application Requirements and as Follows:
      a. Apply at least 2 coats, 8 to 14 mils dry film thickness each.

3.06 WAX COATING

A. Preparation:
   1. Prepare surfaces in accordance with general preparation requirements.

B. Application:
   1. Apply in Accordance with General Application Requirements and as Follows:
      a. Apply at least 1/32-inch thick coat with 2-inch or shorter bristle brush.
      b. Thoroughly rub coating into metal surface with canvas covered wood block or canvas glove.

3.07 HIGH SOLIDS EPOXY SYSTEM

A. Preparation:
   1. Prepare surfaces in accordance with general preparation requirements and as follows:
      a. Abrasive blast ferrous metal surfaces to be submerged at jobsite in accordance with SSPC SP-5 prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-10.
      b. Abrasive blast non-submerged ferrous metal surfaces at jobsite in accordance with SSPC SP-10, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.
      c. Abrasive blast clean ductile iron surfaces in accordance with SSPC SP-7.

B. Application:
   1. Apply coatings in accordance with general application requirements and as follows:
      a. Apply minimum 2-coat system with minimum total dry film thickness (DFT) of 12 mils.
      b. Recoat or apply succeeding epoxy coats within time limits recommended by manufacturer. Prepare surfaces for recoating in accordance with manufacturer's instructions.
      c. Coat metal to be submerged before installation when necessary, to obtain acceptable finish and to prevent damage to other surfaces.
      d. Coat entire surface of support brackets, stem guides, pipe clips, fasteners, and other metal devices bolted to concrete.
      e. Coat surface of items to be exposed and adjacent 1 inch to be concealed when embedded in concrete or masonry.

3.08 HIGH SOLIDS EPOXY AND POLYURETHANE COATING SYSTEM

A. Preparation:
   1. Prepare surfaces in accordance with general preparation requirements and as follows:
      a. Prepare concrete surfaces in accordance with general preparation requirements.
      b. Touch up shop primed steel and miscellaneous iron.
      c. Abrasive blast ferrous metal surfaces at jobsite in accordance with SSPC SP-6, Commercial Blast Cleaning, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-6.
      d. Degrease or solvent clean, whip abrasive blast, power tool, or hand tool clean galvanized metal surfaces.

e. Lightly sand fiberglass and poly vinyl chloride (PVC) pipe to be coated and wipe clean with dry cloths, or solvent clean in accordance with coating manufacturer's instructions.
f. Abrasive blast clean ductile iron surfaces.

B. Application:
1. Apply Coatings in Accordance with General Application Requirements and as Follows:
a. Apply 3 Coat System Consisting of:
1) Primer: 4 to 5 mils dry film thickness high solids epoxy primer.
2) Intermediate Coat: 4 to 5 mils dry film thickness high solids epoxy intermediate coat.
3) Top Coat: 2.5 to 3.5 mils dry film thickness aliphatic or aliphatic-acrylic polyurethane topcoat.
2. Recoat or apply succeeding epoxy coats within 30 days or within time limits recommended by manufacturer, whichever is shorter. Prepare surfaces for recoating in accordance with manufacturer's instructions.
3. For fiberglass and PVC pipe, apply 1 coat high solids epoxy (4 to 5 mils DFT) and 2 coats aliphatic or aliphatic-acrylic polyurethane.

3.09 POLYMORPHIC POLYESTER RESIN SYSTEM

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements and as follows:
2. Prepare concrete to obtain clean, open pore with exposed aggregate in accordance with manufacturer's instructions.
3. Prepare ferrous metal surfaces in accordance with SSPC SP-5, White Metal Finish, with coating manufacturer's recommended anchor pattern.
4. Complete abrasive blast cleaning within 6 hours of applying prime coat. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-5.
5. When handling steel, wear gloves to prevent hand printing.
6. Adjust pH of concrete to within 5.5 to 8.0 before applying prime coat.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
2. Apply minimum dry film thickness system consisting of primer, tie coat and top coat in accordance with manufacturer's instructions as follows:
a. Steel: 35 mils.
b. Concrete: 45 mils.

3.10 HIGH TEMPERATURE COATING

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements and as follows:
2. Abrasive blast surface in accordance with SSPC SP-10.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:

a. Apply number of coats in accordance with manufacturer's instructions.

3.11 ASPHALT VARNISH

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
a. Apply minimum 2 coats.

3.12 PROTECTIVE COAL TAR

A. Preparation:
1. Prepare surfaces in accordance with general preparation coal tar requirements.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
a. Apply minimum 20 mils dry film thickness coating.

3.13 COAL TAR EPOXY

A. Not Used.

3.14 COAL TAR EPOXY SUBSTITUTE

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements and in accordance with the coating manufacturer's printed instructions.

B. Application:
1. Apply 2 coats at 6 mils to 8 mils each, for a minimum total DFT of 12 mils.

3.15 VINYL ESTER

A. Preparation:
1. Prepare surfaces in accordance with coating manufacturer's recommendations and as directed and approved by coating manufacturer's representative.

B. Application:
1. Apply prime coat, as required by coating manufacturer, base coat, glass mat, and topcoat to total dry film thickness of 125 mils minimum:
a. Final topcoat on floors shall include non-skid surface, applied in accordance with manufacturer's instructions.
2. Perform holiday detection test over 100 percent of coated surface areas to ensure pinhole free finished coating system.
3. All work shall be accomplished in strict accordance with coating manufacturer's instructions and under direction of coating manufacturer's representative.

3.16 ELASTOMERIC POLYURETHANE (100 PERCENT SOLIDS)

A. Preparation:
   1. Prepare surfaces in strict accordance with coating manufacturer's instructions and as directed and approved by coating manufacturer's representative.

B. Application:
   1. Apply epoxy primer at DFT of 1 to 2 mils, in strict accordance with manufacturer's instructions.
   2. Apply Polyurethane Coating at Minimum Total DFT as Follows:
      a. Steel: 60 mils DFT.
      b. Ductile Iron and Ductile Iron Pipe Coating and Lining: 30 mils DFT.
      c. Concrete: 120 mils DFT.
      d. Or as recommended by the coating manufacturer and accepted by the ENGINEER.
   3. For Concrete application, provide saw cutting for coating terminations in strict accordance with manufacturer's instructions:
      a. For application to damaged concrete, refer to Section 03925.

3.17 CONCRETE FLOOR COATINGS

A. Preparation:
   1. Prepare surfaces in accordance with general application requirements and in strict a accordance with coating manufacturer's instructions.

B. Application:
   1. Apply primer if required by coating manufacturer.
   2. Apply 1 or more coats as recommended by coating manufacturer to receive a minimum total dry film thickness of 25 mils, color as selected by OWNER.

C. Final topcoat shall include non-skid surface, applied in strict accordance with coating manufacturer's instructions.

3.18 FIELD QUALITY CONTROL

A. Each coat will be inspected. Strip and remove defective coats, prepare surfaces and recoat. When approved, apply next coat.

B. Control and check dry film thicknesses and integrity of coatings.

C. Measure dry film thickness with calibrated thickness gauge.

D. Dry film thicknesses on ferrous-based substrates may be checked with Elcometer Type 1 Magnetic Pull-Off Gauge or Positector 6000.

E. Verify coat integrity with low-voltage holiday detector. Allow ENGINEER to use detector for additional checking.

F. Check wet film thickness before coal tar epoxy coating cures on concrete or non-ferrous metal substrates.

G. Arrange for services of coating manufacturer's field representative to provide periodic field consultation and inspection services to ensure proper surface

preparation of facilities and items to be coated, and to ensure proper application and curing:

1. Notify ENGINEER 24 hours in advance of each visit by coating manufacturer's representative.
2. Provide ENGINEER with a written report by coating manufacturer's representative within 48 hours following each visit.

3.19 SCHEDULE OF ITEMS NOT REQUIRING COATING

A. General: Unless specified otherwise, the following items do not require coating:
   1. Items that have received final coat at factory and not listed to receive coating in field.
   2. Aluminum, brass, bronze, copper, plastic (except PVC pipe), rubber, stainless steel, chrome, Everdur, or lead.
   3. Buried or encased piping or conduit.
   4. Exterior Concrete.
   5. Galvanized roof decking, electrical conduits, pipe trays, cable trays, and other items:
      a. Areas on galvanized items or parts where galvanizing has been damaged during handling or construction shall be repaired as follows:
         1) Clean damaged areas by SSPC SP-1, SP-2, SP-3, or SP-7 as required.
         2) Apply 2 coats of a cold galvanizing zinc compound such as ZRC World Wide Inovatie Zinc Technologies of Marshfield, MA or accepted equal, in strict accordance with manufacturer's instructions.
   6. Grease fittings.
   7. Fiberglass ducting or tanks in concealed locations.
   8. Steel to be encased in concrete or masonry.

3.20 SCHEDULE OF SURFACES TO BE COATED IN THE FIELD

A. Not Used.

END OF SECTION

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SECTION 11202

FACTORY BUILT, AUTOMATIC PUMP STATION

PART 1 GENERAL

1.01 SCOPE

A. General
   1. The contractor shall furnish and install one factory-built, automatic pumping station as manufactured by Smith & Loveless, Inc.or approved equal. The station shall be complete with all needed equipment factory-installed in a welded steel chamber with welded steel entry tube and equipment tube to provide access and equipment removal.
   2. The principal items of equipment shall include three (3) vertical, close-coupled, motor driven, non-clog pumps; valves; internal piping; lighting; sump pump; ventilating blower; dehumidifier and all internal wiring, material handling systems, and environmental controls.

B. Responsibilities
   1. The factory-built pumping station shall be furnished to the Contractor by one manufacturer who shall be responsible to the Contractor for furnishing factory testing and warranting the systems.

1.02 QUALITY ASSURANCE

A. References
   1. The publications referred to hereinafter form a part of this specifications to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.
   2. American Society of Testing and Materials (ASTM):
      a. A-36, Standard Specification for Carbon Structural Steel
   3. American Welding Society (AWS)
      a. A5.1, Standard Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding
   4. National Fire Protection Association (NFPA) Publications:
      a. NFPA 70National Electrical Code
      b. NFPA 820Fire Protection in Wastewater Treatment & Collection Facilities
   5. Steel Structures Painting Council (SSPC) Publications:
      a. SSPC-SP-6Commercial Blast Cleaning

B. Qualifications
   1. Manufacturer shall be regularly engaged in the manufacture of factory-built sewage pumping stations for not less than five (5) years.

C. Single Source Responsibility
   1. Provide single source responsibility for all station components through supplier of package pump station.
   2. Coordinate electrical with Division 16 as shown on the drawings.

D. Warranty
   1. The Manufacturer of the station shall warranty for 36 months from date of start-up that the structure and all equipment it provides will be free from defects in material and workmanship. Warranties of the suppliers of various components in lieu of a single source responsibility by the Manufacturer will not be accepted. The Manufacturer shall assume prime responsibility for the warranty of the station and all components.
   2. In the event a component fails to perform as specified or is proven defective in service during the warranty period, the Manufacturer shall repair or replace, at its discretion, such defective part. It shall further provide, without cost, such labor as may be required to replace, repair or modify major components such as the steel structure, main pumps, main pump motors and main piping manifold. After start-up service has been performed, the labor to replace accessory items, such as the ventilating blower, dehumidifier, sump pump, etc. shall be the responsibility of others.
   3. The repair or replacement of those items normally consumed in service, such as seals, grease, light bulbs, etc., shall be considered as part of routine maintenance and upkeep.

1.03 SUBMITTALS

A. The Contractor shall submit information in accordance with Section 01730 to substantiate compliance with this specification. In addition, the following specific information shall be provided.

B. Shop Drawings
   1. The Contractor shall submit the following:
      a. Dimensional outline drawings showing the general arrangement, weight, and layout of the pumping station and all accessories, including identification of material selections and general method of construction. Drawings and information shall detail the specific unit accessories to be provided.
      b. Catalog data of all major equipment items, accessories, and instrumentation and control items.
      c. Complete custom documentation, schematic electrical diagrams and connection diagrams.
      d. Complete operating data for sewage pumps including pump performance curves.

C. Operation and Maintenance Manuals
   1. O&M manuals shall be furnished for the equipment herein specified in accordance with Section 01730, Operating and Maintenance Data.

D. Certificates
   1. Manufacturer's certificate as specified in Part 3.04, Manufacturer's Representative Services, relating to the item(s) of this section.

1.04 SUPPLIER'S AND/OR MANUFACTURER'S SERVICES

A. The Contractor shall provide the following services of technical representatives at the jobsite relating to the item(s) specified in this section. The number of days and scope of services indicated are minimum requirements not including travel time. Time for travel and all associated expenses of the technical representative shall also

be included at no additional cost to County. Trips included as follows:

2 labor days -Initial start-up of the system.
2 labor days -Finish start-up and Training of County personnel.

B. Startup services and training of County personnel shall be at such times as requested by the County. See Section 01730, Operating and Maintenance Data.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Equipment shall be a new product of the latest design by the same manufacturer. The manufacturer shall be Smith & Loveless, or approved equal.

B. The specifications and drawings detail and represent the minimum standard of quality for both equipment and materials of construction. The contractor shall prepare his bid on the basis of the particular equipment and materials specified for the purpose of determining the low bid.

2.02 PUMP CHAMBER

A. The pump chamber shall contain all pumps and other equipment and shall be sized as shown on the drawings. The top and bottom of the station shall be designed for the depth of bury involved plus additional surcharge. Steel plate shall meet or exceed ASTM A-36 specifications.

B. The exterior of the station shall be designed so all welds exposed to ground water after installation are continuous or sealed throughout their length so that water cannot seep between uncoated steel surfaces. In addition, the structure shall be designed so that sharp corners and similar difficult-to-coat conditions are held to an absolute minimum. The thickness of the steel walls and their reinforcements shall be determined by the structural requirements for the depth of bury involved. It shall be the responsibility of the Manufacturer to determine the structural requirements of the shell based on the external loads specified on the plans.

C. Lifting eyes adequate to support the entire weight of the pump station shall be provided and welded to the station head. Tie-down holes shall be provided for anchoring the discharge line at the point it leaves the station. A traveling beam hoist with 2-ton capacity shall be located on the ceiling of the pump station over the pumps at an adequate height to permit pump disassembly. Minimum maintenance clearances shall be as shown on the drawings or specified herein.

D. Two (2) sumps with walls of 1/4" structural-grade steel plate shall be provided. Where the ductile iron suction and discharge lines pass through the station walls, they shall be reinforced with 1/4" thick steel sleeves, welded inside and out to the station wall. The space between the ductile iron pipes and the steel sleeves shall be packed tight with portland cement grout containing aggregate to prevent leakage.

2.03 OPERATING CONDITIONS

A. Each pump shall be capable of delivering 2600 gallons per minute (GPM) of

wastewater against a total dynamic head (TDH) of 80-feet. The minimum acceptable pump efficiency at this condition shall be 75%. Due to the energy conservation requirements, the minimum efficiency will be enforced. The maximum allowable speed shall be 1170 RPM. The minimum rated horsepower of each pump motor shall be 100.

B. Two (2) pumps operating in parallel shall be capable of delivering 5200 GPM at 80-feet TDH.

C. All openings and passages shall be large enough to permit the passage of a sphere 3" in diameter.

2.04 PERSONNEL ENTRY TUBE AND EQUIPMENT REMOVAL TUBE

A. The staircase entry tube shall be provided in one section as shown on the drawings. The length shall be adequate to place the top above the finished floor of the electrical building as shown on the drawings and adjustable to accommodate differential changes in elevation after construction. The bottom of the entry tube shall be attached to a structural member, shop welded to the head of the pump station.

B. A 60-inch diameter equipment access and removal tube as shown on the drawings shall be provided. The length shall be adequate to place the top above the surrounding grade as shown on the drawings. The bottom of the equipment tube shall be attached to a structural member, shop welded to the head of the pump station. The tube will be capped as shown on the Drawings.

2.05 VENTILATION BLOWER

A. A steel ventilation duct with inlet vent shall be of a length adequate to place the blower above the surrounding grade as shown on the drawings. The inlet vent shall be covered with a screen to exclude rodents and foreign objects. The station-ventilating blower shall be connected directly to the inlet duct.

2.06 WELDING

A. All steel in the station structure shall be joined by electric arc welding with fillets of adequate section for the joint involved. Where required to exclude ground water, all welded joints on the exterior of the station shall be continuous throughout their length.

2.07 PROTECTION AGAINST CORROSION

A. All structural steel surfaces shall be factory blasted with steel grit to remove rust, mill scale, weld slag, etc. All weld spatter and surface roughness shall be removed by grinding. Surface preparation shall comply with SSPC-SP6 specifications. Immediately following cleaning, a single 6-mil dry film thickness of VERSAPOX® epoxy resin shall be factory applied. This finish coating shall be formulated for abrasion and corrosion resistance.

B. Stainless steel, aluminum and other corrosion resistant surfaces shall not be coated. Carbon steel surfaces not otherwise protected shall be coated with a suitable non-hardening rust preventative compound. Auxiliary components, such as the

electrical enclosure, ventilating blower and dehumidifier shall be furnished with the original manufacturer's coating.

C. Finish coating shall be accomplished prior to shipment of the station from the factory and shall comply fully with the intent of these specifications. The pump station manufacturer shall provide a touch-up kit for repair of any mars or scratches occurring during shipping and installation. This kit shall contain detailed instructions for use and shall be the same material as the original coating.

D. A heavy synthetic rubber mat shall be cemented to the station floor by the Manufacturer to protect the coating on the steel floor.

E. The station Manufacturer shall provide a minimum of eight (8) 17-pound magnesium anode packs for Cathodic protection. The anode packs shall be provided with 15-foot long insulated copper leads. The Manufacturer shall provide an anode test box(es) with milli-amp meter to benchmark and measure anode life to gauge when and if it is time for anode replacement throughout the life of the steel structure.

F. **CAUTION:** Purchasing contractor shall thoroughly review specifications and installation instructions for special anode lead connections, prior to back-filling station.

2.08 MAIN PUMPS

A. The pumps shall be 8-inch vertical, non-clog type of heavy cast iron construction, especially designed for the use of mechanical seals. In order to minimize seal wear caused by linear movement of the shaft, the shaft bearing nearest the pump impeller shall be locked in place so that end play is limited to the clearance within the bearing. To minimize seal water resulting from shaft deflection caused by the radial thrust of the pump, the shaft from the top of the impeller to the lower bearing supporting the impeller shall have a minimum diameter of 3 inches. The dimension from the lowest bearing to the top of the impeller shall not exceed 6 inches.

B. The oversized shaft incorporating oversized bearings and heavier bearing frame construction provides for extended mechanical seal, bearing and overall pump/motor life. Since the larger shaft with the specified minimum overhang is the key to heavier, more rigid construction throughout, no deviation from the specified shaft diameter or tolerances will be allowed.

C. The bearing nearest the impeller shall be designed for the combined thrust and radial load. The upper bearing shall be free to move linearly with the thermal expansion of the shaft and shall carry only radial loads.

D. The shaft shall be solid stainless steel through the mechanical seal to eliminate corrosion and abrasive rust particles. Removable shaft sleeves will not be acceptable if the shaft under the sleeve does not meet the specified minimum diameter.

E. The pump impeller shall be of the enclosed type made of close-grained cast iron and shall be balanced. The impeller shall be keyed with a stainless steel key and secured to the motor shaft by a stainless steel cap screw equipped with a Nylock or other suitable self-locking device. The impeller shall not be screwed or pinned to the motor-pump shaft and shall be readily removable without the use of special tools. To

prevent the buildup of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shroud. The shroud shall remain full diameter so that close minimum clearance from shroud to volute is maintained. Both the end of the shaft and the bore of the impeller shall be tapered to permit easy removal of the impeller from the shaft.

F. In order to reduce the number of registered fits required and minimize the possibility of unbalancing the motor rotor in relation to the impeller and mechanical seal, the motor shall be attached to the pump volute by a one-piece cast iron adapter and backhead. Pump construction incorporating sandwiched parts, such as the backhead, will not be allowed.

G. The pump shall be arranged so that the rotating element can easily be removed from the volute without disconnecting seal system or the electrical wiring or disassembling the motor, impeller, backhead or seal, so that any foreign object may be removed from the pump or suction elbow. Volute and/or suction elbow clean-outs are not acceptable substitutes.

H. A double mechanical seal installed in a bronze seal housing shall seal the pump shaft against leakage constructed in two (2) sections with registered fit. The housing shall be recessed into the pump backhead and securely fastened thereto with stainless steel cap screws. The inside of the seal housing shall be tapered to facilitate the replacement of the seal parts. The seals shall be of carbon and ceramic materials with the mating surfaces lapped to a flatness tolerance of one light band. The rotating ceramics shall be held in mating position with the stationary carbons by a stainless steel spring. The seal housing with assembled parts shall be so constructed as to be readily removable from the shaft as a unit and shall be provided with tapped jackscrew openings to assist in removing it from the backhead.

I. The seal shall be pressurized and lubricated by liquid taken directly from the pump backhead through a filter to the seal housing and introduced between the upper and lower sealing surfaces. The filter shall be of corrosion-resistant materials and shall screen out all solids larger than 50 microns. The seal system shall contain a brass valve connected near the top of the seal housing to permit the relief of any air trapped in the seal unit. A manually operated brass valve shall also be provided to vent the pump volute.

J. The pump volute shall be free from projections that might cause clogging or interfere with flow through the pump.

K. A heavy cast iron base with four legs shall support the pump. The height of the base shall be sufficient to permit the use of an increasing suction elbow, which shall be provided when the nominal pump size is smaller than the suction line. The suction and discharge openings shall be flanged, faced and drilled 125-pound American Standard.

2.09 MOTORS

A. The pump motors shall be Inverter Duty rated and labeled, 100 HP, 1170 RPM vertical, solid shaft, NEMA P-base, squirrel-cage induction type, suitable for 3 phase, 60 cycle, 460 volt electric current. The motors shall have Class F insulation, suitable for temperatures up to 105° C. Insulation temperature shall, however, be maintained below 80° C. The motors shall have normal starting torque and low

starting current, as specified by NEMA Design B characteristics. The motors shall be open drip-proof design with forced air circulation by integral fan. Openings for ventilation shall be uniformly spaced around the motor frame. Leads shall be terminated in cast connection box and shall be clearly identified.

B. The motors shall have 1.15 service factor. The service factor shall be reserved for the owner's protection. The motors shall not be overloaded beyond their nameplate rating, at the design condition, or at any head in the operating range as specified under Operating Conditions.

C. The motor-pump shaft shall be centered, in relation to the motor base, within 0.005 inches. The shaft run-out shall be limited to 0.003 inches.

D. The motor shaft shall equal or exceed the diameter specified under "main pumps", at all points from immediately below the top bearing to the top of the impeller hub.

E. A bearing cap shall be provided to hold the bottom motor bearing in a fixed position. Bearing housings shall be provided with fittings for lubrication as well as purging old lubricant.

F. The motor shall be fitted with heavy lifting eyes or lugs, each capable of supporting the entire weight of the pump and motor.

G. The motor shall be equipped with a motor thermal temperature switch to indicate motor over temperature to the pump station SCADA system. The switch shall be wired to the environmental cabinet for extension to the station SCADA system.

H. The motors shall be wired to the environmental cabinet terminal blocks with 2000 volt rated wiring. The pump station manufacturer shall use 2000 volt diesel locomotive (DLO) cable for phase conductors, No. 2/0 AWG, Anixter Part, No. 5N-2021 or approved equal. Grounding conductor for each motor shall be No. 4 AWG type THHN/THWN, XHHW or THW.

I. **Minimum Requirements:**

Shaft through seal:	3-inch Dia. Solid Stainless Steel
Seal Housing:	Bronze
Lower Bearing to Impeller	6-inch Maximum
Shaft Run-Out:	0.003-inch Maximum
Shaft End Play:	Limited to Bearing Shake
Shaft to Motor Base:	0.005-inch Maximum
Impeller to Shaft Fit:	Tapered
Impeller Shroud:	Untrimmed-Full Diameter
Upper Bearing:	Axially Free
Lower Bearing:	Locked in Place
Efficiency at Design:	75% Minimum
Efficiency at B.E.P.:	80% Minimum
Backhead & Motor Adapter:	One Piece
Motor Insulation:	Class F
Motor Temperature Rise:	Class B
Motor Service Factor:	1.15, Reserved for Owner

2.10 CONTROL

A. A junction box shall be located adjacent to each pump motor and house a safety disconnect for each pump motor. Each motor disconnect switch shall be provided with an auxiliary contact to indicate the position of the switch to the pump station SCADA system. Contacts shall be form C with (1) NO and (1) NC contact. Contacts shall be wired to the environmental cabinet for extension to the station SCADA system.

B. The environmental equipment controls shall be mounted within a NEMA Type 1, enclosure, fabricated of steel and reinforced as required. The circuit breaker section shall be provided with hinged covers, complete with suitable latching devices.

C. A grounding type convenience duplex outlet shall be provided on the side of the cabinet for operation of 115 volt AC devices.

D. Thermal magnetic air circuit breakers shall be provided for branch disconnect service and over-current protection of all station control and auxiliary circuits. Each single-phase auxiliary motor shall be equipped with an over-current protection device, in addition to its branch circuit breaker, or shall be impedance protected.

E. All switches shall be labeled and a coded wiring diagram shall be provided.

F. Each Booster Pump shall be provided with a pump discharge check valve with a position limit switch to indicate the position of the check valve to the pump station SCADA system. Check valve limit switch contacts shall be form C with (1) NO and (1) NC contact. Contacts shall be wired to the environmental cabinet for extension to the station SCADA system. Each Booster Pump shall be provided with a pump discharge high pressure switch between the pump and the check valve. The pressure switch shall indicate pump discharge high pressure to the pump station SCADA system. Pressure switch contacts shall be form C with (1) NO and (1) NC contact. Contacts shall be wired to the environmental cabinet for extension to the station SCADA system.

2.11 PUMP OPERATION

Not Used

2.12 VARIABLE FREQUENCY DRIVES

A. As specified in Section 16370 - Variable Frequency Drives

2.13 DEHUMIDIFIER AND VENTILATING BLOWER

A. A dehumidifier assembly with hermetically sealed freon refrigeration type compressor, expansion coil, fan and condenser coil shall be furnished to maintain the relative humidity of the air in the pump chamber low enough to keep the electrical equipment dry and to prevent condensation on the walls.

B. The moisture removing capability of the dehumidifier will vary with the temperature and relative humidity within the station. The minimum capacity rating at 80° F and 68% relative humidity shall be 15.50 pints per day. The maximum capacity of 80° F and 90% relative humidity shall be 25.00 pints per day. The dehumidifier shall be controlled automatically by an adjustable humidistat. The dehumidifier shall be located above the floor on a shelf and the condensate drained to the sump.

C. Fresh air shall be drawn into the station through the air duct from above grade. The ventilating blower shall have a minimum capacity of 30 air changes per hour, and shall be controlled by a 15-minute cycle timer with a range of 0-100% so as to provide essentially continuous ventilation without exceeding the capabilities of the dehumidifier.

D. Ventilation systems shall be arranged so that intake air is not pulled into the station through an inlet duct.

E. The ventilating blower shall have a high velocity discharge directed across the station such that vortexing and vigorous mixing will ensure adequate dehumidification and purging of the station air. It shall be positioned on the head of the station to prevent inadvertent damage by service personnel.

F. A switch shall be provided at the top of the entrance tube for operation of the lights and ventilating blower when entering the station.

G. The ventilating blower control system shall provide an output contact to indicate blower fault or failure to the pump station SCADA system. The contact shall be normally open and indicate that the blower is not functional at any time the blower is called for to run.

2.14 LIGHTING

A. Minimum lighting shall consist of twin 40-watt fluorescent lamp fixture provided for the convenience and safety of the operator. The lighting shall provide illumination for all areas in the station. Emergency lighting fixtures with battery back up shall be supplied in the pump chamber for the convenience of the operator in the event of a power failure.

2.15 SUMP PUMP

A. A submersible sump pump with close-coupled, vertical motor shall be installed in the sump. It shall have a minimum capacity of 1000 GPH at design head. The design head this pump will operate against is 110 feet. A mechanical seal on the shaft shall exclude liquid from the motor housing.

B. The sump pump shall be controlled automatically by a built-in float switch. It shall discharge through double check valves and a gate valve.

C. A float switch shall be installed in the sump for High Level indication to the pump station SCADA system. The float switch shall be wired to the environmental cabinet for extension to the pump station SCADA system. The float switch shall be equal to a GEMS LS-750 series with NO contact.

2.16 MAIN PIPING

A. Pump suction lines shall be steel. Plug valves shall be provided inside the chamber on the suction and discharge sides of the pumps. The discharge line from each pump shall be fitted with a spring loaded, clapper-type check valve. The diameter of all pipe and valves shall be as shown on the drawings.

B. The common discharge header shall be fabricated of steel for manifolding the discharge risers and the discharge outlet shall be Class 53, plain-end, ductile iron pipe terminating outside the pump chamber.

2.17 WIRING

A. The pump station shall be completely wired at the factory, except for the power feeder lines and entrance light switch. All wiring in the pump station shall meet the requirements of the National Electrical Code and shall be coded as indicated on the wiring diagram. All wiring outside the panel shall be in conduit, except for 115-volt accessory items, which are provided with connecting insulated service cord. The Manufacturer shall provide conduit from the control panel across the ceiling, and up the entrance tube to receive the feeder lines. The conduit shall terminate in a threaded conduit connection through the wall of the entrance tube above ground level.

B. Accessory items such as the sump pump, dehumidifier and air compressors shall be plugged into selectively polarized, grounded convenience outlets, located close to their installed position so that such items can be readily removed and serviced if necessary.

2.18 DISCHARGE PRESSURE TRANSMITTER

A. The pump station manufacturer shall furnish and install a pump station discharge pressure transmitter on the pump discharge header at the point the header exits the pump chamber. The pressure transmitter shall be wall mounted approximately 5'-6" above the pump station floor. The sensor shall be a diaphragm type, mounted on the side or top of the header and connected to the transmitter with a factory sealed integral capillary tube. The pump station manufacturer shall determine the capillary length. The assembly shall be as specified in specification Section 17050, Part 2 Products

PART 3 EXECUTION

3.01 PREPARATION FOR SHIPMENT

A. Insofar as is practical, the equipment specified herein shall be factory assembled. The parts and assemblies that are of necessity shipped unassembled shall be packaged in a manner that will protect the equipment from damage and facilitate the final assembly in the field. Generally, machined and unpainted parts shall be protected from damage by the elements with the application of strippable, protective coatings. Provide all lubricant required for initial lubrication.

3.02 INSTALLATION

A. The primary supplier shall provide information on, procedures for, sequence of, and tolerances allowed in equipment installation. In particular, assistance and recommendations for installation, level and alignment and minimizing vibration shall be provided. The manufacturer's representative shall be responsible for making adjustments, repairs, corrections, and fine-tuning necessary to complete startup and field testing.

3.03 FACTORY TESTS

A. All components of the pump station shall be given an operational test at the pump station manufacturer's facility to check for excessive vibration, for leaks in the piping or seals and for correct operation of the automatic control system and all auxiliary equipment. The pump suction and discharge lines shall be coupled to a reservoir and the pumps shall re-circulate water under simulated service conditions. The automatic controls shall be adjusted to start and stop the pumps at approximately the levels required by the job conditions. The control panel shall undergo both a dry logic test and full operational test with all systems operating.

B. Factory test instrumentation must include flow measuring with indicator; compound suction gauge; bourdon tube type discharge pressure gauge; electrical meters to measure amperes, volts, kilowatts and power factor; speed indicator and a vibrometer capable of measuring both amplitude and frequency.

3.04 MANUFACTURER'S REPRESENTATIVE SERVICES

A. The manufacturer or his representative shall inspect the installation of the equipment prior to startup and shall make the necessary adjustments to the equipment for satisfactory operation. The manufacturer shall also be responsible for instructing the County's personnel in the operation and maintenance of the equipment. The manufacturer or his representative shallcertify the correctness of the installation in accordance with Section 01730, Operating and Maintenance Data.

END OF SECTION

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SECTION 13447

MOTORIZED OPERATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Motorized gate and valve operators, and mechanical, gear type limit switches.

B. Related sections:
   1. Section 17100 - Control Strategies.

1.02 REFERENCES

A. American Water Works Association (AWWA):

B. National Electrical Manufacturer's Association (NEMA).

1.03 SUBMITTALS

A. Design data: Submit operating torque calculations for each valve size and class. Show maximum starting and normal operating torques for valve gates and operators supplied. Size operator for maximum starting torque.

B. Manufacturer's published instructions.

1.04 QUALITY ASSURANCE

A. Motorized operators for gates and valves: The product of a single supplier for each type of gate or valve.

B. Ascertain that valve manufacturer provides limit switches with valves.

C. Actuator/operator manufacturer shall coordinate with the valve manufacturer and submit calculations showing the maximum and normal operating torques for the valves and operators supplied.

PART 2 PRODUCTS

2.01 MOTORIZED OPERATOR

A. Manufacturers: One of the following or equal:
   1. Limitorque Corporation.
   2. EIM Company.

B. Design:
   1. Sized to move gates or valves from full open to closed position at minimum 12 inches per minute, plus or minus 10 percent, under maximum load.

a. Measure rate of closure for butterfly valve discs at disc edge on diameter at right angle to valve shaft.

2. Actuator: Provide with built-in device to allow motor to reach full speed before engaging valve load; in manual operating mode when motor is not energized; in electrical operating mode when motor is energized.
3. Handwheels for manual operation: Metallic with arrows to indicate "OPEN" rotation; incapable of rotation during motor operation; unaffected by fused motor; maximum 80 pound pull on rim when rotating.

C. Actuator gearing:
1. Valve actuator gearing: Multiple reduction type with hardened alloy steel spur or helical gears and self-locking, alloy bronze worm gear set in drive train to maintain valve position.
2. Gate actuator gearing: Multiple reduction type with hardened alloy steel spur gear, bevel pinion and bevel gears; self-locking to maintain gate position.
3. Power gearing: Hardened alloy steel; accurately cut to assure minimum backlash; anti-friction bearing with caged balls or rollers throughout.
4. Stem nuts: High tensile manganese bronze; accurately machined and mounted in heavy ball or roller bearings; minimum 2-1/4 times stem diameter for length of thread in lift nuts.
5. Actuator gear housing: Ductile iron.
6. Lubrication: Rotating power train components immersed in grease with provisions for inspection and re-lubrication without disassembly.
   a. Lubricants: Suitable for ambient conditions of minus 20 degrees Fahrenheit to plus 150 degrees Fahrenheit.
   b. Provide seals on shafting.

D. Motors:
1. Type: Specifically designed for valve actuator service with high starting torque, totally enclosed non-ventilated construction.
2. Motor insulation: Minimum NEMA Class F, with a maximum continuous temperature rating of 155 degrees Celsius, rise plus ambient.
3. Motor windings: Epoxy treated.
4. Size: Sufficient to open and close valves at maximum stated torque.
5. Voltage tolerance: Capable of operating at within 10 percent of specified voltage.
6. Motor duty ratings: 15 minute duty rating for open and close service; continuous duty rating for modulating service.
7. Accessories: Internal thermal contacts, heaters in motor and switch compartment, and ground lug.
8. Power supply: As scheduled or as indicated on the Drawings.
9. Enclosures for motors, switches, and other electrical compartments:
   a. Where explosion-proof construction is indicated on the Drawings, provide NEMA 7 enclosures.
   b. Other locations: Provide NEMA 4X enclosures.

E. Controls:
1. Voltage transformer: No transformer is required in the valve operator. Control transformer is mounted in a remote cabinet.
2. Control station:
   a. Integral with operator or mounted in separate enclosure.

1) Where explosion-proof construction is indicated on the Drawings, provide NEMA 7 enclosure.
2) Other locations, provide NEMA 4X enclosure.

b. Provide with additional contacts for remote indication of hand switch position where indicated on the Drawings.

c. Provided with following devices:
1) Lock-out LOCAL-OFF-REMOTE hand switch.
2) OPEN, STOP, CLOSE pushbuttons.
3) OPEN and CLOSE indicating lights.

3. Position limit switches and associated gearing: Integral with valve actuator.
a. Gearing: Intermittent type; bronze or stainless steel; grease lubricated; totally enclosed.
b. Contacts: Heavy duty and silver plated with wiping action.
c. Remote indication contacts: As indicated on the Drawings.
d. Switches: Adjustable; allowing for trip points from fully open to closed positions of valve travel; not subject to breakage or slippage due to over-travel; permits visible verification of switch position without disassembly.

4. Torque limit switches:
a. Capable of interrupting control circuit in both opening and closing when valve torque overload occurs.
b. Silver plated contacts.
c. Graduated dials for both open and close directions of travel, each independently adjustable or 0-100 LTD display.
d. Positive means to limit adjustability to avoid exceeding actuator output torque capability with solid-state sensor embedded within the torque transducer.
e. Permits visible verification of switch position without disassembly.
f. Remote indication contacts: As indicated on the drawings.

5. Electromechanical Reversing Starter: No starters are required in the valve operator. Reversing starters are located in a remote cabinet.

F. Operation:
1. Open-close service:
a. Operators shall operate automatically by remote signal specified and as indicated on the Drawings.
b. Remote signal shall control, with hand switch in REMOTE position, remote mounted electromechanical reversing starter shall cause valve or gate to open or close.
c. In LOCAL position, control remote reversing starter for motorized operator with local control station.

2. Modulating service:
a. Actuator controller: Microprocessor based and using proportional-integral derivative algorithm to calculate actuator response.
b. Controller shall compare 4 to 20 milliampere direct-current analog command signal to analog feedback signal and move actuator accordingly.
c. Microprocessor-based controller shall control integrally mounted solid state reversing starter.

3. Where indicated on the Drawings, provide 4 to 20 milliampere direct-current analog output signal for continuous remote monitoring of position.

4. Controller system: Rated for continuous duty.

5. Operation: As specified in Section 17100.

G. Valve limit switches:
   1. Type: Mechanical cam gear for remote operation, indication, and other control; compatible with associated operation and suitable for service intended; for valves specified and indicated on the Drawings; with racks, gears, cam, linkages mountings, and accessories.
   2. Mechanical limit switches: 2-pole, 3-pole, or 4-pole, gang-mounted in required multiples, and with necessary mechanical linkage.
   3. Contact ratings: 120 volt alternating current, 20 amperes at 75 to 100 percent power factor, and 24 volt direct current, 5 amperes minimum.
   4. Enclosures: Watertight and oiltight for normal service.
   5. Valve box: Large enough to contain and to allow easy adjustment of limit switch without switch's removal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install operators in accordance with manufacturer's instructions.

B. Locate valve boxes where indicated on the Drawings.

3.02 SCHEDULE

A. Do not rely on the following schedule to determine number and types of operators required for the Project only major process operators are scheduled.

B. Abbreviations relating to valve or gate type:
   1. BFV: Butterfly valve.
   2. RBFV: Rectangular butterfly valve.
   3. BV: Ball valve.
   4. DV: Diaphragm valve.
   5. PV: Plug valve.
   6. SLG: Sluice gate.
   7. SG: Slide gate.

C. Abbreviations relating to operator function:
   1. O/C: Open and close service.
   2. MOD: Modulating service.

Operator Schedule					
Valve or Gate Tag	**Valve or Gate Size (Inches)**	**Valve or Gate Type**	**Operator Function**	**Power Supply**	**Remarks**
FCV101	20	PV	O/C	120V	Notes 1, 2
FCV102	18	PV	O/C	120V	Notes 1, 2

Notes:

1. Size electric actuators in accordance with AWWA C504.
2. Calculate valve operating torque with AWWA C504, Appendix A, for the AWWA Class specified in this Schedule.

END OF SECTION

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SECTION 14624

MONORAIL SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Monorail system, including trolley, hoist, monorail beam, restraint bracing, end stops, hangers and hanger connections to beams, and accessories.

B. Related sections:
   1. Section 09960 - Coatings.

1.02 REFERENCES

A. American Society of Mechanical Engineers (ASME):
   1. B30.11 - Underhung Cranes and Monorail Systems.
   2. B30.16 - Overhead Hoists (Underhung).

B. American Institute of Steel Construction (AISC):
   1. Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings.

C. American Welding Society (AWS).

D. Occupational Safety and Health Administration (OSHA).

E. Monorail Manufacturers' Association (MMA):
   1. Specifications for Underhung Cranes and Monorail Systems.

F. National Electrical Code (NEC):
   1. Article 610 - Cranes and Hoists.

G. National Electrical Manufacturer's Association (NEMA).

1.03 SYSTEM DESCRIPTION

A. Design requirements:
   1. Hoisting system: In accordance with ASME B30.11, ASME B30.16, and OSHA standards.
   2. Structural steel construction: In accordance with AISC Specifications.
   3. Safety factor of castings, forgings, and stampings: Minimum 5 with regard to ultimate strength.
   4. Perform welding in accordance with AWS Standards.
   5. Conform electrification to NEC 610.
   6. Design equipment in accordance with MMA Specifications for Underhung Cranes and Monorail Systems.

B. Performance requirements:
   1. Service classification: Class C, moderate service.

2. Capacity: 2 tons.
3. Arrange working parts for convenient inspection, lubrication, adjustment, repair, or replacement.

1.04 SUBMITTALS

A. Shop drawings: Include support types, sizes, spacing, bridging, connections, anchoring, bearing plates, and erection instructions.

B. Product data.

C. Calculations: Signed and stamped by registered engineer in state where project is located.

D. Certificates:
1. Certificate of tests conducted by the monorail manufacturer in accordance with industry standards and federal regulations prior to shipment of equipment.
2. OSHA certificate upon completion of field load testing.

E. Operations and Maintenance Data.

1.05 QUALITY ASSURANCE

A. Installer qualifications: Minimum 3 years experience in, and regularly engaged in, field installation of monorail hoist systems.

B. Unload, store, and install monorail system under direct supervision of manufacturer.

1.06 DELIVERY, HANDLING, AND STORAGE

A. Assemble, paint, test, and adjust monorail system in manufacturer's shop before shipment as far as practical.

PART 2 PRODUCTS

2.01 MONORAIL TRACK AND SUSPENSION

A. Manufacturers: One of the following or equal:
1. Cleveland Tramrail.
2. Trambeam Corporation.

B. Maximum vertical deflection of monorail beam: Maximum span of monorail beam divided by 600.

C. Stops and bumpers: Adequate to absorb energy of and stop moving trolley at end of permitted travel.

D. Hangers: Adjustable, able to level and accurately align system within 1/8-inch tolerance, able to support monorail from building structure.

E. Length: 14-feet approximately.

F. Labeling: Paint hoist capacity on monorail with minimum 4-inch high letters and numbers where clearly visible from operating floor.

G. Coating: Provide prime coat, intermediate coat, and finish coat as specified in Section 09960.

2.02 TROLLEY HOISTS

A. Manufacturers: One of the following or equal:
   1. Cleveland Tram Rail.
   2. P&H Hevi-Lift.
   3. Yale.

B. Type: Combination electric motor-driven trolleys and hoists, single-speed with trolley cushioned start, including mechanical brake, electrical brake, and upper hoist limit stop and load limiting device, low headroom.

C. Hoisting speed: 20 - 5 feet per minute.

D. Distance from bottom of rail to inside of hook: Maximum 25 inches with hook in fully raised position.

E. Trolleys wheels: Single-flanged; forged steel, hardened to 425 Brinell; fitted with anti-friction bearings with lifetime seals; suitable for adjustment to monorails.

F. Safety lugs: Add safety lugs to manufacturer's standard design.

G. Motors: 480-volt, 3-phase, 60-hertz, totally enclosed non-ventilated (TENV), squirrel-cage induction type operating at maximum 1,800 revolutions per minute, with Class B or F insulation, horsepower as follows:
   1. Hoist: 7.5.
   2. Trolley: 3/4.
      a. Actual horsepower requirement not to exceed the specified motor horsepower.

H. Drive units: Specially designed for monorail service with cushioned stop holding brakes.

I. Hoisting drum: Steel or cast iron with machined, 1/2 rope diameter deep grooves; adequate to provide minimum 2 complete rope wraps on drum with hook in lowest position, and to accommodate full length of rope without overlapping when in highest position.

J. Hoist drive speed reducer: With heat-treated steel helical gears; oil-lubricated with oiltight cases; shafts running in anti-friction bearings.

K. Limit switches and overload device: Set to 100 percent of hoist rated capacity.

L. Hoisting rope: Specifically designed for specified service loads; preformed, improved plow steel with fiber core; double-reeved.

M. Hoisting block: Steel with forged or cast steel hook supported on ball or roller bearings for true vertical lift.

N. Hook: Safety type, able to rotate freely on bearing support with heavy-duty type safety latches.

O. Bottom block: Shrouded.

P. Lifting distance: 10 feet approximately.

Q. Coating: Provide prime coat, intermediate coat, and finish coat in as specified in Section 09960.

2.03 ELECTRIFICATION AND CONTROL

A. Electrification type: Cable and spring-loaded swiveled cable reel-mounted on structure.

B. Cable run: From junction box to cable reel, then to control unit.

C. Control unit: Pendant pushbutton station hanging from hoist to maximum 4 feet above operation floor.

D. Control voltage: 120 volts alternating current, supplied from transformer on hoist.

E. Pushbuttons: Momentary-contact, maintain-pressure, automatically de-energizing upon relaxation of pressure; number and functions as follows:
   1. 2 pushbuttons for hoisting, 1 for each direction.
   2. 2 pushbuttons for trolley, 1 for each direction.

F. Enclosures for control unit, electrical control, and reel: NEMA 4.

G. Control unit support: Steel cable.

H. Control accessories:
   1. Geared limit switch able to limit up and down travel with second switch operated by hook to stop hoist when highest safe point is reached.
   2. Magnetic contactors for up and down operation and control.

I. Junction boxes: Suitable for connection of field services with ground pads.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install monorail crane system in accordance with manufacturer's instructions.

3.02 LOAD TESTING

A. Perform test in presence of OSHA certifier, manufacturer, ENGINEER, and OWNER.

B. Test equipment with load equal to 100 percent of rated capacity.

C. Provide load and slings for test. Remove when tests are completed.

D. Operate equipment through complete lift and lowering cycle and through complete travel of trolley to demonstrate quiet, smooth, and safe hoisting, braking, and traveling.

E. Correct defects.

3.03 USE OF MONORAIL CRANE SYSTEM

A. Prohibit hoisting equipment use until receipt of OSHA certificate.

B. Do not use monorail crane system for construction.

END OF SECTION

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SECTION 15094

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals and install pipe hangers, supports, concrete inserts and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

1.02 QUALIFICATIONS

A. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate tensile strength of the material.

Note: Lift Stations have their own pipe support hanger and support design and detail, shown in the Utility Standards if not shown on the plans.

B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification stating that such requirements have been complied with.

1.03 SUBMITTALS

A. Submit to the Engineer for approval, as provided in the Contract Documents, shop drawings of all items to be furnished under this Section.

B. Submit to the Engineer, for approval, samples of all materials specified herein.

C. All pipe hangers, supports, hanger rods, clamps, concrete inserts and wall brackets, etc., whether specified or not, shall be submitted (together with load calculations) to the Engineer for approval, if requested.

PART 2 PRODUCTS

2.01 GENERAL

A. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. All pipe supports shall be approved prior to installation.

B. All materials used in manufacturing hangers and supports shall be capable of meeting the respective ASTM Standard Specifications with regard to tests and physical and chemical properties, and be in accordance with MSS SP-58.

C. Hangers and supports shall be spaced in accordance with ANSI B31.1.0 except that the maximum unsupported span shall not exceed ten (10) feet unless otherwise specified herein.

D. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by Grinnell Co., Inc., Carpenter and Patterson, Inc., or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval.

2.02 PIPE HANGERS AND SUPPORTS FOR METAL PIPE

A. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts.

B. The following sizes are minimum requirements and are subject to the Engineer's approval:

1. Hanger rods shall be rolled steel machine threaded with load ratings conforming to ASTM Specifications and the strength of the rod shall be based on root diameter. Hanger rods shall have the following minimum diameters:

Pipe Size (inches)	Minimum Rod Diameter (inches)
Less than 2 1/2	3/8
2 1/2 - 4	1/2
4	5/8
6	3/4
8 -12	7/8
14 - 18	1
20 - 30	1 1/4

Above 30 See SPECIAL SUPPORTS Paragraph 2.04

2. Where applicable, structural attachments shall be beam clamps. Beam clamps, for rod sizes 1/2-inch through 3/4-inch shall be equal to Grinnell Fig. No. 229, and for rod sizes 7/8-inch through 1-1/4 inches shall be equal to Grinnel Fig. No. 228, or equal.
3. Concrete inserts for pipe hangers shall be continuous metal inserts designed to be used in ceilings, walls or floors, spot insets for individual pipe hangers, or ceiling mounting bolts for individual pipe hangers and shall be as manufactured by Unistrut Corp., Wayne, Michigan; Carpenter and Patterson, Inc., Richmond or equal and shall be as follows:
   a. Continuous concrete inserts shall be used where applicable and/or as shown on the Drawings and shall be used for hanger rod sizes up to and including 3/4-inch diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be Series P3200 by Unistrut Corp., Fig. 1480 Type 2 by Carpenter and Patterson, Inc. or equal. Inserts to be used where supports are perpendicular to the main slab reinforcement

shall be Series P3300 by Unistrut Corp., Fig. 1480 Type I by Carpenter and Patterson, Inc., or equal.

b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8-inch diameter. Inserts shall be Fig. 650 by Carpenter and Patterson, Inc. for hanger rod sizes 1/2-inch through and including 3/4-inch and Fig. 266 by Carpenter and Patterson, Inc., for 7/8-inch hanger rods.

c. Ceiling mounting bolts shall be used where applicable and be for hanger rod sizes 1-inch through and including 1-1/4 inches shall be Fig. 104M as manufactured by Carpenter and Patterson, Inc. or equal.

d. All pipe hangers shall be capable of vertical adjustment under load and after erection. Turnbuckles, as required and where applied, shall be equal to Grinnell Fig. No. 230.

4. Wall or column supported pipes shall be supported by welded steel brackets equal to Grinnell Fig. 194, 195 and 199 as required, for pipe sizes up to and including 20-inch diameter. Additional wall bearing plates shall be provided where required.

   a. Where the pipe is located above the bracket, the pipe shall be supported by an anchor chair and U-bolt assembly supported by the bracket for pipes 4-inches and larger or by a U-bolt for pipes smaller than 4-inches. Anchor chairs shall be equal to Carpenter and Patterson Fig. 127. U-bolts shall be equal to Grinnell Fig. 120 and 137.

   b. Where the pipe is located below the bracket, the pipes shall be supported by pipe hangers suspended by steel rods from the bracket. Hangers and steel rods shall be as specified above.

   c. Wall or column supported pipes 2-inches and smaller may be supported by hangers equal to Carpenter and Patterson Figures 74, 179 or 237 as required.

5. Floor supported pipes 3-inches and larger in diameter shall be supported by either cast-in-place concrete supports or adjustable pipe saddle supports as directed by the Engineer. In general, concrete supports shall be used when lateral displacement of the pipes is probable (unless lateral support is provided), and adjustable pipe saddle type supports shall be used where lateral displacement of the pipes is not probable.

   a. Each concrete support shall conform to the details shown on the Drawings. Concrete shall be poured after the pipe is in place with temporary supports. Top edges and vertical corners of each concrete support shall have 1-inch bevels. Each pipe shall be secured on each concrete support by a wrought iron or steel anchor strap anchored to the concrete with cast-in-place bolts or with expansion bolts. Where directed by the Engineer, vertical reinforcement bars shall be grouted into drilled holes in the concrete floor to prevent overturning or lateral displacement of the concrete support. Unless otherwise approved by the Engineer, maximum support height shall be five (5) feet.

   b. Concrete piers used to support base elbows and tees shall be similar to that specified above.

      1) Piers may be square or rectangular.

   c. Each adjustable pipe saddle support shall be screwed or welded to the corresponding size 150 lb. companion flanges or slip-on welding flanges respectively. Supporting pipe shall be of Schedule 40 steel pipe construction. Each flange shall be secured to the concrete floor by a minimum of two (2) expansion bolts per flange. Adjustable saddle supports shall be equal to Grinnell Fig. No. 264. Where used under base

fittings, a suitable flange shall be substituted for the saddle.

d. Floor supported pipes less than 3-inches shall be supported by fabricated steel supports.

6. Vertical piping shall be supported as follows:
   a. Where pipes change from horizontal to vertical, the pipes shall be supported on the horizontal runs within two feet of the change in direction by pipe supports as previously specified herein.
   b. For vertical runs exceeding 15 feet, pipes shall be supported by approved pipe collars, clamps, brackets, or wall rests at all points required to insure a rigid installation.
   c. Where vertical piping passes through a steel floor sleeve, the pipe shall be supported by a friction type pipe clamp which is supported by the pipe sleeve. Pipe clamps shall be equal to Grinnell Fig. 262.
7. Anchor bolts shall be equal to Kwik-Bolt as manufactured by Hilti Fastening Systems, or Wej-it manufactured by Wej-it Expansion Products, Inc.
8. All rods, hangers, inserts, brackets, and components shall be furnished with galvanized finish.

2.03 PIPE HANGERS AND SUPPORTS FOR PLASTIC PIPE

A. Single plastic pipes shall be supported by pipe supports as previously specified herein.

B. Multiple, suspended, horizontal plastic pipe runs, where possible, and rubber hose shall be supported by ladder type cable trays such as the Electray Ladder by Husky-Burndy, the Globetray by the Metal Products Division of United States Gypsum, or equal. Ladder shall be of mild steel construction. Rung spacing shall be approximately 18-inches for plastic pipe and 12-inches for rubber nose. Tray width shall be approximately 6-inch for single runs of rubber hose and 12-inches for double runs of rubber hose. Ladder type cable trays shall be furnished complete with all hanger rods, rod couplings, concrete inserts, hanger clips, etc. required for a complete support system. Individual plastic pipes shall be secured to the rungs of the cable tray by strap clamps or fasteners equal to Globe Model M-CAC, Huskey-Burndy Model SCR or equal. Spacing between clamps shall not exceed 9 feet. The cable trays shall provide continuous support along the length of the pipe.

C. Individual clamps, hangers, and supports in contact plastic pipe shall provide firm support, but not so firm as to prevent longitudinal movement due to thermal expansion and contraction.

2.04 SPECIAL SUPPORTS

A. The pipes shall be supported by means of a supporting framework suitably anchored into the floor or curbing. The vertical piping shall be suitably secured to horizontal support members connected at each end to vertical support members and spaced as required to provide a rigid installation.
   1. The complete supporting system shall be as manufactured by the Unistrut Corporation, Globe-Strut as manufactured by the Metal Products Division of U.S. Gypsum, or equal.
   2. Vertical and horizontal supporting members shall be U-shaped channels similar to Unistrut Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps equal to Unistrut Series P1100M and Series P2558. All components shall be of mild steel.

3. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly.
4. The design of each individual framing system shall be the responsibility of the Contractor. Shop drawings shall be submitted and shall show all details of the installation including dimensions and types of supports.

B. Any required pipe supports for which the supports specified in the Section are not applicable, including pipe supports for above 30-inch pipe, shall be fabricated or constructed from standard aluminum shapes in accordance with Specifications, concrete and anchor hardware similar to items previous specified herein and shall meet the minimum requirements listed below and be submitted to the approval of the Engineer.
1. Pipe support systems shall meet all requirements of this Section and all related Sections of this Specification.
2. Complete design details of the entire pipe support systems shall be provided by the Contractor, for approval by the Engineer.
3. The pipe support system shall not impose loads on the supporting structures, in excess of the loads for which the supporting structure is designed.
4. Hanger rods for above 30-inch pipe shall be a minimum of 1-1/2 inch diameter and shall not exceed the manufacturer's standard maximum recommended safe load.

C. Pipe supports in lift stations shall be as shown in the Utility Standards details.

PART 3 EXECUTION

3.01 INSTALLATION

A. All pipes, horizontal and vertical, shall be rigidly supported from the building structure by approved supports. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or specified herein. No piping shall be supported from other piping or from metal stairs, ladders, and walkways, unless it is so indicated on the Drawings, or specifically directed or authorized by the Engineer.

B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces. Prior to installation, all pipe supports shall be approved by the Engineer.

C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings, and sleeve type couplings and to minimize all pipe forces to pump housings. Pump housings shall not be utilized to support connecting pipes.

D. Pipe supports shall be provided as follows:
1. Cast iron and ductile iron shall be supported at a maximum support spacing of 10-feet 0-inches with a minimum of one (1) support per pipe section at the joints.
2. Supports for multiple PVC pipes shall be continuous wherever possible. Individually supported PVC pipes shall be supported as recommended by the manufacturer except that support spacing shall not exceed five (5) feet.
3. Support spacing for galvanized steel pipe and copper tubing shall not exceed

five (5) feet.

4. All vertical pipes shall be supported at each floor or at intervals of at least 15 feet by approved pipe collars, clamps, brackets, or wall rests and at all points necessary to insure rigid construction.

E. Pipe supports shall not result in point loadings, but shall distribute pipe loads evenly along the pipe circumference.

F. Effects of thermal expansion and contraction of the pipe shall be accounted for in pipe support selection and installation.

G. Inserts for pipe hangers and supports shall be installed on forms before concrete is poured. Before setting these items, all drawings and figures shall be checked which have a direct bearing on the pipe locations. Responsibility for the proper location of pipe supports is included under this Section.

H. Continuous metal inserts shall be embedded flush with the concrete surface.

3.02 PRIME COATING

A. Prior to prime coating, all pipe hangers and supports shall be thoroughly clean, dry, and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the Engineer.

B. All submerged pipe supports shall be prime coated with TNEMEC 69-1211 Epoxy Primer or equal. All other pipe supports shall be prime coated with TNEMEC 66-1211, or equal.

C. Finish coating shall be compatible with the prime coating used and shall be applied as specified in the Contract Documents.

END OF SECTION

STSECTION 15852

LOUVERS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Stationary weather louvers.

B. Related sections:
   1. Section 15954 - HVAC Testing, Adjusting, and Balancing.

1.02 REFERENCES

A. Air Movement and Control Association (AMCA):
   1. 500 - Test Methods for Louvers, Dampers, and Shutters.
   2. 511 - Product Rating Manual for Air Control Devices.

B. ASTM International (ASTM):
   1. D 2584 - Standard Test Method for Ignition Loss of Cured Reinforced Resins.

1.03 PERFORMANCE REQUIREMENTS

A. Performance: Meet requirements of AMCA 511 when tested in accordance with AMCA 500.

B. Designed for 20 pounds per square foot wind load.

1.04 SUBMITTALS

A. Shop drawings: Include dimensions, anchorage details, and relationships to adjacent materials.

B. Product data.

1.05 QUALITY ASSURANCE

A. Provide louvers with the following, unless otherwise specified:
   1. AMCA certification and rating in accordance with AMCA 511 for air performance and water penetration.

PART 2 PRODUCTS

2.01 GENERAL

A. Louver types: Louvers are marked on the drawings. Individual louver size is indicated on the Drawings.

B. Accessories:
   1. Provide installation clips and flanged or jamb-mounting styles suitable for the mounting locations as indicated on the Drawings.
   2. Provide stainless steel fasteners unless noted otherwise.
   3. Corrosion protection.

C. Protective coatings for aluminum in contact with concrete or masonry:
   1. Manufacturers: One of the following or equal:
   2. Koppers Company, Inc.
   3. Tarmastic 100.
   4. Porter Coatings.

2.02 STATIONARY WEATHER LOUVERS, TYPE L-1

A. Manufacturers: One of the following or equal:
   1. Greenheck, Model EHH-501X.

B. Requirements:
   1. Type: Stationary louver with drainable blades. Florida product approved wind-driven rain louver
   2. Frame: 5 inches deep. Type 6063-T5 aluminum.
   3. Blades: Type 6063-T5 aluminum drainable blades.
   4. Screens: Removable aluminum frame with aluminum wire; insect screens on intakes and bird screens on exhausts.
   5. Finish: Mill finish; color as selected.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install louvers in accordance with manufacturer's instructions; caulk all frames to make weathertight.

B. Anchor louvers to concrete or masonry with concrete anchors through jambs.

C. Corrosion protection:
   1. Aluminum in contact with concrete or masonry: Apply 2 coats bitumastic black solution.
   2. Aluminum in contact with dissimilar metal, except stainless steel: Isolate from dissimilar metal with neoprene gaskets, sleeves, or washers. Utilize stainless steel fasteners.

END OF SECTION

SECTION 15954

HVAC SYSTEMS TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Heating, ventilation, and air conditioning systems testing, adjusting, and balancing.

B. Related Sections:
   1. Section 01756 - Testing, Training, and Facility Start-up.

1.02 REFERENCES

A. Associated Air Balance Council (AABC):
   1. National Standards for Field Measurements and Instrumentation, Total System Balance, Air Distribution-Hydronic Systems.

B. National Environmental Balancing Bureau (NEBB):
   1. Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

C. Sheet Metal and Air Conditioning Contractors' National Association, Incorporated (SMACNA):
   1. Heating, Ventilating, and Air Conditioning Systems - Testing, Adjusting, and Balancing.

1.03 TESTING, ADJUSTING, AND BALANCING WORK REQUIREMENTS

A. Procure the services of an independent air balance and testing agency belonging to and in good standing with the Associated Air Balance Council or the National Environmental Balancing Bureau to perform air and hydronic balancing, testing, and adjustment of building and process air conditioning, heating, and ventilating air systems.

B. The Work Includes: Balancing new air and hydronic systems installed as part of this contract and existing air and hydronic systems affected by the installation of new equipment.

C. Perform testing of heating, ventilating, and air conditioning equipment, balancing of distribution systems, and adjusting of air terminal units and ductwork accessories to ensure compliance with Specifications and Drawings. Perform Tests for Following:
   1. Air conditioning units.
   2. Central station air handlers.
   3. Fans.
   4. Condensors.
   5. Air terminal units.
   6. Ductwork accessories.

7. Ducting.
8. HVAC controls.
9. Other specified HVAC equipment.

D. Test each mode of operation of thermostats, electronic controllers, and pneumatic, electric or electronic heating, ventilating, and air conditioning instruments to ensure operation as specified.

E. Test and adjust room distribution patterns at air outlets.

F. Provide instruments required for testing, adjusting, and balancing operations; retain possession of instruments; remove instruments from site at completion of services.

G. Make instruments available to the ENGINEER to facilitate spot checks during testing.

H. Provide test holes for pressure and pitot flow measurements; provide plugs for all test holes after testing.

1.04 QUALITY ASSURANCE

A. Test, balance, and adjust environmental systems in accordance with either:
1. AABC: National Standards for Field Measurements and Instrumentation, Total Systems Balance, Air Distribution-Hydronics System.
2. NEBB: Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

B. Perform services under direction of AABC or NEBB certified supervisor.

C. Calibrate and maintain instruments in accordance with requirements of standards. Make calibration histories of instruments available for examination.

D. Make measurements in accordance with accuracy requirements of standards.

E. Testing, Adjusting, and Balancing Performance Requirements:
1. Comply with procedural standards of certifying association.
2. Execute each step of prescribed testing, balancing, and adjusting procedures without omission.
3. Accurately record required data.
4. Make measurements in accordance with recognized procedures and practices of certifying association.
5. Measure air volume discharged at each outlet and adjust air outlets to design air volumes within 5 percent over.

1.05 SUBMITTALS

A. Resumes of proposed supervisor and personnel showing training and qualifications.

B. Interim Reports: At least 30 days prior to starting field work, submit the following:
1. Set of report forms filled out as to design flow values and installed equipment pressure drops, and required cubic feet per minute for air terminals.
2. Develop heating, ventilating, and air conditioning system schematic similar to Figure 6-1 in SMACNA Testing, Adjusting, and Balancing.

3. Complete list of instruments proposed to be used, organized in appropriate categories, with data sheets for each showing:
    a. Manufacturer and model number.
    b. Description and use when needed to further identify instrument.
    c. Size or capacity range.
    d. Latest calibration date.

C. Final Report: At least 15 days prior to CONTRACTOR's request for final inspection, submit 3 copies of final reports, on applicable reporting forms. Include:
1. Identify instruments which were used and last date of calibration of each.
2. Procedures followed to perform testing, adjusting, and balancing.
3. Identification and succinct description of systems included in report.
4. Initial balance test results made with all dampers and air control devices in full open positions.
5. Description of final locations and sizes, including opening area and dimensioned configuration of orifices and other restrictions used to achieve final balanced flows.
6. Description of final location and opening positions of dampers, registers, louvers, and valves.
7. Schematics of systems included in report; use schematics as part of testing, adjusting, and balancing report to summarize design and final balanced flows.
8. Testing, adjusting, and balancing report forms.
9. Final field results established for system balancing including air flow, fan speeds and fan static pressures at the fan inlet and outlet.
10. Appendices.
11. Include Appendices For:
    a. Raw field data taken during testing.
    b. Sample calculation sheet for each type of calculation made to convert raw field data to final results.
    c. Initial air balance results with dampers and registers in full open position; include air flow at all inlets and outlet, initial fan speed and fan suction and discharge pressures.

D. Proposed schedule for testing and balancing.

E. Certificate of proper installation. Comply with Section 01756.

1.06 SITE CONDITIONS

A. Prior to start of testing, adjusting, and balancing, verify that:
1. Systems installation is complete and in full operation.
2. Outside conditions are within reasonable range relative to design conditions.
3. Lighting fixtures are energized.
4. Special equipment such as computers, laboratory equipment, and electronic equipment are in full operation.
5. Requirements for preparation for testing and balancing have been met for elements of each systems which require testing.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Testing, Adjusting, and Balancing Acceptance Criteria: Consider testing, adjusting, and balancing procedures successful and complete when heating, ventilating and air conditioning systems and components are functioning properly and system air and water flows are within specified tolerances of design flows.

3.02 TESTING, ADJUSTING, AND BALANCING

A. Test, adjust, and balance separate complete heating, ventilating, and air conditioning systems.

B. Include in testing, adjusting, and balancing related existing heating, ventilating and air conditioning components.

C. Perform testing, adjusting, and balancing cycles until air flows meet acceptance criteria.
   1. Ascertain air flow balance between overall requirements and flow in individual supply and exhaust grills.

D. Initial Testing, Adjusting, and Balancing: Perform first test on each system with dampers, grills, orifices, and other variable air flow devices in their full open position; measure and report initial air flows, fan speed and fan static pressures at fan inlet and outlet.
   1. Adjust total system flow downward or upward by adjusting fan speed until 1 inlet or outlet is at indicated flow and all other flows exceed indicated flows.
   2. Adjust fan speed by changing fan drives or sheaves as necessary.

E. Subsequent Testing, Adjusting, and Balancing: Perform adjustments in subsequent testing, adjusting, and balancing by adjusting dampers, louvers, or size of orifices or plates.
   1. Measure and record air volume discharged at each inlet and outlet and adjust air inlets and outlets to design air volumes within 0 to 5 percent over design rates.
   2. Adjust fan speeds and motor drives within drive limitations, for required air volume.
   3. Measure cfm and static pressures and adjust air supply and exhaust fan units to deliver at least 100 to 105 percent of the design air volume.
   4. Measure and record static air pressure conditions on fans, including filter and coil pressure drops, and total pressure across the fan.
   5. Evaluate building and room pressure conditions to determine adequate supply and return air conditions.
   6. Evaluate space and zone temperature of conditions to determine adequate performance of the systems to maintain temperatures without draft.
   7. Permanently mark final balance positions of balancing dampers.

F. Develop heating, ventilating, and air conditioning system schematics similar to Figure 6-1 in SMACNA Testing, Adjusting, and Balancing.

G. Accurately record the required data on Associated Air Balance Council or National Environmental Balancing Bureau test and balance report forms.

H. Measure amperage draw of fan and pump motors for final balance.

I. Following completion of balancing procedures for air systems, test, adjust, and balance hydronic systems.
   1. Measure flow and adjust circuit setter valves so pumps deliver at least 100 percent of the design water flow.
   2. Measure and adjust water flow at coils for design conditions, within 5 percent. Check conditions at cooling and heating coils for required performance at design conditions.
   3. Lock balance valves in the adjusted position and permanently mark the design set point. Record valve settings in the design report.

J. Test primary source equipment in accordance with AABC or NEBB procedures.
   1. Primary source equipment includes items listed in Part 1 not previously tested as part of this testing, adjusting, and balancing work.
   2. Complete appropriate AABC or NEBB equipment test forms for each piece of equipment.
   3. Calculate cooling and heating capacities to show conformance with specified capacities.
   4. Adjust equipment as needed to deliver specified cooling and heating loads.
   5. Record final equipment performing characteristics and adjustment settings in the final design report.

END OF SECTION

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SECTION 16050

ELECTRICAL – GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, devices, equipment, appurtenances, and incidentals required for a complete electrical system as hereinafter specified and/or shown on the Contract Drawings. This work may necessarily include interfacing with and/or completely installing devices and/or equipment furnished under other sections of these Specifications.

B. It is the intent of these Specifications that the electrical system be suitable in every way for the service required. All materials and all work/labor which may be reasonably implied as being incidental to the requirements of this Section shall be furnished at no additional cost to the Owner.

C. All power interruptions to existing equipment shall be at the Owner's convenience. Each interruption shall have prior approval. Request(s) for power interruption(s) shall be made at least forty-eight (48) hours in advance.

D. The work shall include complete testing of all electrical components, including wiring.

E. All workmanship shall be of the highest quality. Substandard work will be rejected and it shall be replaced entirely at the Contractor's expense with no cost to the Owner.

F. It shall be the responsibility of each bidder or his authorized representative to physically visit the job site in order that he may be personally acquainted with the area(s), buildings and/or structures intended for use in the installation/construction under this Specification. The submittal of a proposal/bid by a bidder shall be considered evidence that he has complied with this requirement and accepts all responsibility for a complete knowledge of all factors governing his work. Therefore, failure to comply with this requirement of the Specifications will NOT be grounds for the successful bidder (Contractor) to request approval of change orders and/or additional monetary compensation.

1.02 TEMPORARY ELECTRICAL SERVICE

A. The Contractor shall make the requisite arrangements for securing temporary electrical power for his use in accordance with Section 01510 of these Specifications.

1.03 CODES, INSPECTIONS AND FEES

A. All materials and installations shall be in accordance with the National Electrical Code (latest edition) and the latest editions of all applicable national, state, county and local codes.

B. To the extent that any item is routinely tested and rated by the Underwriter's Laboratories, Inc., that item shall bear the U.L. label. Additionally, all items shall be manufactured to the applicable NEMA standards.

C. The Contractor shall make the necessary arrangements for obtaining all requisite permits and inspections and pay any applicable fees.

1.04 TESTS

A. The Contractor shall test all items individually and as a system for proper operation.

B. The Contractor shall, at his expense, make all the requisite repairs, adjustments and/or alterations to correct any shortcomings found as a result of the tests performed under Item 1.04.A above.

C. A representative of the Owner shall be present during all testing. The Owner shall be notified at least two (2) days prior to any testing.

1.05 SLEEVES AND FORMS FOR OPENINGS

A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured. All sleeves and penetrations in the floors, wall, partitions, etc. shall be coordinated with the prefabricated building manufacturer.

1.06 CUTTING AND PATCHING

A. All cutting and patching shall be done in a thoroughly workmanlike manner - i.e., care shall be taken when cutting not to damage or mar surrounding areas, and when patching to match the original finish as closely as possible while providing a watertight seal. Refer to Item 1.01.E above. All cutting and patching associated with the prefabricated building shall be in strict accordance with prefabricated building manufacturer's recommendations.

1.07 INTERPRETATION OF DRAWINGS

A. The layouts and arrangements as shown on the Contract Drawings are indicative of the physical arrangements desired; however, they are not intended to restrict the Contractor's freedom to accommodate the exact conditions as found in the field. Any deviations from the arrangements shown must be approved by the Owner prior to the final placement of the item(s) in question.

B. The Contract Drawings are not intended to show exact locations of conduit runs.

C. Circuit and conduit layouts shown are not intended to indicate the exact installation details. The Contractor shall furnish and install all requisite items, including all fittings, junction boxes, etc., to insure that the electrical system operates in conformance with the Specifications and the specific requirements of an individual piece of equipment.

D. Where circuits are shown as "home-runs", all necessary fittings and boxes shall be provided for a complete conduit installation.

E. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Contract Drawings.

F. Surface mounted items such as panelboards, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between the equipment and the mounting surface.

G. The Owner shall make the final decision in determining the exact location(s) and mounting height(s) of any item(s) or piece(s) of equipment in question.

H. All connections to equipment shall be made in accordance with the approved shop and manufacturer's drawings, regardless of the number of conductors shown on the Contract Bid Drawings.

I. The Contractor shall coordinate the work of the different trades in order to prevent interferences between conduit(s), piping and other non-electrical equipment. In case any interference develops, an authorized representative of the Owner shall decide which equipment, conduit(s) or piping must be relocated, regardless of which was installed first. Any such interferences shall be remedied solely at the Contractor's expense without any additional cost to the Owner.

1.08 EQUIPMENT SIZING AND HANDLING

A. The Contractor shall thoroughly check all entryways, doors, hallways, stairways, buildings and structures through which equipment must be transported to reach its final location.

B. If necessary for safe passage of the equipment, the manufacturer shall be required to ship his material in sections sized to pass through the restricted areas. This requirement holds even if such equipment sizing differs from the manufacturer's standard shipping section.

C. To the extent possible, the equipment shall be kept upright at all times. If equipment has to be tilted for ease of passage through restricted areas, the manufacturer shall provide specific handling instructions as well as any requisite bracing in order to assure both the functional integrity of the equipment and the validity of the equipment warranty.

1.09 SUBMITTALS

A. As specified under Section 01340 of these Specifications, the Contractor shall submit shop drawings and/or manufacturer's cut sheets for approval of all materials, equipment, devices, apparatus, and other items as required by the Owner.
   1. Prior to submittal by the Contractor, all shop drawings shall be checked for accuracy and Contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the Specifications and Contract Drawings. This statement shall also list all discrepancies with the Specifications and Contract Drawings. Shop drawings not so checked and noted shall be returned unchecked by the Owner.
   2. The Owner's check shall be only for conformance with the design concept of the Project and compliance with the Specifications and Contract Drawings. The responsibility for, or the necessity of, furnishing materials and workmanship

required by the Specifications and Contract Drawings which may not be indicated on the shop drawings is included under the work of this Section.

3. No material shall be ordered, no equipment manufacturing shall be started, nor shall any shop work/fabrication commence until the Owner has approved the shop drawings. Any deviation from this requirement of the Specifications shall be entirely at the risk and expense of the Contractor without any additional cost to the Owner.

B. Record Drawings: As the work progresses, the Contractor shall legibly record all field changes on a set of Contract Drawings. When the project is completed, the Contractor shall furnish the Owner with a complete set of reproducible "as-built" drawings.

1.10 MANUFACTURER'S SERVICES

A. The Contractor shall arrange for an authorized manufacturer's representative who shall be an experienced field service engineer to be present for the inspection, installation, testing, calibration, adjusting and start-up of any item(s) or piece(s) of equipment as deemed necessary by the Owner.

B. In addition to the duties of Item 1.11.A above, the manufacturer's representative shall also instruct the Owner's personnel in the proper operation and maintenance of the item(s) in question.

1.11 MATERIALS

A. All materials used shall be new, unused and as hereinafter specified. Where not specifically called out, all materials shall be of the very best quality of their respective kinds. Unless specifically otherwise approved in writing by the Owner, only material manufactured in the United States shall be used!

B. Where applicable, all materials and equipment shall conform with the requirements of Item 1.03.B above.

C. Electrical equipment shall at all times during construction be adequately protected against both mechanical injury and damage by water. Electrical equipment shall be stored indoors in dry shelters. Any damaged equipment shall be replaced by the Contractor at his own expense.

D. All items shall be manufactured from the materials specified - substitute materials will NOT be acceptable.

E. Only the specified manufacturer's equipment shall be used unless an "or approved equal" is noted. The Owner shall be the sole determiner of what constitutes an "approved equal".

1.12 GUARANTEES AND WARRANTIES

A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship as specified under Section 01740 of these Specifications.

END OF SECTION

SECTION 16110

CONDUITS AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install the conduits, fittings, devices and appurtenances as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

1.03 APPLICATIONS

A. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all wiring shall be run in rigid conduits.

B. Schedule 80 PVC conduits shall be used at all locations aboveground and within structures and buildings except where otherwise shown on the Contract Drawings.

C. Galvanized rigid steel conduits shall be used at all locations for shielded instrumentation and shielded control wiring except where otherwise shown on the Contract Drawings.

D. Schedule 80 PVC conduits shall be used for all underground, under-slab and in-slab applications except where otherwise shown on the Contract Drawings.

E. Schedule 80 PVC conduits shall be used in highly corrosive areas such as chlorine storage areas, digesters, fluoride storage and handling areas, etc.

F. All conduits of a given type shall be the product of one manufacturer.

G. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be metal.

H. Flush mounted switch, receptacle and control station boxes shall be pressed steel.

I. Surface mounted switch, receptacle and control station boxes shall be cast or malleable iron.

J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.

K. Devices designated as NEMA Type 4X shall be fiberglass, gasketed, except as otherwise shown on the Contract Documents.

L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Conduit
   1. Rigid steel conduit shall be hot-dipped galvanized as manufactured by the Youngstown Sheet and Tube Company, Wheeling-Pittsburg Steel Corp., or approved equal.
   2. Rigid PVC conduit shall be Carlon Plus 80 rigid PVC non-metallic conduit (extra heavy wall EPC-80) as manufactured by Carlon, or approved equal.
   3. Electrical metallic tubing shall be hot-dipped galvanized steel as manufactured by U.S. Steel Corp., Youngstown Sheet and Tube Company, or approved equal.

B. Liquidtight, Flexible Conduit
   1. Liquidtight, flexible metal conduits shall be Sealtite, Type UA, as manufactured by Anaconda, American Flexible Conduit Co., Inc., or approved equal.
   2. Liquidtight, flexible non-metallic conduits shall be Carflex Liquidtight Flexible Non-Metallic Conduit as manufactured by Carlon, or approved equal.

C. Rigid Conduit Fittings
   1. Rigid Steel Conduit Fittings:
      a. Steel elbows, bends, sweeps, nipples, couplings, etc., shall be hot-dipped galvanized as manufactured by Youngstown Sheet and Tube Company, or approved equal.
      b. Conduit hubs shall be as manufactured by Meyers Electric Products, Inc., or approved equal.
   2. Rigid Non-Metallic Conduit Fittings: PVC elbows, bends, sweeps, nipples, couplings, device boxes, etc., shall be Plus 80 fittings as manufactured by Carlon, or approved equal.
   3. EMT Conduit Fittings: EMT fittings shall be hot-dipped galvanized steel, rain-tight, concrete tight, compression type, as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

D. Flexible Conduit Fittings
   1. Flexible Metal Conduit Fittings: Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts Company, or approved equal.
   2. Flexible Non-Metallic Conduit Fittings: Fittings used with flexible non-metallic conduit shall be Carflex Liquidtight Non-metallic Fittings as manufactured by Carlon, or approved equal.

E. Flexible Couplings: Flexible couplings shall be as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

F. Wall Seals: Conduit wall seals shall be type "WSK" as manufactured by the O.Z. Electrical Manufacturing Company, or approved equal.

G. Expansion Fittings: Combination expansion-deflection fittings shall be type "XD" as manufactured by Crouse-Hinds, or approved equal.

H. Boxes
   1. Device Boxes

a. Flush mounted wall device boxes shall be galvanized pressed steel as manufactured by the Raco Manufacturing Company, or approved equal.
b. Surfaced mounted wall device boxes shall be cast or malleable iron as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.
c. Flush mounted in-floor device boxes shall be cast metal, shall be watertight, shall have adjustable cover frames, and shall be as manufactured by Russell & Stoll Company, Steel City Electric, or approved equal.

2. Other Boxes
   a. Terminal boxes, junction boxes, pull boxes, etc., except as otherwise specified and/or shown on the Contract Drawings, shall be hot-dipped galvanized steel.
   b. The boxes shall have continuously welded seams which shall be ground smooth prior to being galvanized.
   c. The box bodies shall be flanged, shall be not less than 14-gauge metal, and shall not have holes or knockouts.
   d. The box covers shall be not less than 12-gauge metal, shall be gasketed, and shall be fastened to the box bodies with stainless steel screws.
   e. The boxes shall be as manufactured by Hoffman Engineering Company, or approved equal.

I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be hot-dipped galvanized iron or steel as manufactured by Appleton Electric Company, Thomas and Betts Company, Unistrut Corp., or approved equal.

J. Fixture Support System
   1. The fixture support system shall be the channel type and shall be furnished complete with all requisite mounting hardware and appurtenances.
   2. The channel, mounting hardware and related appurtenances shall be hot-dipped galvanized steel.
   3. The fixture support system shall be as manufactured by the Unistrut Corp., or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. No conduit smaller than 3/4-inch electrical trade size shall be used nor shall either 1-1/4-inch conduit or 3-1/2-inch conduit be used. Minimum size underground, under slab or in-slab shall be 1-inch.

B. No wires shall be pulled until the individual conduit runs are complete in all details. Additionally, each conduit shall be cleaned and reamed and certified clear of all burrs and obstructions before any wire is pulled.

C. The ends of all conduits shall be tightly capped to exclude dust and moisture during construction.

D. For all galvanized steel conduits, the field-cut threads shall be thoroughly cleaned and coated with a cold galvanizing compound which contains 95% pure zinc metal.

The galvanizing compound shall be as manufactured by ZRC Products Company, or approved equal. This treatment shall also be used on any nipples, elbows, etc., that are not supplied with galvanized threads.

E. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid installation.

F. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.

G. Single conduits shall be supported by one-hole pipe clamps in combination with one-screw backplates to provide space between the conduits and the mounting surface.

H. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.

I. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.

J. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.

K. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.

L. Conduits terminating in pressed steel boxes shall have double locknuts and insulated bushings.

M. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.

N. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.

O. Liquidtight, flexible conduit - metal or non-metallic as shown on the Contract Drawings - shall be used for all motor terminations and for all connections/terminations where vibration is anticipated.

P. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.

Q. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.

R. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.

S. Galvanized steel conduits entering manholes and/or below grade pull boxes shall be terminated with grounding type bushings which shall be connected to a 5/8-inch by 10-foot long driven ground rod with No. 6 AWG bare copper wire.

T. Galvanized rigid steel conduit shall be used for all risers. The underground portion of the riser and a 12-inch section of the riser immediately above the ground or

slab/floor level shall be painted with a bitumastic coating.

U. The use of electrical metallic tubing shall be restricted to low voltage applications (600V or less) in non-process areas where specifically approved by the owner on a "per installation" basis - e.g., above suspended ceilings in office areas.

3.02 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

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SECTION 16120

WIRES AND CABLES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install all wires, cables and appurtenances as described hereinafter and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

B. Samples of the actual wires and cables proposed for use shall be submitted for approval. There shall be a sample for each size and type of wire and cable proposed for use. The samples shall be of sufficient length to show the maximum rated voltage, insulation type and class, conductor size, the manufacturer's name, trademark or identifying logo, and the U.L. listing number.

C. The wires and cables as approved for use shall be compared with the wires and cables actually installed. If any unapproved wires and cables are installed, they shall be removed and replaced solely at the Contractor's expense with no additional cost to the Owner.

1.03 APPLICATIONS

A. The wire for lighting and receptacle circuits shall be type THHN/THWN, solid or stranded.

B. The wire for all power circuits and motor leads shall be type THHN/THWN, stranded.

C. Single conductor wires for control, indication and metering shall be type THHN/THWN, No. 14 AWG, stranded.

D. Multiconductor control cable shall be No. 14 AWG, stranded.

E. The wire for process instrumentation shall be No. 16 AWG, stranded.

1.04 MINIMUM SIZES

A. Except for control and signal leads, no conductor smaller than No. 12 AWG shall be used.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wire and cables shall be made of annealed, 98% conductivity, soft drawn copper conductors.

B. All conductors shall be stranded except that the uninsulated copper grounding conductors shall be solid. However, the Contractor may, at his option, install solid conductors for the lighting and receptacle circuits.

2.02 600 VOLT WIRE AND CABLE

A. Type THHN/THWN insulation shall be used for all 600 Volt wires and cables. The insulation shall be a flame-retardant, heat-resistant thermoplastic, and shall have a nylon, or equivalent jacket unless noted otherwise on the drawings.

B. The 600 Volt wires and cables shall be as manufactured by Anixter, Rome Cable, Southwire, or approved equal.

2.03 INSTRUMENTATION AND CONTROL WIRING

A. Process instrumentation wiring shall be No. 16 AWG stranded twisted pair, 600 Volt, cross-linked polyethylene insulated, aluminum tape shielded, PVC jacketed. Multiconductor cables with individually twisted pairs shall be installed where shown on the Contract Drawings.

B. Multiconductor control cables shall be No. 14 AWG, stranded, 600 Volt, cross-linked polyethylene insulated, PVC jacketed.

C. Instrumentation and control wiring shall be as manufactured by Belden, Alpha, or approved equal.

2.04 5KV CABLES

A. All 5KV cables shall be manufactured and tested in accordance with ICEA Publication No. 5066-524 and AEIC No. 5, latest revisions.

B. 5KV cables shall be single conductor, stranded, shielded, cross-linked polyethylene insulated, PVC jacketed, 133% insulation level, ungrounded.

C. 5KV cables shall be as manufactured by Anixter, or approved equal.

2.05 5KV CABLE TERMINATIONS AND SPLICES

A. Both ends of 5KV cables shall be terminated in accordance with IEEE Standard 48, Class 1.

B. Terminations shall be of the preformed stress cone type, shall be approved by the cable manufacturer for use with his cable, and shall be as manufactured by Anixter, or approved equal.

C. Unless otherwise shown or indicated on the Contract Drawing, no splices may be

made in the 5KV cables without the prior written approval of the Owner.

D. Where splicing is permitted, the splicing methods and materials shall be approved by the cable manufacturer for use with his cable and shall be as manufactured by Anixter, or approved equal.

E. All 5KV cable terminations and splices shall be made by a qualified and certified high/medium voltage cable splicer whose qualifications shall be submitted to the Owner for approval before any work is begun.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wires and cables shall be sized as shown on the Contract Drawings and/or, where applicable, sized to match existing wiring.

B. All conductors shall be carefully handled to avoid kinks or damage to the insulation.

C. Lubricants or pulling compounds shall be used to facilitate wire pulling. Such lubricants/compounds shall be U.L. listed for use with the insulation specified.

D. Use pulling means - fish-tape, cable, rope, basket weave wire/cable grips, etc. - which will not damage the wire/cable insulation or the raceway.

E. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.

F. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only instrumentation cables. Instrumentation cables shall be separated from control cables in manholes.

G. Shielding on instrumentation cables shall be grounded at the transmitter end only.

H. All new wires and cables shall be continuous and without splices between points of connection to equipment terminals. However, the Owner will permit a splice provided that the length between the connection points exceeds the greatest standard shipping length available from the submitted manufacturer and no other manufacturer acceptable to the Owner is able to furnish wires or cables of the required length.

I. All 600 volt wire and cable connections shall be made using compression type connectors. Insulated connectors shall be used for all terminations. The connections shall be made so that both the conductivity and the insulation resistance shall be not less than that of the uncut conductor.

J. All 5KV cable connections shall be made using approved terminators.

K. 5KV cables exposed in manholes, vaults, pull boxes, switchgear and other areas where the cables are not protected by conduits shall be fireproofed using fireproof tape and/or glass tape in accordance with the manufacturer's recommendations and instructions. Fireproofing using asbestos tape shall not be used.

L. All wires shall be numbered at both ends and at all intermediate junction points. Screw type terminations shall be made with forked tongue (spade), self-insulated, crimp terminals. All other wire terminations shall be made on appropriate terminal strips.

3.02 TESTS

A. Upon the completion of the pulling-in of and prior to the terminating/connecting of the 600 Volt wiring, all wires shall be individually checked and tested for continuity and short circuits, and each wire/cable shall be meggered to check insulation resistance. The test voltage shall be not less than 500 Volts. Three (3) copies of these test results shall be submitted to the Owner.

B. Similarly, the 5KV cables shall also be tested, except that a 15 minute test shall also be made using a DC voltage not less than 80% of that used for the factory tests. A plot of leakage current versus voltage shall be made and three (3) copies of the test results shall be submitted to the Owner.

C. An authorized representative(s) of the Owner shall witness all testing. The Owner shall be notified at least two (2) days in advance of the testing.

D. Any faulty conditions and/or shortcomings found during the testing shall be corrected at no cost to the Owner. However, a retest to demonstrate compliance shall be conducted before any hook-ups or terminations are made. Any such requisite retesting shall be witnessed by an authorized representative(s) of the Owner.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16160

PANELBOARDS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, devices, and incidentals required and install all panelboards as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

PART 2 PRODUCTS

2.01 RATING

A. All panelboards shall be rated for the intended voltage. Panelboard ratings shall be as shown on the Contract Drawings.

B. Panelboards shall be U.L. listed.

2.02 CONSTRUCTION

A. Interiors
   1. Interiors shall be completely factory assembled with main breakers, bus bars, branch circuit breakers, wire connectors, etc.
   2. All wire connectors, except screw terminals, shall be of the anti-turn solderless type.
   3. All wire connectors shall be suitable for use with copper wires of the size(s) indicated on the Contract Drawings.
   4. Branch circuits shall be arranged using double row construction except where narrow column panels are called for on the Contract Drawings.
   5. Branch circuits shall be numbered by the panelboard manufacturer.
   6. Interiors shall be so designed that circuits may be changed without machining, drilling or tapping; without disturbing adjacent units; and without removing the main bus connectors.
   7. Interiors shall be durably marked by the manufacturer with the voltage, current rating and number of phases for which the panelboards are designed. The markings, which shall be visible after installation without disturbing the interior parts or wiring, shall also include the manufacturer's name or trademark.
   8. All current carrying parts, including cross connectors, shall be copper.

B. Bus Bars
   1. The bus bars for the mains shall be sized as shown on the Contract Drawings.
   2. Both a full-capacity neutral bus and a separate ground bus shall be provided. Neutral bus bars shall have a suitable lug for each outgoing feeder requiring a neutral connection.

3. Phase bus bars shall be full height without reduction.
4. Bus bar taps for panelboards with single pole branches shall be arranged for sequence phasing of the branch circuit devices.
5. Bus bars shall be braced to conform to industry standards for short circuit stresses in panelboards.

C. Circuit Breakers
1. The panelboards shall be equipped with circuit breakers, main and branch, with trip settings as shown on the Contract Drawings.
2. The circuit breakers shall be of the molded case, bolt-on type with the number of poles as shown on the Contract Drawings.
3. Circuit breakers used in 120/240 Volt and 120/208 Volt panelboards shall have a minimum interrupting rating of 10,000 Amperes RMS symmetrical.
4. Three-pole circuit breakers used in 480 Volt panelboards shall have a minimum interrupting rating of 65,000 Amperes RMS symmetrical.

D. GFCI (Ground Fault Circuit Interrupter)
1. GFCI units shall be provided for all circuits where shown on the Contract Drawings.
2. The GFCI units shall be 1-pole, 120 Volt, molded case, bolt-on circuit breakers incorporating a solid state ground fault interrupter circuit which shall be insulated and isolated from the breaker mechanism.
3. The GFCI units shall be U.L. listed Class A, Group I devices (5 milliamp sensitivity, 25 millisecond trip time), and shall have an interrupting capacity of 10,000 Amperes RMS symmetrical.

E. Enclosures, Covers and Trim
1. The enclosures shall be of the NEMA Type (1, 3R, 4, 4X, 12), material (code gauge steel, stainless steel, fiberglass), and mounting configuration (flush, surface) as shown on the Contract Drawings.
2. Enclosures shall be of sufficient size to provide a minimum 4-inch gutter space on all sides. At least four (4) interior mounting studs shall be provided for each enclosure. Enclosures shall be furnished without conduit knockouts. Enclosures shall have hinged doors which cover all circuit breaker handles.
3. Stainless steel enclosures and covers shall have a natural metal finish. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
4. Fiberglass enclosures and covers shall be the manufacturer's standard color. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
5. Code gauge steel enclosures and covers shall be galvanized steel finished as per Item 2.03.E.7 below. Enclosures and covers shall be joined together with a concealed piano type hinge. Conduit openings in the enclosures shall be field punched.
6. Code gauge steel enclosures shall have panel trims of code gauge sheet steel. Trims for flush mounted enclosures shall overlap the enclosures by at least 3/4-inch all around. Surface mounted enclosures shall have trims the same height and width as the enclosures. Trims shall be fastened to the enclosures with quarter-turn clamps or screws.
7. All interior and exterior surfaces of the panelboards, enclosures and trims shall be properly cleaned, painted with a rust inhibitor (two coats), and over-coated

with ANSI Z55.1, No. 61 light gray paint. The finish paint shall be of a type to which field applied paint will adhere.

8. The inside surface of each cover shall have a directory frame with a transparent cover and a directory card.
9. Covers shall have semi-flush type cylinder locks and catches, except that covers over 48-inches in height shall have vault handles and 3-point catches, complete with lock, arranged to fasten at top, bottom and center. Two (2) keys shall be furnished for each lock and all locks shall be keyed alike.

F. Manufacturer
   1. 120/240 Volt and 120/208 Volt panelboards shall be type NQOD with QOB bolt-on circuit breakers as manufactured by the Square "D" Company, or approved equal.
   2. 480 Volt panelboards shall be the I-Line type as manufactured by the Square "D" Company, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Surface mounted panelboards shall be installed using spacers so that there is an air space between the enclosure and the mounting surface.

B. Unless otherwise shown on the Contract Drawings, the tops of the enclosures shall be mounted at a height of 6-feet above the floor. The enclosures shall be properly aligned, true-and-square, and shall be adequately supported independently of the connecting conduits.

C. All panelboard wiring shall be neatly formed, grouped, laced, and identified to provide a neat and orderly appearance.

D. The Contractor shall type on the directory card the description/use of each active circuit. "Spare" shall be indicated in erasable pencil!

3.02 TESTS

A. Each individual circuit breaker, including the main breaker and the GFCI breaker(s), shall be tested for proper operation under the appropriate overload/ground fault conditions.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

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SECTION 16210

DIESEL GENERATOR FUEL SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

A. Work under this section consists of furnishing all materials, supplies and equipment in accordance with the requirements set forth and as shown on the drawings for a fully functional diesel fuel storage and supply system for the emergency generator system that complies with all applicable codes and manufacturer's recommendations.

1.02 GENERAL

A. Provide a fuel supply system for the supply of fuel oil to the engine generator set. The fuel supply system shall include, but not be limited to, the following, each of which is described within the specification below:
   1. An outdoor main fuel tank as manufactured by Convault or approved equal.

1.03 SYSTEMS

A. The elements of the system shall be designed and supplied as an engineered system by the respective manufacturer. Each tank shall be of packaged design to include all pumps, valves, level controls, pump controls and motor starters, indicators, alarms, fuel lines, return lines, vents and all other devices as required to form an integrated, functional system such that field installation is restricted largely to piping, wiring and such intermediate devices that are required by code and/or good engineering practice to interconnect the main tank to the day tank, the day tank to the engine, the overflow tank to the main tank and to provide for external vents and other requirements set forth by local codes and UL 142, NFPA 31 and NFPA37.

1.04 DEFINITIONS

A. The system shall be for use with fuel oil as described by NFPA 321, "Basic Classification of Flammable and Combustible Liquids." As defined by this standard, the Fuel Supply System shall be for use with "combustible liquids," those having a flash point at or above 100 deg. F and further defined as class II or class III liquids. In no case shall a liquid defined as "flammable," or as "class I" or as having a flash point less than 100 deg. F be used. In every case, the system shall not be used or applied at a temperature in excess of the flash point of the contents. Electrical equipment used in the system shall be in accordance with NFPA 30, section 5-7, wherein it states "For areas where class II or class III liquids only are stored or handled at a temperature below their flash points, the electrical equipment may be installed in accordance with provisions of NFPA 70, National Electric Code, for ordinary locations..."

1.05 STANDARDS

A. The system shall be designed and installed in accordance with applicable sections of NFPA 30, NFPA 31, NFPA 37, UL 80 and UL 142. All tanks shall bear the label of Underwriters Laboratories standard 142.

PART 2 PRODUCTS

2.01 MAIN TANK

A. The main tank shall have a capacity of 2,000 gallons, non-cylindrical configuration and shall be of the insulated secondary containment aboveground storage tank system as manufactured by ConVault.

B. The primary steel tank shall be rectangular or cylindrical in shape and have continuous welds on all exterior seams, manufactured in accordance with UL listing requirements and UL Standard 142.

C. The primary steel tank shall be pressure tested at 5 psig for 24 hours.

D. The primary steel tanks shall have "emergency vent" system as per NFPA 30 Code requirements.

E. The protected and insulated AST systems shall have a thru-tank leak detector tube to allow for physical checkup and monitoring capability between the primary and the secondary containment.

F. The primary steel tank shall be pressurized at 5 psig during concentrate encasement.

G. The outer surface of the primary steel tank shall be covered by a minimum of 1/4-inch thick (6.4 mm) styrofoam insulation panels or equally acceptable thermal insulation.

H. The secondary containment shall consist of a 30 Mil thick (0.76 mm) high-density polyethylene membrane enclosing the steel tank and insulation material.

I. The primary steel tank and the secondary containment shall be encased in six-inches of monolithic reinforced concrete, with minimum design strength of 4,000 psi at 28 days. The concrete design shall include the following for long-term durability: air entrainment, water reducing admixture, and steel reinforcement. Concrete encasements with seams will not be approved.

J. The protected and insulated AST systems shall be of concrete exterior and a continuous and visually verifiable monolithic (seamless) pour on top, bottom, ends, and sides and contain no cold joints or heat sinks (heat transfer points). The AST must be shop fabricated and tested in accordance with the UL listings. Designs that use two layers of steel with insulation material between them will not be approved.

K. No steel or insulating material shall come in contact with the concrete or other corrosive material.

L. All openings shall be from the top only.

M. All exposed metal shall be powder coated to inhibit corrosion.

N. The protected and insulated AST systems shall include a minimum 5-15 gallon powder coated UL listed spill containment, and shall include normally closed valve to release spilled product into the primary steel tank. Spill containment which route the spilled product into interstitial area will not be approved.

O. The protected and insulated AST systems shall have a coated concrete exterior to resist weather and reflect sunlight. Models with steel exteriors will not be approved.

P. The protected and insulated AST systems shall have a warranty of 30 years.

Q. The protected and insulated AST systems design shall have been in use for minimum of thirteen (13) years. The manufacturer must stipulate no AST containment system failure in 24,000 units produced.

R. The protected and insulated AST systems shall have two (2) lugs for connecting grounding conductors for lightening protection in accordance with NFPA 780.

S. The external surfaces of the completed product shall be finish coated with the manufacturer's standard coating system.

T. The tank shall come equipped with an access ladder to the tank top as shown on the plans.

U. Provide the following top mounted field use fittings on the main tank:
1. Vent with weatherproof, screened vent cap per NFPA 30;
2. Emergency vent;
3. Fill inlet, 4", with weatherproof, lockable cap and overflow containment. Provide a label "Diesel Fuel Only" visible to fuel supplier;
4. Access manway;
5. 1" connections for fuel piping;
6. Secondary containment monitor tube;
7. Level Gauge with local readout and 4-20 mA output to the plant PLC. The plant PLC screens shall be configured/modified or expanded to graphically display all operating conditions and alarms.

2.02 LEVEL CONTROL SYSTEM

A. Provide a Veeder Root fuel tank monitor system for the fuel tank. The system shall be a Veeder Root model TLS-300C with integral printer. The monitor console shall be remotely mounted from the fuel tank inside the pump station building electrical room. The monitor console shall be connected underground to the fuel tank junction boxes and fuel sensors. The contractor shall coordinate with the tank manufacturer and the Veeder Root System supplier and determine the length of all probes, cables, insertion tubes, conduit kits, etc to coordinate with the actual fuel tank provided. The contractor shall furnish and install all necessary components to make the system complete and operational. Provide the following options and connections to the pump station PLC Main Control Panel.
1. A Mag Plus Probe for inventory only.
2. A 4" Diesel Float Kit with cable for the Mag Plus Probe.

3. A 4" Cap and Riser for the Mag Plus Probe.
4. An AST Kit for the Mag Plus Probe.
5. A Steel Tank Interstitial Leak Sensor.
6. A 2" Diesel Float Kit with cable for the Interstitial Sensor.
7. A 2" Cap and Riser for the Interstitial Sensor.
8. An AST Kit for the Interstitial Sensor,
9. Overfill Alarm Horn, Light and Enclosure.
10. Overfill Alarm Acknowledge Switch and Pilot Light.
11. Provide low fuel level alarm to the PLC from the TLS-300C console.
12. On site installation assistance, startup, programming and training from the certified Veeder Root supplier.

PART 3 EXECUTION

3.01 INSTALLATION

A. Tank shall be installed adjacent to the generator as shown on the plans.

3.02 PIPING

A. Provide schedule 40, ASTM A 53, black iron pipe connections to each tank as shown. Make all connections to fixed installed pipe with pipe unions to facilitate tank service/removal. Provide the following:
   1. Main tank supply to day tank with vacuum breaker;
   2. Supply and return to engine as recommended by manufacturer;
   3. Vent sizes shall be as shown and as required by local codes and by UL 142, NFPA 31 and NFPA 37 specifications.

B. Fuel piping sizes shown on the drawing shall be considered as minimum. Piping sizes shall be increased subject to the Engineer's approval, as required to produce a fully functional fuel supply/return system adequate to operate the generator system as installed at full capacity. The manufacturer shall certify the fuel system adequately as a part of the shop drawing process.

3.03 SYSTEM TESTING

A. The fuel supply system shall be supplied with manufacturers test certificates as specified below.
   1. Tank test: pressure test, leakproof test and structural integrity/appearance test;
   2. Level controller: operational test and calibration of level sensors, level indicator, level control, alarms, backup devices;
   3. Pumps: vacuum test, flow test, pressure test, leakproof test, ampere/voltage test, load test, overload test.

3.04 O&M MANUALS

A. The system shall be supplied with an illustrated manufacturer's manual which includes the following:
   1. Registration certificate
   2. Glossary
   3. Equipment list
   4. Detailed description of operation

5. Pump specifications
6. Installation instructions
7. Troubleshooting instructions
8. Maintenance instructions
9. Piping diagram
10. Electrical drawing
11. Exploded view parts drawing/parts list
12. Dimensional drawing
13. Warranty card

END OF SECTION

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SECTION 16231

DIESEL GENERATOR SET

PART 1 GENERAL

1.01 SCOPE

A. Provide and install complete and operable UL 2200 listed emergency/standby electric generating system which contains all the devices and equipment specified herein and/or required for the service. Equipment shall be new, factory and field tested, installed, and ready for operation.

B. The diesel engine is to be of sufficient horsepower to drive the generator under full load conditions. It shall be 4-cycle, fueled via an adjacent stand alone fuel tank and cooled with a closed looped radiator system. The generator is to be a low reactance brushless generator, with torque matched excitation and automatic voltage regulation. There is to be a set-mounted control panel with vibration insulators between it and the diesel generator set. The generator, controls and associated cooling and exhaust systems specified in these specifications are to be housed in a suitable weather protected enclosure which is to be permanently installed outdoors. It is the intent of these specifications to have a single source responsibility for the generator and the automatic transfer switch. See part 2.09. The automatic transfer switch will be located in the Electrical Room with the service main circuit breaker and switchboard.

C. Where conflict between drawings, specifications or code occurs, the Contractor shall assume and provide the more stringent of the alternatives to the County.

1.02 RATINGS

A. Generator set at site number 1 is to be installed at:
   1. The PS 428 Booster Pump Station
   2. 7422 41st Avenue East
   3. Bradenton, Florida 34208

B. This generator set is to be a minimum 300KW, 480 volt, 3 phase unit of suitable power to drive a total of two (2) vertical, non-clog 460 volt, 100 horsepower induction motor pumps operating on variable frequency drives. The generator shall also support an additional connected load of 30KVA for miscellaneous loads and HVAC loads as shown on the single line diagram drawing. This site shall have an adjacent stand alone fuel tank. Enclosure shall be wind rated to 150 mph.

C. PLEASE NOTE : The induction pump motors providing the loads at the above site(s) all have the following characteristics and the diesel generator sets supplied with this contract are to be built and sized bearing these facts in mind:
   1. NEMA LRA Code H
   2. Started with variable frequency drives-maximum allowable voltage dip at start is 20%-loading will be sequential, (i.e., after each pump is brought up to speed the next one will be started)
   3. 480 VAC

4. 3 Phase
5. 60 HZ.

D. ALSO: Each generator is to be built with the following characteristics/conditions:
1. Generator sized as a sequence load.
2. Standby Emergency Rating
3. Power Factor = .8
4. Site Altitude = 32 feet
5. Range of Site Ambient Temperatures = 20 – 120° F.

1.03 DIESEL GENERATOR SET PERFORMANCE

A. The voltage regulation of each set shall be + 0.5% of rated voltage for any constant load from the range of no load to full rated load.

B. The frequency regulation of each set shall be accomplished through an isochronous electronic governor from the range of steady state no load to steady state full rated load.

1.04 MANUFACTURERS

A. Subject to compliance with requirements stated and defined in these specifications, the following are approved manufacturers of the diesel generator sets:
1. Kohler Co.
2. Caterpillar, Inc.
3. Baldor
4. Generac
5. Katolight
6. Cummins Power Generation
7. Approved equal to the above manufacturers - approval is granted if all of the following conditions are met:
   a. The manufacturer meets or exceeds all the specifications of this document
   b. The components of their systems are of equal or better quality than the above specified manufacturers
   c. The manufacturer has an experience level in the product line that is provided that is equal to or greater than the above specified manufacturers.

1.05 SUPPLIER

A. The complete package - engine, generator, automatic transfer switch and other auxiliary components specified in this section shall be provided from a single manufacturer, except for the fuel tank. The supplier shall be the manufacturer's authorized distributor who shall maintain a service center capable of emergency maintenance and repairs with a maximum of four hours response time. The supplier shall have 24 hour/365 days per year service availability and factory trained service technicians authorized and capable to perform warranty service on all warrantable products.

1.06 SUBMITTALS

A. As a minimum for all equipment specified and provided, for each site, submit the following:

1. Specification and application data sheets for the entire system supplied.
2. Shop drawings showing a dimensioned outline plan and elevation views of the system with certified overall and interconnection point dimensions. Indicate fabrication details, dimensions, weights, loads, required clearances, components, location and size of each field connection and method of field assembly.
3. Site plan showing foundation slabs & underground conduit locations along with all existing facilities on site, distance to nearest habitable structure and overhanging trees.
4. Shop drawings of connections details of generator, fuel tank and automatic transfer switch enclosure connections to foundation slabs. Illustrate all necessary mounting bolts, any conduit requirements in the foundation, etc
5. Manufacturer's installation instructions.
6. Interconnection wiring and piping diagrams which show all external connections required. Show field wiring terminals with markings in a consistent point to point manner.
7. Manufacturer's certification of prototype testing which show evidence of compliance with specified requirement.
8. Manufacturer's applicable published warranty documents.
9. Time vs. current characteristic curves for generator's protection devices.
10. Thermal damage curve for generator.

The above documents shall be provided to Manatee County within two weeks of contract award. No equipment is to be purchased until the submittal is approved.

B. Prior to acceptance of the generator at each site by the County:
   1. Generator field test results showing compliance with the specifications.
   2. Signed and sealed concrete foundation slab drawings
   3. Signed and sealed final site plan showing all existing and new above ground facilities / improvements, new underground conduit and fuel line locations, and property corners.

1.07 WARRANTY

A. A comprehensive, no deductible warranty shall be supplied for the complete electrical power system (the generator set, controls and associated switches, switchgear, automatic transfer switch and all accessories) supplied for each installation. The complete systems shall be warranted by the manufacturer against defects in materials and workmanship for a period of five (5) years or 1500 hours of operation; whichever occurs first from the date of system startup. This warranty coverage shall include parts, labor, and travel expenses.

B. The warranty of the coating of the enclosure shall be a non-deductible, unlimited warranty against rust and corrosion for a period of ten (10) years.

PART 2 PRODUCTS - AT EACH SITE:

2.01 AC GENERATOR

A. Each generator shall be:
   1. Used for 60 Hz Operation, 240 Volt or 460 Volt output voltage
   2. 4- Pole - 1800 RPM - Revolving Field Synchronous Machine

3. Stator Winding to be .667 Pitch
4. Air Cooled by Shaft Mounted Fans
5. 12 Leads for Output Connections
6. Class H Insulation System
7. Temperature Rise by Resistance not to Exceed 125o C at Full Load
8. The stator shall have vacuum impregnated windings with fungus resistant epoxy varnish.

B. Utilize a permanent magnet generator for excitation power to an automatic voltage regulator. The permanent magnet generator shall sustain main field excitation power for optimum motor starting and to sustain short circuit current for selective operation and coordination of system over current devices.

C. The automatic voltage regulator shall be a temperature compensated solid state design. It shall be equipped with 3-phase RMS sensing. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The regulator shall include an under frequency rolloff torque-matching characteristic which shall reduce output voltage in proportion to frequency below a threshold of 58 hz. The torque matching characteristic shall include differential rate of frequency change compensation to use maximum available engine torque and provide optimal transient load response. Regulators which use a fixed voltage per hz. characteristic are not acceptable.

D. Provide a generator main circuit breaker. This breaker is to be set mounted and wired, molded case thermal-magnetic rated for proper generator set operation. The breaker shall be UL listed. Field circuit breaker shall not be acceptable for the purpose of generator overcurrent protection. The generator circuit breaker shall incorporate:
1. Tripping characteristic: designed specifically for generator protection.
2. Trip rating is to be matched to generator rating.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting Position: Adjacent to or integrated with control and monitoring panel.

E. Provide a microprocessor-based unit that will continuously monitor current level in each phase of generator output. When signaled by the protector or other generator set protective device, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from the load circuits. This microprocessor-based unit shall also:
1. Initiate a generator overload alarm when the generator has operated at an overload equal to 110% of full load for 60 seconds.
2. Under single or three phase fault conditions, it shall regulate the generator to 300% or rated full load current for up to 10 seconds.
3. When the heating effect of overcurrent on the generator approaches the thermal damage point of the unit, the processor shall switch the excitation system off and open the generator disconnect switch to shut the generator down.
4. Sense the clearing of a fault by other overcurrent devices and control the recovery of the rated voltage to avoid overshoot.

F. Leads for water jacket heaters and space heaters shall be housed in their own separate conduit box.

G. Provide alternator strip heater or thermostatically controlled space heater(s) per manufacturer's recommendation to keep moisture out of the windings.

2.02 INSTRUMENTATION AND CONTROL

A. Each diesel generator set is to be capable of being started and shutdown through an automatic transfer switch or manually.

B. Manually, the control shall have automatic remote start capability from a panel mounted three (3) position (Stop, Run, Remote) switch. When the control panel is selected to the "Run" position, the generator set starts and runs. When selected to the "Stop" position, a shutdown is initiated. The "Remote" position allows the set to be operated from a remote location.

C. An emergency stop button will also be installed to shut the system down. This button should be a minimum of two inches in diameter painted red, labeled "STOP" and installed in a conspicuous location on the diesel generator set. It shall be reusable and resettable.

D. The control shall shut down and lock out upon: failing to start (overcrank), overspeed, low engine oil pressure, high engine coolant temperature, or operation of a remote manual stop station. A panel mounted switch shall reset the engine monitor and test all the lamps. Lamp indications on the control panel shall include as a minimum:
   1. Overcrank Shutdown - Red
   2. Overspeed Shutdown - Red
   3. High Coolant Temperature - Red
   4. Low Engine Oil Pressure - Red
   5. High Engine Coolant Temperature Prealarm - Yellow
   6. Low Engine Oil Pressure Prealarm - Yellow
   7. Low Fuel - Yellow
   8. Run - Green

E. Each diesel generator set is to be set up by the manufacturer to indicate to a remote location through the County's RTU system:
   1. When diesel generator set is in operation.
   2. When generator fails (no commercial or generator power).

   The County's RTU system uses discrete- type signals with N/O type contacts.

F. All basic system controls, operating and annunciating indicators, generator meters, engine gage and associated transformers, disconnect switches and circuit breakers are to be mounted in a NEMA 1 enclosure control panel on the generator set base through vibration isolators.

G. Regulation of NFPA 110 Level 2 shall apply for instrumentation, alarm and shutdown. The instrument panel shall include, but not necessarily be limited to:
   1. Gages for diesel engine: digital or analog gages with + 2% full scale accuracy:
      a. Oil Pressure
      b. Engine Coolant Temperature
      c. Voltmeter for the DC Battery
   2. Gages for generator: digital or analog gages with + 2% full scale accuracy:
      a. AC Ammeter - dual range

b. AC Volt Meter - dual range
c. Frequency Meter - range of 45-65 Hz.

3. Elapsed Time Meter
4. 0-3000 RPM Tachometer - digital or analog gage with + 2% full scale accuracy.
5. A seven position phase selector switch with AOFF@ position to show meter display of current and voltage of each generator phase. This selector switch may be manual or push-button.
6. A power source with circuit protection - 12 or 24 VDC.
7. An AC interlock to prevent starter re-engagement with engine running.
8. DC circuit protection.
9. A minimum of two panel lamps to illuminate instrument panel.

H. H.Switches and Controls
1. Rheostat for adjusting output voltage of the generator to + 5% of nominal voltage.
2. Over voltage protection shutdown switch.
3. Emergency stop switch mounted on control panel.
4. Engine start switch - with Run, Off, Reset, Automatic positions.
5. Five minute engine cool down timer.
6. Cyclic cranking switch.

I. Contractor shall install four wire pairs from the generator control panel to the RTU control panel: generator running, generator failed, and two spare pairs. County shall make the actual connections to the RTU system.

J. All electrical penetrations in any enclosure shall be properly sealed from the weather.

2.03 ENCLOSURE

A. The diesel generator set and all the equipment supplied in this contract, shall be operated in a stationary outdoor environment. At each site, it shall:
1. Require weather protected enclosures. These enclosures shall protect the unit and all equipment and devices from the elements of the weather to include rain and winds to 150 MPH. All enclosures, boxes, trays, etc shall have weep holes for condensation or water intrusion drainage. The enclosure shall provide adequate ventilation for cooling and operation under full load conditions.
2. The enclosure shall be constructed of at least 14-gauge steel or aluminum or an approved material of similar strength and durability. The enclosure (if metal) shall have an electrostatically applied, baked on, powder coated enamel finish 1.5 to 2.5 mil. The coating shall have a non-deductible, unlimited warranty against rust and corrosion for a period of ten years. The color of the coating shall be a "buff" color and must be approved by Manatee County prior to installation of the product.
3. The side panels shall be easy to remove to allow access to all areas of the equipment.
4. The housing shall have hinged side access doors and a rear control door. All doors shall be provided with padlock hasps so that the County can install their standard padlocks. All handles, hinges, hasps, and all mounting bolts and screws shall be stainless steel and tamper-proof.
5. The housing shall be factory assembled to the generator set skid base. The skid base shall be firmly fastened to a concrete foundation which is to be provided and installed as part of this contract.

6. The diesel engine and generator shall be removable from the base for maintenance purposes.
7. The skid is to have adequate strength and rigidity to maintain alignment of mounted components without depending on the concrete foundation. Lifting attachments shall be arranged to facilitate lifting with slings without damaging any components.
8. The base shall incorporate a battery tray with battery hold down clamps within the rails. Provisions for stub up of electrical conduits shall be within the footprint of the set. Vibration isolation shall be integral between the generator set and base.
9. The enclosure shall be a low noise or sound attenuated enclosure. The noise level at any load operating condition, in any direction from the enclosure, shall not exceed 75 dBA at a distance of five (5) meters from the enclosure unless noted otherwise on the plans.

2.04 ENGINE

A. The engine at each site, shall be a 4-cycle, suitable for 1800 RPM continuous operation, direct injection diesel with forged steel crankshaft and connecting rods. It shall be designed for stationary applications and shall be complete with all necessary auxiliaries needed for operation of the AC generator.

B. The engine shall be cooled by a closed loop radiator system rated for full load operation in a 50° C ambient. See the Cooling System section for further details.

C. The engine shall have an electronic governor which shall provide isochronous frequency regulation. The governor shall have provision for paralleling with the addition of load sharing controls.

D. The engine shall have an electric starter and battery(ies). See the Starting System section for further details.

E. Provide full flow lubrication oil filters with replacement spin-on canister elements. Provide a dipstick for oil level indication and an easily accessible fill location.

F. Supply a fuel/water separator and filter. See the Fuel System section for further details.

G. Supply a replaceable dry element air cleaner with restriction indicator.

H. Provide an engine mounted thermostatically controlled water jacket heater. The heater(s) wattage size shall be determined by the manufacturer. The heater voltage shall be single phase, 120V, 60HZ.

2.05 STARTING SYSTEM - ENGINE

A. The battery(ies) used for cranking the diesel generator shall be the lead acid type, 12- or 24-volt, sized as recommended by the generator manufacturer. The battery(ies) shall have sufficient capacity to crank the diesel engine for at least three cycles of 15 seconds on - 15 seconds off, for a total of 75 seconds. They shall be provided as new with the entire manufacturer's warranty.

B. The battery(ies) shall be fastened securely in its(their) own tray within the foot print

of the skid. The tray shall be acid resistant.

C. Include all interconnecting conductors and connection accessories.

D. A battery charger of appropriate rating which is voltage regulated, shall be provided for the diesel generator set. It shall be sized for the proper current, input AC voltage and output DC voltage. The charger shall be equipped with float, taper and equalize charge settings.

E. A meter on the charger shall provide a visual output reading of the charger.

F. On the engine, provide a factory mounted alternator with solid state voltage regulation and 35 Amp minimum continuous rating.

2.06 FUEL SUPPLY SYSTEM- ENGINE

A. Provide a stand alone, double walled fuel tank, see tank specification Section 16210. The tank is to have the following features:
   1. The capacity of the fuel tank shall be a minimum 2,000 gallons and be sufficient to run the generator continuously for 96 hours at 75% load.

B. The overall fuel system is to comply with all applicable NFPA regulations as well as those required by the Florida Department of Environmental Regulation.

C. Provide an anti-siphon valve in the fuel line at the output of the tank.

D. A fuel filter shall be installed between the fuel tank and fuel inlet to the engine. It shall have a fuel water separator. The filter element shall be disposable and be easily removed and installed for maintenance purposes.

E. Provide supply and return fuel lines of sufficient diameter for all load requirements, flexibility for maximum resistance to fatigue due to component operation and made of material which has maximum resistance to corrosion due to environment and fuel supply.

F. Provide an integral fuel pump of sufficient capacity to sufficiently charge the fuel lines from the stand alone fuel tank under any start or run condition.

G. The fuel for all startup, testing and acceptance procedures shall be furnished by the contractor. The contractor shall provide the fuel for all generator activities throughout the contract period.

2.07 COOLING SYSTEM- ENGINE

A. The engine shall be cooled by a unit mounted closed loop radiator system rated for full load operation in 50o C ambient condition with the ambient temperature as measured at the air inlet to the radiator. Radiator shall be provided with a duct adapter flange. The cooling system shall use a 50/50 (Prestone, Xerex or equivalent coolant and water) mixture provided by the supplier.

B. Provide drain cocks or plugs in the engine block and radiator for easy changing and flushing of the coolant. Provide coolant drain extensions where necessary for easy access to the drainage device.

C. Provide a coolant heater which is thermostatically controlled in the jacket of the engine. See paragraph 2.04 H.

2.08 EXHAUST SYSTEM- ENGINE

A. The muffler for the diesel engine shall be the critical grade made from aluminized steel of thickness and design as recommended by the manufacturer. The muffler shall be housed within the generator enclosure.

B. All exhaust piping shall be stainless steel. Vertical discharge exhaust shall be equipped with a rain cap, appropriate condensation drains in the piping, and the outlet, and shall be designed so no external rain or moisture may enter the engine from the outside even if the rain cap fails. Care must be exercised so there is no recirculation of exhaust gases into the intake system.

C. The connection of the engine to the exhaust system shall be a flexible section of corrugated stainless steel pipe. The connection of the exhaust pipe to the muffler shall be a stainless steel expansion joint with liners. The connection of the muffler to the end of the system shall be stainless steel pipe.

D. The exhaust emissions shall fall within the guidelines of the EPA and other state and governmental agencies.

2.09 AUTOMATIC TRANSFER SWITCH

A. Supply an automatic transfer switch with built-in control logic monitors to sense any interruption in the utility supplied power. When the power fails, the automatic transfer switch starts the engine and transfers the load after the generator has reached proper voltage and frequency. When the utility power has been restored to the proper voltage and frequency, the automatic transfer switch will switch the load back to the utility source and after a time delay to sufficiently cool down the generator, shut down the engine. The utility power service size to each site shall be verified by the contractor and shall be factored in when determining the size of the automatic transfer switch.

B. Automatic transfer switch ratings:
   1. 600 AMPS, 3 phase, 3 wire, 480 VAC
   2. Withstand rating 65 KAIC

C. The automatic transfer switch shall be housed within a NEMA 1 enclosure and be located in the Electrical Room with the service main circuit breaker and main switchboard.The enclosure shall have an electrostatically applied, baked on, powder coated enamel finish 1.5 to 2.5 mil. This coating shall have a non-deductible, unlimited warranty against rust and corrosion for a period of ten years. The color of the coating shall be a "gray", matching the main circuit breaker and switchboard enclosure.enclosure.

D. The transfer switch shall meet or exceed the following standards for emergency standby power system automatic transfer switches:
   1. UL 1008
   2. NFPA 110
   3. NEC - articles 700 thru 702
   4. NEMA 1 CS-2-447

E. The automatic transfer switch is to have the following features:
   1. Unit to have a bypass switch with rating equal to the automatic transfer switch. The bypass switch shall be a manual type switch.
   2. Suitable for emergency and standby applications on all classes of load.
   3. Adjustable normal source voltage sensing for pickup and dropout. The voltage is to be monitored line to line for all three phases of the switch.
   4. The normal source voltage sensing is to be adjustable from a minimum of 70%-90% of nominal voltage for drop out and a minimum of 75%-100% for pickup.
   5. There shall be a single phase sensing of the emergency source. It shall have an adjustable pickup setting of a minimum of 70% to 100% of nominal voltage.

F. There shall be time delays activated in the automatic transfer switch as follows:
   1. Provide an adjustable time delay to override momentary normal source outages. If the utility provided power does not correct itself to a nominal range of values for voltage and frequency before the time on the relay expires, then all applicable transfer and engine starting signals will be activated. If the power goes back into specification, then no transfer will take place.
      a. Upon loosing commercial power:
         1) 30 seconds for time delay start
         2) 2 minutes to neutral transfer
         3) 1 minute from neutral to emergency power
      b. After commercial power is restored:
         1) 10 minutes to neutral transfer
         2) 1 minute from neutral to utility
   2. Provide an adjustable time delay for transferring the load to emergency power.
   3. Provide an adjustable time delay for retransferring back to the utility power from emergency power.
   4. Provide a non-adjustable (five minute minimum) unloaded running time for cool down of the generator after the power has switched back to the utility supply mode.
   5. Provide a time delay to absorb momentary voltage and frequency spikes or dips during initial genset loading.

G. The automatic transfer switch shall be a 3-pole switch.

H. The automatic transfer switch is to have a disconnect switch which will prevent transfer.

I. The automatic transfer switch shall have in phase transfer control logic which will initiate an in phase transfer of motor loads between line sources. This logic shall help prevent nuisance tripping of distribution circuit breakers and damage to mechanical loads resulting from out of phase power transfer.

J. The automatic transfer switch is to be designed to be completely front accessible.

K. The automatic transfer switch is to have true double throw operation. This is accomplished through a single solenoid design which inherently interlocks and prevents contacts from stopping between sources or from being in contact with both sources during any given time period.

L. The automatic transfer switch shall be equipped with a ground bus for the installation of four (4) customer provided ground terminations.

M. The automatic transfer switch shall have, as a minimum, the following equipment for the control panel.
   1. Microprocessor based electrical controls with circuitry protected against EMI, voltage transients, ESD, shock vibration, and other hostile environments.
   2. Analog or digital kilowatt meter, frequency meter, AC voltmeter and ammeter.
   3. Reset switch.
   4. Emergency Stop Switch.
   5. LCD display, touch key pad, and LED indicators for user access to system information and settings. Provide a green light for when normal source is in operation and red light when generator is operating.
   6. Generator set exerciser control.
   7. Test pushbutton to simulate a normal power source failure.
   8. Provision for optional interface with a P.C.

N. The automatic transfer switch shall have a surge suppressor which provides protection from transient voltage surges produced by lightning and other sources. The surge suppressors are to be composed of an array of matched metal oxide varistors with sufficient capacity to protect the transfer switch. It is to be connected to the normal power source terminals and installed at the factory.

O. The automatic transfer switch electronic components shall be protected from vibration and damage due to rough handling during shipment. If shipped pre-assembled or pre-mounted to the cabinet, ensure adequate connection strength.

2.10 SPARE PARTS

A. The spare parts at each site shall include, but not necessarily be limited to the following:
   1. (6) Fuses of each type and size used.
   2. (6) Pilot lamps for each type used.
   3. (3) Green lens caps for pilot lamps.
   4. (3) Red lens caps for pilot lamps.
   5. (3) Amber lens caps for pilot lamps.
   6. (1) Oil, air and fuel filter.
   7. (1) Of each special tool or device, if any, required to maintain the diesel-generator set and included equipment.

2.11 FOUNDATION

A. The concrete foundations for the generator and fuel tank are to be suitable to fully support, under all load conditions, and with a reasonable safety factor, the complete load. These steel reinforced concrete foundations shall be designed by a professional engineer licensed in the State of Florida. Signed and sealed drawings shall be provided to Manatee County as defined in section 1.06, "Submittals". The top of the concrete foundation shall be a minimum of two inches above the surrounding grade level.

PART 3 EXECUTION - AT EACH SITE:

3.01 INSTALLATION

A. The contractor who is awarded the bid, at his expense, shall have all the devices

described in this contract delivered to, and unloaded at the site. The contractor shall furnish and install the entire product to include all necessary site preparation, the concrete foundation(s), electrical connections, and all devices described in this contract so that it is fully functional and operable as intended. The installation of the devices shall be per the manufacturer's instructions provided in item 1.06. The contractor, at his expense, shall connect the existing system equipment at each site to the equipment he is providing. The contractor shall insure compatibility with the system he is providing and the existing system. The contractor shall complete the installation of the equipment he provides to the existing site equipment to the degree that it shall not be necessary for the owner (Manatee County) to make further modifications or connections in order to have a fully functional, overall system which is comprised of the existing system and that provided by the contractor under this bid. The owner (Manatee County) shall not be responsible for any costs associated with the complete installation of the product described in these specifications because all associated costs shall be included in the bid price.

B. The contractor shall install the generator, automatic transfer switch, and conduit as shown on the approved site plan he has prepared for each site.
   1. County to provide an existing site plan.
   2. Contractor and Superintendent shall meet on each site and determine the exact location for the generator, fuel tank and transfer switch.

C. All wiring shall be installed in schedule 40 PVC conduit encased in concrete and sized according to the project drawings and National Electrical Code for the number and size of conductors contained within. All trenches for underground installation of conduit shall be hand dug.

D. Install the electrical components per Manatee County Division 16 Electrical Standards as follows:
   1. Section 16050 - Electrical General Provisions
   2. Section 16110 - Conduit and Fittings
   3. Section 16120 - Wires and Cables

3.02 FIELD QUALITY CONTROL

A. Upon completion of item 3.01, a factory authorized service representative of the product supplied, is to inspect all field assembled and installed components and make any necessary corrections to insure proper equipment operation. Any cost associated with this procedure shall be born by the contractor.

3.03 TESTING

A. All test instruments used to perform the testing are to have been calibrated within the past 12 months. The calibration shall be performed in accordance with the standards of the National Institute for Standards and Technology.

B. Perform the following on-site tests after items 3.01 and 3.02 have been completed:
   1. All necessary tests recommended by the manufacturer.
   2. All NFPA 110 tests that are in addition to:
      a. System Integrity Test: Verify proper installation, connection, and integrity of each of the components of the diesel generator system before and during operation.
      b. Noise level test: Measure and calculate the A-weighted (DbA) levels

emanating from the product assembly at five (5) meters for at least six equally spaced points around the enclosure while the machine is under load. Include such points as the exhaust discharge, and cooling air intake and discharge. The noise level test is to be taken at the site after installation and shall adhere to the conditions described in section 2.03A - item 13. Also refer to the test method as defined by ISO 3744.

c. Load Bank test: Run a two (2) hour minimum test with all applicable field load (See section 1.02 for the ratings of the pump loads at each respective site). The automatic transfer switch is to be engaged and fully tested for all phases of operation during this test. The load bank may be either resistive or inductive. For purposes of the load test, the NEMA LRKVA/HP Code of the pump motors is H.

d. Determine the rise by resistance of the generator while under full load. It may be performed in conjunction with the load test. This test is sometimes called a "Heat Run" or "Hot Shutdown Test" (refer to IEEE – 112) and is performed by measuring the ambient temperature and the resistance across any two phases (+/- 1% accuracy) of the generator immediately prior to starting the machine for the load test and at the conclusion of the load test and temperature stabilization. The test is performed for a minimum of two hours and at least until the measured temperature stabilizes in the machine while under full load. After the termination of the load test and the temperature stabilization, allow the machine to coast to a stop, quickly remove any residual charge on the windings and immediately measure the resistance again (+/- 1% accuracy) across the exact same leads as when measuring the ambient temperature at the beginning of the test. The rise by resistance is calculated by a formula which correlates a change in electrical resistance to a change in temperature.

C. Compare all measured quantities with required values of testing. Correct all deficiencies identified by tests and repeat test and correction procedure until specified test requirements are met. All problems and shortcomings in the product provided, which are discovered during the testing process, shall be remedied and corrected at the expense of the supplier with no cost to the County.

D. The County shall have the option of whether or not to witness all testing that is performed. Report all test results in writing to the County.

3.04 TRAINING AND DEMONSTRATION

A. A factory representative of the product is to provide the County's maintenance personnel with a thorough period of instruction and hands-on session regarding the operation, trouble shooting and maintenance of all components of the product. Typical training period: one hour for each site.

3.05 DELIVERY

A. The product described in these specifications shall be fully installed and fully operational, tested and demonstrated within 120 days after the award of the bid has been made.

3.06 NOTICE OF DELIVERY, TESTING, TRAINING AND DEMONSTRATION

A. At least seven (7) business days of notice is to be given by the contractor to the

County for delivery, installation, testing, training and demonstration of the product.

3.07 COSTS

A. The accepted quotation shall be payment in full for all items and services listed in this specification.

END OF SECTION

SECTION 16370

VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish three (3) variable frequency drives (VFDs) as specified hereinafter.

1.02 DRIVE APPLICATION

A. The VFDs will be used to control the speed of inverter duty rated NEMA B design squirrel cage induction motors driving vertical, non-clog pumps in wastewater effluent pumping service. Motors will be rated 100 HP.

1.03 DRIVE PARAMETERS

A. The VFDs shall be designed and sized for the loads intended, shall not exceed their full-rated capacity when the driven pumps are operating at maximum capacity, shall not overload under any operating condition of the pumps, and shall be provided with an integral bypass motor starter package.

1.04 SPARE PARTS

A. As a minimum, each of the VFDs shall be furnished with the following spare parts:
   1. One (1) circuit board of each type used.
   2. Three (3) spare bulbs of each type and size used.
   3. Three (3) lens caps of each color and size used.
   4. Three (3) sets of power fuses.
   5. Three (3) sets of control fuses.

1.05 MANUFACTURER'S QUALIFICATIONS

A. The VFDs shall be the products of a single manufacturer who has been in the business of designing and manufacturing VFDs for a period of at least ten (10) years.

B. The manufacturer shall have a factory authorized representative(s) and/or a certified repair shop(s) located within the State of Florida staffed with factory trained service personnel capable of providing installation and start-up assistance, routine and 24-hour emergency repair services (including parts), and training for the Owner's personnel in operating and maintenance procedures associated with the specific VFDs furnished.

C. The manufacturer shall offer both standard and extended period service contracts as part of his normal operating policy.

1.06 MANUFACTURER'S REPRESENTATIVE

A. A factory trained authorized representative(s) of the manufacturer shall be available

to perform the following functions:

1. Provide installation assistance to the Owner's personnel on an "as needed" basis, one (1) scheduled day minimum.
2. Provide checkout and start-up services as well as conduct the final acceptance tests, two (2) scheduled days.
3. Provide training for the Owner's personnel in the proper operation and maintenance techniques to be used with the specific VFDs furnished, two (2) scheduled days.

B. The manufacturer shall include in his bid sufficient funds to cover all the costs (travel, meals, lodging) associated with providing the services listed in Item 1.06.A.1, 2 and 3 above.

1.07 SUBMITTALS

A. Within three (3) weeks of receiving the order, the manufacturer shall furnish the Owner with certified dimension prints which clearly show the nameplate data and outline dimensions.

B. Prior to start of manufacture of the VFDs, the manufacturer shall submit sets of drawings which shall include, but not necessarily be limited to, enclosure drawings showing the location of both internally and externally mounted components, master wiring diagrams showing all interconnections to the discrete component level, elementary or control schematics including coordination with other external control devices operating in conjunction with the VFDs, and outline drawings with sufficient details to allow for locating conduit stub-ups and field wiring.

C. Prior to start of manufacture of the VFDs, the manufacturer shall submit calculations and documents indicating the compliance with IEEE 519 for harmonic distortion as identified in part 2.01.A.4 of this specification.

D. Failure to comply with Item 1.07.B and 1.07.C above shall be entirely at the manufacturer's risk. Any changes required as a result of the Owner's review will be solely at the manufacturer's and contractor's expense with no cost to the Owner.

1.08 WARRANTY

A. The manufacturer shall warrant that the variable frequency drives shall be free from defects in all materials and workmanship for a period of three (3) years from date of final acceptance.

B. During the Warranty period, any and all covered defects shall be corrected by the manufacturer solely at his own expense with no cost to the Owner.

PART 2 PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. GENERAL

1. The variable frequency drives shall be the adjustable frequency (AF), heavy duty, six (6) pulse, variable torque (VT), pulse width modulated (PWM) type designed to provide continuous speed adjustment of 3-phase NEMA B squirrel

cage induction motors, inverter duty rated.

2. The adjustable frequency drives (VFDs) shall be designed to control 100 HP motors, and shall be rated for the horsepower (HP), full-load current (Amps), and speed (RPM) of the motors actually supplied.
3. The VFDs shall be furnished in NEMA Type 1 floor-mounted enclosures of the stand alone style. The enclosures shall be forced air ventilated using door-mounted fans and filters. Fan installation shall include cleanable, reuseable air filters. Enclosures shall be suitable for side by side mounting with no requirement space between the enclosures or other electrical cabinets.
4. The VFDs shall comply with the requirements of IEEE 519 and the power company (Florida Power and Light) for harmonic distortion including total voltage harmonic distortion and total current distortion. The VFD manufacturer shall provide calculations, specific to this installation, showing total harmonic current distortion (TDD), at the point of common coupling (PCC), is less than required. Input line filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519-1992, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems. The acceptance of this calculation must be completed prior to VFD installation. Prior to installation, the VFD manufacturer shall provide the estimated total harmonic distortion (THD) caused by the VFD. The results shall be based on a computer aided circuit simulation of the total actual system, with information obtained from the power company and the Engineer. If the total harmonic current distortion (TDD), at the point of common coupling (PCC), exceeds required levels, the VFD manufacturer is to recommend the additional equipment required to reduce the current TDD to an acceptable.

B. CONSTRUCTION

1. The VFDs shall be microprocessor based solid state devices consisting of three (3) basic sections:
   a. A rectifier section to change the constant frequency AC input voltage to a DC voltage. A full wave rectifier shall be used to prevent input line notching. Internal fast acting semiconductor fuses shall be installed to preclude the necessity for having external AC line fuses.
   b. A DC bus/link section to interconnect the rectifier section and the inverter section. A DC line reactor and capacitors shall be used to smooth the DC bus/link operation, improve displacement power factor, lower harmonic distortion, and eliminate the need for an isolation transformer.
   c. An inverter section to convert the DC voltage to a variable frequency AC voltage. Insulated gate bipolar transistors (IGBT's) shall be used as output switching devices to allow "tripless" operation, reduce motor noise, provide smoother motor operation, assure reliable and safe shutdowns under fault conditions, and increase drive efficiency; specifically, SCR's, GTO's, and Darlington Transistors are not acceptable as switching devices under this Specification.
2. The VFDs shall be capable of operating from a 3-phase input voltage of 480 Volts +10% over a frequency range of 48-63 Hertz while providing a constant volts per Hertz excitation to the motors.
3. The VFDs shall have a one minute overload rating of 150%, minimum.
4. The VFDs shall employ surface mount technology for reduced size, high reliability, ease of maintenance, and resistance to vibration.
5. The VFDs shall incorporate full internal protection against short circuits, ground faults, over- and undervoltage, over- and undercurrent, and temperature extremes.

6. The VFDs shall contain an adjustable electronic motor overload (I2t) circuit to eliminate the need for an external motor overload relay.
7. The VFDs shall utilize advanced diagnostic techniques to simplify trouble shooting and correcting problems.
8. The VFDs shall have a minimum drive efficiency of 97% at full speed and full load.
9. The VFDs shall have a minimum fundamental power factor of 0.98 at all speeds and loads.
10. The VFDs shall be able to operate under the following environmental conditions without modification or derating:
    a. Temperature: 0 to 40°C.
    b. Altitude: Up to 3,300 feet above sea level.
    c. Humidity: 0 to 95%, non-condensing.
11. The VFDs shall be UL listed and shall comply fully with the applicable standards and provisions of ANSI, NEMA, IEEE, IEC, and NEC, latest revisions.

C. STANDARD FEATURES
1. The VFDs shall, as a minimum, have the standard features and adjustments listed below:
    a. The VFDs shall have the same customer interface regardless of horsepower rating, including keypad, digital display, and user connections. The keypad and the digital display shall be accessible without opening the main door of the drive enclosures.
    b. The keypad shall be the seven (7) button touch type and shall be used for start-up, for setting all parameters, for stepping through the displays and menus, and for local control, including speed adjustments.
    c. In addition to the keypad speeds adjustment provisions, the VFDs shall also be furnished with a manual speed adjustment potentiometer. The potentiometer shall be accessible without opening the main door of the drive enclosures.
    d. The digital display shall be the LCD alphanumeric type with 40-character, 2-line capability. The LCD display shall be backlit to provide easy viewing at any angle in any light condition. The display shall have adjustable contrast.
    e. The display shall utilize plain English - i.e., all set-up parameters, indications, faults, warnings, and other such information must be displayed in words for easy user understanding; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification.
    f. The VFDs shall incorporate pre-programmed application macros for ease of start-up. To reduce programming time, the macros shall provide one command operation to reprogram all parameters and user interfaces for a particular application.
    g. The VFDs shall provide a user selectable option of either displaying a fault or running at a preset speed if a reference input is lost.
    h. The VFDs shall be capable of a "flying start" into a rotating load and accelerating to setpoint without safety tripping or damage to the drives or driven equipment.
    i. The user terminal strip shall be isolated from both the line and ground.
    j. The VFDs shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset

attempts shall be programmable. If the time between reset attempts is greater than zero, the time remaining until reset occurs shall count down on the display to warn an operator that a restart will occur.

k. The VFDs shall be equipped with an automatic extended power loss ride-through circuit which will utilize the inertia of the load to keep the drive powered. Minimum power loss ride-through shall be one-cycle, based on full load and no inertia. Removing power from the motor will not be an acceptable method of increasing power loss ride-through under this Specification.

l. The VFDs shall be optimized for a 3 kHz carrier frequency to reduce motor noise.

m. The VFDs shall incorporate the following three (3) separate current limit circuits to provide "trip free" operation:
   1) A slow current regulation limit circuit which shall be an adjustable percentage of the VFDs variable torque current rating, minimum setting of 125%. This adjustment shall be made via the keypad and shall be displayed in actual amperes, not as a percentage of full load.
   2) A rapid current regulation limit circuit which shall be an adjustable percentage of the VFDs variable torque current rating, minimum setting of 170%.
   3) A current switch-off limit circuit which shall be a fixed percentage of the VFD's variable torque current rating, minimum setting of 255% instantaneous.

n. In addition to any software items listed above, the VFDs shall, as a minimum, contain the following built-in software features:
   1) Automatic slip-compensation for maintaining motor speed under varying load conditions.
   2) A motor under-load function to protect the pumps.
   3) Starting torque up to 180% of full load torque.
   4) User selectable manual or automatic IR compensation for torque increases over a selected frequency range.
   5) Five (5) adjustable/selectable critical frequency lock-out bands to avoid load resonance points during ramp-up or ramp-down.
   6) Two (2) acceleration and two (2) deceleration ramps, adjustable from 0.1 seconds to 1800 seconds.
   7) Three (3) adjustable S-curve acceleration and deceleration patterns.
   8) User selectable linear, squared, or automatic control of the Volts-per-Hertz shape to assure maximum energy efficiency.
   9) Precise full range frequency resolution adjustable in 0.01 Hertz increments.
   10) Integral kilowatt-hour and elapsed-time displays.
   11) Integral PI and sequential control functions.
   12) Hand-Off-Auto function for local control through the integral keypad and remote control via pushbuttons and/or potentiometers. The Hand-Off-Auto selector switch shall have two (2) auxiliary contacts to indicate the switch position in Hand and Auto to the pump station SCADA system.

o. The VFDs shall have seven (7) programmable preset speeds as well as unidirectional rotation and coast-to-a-stop features.

p. The VFDs shall have two (2) programmable analog inputs capable of accepting either a current or a voltage signal. Inputs shall be filtered and shall have adjustable gain and offset.

q. The VFDs shall have six (6) programmable digital inputs.

r. The VFDs shall have two (2) programmable analog outputs proportional to the chosen reference (frequency, motor speed, current, etc.).
s. The VFDs shall have three (3) programmable digital outputs. Outputs must be true Form C relays; specifically, open collector outputs will not be acceptable under this Specification.
t. The VFDs shall be equipped with an RS-485 serial port capable of communicating with external PLC's, DCS's, DDC's, and touch-screen graphic operator panels.
u. The VFDs digital display shall contain, as a minimum, the following information shown in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:
    1) Output FrequencyDC Bus Voltage
    2) Output VoltageHeatsink Temperature
    3) Motor SpeedAnalog Input Values
    4) Motor CurrentKeypad Reference Values
    5) Calculated Motor TorqueElapsed Time
    6) Calculated Motor PowerKilowatt-hours
v. The VFDs shall, as a minimum, incorporate the following protective circuits which, in the case of a protective trip, shall stop the drive and announce the fault condition in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:
    1) Overcurrent: Trip set at 315% instantaneous (225% RMS) of the VFDs variable torque current rating.
    2) Overvoltage: Trip set at 130% of the VFD's rated voltage.
    3) Undervoltage: Trip set at 65% of the VFD's rated voltage.
    4) Overtemperature: Trip set at +70°C or +85°C dependent upon drive furnished.
    5) Ground Fault: Both "running" and "at start".
    6) Adaptable Electrical Motor Overload (I2t): Motor protection in VFD mode shall be based on motor speed and load; specifically, circuits which are not speed dependant will not be acceptable under this Specification.
w. The VFDs shall incorporate a parameter lock feature which will prevent unauthorized personnel from altering the drive parameters without entering a programmable password or combination number. The parameter lock shall also be settable to a digital input.

D. FACTORY INSTALLED OPTIONS
1. In addition to the Hand-Off-Auto switch and speed potentiometer mentioned hereinabove, the VFDs shall include the following factory installed options:
    a. Circuit Breaker: The circuit breaker shall be the thermal magnetic, thru-the-door interlock type, padlockable in the Off position.
    b. 115 VAC Control Transformer and Terminal Board: A terminal board shall be provided for convenient connection of all field control wiring, including all drive inputs and outputs and 115 VAC start input. A control transformer, 150 VA minimum, shall also be included.
    c. Integral Manual Bypass with Service Switch: A manually operated bypass switch shall allow the motor to be connected directly across the line and operate at full synchronous speed. In bypass, power is to be removed from the drive, but the start signals and the safety interlocks are to remain active. Normal and bypass pilot lights and an external fault circuit with an

indicating lamp which illuminates whenever any external safety device has shut down the motor shall be included. Pilot lights shall be the push-to-test type. The service switch shall allow power to be removed from the drive for servicing while the motor operates from line power. The service switch shall be internally mounted to prevent unauthorized personnel from disrupting operation. The VFD-Off-Bypass selector switch shall have two (2) auxiliary contacts to indicate the switch position in VFD and Bypass to the pump station SCADA system.

d. Motor Overload Relay: A standard, manually resettable, bimetallic, motor overload relay with a Class 20 trip curve shall be installed to provide thermal motor protection in the bypass mode. A thru-the-door reset button for the motor overload relay shall also be included.

e. Numbered Wires: All internal drive wires shall be numbered at both ends to facilitate maintenance and trouble shooting.

E. ACCEPTABLE MANUFACTURERS: The VFDs shall be a heavy duty Model ACS800-CC-0120 as manufactured by the ABB Industrial Systems Inc.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Prior to assembly in the VFDs, all printed circuit boards shall be thoroughly factory tested and given a minimum eight (8) hour burn-in.

B. After assembly, the drives shall be given a minimum eight (8) hour load test using a driven motor. The load shall be continuously cycled from no-load to full rated load to induce maximum stress and thermal variations in the drive components.

C. During the load test, the major drive parameters (input volts, output volts, output current, output speed, output frequency, percent load, etc.) shall be recorded and a copy of the test results shall be reviewed by the Owner prior to the shipment of the AFD's. Similarly, any failure(s) of the drives during the load test shall be recorded, analyzed, corrected, and reported to the Owner before shipment of the VFD's.

3.02 SHIPPING

A. The VFDs shall be so packaged for shipment that they are maximally protected from both physical and environmental damage.

B. The VFDs shall be transported to the Owner's job sites utilizing the manufacturer's customary method of shipment.

3.03 INSTALLATION

A. The VFDs shall be installed by the Owner's personnel in accordance with the recommendations and procedures set forth in the installation manual furnished by the manufacturer.

B. An authorized factory trained representative(s) of the manufacturer shall be available to assist the Owner's personnel on an "as needed" basis.

3.04 CHECKOUT AND START-UP

A. Prior to start-up, a factory trained representative(s) of the manufacturer shall be on hand to assure that the VFDs have been properly installed and that all field wiring is correctly terminated.

B. After checkout, the manufacturer's representative(s) shall then conduct a certified factory start-up using procedures and forms established by the manufacturer of the VFDs.

C. A copy of the certified start-up form(s) for each drive shall be provided to the Owner, and a copy shall be kept on file by the manufacturer.

3.05 FIELD TESTING

A. After satisfactory completion of the checkout and start-up procedures, the manufacturer's representative(s) shall begin an eight (8) hour acceptance test using actual plant loads.

B. Any and all short-comings discovered and/or failures occurring during the acceptance test shall be remedied by the manufacturer solely at his own expense with no cost to the Owner.

C. Any time after four (4) hours of acceptance testing, the Owner may, at his option, curtail further testing and take acceptance of the VFDs.

3.06 TRAINING

A. As set forth in Items 1.05.B and 1.06.A above, a factory trained authorized representative(s) of the manufacturer shall be available at such a time(s) and place(s) established by the owner to train the Owner's personnel in the proper operation and maintenance procedures required by the specific VFDs furnished.

3.07 WARRANTY

A. The manufacturer shall furnish to the Owner a written warranty which complies with the requirements set forth in Item 1.08 above.

END OF SECTION

SECTION 16443

CUSTOM POWER AND CONTROL PANELS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section describes the materials, testing and installation of custom power and control panels. These panels shall include the PLC I/O panels in Section 17050, power and control panels and area lighting contactor panels. The tag numbers in this specification shall include but not be limited to Main Control Panel "MCP", Motor Operated Valve Power and Control Panel "PCPMOV100" and Lighting Contactor "LC1".

1.02 SUBMITTALS

A. Submit shop drawings in accordance with the Section 01340.

B. Submit a complete list of equipment, materials, and any details required to demonstrate that the panel(s) and equipment shall function properly as a unit. These lists, details and drawings shall include:
   1. System configuration with single line diagrams.
   2. Detailed descriptions of the panels, material and equipment including weights, dimensions, installation requirements, and heat dissipations.
   3. Internal panel layouts indicating spacing and dimensions.
   4. Panel front layouts.
   5. Catalog cuts of all devices used.
   6. Control schematics, ladder diagrams, and inter-connection drawings.
   7. Nameplates.

PART 2 MATERIALS

2.01 DIAGRAMS

A. Schematic diagrams shall show the equipment serial number, the purchaser's drawing number, purchase order number, or similar identification which shall indicate the particular equipment system including internal wiring of subassemblies. Diagrams of subassemblies may be furnished on separate sheets.

B. Identify each device by a unique number or number-letter combination. Numbers for devices shown on the drawings shall be maintained on the system panel drawings.

C. Conductor Identification: Identify each conductor by a unique number, letter, or number-letter combination as detailed on the Contract drawings. All conductors connected to the same terminal or tie point shall have the same identification. For PLC systems, the panel side conductors shall be marked with the PLC I/O address

and the field side shall be marked with the device number. See the Instrumentation PLC I/O drawings for typical conductor marking systems for PLC digital and analog I/O and all power and control panels. Where color-coded multi-conductor cable is used for wiring identical components, such as limit switches, the color code used shall be consistent and charted on related diagrams, in addition to the wire marker with the conductors' unique number, letter or number-letter combination.

D. Provide a schematic diagram for each electrical system. The schematic diagram shall be drawn between vertical lines, which represent the source of control power. Show control devices between these lines. Show actuating coils of control devices on the right-hand side. Show contacts between the coils and the left vertical line.
   1. Where the internal wiring diagrams of subassemblies are furnished on separate sheets, they shall be shown as a rectangle in the schematic diagram with all external points identified and cross-referenced to the separate sheets of the control circuit. Show coils and contacts internal to the subassemblies in the rectangle connected to their terminal points.
      a. Exception No.1: Where relay and electronic circuits are mixed, diagrams may be drawn between horizontal lines, which represent the source of control power.
      b. Exception No.2: Overload relay contacts, motor temperature switches and starter temperature switches may be connected to the right of the coil (common) if the conductors between such contacts and the coils of the magnetic devices do not extend beyond the control enclosure.
   2. For clarity, show control device symbols in the order in which the controls are positioned on the diagram.
   3. Use a rung or line numbers cross-referencing system in conjunction with each relay coil so that associated contacts may be readily located on the diagram(s).
      a. Rungs or lines shall be numbered on the left rail and numbers for contact locations shall be to the right of the coils.
      b. Underlined numbers shall be normally closed contacts.Numbers under the contacts shall be the coil locations.
   4. Show spare contacts.
   5. Show limit, pressure, float, flow, temperature sensitive, and similar switch symbols on the schematic diagram with all utilities turned off (electric power, air, gas, oil, water, lubrication, etc.) and with the equipment at its normal starting position.
   6. Show contacts of multiple contact devices, e.g., selector switches, on the line of the schematic diagram where they are connected in a circuit. Indicate a mechanical connection between the multiple contacts by a dotted line or arrow. This does not apply to control relays, starters, or connectors.
   7. Additional charts or diagrams may be used to indicate the position of multiple contact devices such as drum, cam, and selector switches.
   8. Show the purpose or function of all switches adjacent to the symbols.
   9. Show the purpose or function of controls such as relays, starters, contactors, solenoids, subassemblies, and timers on the diagram adjacent to their respective symbols. Show the number of positions of the solenoid valve solenoid symbol.
   10. Show values of capacitors and resistors on the diagram.
   11. Descriptive terms for command and status functions shall be in the present or past tense. For example, Raise Transfer-Transfer Raised; Advance Transfer-Transfer Advance. Do not use terms such as "Transfer Up".

E. The panel front and internal layouts shall show the general physical arrangements of all components on the control panel. Devices shall be identified with the same marking as used on the schematic diagram. Spare panel space shall be dimensioned. The drawings shall include a layout of the operator's console or push-button station, but terminal numbers need not be shown.

2.02 CONTROL ENCLOSURES

A. Design and test control enclosures in conformance with UL 508. The enclosure shall be UL508 listed and labeled as a completed assembly. All inspections, approvals and modifications required to have the completed panel labeled and listed by UL shall be furnished by, and the responsibility of the contractor. Enclosure types shall be as follows unless noted otherwise in the drawings:
   1. Indoors non-Corrosive use:NEMA Type 12, Finish Painted Steel
   2. Outdoors use:NEMA Type 4X or 12/3R, 316S.S. with sunshields
   3. Indoors in a corrosive area: NEMA Type 4X or 12/3R, 316S.S.

B. The depth of the control enclosure or compartment shall be as a minimum consistent with the maximum depth of the control devices plus the required electrical clearance. In no case shall the depth of the enclosure be less than 8 inches.

C. Provide 12 gauge minimum steel sub-panels for mounting of all interior components utilizing tapped holes. There shall not be anything mounted with screws or bolts that require the sub-panel to be removed for replacing or mounting components. Sub-panels shall be finish painted with white enamel.

D. Where heating from control devices results in a temperature rise which is detrimental to the contained equipment or its operation, provide louvers or forced air ventilation for the indoor panels. Any ventilating opening shall be designed to prevent the entrance of any deleterious substance. When forced air ventilation is required, the cabinets shall be pressurized. Air filters shall be commercially available types and sizes.

E. Provide a permanent metal data pocket attached to the inside of the enclosure. If space permits, the pocket shall be at least 10-1/2 inches wide and of depth and thickness to accommodate all electrical diagrams.

F. Enclosure construction shall be minimum 14-guage steel. Provide 316 stainless steel continuous hinges for enclosure doors with external 316 stainless steel screw clamps. Provide a hasp for padlocking.

G. The exterior of all indoor enclosures shall be painted with a rust-inhibiting primer and two coats of epoxy paint.

H. The interiors shall be provided with formed 12-guage subpanels for attaching surface mounted components. All components shall be attached with screws and the subpanel shall be threaded. Rivets or back of panel nuts shall not be allowed. The interiors shall be painted with two coats of white paint. Refer to instrument drawings for installation details.

2.03 CONTROL WIRING

A. 120-Volt control wiring shall be Type MTW, (UL)/TEW. Conductors shall not be smaller than No.14 AWG. Ampacity shall be in accordance with the NEC. Nylon jacketed wire such as THHN/THWN is not acceptable. Wires shall be color-coded in accordance with the following table:

Black:	L1 (hot)
White:	L2 (neutral)
Red:	AC control circuits
Blue:	DC circuits
Yellow:	Interlock control circuits wired from an external power source
Green:	Equipment ground

B. 24 volt DC wiring within the panel for digital PLC I/O and interposing relays shall be No.16 AWG type MTW (UL)/TEW. Nylon jacketed wire such as THHN/THWN is not acceptable.

C. Instrumentation signal cables shall be of the type used for process control with shielded pairs or triads with polyvinyl chloride jackets and an overall shield over the multiple pairs or triads. The instrumentation cable shall be rated 300 volts at 90°C or better. The size of the instrumentation cable shall be No.16 AWG with seven strands minimum, unless otherwise specified elsewhere. All instrumentation cables shall meet all the requirements of IPCEA A-61-402 and shall be UL listed for a wet location.

2.04 MARKING

A. Identify wire terminations with a number to correspond with the schematic diagrams. Each signal and circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all shop drawings. Numbers shown on the PLC I/O drawings and layout drawings shall be maintained in the panels. See the drawings for conductor marking systems for the PLC digital and analog I/O wiring. All wire shall be marked on both ends with white heat shrink markers printed in black with a machine. No hand written or expanded dot matrix markers shall be acceptable. The numbers and letters must be letter quality where all lines and shapes appear as solid. The markers shall be equal to the Tyton Hellermann type THS, white heat shrink markers or approved equal.

B. Plainly and permanently identify control and power devices using the same identification as shown on the schematic diagrams. Show identification for devices inside the enclosure on an identification plate adjacent to, not on, the device.
   1. Exception No.1: Where the size or location of the devices make individual identification impractical, such as on electronic assemblies, use group identification.
   2. Exception No.2: Where panel layouts do not permit mounting identification plates adjacent to components, such as relays, place the permanent relay identification on the relay where it is plainly visible, and provide a second

identification on the top of the panel wireway cover directly below the relay. Identify the wireway covers to show their proper location.

C. Identification plates for devices mounted inside and outside the control enclosure shall be one of the following:
   1. Laminated phenolic for engraving stock; a minimum of 0.062 inch thick. Hold plates in place with S.S. drive screws or the equivalent. Use permanent adhesives for attaching nameplate to wireway covers.
   2. Non-corrosive metal: a minimum of 0.031 inch thick for engraving stock or 0.012 inch thick for embossing stock. Hold plates in place with S.S. drive screws.

2.05 SUPPLY CIRCUIT DISCONNECTING MEANS

A. The power supply for all power panels with contactors and/or starters for three (3) phase equipment shall be a 480 VAC three (3) phase three (3) wire feeder from a 480/277 WYE system. There shall not be any 277 VAC equipment or systems as the 480/277 VAC WYE neutral connection shall not be run to any panels from the main breaker. Provide a 600 VAC rated supply circuit disconnect for each 480 VAC input power and control panel. The disconnect shall be a circuit breaker, unless noted otherwise on the drawings, mounted within the 480 VAC motor control center, main switchboard or power distribution panelboard.

2.06 CONTROL DEVICES

A. Provide 120-volt control circuit transformer if incoming power supply is not 120 volts. Provide 100-volt-ampere spare capacity that is in addition to the loads specified. Fuse one side of the secondary winding and ground the other side. Provide primary winding fuses on both lines.

B. Provide indicator lights, selector switches, push buttons, meters, etc., as shown in the schematic diagrams, single line diagrams, and as required for correct operation. Mount on the front panel of the indoor control enclosures or on a dead front panel inside the outer sun shielded door of the NEMA 4X 316 S.S. outdoor panels.

C. Pushbuttons and selector switches shall be 30.5 MM heavy duty NEMA Type 4X corrosion resistant. Provide with quantity of contact blocks required for correct operation. Units shall be UL listed with NEMA A600 rated contacts.

D. Push buttons shall be 30.5 MM, heavy duty NEMA 4X corrosion resistant, round, flush head with momentary contacts.

E. Selector switches shall be 30.5 MM, heavy duty NEMA 4X corrosion resistant, round with lever operators. HAND-OFF-AUTO AND LOCAL-OFF-REMOTE selector switches shall have an additional isolated contact that closes in each position other than OFF wired to the field terminal blocks to provide an input to a remote PLC.

F. Indicating lights shall be 30.5 MM round, transformer type, heavy duty NEMA Type 4X corrosion resistant, complete with color of glass lens indicated on the drawings, or as required, and legend plates. Lamps shall be high-density light emitting diodes. Indicating lights shall be push-to-test type with glass lens.

G. Elapsed time meters shall be synchronous motor driven, 0- to 99,999.9-hour range, non-reset type, suitable for semi-flush NEMA 4X panel mounting. Provide ENM Company NEMA 4X Type T50B2.

H. PLC output interposing relays and control relays shall be magnetically held, plug in, tubular terminal with a pilot light across the coil. Control relays shall be UL listed with NEMA A300 rated contacts and coil voltage, number of poles, and pole arrangement as indicated in the drawings. Relays shall be Square D Class 8501, Type KP12P14V20 for 120 VAC coils and KPD12P14V53 for 24 VDC coils, DPDT contacts or approved equal. Sockets shall be Omron No.PF083A, DIN rail mount or approved equal. Individual interposing relays shall be provided for each PLC output point. Individual control circuits and external control power shall not be wired directly to any PLC output module.

I. Time delay relays shall be UL listed with contacts rated 10-ampere non-inductive load, 120 volts, with coil voltage, number of poles, pole arrangement, and maximum timing adjustment as indicated in the drawings. Relays shall be solid-state type with timing dial adjustment. Provide Allen Bradley Type HR for multi-function plug in timers or SSAC Type TDM, TDB or TDI for on delays, off delays and interval timers or approved equal. Sockets shall be Omron Type PF DIN rail mount or approved equal.

2.07 TERMINAL BLOCKS

A. Provide terminal blocks for all incoming and outgoing control wires. Wire and mount terminal blocks so that internal and external wiring do not cross over the terminals. No more than two conductors shall be terminated at each terminal connection.

B. Field wiring shall terminate on the "field side" of the terminal blocks. Do not connect internal panel wiring to the "field side" of the terminal blocks. Do not connect field wiring to the "panel side" of the terminal blocks.

C. Terminal blocks shall be modular, approximately 6.2 mm wide, rail mounted, rated at 20 amperes, 600 volts capable of terminating wire sizes 10 through 24 AWG and constructed of polyamide thermoplastic. Terminal blocks shall be UL listed in accordance with UL 486A and 1059. All current carrying parts shall be made of copper or brass electroplated with tin/lead. Terminal connection shall be a screw clamp pressure plate connection, designed such that the clamping screw does not clamp the screw directly to the wire. Terminal block system shall be equal to Phoenix Contact UK5N Series or approved equal. Spring clamp type terminal blocks are acceptable.

D. Provide symmetrical aluminum assembly rails, end brackets, jumper bars, and other accessories as required for a complete terminal block assembly. All DIN Rail shall be 2-1/4" elevated aluminum top hat style equal to Allen-Bradley, Catalog No.1492-DR6 to bring all sockets and terminals up to an accessible level when mounted adjacent to wiring channels.

E. Terminal blocks shall be consecutively numbered on the field and panel side to match the wire numbers from top to bottom with preprinted marking tags. Tags shall be white polyamide and hot printed with black symbols so that the print is permanent. The markers to be equal to Phoenix Contact Type ZBM6-CMS computer printer markers, vertical marked.

F. All 4-20 MADC signals shall terminate on a surge protection terminal block in the PLC I/O panel(s). The surge protection terminal blocks shall be a Phoenix Contact plug-in terminal block assembly for two (2) 24 VDC, 4-20 MADC signal cables or approved equal. The assembly shall be a PLUGTRAB PT series made up of a Cat. No. 2839208 type PT2X2-BE base and a Cat. No. 2838228 type PT2X2-24VDC-ST plug or approved equal.

2.08 WIRING METHODS

A. Panel wiring shall be neatly contained in panel wiring channels or ducts, including incoming and outgoing field control wiring. Panel wiring channels or ducts shall be white, restricted slot design, with matching snap on covers. Provide panel wiring channels with mounting holes and nylon "push" rivets for mounting. Panel wiring channel material shall be PVC.

B. Provide a minimum of 2 inches of clearance between panel wire channel and wire terminations to allow for clear viewing of wire identification marking.

C. Wiring run to control devices on the front door shall be tied together at short intervals and secured to the inside front door with adhesive mounts. Mounts shall be adjustable releasable clamp type for wire bundles 0.69 inch in diameter or smaller, or mounts with releasable nylon cable ties for bundles larger than 0.69 inch in diameter. Mounts shall be attached to front panel with adhesive.

2.09 CURRENT TRANSMITTERS (IT)

A. All power and control panels with motor starters for motors 5 HP and above shall have an individual two (2) wire current transducer and transmitter unit for each motor with an AC primary current in the range to have the motor FLA at about 75% and a 4-20 MADC output with a 24 VDC +/-10% power supply. The transducer and transmitter unit shall be equal to Riley Model 420 or 420L, depending on the range required, or Instrument Transformers, Inc. in Clearwater, Florida Model Series PCM242 or approved equal.

2.10 MOTOR STARTERS AND CONTACTORS

A. All single phase and three (3) phase motor starters and power contactors shall be NEMA rated for the horsepower or current rating of the equipment they are operating. IEC ratings are not acceptable.

B. Each motor starter shall have an integral or separately mounted, NEMA rated overload relay. There shall be an isolated auxiliary contact on each motor starter and overload relay that closes when the starter is energized and when the overload relay is tripped. The contacts shall be rated at 10 amperes at 120/240 VAC and 24 VDC and shall be wired to the field interface terminal blocks to provide a RUN and a TRIPPED input to a remote PLC.

PART 3 EXECUTION

3.01 FACTORY TESTS

A. Control panels shall be inspected and tested for correct operation. Each circuit shall be tested for continuity, short circuits, and fault grounds.

3.02 SITE TESTS

A. Control panels shall be tested with all field wiring connected. Set all adjustable set points and time delays as required for proper operation of equipment. Check operation of control panel and field devices to verify correct operation. Perform all required adjustments as required for correct operation.

B. The above scope of work detailed in sections 3.01 and 3.02 shall be provided by the Contractor for power and control panels in addition to all of the requirements specified in Section 17050 for start up and training for the Main Control Panel.

END OF SECTION

SECTION 16450

GROUNDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and/or as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

B. Test results as indicated in 3.02 C shall be submitted.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ground Rods: The ground rods shall be solid copper or copper-clad steel having a diameter of 5/8-inch and a length of 10-feet. The ground rods shall be as manufactured by Copperweld, or approved equal.

B. Grounding Conductors
   1. All grounding conductors shall be copper. Aluminum or copper-clad aluminum grounding conductors will not be allowed.
   2. The grounding conductors shall be sized in accordance with the latest edition of the National Electrical Code, Table 250-94 or Table 250-95, whichever is applicable to the particular grounding conductor.

C. Ground Rod Clamps: The ground rod clamps shall be malleable iron or cast bronze fittings suitable for use with copper conductors. The ground rod clamps shall be as manufactured by Bridgeport Fittings, Inc.; ITT Blackburn, Inc.; or approved equal.

D. Dissimilar Metals Junctions: Connections between different metals shall be sealed using NO-OXIDE paint, Grade A, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wherever possible, the Contractor shall connect to an existing plant, area or building grounding grid. Where no such grounding grid exists, the Contractor shall provide grounding as hereinafter specified and/or as shown on the Contract Drawings.

B. Building grounding grid conductors shall be embedded in backfill material around the

structures.

C. All underground conductors shall be laid slack and, where exposed to mechanical injury, shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

D. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.

E. All equipment enclosures, motor and transformer frames, conduit systems, cable armor, exposed structural steel and similar items as required by Article 250 of the NEC shall be grounded.

F. All steel building columns shall be bonded together and connected to the building ground grid.

G. Exposed connections shall be made utilizing approved grounding clamps. Buried connections shall be Cadweld, or approved equal, welding process.

H. The ground bus of service entrance equipment shall be connected to the plant, area or building ground grid, whichever is applicable.

I. For reasons of mechanical strength, grounding conductors extending from the plant, area or building grounding grid or service entrance ground bus, whichever is applicable, to the ground buses of motor control centers and/or unit substations shall be No. 1/0 AWG bare copper.

J. Lighting transformer neutrals shall be grounded to the nearest grounding electrode.

K. Conduits stubbed-up below a motor control center shall be fitted with insulated grounding bushings and connected to the motor control center ground bus. Boxes mounted below motor control centers shall be bonded to the motor control center ground bus. The grounding wire shall be sized in accordance with Table 250-95 of the National Electrical Code, except that a minimum No. 12 AWG shall be used.

L. Motors shall be grounded in accordance with Section 16150, Item 3.01.A of these Specifications.

M. The Contractor shall exercise care to insure good ground continuity, in particular between conduits and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3.02 TESTS

A. The Contractor shall test the ground resistance of the system. The Contractor shall provide all test equipment of which the Owner shall have approval.

B. The dry season resistance of the system shall not exceed five (5) ohms. If a single driven rod does not produce this value, the Contractor shall drive additional rods and/or take other measures as directed by the Owner without any cost to the Owner.

C. The Contractor shall furnish to the Owner three (3) copies of the test report certifying

that the system is in compliance with the ohmic value requirement. The certified test report shall include, but not necessarily be limited to, the following:

1. Description of the test.
2. Type of test equipment used.
3. Moisture content of the soil.
4. Date and time of the test.
5. Resistance measurement of each rod cluster.
6. Name of individual(s) performing the test.
7. Contractor's certification stamp or seal.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

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SECTION 16670

LIGHTNING PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION

A. This section describes materials and installation of a Lightning Protection system for the Ground Storage Reservoir, Operations Building and generator housing utilizing all heavy duty Class II equipment and material.

B. Lightning protection system grounds shall be tied into the main sub-grade ground system loop.

1.02 Related Work Specified Elsewhere

A. Section 16050– Electrical – General Provisions

B. Section 16120 - Wires and Cables

C. Section 16450 - Grounding

1.03 SUBMITTALS

A. Submit shop drawings in accordance with the General Conditions and the following.

B. Submit material list including manufacturer, complete part number and quantities.

C. Submit statement that material and design conforms to the requirements for a UL master label.

1.04 STANDARD

A. National Bureau of Standards Code for Protection Against Lightning, Handbook 46 (American Standard C5).

B. Nation Fire Protection Association, NFPA 780

PART 2 PRODUCTS

2.01 GENERAL

A. Attach to the Pump Station Building and the Generator a UL master label signifying that the installation of the lightning protection system has (1) been made by an accredited installer of a manufacturer of listed lightning protection material, (2) materials used are subject to factory inspection and are labeled, and (3) the installation of the labeled materials has been made according to these requirements. The label shall be an embossed brass plate issued by UL.

B. Tie Air Terminals into main grounding system as shown on the drawings.

2.02 AIR TERMINALS

A. Provide Class II heavy-duty nickel-tipped solid copper air terminals 5/8-inch minimum diameter and tapered. Points shall be rounded (blunt) and fabricated to protect against possible impalement. Air terminals shall bear a UL label.

2.03 CONDUCTORS

A. Conductors shall bear the UL label for lightning protection at 10-feet intervals.

B. Provide Class II heavy-duty copper conductors of 98% conductivity in all areas that a UL bonded system allows the use of copper.

C. Main copper conductors shall be Class II, 133.100 circular mils or 2/0 AWG with 28 strands of .0689-inch-diameter wire and shall not weigh less than 420 pounds per 1,000 feet.

D. Secondary copper conductors shall have 17 AWG minimum strands and shall have 14 strands. A solid strip 16 AWG thick and ½ inch wide can also be used.

E. Counterpoise copper conductors shall be 4/0 AWG with 28 strands of .0865-inch-diameter wire and shall not weigh less than 660 pounds per 1,000 feet.

2.04 GROUND RODS AND CLAMPS

A. Provide Class II heavy-duty copper clad steel sectional ground rods 3/4-inch diameter and 10 feet long.

B. Provide exothermic welded cable to ground rod underground connections or ground rod clamps that make contact with the ground rod for a distance of 1-1/2 inches, measured parallel to the axis of the ground rod and with the cable itself for distance of at least 1-1/2 inches. Clamps shall be secured with at least two bolts or cap screws. Do not provide crimp-type fittings for any ground connections or cement for an attachment method to any equipment, structures or slabs.

2.05 SPLICERS AND CLAMPS

A. Connector fittings for lightning conductors at "end-to-end," "tee," or "wye" splices shall be capable of withstanding a pull test of 200 pounds. Splicers, connectors, and bonding devices shall comply with set standards for lightning protection systems and be of an accepted UL inspected and approved type. Provide bolted clamps and splicers. Do not provide crimp type.

B. Exothermic welding process is to be utilized where shown to connect conductors to metal bodies, reinforcing steel, ground rods or other cables, as manufactured by Cadweld.

2.06 FASTENERS

A. A. Screws or bolts employed to secure the fasteners shall be stainless steel or of the same material as the fasteners or shall be of a material which is as resistant to orrosion as that of the fasteners

B. Galvanized or plated steel nails, screws or bolts are not acceptable

C. Provide stainless steel masonry anchors with diameters of 1/4-inch minimum. Anchors shall be capable of withstanding a pull test of 100 pounds. Plastic or fiber anchors are not acceptable.

D. Mechanically attach lightning protection conduits to the Storage Reservoir with 316 stainless steel hardware. Coordinate the location of all fasteners and the method of attachment to the Storage Reservoir with the Storage Reservoir contractor.

PART 3 EXECUTION

3.01 AIR TERMINALS

A. Air terminals shall extend above the object to be protected not less than 10 inches nor more than 36 inches. Air terminals exceeding 24 inches in height shall be supported with a suitable brace located at a point not less than one half the height of the air terminal.

3.02 CONDUCTORS

A. Do not make bends of conductors over 90 degrees. Minimum bending radius shall be 8 inches.

B. Support conductors every 3 feet or less.

C. Conductors run through metal pipe, tubing or conduit shall be bonded at both ends of the pipe, tubing or conduit.

D. Where conductors are embedded in concrete, bond the reinforcing steel to the conductor with a main size conductor. Reinforcing steel shall be bonded at the top and bottom of each embedded download. Roof conductors embedded in concrete shall be bonded to reinforcing steel at 100-foot intervals minimum. Bond with welded type Cadweld connectors.

E. Install counterpoise conductors as shown on the drawings. Lay in a trench not less than 30" deep at a distance between 3 and 8 feet from the nearest point of the structure.

3.03 BONDING OF METALLIC BODIES

A. Bond bodies of conductance to the main lightning conductor. Bodies of conductance include metal ventilators, radio antennas, and other large metal bodies whose height above the roof exceeds the height of the air terminals. Provide a bonding surface of not less than 3 square inches. Provision shall be made to guard against the

corrosive effect introduced by dissimilar metals at points of bonding. Cables shall be main-size conductors and shall maintain a horizontal or downward path to the main conductor wherever possible.

B. Bond bodies of inductance to the lightning protection grounding system. Bodies of inductance include metal roof drains, plumbing vents, copings, flashings, gutters, downspouts, small wall vents, door and window frames, interior piping, ductwork, and machinery, and in general any isolated metal object. The interconnecting conductor for both interior and exterior bodies of inductance shall be secondary size conductors.

C. If a metal water supply system is present and the lightning conductor has been grounded to the water pipe, then the above metallic bodies may be connected either to the water pipe system, the nearest lightning conductor, or to another metallic body already connected to the system. It is recognized that many bodies of inductance will be grounded automatically through their structural connection to the water supply system and require no additional bonding.

D. It is possible that some metal bodies may be bodies of both inductance and conductance. In such cases, the requirements (as to size of conductor) covering bodies of conductance shall apply.

E. Radio masts shall be bonded to the main conductor of the lightning protection system with a main-size conductor.

F. Light stanchions and poles shall be bonded to the main conductor of the lightning protection system. The riser cable will be inside the pole or stanchion and brought out below grade for the point of attachment. If approved for a UL bonded system, a Class II heavy duty clamp may be used at the top and bottom of the stanchion or pole to attach the cable and use the stanchion or pole as the cable riser. In any case, there will not be any exposed cables run up the outside of the light stanchions or poles.

3.04 GROUNDING

A. Drive ground rods from 3 to 8 feet from the structure. Top of rod shall be 30" inches below grade level.

B. If electric and/or telephone service employing driven ground electrodes enter a protected structure; the ground electrodes shall be interconnected with the lightning protection system so as to obtain common grounding about the structure. Tie to main grounding system shown on the drawings. The interconnection shall be made using main-size conductors.

3.05 CORROSION PROTECTION

A. Do not install copper lightning protection materials on aluminum roofing or siding material or other aluminum surfaces. Install in 1-inch Schedule 40 PVC conduit to within 2-inches of a connection point.

B. All risers from the ground grid to copper air terminals and exposed cables on structures, tanks buildings and equipment will be encased in 1-inch Schedule 40 PVC conduit to within 2-inches of a connection point. There will not be any bare

cable risers or taps on the structures that will bleed when exposed to water or moisture.

3.06 INDICATOR OF GROUNDING

A. Attach stamped metal tags to or adjacent to each down conductor, indicating in feet the exact vertical depth in the ground of each ground terminal. Down leads shall also be indicated by suitable markings on the depth tag or on a separate tag. Tags shall be of corrosion-resistant metal and shall be placed at heights of from 3 to 6 feet above grade.

END OF SECTION

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SECTION 17050

PROCESS CONTROL AND INSTRUMENTATION SYSTEMS

GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. It is the meaning and intent of this specification that the Instrument Subcontractor shall make an instrument installation ready for operation and complete in every respect, to include engineering, furnishing, installing, adjusting, testing, documenting, and start-up. It is however, the final responsibility of the General Contractor that this work is accomplished complete and satisfactory. Instrument Subcontractor shall include but not necessarily limit to the following:

1. Control Panel as specified herein
2. Control Panel mounted OIT
3. 2. Field Instruments as specified herein
4. 3. Panel Internal Wiring
5. 4. Piping, Tubing, and Miscellaneous Work
6. 5. PLC equipment

B. Attention is directed to the fact that the Instrumentation and Control System shall be furnished by a single SYSTEM SUPPLIER (Supplier), who shall provide all of the services, equipment, and appurtenances required to achieve a fully integrated and operational system. To facilitate the OWNER'S future operation and maintenance, products shall be of the same major instrumentation MANUFACTURER, with panel mounted devices of the same type and model as far as possible.

C. All work is to be coordinated with the General Contractor and in cooperation with other subcontractors in all phases of work. Any conflicts or interferences shall be brought to the attention of the Engineer, who shall have the final decision on changes and/or relocations.

D. Changes or additions to the drawings and specifications shall only be made with written approval of the Engineer.

E. The Instrument Subcontractor shall furnish supervision, labor, tools, equipment, and material necessary to inspect, install, checkout, test, program, and calibrate all instruments, controls, and accessories described and listed on the accompanying drawings.

F. Furnish and install all material, fabricated items, and equipment as shown on the drawings.

G. The General Contractor shall assign the Instrument Subcontractor an area for the storage of instruments and materials required for the installation work. The Instrument Subcontractor shall provide adequate facilities within that area to insure the protection of instruments from the elements.

H. Acceptable Instrument Subcontractors are:
   1. Data Flow Systems; or
   2. Approved Equal

I. The Contractor shall provide the fully annotated software and programming required to perform the functions in addition to the interlocking, monitoring and control functions indicated on the loop diagram drawings and developed in the PLC logic and OIT screen development meetings.
   1. Provide startup, shutdown and other monitoring, operating and control logic for the Booster Pump Station process control as set forth in the System Functional Descriptions, Section 2.04.
   2. Provide system development and review meetings with the Owner, the Engineer and the Contractor. Adequate time for meetings with the Owner and Engineer shall be included by the Contractor for clarification of any questions the Contractor has concerning the operating requirements of the pump station that the logic must provide and review of the proposed logic from the Contractor. The clarification and review meetings are essential to minimize the time required for start-up of the Booster Pump Station on the PLC system. The Contractor shall allow for a minimum of three (3), eight (8) hour minimum meetings, excluding travel time, for PLC logic development and system review. The Contractor shall allow for a minimum two (2) eight (8) hour minimum meetings, excluding travel time, for OIT screen submittal and review meetings. The Contractor shall allow for a minimum two (2) eight (8) hour minimum meetings, excluding travel time, for report development and review meetings. These meetings are in addition to the start-up and training sessions specified in Section 3.04.
   3. Fully document the logic with electrical tag names serving as I/O point nicknames for all connected I/O points, verbal descriptors of all real and internal I/O points and registers, and rung descriptions sufficient to troubleshoot PLC logic from a printout of the logic.

1.02 CODES

A. All material, equipment, and work are to be in accordance with all applicable Local, State, and Federal codes pertaining to the industry and OSHA.

1.03 SUPERVISION

A. Prior to award of the contract, the successful Instrument Subcontractor shall submit to the Engineer the name or names of his proposed supervisor, along with their resume of qualifications. After supervisor has been approved, the Instrument Subcontractor shall not remove nor change supervisor without the Engineer's written approval. If during the course of this job, the Engineer regards the Instrument Subcontractor's supervisor as not satisfactory; they shall be replaced within 72 hours with an approved acceptable supervisor.

1.04 MANPOWER

A. The Instrument Subcontractor shall maintain competent workmen and manpower to maintain the approved time schedule. If at any time the Engineer sees that the Instrument Subcontractor is falling behind schedule, the Instrument Subcontractor shall within 72 hours of written notice from the Engineer increase his work force to a point that the schedule can be maintained.

1.05 CONSTRUCTION EQUIPMENT

A. The Instrument Subcontractor shall maintain safe operating equipment of sufficient quantity to fulfill the requirements to meet the scope of work and time schedule. If this is not fulfilled, the Engineer shall notify the Instrument Subcontractor in writing, which the Instrument Subcontractor shall correct within 72 hours.

1.06 WORKMANSHIP AND MATERIALS

A. All work shall be installed in a good workmanship manner. Any work found by the Engineer that is incorrect, poor workmanship, or not installed as described in the specifications or as shown on the drawings, shall be immediately removed and correctly installed at the Instrument Subcontractor's expense.

1.07 GUARANTEE

A. All materials and equipment furnished by the Instrument Subcontractor and all workmanship shall be guaranteed by the Instrument Subcontractor for a period of one (1) year after acceptance by the Owner. On equipment that carries a manufacturer's guarantee; the guarantee shall be in the Owner's names and be turned over to the Engineer upon acceptance.

1.08 INSTRUCTION AND MAINTENANCE MANUALS

A. Provide operation and maintenance manuals in accordance with the Section 01730. All instruction and maintenance manuals supplied with equipment shall be formally submitted to the Engineer with appropriate data sheets for the equipment to which it applies.

1.09 SUBMITTALS

A. Materials and Shop Drawings:
   1. Furnish, as prescribed under the General Requirements, Shop Drawings covering the items included under this section of the work.
   2. All panel drawings, circuit drawings, schematics, programmable logic controller (PLC) hardware, and manufacturer's cut sheets with a system interconnecting diagram shall be submitted at one time at an early date to expedite construction, as a complete package for interface checking. Provide data sheets to include complete model numbers, input/output characteristics, range, size, and graduations for each field instrument. Software documentation submittals may be submitted separately.
   3. The information shall include dimensional drawings, anchoring details, installation instructions, test results, and wiring and piping diagrams. These shall be submitted in the form of shop drawings and manufacturer's cut sheets for all field instruments, panel enclosures and accessories, switches, push-buttons, lights, relays, timing devices, solid state timers, panel wiring devices, and PLC hardware. The information shall include catalog descriptions, schematics, and manufacturer names. Certified calibration data on all flow metering devices shall be included.
   4. A system diagram shall show all connections required between component parts of each system and between the various systems specified. Piping and electrical terminal blocks shall be numbered. Each line shall be identified at

each termination point with the same number, and this number shall not be used again for any other purpose in the complete control scheme.

5. Shop drawings submitted for approval that do not contain sufficient information for complete interface checking shall be returned by the Engineer as not reviewed.
6. The Instrument Subcontractor shall include in his shop drawings a general outline of the type(s) of tests he intends to perform to demonstrate conformance of the system to the specifications and project requirements.
7. The Instrument Subcontractor shall submit the number of copies indicated in the General Requirements and shall obtain approval from the Engineer prior to fabricating or ordering the instruments, panels, and accessories covered.
8. Submittals that are contrary to the design or specifications that are approved in error do not relieve the Instrument Subcontractor of his responsibility for providing the specified equipment.
9. A list of manufacturer's recommended spare parts shall be supplied with each system. The list shall include the manufacturer's current price for each item.

B. Submit detailed ladder diagrams of the relay, switch, and programmable logic controller (PLC) I/O terminations. The ladder diagram format shall be the same for all processes, systems, subsystems, and equipment. Diagram formats differing based on different manufacturers will not be accepted. Rungs of the ladders shall be cross-referenced. All functions shall be annotated and cross-referenced to instrumentation drawings and PLC I/O. Partial submittals shall be rejected.

C. The data sheets shall be provided with an index and proper identification and cross-referencing. There shall be separate volumes for field/panel and in-line equipment. The in-line equipment shall be coordinated with the piping work. The detailed loop diagrams shall accompany the field/panel instrument submittal. Each volume shall be submitted in its entirety. Partial submittals will be rejected.

D. Submit detailed drawings concerning control panels and/or enclosures including:
   1. Cabinet assembly and interior and exterior layout drawings to scale.
   2. Fabrication and painting specifications.
   3. Color selection samples for selection by the Engineer.
   4. Point to point wiring diagrams depicting wiring within the panel as well as connections to external devices.

E. Exceptions to the Specifications or Drawings shall be clearly defined by the Instrument Subcontractor. Data shall contain sufficient details so a proper evaluation may be made by the Engineer.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Manufactured material shall be adequately packed to prevent damage during shipping, handling, storage and erection. All material shipped to the project site shall be packed in a container properly marked for identification. Blocks and padding shall be used to prevent movement.

B. Shipping containers for materials that must be handled with the aid of mechanical tools shall be shipped in wood framed crates.

C. All materials shipped to the project site shall have at least one (1) layer of plastic wrapping or other approved means to make it weatherproof.

D. The Instrument Subcontractor shall inspect the material prior to removing it from the carrier. If any damage is observed, he shall immediately notify the carrier so that a claim can be made. If no such notice is given, the material shall be assumed to be in undamaged condition and any subsequent damage that occurs to the equipment shall be the responsibility of the Instrument Subcontractor. Repair and replacement of damaged parts shall be done at no expense to the Owner.

E. The Instrument Subcontractor shall be responsible for any demurrage charges resulting from the handling of the materials.

F. The Instrument Subcontractor shall immediately open and inspect all instruments, controls and accessory shipments after receipt to determine that they meet specifications and that they are not damaged. Where equipment is received as specified and in good condition, the Instrument Subcontractor shall be responsible for its storage, handling, and safeguarding from that point through installation. Where equipment is received at the job-site in a damaged condition, the Instrument Subcontractor is to assume full responsibility for replacement or restoration to new condition of the damage equipment.

PART 2 PRODUCTS

2.01 PROCESS INSTRUMENTATION AND CONTROLS – GENERAL

A. Type:
1. All instrumentation supplied shall be of the Manufacturer's latest design and shall produce or be activated by signals, which are established standards for the water and wastewater industries.
2. All electronic instrumentation shall be of the solid-state type and shall utilize linear transmission signals of 4 to 20 mADC (milliampere direct current); however, signals between instruments within the same panel or cabinet may be 1 to 5 VDC (volts direct current).
3. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible 4 to 20 mADC standard signals for remote transmission.
4. All instruments shall be provided with mounting hardware and floor stands, wall brackets, sun shields or instrument racks as shown on the Drawings or as required. If necessary, special stands shall be fabricated to hold instruments that cannot be pipe stand mounted due to interfering pipes, etc. All special stands shall be all aluminum or 316 stainless steel. All mounting hardware, screens, machine bolts with washers and nuts shall be 316 stainless steel.
5. Equipment installed in a hazardous area shall meet Class, Group, and Division as shown on the Contract Electrical Drawings, to comply with the National Electrical Code.
6. All indicators and readouts shall be linear in process units.
7. Electronic equipment shall be of the Manufacturer's latest design, utilizing printed circuitry and suitably coated to prevent contamination by dust, moisture, and fungus. Solid state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmospheric fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

8. All equipment, cabinets, and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single Manufacturer, insofar as possible, and shall consist of equipment models, which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.
9. All electronic equipment shall be provided with radio frequency interference protection.

2.02 ELECTRICAL

A. All equipment power supplies shall be designed to operate on a 60 Hertz alternating current power source at a nominal 110 volts, plus or minus 10 percent, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided between power sources and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

B. All analog transmitter and controller outputs shall be 4 to 20 mADC into a minimum load range of 0 to 750 ohms unless specifically noted otherwise.

C. All process instrumentation power supply switches shall have double-pole double-throw contacts rated at a minimum of 600 VA at 120 VAC and/or 24 VDC, unless specifically noted otherwise.

D. Materials and equipment used shall be UL (Underwriters Laboratories Inc) approved wherever such approved equipment and materials are available.

E. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting when power is restored.

2.03 LIGHTNING/SURGE PROTECTION

A. General: Lightning/Surge protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the analog and discrete signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, and be maintenance-free and self-restoring. Instruments shall be housed in NEMA 4X nonmetallic or 316 stainless steel enclosures with ground buses, properly grounded. Ground wires for all surge protectors shall be connected to a good earth ground and where practical each ground wire run individually and insulated from each other. These protectors shall be mounted within the instrument enclosure or a separate NEMA 4X junction box coupled to the enclosure. The units shall be as manufactured by Phoenix Contact, Telecommunications Industries Inc., Joslyn, or equal.

B. Power Supply: Protection of all alternating current (AC) instrument power supply lines shall be provided. Cabinet(s)/panel(s) and groups of field instruments, as approved by the Engineer, shall be protected by isolation transformers and surge suppressors. Individual field instruments shall be protected by individual gas tube surge suppressors.

C. Signal Line: Protection of all field analog, discrete, digital and telemetry signal lines shall be provided. Protection devices shall be installed at both ends and as close to the instrument being protected as possible. Where signal lines enter control rooms through an interface cabinet, the protection devices shall be mounted in the interface cabinet. Protection shall be with the combined use of gas tube surge arrestor and zener diode protectors. 4 to 20 mADC signal lines shall be installed in metal, rigid aluminum conduit.

D. Surge Protection: All field mounted primary element transmitters with 4-20 MADC outputs shall have a transmitter mounted surge protection unit wired across the 4-20 MADC output terminals and tied to the instrument ground. The surge protector is a 316 SS encased unit with 1/2" NPT male threads for mounting in a spare hub of the transmitter or in a Myers type ST1 hub installed in the transmitter enclosure. The surge protection unit is a Telematic, MTL Instruments Group, part number TP48-N.

2.04 SYSTEM FUNCTIONAL DESCRIPTIONS

A. BOOSTER PUMPS CONTROL:

1. REMOTE AUTOMATIC CONTROL: The Booster Pumps shall be controlled automatically from a PID controller, PIC101, in the Booster Pump Station PLC with the individual analog output signals controlling the variable frequency drives (VFD's). The process variable to PIC101 will be the suction pressure transmitter PIT101 and the controller PIC101 output shall drive three (3) isolated analog outputs so that the lead pump VFD speed control signal may be locked at 100% output when the lag pump is called to start. The lag pump VFD will be modulated by PIC101 to control the suction pressure. The digital call to run outputs from the Booster Pump Station PLC to the VFD's shall be based on the Booster Pump Station Bypass Valve FCV101 being full closed, the Booster Pump Station Service Valve FCV102 being full open and the suction pressure signal from PIT101 equal to or greater than an operator adjustable set point for an adjustable time delay. The suction pressure and valve position control logic in the PLC shall automatically alternate the lead/lag sequence after each shutdown of the lead pump or after an operator adjustable run time hours of the lead pump to equalize the run time of the pumps. The booster pumps shall operate under the modulating control of PIC101 until the suction pressure signal from PIT101 drops below the operator adjustable pressure set point for an operator adjustable time delay set point.

   Provide control logic that will exhibit smooth pressure transition when starting and stopping pumps in multiple stages (no spikes or numerous cycles). Control logic shall provide some overlap between sequence stages to cover all possible demand flows. The VFD's shall operate within a speed range from a minimum speed to full speed programmed in the VFD based on field test and the pump curves. The minimum speed shall be the pump speed required to create enough head to overcome the force main pressure and start a positive flow from the booster pumps. The minimum speed of the VFD will correspond to a 4 mADC speed control input signal from the PLC pressure controller PIC101 output signals. An example would be if 70% pump or VFD speed is the minimum speed required for a positive flow into the pressurized force main, the minimum speed of the VFD would be 70% with a 4 mADC input signal to the VFD from the PLC, a 12mADC input signal to the VFD from the

PLC would be 85% speed and a 20 mADC input signal to the VFD from the PLC would be 100% speed.

When the VFDs are being run in automatic for pressure control by the PLC configured PID controller that is displayed and configured in the operator interface terminal (OIT), the following functions shall cycle the VFDs in a multiple pump Lead, Lag 1, Lag 2 mode. When a given pump goes above "X"% speed for "Y" minutes the next pump comes on. Reverse on the shutdown sequence of the pumps as pressure is falling. When the lead pump operates below speed "Z" for more than "S" minutes, the pump shuts off and shall not restart for "T" minutes. The normal shutdown of all the pumps at the Booster Pump Station will be as each pump in the sequence operates below speed "Z" for more than "S" minutes as detailed above. As a backup to the normal shutdown sequence, all pumps shall shutdown if an emergency or low-low pressure set point from the suction pressure transmitter PIT101 is equal to or below the set point for an adjustable time delay period. All times, % speeds and pump sequence shall be operator selectable and adjustable from the OIT. Each set point shall have an "On" and "Off" set point and actuation time delay for each function, all of which are operator adjustable from the OIT.

2. LOCAL HAND CONTROL: The pumps shall be hand operated through the HOA switches on the door of the VFDs. When placed in HAND, a pump is to start independent of the PLC and run continuously with speed controlled by the keypad on the VFD with interlocks to VFD faults only.
3. REMOTE MANUAL CONTROL: Provide manual control through the PLC from operator inputs to the OIT to start, adjust the speed, and stop the pumps.

B. MOTORIZED FLOW CONTROL VALVES (FCVs) CONTROL:
   1. The FCVs are to be controlled automatically through the PLC via signals to Motorized Valve Power and Control Panel PCPMOV100 when the Local-Off-Remote selector switch at the FCVs are in the Remote position. The mode of control shall be provided to open and close the valves based on the demand for the Booster Pump Station to be placed in service.
   2. FCV101 BOOSTER PUMP STATION BYPASS VALVE: FCV101 will normally be in the open position to direct flow from various Lift Stations and Pump Station PS 428 to the line bypassing the Booster Pump Station and flowing directly to the Waste Water Treatment Plant.
      a. REMOTE AUTOMATIC CONTROL: FCV101 shall operate automatically through the PLC when the integral Local-Off-Remote switch in the control valve housing is placed in the Remote position. When the operator manually initiates the start command from the OIT to the Booster Pump Station PLC or the automatic sequence to start the Booster Pump Station based on the suction pressure transmitter PIT101 as described in 2.04, A, 1 above is initiated, FCV101 will begin to close after FCV102 reaches the fully open position. See item B.3.A below. FCV101 will remain closed until the requirement for the Booster Pumps has ended. When the command to shut down the Booster Pump Station is received, FCV101 will open and reach the full open position before the Booster Pumps shut down and FCV102 begins to close.
      b. LOCAL HAND CONTROL: FCV101 shall operate by hand from the integral Local-Off-Remote switch and the Open-Close pushbuttons in the control valve operator housing. When placed in the Local position, the valve will operate independent of the PLC and open or close from the

integral Open and Close pushbuttons in the control valve operator housing. The valve shall start and move to the fully open position when the integral Open pushbutton is momentarily depressed. The valve shall start and move to the fully closed position when the integral Close pushbutton is momentarily depressed.

c. REMOTE MANUAL CONTROL: Provide manual control through the PLC Via the OIT to open and close FCV101.

3. FCV102 BOOSTER PUMP STATION SERVICE VALVE: FCV102 will normally be in the closed position to direct flow from various Lift Stations and PS 428 to the line bypassing the Booster Pump Station and flowing directly to the Waste Water Treatment Plant through FCV101.

a. REMOTE AUTOMATIC CONTROL: FCV102 shall operate automatically through the PLC when the integral Local-Off-Remote switch in the control valve housing is placed in the Remote position. When the operator manually initiates the start command from the OIT to the Booster Pump Station PLC or the automatic sequence to start the Booster Pump Station based on the suction pressure transmitter PIT101 as described in 2.04, A, 1 above is initiated, FCV102 will open. When FCV102 reaches the fully open position and the suction pressure signal from PIT101 is equal to or greater than the operator adjustable set point for an adjustable time delay as described in 2.04, A, 1 above, the Booster Pumps will start. After the Booster Pumps have started, FCV101 Bypass valve will close. See item B.2.A above. FCV101 will remain closed until the requirement for the Booster Pumps has ended. When the command to shut down the Booster Pump Station is received, FCV101 will open and reach the full open position before the Booster Pumps shut down and FCV102 begins to close.

b. LOCAL HAND CONTROL: FCV102 shall operate by hand from the integral Local-Off-Remote switch and the Open-Close pushbuttons in the control valve operator housing. When placed in Local position, the valve will operate independent of the PLC and open or close from the integral Open and Close pushbuttons in the control valve operator housing. The valve shall start and move to the fully open position when the integral Open pushbutton is momentarily depressed. The valve shall start and move to the fully closed position when the integral Close pushbutton is momentarily depressed.

c. REMOTE MANUAL CONTROL: Provide manual control for FCV102 through the PLC Via the OIT to open and close the valve.

C. OPERATOR INTERFACE TERMINAL (OIT):

1. The OIT is primarily used for indicating and controlling the operation of the Booster Pump Station. The OIT will also monitor the status of certain equipment and controls at remote Pump Station PS 428 (via telemetry) for control of the Booster Pump Station. The following will be indicated:

a. For the Emergency Power Generator

1) 1. Automatic Transfer Switch (ATS) in Normal Power Position
2) 2. Automatic Transfer Switch (ATS) in Emergency Power Position
3) 3. Generator Running
4) 4. Generator Faulted
5) 5. Fuel Tank Level Low

b. For the Booster Pumps

1) 1. Pump Running

2) 2. Pump Speed
3) 3. Pump Overload Tripped
4) 4. Pump VFD Faulted
5) Pump in Automatic/Manual Mode
6) Pump in VFD/Bypass Mode
7) Pump discharge pressure high.
8) Pump discharge check valve Closed/Open/Faulted

c. For the Flow Control Valves
1) Valve in Local/Remote Mode
2) Valve closed
3) 3. Valve open
4) 4. Valve Faulted

d. For Remote Pump Station PS 428 (via telemetry)
1) 1. PS 428 Pump No.1 Running
2) 2. PS 428 Pump No.2 Running
3) 3. PS 428 Pump No.3 Running
4) 4. PS 428 Pumps Off
5) 5. PS 428 Lead Pump On
6) 6. PS 428 Discharge Pressure (psig)

2. The OIT will provide override control capability for the Booster Pumps and Flow Control Valves; display and provide means for changing the system's operating and alarm setpoint values; and display warning and alarm messages.

2.05 MATERIAL AND EQUIPMENT

The following are the component specifications for specific field and panel mounted devices identified on the drawings:

A. MAIN CONTROL PANEL (MCP) / REMOTE TERMINAL UNIT (RTU): The Main Control Panel (MCP), Remote Terminal Unit (RTU) shall be properly sized and equipped to provide the local automatic control specified. The RTU shall incorporate a Programmable Logic Controller (PLC). All configurable operational parameters shall be selectable from a local operator interface touchscreen (OIT), and via the existing TAC II SCADA HMI. Programming of the PLC, OIT, and TAC II SCADA HMI shall be provided by DFS. The RTU shall incorporate a Radio Transceiver compatible with the owner's existing frequency and Input / Output (I/O) function modules required to meet the monitor and control requirements. Function module card connectors shall be gold-over-nickel plated to inhibit corrosion. The RTU shall be capable of operating in a temperature ranging from -10 to 60 Degrees Celsius (14 to 140 Degrees Fahrenheit).

B. SERVICE PORT: The RTU shall support a local serial interface service port for access to all the functions of the unit and local monitoring of the radio communications link. The RTU shall support an automatic antenna alignment function utilizing the local serial interface.

C. POWER SUPPLY MODULE: All function modules in the RTU shall run off DC voltage from +7.5 volts to +13 volts. The Power Supply Module (PSM) shall supply +12 volts. A battery backup shall be provided to operate the system in event of power failure. The PSM shall be surge protected. The PSM shall be short circuit

protected by current limiting. Normal operation shall automatically resume when the short circuit overload is removed. The PSM shall be sized to operate the system with the battery removed. The PSM shall provide a battery backed, isolated bias voltage source. The circuit breaker for the PSM shall be part of the module. Neither the use of tools nor the disconnection of any wires shall be required to replace the PSM.

D. SURGE PROTECTION: Multiple staged surge protection shall be provided for all power supply and power monitoring circuits. This design shall provide a very high level of non-destructive transient immunity. With the exception of a direct lightning strike, the device shall protect the RTU power supply and power monitoring circuits from damage due to voltage transients. The unit shall provide circuit protection to withstand multiple transients in excess of 6,500 volts, 3,250 amps, without damage. Damage shall be limited to a blown fuse when exposed to larger transients. The device shall be transient-tested to ANSI standard C62.41. The unit shall be the Transient Filter Shield TFS001 as manufactured by Data Flow Systems. The AC power input protection shall be the Single Phase Suppresser, SPS001 as manufactured by Data Flow Systems. All surge protection shall be UL Listed.

E. BACKUP BATTERY: The RTU shall have the uninterruptible power supply (UPS) function built in. The unit's internal power supply module shall keep the battery at a float charge. The battery shall not be damaged by deep discharges.

F. RADIO INTERFACE MODULE: The RTU shall require one radio interface module (RIM). The RIM shall control the terminal radio during the polling sequence. The RIM shall have a service port to provide communications link monitoring. The service port shall also provide the capability to directly monitor and/or control each module in the RTU. The RIM utilized at the RTU shall be interchangeable with the RIM at the central site. All radio communications shall be in ASCII and utilize an error detecting data transfer protocol. Each RIM shall have an FM radio transceiver mounted to it. Replacement of the RIM shall trigger an automatic configuration of the new module to accommodate the site address and function (plug & play).

G. FUNCTION MODULES: The function modules shall be designed so they do not have configuration switches or straps. The function modules shall be designed with surge suppression on all inputs and outputs. Replacement of a function module shall not require the use of tools or the removal of any interface wires. There shall be no components associated with the function module mounted to the motherboard (passive backplane). The function modules shall be backward compatible with all older modules of same type. All the function modules shall support central site computer access to the revision level of the module over the radio communications link.

H. DIGITAL MONITOR MODULE: The digital monitor module (DMM) shall accept 12 on/off or pulsed inputs of 12 to 30 volts AC or DC. Other AC or DC voltages shall be accommodated with the use of an inline voltage converter device. Status reporting of the digital inputs shall have an accuracy of +- 2 seconds to the time the event occurred at the RTU. The DMM shall have LEDs to indicate: the status of each input point; receive communications; transmit communications; CPU fault; and power status. The configuration of the monitor points as alarm points, monitor points (pump run time monitors), or pulsed input points shall be operator changeable at the central site. The custom configuration of the DMM shall not require any software or

firmware changes in the RTU. Replacement of the DMM shall trigger an automatic configuration of the new module by the central site (plug & play).

I. DIGITAL MONITOR MODULE: The digital control module (DCM) shall be available in two configurations, providing eight (8) digital outputs and four (4) digital inputs, or four (4) digital outputs and eight (8) digital inputs. Each control point shall accommodate 60 to 280 volt AC devices. Each control point shall be capable of driving a 0.5 amp load @ 280 volts AC (140 VA), with inrush current of 5 amps. Any discrete control point shall have the capability of being automatically controlled by any discrete monitor point, at the same RTU or at any other RTU. This shall be accomplished during configuration at the central site and shall be available for an unlimited number of control points. Each input shall accept ON/OFF inputs of 12 to 30 volts AC or DC. Other AC or DC voltages shall be accommodated with the use of an inline voltage converter device. Status reporting of the digital inputs shall have an accuracy of +- 2 seconds to the time the event occurred at the RTU. The configuration of the monitor points as alarm points or monitor points (pump run time monitors) shall be operator selectable. The configuration shall not require any software of firmware changes in the system. The DCM shall have LEDs to indicate: the status of each output point; receive communications; transmit communications; CPU fault; and power status. Replacement of the DCM shall trigger an automatic configuration of the new module by the central site (plug & play).

J. ANALOG MONITOR MODULE: The analog monitor module (AMM) shall monitor up to 4 analog inputs, each capable of accepting 4-20 ma or 0-5 VDC. The analog input shall provide 12-bit accuracy. The analog inputs shall be individually optically isolated. The AMM shall have support-configurable reporting granularity and alarm thresholds. All configurable parameters shall be operator-controlled. The AMM shall have LEDs to indicate: the status of receive communications; transmit communications; CPU fault; and power status. The AMM shall be capable of supplying 24 VDC power source for 4-20 ma transmitters. Replacement of the AMM shall trigger an automatic configuration of the new module by the central site (plug & play).

K. ANALOG CONTROL MODULE: The analog control module (ACM) shall control up to 4 analog outputs, each capable of producing 4-20 ma output driving a 0 to 1000 ohm load. The analog output shall have 12-bit accuracy. Each analog control shall have configurable engineering units. All configurable parameters shall be operator controlled. ACM shall have LEDs to indicate: receive communications; transmit communications; CPU fault; and power status. Any analog control point shall have the capability of being automatically controlled by any analog monitor point, at the same RTU or at any other RTU. This shall be accomplished during configuration at the central site and shall be available for an unlimited number of control points. The ACM shall be capable of supplying 24 VDC power source for 4-20 ma transmitters. Replacement of the analog control module shall trigger an automatic configuration of the new module by the central site computer (plug & play).

L. PROGRAMMABLE LOGIC CONTROLLER: The Programmable Logic Controller module (PLC033) shall be a microprocessor-controlled module designed for implementing local logical control at the RTU via an installed ladder logic program. The PLC033 shall feature a 33 MIP ARM processor with 8M Flash ROM, 16M RAM, 1200/9600 baud communications with TAC II devices, up to 38.4 Kbps with external

RS-232/RS-485 devices using Modbus RTU or ASCII protocol, program stored in Non-Volatile memory, and battery-backed real time clock for time of day functions. A Process Management Toolkit (PMT) software shall be provided and utilized to configure I/O, communication settings, and to create the ladder logic program. The PLC033 shall incorporate an Ethernet port and a serial port (either RS-232 or RS-485) that can be used to expand the modules functionality. The Ethernet port shall serve as the programming interface, as well as allow it to function as a network slave device using either the DFS protocol or Modbus TCP protocol. The COM1 serial port shall allow the module to function as a Modbus RTU/ASCII master or slave device. The PLC033 shall support an OIT via a Modbus interface. The PLC033 shall have LEDs to indicate: the status of receive communications; transmit communications; CPU fault; and power status. The PLC033 shall also have 4 programmable LEDs. The PLC033 shall monitor its power source and save accumulated data when a power failure is detected. The PLC033 shall incorporate a shutdown button to enable a graceful shutdown of all processes. An interface port shall be provided to load programs locally from a portable computer.

M. OPERATOR INTERFACE TERMINAL (OIT) / TOUCH-SCREEN PANEL PC: The RTU shall include an industrial grade Touch-screen Panel PC for use as the Operator Interface Terminal (OIT). The OIT shall be Industrial Panel PC Model 19IPIA7T-M1 as manufactured by American Industrial Systems. The same HMI screen utilized for the SCADA System workstations shall be utilized for the RTU's OIT screen.

N. ENCLOSURE: The RTU shall be housed in a NEMA 4X stainless steel enclosure. The enclosure shall be sized to accommodate the backplanes, PLC and functions modules needed to meet the requirements.The enclosure shall incorporate a swing open dead-front to support the required OIT. All mounting hardware utilized shall be stainless steel. The enclosure shall be capable of being locked.

O. ANTENNA SUBSYSTEM : Data Flow Systems, Inc. shall perform a radio path analysis. The path analysis shall provide a minimum of 15 dB of fade margin. The 15 dB fade margin shall be demonstrated by inserting a 15 dB pad into the RTU coax cable, and thereafter maintaining communications with the central site. A high gain directional antenna shall be used to transmit and receive data at the RTU. The directional antenna shall have all welded aluminum elements, and a single radiator element connected to a type N female connector. The antenna shall be the RTA series as provided by Data Flow Systems, Inc. The antenna mast/pole shall be hot dipped galvanized for corrosion protection. All mounting hardware shall be made of stainless steel. The coax cable shall be the type that utilizes an inert semi-liquid compound to flood the copper braid. The coax cable shall be of the RG-8 construction type and have the RF-loss characteristic of foam flex. The coax cable shall be RTC 400 as supplied by Data Flow Systems, Inc. Type N connectors shall be utilized at both ends of the coax. The Type N connectors shall be sealed with 3-inch sections of Alpha FIT321-1-0 sealant shrink-tubing. The coax cable shall be secured to the mast/pole with EVA-coated 316 stainless steel cable ties. The cable ties shall be AE112 cable ties manufactured by Band-It. The RTU shall be protected from electrical surge or transients entering through the coaxial cable by use of a coaxial cable surge protector. The coaxial cable surge protector shall be IS-B50LN-C2 manufactured by Polyphaser.

P. PRESSURE TRANSMITTER: The pressure transmitter shall be a two-wire 4-20mAdc device and shall transmit an isolated signal into a load impedance of 0 to 600 ohms without adjustments. Accuracy shall be ±0.1% or better of maximum span. Transmitter shall include integral indicator with a calibrated range of 0 psig to 150 psig and shall be supplied with 316 stainless steel support brackets for mounting. The pressure transmitter shall have an adjustable pressure range of 0 to 150 psig, 4-20mAdc output with digital signal based on HART Protocol, 1/2 – 14 NPT female process connection, 316 S.S. isolating diaphragm, polyurethane covered aluminum housing, one remote diaphragm seal, flange bracket for panel and pipe mounting, FM explosion-proof certification, LCD display and calibration data sheet. The pressure transmitter shall be a Rosemount Model 3051-G-2-A-2B-2-1-A-S1-B4-E5-Q4-M5. The capillary tube/fill fluid type shall have S.S. jacketed capillary, diaphragm seals, seal on high pressure side of transmitter, fill fluid type D.C.200, capillary diameter of .075" and the length (**) shall be determined by the contractor for the actual installation distance from the underground force main mounted diaphragm sensor to the above ground transmitter. The capillary/fill fluid order information shall be Rosemount 1199-W-D-D-** (length). The extended flanged seal (EFW) shall be ANSI/ASME B16.5, extended flange seal process connection, 3" schedule 40 nozzle style process connection, ANSI class 150 flange rating, 316 S.S. diaphragm material and 4" long extension length. The extended flange seal type shall be Rosemount 1199-A-R-1-DA-4

2.06 TAC II SCADA SYSTEM UPDATE (EXISTING)

A. The existing Manatee County TAC II SCADA System shall be modified to incorporate a new graphical OIT screen for this new station. Note that the same HMI screen utilized for the SCADA System workstations shall be utilized for the RTU's OIT screen.

2.07 CONTROL STRATEGY

A. See Part 2.04 SYSTEM FUNCTIONAL DESCRIPTIONS

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall install and place into operation a complete new RTU System at the site. This work shall include the new antenna system, all interconnecting wiring, conduit, and circuitry necessary to provide the owner with a fully operable control system/RTU.

B. The Contractor shall install the equipment in accordance with the Contract Documents, manufacturer's instructions and shop drawings. Rigidly support and mount equipment level and plumb, and in such a manner as to provide accessibility; protection from damage; isolation from heat, shock, and vibration; and freedom from interference with other equipment, piping, and electrical components.

C. Include the services of a factory trained and qualified employee of the equipment manufacturer to inspect the complete equipment installation to assure that it is installed in accordance with the manufacturer's recommendations, make all adjustments necessary to place the system into trouble-free operation and instruct

the operating personnel in the proper care and operation of the equipment furnished. Provide necessary services at the new Booster Pump Station site, Wastewater Pump Station PS 428 site and the Manatee County Central Site.

D. All workmanship utilized in the manufacture and installation of this system shall be of the highest quality and performed in a manner consistent with all accepted industry practices.

E. The Instrument Subcontractor shall provide labor, materials, gaskets, and miscellaneous hardware to install all instruments, controls and accessories whether mounted locally or in panels.

F. Instruments shall be installed in accordance with the drawings and specifications. All instruments shall be located where they will be accessible from structural platforms or grade. The top of the instruments shall be 5' 0" to 5' 6" above grade or the finished floor. Any variation from this will have to be approved by the Engineer. See Section 2.01-A-4 for mounting stands and hardware requirements.

G. All locally mounted indicating instruments shall be faced toward the normal operations area and shall be within reading distance and in line of sight.

H. Provide stainless steel ball valve to instruments mounted on vessels or pipe lines.

I. Control Panel
   1. The Instrument Subcontractor shall furnish tools, equipment, and labor to unload and install instrument control panels in their permanent location on the jobsite. The panels should be mounted level and plumb in such a manner to be free from vibration. Instrument Subcontractor shall provide suitable protection for the front of the panels to prevent damage during construction. Any damage to panel finish or to any components included in the panel shall be repaired to the condition received at the Instrument Subcontractor's expense.
   2. Plugs on process and electrical equipment shall not be removed until final piping or wiring is ready to be installed.
   3. The Instrument Subcontractor shall check delivery schedules of the control panels and provide necessary tools, equipment and labor to unload, protect and store the panels if they are to be delivered before the Instrument Subcontractor is permanently on the jobsite.

J. Installation of interconnecting conduit and wiring for 120 VAC or above for power supplies will be furnished and installed by the Electrical Subcontractor, including terminations. All conduit and wire for signal leads such as milliampere, millivolt, and digital pulse signals will be furnished and installed by the Electrical Subcontractor but shall be terminated at the instruments and control panel T-Blocks, including permanent wire markers, by the Instrumentation Subcontractor.

3.02 CALIBRATION TESTING AND SYSTEM OPERATIONS

A. Field tests shall consist of installation check-out, and a field acceptance test, in sequence. Each stage of testing shall not be commenced until the preceding stage is substantially complete as determined by the Engineer.

B. Field Test: When the facility is complete and ready for operation, the RTU and associated components shall be inspected and tested for compliance with the Contract Documents. Testing of the equipment shall be made by the Contractor in the presence of the Owner, Engineer, the Electrical Subcontractor, the Instrumentation Subcontractor, and the equipment manufacturer's representative. The test shall include, but not be limited to the following:
   1. Electrical: Contractor shall record readings of the voltage and amperage on all electrical components at start and at steady state operating conditions. The results of the tests, including the serial number of the accessories tested, shall be given to the engineer.
   2. Inspection: A thorough inspection of all mechanical and electrical equipment and controls, fittings, brackets, mountings, seals, conduit, painting, components, and features shall be made while the facility is being tested to determine performance and compliance with design requirements and specifications.
   3. Repairs, Adjustments, and Replacements: The Contractor shall make any and all necessary repairs, adjustments, and replacements until performance has been demonstrated to the satisfaction of the Engineer. The Contractor shall bear the cost of any repair, adjustment, and replacement.

C. Calibration: The Instrument Subcontractor shall bring in factory trained instrument servicemen or supply qualified technicians to check the calibration of all individual instruments to their guaranteed accuracy, to insure proper range, zero adjustment and linearity. All equipment required for the above testing shall be the Instrument Subcontractor's property or responsibility. Pressure switches and other alarm actuators shall be set at values tabulated on the drawings. The pressure transducers shall be factory calibrated and field verified.

D. System Checking: The Instrument Subcontractor shall operate controls and simulate transmitter action to determine that all control loops are functional. All controllers shall be set for the correct action in response to an input change. Initial control function settings shall be made to permit start-up without unusual upsets.

E. Instrument Signal Wiring: The Instrument Subcontractor shall check operability of all wiring to instruments and controls. Preliminary functional test shall be made to determine that correct sequences of events do occur. Any defects in the wiring installation shall be reported to the Engineer for correction. Specifically, the Instrument Subcontractor shall verify the following:
   1. Wire sizes and types correspond to instrument supplier's recommendation.
   2. Polarity of signal wires is correct.
   3. Wires are permanently identified.
   4. Separate conduits are used for low voltage signals.
   5. Wire shields are grounded only at the receiver, unless otherwise specified, and that shields are continuous through junction boxes.
   6. Cables of predetermined length are not cut in the field.
   7. Conduits do not interfere with the removal of instruments.
   8. Arrestors are installed and grounded.
   9. All terminations are tight.

F. Reports and Records
   1. The Instrument Subcontractor shall submit all report forms covering his work to the Engineer for approval before use.

2. The Instrument Subcontractor shall submit progress reports at agreed-upon intervals on the status of installation.
3. Upon completion of calibration and system checking for the system, the Instrument Subcontractor shall submit to the Engineer a complete report of the work.

3.03 START-UP

A. The Instrument Subcontractor shall include in his bid, as a separate item, "Start-up Assistance" to be available as required to repair, replace and recalibrate instruments and controls until proven acceptable to the Owner.

B. The Instrument Subcontractor will furnish start-up labor assistance, factory technician, for a period of three (3) days (eight hours per day).

C. The Instrument Subcontractor shall submit his demonstration test procedures to the Engineer to verify that preliminary functional tests have been made. Instrument Subcontractor shall then request the Engineer's presence to witness the actual demonstration test, giving three (3) days notice.

D. Repetitive visits required for the Engineer for testing the same loop due to improper test preparation by the Instrument Subcontractor will be charged to the Instrument Subcontractor.

3.04 SUPPLIERS FIELD SERVICES

A. Provide services of a factory trained service engineer, specifically trained on the type of control system specified herein.
1. Installation and Erection – Two 2-day trips.
2. Start-Up and Training – Two 2-day trips.
3. Three Months After Start-Up – One 1-day trip.
4. Six Months After Start-Up – One 1-day trip.
5. One Year After Start-Up – One 1-day trip.

B. The minimum days specified above do not relieve the system supplier of providing sufficient service to place the system in satisfactory operation.

3.05 SUBSTANTIAL COMPLETION

A. Acceptance of instrumentation and control systems is substantially complete will be made only when:
1. All pertinent requirements are met; and
2. All mechanical systems being served by the instruments become fully operational to the extent that said instruments can be fully utilized and are capable of demonstrating performance during conditions which simulate the Engineer's design parameters for the respective systems.

3.06 WARRANTY

A. The RTU manufacturer shall warrant all hardware and software provided under this contract against all defects in material and workmanship for a period of one year from owner acceptance. The I/O function modules, RIM, PSM, and PLC shall carry an additional 2-year return-to-factory warranty. The I/O function modules, RIM,

PSM, and PLC shall be warranted against lightning and surge damage the entire three year period.

3.07 SERVICE

A. The RTU manufacturer shall offer full factory support and service of the installed product through the use of factory employees. Service representatives who are not direct employees of the manufacturer, or who are not specifically trained in the service of the owner's existing SCADA System shall be unacceptable. The customer shall have 24 hour per day access to service personnel through the use of a pager and/or cell phone.

B. Furnish the services of a manufacturer's representative onsite during start-up and system commissioning.

3.08 SPARES FOR MCP / RTU

A. One spare RIM, PSM, PLC and each type of I/O Function Module utilized in the RTU shall be supplied to the owner.

END OF SECTION

Florida Department of Environmental Protection

Southwest District Office
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Manatee County Board of County Commissioners
c/o Wayne Roberts
Deputy Director of Engineering Services
1022 26th Avenue East
Bradenton, FL 34208

File No.: 41-0297620-001, Manatee County

Dear Mr. Roberts:

This is to acknowledge receipt of your notice on September 25, 2009 of intent to use a Noticed General Permit (NGP), pursuant to Rule 62-341.475, Florida Administrative Code (F.A.C.), to construct a 0.11-acre, 4,792-square-foot pump station (#428) that will include three pumps, an emergency generator, and a fuel tank (all on separate concrete pads), an electrical building, and a 3,760-square-foot access drive. The project is located at 7422 41st Avenue East, Bradenton, Section 02, Township 35 South, Range 18 East, Manatee County.

In addition to regulatory authorization under Rule 62-341.475, F.A.C., this type of activity also requires both proprietary and federal authorizations. Proprietary authorization is required pursuant to Chapters 253 and 258, Florida Statute (F.S.), to use state-owned submerged lands for private purposes. Federal authorization is needed for works in waters of the United States through the State Programmatic General Permit (SPGP) program.

Your notice has been reviewed by Department staff for all three types of authorizations: regulatory, proprietary and federal. 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 authorizations. If your project did not qualify for one or more of the authorizations, the specific section dealing with that authorization will advise you how to obtain it. **You may NOT commence your project without all three authorizations**. If you change the project from what you submitted, the authorization(s) granted may no longer be valid at the time of commencement of the project. Please contact us prior to beginning your project if you wish to make any changes.

REGULATORY REVIEW – APPROVED

Based on the forms, drawings, and documents submitted/revised with your notice, it appears that the project meets the requirements for the Noticed General Permit under Rule 62-341.475, F.A.C.

Please be advised that the construction phase of the NGP must be completed within five years from the date the notice to use the NGP was received by the Department. If you wish to continue this NGP beyond the expiration date, you must notify the Department at least 30 days before its expiration. Any activities performed under a noticed general permit are subject to general conditions required in Rule 62-341.215, F.A.C. (attached), and the specific conditions of Rule 62-341.475, F.A.C. (attached). Any deviations from these conditions may subject the permittee to enforcement action and possible penalties.

Authority for review- Part IV of Chapter 373, F.S., Title 62, F.A.C. and in accordance to operating agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C.

PROPRIETARY REVIEW –APPROVED

A review of the location of your proposed project indicates that it is not on state-owned submerged lands. Therefore, your project is exempt from the further requirements of Chapter 253, F.S.

Authority for review - Chapter 253 and Chapter 258, F.S., and Chapter 18-21, F.A.C. and Chapter 18-20, F.A.C., (if located in an aquatic preserve), and Section 62-343.075, F.A.C., as required.

SPGP REVIEW - NOT APPLICABLE

Your project has been reviewed for compliance with a State Programmatic General Permit (SPGP). No further permitting for this activity 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.

If you revise your project after submitting the initial joint application the above authorization(s) may no longer be valid. Please contact us prior to construction if you wish to make any changes. Also, if you have any questions, please contact Kristina Evans at (813) 632-7600, ext. 286. When referring to this project, please use the file number listed above.

Executed in Temple Terrace, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Thomas P. Glancy
Environmental Specialist III
Environmental Resource Management

Copies furnished to:
Robert Cushing, PhD, P.E., BCEE, Carollo Engineers, 401 North Cattleman Road, Suite 306, Sarasota, FL 34232
File

Enclosures:
Ch. 62-341.475, F.A.C.
Ch. 62-341.215, F.A.C.
Notice of Rights of Substantially Affected Persons

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this determination, including all copies, was mailed before the close of business on 11/3/09, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to 120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk E Robinson Date 11/3/09

62-341.475 General Permit for Minor Activities.

(1) A general permit is herby granted for the construction, alteration, maintenance, operation, abandonment and removal of the following minor systems:
(d) Less than 4,000 square feet of impervious surface in uplands that is subject to vehicular traffic such as roads, parking lots and driveways, and less than 9,000 square feet total of impervious surface in uplands. However, this paragraph shall not apply within the Wekiva River Basin Riparian Habitat Protection Zone as described in subparagraph 40C-41.063(3)(e)1., F.A.C., or in any Area of Critical State Concern;
(2) In order to qualify for this general permit, an applicant must provide reasonable assurance that the proposed system:
(a) Does not significantly impede navigation and does not entail the construction of a structure for the launching or mooring of a boat when navigational access to the structure does not currently exist;
(b) Does not cause a violation of state water quality standards;
(c) Does not impede the conveyance of a stream, river or other watercourse in a manner that would increase off-site flooding;
(d) Does not adversely impact aquatic or wetland dependent listed species;
(e) Does not cause the drainage of wetlands; and
(f) Is not located in, on or over a coral community, macro-marine algae or submerged grassbed community. For the purposes of this general permit, macro-marine algae community shall not include algae unattached to the bottom, nor shall it include algae growing landward of the mean high water line or growing as an epiphyte on woody plants.
(3) Persons wishing to qualify for this general permit must file a notice, describing the proposed activities and providing plans and other information necessary to evaluate the potential for adverse impacts from the proposed activities. Any person proposing a system described in paragraph (1)(f) above, shall submit tax parcel information or other documentation, sufficient to establish that the property is not part of a tract of land that was divided into two or more parcels after July 1, 1994. The Department will provide written notification to the applicant whether the proposed activity qualifies for this general permit within 30 days of submittal of the written notice. The proposed activity shall not be commenced until the Department has provided written notice that the applicant qualifies for the general permit.
(4) A determination that an activity qualifies for a General Permit for a minor activity applies only to the site specific activity, location, method of construction or operation of the authorized activity and the other design and operation features of the authorized activity.
(5) This general permit shall not be applicable on any parcel of property which has been the subject of the successive filing of notices under this section within a three year period where the combination of activities to be conducted pursuant thereto exceed the thresholds in Rule 62-341.475, F.A.C.

GENERAL CONDITIONS FOR ALL NOTICED GENERAL PERMITS
Rule 62-341.215, Florida Administrative Code

(1) The terms, conditions, requirements, limitations, and restrictions set forth in this section are general permit conditions and are binding upon the permittee for all noticed general permits in this chapter. These conditions are enforceable under Part IV of Chapter 373, F.S.

(2) The general permit is valid only for the specific activity indicated. Any deviation from the specified activity and the conditions for undertaking that activity shall constitute a violation of the permit. A violation of the permit is a violation of Part IV of Chapter 373, F.S., and may result in suspension or revocation of the permittee's right to conduct such activity under the general permit. The Department also may begin legal proceedings seeking penalties or other remedies as provided by law for any violation of these conditions.

(3) This general permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any construction, alteration, operation, maintenance, removal or abandonment authorized by this permit.

(4) This general permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the general permit as provided by Chapter 62-330, F.A.C.

(5) The general permit does not relieve the permittee from liability and penalties when the permitted activity causes harm or injury to: human health or welfare; animal, plant or aquatic life; or property. It does not allow the permittee to cause pollution in contravention of Florida Statutes and Department rules.

(6) The permittee is hereby advised that Section 253.77, F.S., states that a person may not commence any excavation, construction, or other activity involving the use of sovereign or other lands of the state, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without obtaining the required is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on sovereignty lands or other state-owned lands.

(7) The authorization to conduct activities pursuant to a general permit may be modified, suspended or revoked in accordance with Chapter 120, F.S., and Section 373.429, F.S.

(8) This permit shall not be transferred to a third party except pursuant to Section 62-343.130, F.A.C. The permittee transferring the general permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to sale, conveyance, or other transfer of ownership or control of the permitted system or the real property at which the permitted system is located.

(9) Upon reasonable notice to the permittee, Department staff with proper identification shall have permission to enter, inspect, sample and test the permitted system to insure conformity with the plans and specifications approved by the permit.

(10) The permittee shall maintain any permitted system in accordance with the plans submitted to the Department and authorized in this general permit.

(11) A permittee's right to conduct a specific noticed activity under this noticed general permit is authorized for a duration of five years.

(12) Construction, alteration, operation, maintenance, removal and abandonment approved by this general permit shall be conducted in a manner which does not cause violations of state water quality standards, including any anti-degradation provisions of Sections 62-4.242(1)(a) and (b), 62-4.242(2) and (3), and 62-302.300, F.A.C., and any special standards for Outstanding Florida Waters and Outstanding National Resource Waters. The permittee shall implement best management practices for erosion, turbidity, and other pollution control to prevent violation of state water quality standards. Temporary erosion control measures such as sodding, mulching, and seeding shall be

implemented and shall be maintained on all erodible ground areas prior to and during construction. Permanent erosion control measures such as sodding and planting of wetland species shall be completed within seven days of any construction activity. Turbidity barriers shall be installed and maintained at all locations where the possibility of transferring suspended solids into wetlands and other surface waters exists due to the permitted activity. Turbidity barriers shall remain in place and shall be maintained in a functional condition at all locations until construction is completed and soils are stabilized and vegetation has been established. Thereafter the permittee shall be responsible for the removal of the barriers. The permittee shall correct any erosion or shoaling that causes adverse impacts to the water resources.

(13) The permittee shall hold and save the Department harmless from any and all damages, claims, or liabilities, which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any system authorized by the general permit.

(14) The permittee shall immediately notify the Department in writing of any previously submitted information that is later discovered to be inaccurate. Specific Authority: 373.026, 373.043, 373.044, 373.118, 373.406, 403.813, 403.814, F.S. Law Implemented: 373.026, 373.043, 373.046, 373.118, 373.403, 373.413, 373.416, 373.418, 373.419, 373.422, 373.423, 373.426, 403.813, 403.814, F.S. History—New 10-3-95.

RIGHTS OF AFFECTED PARTIES

This letter acknowledges that the proposed activity may be conducted under general permit rule 62-341.475, F.A.C. This determination is final and effective on the date filed with the Clerk of the Department unless a sufficient petition for an administrative hearing is timely filed under sections 120.569 and 120.57 of the F.S. as provided below. If a sufficient petition for an administrative hearing is timely filed, this determination automatically becomes only proposed agency action subject to the result of the administrative review process. Therefore, on the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because an administrative hearing may result in the reversal or substantial modification of this action, the applicant is advised not to commence construction or other activities until the deadlines noted below for filing a petition for an administrative hearing or request for an extension of time have expired.

Mediation is not available.

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 of the F.S. 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) of the 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. 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. If a request is filed late, the Department may still grant it upon a motion by the requesting party showing that the failure to file a request for an extension of time before the deadline was the result of excusable neglect.

If a timely and sufficient petition for an administrative hearing is filed, other persons whose substantial interests will be affected by the outcome of the administrative process have the right to petition to intervene in the proceeding. Intervention will be permitted only at the discretion of the presiding officer upon the filing of a motion in compliance with rule 28-106.205 of the Florida Administrative Code.

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) of the 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) of the 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 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 for an administrative hearing within the appropriate time period shall constitute a waiver of that right.

A petition that disputes the material facts on which the Department's action is based 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, 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; 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.

A petition that does not dispute the material facts on which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by rule 28-106.301.

Under sections 120.569(2)(c) and (d) of the F.S., a petition for administrative hearing must be dismissed by the agency if the petition does not substantially comply with the above requirements or is untimely filed.

This determination constitutes an order of the Department. Subject to the provisions of paragraph 120.68(7)(a) of the F.S., which may require a remand for an administrative hearing, the applicant has the right to seek judicial review of the order under section 120.68 of the Florida Statutes, by the filing of a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 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 when the final order is filed with the Clerk of the Department. The applicant, or any party within the meaning of section 373.114(1)(a) or 373.4275 of the 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 of the 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 final order is filed with the Clerk of the Department. The applicant, or any party within the meaning of paragraph 20.255(5)(a) of the F.S., may also seek appellate review of the order before the Land and Water Adjudicatory Commission under subsection 20.255(5) of the 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.

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
Southwest District Office
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

July 1, 2010

Wayne Roberts
Deputy Director of Engineering Services
Manatee County Public Works Department
1022 26th Avenue East
Bradenton, FL 34208
wayne.roberts@mymanatee.org

Re: General Permit for Construction of a Domestic Wastewater Collection/Transmission System
Project: PS 428 Booster Pump Station
FDEP Permit No.: CS41-0182518-344
County: Manatee

Dear Mr. Roberts:

The Department has received your Notice of Intent to Use the General Permit to construct a domestic wastewater collection/transmission system consisting of a 5,200 gallon per minute in-line booster pump station. Existing flow will be treated at the MC Southeast Regional Wastewater Treatment Facility. The Department received this Notice on June 3, 2010.

The Department has no objection to your use of a General Permit for the construction of a collection/transmission system that has been designed in accordance with the standards and criteria set forth in Rule 62-604.400, Florida Administrative Code (FAC). In accordance with Rules 62-4.530(1) and 62-604.600(6)(a)1., FAC, construction of this project shall not begin until at least 30 days after the receipt date (referenced above) of Application Form 62-604.300(8)(a). All General Permits are subject to the general conditions of Rule 62-4.540, FAC, (attached), and Rules 62-604.600 and 62-604.700, FAC. The construction activity must conform to the description contained in your Notice of Intent to Use the General Permit. Any deviation will subject the permittee to enforcement action and possible penalties.

If you have any questions, you may contact Patricia León at (813) 632-7600, extension 315 or via email at patricia.leon@dep.state.fl.us.

Sincerely,

Isabel King, P.E.
Permitting Supervisor
Domestic Wastewater Section

IK/pl

Attachments: General Conditions
Location of Public Water System Mains

cc: Eric Peters, P.E., Carollo Engineers, PC., epeters@carollo.com
Gary Sagehorn, P.E., Carollo Engineers, PC., gsagehorn@carollo.com
Robert Garcia, P.E., JH Ham Engineering, Inc., garciape@jhhameng.com

62-4.540 General Conditions for All General Permits

(1) The terms, conditions, requirements, limitations, and restrictions set forth in this Part are "general permit conditions" and are binding upon the permittee. The conditions are enforceable under Chapter 403, F.S.

(2) The general permit is valid only for the specific activity indicated. Any deviation from the specified activity and the conditions for undertaking that activity shall constitute a violation of the permit. The permittee is placed on notice that violation of the permit may result in suspension or revocation of the permittee's use of the general permit and may cause the Department to begin legal proceedings.

(3) The general permit does not convey any vested rights or any exclusive privileges. It does not authorize any injury to public or private property nor any invasion of personal rights. It does not authorize any infringement of federal, State or local laws or regulations. It does not eliminate the necessity for obtaining any other federal, State or local permits that may be required, or allow the permittee to violate any more stringent standards established by federal or local law.

(4) The general permit does not relieve the permittee from liability and penalties when the construction or operation of the permitted activity causes harm or injury to human health or welfare; causes harm or injury to animal, plant or aquatic life; or causes harm or injury to property. It does not allow the permittee to cause pollution in contravention of Florida Statutes and Department rules.

(5) The general permit conveys no title to land or water, nor does it constitute State recognition or acknowl- edgement of title. It does not constitute authority for reclamation of submerged lands. Only the Board of Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

(6) No general permit shall authorize the use of state owned land without the prior consent of the Board of Trustees of the Internal Improvement Trust Fund pursuant to Section 253.77, F.S.

(7) The general permit may be modified, suspended or revoked in accordance with Chapter 120, Florida Statutes, if the Secretary determines that there has been a violation of any of the terms or conditions of the permit, there has been a violation of state water quality standards or state air quality standards, or the permittee has submitted false, incomplete or inaccurate data or information.

(8) The general permit shall not be transferred to a third party except pursuant to Florida Administrative Code Rule 62-4.120.

(9) The general permit authorizes construction and where applicable operation of the permitted facility.

(10) The permittee agrees in using the general permit to make every reasonable effort to conduct the specific activity or construction authorized by the general permit in a manner that will minimize any adverse effects on adjacent property or on public use of the adjacent property, where applicable, and on the environment, including fish, wildlife, natural resources of the area, water quality or air quality.

(11) The permittee agrees in using the general permit to allow a duly authorized representative of the Department access to the permitted facility or activity at reasonable times to inspect and test upon presentation of credentials or other documents as may be required by law to determine compliance with the permit and the Department rules.

(12) The permittee agrees to maintain any permitted facility or activity in good condition and in accordance with the plans submitted to the Department under Rule 62-4.530(1).

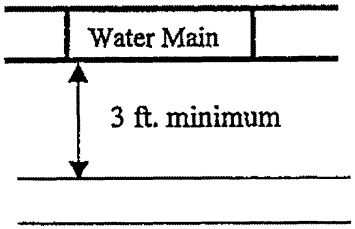
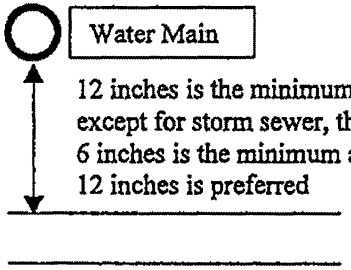
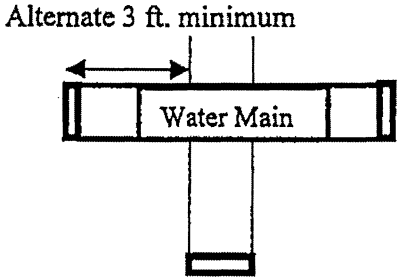
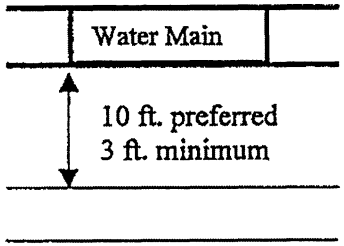
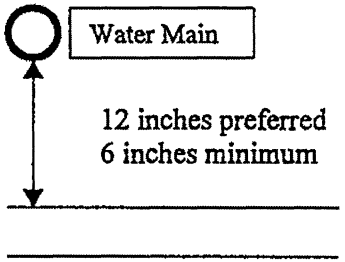
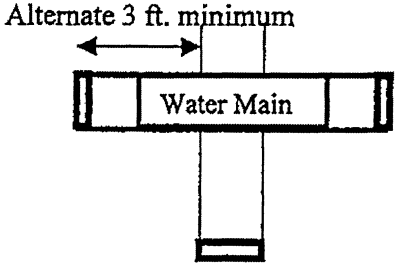
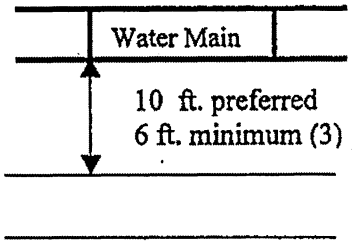
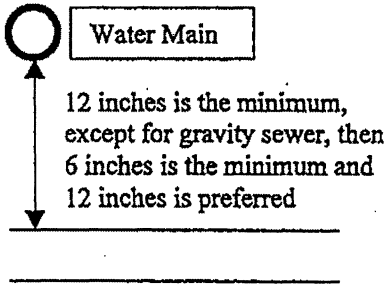
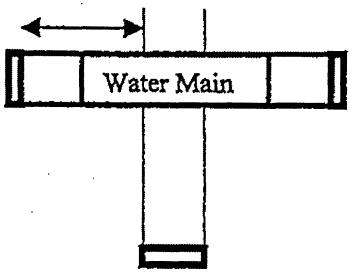
(13) A permittee's use of a general permit is limited to five years. However, the permittee may request continued use of the general permit by notifying the Department pursuant to Rule 62-4.530(1). The permittee shall give notice of continued use of a general permit thirty days before it expires.

Specific Authority: 403.814(1), F.S.

Law Implemented: 253.123, 253.124, 403.061, 403.087, 403.088, 403.702-403.73, 403.814, 403.851-403.864, F.S.

History: New 7-8-82. Amended 8-31-88. Previously Numbered As 17-5.54.

LOCATION OF PUBLIC WATER SYSYEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

Other Pipe	Horizontal Separation	Crossings (1)	Joint Spacing @ Crossings (Full Joint Centered)
Storm Sewer, Stormwater Force Main, Reclaimed Water (2)			
Vacuum Sanitary Sewer			
Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)			
On-Site Sewage Treatment & Disposal System	10 ft. minimum	---	---

(1) Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches.
(2) Reclaimed water regulated under Part III of Chapter 62-610, F.A.C.
(3) 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer.
(4) Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.

MANATEE COUNTY CONSTRUCTION PERMIT

1112 Manatee Avenue West Bradenton, Florida 34206
06/24/2010 Application Number 10061054 NOT A PERMIT!

Project Address: 7422 41ST AVE E
Type of Permit: NEW COMMERCIAL
Setbacks (Feet): Front- Rear- Left- Right-
**Subdivision: ROHRS RANCHETTES SUBDIVISION P

SCT
Technician: bdorman

OWNER INFORMATION
Owner: MANATEE COUNTY
Address: PO BOX 1000
City: BRADENTON
State: FL
Zip: 34206-
Phone:

CONTRACTOR INFORMATION
Contractor: TO BE DETERMINED
License No: MC00000
Lic. Type : OWNER
DBA: TO BE DETERMINED
Address:
C/S/Z: , FL

Telephone:

PARCEL INFORMATION
Parcel ID No: 1469700353
Sec Twn Rge: S02 T35S R18E
Lot: 5
Block:
Floor Elev:
Impact Area: CSE
Zoning: A1
Overlay: NONE/NONE
Flood Zone: X
Flood Eleva:
Fire District: EMFD

PROJECT INFORMATION
Square Footage: 275
Declared Value: 980000
TARGET DATE: *SEE BELOW

PROJECT INFORMATION/NOTES/CONDITIONS
NEW WASTEWATER BOOSTER PUMP STATION
-1 OF 4-

LOT#5-ROHRS RANCHETTES SUB

****

Approving Agencies: PLEASE SIGN & DATE BELOW. IF YOUR APPROVAL IS REQUIRED FOR THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY, PLEASE WRITE "YES" AFTER YOUR SIGNATURE.

Pmtg	BD	CO	E-Health		CO
PlansRev		CO	EMD		CO
Zoning		CO	Fire		CO
Impact Fees		CO	ACDR		CO
Flood		CO	Eng./P.works Nat. Resources		CO
Enviromental Div.		CO	FP&L		CO
Concurrency		CO	Utilities		CO

RECEIVED
JUL 14 2010
PROJECT MGMT

****

TO CHECK THE STATUS OF A PERMIT
CALL: 749-3047 or go to: WWW.MYMANATEE.ORG

*TARGET DATES ARE ANTICIPATED REVIEW TIMES AT THE DATE OF APPLICATION. VISIT OUR WEB PAGE "TARGET DATES" FOR UPDATED REVIEW TIMES

MANATEE COUNTY CONSTRUCTION PERMIT

1112 Manatee Avenue West Bradenton, Florida 34206
06/24/2010 Application Number 10061056 NOT A PERMIT!

Project Address: 7422 41ST AVE E SCT
Type of Permit: CONCRETE - WALL/FOUNDATION/RET Technician: bdorman
Setbacks (Feet): Front- Rear- Left- Right-
**Subdivision: ROHRS RANCHETTES SUBDIVISION P

OWNER INFORMATION
Owner: MANATEE COUNTY
Address: PO BOX 1000
City: BRADENTON
State: FL
Zip: 34206-
Phone:

CONTRACTOR INFORMATION
Contractor: TO BE DETERMINED
License No: MC00000
Lic. Type : OWNER
DBA: TO BE DETERMINED
Address:
C/S/Z: , FL
Telephone:

PARCEL INFORMATION
Parcel ID No: 1469700353
Sec Twn Rge: S02 T35S R18E
Lot: 5
Block:
Floor Elev:
Impact Area: CSE
Zoning: A1
Overlay: NONE/NONE
Flood Zone: X
Flood Eleva:
Fire District: EMFD

PROJECT INFORMATION
Square Footage: 340
Declared Value: 350000
TARGET DATE: *SEE BELOW

PROJECT INFORMATION/NOTES/CONDITIONS
STANDBY GENERATOR/FUEL TANK NEW WASTEWATER BOOSTER PUMP STATION
-2 OF 4-
LOT#5-ROHRS RANCHETTES SUB

****

Approving Agencies: PLEASE SIGN & DATE BELOW. IF YOUR APPROVAL IS REQUIRED FOR THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY, PLEASE WRITE "YES" AFTER YOUR SIGNATURE.

Pmtg		CO	E-Health		CO
PlansRev		CO	EMD		CO
Zoning		CO	Fire		CO
Impact Fees		CO	ACDR		CO
Flood		CO	Nat.Resources		CO
Enviromental Div.		CO	FP&L		CO
Concurrency		CO	Utilities		CO

****

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*TARGET DATES ARE ANTICIPATED REVIEW TIMES AT THE DATE OF APPLICATION. VISIT OUR WEB PAGE "TARGET DATES" FOR UPDATED REVIEW TIMES

MANATEE COUNTY CONSTRUCTION PERMIT
1112 Manatee Avenue West Bradenton, Florida 34206
06/24/2010 Application Number 10061058 NOT A PERMIT!

Project Address: 7422 41ST AVE E SCT
Type of Permit: FENCE Technician: bdorman
Setbacks (Feet): Front- Rear- Left- Right-
**Subdivision: ROHRS RANCHETTES SUBDIVISION P

OWNER INFORMATION
Owner: MANATEE COUNTY
Address: PO BOX 1000
City: BRADENTON
State: FL
Zip: 34206-
Phone:

CONTRACTOR INFORMATION
Contractor: TO BE DETERMINED
License No: MC00000
Lic. Type : OWNER
DBA: TO BE DETERMINED
Address:
C/S/Z: , FL

Telephone:

PARCEL INFORMATION
Parcel ID No: 1469700353
Sec Twn Rge: S02 T35S R18E
Lot: 5
Block:
Floor Elev:
Impact Area: CSE
Zoning: A1
Overlay: NONE/NONE
Flood Zone: X
Flood Eleva:
Fire District: EMFD

PROJECT INFORMATION
Square Footage: 180
Declared Value: 50000
TARGET DATE: *SEE BELOW

PROJECT INFORMATION/NOTES/CONDITIONS
180 L.F. OF SITE FENCING FOR WASTEWATER BOOSTER PUMP STATION
-3 OF 4-
LOT#5-ROHRS RANCHETTES SUB

****
Approving Agencies: PLEASE SIGN & DATE BELOW. IF YOUR APPROVAL IS REQUIRED FOR THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY, PLEASE WRITE "YES" AFTER YOUR SIGNATURE.

Pmtg BD	CO	E-Health	CO
PlansRev	CO	EMD	CO
Zoning	CO	Fire	CO
Impact Fees	CO	ACDR	CO
Flood	CO	Nat.Resources	CO
Enviromental Div.	CO	FP&L	CO
Concurrency	CO	Utilities	CO

****
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CALL: 749-3047 or go to: WWW.MYMANATEE.ORG
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4 of 4

MANATEE COUNTY CONSTRUCTION PERMIT

1112 Manatee Avenue West Bradenton, Florida 34206
06/24/2010 Application Number 10061060 NOT A PERMIT!

Project Address: 7422 41ST AVE E SCT
Type of Permit: FENCE Technician: bdorman
Setbacks (Feet): Front- Rear- Left- Right-
**Subdivision: ROHRS RANCHETTES SUBDIVISION P

OWNER INFORMATION
Owner: MANATEE COUNTY
Address: PO BOX 1000
City: BRADENTON
State: FL
Zip: 34206-
Phone:

CONTRACTOR INFORMATION
Contractor: TO BE DETERMINED
License No: MC00000
Lic. Type : OWNER
DBA: TO BE DETERMINED
Address:
C/S/Z: , FL

Telephone:

PARCEL INFORMATION
Parcel ID No: 1469700353
Sec Twn Rge: S02 T35S R18E
Lot: 5
Block:
Floor Elev:
Impact Area: CSE
Zoning: A1
Overlay: NONE/NONE
Flood Zone: X
Flood Eleva:
Fire District: EMFD

PROJECT INFORMATION
Square Footage: 0
Declared Value: 20000
TARGET DATE: *SEE BELOW

PROJECT INFORMATION/NOTES/CONDITIONS
NEW ANTENNAE FOR WASTEWATER BOOSTER PUMP STATION
-4 OF 4-
LOT#5-ROHRS RANCHETTES SUB

****

Approving Agencies: PLEASE SIGN & DATE BELOW. IF YOUR APPROVAL IS REQUIRED FOR THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY, PLEASE WRITE "YES" AFTER YOUR SIGNATURE.

mtg	BD	CO	E-Health		CO
PlansRev		CO	EMD		CO
oning		CO	Fire		CO
mpact Fees		CO	ACDR		CO
lood		CO	Nat.Resources		CO
nviromental Div.		CO	FP&L		CO
oncurrency		CO	Utilities		CO

****

TO CHECK THE STATUS OF A PERMIT
CALL: 749-3047 or go to: WWW.MYMANATEE.ORG

*TARGET DATES ARE ANTICIPATED REVIEW TIMES AT THE DATE OF APPLICATION. VISIT OUR WEB PAGE "TARGET DATES" FOR UPDATED REVIEW TIMES

MANATEE COUNTY METER SIZING FORM

Project Name: PS 428 BOOSTER PUMP STATION **Building Permit # :** 1006154

Final Site Plan Case # (If applicable):

Project Address: 7422 41st AVE E.

If this is an existing meter, provide Meter I.D. No.: **Existing Meter Size:**

Physical Address of Existing Meter or Water Billing Account No.:

Quantity	Fixture Type	Occupancy	Type Supply	Load/Unit	Load
	Bathroom Group (Toilet, Sink, & Bathtub)	Private	Flush Tank	3.60	
	Bathroom Group (Toilet, Sink, & Bathtub)	Private	Flush Valve	8.00	
	Bathtub	Private	Faucet	1.40	
	Bathtub	Public	Faucet	4.00	
	Bidet	Private	Faucet	2.00	
	Combination Fixture	Private	Faucet	3.00	
	Dish Washing Machine	Private	Automatic	1.40	
	Dish Washing Machine	Public	Automatic	1.50	
	Drinking Fountain	Office, etc.	3/8" Valve	0.25	
	Kitchen Sink	Private	Faucet	1.40	
	Kitchen Sink	Hotel, Restaurant	Faucet	4.00	
	Laundry Trays (1 to 3)	Private	Faucet	1.40	
	Lavatory/Hand Sink	Private	Faucet	0.70	
	Lavatory/Hand Sink	Public	Faucet	2.00	
	Service Sink/Mop Sink/Utility Sink	Office, etc.	Faucet	3.00	
	Shower Head	Public	Mixing Valve	4.00	
	Shower Head	Private	Mixing Valve	1.40	
	Urinal	Public	1" Flush Valve	10.00	
	Urinal	Public	3/4" Flush Valve	5.00	
	Urinal	Public	Flush Tank	3.00	
	Washing Machine (8 lb)	Private	Automatic	1.40	
	Washing Machine (8 lb)	Public	Automatic	3.00	
	Washing Machine (15 lb)	Public	Automatic	4.00	
	Water Closet (toilet)	Private	Flushometer Valve	6.00	
	Water Closet (toilet)	Private	Flush Tank	2.20	
	Water Closet (toilet)	Public	Flushometer Valve	10.00	
	Water Closet (toilet)	Public	Flush Tank	5.00	
	Water Closet (toilet)	Public or Private	Flushometer Tank	2.00	
	Hose Connection 1/2"	Public or Private	Faucet	2.60	
	Hose Connection 3/4"	Public or Private	Faucet	5.50	
	Other (attach source of load/unit)				
	Other				
				Project Load:	

Number of existing units served by meter:

Total number of units served by meter:

If this is an existing meter that serves more than one unit, provide additional existing load:

Total Load:

County Sanitary Sewer Service? (Check Box): ☐ Yes ☒ No N.A.

Does the project include any sanitary lift stations? (Check Box): ☒ Yes ☐ No

Applicant's Comments: NEW BOOSTER PUMP STATION FOR UTILITIES. 20 GPM OF WATER FOR WASHDOWN SERVICE. NO OTHER LOADS.

Circle one: (Engineer) Architect, Plumber/Contractor

Company Name: CAROLLO ENGINEERS

Address: 401 N. CATTLEMEN ROAD, STE 306 SARASOTA, FL 34232

E-mail Address: EPETERS@CAROLLO.COM

Telephone Number: 941-371-9832

Proposed/Required Meter Size: 1-INCH

Meter Size shall be consistent with Florida Building Code - Plumbing.

Name (Printed): ERIC PETERS

Signature: Eric Peters

License No.: 61306

Date: 6/25/10

If Professional Engineer or Architect; print name, license #, sign, date & seal.
If Plumber/Contractor; print name, license #, sign & date.

Note: Completed form may be e-mailed to PW.EngMeters@mymanatee.org

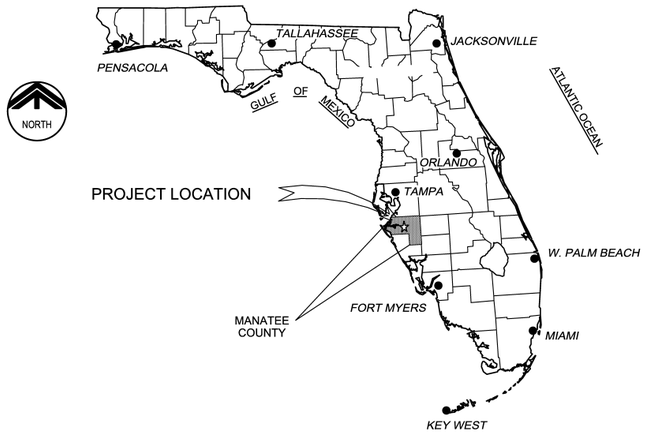
Rev. March 2010

Eric ph: 941-378-1415

MANATEE COUNTY GOVERNMENT
PUBLIC WORKS DEPARTMENT
(MANATEE COUNTY, FLORIDA)
PS428 BOOSTER PUMP STATION
MANATEE COUNTY PROJECT NO. 6055480

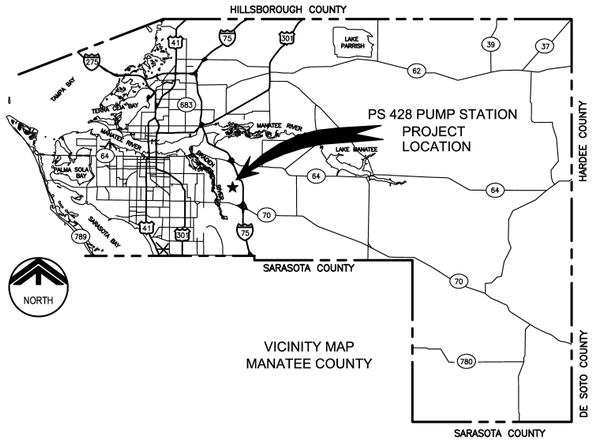
JUNE 2010

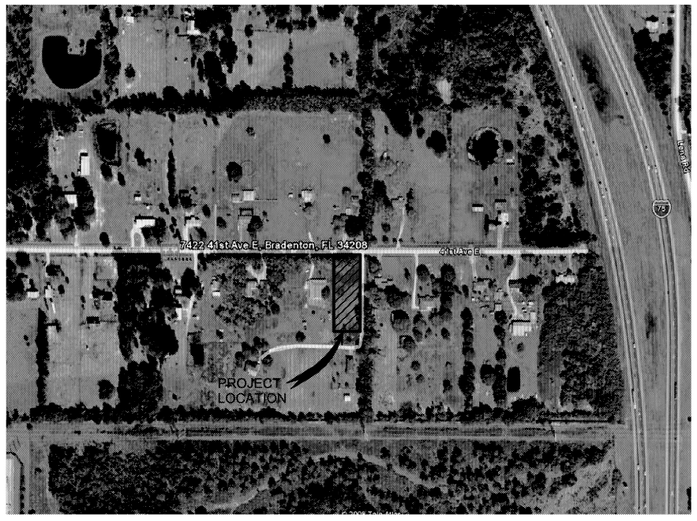
FINAL



LOCATION MAP

PROJECT LOCATION: SEC. 2, TWP. 35S, RNG. 18E





DWG NO	TITLE
	GENERAL
G-01	TITLE SHEET
G-02	ABBREVIATION SHEET
G-03	GENERAL NOTES
G-04	SURVEY CONTROL PLAN
	CIVIL
C-01	SITE PLAN AND EROSION CONTROL PLAN
	MECHANICAL
M-01	PUMP STATION PLAN AND SECTION
	STRUCTURAL
S-01	PUMP STATION PLAN, SECTION AND DETAIL
S-02	ELECTRICAL BUILDING PLAN AND ELEVATIONS
S-03	ELECTRICAL BUILDING OVERALL SECTION AND DETAILS
S-04	EMERGENCY GENERATOR AND FUEL TANK PLAN AND SECTION
	ELECTRICAL
E-01	ELECTRICAL GENERAL NOTES AND LEGEND
E-02	ELECTRICAL SINGLE LINE DIAGRAM
E-03	POWER AND PHASE MONITOR SCHEMATICS AND SINGLE LINE DIAGRAM NOTES
E-04	ELECTRICAL INCOMING UTILITY SITE PLAN
E-05	ELECTRICAL POWER SITE PLAN
E-06	ELECTRICAL BUILDING LIGHTING AND RECEPTACLE PLAN
E-07	ELECTRICAL LIGHTING AND GROUNDING SITE PLAN
E-08	ELECTRICAL SCHEDULES AND MISCELLANEOUS DETAILS
E-09	BOOSTER PUMP STATION TRANSFORMER GROUNDING AND MISCELLANEOUS DETAILS
E-10	BOOSTER PUMP STATION ANTENNA DETAILS
E-11	ELECTRICAL VFD SCHEMATIC DIAGRAM FOR PUMP MOTORS M301, M302 & M303
E-12	ELECTRICAL VFD WIRING DIAGRAM FOR PUMP MOTORS M301, M302 & M303
E-13	BOOSTER PUMP STATION MOTOR OPERATED VALVE SCHEMATIC DIAGRAM FOR FCV MOV VALVES
E-14	MOTORIZED VALVES POWER & CONTROL PANEL PCPMOV100 LAYOUT AND DETAILS
E-15	MOTORIZED VALVES POWER & CONTROL PANEL PCPMOV100 TERMINAL BLOCKS - LAYOUTS AND DETAILS
E-16	ELECTRICAL CABLE AND CONDUIT SCHEDULE
E-17	ELECTRICAL AREA LIGHTING CALCULATIONS
E-18	ELECTRICAL BUILDING ELEVATION
	INSTRUMENTATION AND CONTROL
N-01	MAIN CONTROL PANEL MCP PANEL LAYOUT AND DETAILS
N-02	MAIN CONTROL PANEL MCP BILL OF MATERIALS AND NAMEPLATE SCHEDULE
N-03	MAIN CONTROL PANEL MCP TERMINAL BLOCKS - LAYOUTS AND DETAILS
N-04	MAIN CONTROL PANEL MCP PLC I/O SCHEMATIC DIAGRAM - 1 OF 4
N-05	MAIN CONTROL PANEL MCP PLC I/O SCHEMATIC DIAGRAM - 2 OF 4
N-06	MAIN CONTROL PANEL MCP PLC I/O SCHEMATIC DIAGRAM - 3 OF 4
N-07	MAIN CONTROL PANEL MCP PLC I/O SCHEMATIC DIAGRAM - 4 OF 4
N-08	PRESSURE TRANSMITTERS INSTRUMENT LOOP SHEETS AND DETAIL
	HVAC
AC-01	ELECTRICAL BUILDING HVAC PLAN AND DETAILS
	TYPICAL DETAILS
T-01	TYPICAL DETAILS
T-02	TYPICAL DETAILS
T-03	TYPICAL DETAILS
T-04	TYPICAL DETAILS

carollo
Engineers...Working Wonders With Water™

401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FLORIDA 34232
PHONE: (941) 371-9832 FAX: (941) 371-9823
CA 00008571

JOB NO. 7880C.10

DRAWING NO. G-01

Last Opened by: 6-25-10 04:38pm DPerry

FILENAME: Last Saved By: SMF_DENL 6-25-10 10:26am C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-01-G-01 XREFS: 7880C10-01-000-103; 7880C10-01-000-100 PS 428 Aerial;

PIPE SERVICE ABBREVIATIONS

ABBREVIATION	DESCRIPTION
A:	
AA	AERATION or AIR
AC	ASPHALTIC CONCRETE
AHP	AIR, HIGH PRESSURE
AIS	AIR, INSTRUMENT SUPPLY
ALM	ALUM
ALP	AIR, LOW PRESSURE PROCESS
AS	ANTISCALENT
B:	
BW	FILTER BACKWASH DRAINAGE
BWR	FILTER BACKWASH RETURN
C:	
CA	COMPRESSED AIR
CAUSTIC	CAUSTIC SOLUTION (CONCENTRATED OR DILUTE)
CD	CONDENSATE DRAIN
CDL	CHEMICAL DRAIN LINE
CEN	CENTRATE
CH	CHEMICAL
CHDR	CHEMICAL DRAIN
CIP	HYDROCHLORIC ACID (5-10%)
CLG	CHLORINE GAS
CLGV	CHLORINE GAS (VACUUM)
CLS	CHLORINE SOLUTION WATER
CM	CONCENTRATE MAKEUP
CR	CONCENTRATE RECYCLE
CRJ	CONCENTRATE REJECT
CSDL	CHEMICAL SUMP DRAIN LINE
CW	COLD WATER
CWR	COOLING WATER RETURN
CWS	COOLING WATER SUPPLY
D:	
DCT	DECANT
DL	DRAIN LINE
DRN or D	DRAIN
DR - 1	PLANT DRAIN
DR - 2	PLANT DRAIN
DR - 3	PLANT DRAIN
DR - 4	PLANT DRAIN
DW	DOMESTIC WATER (POTABLE)
DW - 2	DOMESTIC WATER (POTABLE)
DW - 3	DOMESTIC WATER (POTABLE)
E:	
ECIP	HYDROCHLORIC ACID (20%)
EFF	EFFLUENT
EXG	EXHAUST GAS
EUG	ELECTRICAL CONDUIT or DUCT BANK
EXH	EXHAUST
F:	
FA	FOUL AIR DUCT
FE	FILTER EFFLUENT
FF	FILTER FEED
FI	FILTER INFLUENT
FIW	FINISHED WATER
FLT	FILTRATE
FLW	FILTER WASH WATER
FM	FORCE MAIN
FOF	FUEL LINE FILL
FOO	FUEL LINE OVERFLOW
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL LINE VENT
FP	FIRE PROTECTION EXTERIOR
FR	FILTER RINSE TO WASTE
FS	FINISH SURFACE
FW	FLUSHING WATER
G:	
G	GAS
GR	GRIT GREASE
GS	GRAVITY SEWER
H:	
HCL	HYDROCHLORIC ACID
HG	HYDROGEN GAS
HPW	HIGH PRESSURE WATER
HW	HOT WATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
I:	
INF	INFLUENT
IRR	IRRIGATION WATER
L:	
LO	LUBRICATION OIL
LPA	LOW PRESSURE AIR
LPC	LOW PRESSURE CONDENSATE
LPS	LOW PRESSURE STEAM
N:	
NH_3 - 1	AMMONIA (NH_3) GAS
NH_3 - 2	AMMONIA (NH_3 GAS LOW PRESS.)
NaOCl	SODIUM HYPOCHLORITE
NaOH	SODIUM HYDROXIDE SOLUTION
NTDR	NEUTRALIZATION TANK DRAIN LINE
O:	
OF	OVERFLOW
OSW	OFF - SPEC WATER
OSW - 1	OFF - SPEC WATER

ABBREVIATION	DESCRIPTION
P:	
PA	PROCESS AIR
PF	PROCESS FEED
PD	PLANT DRAIN
PRW	PEACE RIVER WATER
PW	POTABLE WATER
PS	POLYMER SOLUTION
R:	
RAW	RAW WATER
RCY	RECIRCULATION - NEUTRALIZATION TANK
REC	RECYCLE
RD	ROOF DRAIN
RJW	REJECT WATER
RW	RAW WATER
S:	
S	SANITARY SEWER
SA-1	SAMPLING
SA-2	SAMPLING
SAN	SANITARY SEWER
SCM	SCUM
SD	STORM DRAIN
SDL	SUMP DRAIN LINE
SEW	SETTLED WATER
SFT	SOFT WATER
SLW	SEAL WATER LINE
SMP	SAMPLE
SPD	SUMP PUMP DISCHARGE
SPW	SAMPLE WATER or SPRAY WATER
SRL	SCRUBBER RECIRCULATION LIQUID (CAUSTIC)
SRW	SERVICE WATER
SOF	SOFTENED WATER
STW	STORM WATER
SUB	SUBNATANT
SUP	SUPERNATANT
SW	SURFACE WASH
T:	
TSL	THICKENED SLUDGE
U:	
UD	UNDERDRAIN
V:	
VT or V	VENT
VTR	VENT THROUGH ROOF
W:	
W	POTABLE WATER
WAW	WASH WATER
WE	WELL WATER
WPS	WATER, PLANT SERVICE
WW	WASHWATER (FILTER BACKWASH)
W2-1	SERVICE WATER (NON POTABLE)
W2-2	SERVICE WATER (NON POTABLE)
W2-3	SERVICE WATER (NON POTABLE)
W2-4	SERVICE WATER (NON POTABLE)
W2-5	SERVICE WATER (NON POTABLE)

STANDARD ABBREVIATIONS

ABBREVIATION	DESCRIPTION
A:	
&	AND
@	AT (MEASUREMENT)
A	AMPERE or AIR
AB	ANCHOR BOLT or AERATION BASIN
ABS	ACRYLONITRILE BUTADIENE STYRENE
AC	ASPHALTIC CONCRETE
ACB	AIR CIRCUIT BREAKER
ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
ADD'L	ADDITIONAL
ADJ	ADJACENT
AED	AREA EQUIPMENT DRAIN
AER	AERATION
AF	AMPERE FRAME
AIL	AIR INTAKE LOUVER
AL	ALUMINUM
ALT	ALTERNATE
AM	AMMETER
ANNUN	ANNUNCIATOR
APPROX	APPROXIMATELY
ARV	AIR RELEASE VALVE
AS	AMMETER SWITCH
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
AWTP	ADVANCED WASTEWATER TREATMENT PLANT
B:	
BAS	BASIN
BC	BACK OF CURB
BC	BOLT CIRCLE OR BRASS CAP
BD	BOARD
BF	BLIND FLANGE
BFP	BACK FLOW PREVENTER
BFV	BUTTERFLY VALVE
BKR	CIRCUIT BREAKER
BL	BITUMINOUS LINING
BLDG	BUILDING
BLKHD	BULKHEAD
BLO	BLOWER
BM	BEAM
BM	BENCH MARK
BOC or BC	BEGINNING OF CURVE
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BPV	BACK PRESSURE VALVE
BPRV	BACK PRESSURE REGULATOR VALVE
BRG	BEARING
BS	BELL AND SPIGOT
BSMT	BASEMENT
BSP	BLACK STEEL PIPE
BU	BELL UP
BV	BALL VALVE
BW	BOTH WAYS
C:	
C	CLOSE, CHANNEL OR CONDUIT
C&G	CURB & GUTTER
CA	CONCRETE ANCHOR or COMBUSTION AIR
CAB	CABINET
CB	CATCH BASIN
CBC & C	CIRCUIT BREAKER, CONTROLS & CONTACTORS
CC	CENTER OF CURVATURE
CC	CENTER TO CENTER
CEF	CEILING EXHAUST FAN
CEM	CEMENT
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CI	CAST IRON
CJ	CONTROL JOINT
CKD PL	CHECKERED PLATE
CKV	CHECK VALVE
CL or ℄	CENTER LINE
CL or C.L.	CHAIN LINK
CLG	CEILING
CLR	CLEAR, CLEARANCE
CM	CONCRETE MORTAR
CML&C	CEMENT MORTAR LINED AND COATED
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
COMM	COMMUNICATIONS
CON	CONCENTRIC
CONC	CONCRETE
CONC REINF	CONCRETE REINFORCING
CONN	CONNECT OR CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUOUS OR CONTINUATION
CP	CONTROL PANEL
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CQ	COUNTER
CR	CONTROL RELAY
CS	CARBON STEEL or CHLORINE GAS
CSK	COUNTERSINK (COUNTERSUNK)
CT	CURRENT TRANSFORMER
CTB	CONCRETE THRUST BLOCK
CTL	CONTROL
CTM	CURRENT TRANSMITTER
CTR	CENTER, CENTERED
CUP	COPPER PIPE
CV	CHECK VALVE
D:	
D	DIGITAL OR DISCRETE
DW	DRIVEWAY
DAFT	DISSOLVED AIR FLOTATION THICKENER
DAM	DAMPER
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DEG or °	DEGREE
Delta or △	CENTRAL ANGLE
DEMO	DEMOLITION
DET	DETAIL
DF	DRINKING FOUNTAIN
DI	DUCTILE IRON
DIA or Ø	DIAMETER
DIAG	DIAGONAL
DIF	DIFFUSER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DIST	DISTRIBUTION
DL	DEAD LOAD OR DRAIN LINE
DLV	DOOR LOUVER
DMS	DIAPHRAGM SEAL
DN	DOWN
DPV	DIAPHRAGM VALVE
DR	DOOR
DRN	DRAIN
DRV	DRIVE
DS	DOWNSPOUT
DW	DEWATERING
DWG	DRAWING
E:	
E	EAST
EA	EACH
EBF	EMBANKMENT FILL
EC	ELECTRICAL CONDUIT OR DUCT BANK
ECC RED	ECCENTRIC REDUCER
ECO	EXPOSED CLEANOUT
EF	EACH FACE
EFU	EXHAUST FAN UNIT
EG	EXHAUST GRILLE
EI	ELECTRICAL INTERLOCK
EJ	EXPANSION JOINT
ELEC	ELECTRICITY, ELECTRIC (AL)
ELEV or EL	ELEVATION
ELL	ELBOW
EMBED	EMBEDMENT
EMH	ELECTRICAL MANHOLE
EOC	END OF CURVE
EP	EDGE OF PAVEMENT
EQ SP	EQUAL SPACING
EQ	EQUAL
EQUIP	EQUIPMENT
ER	EXHAUST REGISTER
ES	EACH SIDE
ESEW	EMERGENCY SHOWER AND EYE WASH
ET	ELECTRICALLY TRACED
EW	EACH WAY
EWEF	EACH WAY EACH FACE
EXH	EXHAUST
EXIST or EX	EXISTING
EXP	EXPANSION
EXPO	EXPOSED
EXT	EXTERIOR
F:	
F	FACTORY FINISH
FACP	FIRE ALARM CONTROL PANEL
FC	FACE OF CURB
FCA	FLEXIBLE COUPLING ADAPTER or FLANGED COUPLING ADAPTER
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN, FUSABLE LINK, or FIRE DAMPER
FDL	FLOOR DRAIN LINE
FDR	FEEDER
FEXT	FIRE EXTINGUISHER
FF	FINISHED FLOOR
FG	FINISH GRADE
FHT	FEMALE HOSE THREAD
FHY	FIRE HYDRANT
FI	FLOW INDICATOR
FIN	FINISH
FL	FLOOR, FILTRATE OR FLOW LINE
FLA	FULL LOAD AMPS
FLASH	FLASH OR FLASHING
FLEX	FLEXIBLE
FLG	FLANGE OR FLANGED
FM	FLOW METER
FO	FACE OF
FPM	FEET PER MINUTE
FPP	FLEXIBLE PLASTIC PIPE
FRP	FIBERGLASS REINFORCED PIPE
FRS	FROTH SPRAY
FS	FLOOR SINK
FSW	FIRE SUPPLY WATER
FT or '	FEET
FTG	FOOTING
FUT	FUTURE
FXC	FIRE EXTINGUISHER CABINET
G:	
G	GUTTER or GROUND
GA	GAGE or GAUGE
GAL	GALLONS
GALV	GALVANIZED
GAV	GRAVITY VENTILATOR
GB	GRADE BREAK
GC	GAS COCK, GROOVED COUPLING or GEL COAT
GE	GROOVED END JOINT
GEL	GRAVITY EXHAUST LOUVER
GFI	GROUND FAULT INTERRUPTER
GHU	GAS HEATING UNIT
GL	GLASS
GLO	GOVERNMENT LAND OFFICE
GLV	GLOBE VALVE
GM	GAS METER
GND	GROUND
GPD	GALLONS PER DAY
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
GR	GRADE
GRTG	GRATING
GSP	GALVANIZED STEEL PIPE
GTV	GATE VALVE
GW	GRIT WASHER
GWB	GYPSUM WALL BOARD
H:	
HTE	HOOKED ONE END
H2E	HOOKED TWO ENDS
HB	HOSE BIB
HD	HEADER
HDG	HOT-DIP GALVANIZED
HDW	HARDWARE
HERCP	HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE
HF	HOSE FAUCET
HGT	HEIGHT
HH	HAND HOLE
HK	HOOK
HM	HOLLOW METAL
HMC	HARNESSED MECHANICAL COUPLING
HORIZ	HORIZONTAL
HP	HORSEPOWER or HIGH PRESSURE
HR	HANDRAIL
HTR	WALL HEATER
HTX	HEAT EXCHANGER
HV	HOSE VALVE
HVAC	HEATING, VENTILATION & AIR CONDITIONING
HWL	HIGH WATER LEVEL
HXW	HEIGHT BY WIDTH
HZ	HERTZ
I:	
IC	INSTRUMENTATION CONDUIT
ID	INSIDE DIAMETER or INSIDE DIMENSION
IE	INVERT ELEVATION
IF	INSIDE FACE
IN or "	INCH(S)
INJ	INJECTOR
INST	INSTRUMENTATION
INSUL	INSULAT(E)(ED)(ING)(ION)
INV	INVERT
IP	IRON PIPE
ISR	INTRINSICALLY SAFE RELAY
J:	
JB	JUNCTION BOX
JST	JOIST
JT	JOINT
K:	
KGV	KNIFE GATE VALVE
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KW	KILOWATT
KWH	KILOWATT-HOUR
L:	
L	ANGLE (STRUCTURAL)
LAV	LAVATORY
LBS	POUNDS
LF	LINEAL FEET
LG	LONG
LL	LIVE LOAD
LLV	LONG LEG VERTICAL
LP	LOW POINT or LOW PRESSURE
LP	LIGHT POLE
LPA	LOW PRESSURE AIR
LR	LONG RADIUS
LS	LIMIT SWITCH
LSG	LOW VOLTAGE SWITCHGEAR
LT	LAUNDRY TUBE
LTG	LIGHTING
LVP	LOW VOLTAGE PROTECTION
LWL	LOW WATER LEVEL
M:	
MACH	MACHINED
MATL	MATERIAL
MAX	MAXIMUM
MC	MECHANICAL COUPLING
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MET	METAL
MFG	MANUFACTURING
MFRS	MANUFACTURER
MGD	MILLIONS OF GALLONS PER DAY
MG/L	MILLIGRAMS PER LITER
MH	MANHOLE
MI	MALLEABLE IRON
MIN	MINIMUM
MISC	MISCELLANEOUS
MIX	MIXER
MJ	MECHANICAL JOINT
MJDIP	DUCTILE IRON PIPE, MECHANICAL JOINT
MK	MARK
MO	MASONRY OPENING
MON	MONUMENT
MS	MOP SINK
MSG	MEDIUM VOLTAGE SWITCHGEAR
MTR	METER
MULL	MULLION
N:	
N	NORTH
NAT	NATURAL
NCHO	NORMALLY CLOSED; HELD OPEN
NDV	NEEDLE VALVE
NEC	NATIONAL ELECTRICAL CODE
NF	NEAR FACE
NIC	NOT IN CONTACT
NO. or #	NUMBER
NOHC	NORMALLY OPEN; HELD CLOSED
NOM	NOMINAL
NP	NATIONAL PIPE THREAD
NPS	NOMINAL PIPE SIZE
NTS	NOT TO SCALE
NWB	NON WATER BEARING
O:	
OIH	OVERHEAD
OA	OUTSIDE AIR
OBVD	OPPOSITE BLADE VOLUME DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER or OUTSIDE DIMENSION
OF	OUTSIDE FACE
OPNG	OPENING
OPP	OPPOSITE
P:	
P	PAVEMENT, POLE or PAINTED
PA	PIPE ANCHOR
PB	PULL BOX
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PD	POSITIVE DISPLACEMENT or PUMPED DRAIN
PE	PLAIN END or POLYETHYLENE WRAPPED
PERP	PERPENDICULAR
PF	POWER FACTOR
PFC	POWER FACTOR CAPACITOR
PFM	POWER FACTOR METER
PG	PRESSURE GAUGE
PI	PRESSURE INDICATOR or POINT OF INTERSECTION
PL	PLATE or PROPERTY LINE
PLAS	PLASTER
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLCS	PLACES
PLM	POWER LOGIC MONITOR
PLWD	PLYWOOD
PNL	PANEL
PO	POLYURETHANE
POC	POINT OF CONNECTION
POJ	PUSH ON JOINT
POS	POSITION
PR	PAIR
PRC	POINT OF REVERSE CURVE
PRI	PRIMARY
PRV	PRESSURE REGULATION VALVE
PRV	PRESSURE RELIEF VALVE
PS	PRESSURE SWITCH OR PRESSURE SEWER
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	POINT, POINT OF TANGENCY, POTENTIAL TRANSFORMER OR PRESSURE TREATED
PV	PLUG VALVE
PVC	POLYVINYL-CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
Q:	
QTY	QUANTITY
R:	
R	REGISTER
RA	RETURN AIR
RAD	RADIUS
R/D	RADIUS TO DIAMETER
R/F	REACTOR AND/OR FILTER
R/W	RIGHT-OF-WAY
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RED	REDUCER
RDWD	REDWOOD
REC	RECEPTACLE, RECYCLE
RECIRC	RECIRCULATING
REF	REFERENCE
REINF	REINFORCING
REJ	RUBBER EXPANSION JOINT
REQD	REQUIRED
RESIL	RESILIENT
REV	REVISION
RG	RUBBER GASKET
RM	ROOM
RMJ	RESTRAINED MECHANICAL JOINT
RP	RADIUS POINT
RPL	RECYCLE PRESSURIZATION LINE
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
RTM	RUNNING TIME METER
RWS	ROTARY WALL SWITCH
S:	
S	SLOPE, SOUTH or SWITCH
S/W	SIDEWALK
SA	SAMPLE or SUPPLY AIR
SC	SCORING JOINT OF CONCRETE POUR or SCREWED
SCD	SCUM DRAIN
SCFM	STANDARD CUBIC FEET PER MINUTE
SCG	SLUICE GATE
SCH	SCHEDULE
SD	DUCT MOUNTED SMOKE DETECTOR
SEC	SECONDARY
SEC	SECOND
SECT	SECTION
SEPP	SEPTAGE PUMP
SF	SUPPLY FAN
SG	SUPPLY GRILLE
SH or SHR	SHOWER
SHT	SHEET
SIM	SIMILAR
SK	SKIMMINGS
SLSUC	SLUDGE SUCTION
SMP	SAMPLER
SO	SOUTH
SOL	SOLUTION
SP	SET POINT
SPC	SPARE CONDUIT
SPEC	SPECIFICATION
SPL	SPLASH
SQ	SQUARE
SQ FT	SQUARE FEET
SQ INS	SQUARE INCHES
SR	SUPPLY REGISTER
SSBS	SOLID STATE BYPASS STARTER
SST, SS or ST STL	STAINLESS STEEL
STA	STATION
STD	STANDARD
STIFF	STIFFENER
STIR	STIRRUPS
STL	STEEL
STR	STRAINER
STRUCT	STRUCTURAL
SUC	SUCTION
SUPP	SUMP PUMP
SUPT	PIPE SUPPORT or SUPPORT
SUSP	SUSPENDED
SV	SOLENOID VALVE
SW	SOLVENT WELD
SWBD	SWITCHBOARD
SYM	SYMMETRICAL
SYN	SYNTHETIC
T:	
T	TELEPHONE SERVICE OR TREAD
T&B	TOP AND BOTTOM
T/	TOP OF
TB	TERMINAL BOX or TELEPHONE BOX
TC	TOP OF CURB
TCC	TELEPHONE/COMMUNICATION CONDUIT
TD	TIME DELAY RELAY
TDH	TOTAL DYNAMIC HEAD
TEL	TELEPHONE
TEMP	TEMPERATURE
TEMPG	TEMPERATURE GAUGE
TF	TOP FLAT
TFMR	TRANSFORMER
TG	TRANSFER GRILLE
THK	THICK OR THICKENER
TMH	TELEPHONE MANHOLE
TMP	TEMPERATURE
TOC	TOP OF CONCRETE
TOD	TOP OF DUCT
TOP	TOP OF PIPE
TOS	TOP OF SLAB, TOP OF STEEL
TOW	TOP OF WALL
TRANS	TRANSOM
TS	TUBE STEEL
TSTAT	THERMOSTAT
TWV	THREE WAY VALVE
TYP	TYPICAL
U:	
UC	UNDERCUT
UH	UNIT HEATER
UN	UNLESS NOTED
UNO	UNLESS NOTED OTHERWISE
URN	URINAL
V:	
V	VOLT or VENT
VA	VALVE
VAC	VACUUM or VOLT-AC
VB	VALVE BOX
VC	GROOVED COUPLING
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VG	VACUUM GAUGE
VIT	VITRIFIED
VM	VOLTMETER
VOL	VOLUME
VPI	VERTICAL POINT OF INTERSECTION
VS	VARIABLE SPEED or VOLTMETER SWITCH
VSD	VARIABLE SPEED DRIVE
VTR	VENT THRU ROOF
W:	
W	WEST, WASHER, or WELDED
W/	WITH
W/O	WITHOUT
WA	WATTS
WB	WATER BEARING
WC	WATER CLOSET
WCO	WALL CLEANOUT
WD	WOOD
WDW	WINDOW
WEF	WALL EXHAUST FAN
WFPU	WATER FEATURE PUMP
WH	WATER HEATER or WALL HYDRANT
WI	WROUGHT IRON
WL	WALL LOUVER or WATER LEVEL
WM	WATER METER
WP	WEATHERPROOF or WORKING POINT
WS	WATER SURFACE or WATER STOP
WSE	WATER SURFACE ELEVATION
WT	WALK THROUGH, WATER TIGHT or WARNING TAPE
WWF	WELDED WIRE FABRIC
X:	
XFMR	TRANSFORMER
XP	EXPLOSION-PROOF
Y:	
YH	YARD HYDRANT
YP	YARD PIPE

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ABBREVIATION SHEET

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. G-02

Last Opened by: 6-24-10, 04:00pm DPerry
FILENAME: Last Saved By: SMF_DENL 5-28-10 11:58am C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-01-G-02 XREFS: 7880C10-01-000-102; 3624bdr

GENERAL NOTES:

1. NOTES APPLY TO ALL SHEETS.

2. LOCATIONS OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY VERTICAL AND HORIZONTAL LOCATIONS AND TO NOTIFY THE RESPECTIVE UTILITY COMPANIES FOR VERIFICATION PRIOR TO ANY CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES BEFORE PROCEEDING WITH THE WORK.

3. CONTRACTOR SHALL UNCOVER ALL EXISTING LINES BEING TIED INTO TO VERIFY LOCATIONS. THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES IN ADVANCE OF CONSTRUCTION AND SHALL ELIMINATE ALL CONFLICTS PRIOR TO START OF CONSTRUCTION. ALL EXISTING UTILITIES EXPOSED DURING CONSTRUCTION SHALL BE ACCURATELY RECORDED ON THE RECORD DRAWINGS.

4. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF DISCREPANCIES BETWEEN THE INFORMATION SHOWN ON THESE DRAWINGS AND THE CONDITIONS EXISTING IN THE FIELD.

5. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO PROJECT AND THESE LOCATIONS SHALL BE INCLUDED IN PRE-CONSTRUCTION VIDEO TAPING.

6. ANY NECESSARY SYSTEM SHUTDOWNS SHALL BE STRICTLY COORDINATED WITH THE OWNER. IT IS POSSIBLE THAT THE TIE-IN WORK MAY HAVE TO OCCUR DURING OFF-HOURS. PROVIDE A MINIMUM 48 HOURS NOTICE TO OWNER.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING ROADS, BUILDINGS, OR OTHER STRUCTURES RESULTING FROM CONTRACTOR'S CONSTRUCTION ACTIVITIES. REPAIRS SHALL BE MADE TO THE SATISFACTION OF THE OWNER AND THE ENGINEER AT NO COST TO THE OWNER.

8. THE CONTRACTOR'S ACTIVITIES SHALL BE CONFINED WITHIN THE LIMITS OF CONSTRUCTION. ABSOLUTELY NO FOOT TRAFFIC, CONSTRUCTION VEHICLE TRAFFIC, ETC. SHALL TAKE PLACE IN WETLANDS AREAS, WITHIN LINES OF ADJACENT PROPERTIES OR OUTSIDE OF THE LIMITS OF CONSTRUCTION.

9. ANY WORK PERFORMED WITHOUT APPROVAL OF MANATEE COUNTY OR ENGINEER AND/OR ALL WORK AND MATERIAL NOT IN CONFORMANCE WITH THE SPECIFICATIONS IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.

10. CONTRACTOR TO INSTALL SAFETY FENCE AROUND OPEN EXCAVATIONS IN ACCORDANCE WITH OSHA.

11. CONTRACTOR TO RESTORE AREA EQUAL TO OR BETTER THAN EXISTING AND IN ACCORDANCE WITH SITE PLAN.

12. ALL ANCHOR BOLTS SHALL BE EMBEDDED IN CONCRETE. UNLESS OTHERWISE STATED, ALL ANCHORS, BOLTS, NUTS, WASHERS, EXPANSION SLEEVES AND OTHER FASTENERS SHALL BE 316L STAINLESS STEEL.

13. HANDRAILS, GUARDRAILS, POSTS, BRACKETS, MOUNTINGS, AND LADDERS SHALL COMPLY WITH THE FLORIDA STANDARD BUILDING CODE, AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) LOADING REQUIREMENTS.

14. STAINLESS STEEL BOLTS 1/2-INCH AND LARGER SHALL BE THREAD PROTECTED DURING SHIPMENT.

15. CONTRACTOR TO COORDINATE THE LOCATION OF SLEEVES AND WALL PIPE THROUGH WALLS, SLABS AND CEILINGS. REFER TO MECHANICAL, ELECTRICAL, STRUCTURAL, AND PROCESS DRAWINGS FOR SPECIFIED REQUIREMENTS.

16. A VERTICAL CLEARANCE OF AT LEAST 18 INCHES AND A HORIZONTAL SEPARATION OF TEN (10) FEET SHALL BE MAINTAINED BETWEEN CROSSINGS OF POTABLE WATER AND SEWER LINES OR OTHER NON-POTABLE WATER LINES.

17. ALL BELOW GROUND DUCTILE IRON PIPE AND VALVES TO BE RESTRAINED JOINT. ALL ABOVE GROUND VALVES TO BE FLANGED.

18. PROVIDE MINIMUM OF 36-INCH COVER FROM GRADE FOR UNDERGROUND PIPING TO TOP OF PIPE, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

19. ALL PIPING AND/OR APPURTENANCES CONNECTING TO ADJACENT CONSTRUCTION SHALL BE PLUGGED IF ADJACENT WORK HAS BEEN COMPLETED.

20. WHERE PIPING CONNECTS TO EQUIPMENT, IT SHALL BE SUPPORTED BY A PIPE SUPPORT AND NOT THE EQUIPMENT.

21. DIMENSIONS FOR ALL EQUIPMENT SHALL BE VERIFIED BY CONTRACTOR PER MANUFACTURER'S SHOP DRAWINGS, AND REVISED AS NECESSARY PRIOR TO CONSTRUCTION. INFORM ENGINEER OF ANY DISCREPANCY.

22. SIZE AND FINAL LOCATION OF ALL OPENINGS AND CONNECTIONS SHALL BE COORDINATED WITH EQUIPMENT MANUFACTURER/SUPPLIER. ALL EQUIPMENT PAD DIMENSIONS INDICATED ON THE DRAWINGS SHALL BE VERIFIED WITH MANUFACTURER FOR ACTUAL SIZE OF EQUIPMENT SELECTED. REFER TO STRUCTURAL DRAWING DETAILS FOR EQUIPMENT PAD DESIGN DETAILS.

23. ALUMINUM EMBEDDED IN CONCRETE MUST BE PAINTED WITH ONE SHOP COAT OF ZINC CHROMATE FOLLOWED BY ONE HEAVY COAT OF ALUMINUM PIGMENTED ASPHALT PAINT. ALUMINUM SHAPES IN CONTACT WITH CONCRETE MUST BE ISOLATED FROM THE CONCRETE BY A 1/32 INCH NEOPRENE GASKET. ALSO ANY CASE WHERE TWO DIFFERENT METALS ARE IN CONTACT, A NEOPRENE GASKET MUST BE PROVIDED ALONG WITH BOLT ISOLATION KITS FOR FLANGES.

24. PUMP STATION MANUFACTURER SHALL SUPPLY AND INSTALL ALL NECESSARY TAPS AND BLIND FLANGES AS NECESSARY FOR ALL PRESSURE, VACUUM AND LEAK TESTS AND CLEANING. ALL TAPS SHALL HAVE BALL VALVES AND MATCH PIPING MATERIAL. VALVES SHALL BE PER THE TECHNICAL SPECIFICATIONS.

25. CONTRACTOR TO PROVIDE TEMPORARY PIPING, BLIND FLANGES, PUMPS FOR BYPASSING EQUIPMENT FOR CLEANING, TESTING AND START UP ACTIVITIES.

26. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL ADHERE TO ALL CONDITIONS AND REQUIREMENTS OF ALL PERMITS WHICH HAVE BEEN OBTAINED.

27. CONTRACTOR SHALL TAKE CARE TO PROVIDE PROPER GRADE, ELEVATIONS, AND ALIGNMENT FOR PROPOSED AND FUTURE CONNECTIONS AS SHOWN ON THE DRAWINGS.

28. ALL DISTURBED AREAS SHALL BE SODDED AT THE END OF CONSTRUCTION, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

29. EROSION AND SEDIMENT CONTROL BMPS IN ADDITION TO THOSE PRESENTED ON THE PLANS AND SHALL BE IMPLEMENTED AS NECESSARY TO PREVENT TURBID DISCHARGES FROM FLOWING ONTO ADJACENT PROPERTIES OR ROADWAYS, OFFSITE STORMWATER CONVEYANCES, OR OFFSITE RECEIVING WATERS. BMPs SHALL BE DESIGNED, INSTALLED AND MAINTAINED BY THE CONTRACTOR TO ENSURE THAT OFFSITE SURFACE WATER QUALITY REMAINS CONSISTENT WITH STATE AND LOCAL REGULATIONS.

30. THE CONTRACTOR SHALL ENSURE THAT ADJACENT PROPERTIES ARE NOT IMPACTED BY WIND EROSION OR EMISSIONS OF UNCONFINED PARTICULATE MATTER IN ACCORDANCE WITH RULE 62-296.320(4) (c) 1, F.A.C., BY TAKING APPROPRIATE MEASURES TO STABILIZE AFFECTED AREAS.

31. CONTRACTOR SHALL DISPOSE ALL EXCESS FILL AND ANY VEGETATION FROM CLEARING/GRUBBING OFF-SITE.

32. MANATEE COUNTY OWNS THE SITE AND EXERCISES UNIFIED CONTROL OVER THIS FACILITY.

33. SOIL REPORT PREPARED BY TIERRA, INC. (DATED MARCH 17, 2009) IS AVAILABLE ON REQUEST.

34. ALL SOIL EXPLORATION WORK PERFORMED BY TIERRA, INC. TAMPA, FLORIDA. SOIL EXPLORATION WORK IS SOLELY TO ASSIST BIDDERS IN ASSESSING THE NATURE AND EXTENT OF TESTING PROCEDURES REQUIRED MAKING THEIR OWN DETERMINATION OF ACTUAL CONDITIONS, WHICH WILL BE ENCOUNTERED DURING THE COURSE OF THE WORK. NO REPRESENTATION IS MADE OR WILL BE GIVEN CONCERNING ACTUAL CONDITIONS WHICH WILL BE ENCOUNTERED DURING THE COURSE OF THIS WORK. BIDDERS ARE DIRECTED PRIOR TO BIDDING, TO CONDUCT WHAT INVESTIGATION THEY DEEM NECESSARY TO ARRIVE AT THEIR OWN CONCLUSION REGARDING SUCH CONDITIONS.

35. CLOSURE PLAN: IN THE EVENT THIS PROJECT IS ABANDONED PRIOR TO COMPLETION, THE SITE SHALL BE RESTORED TO A CLEAN AND DEBRIS FREE CONDITION. ALL CONSTRUCTION MATERIALS SHALL BE REMOVED FROM THE SITE AND STORED IN AN APPROPRIATE MANNER. ALL STOCKPILED VEGETATIVE DEBRIS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF ACCORDINGLY.

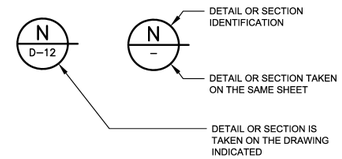
36. CONTRACTOR SHALL PROVIDE SILT FENCES PER DETAILS ON THE DRAWINGS AROUND ANY VEGETATION OR SOIL STOCKPILE AREAS.

37. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR 41ST AVENUE EAST IN ACCORDANCE WITH SPECIFICATIONS. A MAXIMUM OF ONE LANE CAN BE SHUT DOWN AT A TIME.

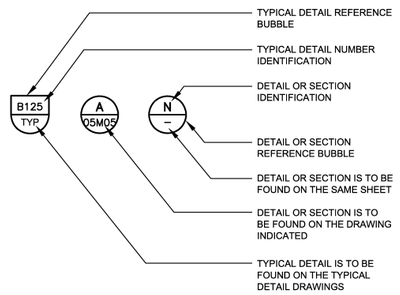
CIVIL LEGEND

NEW SPOT ELEVATION	1325.46
ELEVATION	1325.00
POINT OF CURVATURE	PC = 10+00.00
POINT OF TANGENT	PT = 10+00.00
INVERT ELEVATION	INV = 1325.00

DRAWING CROSS REFERENCE



AT TITLE



AT CROSS REFERENCE

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
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PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
GENERAL NOTES

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. G-03

Last Opened by: 6-04-10 04:00pm DPerry

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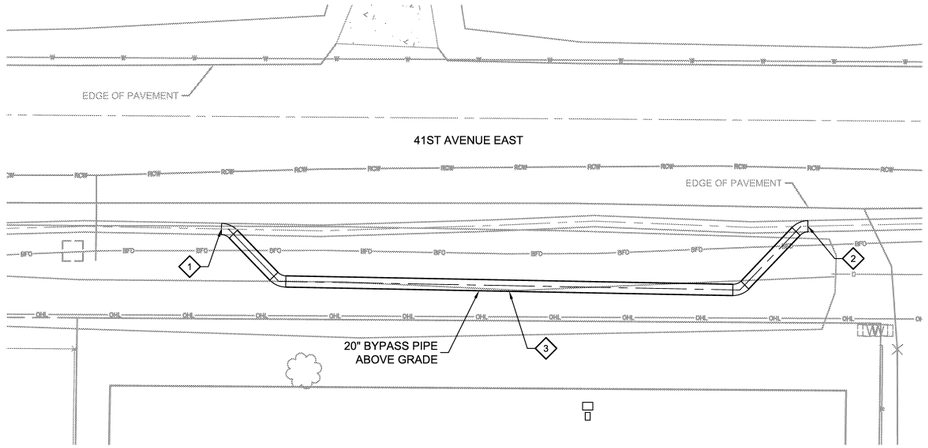


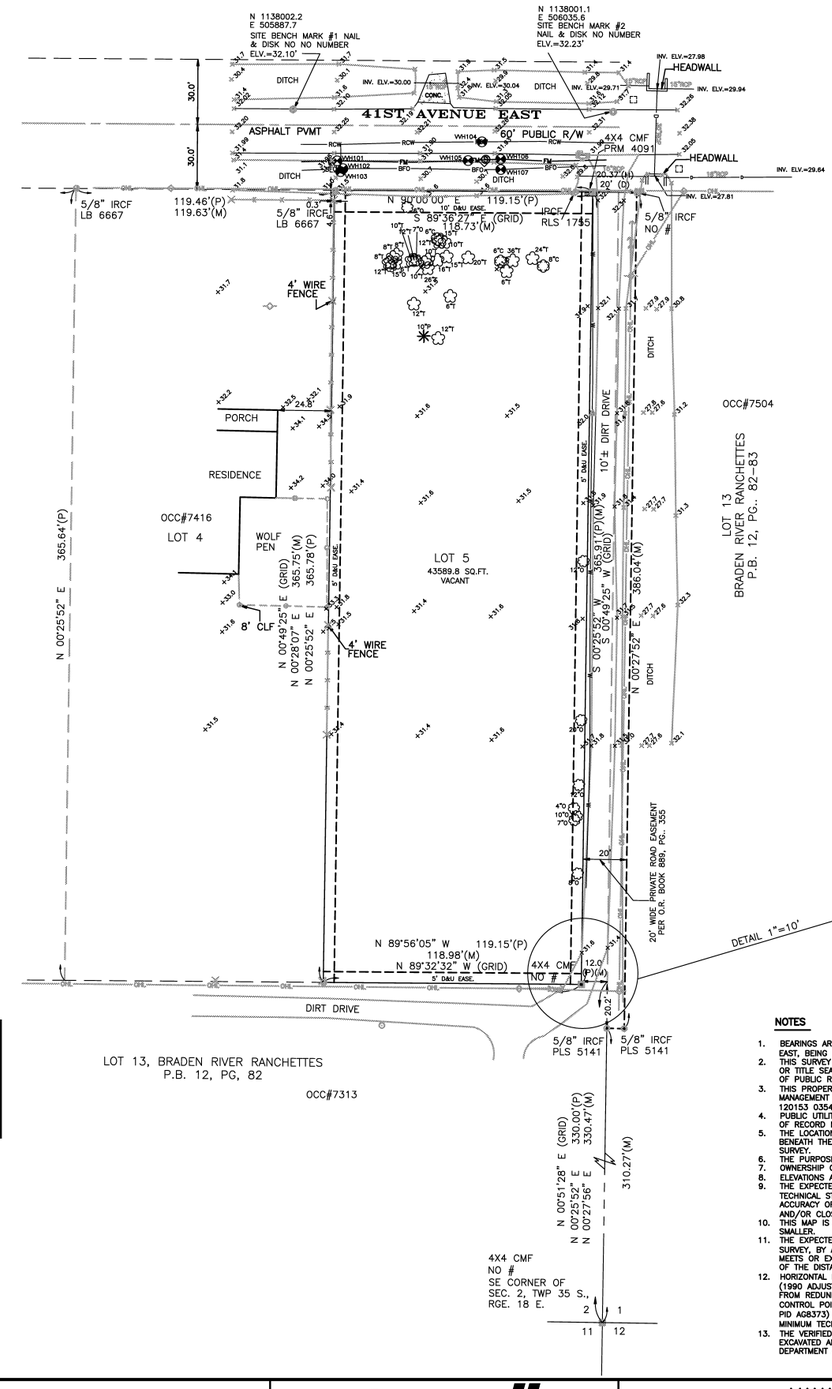
A BYPASS PLAN
SCALE: 1" = 10'

GENERAL NOTES:

1. CONTRACTOR SHALL SUBMIT A BYPASS PLAN FOR APPROVAL BY OWNER AT LEAST 14 DAYS BEFORE BYPASS INSTALLATION.
2. CONTRACTOR SHALL COORDINATE WITH OWNER ON BYPASS SCHEDULE. SHUTDOWN PERIOD FOR BYPASS INSTALLATION WILL BE LIMITED TO THE HOURS BETWEEN 3 A.M. TO 5 A.M.
3. BYPASS PIPE SHALL BE 20" HDPE SDR-11. RESTRAIN BYPASS PIPE AND PROTECT FROM DAMAGE BY VEHICLES, EQUIPMENT, ETC.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING BYPASS PIPE FOR ANY LEAKS OR DAMAGE.

KEY NOTES:

1. CONNECT 20" HDPE SDR-11 BYPASS PIPE TO EXISTING 20" DUCTILE IRON FORCE MAIN AT NORTHING 1137978.04, EASTING 505928.32
2. CONNECT 20" HDPE SDR-11 BYPASS PIPE TO EXISTING 20" DUCTILE IRON FORCE MAIN AT NORTHING 1137978.45, EASTING 506015.28
3. PLACE BYPASS PIPE ABOVE GRADE WITH TEMPORARY AIR RELEASE VALVE AT HIGH POINT. SEE US-25 MC FOR AIR RELEASE VALVE.



LEGAL DESCRIPTION:

LOT 5, ROHR'S RANCHETTES SUBDIVISION,AS PER PLAT THEREOF RECORDED IN PLAT BOOK 32, PAGES 51–52, PUBLIC RECORDS OF MANATEE COUNTY, FLORIDA. A REPLAT OF LOT 12, BRADEN RIVER RANCHETTES, AS RECORDED IN PLAT BOOK 12, PAGE 82–83, PUBLIC RECORDS OF MANATEE COUNTY, FLORIDA.

ABBREVIATIONS

℄	–	CENTER LINE
P.S.M.	–	PROFESSIONAL SURVEYOR & MAPPER
SEC.	–	SECTION
TWP.	–	TOWNSHIP
RGE.	–	RANGE
R/W	–	RIGHT-OF-WAY
(D)	–	DEED DISTANCE
(P)	–	PLAT DISTANCE
(M)	–	MEASURED DISTANCE
CONC.	–	CONCRETE
RES.	–	RESIDENCE
ADD.	–	ADDRESS
C.B.	–	CONC. BLOCK
BLDG.	–	BUILDING
O.R.	–	OFFICIAL RECORDS
F.F.	–	FINISHED FLOOR
EL.	–	ELEVATION
USC&GS	–	UNITED STATES COAST & GEODETIC SURVEY
NGVD	–	NATIONAL GEODETIC VERTICAL DATUM
SAN.	–	SANITARY
INV.	–	INVERT
CMP	–	CORRUGATED METAL PIPE
P.B.	–	PLAT BOOK
BLK.	–	BLOCK
PVM'T	–	PAVEMENT
AC	–	AIR CONDITION
SUB.	–	SUBDIVISION
FND.	–	FOUND
MON.	–	MONUMENT
COR.	–	CORNER
RCP	–	REINFORCED CONC. PIPE
PVC	–	POLYVINYL CHLORIDE PIPE
P.R.M.	–	PERMANENT REFERENCE MONUMENT
P.C.C.	–	PERMANENT CONTROL POINT
D&U	–	DRAINAGE & UTILITY
EASE	–	EASEMENT
DIP	–	DUCTIL IRON PIPE
FM	–	FORCE MAIN
PVC	–	POLYVINYL CHLORIDE
FOC	–	FIBER OPTIC CABLE
GRID	–	BASED ON STATE PLANE COORDINATES
CMF	–	CONCRETE MONUMENT FOUND
OOC	–	OCCUPIED ADDRESS
VVH	–	VERIFIED VERTICAL & HORIZONTAL LOCATION

SYMBOL LEGEND

- NAIL & DISK FOUND
- 4X4 CONC. MONUMENT FOUND
- IRON PIPE FOUND
- IRON ROD & CAP FOUND
- IRON PIPE & CAP FOUND
- IRON ROD FOUND
- 4X4 CONC. MONUMENT FOUND
- IRON ROD & CAP SET
- WOOD POWER POLE
- GUY WIRE
- BARB WIRE FENCE
- CHAIN LINK FENCE
- WIRE PULL BOX
- OAK TREE – SIZE DENOTED WITH "O" – (12"O)
- UNIDENTIFIED TREE– SIZE DENOTED WITH "T" – (12"T)
- CITRUS TREE– SIZE DENOTED WITH "C" – (12"C)
- PALM TREE– SIZE DENOTED WITH "P" – (12"P)
- SANITARY MANHOLE
- MAIL BOX
- WATER METER
- RCW — RECLAIMED WATER LINE – 30" DIP
- FM — BURIED FIBER OPTIC CABLE – 1 1/4" SUBDUCT X2
- BFD — SANITARY FORCE MAIN – 20" DIP
- W — WATER LINE – SIZE AND MATERIAL NOT DETERMINED
- VERIFIED VERTICLE & HORIZONTAL LOCATION (VVH)

Name	Northing	Easting	Surface	MD	TOP	Comment
VVH101	1137978.42	505908.08	GROUND	2.99	28.58	20" DIP FM - MANATEE COUNTY
VVH102	1137974.82	505910.79	GROUND	2.45	28.82	1 1/4" SUBDUCT FOC X2 - VERIZON
VVH103	1137973.45	505909.67	GROUND	0.87	30.33	2" PVC - MANATEE COUNTY
VVH104	1137987.20	505974.99	ASPHALT	3.05	29.05	30" DIP - MANATEE COUNTY
VVH105	1137978.55	505968.61	GROUND	2.73	29.12	20" DIP FM - MANATEE COUNTY
VVH106	1137979.20	505983.60	GROUND	3.37	28.55	20" DIP FM - MANATEE COUNTY
VVH107	1137974.41	505983.66	GROUND	2.25	29.23	1 1/4" SUBDUCT FOC X2 - VERIZON

1. The surveyor has located subsurface utilities physically exposed by vacuum excavation. Electronically designated points may deviate from the actual utility location and should be considered approximate.
2. Subsurface Utilities were located by utilizing the Vacmaster System for vacuum excavation with the benefit of electronic designation and ground penetrating radar (GPR).
3. Utilization of the above equipment and methods is the industry recognized procedure for finding and locating underground utilities. Although effective and reliable, there is the possibility that all utilities may not be detected due to environmental conditions, soil conditions, water table, excessive depth and/or feature makeup.
4. Utility size reflects the approximate outside diameter unless otherwise specified.
5. Utility size and material composition were collected by field observation under adverse conditions and should be considered approximate.
6. Utility owners names used in this report reflect information obtained from field observations, field meetings and utility research.

NOTES

1. BEARINGS ARE BASED ON THE SOUTH RIGHT-OF-WAY OF 41ST AVENUE EAST, BEING N.90°00'00"E. (PLAT OF RECORD).
2. THIS SURVEY HAS BEEN PREPARED WITHOUT THE BENEFIT OF AN ABSTRACT OR TITLE SEARCH AND THERE MAY BE ADDITIONAL EASEMENTS THAT MAY BE OF PUBLIC RECORD.
3. THIS PROPERTY LIES IN FLOOD ZONE "X" AS PER FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP; COMMUNITY PANEL NO. 120153 0354 C, DATED 07/15/92 (INDEX REVISED JUNE 30, 1999).
4. PUBLIC UTILITIES THAT LIE WITHIN PUBLIC RIGHTS OF WAY OR EASEMENTS OF RECORD NOT SHOWN OR LOCATED.
5. THE LOCATION OF UTILITIES, FOUNDATIONS OR STRUCTURES, IF ANY, BENEATH THE SURFACE HAS NOT BEEN DETERMINED EXCEPT AS SHOWN ON SURVEY.
6. THE PURPOSE OF THIS SURVEY IS FOR DESIGN PURPOSES.
7. OWNERSHIP OF FENCES HAS NOT BEEN DETERMINED.
8. ELEVATIONS ARE BASED ON U.S.C. & G.S. 1929 DATUM (NGVD).
9. THE EXPECTED USE OF THE LAND, AS CLASSIFIED IN THE FLORIDA MINIMUM TECHNICAL STANDARDS (61G17-6-F.A.C.), FOR THIS SURVEY IS RURAL. THE ACCURACY OF THE CONTROL SURVEY DATA BY REDUNDANT MEASUREMENTS AND/OR CLOSED TRAVERSE MEETS OR EXCEEDS 1 FOOT IN 5,000 FEET.
10. THIS MAP IS INTENDED TO BE DISPLAYED AT THE SCALE NOTED HEREON OR SMALLER.
11. THE EXPECTED ACCURACY OF THE VERTICAL CONTROL DATA FOR THIS SURVEY, BY A LEVEL LOOP AND/OR CLOSURE TO A SECOND BENCHMARK, MEETS OR EXCEEDS PLUS OR MINUS 0.05 FEET TIMES THE SQUARE ROOT OF THE DISTANCE IN MILES.
12. HORIZONTAL DATUM IS BASED ON NORTH AMERICAN DATUM (NAD) OF 1983 (1990 ADJUSTMENT), FLORIDA STATE PLANE, WEST ZONE, AND WAS DERIVED FROM REDUNDANT REAL-TIME KINEMATIC GPS OBSERVATIONS UTILIZING NGS CONTROL POINTS I75 84 A42 (NGS PID AG 8500) AND I75 84 AOB (NGS PID AG8373) AND ADHERES TO THE ACCURACY REQUIREMENTS OF FLORIDA'S MINIMUM TECHNICAL STANDARDS (61G17-6.003, F.A.C).
13. THE VERIFIED VERTICAL & HORIZONTAL (V.V.H.) HOLES NOTED HEREON WERE EXCAVATED AND MARKED IN THE FIELD BY GEORGE F. YOUNG SUE DEPARTMENT AND LOCATED BY GEORGE F. YOUNG SURVEY DEPARTMENT.

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

Since 1919

George F. Young, Inc.
10540 PORTAL CROSSING, SUITE 105 BRADENTON, FLORIDA 34211
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
SURVEY CONTROL PLAN

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. G-04

Last Opened by: 6-04-10 04:00pm: DPerry

FILENAME: Last Saved By: SMF_DENL 5-28-10 12:00pm C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-01-G-04 XREFS: 7880C10-01-010-901; 3624bdr; 7880C10-01-010-900; 7880C10-03-010-101

NORTH

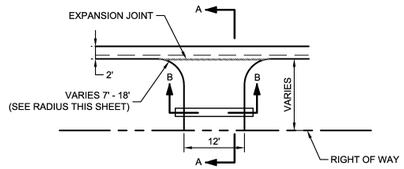
0 5' 10' 20'

GENERAL NOTES:

1. ALL TREES AND SHRUBS WITHIN LIMITS OF CONTSTRUCTION SHALL BE CLEARED. CLEARED VEGETATION AND TREES FROM CONSTRUCTION AREA CAN BE MULCHED AND SPREAD ON SITE. DO NOT CLEAR BEYOND LIMITS OF CONSTRUCTION SHOWN.
2. SEE DRAWING G-04 FOR BYPASS PLAN. COORDINATE WITH OWNER ON SHUT DOWN CONSTRAINTS FOR BYPASS INSTALLATION.

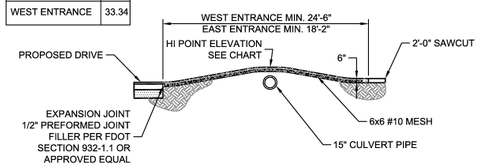
KEY NOTES:

- A — LIMITS OF CONSTRUCTION. INSTALL SILT FENCE PER C304 TYP
- B — SOIL TRACKING PREVENTION DEVICE PER FDOT INDEX 106



PLAN VIEW

HI POINT ELEVATIONS	
EAST ENTRANCE	32.94
WEST ENTRANCE	33.34

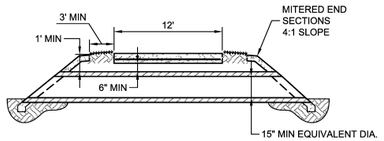


SECTION A-A

NOTES:

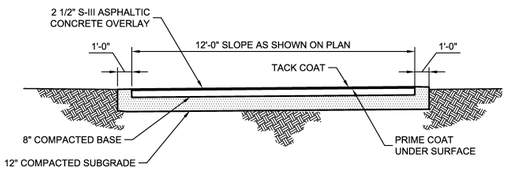
A. DRIVE APPROACH WITH 6" CONCRETE WITH 6"x6" MESH #10, 3000 PSI AT 28 DAYS.

B. EXPANSION JOINT 1/2" PREFORM JOINT FILLER PER FDOT SECTION 932-1.1 OR APPROVED ALTERNATE.



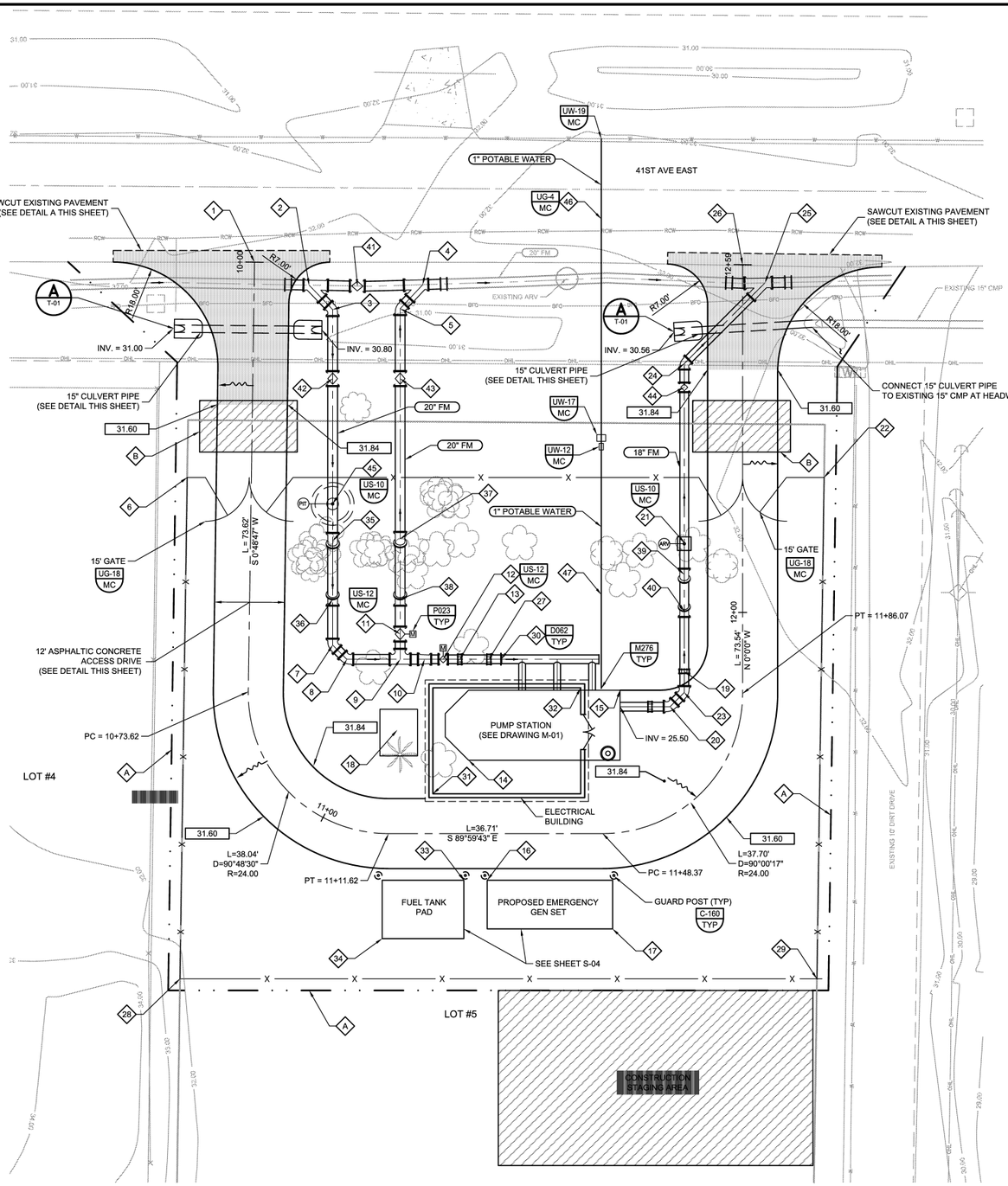
SECTION B-B

A DRIVE APPROACH DETAIL



B DRIVE PAVEMENT SECTION (TYP)

N.T.S.



KEY NOTES:

1. BEGIN ACCESS DRIVE STATIONING. NORTHING: 1137981.80 EASTING: 505923.19
2. 20" WYE (MJ) NORTHING: 1137977.96 EASTING: 505932.56 INV : 26.98
3. 20" x 45° BEND (MJ) NORTHING: 1137973.77 EASTING: 505936.59 INV : 26.98
4. 20" WYE (MJ) NORTHING: 1137978.04 EASTING: 505952.03 INV : 27.16
5. 20" x 45° BEND (MJ) NORTHING: 1137973.93 EASTING: 505948.15 INV : 27.16
6. NW FENCE CORNER NORTHING: 1137945.00 EASTING: 505911.66
7. 20" x 45° BEND (MJ) NORTHING: 1137916.27 EASTING: 5059336.59 INV : 17.62
8. 20" x 45° BEND (MJ) NORTHING: 1137913.84 EASTING: 505939.03 INV : 17.62
9. 20" TEE (MJ x MJ) NORTHING: 1137913.84 EASTING: 505948.15 INV : 17.62
10. 20" x 18" REDUCER (MJ) NORTHING: 1137913.84 EASTING: 505952.33 INV : 17.62
11. 20" PLUG VALVE MOTOR OPERATED (MJ) NORTHING: 1137918.16 EASTING: 505948.15
12. 18" PLUG VALVE MOTOR OPERATED (MJ) NORTHING: 1137913.84 EASTING: 505955.53
13. 18" FLEX COUPLING NORTHING: 1137913.84 EASTING: 505957.87
14. SW CORNER PUMP STATION NORTHING: 1137896.55 EASTING: 505959.89
15. NE CORNER PUMP STATION NORTHING: 1137908.55 EASTING: 505985.85
16. NW CORNER GEN SET CONCRETE PAD NORTHING: 1137865.97 EASTING: 505963.07
17. SE CORNER GEN SET CONCRETE PAD NORTHING: 1137867.64 EASTING: 505984.57
18. AIR CONDITIONING EQUIPMENT PAD
19. 18" FLEX COUPLING NORTHING: 1137911.77 EASTING: 505996.85
20. 18" x 45° BEND (MJ) NORTHING: 1137905.72 EASTING: 505994.42
21. AIR RELEASE VALVE (SEE DRAWING T-02) NORTHING: 1137933.64 EASTING: 505996.85
22. NE FENCE CORNER NORTHING: 1137945.00 EASTING: 506020.82
23. 18" x 45° BEND (MJ) NORTHING: 1137908.15 EASTING: 505996.85
24. 18" x 45° BEND (MJ) NORTHING: 1137964.52 EASTING: 505996.85 INV : 26.75
25. 20" x 18" WYE NORTHING: 1137978.35 EASTING: 506010.69 INV : 26.75
26. END ACCESS DRIVE STATIONING NORTHING: 1137981.35 EASTING: 506006.85
27. 18" FLEX COUPLING NORTHING: 1137913.84 EASTING: 505963.37
28. SW FENCE CORNER NORTHING: 1137859.09 EASTING: 505910.42
29. SE FENCE CORNER NORTHING: 1137859.09 EASTING: 506019.58
30. PIPE FLANGE INSULATION NORTHING: 1137913.84 EASTING: 505965.50
31. SW CORNER ELECTRICAL BUILDING NORTHING: 1137890.80 EASTING: 505953.77
32. NE CORNER ELECTRICAL BUILDING NORTHING: 1137908.97 EASTING: 505979.10
33. NE CORNER FUEL TANK PAD NORTHING: 1137875.97 EASTING: 505959.07
34. SW CORNER FUEL TANK PAD NORTHING: 1137865.97 EASTING: 505945.07
35. 20" x 45° BEND (MJ) NORTHING: 1137934.36 EASTING: 505936.59 INV = 26.98
36. 20" x 45° BEND (MJ) NORTHING: 1137924.14 EASTING: 505936.59 INV = 17.62
37. 20" x 45° BEND (MJ) NORTHING: 1137934.54 EASTING: 505948.15 INV = 27.16
38. 20" x 45° BEND (MJ) NORTHING: 1137924.14 EASTING: 505948.15 INV = 17.62
39. 18" x 11.25° BEND (MJ) NORTHING: 1137928.35 EASTING: 505996.85 INV = 26.75
40. 18" x 11.25° BEND (MJ) NORTHING: 1137922.10 EASTING: 506006.85 INV = 25.50
41. 20" PLUG VALVE (MJ) NORTHING: 1137977.81 EASTING: 505940.82 INV = 27.07
42. 20" PLUG VALVE (MJ) NORTHING: 1137961.95 EASTING: 505936.59 INV = 27.07
43. 20" PLUG VALVE (MJ) NORTHING: 1137961.93 EASTING: 505948.15 INV = 27.16
44. 18" PLUG VALVE (MJ) NORTHING: 1137960.45 EASTING: 505996.85 INV = 26.75
45. PRESSURE TRANSMITTER (SEE DRAWING N-08) NORTHING: 1137940.47 EASTING: 505936.58
46. 1" WATER SERVICE TO BE A MIN OF 18" BELOW EXISTING FORCEMAINS AND UTILITIES UP TO METER BOX
47. 3' MINIMUM COVER FROM METER BOX TO YARD HYDRANT

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

carollo
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MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

SITE AND EROSION CONTROL PLAN

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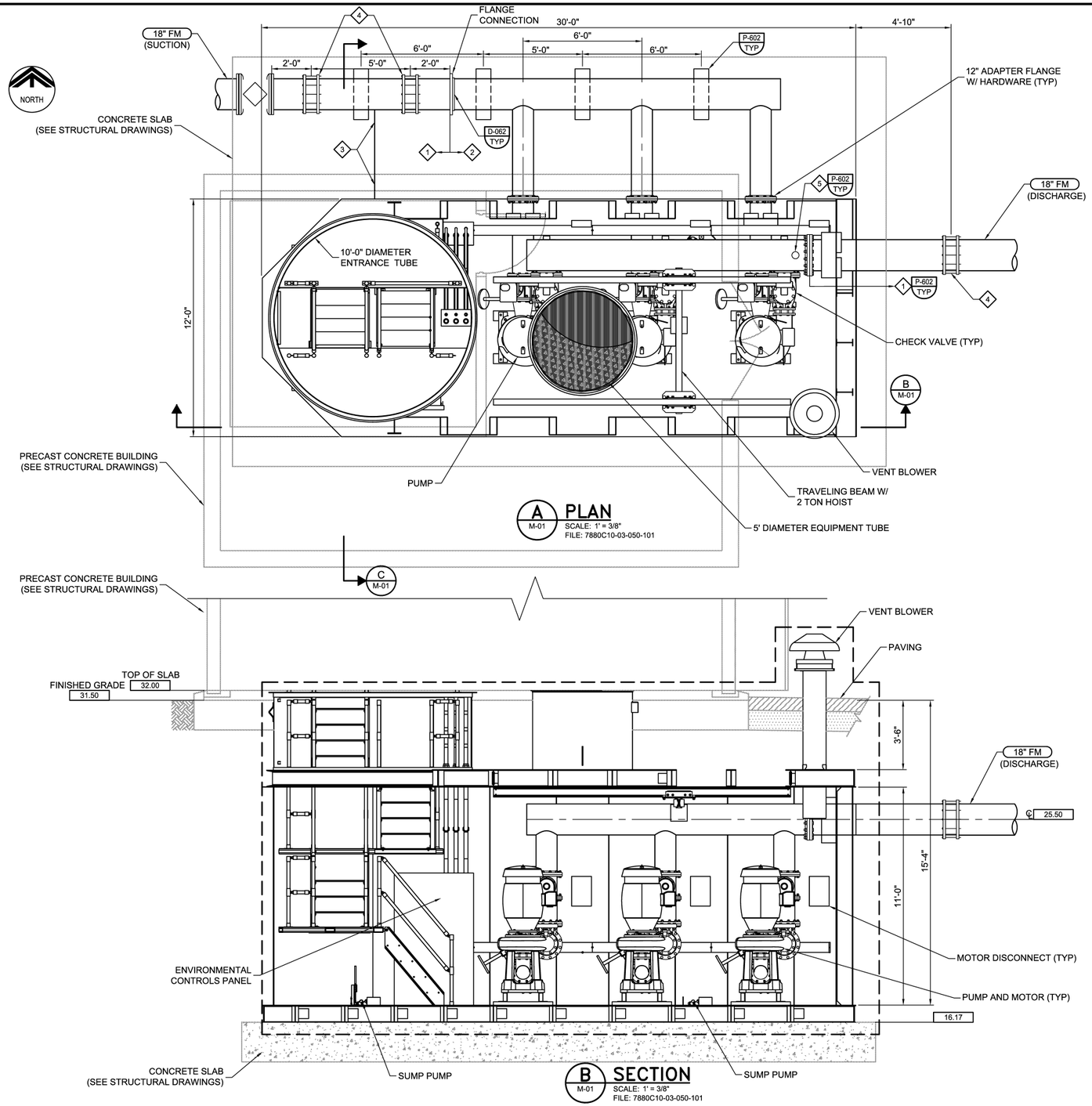
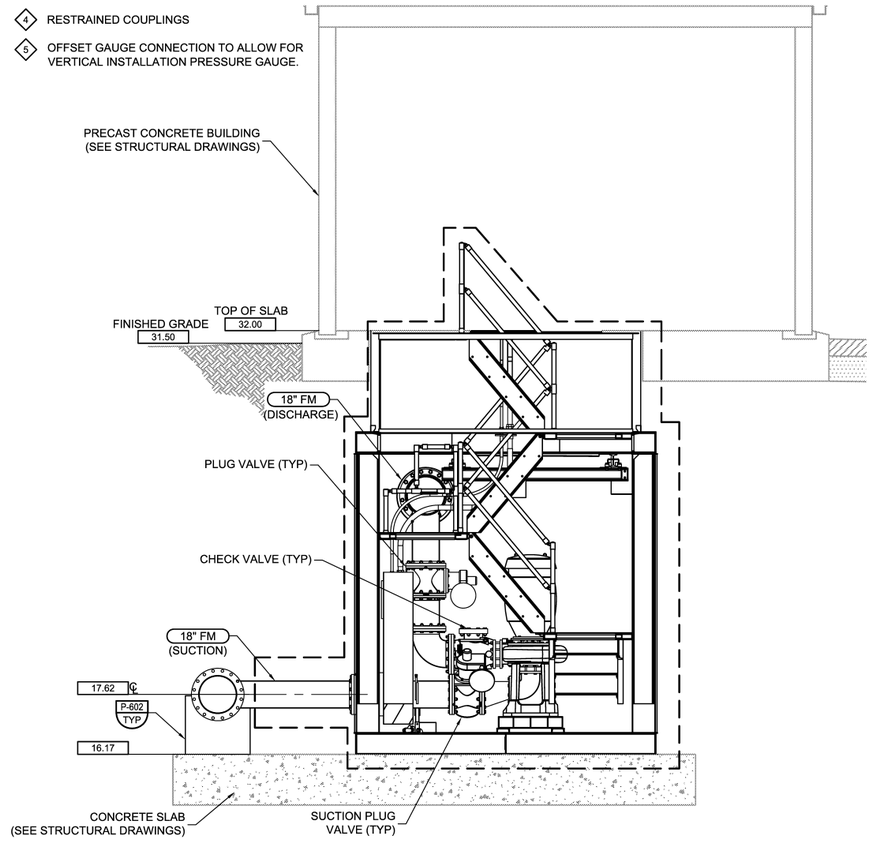


KEY NOTES:

1. PIPE PROVIDED BY CONTRACTOR (DUCTILE IRON).
2. PIPE PROVIDED BY PUMP MANUFACTURER (STEEL).
3. COORDINATE WITH PUMP STATION MANUFACTURER ON LOCATION OF 1" HDPE SUMP PUMP DISCHARGE. TAP 18" SUCTION HEADER FOR SUMP DISCHARGE CONNECTION. PUMP STATION MANUFACTURER TO ROUTE DISCHARGE FROM BOTH SUMP PUMPS TO ONE COMMON 1" HDPE DISCHARGE PIPE. PROVIDE CONNECTION WITH A SMITH-BLAIR DOUBLE BALE SERVICE SADDLE (MODEL NO. 323) WITH A THREADED TRANSITION FITTING ON THE 1" HDPE SUMP DISCHARGE.
4. RESTRAINED COUPLINGS
5. OFFSET GAUGE CONNECTION TO ALLOW FOR VERTICAL INSTALLATION PRESSURE GAUGE.



C M-01 SECTION
SCALE: 1" = 3/8"
FILE: 7880C10-03-050-101

PUMP DATA AND DESIGN CHARACTERISTICS	
NUMBER OF PUMPS	3
DESIGN CAPACITY PER PUMP, G.P.M.	2600
STATION FIRM CAPACITY, GPM	5200
TOTAL DYNAMIC HEAD, FT.	80
MIN. EFF. AT DESIGN CAPACITY %	75%
HORSEPOWER PER PUMP, H.P.	100
MAX. SIZE SOLIDS, IN.	3
DISCHARGE SIZE, IN.	10
PUMP MANUF. & MODEL NUMBER	S&L 8D5A
PUMP R.P.M.	1170
ELECT. SVC - VOLTAGE & PHASE	460/3

LIMITS OF PACKAGE PUMP STATION

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

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Engineers...Working Wonders With Water ™
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
PUMP STATION PLAN AND SECTION

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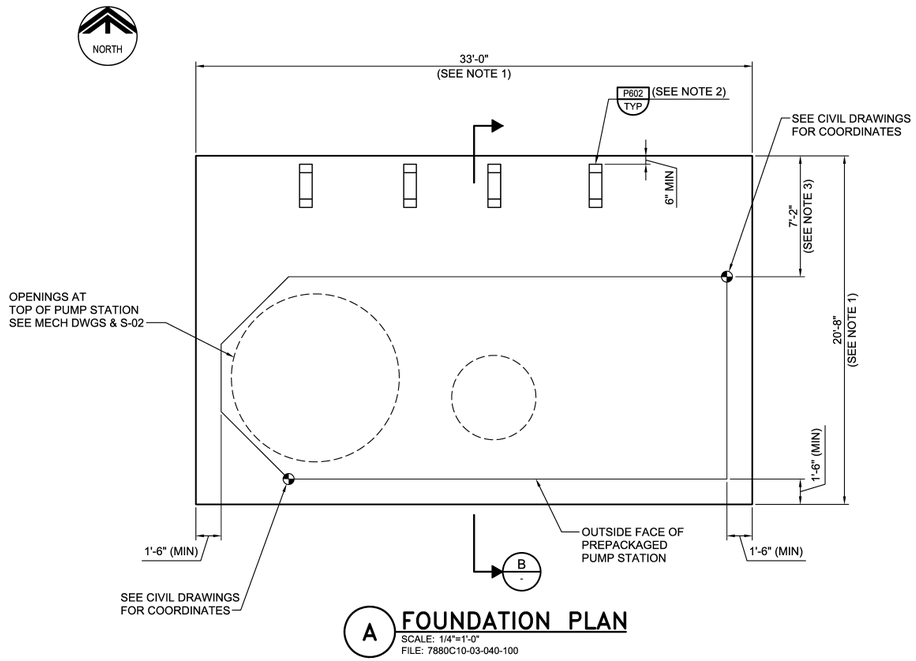

A FOUNDATION PLAN

SCALE: 1/4"=1'-0"
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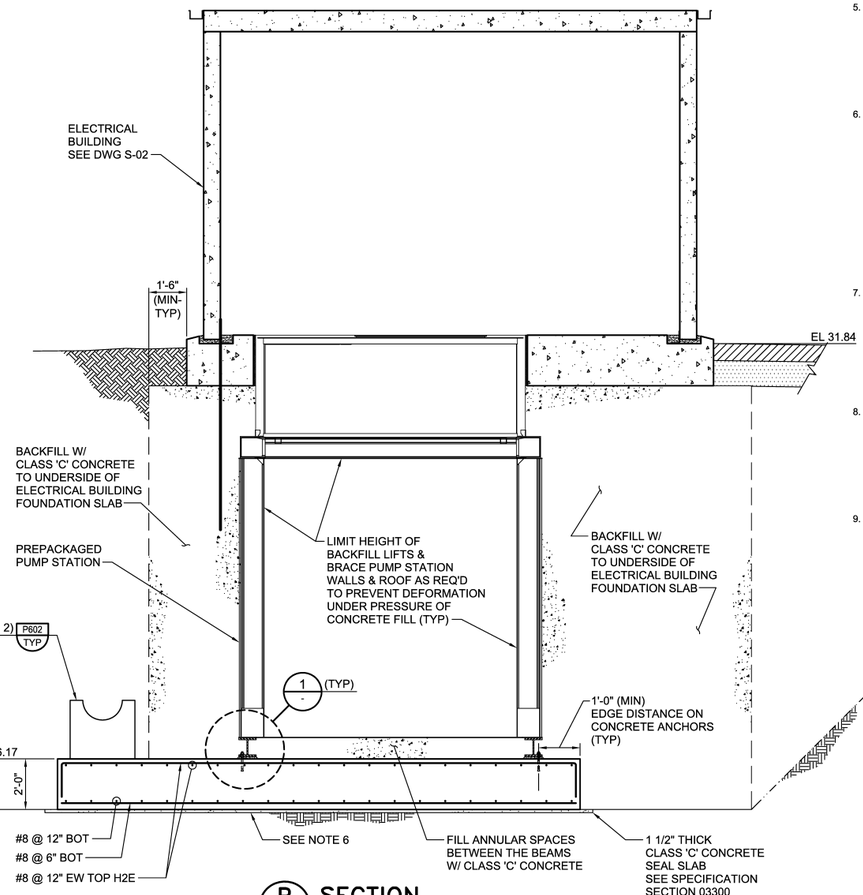
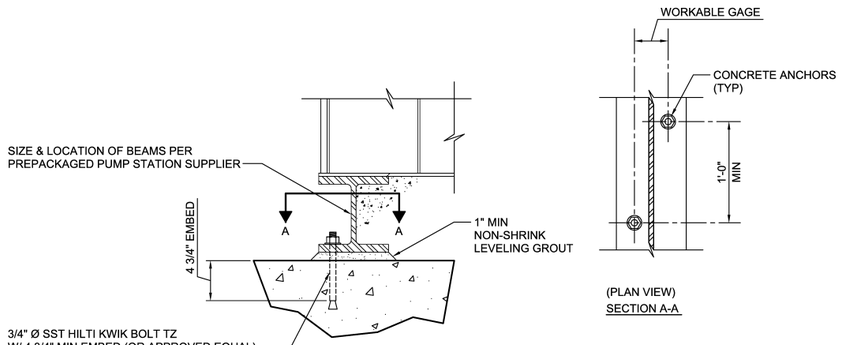


B SECTION

SCALE: 3/8"=1'-0"
FILE: 7880C10-03-040-300



1 DETAIL

SCALE: 1 1/2"=1'-0"
FILE: 7880C10-03-040-300

NOTES:

1. COORDINATE THE SIZE OF THE PAD WITH THE SIZE OF THE PREPACKAGED PUMP STATION. PROVIDE 18" MINIMUM DISTANCE FROM THE EDGE OF THE PUMP STATION BEAMS TO THE EDGE OF THE CONCRETE SLAB (TYP 3 SIDES).
2. REFER TO MECHANICAL DRAWINGS FOR LOCATION OF EXTERIOR PIPE SUPPORTS.
3. PROVIDE 6" DISTANCES BETWEEN EDGES OF PIPE SUPPORT CRADLES AND EDGE OF CONCRETE FILL AND CONCRETE SLAB. COORDINATE THE SIZE OF THE PAD WITH THE LOCATION OF THE PIPES.
4. PROVIDE 60 (SIXTY) CONCRETE ANCHORS BETWEEN THE CAST-IN-PLACE CONCRETE SLAB AND THE PREPACKAGED PUMP STATION STRUCTURAL BEAMS. LOCATE ANCHORS AT TYPICAL GAGE FOR BEAMS PROVIDED AT MINIMUM 12" SPACING. LOCATE THE ANCHORS AT UNIFORM SPACING SYMMETRICALLY AROUND THE PERIMETER BEAMS. PREPACKAGED PUMP STATION MANUFACTURER SHALL SUBMIT PROPOSED LOCATIONS FOR PREDRILLED HOLES IN SHOP DRAWING SUBMITTAL.
5. PREPACKAGED PUMP STATION DESIGN CRITERIA:
   - GROUND WATER AT GRADE
   - LATERAL SOIL PRESSURE = 90 PSF
   - LATERAL PRESSURE DUE TO PLASTIC CONCRETE FILL = 150 PSF
   - UNIFORM LATERAL SURCHARGE = 300 PSF
   - VERTICAL LOAD TO THE ROOF = 1200 PSF (SOIL AND ELECTRICAL BUILDING ABOVE ROOF)
6. REMOVE TREES AND VEGETATION. DEWATER EXCAVATION AREA TO 3'-0" BELOW BOTTOM OF SLAB. CONTRACTOR, OBTAIN NECESSARY PERMITS TO DEWATER EXCAVATION SITE. DISCHARGE WATER AS DIRECTED BY CLIENT OR PERMIT-ISSUING AUTHORITY. ADJUST MOISTURE CONTENT IN SOIL PER ENGINEER'S RECOMMENDATIONS & PROOF ROLL/COMPACT TO 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY. COMPACT 12-INCH SOIL DEPTH SOIL DIRECTLY BELOW FOUNDATIONS TO A 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY. PLACE 1 1/2" LEAN CONCRETE SEAL SLAB BELOW CAST-IN-PLACE CONCRETE SLABS.
7. BACKFILL STRUCTURES WITH SAND FILL PLACED IN 12-INCH LIFTS EXCEPT AGAINST WALLS WHERE LOOSE 6-INCH LIFTS ARE RECOMMENDED. ACCEPTABLE FILL SHALL BE FINE TO MEDIUM SAND WITH LESS THAN 12% PASSING THE NO. 200 SIEVE, FREE OF RUBBLE, ORGANICS, CLAY, AND DEBRIS. COMPACT SOIL DIRECTLY BELOW FOUNDATIONS TO A 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY.
8. FACTOR OF SAFETY (FS) AGAINST UPLIFT DUE TO BUOYANCY = 1.50 MINIMUM = STRUCTURE DEAD LOAD DIVIDED BY UPLIFT ON STRUCTURE. (STRUCTURE DEAD LOAD = PUMP STATION ROOF, WALLS, FLOOR PLATES, BASE SLAB, SOIL ABOVE PUMP STATION AND SURCHARGE FROM ELECTRICAL BUILDING SLAB)
9. APPLY TERMITE CONTROL AS SPECIFIED IN SECTION 02362.

REV	DATE	BY	DESCRIPTION

DESIGNED PAS
DRAWN DMS
CHECKED GLS
DATE APRIL 2010
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
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CA 00008571

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PS 428 BOOSTER PUMP STATION
PUMP STATION
PLAN, SECTION AND DETAIL

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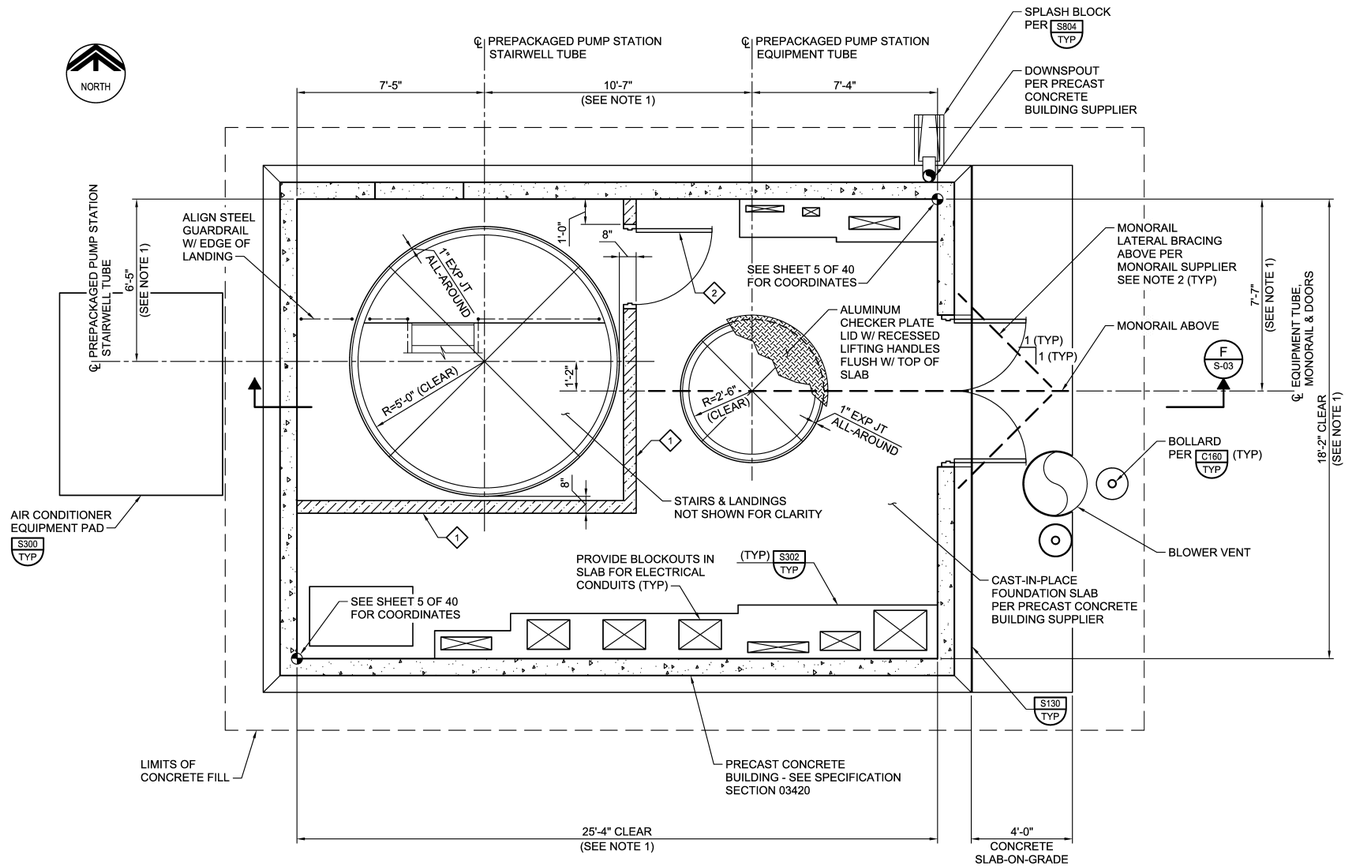
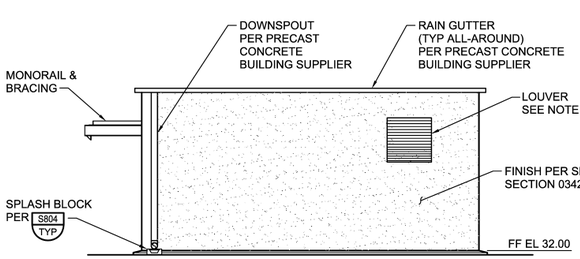


A FLOOR PLAN

SCALE: 3/8"=1'-0"
FILE: 7880C10-04-040-100



B NORTH ELEVATION

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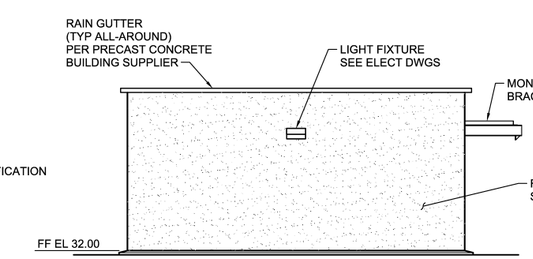
FILE: 7880C10-04-040-500



C SOUTH ELEVATION

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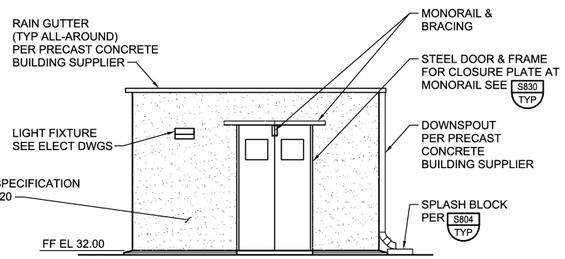
FILE: 7880C10-04-040-500



D EAST ELEVATION

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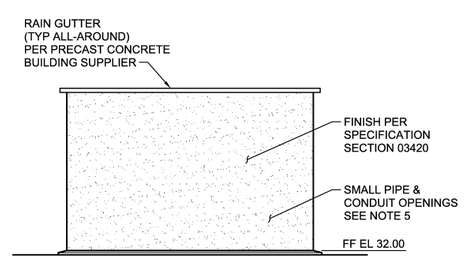


E WEST ELEVATION

SCALE: 3/16"=1'-0"
FILE: 7880C10-04-040-500

NOTES:

1. CENTER THE PAIR OF DOORS ON THE CENTER OF THE EQUIPMENT HATCH OPENING AND THE MONORAIL. CONTRACTOR SHALL COORDINATE THE DOOR LOCATION WITH PREPACKAGED PUMP STATION SUPPLIER AND THE PRECAST CONCRETE BUILDING SUPPLIER. CONTRACTOR SHALL COORDINATE DIMENSIONS BETWEEN PREPACKAGED PUMP STATION AND PRECAST SUPPLIERS.
2. CONTRACTOR SHALL COORDINATE CONNECTIONS BETWEEN THE MONORAIL SUPPLIER AND THE PRECAST CONCRETE BUILDING SUPPLIER.
3. SEE NOTES 5 AND 6 ON DRAWING S-03 FOR EXCAVATION AND BACKFILL REQUIREMENTS.
4. CONTRACTOR SHALL COORDINATE REQUIRED SIZE AND LOCATION OF LOUVER WITH PREPACKAGED PUMP STATION SUPPLIER AND PRECAST CONCRETE BUILDING SUPPLIER. SEE SECTION 15954.
5. CONTRACTOR SHALL COORDINATE SIZES AND LOCATIONS OF OPENINGS BETWEEN THE HVAC EQUIPMENT SUPPLIER AND THE PRECAST CONCRETE BUILDING SUPPLIER.

KEY NOTES

1 REFER TO STEEL STUD MANUFACTURERS ASSOCIATION (SSMA) PRODUCT TECHNICAL INFORMATION (PUBLICATION ICBO ER-4943P) FOR ADDITIONAL INFORMATION.

WALLS:
APPLY BASE LAYER 5/8" MR (GREEN) GYPBD BOTH SIDES PARALLEL TO 362S200-68 STEEL STUDS @ 24" O.C. AND TRACK WITH 1-5/8" TYPE S-12 DRYWALL SCREWS 12" O.C.. STAGGER JOINTS 24" O.C. EACH SIDE. STUDS ATTACHED TO EACH SIDE OF TOP AND BOTTOM TRACKS WITH 1/2" TYPE S-12 PAN HEAD SCREWS, TRACKS ATTACHED TO CONCRETE SLAB AND ROOF WITH 0.145"Ø HILTI POWDER ACTUATED FASTENER X 0'-1-1/2" EMBEDMENT @ 12" O.C.. STUD TRACKS SHALL BE SET IN SEALANT BEAD PRIOR TO FASTENING TO SUBSTRATE. SET STUD AGAINST WALLS IN SIMILAR MANNER.

TAPE AND MUD GYPBD JOINTS SMOOTH. PERIMETER SEAL AGAINST ALL ADJACENT SURFACES. TIGHTLY SEAL ALL CONDUIT AND DUCT PENETRATIONS. KEEP ANNULAR SPACE AT ALL CONDUIT AND DUCT PENETRATIONS TO A MINIMUM. COORDINATE WITH ELECTRICAL AND HVAC DRAWINGS.

CEILING:
APPLY FACE LAYER 1/2" CDX PLYWOOD TO 600S250-97 FLOOR JOISTS AT 12" O.C.. ATTACH TO TOP RUNNER TRACK WITH 1" TYPE S-12 DRYWALL SCREWS 12" O.C. TERMINATE PLYWOOD AT WALL OFFSET ABOVE. JOINTS SHALL BE TIGHTLY FIT.

PERIMETER SEAL ALL PLYWOOD EDGES AT WALLS WITH ELASTOMERIC SEALANT. PROVIDE BASE TRIM AT BOTTOM OF WALLS. PRIME AND PAINT EXPOSED GYPBD AND PLYWOOD WITH LATEX ENAMEL PAINT.

2 INTERIOR DOOR AND FRAME:
NEW 3'-0"W x 6'-8"H HOLLOW METAL DOOR AND FRAME PER SPECIFICATION SECTION 03240.

REV	DATE	BY	DESCRIPTION

DESIGNED PAS
DRAWN DMS
CHECKED GLS
DATE APRIL 2010
PROJECT ENGINEER

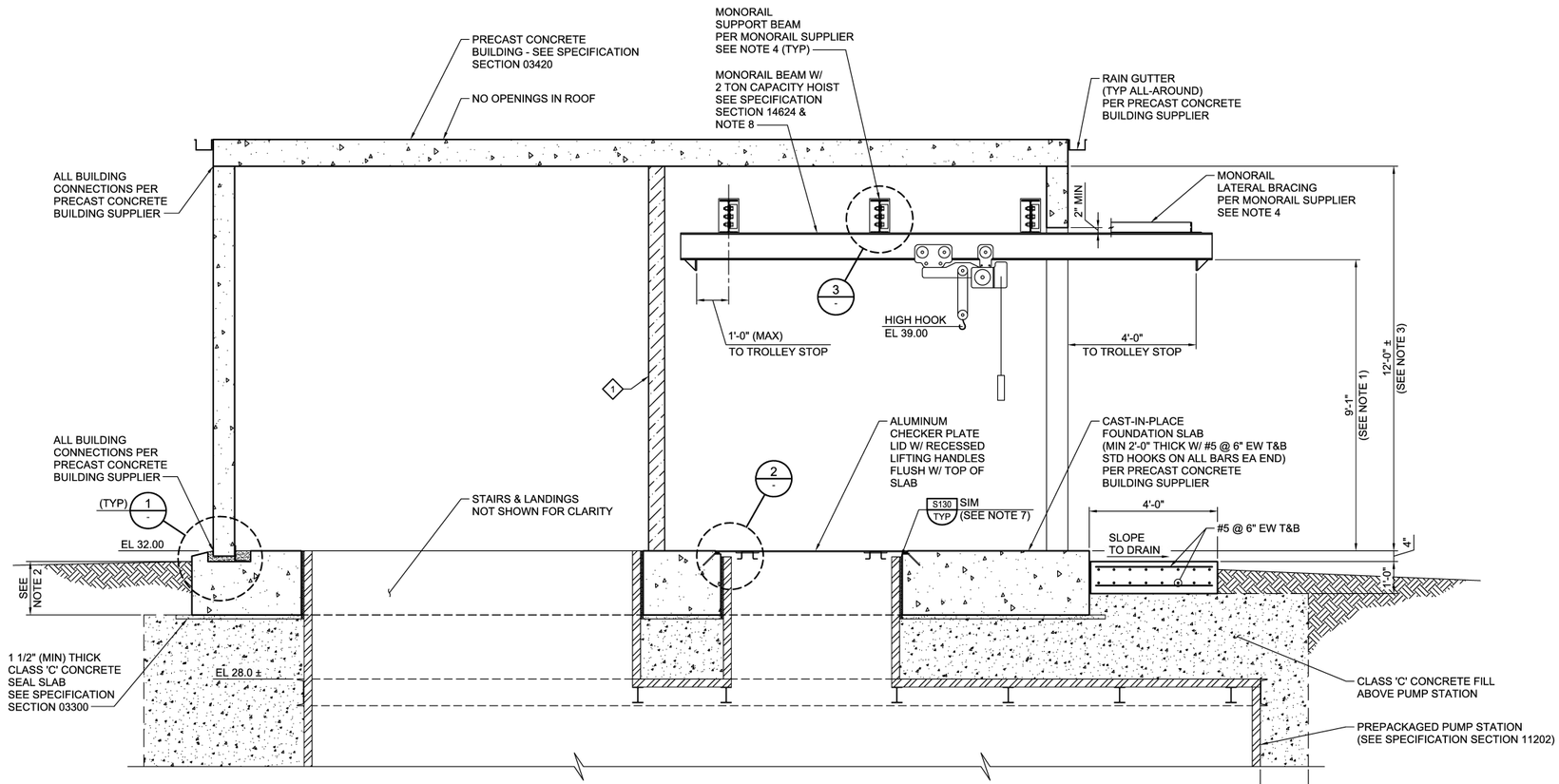
carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL BUILDING PLAN AND ELEVATIONS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. S-02

Last Opened by: 6-04-10 04:01pm DPerry
FILENAME: Last Saved By: SMF_DENL 5-28-10 01:05pm C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-S-02 XREFS: 3624bdr; 7880C10-04-040-100; 7880C10-04-040-500 h20logo; h20logo;



F S-02 OVERALL SECTION

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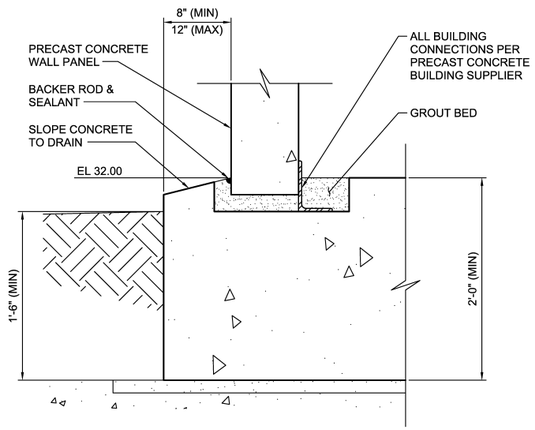

1 - SLAB EDGE DETAIL

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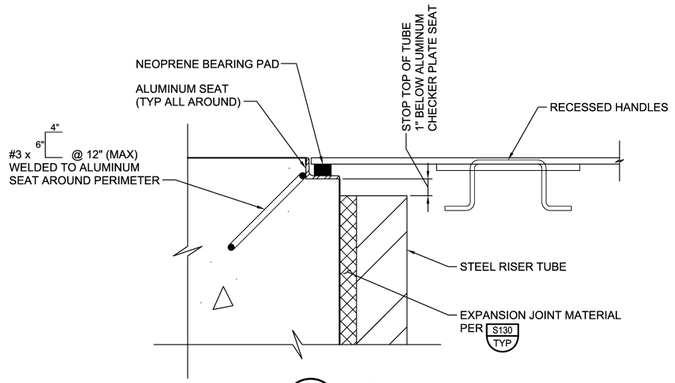
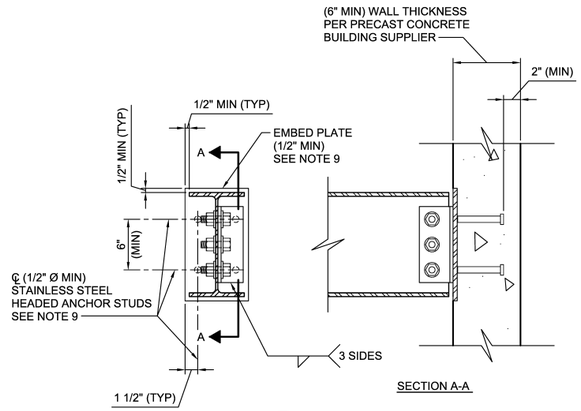


2 - DETAIL

SCALE: 3"=1'-0"
FILE: 7880C10-04-040-300



3 - DETAIL

SCALE: 1 1/2"=1'-0"
FILE: 7880C10-04-040-300

NOTES:

1. CONTRACTOR SHALL COORDINATE DOOR HEIGHT REQUIRED WITH MONORAIL SUPPLIER AND PREPACKAGED PUMP STATION SUPPLIER. INCREASE HEIGHT IF THE LARGEST LIFTED ITEM EXCEEDS 55" IN HEIGHT. PROVIDE A CUT OUT SHAPE TO FIT THE MONORAIL BEAM SO THAT WHEN THE DOOR CLOSES, THE MONORAIL BEAM IS ENCLOSED WITHIN THE CUT OUT SHAPE IN THE DOOR. PROVIDE A MEANS TO MINIMIZE THE AMOUNT OF RAIN AND WIND FROM ENTERING THE BUILDING THROUGH THE MONORAIL BEAM OPENING IN THE DOOR. CONTRACTOR, COORDINATE THE SHAPE OF THE CUT OUT REQUIRED WITH THE MONORAIL SUPPLIER AND THE PRECAST CONCRETE BUILDING SUPPLIER.
2. PROVIDE MINIMUM 18" SOIL COVER ON FOUNDATION SLAB ALL AROUND THE BUILDING.
3. CONTRACTOR TO VERIFY CLEAR HEIGHT REQUIRED. COORDINATE WITH PRECAST CONCRETE BUILDING SUPPLIER.
4. CONTRACTOR SHALL COORDINATE CONNECTIONS BETWEEN THE MONORAIL SUPPLIER AND THE PRECAST CONCRETE BUILDING SUPPLIER.
5. REMOVE TREES AND VEGETATION. DEWATER EXCAVATION AREA TO 3'-0" BELOW BOTTOM OF SLAB. CONTRACTOR, OBTAIN NECESSARY PERMITS TO DEWATER EXCAVATION SITE. DISCHARGE WATER AS DIRECTED BY CLIENT OR PERMIT-ISSUING AUTHORITY. ADJUST MOISTURE CONTENT IN SOIL PER ENGINEER'S RECOMMENDATIONS & PROOF ROLL/COMPACT TO 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY. COMPACT 12-INCH SOIL DEPTH SOIL DIRECTLY BELOW FOUNDATIONS TO A 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY. PLACE 1 1/2" LEAN CONCRETE SEAL SLAB BELOW CAST-IN-PLACE CONCRETE SLABS.
6. BACKFILL STRUCTURES WITH SAND FILL PLACED IN 12-INCH LIFTS EXCEPT AGAINST WALLS WHERE LOOSE 6-INCH LIFTS ARE RECOMMENDED. ACCEPTABLE FILL SHALL BE FINE TO MEDIUM SAND WITH LESS THAN 12% PASSING THE NO. 200 SIEVE, FREE OF RUBBLE, ORGANICS, CLAY, AND DEBRIS. COMPACT SOIL DIRECTLY BELOW FOUNDATIONS TO A 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY
7. EXPANSION JOINT DETAIL S130 SHOWS CONCRETE EACH SIDE OF THE JOINT. PROVIDE EXPANSION JOINT MATERIAL BETWEEN CONCRETE SLAB AND STEEL RISER TUBES ONLY.
8. DESIGN THE MONORAIL AND CONNECTIONS, MONORAIL SUPPORT BEAMS AND MONORAIL SUPPORT BEAM CONNECTIONS FOR 125% OF MONORAIL'S RATED CAPACITY.
9. DESIGN THE ANCHORS AND THE EMBEDDED PLATE TO RESIST 6200 LB VERTICAL DOWNWARD LOAD OR 1700 LB VERTICAL UPWARD LOAD. LOADS ARE UNFACTORED.

KEY NOTES

1. REFER TO STEEL STUD MANUFACTURERS ASSOCIATION (SSMA) PRODUCT TECHNICAL INFORMATION (PUBLICATION ICBO ER-4943P) FOR ADDITIONAL INFORMATION.

WALLS:
APPLY BASE LAYER 5/8" MR (GREEN) GYPBD BOTH SIDES PARALLEL TO 362S200-68 STEEL STUDS @ 24" O.C. AND TRACK WITH 1-5/8" TYPE S-12 DRYWALL SCREWS 12" O.C., STAGGER JOINTS 24" O.C. EACH SIDE. STUDS ATTACHED TO EACH SIDE OF TOP AND BOTTOM TRACKS WITH 1/2" TYPE S-12 PAN HEAD SCREWS, TRACKS ATTACHED TO CONCRETE SLAB AND ROOF WITH 0.145"Ø HILTI POWDER ACTUATED FASTENER X 0'-1-1/2" EMBEDMENT @ 12" O.C.. STUD TRACKS SHALL BE SET IN SEALANT BEAD PRIOR TO FASTENING TO SUBSTRATE. SET STUD AGAINST WALLS IN SIMILAR MANNER.

TAPE AND MUD GYPBD JOINTS SMOOTH. PERIMETER SEAL AGAINST ALL ADJACENT SURFACES. PROVIDE BASE TRIM AT BOTTOM OF WALLS. TIGHTLY SEAL ALL CONDUIT AND DUCT PENETRATIONS. KEEP ANNULAR SPACE AT ALL CONDUIT AND DUCT PENETRATIONS TO A MINIMUM. COORDINATE WITH ELECTRICAL AND HVAC DRAWINGS.

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PROJECT ENGINEER

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SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL BUILDING
OVERALL SECTION AND DETAILS

VERIFY SCALES
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JOB NO. 7880C.10
DRAWING NO. S-03

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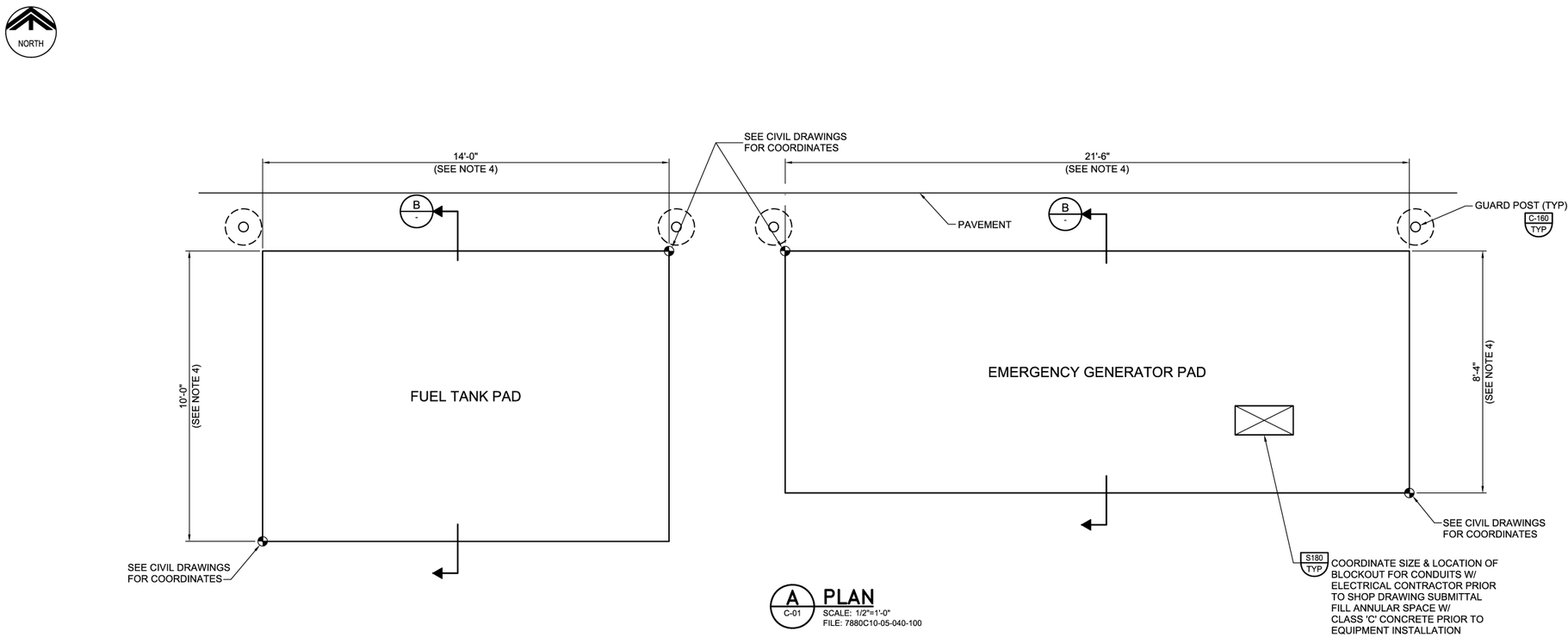
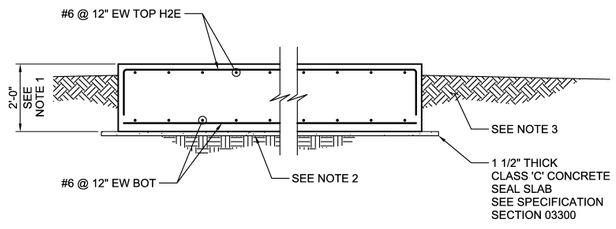


A C-01 **PLAN**
SCALE: 1/2"=1'-0"
FILE: 7880C10-05-040-100

NOTES:

1. PROVIDE 18" MINIMUM SOIL COVER. IF TOP OF SLAB IS MORE THAN 6" ABOVE GRADE, INCREASE SLAB THICKNESS TO MAINTAIN 18" MINIMUM SOIL COVER.
2. REMOVE TREES AND VEGETATION. DEWATER EXCAVATION AREA TO 3'-0" BELOW BOTTOM OF SLAB. CONTRACTOR, OBTAIN NECESSARY PERMITS TO DEWATER EXCAVATION SITE. DISCHARGE WATER AS DIRECTED BY CLIENT OR PERMIT-ISSUING AUTHORITY. PROOF ROLL AS DIRECTED BY THE ENGINEER. ADJUST MOISTURE CONTENT IN SOIL PER ENGINEER'S RECOMMENDATIONS. COMPACT 12-INCH SOIL DEPTH SOIL DIRECTLY BELOW FOUNDATIONS TO A 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY. PLACE 1 1/2" LEAN CONCRETE SEAL SLAB BELOW CAST-IN-PLACE CONCRETE SLABS.
3. BACKFILL STRUCTURES WITH SAND FILL PLACED IN 12-INCH LIFTS EXCEPT AGAINST WALLS WHERE LOOSE 6-INCH LIFTS ARE RECOMMENDED. ACCEPTABLE FILL SHALL BE FINE TO MEDIUM SAND WITH LESS THAN 12% PASSING THE NO. 200 SIEVE, FREE OF RUBBLE, ORGANICS, CLAY, AND DEBRIS. COMPACT SOIL DIRECTLY BELOW FOUNDATIONS TO A 95% MODIFIED PROCTOR MAXIMUM DRY DENSITY.
4. EXTEND PAD 12" BEYOND GENERATOR ENCLOSURE AND FUEL TANK ON ALL 4 SIDES. CONTRACTOR SHALL COORDINATE SIZE OF PAD WITH GENERATOR SUPPLIER AND FUEL TANK SUPPLIER.



B - **SECTION**
SCALE: 1/2"=1'-0"
FILE: 7880C10-05-040-300

REV	DATE	BY	DESCRIPTION

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CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
EMERGENCY GENERATOR AND FUEL TANK
PLAN AND SECTION

VERIFY SCALES
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0 1"
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JOB NO. 7880C.10
DRAWING NO. S-04

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GROUNDING NOTES

1. 3/4" DIA. x 10' LONG COPPERWELD SECTIONAL GROUND ROD(S) COUPLED TOGETHER AS REQUIRED TO GIVE A MAXIMUM SYSTEM RESISTANCE OF 5 OHMS TO GROUND.
2. GROUNDING INSTALLATION SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND SUCH LOCAL CODES WHICH HAVE PRECEDENCE.
3. LOCATION OF GROUNDING LOOP IS SHOWN SCHEMATICALLY. EXACT LOCATION TO MAINTAIN CLEARANCE FROM FOOTERS SHALL BE DETERMINED IN THE FIELD.
4. TOP OF GROUNDING RODS SHALL BE 30" BELOW GRADE.
5. NO.4/0 AWG BARE STRANDED COPPER GROUND WIRE IS TO BE USED FOR THE MAIN GROUND LOOPS, AND WHEN RUN UNDERGROUND, SHALL BE BURIED A MINIMUM OF 30" BELOW GRADE. NO.2/0 AWG BARE STRANDED COPPER GROUND WIRE IS TO USED FOR THE TAPS. UNLESS NOTED OTHERWISE.
6. GROUND WIRE RUNS, BETWEEN POINTS OF CONNECTIONS, SHALL BE AS SHORT AND STRAIGHT AS POSSIBLE.
7. ALL SURFACES TO BE GROUNDED SHALL BE THOROUGHLY CLEANED TO BARE METAL BEFORE ATTACHING GROUND CONNECTION.
8. GROUND RESISTANCE SHALL NOT EXCEED 5 OHMS. THE RESISTANCE TO GROUND SHALL BE MEASURED BY A LOW RESISTANCE TYPE OF MEGGER. MEASUREMENTS SHALL BE MADE BY FALL-OF-POTENTIAL OR 3-POINT METHOD AS DESCRIBED IN JAMES G. BIDDLE PUBLICATION NO. 25-J-3. THE 5 OHMS SHALL BE MEASURED WITH THE GROUND POINT ISOLATED AND NO OTHER GROUND WIRES OR POINTS TIED INTO THE GROUND RODS UNDER TEST. THERE SHALL BE NO TREATMENT OF THE SOIL AROUND THE GROUND RODS TO IMPROVE THE RESISTANCE.
9. IF THE MEASURED RESISTANCE TO GROUND DOES NOT MEET THE REQUIRED VALUE, EXTENSIONS SHALL BE COUPLED TO THE ROD OR ADDITIONAL RODS SPACED 10' APART SHALL BE DRIVEN AND CONNECTED BY NO. 4/0 AWG STRANDED BARE COPPER CABLE.
10. GROUNDING CONDUCTORS SHALL BE SUPPORTED FROM STEEL AND MASONRY, WHERE NO OTHER SUPPORT IS AVAILABLE. GROUNDING CONDUCTORS SHALL BE SUPPORTED ON CONDUIT. GROUNDING CONDUCTORS SHALL NOT BE FASTENED TO PIPING.
11. WHERE GROUNDING WIRE RISES TO ELECTRICAL EQUIPMENT, COLUMNS, VESSELS, ETC. THROUGH EARTH OR CONCRETE SLABS, THE WIRE SHALL BE PROTECTED BY SCHEDULE 80 PVC CONDUIT.
12. ALL DETAILS CALL FOR CADWELD TYPE CONNECTIONS, SUCH AS TYPE HA, HS, HC OR HT FOR HORIZONTAL TAPS TO STRUCTURAL STEEL, TYPE VB, VL, VN, VS, VV, VX AND VT FOR VERTICAL TAPS TO STRUCTURAL STEEL AND TYPE RR, DR, RW, RH, RT OR RC FOR CABLE TO REBAR TAPS.
13. NO.3/0 AWG BARE COPPER FROM GROUND GRID TO AIR TERMINALS ON THE ROOF OR STRUCTURE AS REQUIRED FOR A BONDED LIGHTNING PROTECTION SYSTEM. PROVIDE A MASTER LABELED LIGHTNING PROTECTION SYSTEM PER THE LIGHTNING PROTECTION SPECIFICATION SECTION. THE RISER CABLES WILL BE ENCASED IN THE WALLS OR INSIDE THE BUILDING IN 1" SCH. 80 PVC CONDUIT. WHEN EXPOSED, THERE SHALL BE NO BARE CABLE RISERS ON THE WALLS OR ROOF THAT WILL BLEED WHEN EXPOSED TO WATER OR MOISTURE.

GROUNDING SYMBOLS

- CADWELD TYPE TA, SC OR PA CONNECTION FOR HORIZONTAL TEE (TA) OR SPLICE (SC) OF THREE (3) CABLES OR PARALLEL, HORIZONTAL TAP (PA) OF SIDE BY SIDE CABLES.
- CADWELD TYPE GR CONNECTION FOR HORIZONTAL CABLE TO VERTICAL DOWN GROUND ROD.
- CADWELD TYPE GY OR GT CONNECTION FOR VERTICAL ROD TO HORIZONTAL LAPPED, UNCUT CABLE (GY) OR HORIZONTAL CABLE TEE TO VERTICAL ROD (GT).
- BELOW GRADE GROUND CABLE

LEGEND

- CIRCUIT BREAKER PANELBOARD
- A / b — LIGHTING FIXTURE, CEILING MOUNTED
- B / c — LIGHTING FIXTURE, WALL MOUNTED
- C / d — LIGHTING FIXTURE, FLUORESCENT
- CEL / b — LIGHTING FIXTURE, FLUORESCENT WITH EMERGENCY BALLAST

  (UPPER CASE LETTER DESIGNATES FIXTURE TYPE IN FIXTURE SCHEDULE, LOWER CASE LETTER DESIGNATES CONTROLLING SWITCH)
- EMERGENCY LIGHTING UNIT
- EMERGENCY EXIT LIGHT
- SINGLE LAMP WALL MOUNT FLOOD LIGHT
- POLE MOUNTED DUAL FLOOD LIGHT
- DUPLEX WALL RECEPTACLE
- WP — WEATHERPROOF DUPLEX RECEPTACLE
- GFI — GROUND FAULT INTERRUPTER DUPLEX WALL RECEPTACLE
- SINGLE WALL RECEPTACLE, 208V, 20A, 3W
- WELDING OUTLET RECEPTACLE
- J — JUNCTION BOX
- $d — WALL MOUNTED TUMBLER LIGHT SWITCH
- $3a — 3-WAY WALL MOUNTED TUMBLER LIGHT SWITCH
- $4b — 4-WAY WALL MOUNTED TUMBLER LIGHT SWITCH

  (LOWER CASE LETTER DESIGNATES FIXTURE CONTROLLED)
- PE — PHOTOCELL
- T — THERMOSTAT
- NON-FUSED DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- CONDUIT CONCEALED IN CEILING OR WALL
- CONDUIT IN/OR UNDER FLOOR OR UNDERGROUND
- CONDUIT EXPOSED

  (SHORT MARK INDICATES PHASE WIRE, LONG MARK INDICATES NEUTRAL, LONG MARK W/PERPENDICULAR LINES INDICATES GROUND WIRE)
- XXXXX — CONDUIT/CIRCUIT NUMBER, DESCRIPTION SHOWN ON CONDUIT AND WIRE SCHEDULE DRAWINGS

GENERAL INSTALLATION NOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL NEMA 4X 316 S.S. J-BOXES AT COMMON CONTROL, INSTRUMENTATION, POWER AND LIGHTING JUNCTION BOXES FOR SPLITS TO INDIVIDUAL CONDUITS. BOXES SHALL BE EQUAL TO HOFFMAN NO. A-12106CHNFSS6 (316 S.S.) AS A MINIMUM. ALL SPARE CABLES SHALL BE COILED UP IN THE BOXES. CABLES SHALL BE PULLED WITHOUT SPLICES THROUGH ANY JUNCTION BOX.
2. ALL FITTINGS SHALL BE THREADED ALUMINUM WITH ALUMINUM COVERS, STAINLESS STEEL SCREWS AND SOLID NEOPRENE GASKETS. ALL FITTINGS SHALL BE CAST ALUMINUM. THE FITTINGS SHALL BE EQUAL TO CROUSE HINDS FORM 7-SA FOR SAND CAST ALUMINUM OR FORM 9 DIE CAST FROM 3/4" TO 2" AND SAND CAST ABOVE 2".
3. ALL INSTRUMENTATION CONDUITS NOTED AS RGS/CONC. SHALL BE RIGID GALVANIZED STEEL ENCASED IN CONCRETE WITH GROUNDING BUSHINGS CONNECTED WITH NO.6 AWG MINIMUM STRANDED COPPER TYPE THW GREEN INSULATED WIRE. THE TRANSITION FOR ALL CONDUITS FROM THE UNDERGROUND CONDUIT TO THE ABOVE GRADE SHALL BE MADE WITH RIGID GALVANIZED STEEL WITH THE EXTERIOR SURFACE PAINTED WITH TWO (2) COATS (6 MILS EACH MINIMUM) OF COAL TAR EPOXY OR AN ENGINEER APPROVED EQUAL, OR A 40mil PVC COATING. THE COATING SHALL COVER THE RGS A MINIMUM OF 6" ABOVE AND BELOW FINISHED GRADE OR CONCRETE SLAB. THERE SHALL NOT BE ANY RIGID GALVANIZED CONDUIT IN DIRECT CONTACT WITH THE GROUND.
4. ALL ABOVE AND BELOW GRADE CONDUITS SHALL BE SCHEDULE 80 PVC WITH THE EXCEPTION OF INSTRUMENT CONDUITS DESCRIBED IN NOTE 3. ALL BELOW GRADE CONDUITS THAT ARE NOT UNDER A SLAB SHALL BE ENCASED IN CONCRETE WITH POWER AND CONTROL CONDUITS USING PVC AND INSTRUMENTATION CONDUITS USING ONLY RIGID GALVANIZED STEEL.
5. THE CONTRACTOR SHALL REVIEW WITH THE SELECTED VFD AND INVERTER DUTY MOTOR SUPPLIER, THE SPECIFICS OF THE INSTALLATION TO FIND OUT AND MAKE PROVISIONS FOR ANY SPECIAL REQUIREMENTS FOR MOTOR LEAD FEEDER CABLES AND CONDUITS FOR THE VFD OPERATED MOTOR INSTALLATIONS. THE CONTRACTOR SHALL SUPPLY ALL SPECIAL SIZED OR TYPE OF MOTOR LEAD FEEDER CABLES IF REQUIRED BY THE VFD OR INVERTER DUTY MOTOR SUPPLIERS.
6. THE DEPTH OF ALL ELECTRICAL AND INSTRUMENTATION CONDUITS IS CRITICAL TO NOT INTERFERE WITH PROCESS PIPING. ALL ELECTRICAL AND INSTRUMENTATION CONDUITS SHALL BE COORDINATED WITH THE PROCESS PIPING, THE CONTRACTOR(S) MUST REVIEW ALL STRUCTURAL, PIPING AND MECHANICAL DRAWINGS TO DETERMINE THE DEPTH REQUIREMENTS OF THE CONDUITS WITH THE PROCESS PIPING AND TRENCHES, AND FURNISH CONDUITS AT THE REQUIRED DEPTHS. THE CONTRACTOR(S) WILL FURNISH ALL LABOR REQUIRED TO MODIFY THE CONDUIT RUNS THAT ARE NOT AT THE CORRECT DEPTH AND INTERFERE WITH THE PROCESS PIPING.
7. THE EXACT OR FINAL LOCATION OF ALL CONDUIT PENETRATIONS THROUGH THE SLAB, ACTIVE OR EMPTY FOR CABLES, CONTROL SWITCH LOCATIONS, SUPPORTS FOR INSTRUMENT TRANSMITTERS AND PROCESS TAPS TO THE INSTRUMENTATION WILL BE VERIFIED WITH THE ENGINEER AND GENERAL CONTRACTOR BEFORE INSTALLATION. THE CONTRACTOR(S) WILL FURNISH ALL MATERIAL AND LABOR REQUIRED TO MODIFY THE LOCATIONS THAT ARE INCORRECT AND WERE NOT APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
8. ALL ELECTRICAL EQUIPMENT LOCATED OUTDOORS SHALL BE STAINLESS STEEL, ALUMINUM OR NON-METALIC EXCEPT THAT THE HVAC UNIT AND GENERATOR SHALL BE AS SPECIFIED. ALL ELECTRICAL EQUIPMENT MOUNTED ON MASONARY WALLS WHETHER INDOOR OR OUTDOOR SHALL BE MOUNTED ON SPACERS, 5/8" UNISTRUT CHANNEL OR APPROVED EQUAL. ALL UNISTRUT MOUNTED ON WALLS BEHIND EQUIPMENT SHALL BE RUN VERTICALLY SO THAT MOISTURE AND DIRT CANNOT BE TRAPPED ABOVE THE UNISTRUT. UNISTRUT SHALL NOT EXTEND ABOVE OR BELOW THE EQUIPMENT ENCLOSURE UNLESS NEEDED TO ATTACH EQUIPMENT MOUNTING EARS TO THE UNISTRUT. ALL EQUIPMENT SUPPORTS, SPACERS, MOUNTING HARDWARE, UNISTRUT, ANCHORS, BOLTS, NUTS, WASHERS, ETC INSTALLED OUTDOORS SHALL BE STAINLESS STEEL.
9. RIGID PVC CONDUITS ABOVE GRADE SHALL BE SUPPORTED IN ACCORDANCE WITH THE REQUIREMENTS OF NEC ARTICLE 352 AND TABLE 352-30(B) BOTH HORIZONTALLY AND VERTICALLY.
10. ALL STAND ALONE FLOOR MOUNTED ELECTRICAL CABINETS SHALL BE INSTALLED ON A 4" HIGH CONCRETE EQUIPMENT PAD AND SHALL BE SPACED AWAY FROM THE WALLS A MINIMUM OF 1".

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE AUGUST 2009

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA,FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL
GENERAL NOTES AND LEGEND

VERIFY SCALES
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JOB NO. 7880C.10
DRAWING NO. E-01

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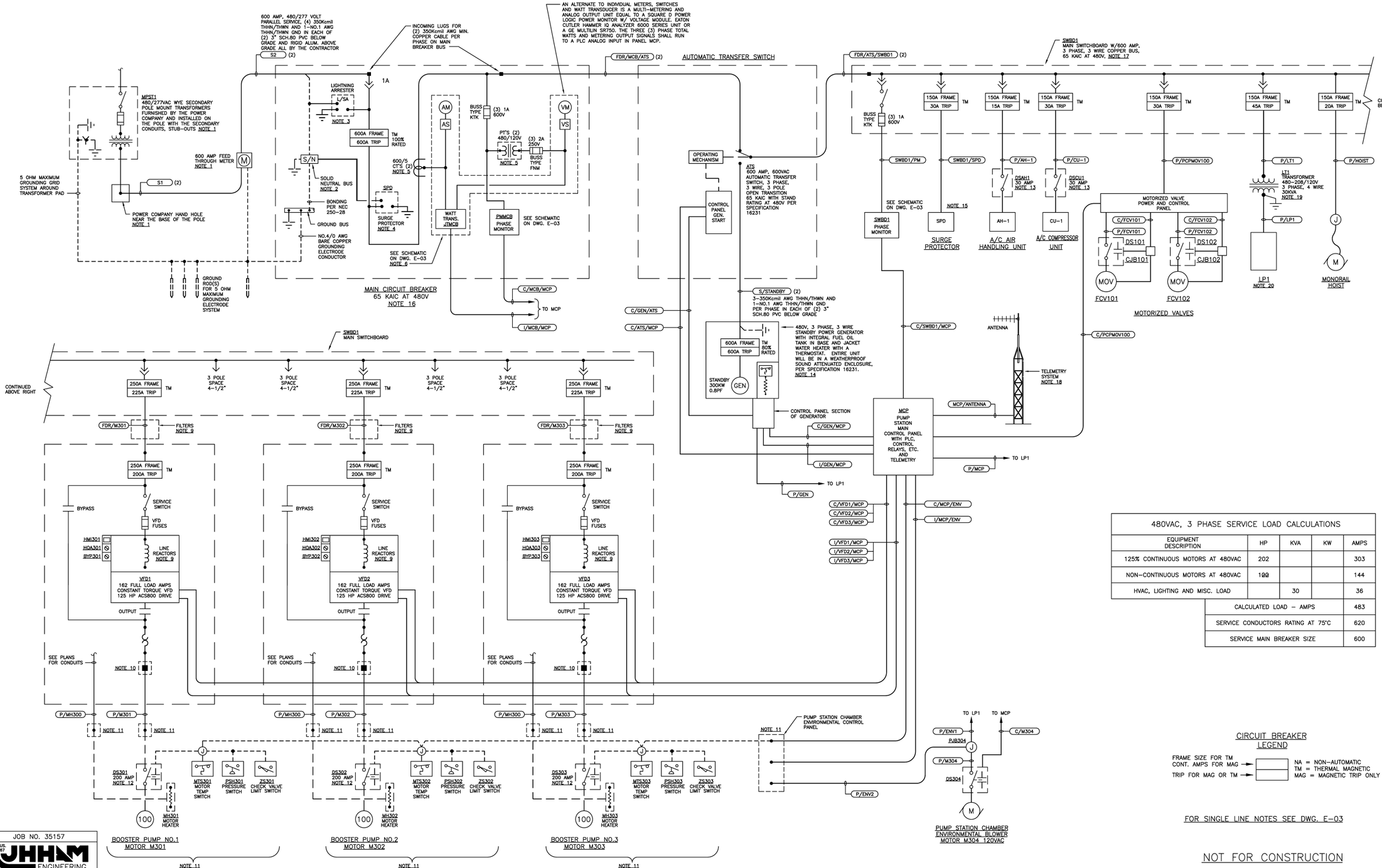

480VAC, 3 PHASE SERVICE LOAD CALCULATIONS

EQUIPMENT DESCRIPTION	HP	KVA	KW	AMPS
125% CONTINUOUS MOTORS AT 480VAC	202			303
NON-CONTINUOUS MOTORS AT 480VAC	100			144
HVAC, LIGHTING AND MISC. LOAD		30		36
CALCULATED LOAD – AMPS				483
SERVICE CONDUCTORS RATING AT 75°C				620
SERVICE MAIN BREAKER SIZE				600

CIRCUIT BREAKER LEGEND

FRAME SIZE FOR TM
CONT. AMPS FOR MAG
TRIP FOR MAG OR TM

NA = NON-AUTOMATIC
TM = THERMAL MAGNETIC
MAG = MAGNETIC TRIP ONLY

FOR SINGLE LINE NOTES SEE DWG. E-03

NOT FOR CONSTRUCTION

JOB NO. 35157

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P.O. BOX 5106 LAKELAND, FLORIDA 33807

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MANATEE COUNTY
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ELECTRICAL
SINGLE LINE DIAGRAM

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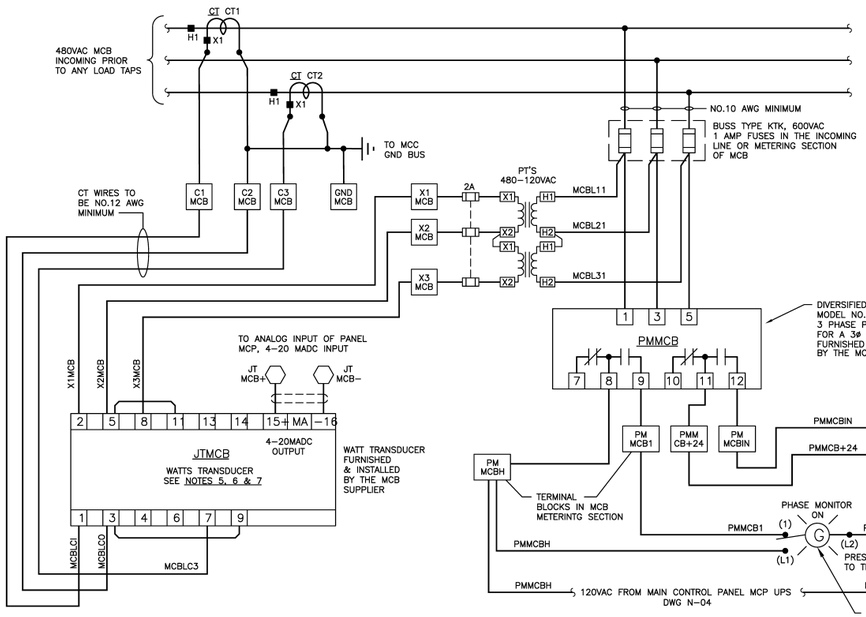
NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL SERVICE INSTALLATION REQUIREMENTS WITH THE POWER COMPANY AND FURNISH ALL MATERIAL AND LABOR NOT FURNISHED BY THE POWER COMPANY TO COMPLETE THE SERVICE. THIS WORK WILL INCLUDE THE KWH METERING, AND ALL ELECTRICAL CONSTRUCTION WORK REQUIRED FOR THE INSTALLATION OF A NEW POWER COMPANY POLE AND 3 PHASE POLE MOUNT TRANSFORMER BANK. THE SCOPE OF THIS WORK IS FROM THE POWER COMPANY POLE MOUNTED TRANSFORMERS, TO THE SECONDARY METERING, CONDUITS AND CABLES, THE FIVE (5) OHMS MAXIMUM GROUND GRID AND TAPS TO THE METER AND MAIN CIRCUIT BREAKER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SITE PREPARATION. ALL THIS WORK SHALL BE IN STRICT ACCORDANCE WITH THE POWER COMPANY REQUIREMENTS FOR ELECTRIC SERVICE AND METER INSTALLATIONS. THE EXACT LOCATION OF THE POLE AND HAND HOLE WILL BE DETERMINED IN THE FIELD WHEN SITE PREPARATION AND TREE REMOVAL WORK HAS BEEN ESTABLISHED. THE CONTRACTOR SHALL FURNISH AND INSTALL THE 600 AMP, 3 PHASE, 4 WIRE METER BASE IN AN ALUMINUM ENCLOSURE, AND MEETING ALL POWER COMPANY REQUIREMENTS. THE METER BASE SHALL BE EQUAL TO MILBANK CAT. NO. UA4667-XT-9527 WITH POWER COMPANY APPROVAL.
2. THE 350Kcmil THHN/THWN GROUNDED CONDUCTORS OR NEUTRAL OF THE 480/277VAC WYE SECONDARY WILL TERMINATE ON A NEUTRAL BUS BAR IN THE 600 AMP MAIN BREAKER. THE GROUNDED CONDUCTORS OR NEUTRAL OF THE 480/277VAC WYE SECONDARY WILL NOT BE EXTENDED TO THE ATS OR SWBD1. THERE ARE NO 277 VOLT LOADS IN THE PUMP STATION.
3. THE CONTRACTOR WILL CONFIRM WITH THE POWER COMPANY THE TYPE OF SERVICE THAT WILL POWER THESE PANELS TO INSURE COMPATIBILITY WITH THE LIGHTNING ARRESTER AS IT MUST BE UL APPROVED FOR THE APPLICATION. THE CONTRACTOR WILL FURNISH AND INSTALL THE LIGHTNING ARRESTOR FOR THE 3 PHASE, 480VAC, 4 WIRE SERVICE ENTRANCE. THE ARRESTOR SHALL BE EQUAL TO A SQUARE D CLASS 6671, CAT. NO. SDSA3650.
4. THE CONTRACTOR WILL CONFIRM WITH THE POWER COMPANY THE TYPE OF SERVICE THAT WILL POWER THESE PANELS TO ASSURE COMPATIBILITY WITH THE SPD UNIT, AS IT MUST BE UL APPROVED FOR THE APPLICATION. THE CONTRACTOR WILL FURNISH AND INSTALL THE SPD UNIT IN A NEMA 4 ENCLOSURE TO MOUNT INSIDE OR OUTSIDE THE MCB ENCLOSURE. THE UNIT SHALL BE 3 PHASE, 480VAC, 4 WIRE PLUS A GROUND, 300KA/PHASE PEAK SURGE CURRENT TRANSIENT VOLTAGE SURGE SUPPRESSOR FOR LINE TO LINE, LINE TO GROUND, LINE TO NEUTRAL AND NEUTRAL TO GROUND PROTECTION WITH LESS THAN 1 NANOSECOND RESPONSE TIME. EATON, INNOVATION TECHNOLOGY, INC. MODEL PTX300(3Y)201-D. NO SPLICING OF SPD LEADS PERMITTED. THE FACTORY REPRESENTATIVE IS ALPHA POWER SYSTEMS PHONE NO. (813) 805-9506 AND THE FACTORY NO. IS (800) 647-8877.
5. IN THE METERING SECTION OF MAIN CIRCUIT BREAKER METAL ENCLOSURE MCB THERE SHALL BE TWO (2) INCOMING LINE CT'S FOR THE AMMETER AND KW TRANSMITTER THAT ARE 5 ANSI METERING CLASS B0.1 (0.3) TO B1.8 (0.6) WINDOW TYPE WITH 2.0" DIA. MINIMUM WINDOW, TYCO ELECTRONICS CROMPTON INSTRUMENTS MODEL 65-601. THE TWO (2) PT'S FOR THE VOLTMETERS ARE 480/480Y, 4:1 RATIO, 120V SECONDARY METERING CLASS 150VA AT 30°C, TYCO ELECTRONICS CROMPTON INSTRUMENTS CAT. NO. 460-480.
6. JTMCB IS A 3 PHASE, 3 WIRE UNBALANCED LOAD WATT TRANSDUCER WITH 3 PHASE, 3 WIRE 120VAC INPUTS FROM THE TWO (2) OPEN DELTA 480 TO 120VAC POTENTIAL TRANSFORMERS THE TWO (2) 600/5 CT'S, SELF POWERED AND A 4-20MADC OUTPUT. TYCO ELECTRONICS, CROMPTON INSTRUMENTS CAT. NO. 256-TWM-120VAC FROM 4:1 PT'S - 600/5 CT'S AND 4-20MADC OUTPUT = 0-498.83 KW.
7. THE METERING SECTIONS OF MCB SHALL HAVE THE DETAILED TERMINAL BLOCKS FOR THE INTERCONNECTION OF THE WATT TRANSDUCER JTMCB AND PHASE MONITORS TO THE METERING SECTION DOORS AND THE REMOTE PLC IN MCP.
8. CONDUIT AND CONTROL WIRING FOR ALL CONTROL CONNECTIONS AND INTERLOCKS BETWEEN ATS, GENERATOR, MCP, SWBD1 AND ALL PUMP CONTROL PANELS TO BE FURNISHED BY ELECTRICAL CONTRACTOR FOR A COMPLETE AND OPERABLE SYSTEM.
9. THE VFD MANUFACTURER SHALL FURNISH AND INSTALL LINE REACTORS BETWEEN THE VFD CIRCUIT BREAKER AND THE LINE SIDE OF 6-PULSE VFD'S TO MEET IEEE 519 STANDARD FOR BOTH CURRENT AND VOLTAGE DISTORTION. IF THE VFD MANUFACTURER'S VFD CANNOT MEET THE REQUIREMENTS OF UL519 AS IDENTIFIED IN VFD SPECIFICATION 16370 WITH LINE SIDE REACTORS ONLY, THE CONTRACTOR / VFD MANUFACTURER SHALL FURNISH AND INSTALL EXTERNALLY MOUNTED LINE SIDE HARMONIC FILTERS, WALL MOUNTED ABOVE EACH VFD CABINET HARMONIC FILTERS SHALL BE MIRUS LINEATOR HARMONIC FILTERS CAT. NO. AUHF-125-480-60-D-EI-O OR APPROVED EQUAL FILTER THAT HAS BEEN TESTED TO FUNCTION PROPERLY WITH THE MANUFACTUER'S VFD.
10. THE ELECTRICAL CONTRACTOR SHALL REVIEW WITH THE VFD MANUFACTURER THE PROPOSED INSTALLATION OF THE VFD AND MOTOR TO DETERMINE IF THE DISTANCE FROM THEIR VFD TO THE MOTOR REQUIRES THE ADDITION OF FILTERS, REACTORS OR REFLECTED WAVE TRAPS ON THE LOAD SIDE OF THE VFD TO PROTECT A STANDARD MOTOR FROM VFD GENERATED VOLTAGE SPIKES. THE SELECTED VFD MANUFACTURER AND ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ANY FILTERS, REACTORS OR REFLECTED WAVE TRAPS REQUIRED TO MATCH THE VFD TO A STANDARD MOTOR AT THE DISTANCE SHOWN FOR EACH VFD OPERATED MOTOR. THE OUTPUT FILTERS SHALL BE EQUAL TO TCI PART NO. KLCUL (AMPS) SIZED FOR THE OUTPUT AMPERES OF THE VFD. THE SELECTED VFD MANUFACTURER AND ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ANY HARMONIC REDUCTION EQUIPMENT THAT IS NOT AN INTEGRAL PART OF THE VFD IF REQUIRED BY THE VFD MANUFACTURER. THIS IS REQUIRED TO PROTECT THE MOTOR CONNECTED TO THE VFD AND ANY EQUIPMENT CONNECTED TO THE COMMON MAIN SWBD BUS, FROM EXCESSIVE HARMONICS THAT IS PRODUCED BY THE VFD.
11. ALL ELECTRICAL MOTORS, LIGHTS, DEVICES, ETC LOCATED IN THE SUB-GRADE PUMP STATION CHAMBER SHALL BE FURNISHED AND INSTALLED BY THE PUMP STATION CHAMBER MANUFACTURER AS PART OF THE PREASSEMBLED PACKAGE PUMP STATION. ALL ELECTRICAL CONDUCTORS SERVING EQUIPMENT IN THE CHAMBER WILL TERMINATE IN THE ENVIRONMENTAL PANEL IN THE SUB-GRADE CHAMBER. THE CONTRACTOR SHALL COORDINATE WITH THE CHAMBER MANUFACTURER FOR CONDUCTOR TERMINATION LOCATIONS AND CONDUIT TERMINATIONS IN THE ENVIRONMENTAL PANEL BELOW GRADE. SEE SECTION "A" ON DWG. E-18 FOR REFERENZNCE.
12. BOOSTER PUMP MOTOR DISCONNECTS SHALL BE FURNISHED AND INSTALLED BY THE SUB-GRADE PUMP STATION CHAMBER MANUFACTURER AS PART OF THE PREASSEMBLED PACKAGE.
13. HVAC DISCONNECTS SHALL BE NON-FUSED NEMA 1 INDOOR AND NEMA 4X S.S. ENCLOSED OUTDOOR, SQUARE D CLASS 3110 WITH GROUNDING LUG. DSAH1 INDOOR UNIT, NEMA 1, 30 AMP, CAT. NO. HU361. DSCU1 OUTDOOR UNIT, NEMA 4X, 30 AMP, CAT. NO. HU361DS.
14. THE GENERATOR AND GENERATOR ENCLOSURE WILL BE FURNISHED BY THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL HANDLING, AND INSTALLATION OF THE GENERATOR INCLUDING A CRANE TO OFF LOAD THE GENERATOR AND ENCLOSURE FROM THE DELIVERY TRUCK, AND SETTING THE GENERATOR IN ITS FINAL LOCATION. THE CONTRACTOR SHALL PROVIDE DUNNAGE TO SET THE NEW GENERATOR AND ENCLOSURE IN A TEMPORARY LOCATION AT THE PUMP STATION DURING CONSTRUCTION OF THE CONCRETE PAD.
15. THE CONTRACTOR SHALL FURNISH AND INSTALL THE SPD UNIT IN A NEMA 4 ENCLOSURE TO MOUNT ABOVE SWBD1. THE UNIT SHALL BE 3 PHASE, 480VAC, 3 WIRE PLUS GROUND WITH NO NEUTRAL. 160KA/PHASE PEAK SURGE CIRCUIT TRANSIENT VOLTAGE SURGE SUPPRESSOR FOR LINE AND LINE TO GROUND PROTECTION WITH LESS THAN 1 NANOSECOND RESPONSE TIME. EATON, INNOVATIVE TECHNOLOGY, INC. MODLE PTX160NN400. NO SPLICING OF SPD LEADS PERMITTED. THE FACTORY REPRESENTATIVE IS ALPHA POWER SYSTEMS, PHONE NO. (813) 805-9506 AND FACTORY IS (800) 647-8877.
16. THE CONTRACTOR SHALL FURNISH AND INSTALL THE SERVICE ENTRANCE RATED MAIN CIRCUIT BREAKER, 100% RATED, 600 AMP, 3 PHASE, 65KAIC INTERRUPTING RATING WITH NEUTRAL BUS AND GROUND BUS. THE CIRCUIT BREAKER SHALL BE HOUSED IN A SWITCHBOARD STYLE, FREE STANDING CABINET, WITH POWER MONITORING EQUIPMENT AS SHOWN AND NOTED ON DWGS E-02 AND E-03. THE MAIN CIRCUIT BREAKER SHALL BE AS MANUFACTURED BY SCHNEIDER/SQUARE D IN A SQUARE D QED SWITCHBOARD STYLE ENCLOSURE OR APPROVED EQUAL.
17. THE CONTRACTOR SHALL FURNISH AND INSTALL THE MAIN SERVICE SWITCHBOARD ON THE LOAD SIDE OF THE AUTOMATIC TRANSFER SWITCH. THE SWITCHBOARD SHALL BE 65KAIC RATED. AND THE CIRCUIT BREAKERS AND FUSABLE DISCONNECT SHALL BE RATED 65KAIC. WITH CIRCUIT BREAKER PADLOCKING ATTACHMENTS ON ALL CIRCUIT BREAKERS. SWITCHBOARD SWBD1 SHALL BE A SCHNEIDER/SQUARE D, I-LINE PANELBOARD TYPE HCM, SURFACE MOUNTED, 600 AMP, 480V, 3 PHASE, 3 WIRE, COPPER BUS WITH GROUND BUS WITH A LOCKABLE DOOR. PER SPEC. 16160. THE SWITCHBOARD SHALL HAVE 18" OF FUTURE BREAKER MOUNTING SPACE AVAILABLE, SUITABLE FOR FOUR (4) 3-POLE, 4-1/2" I-LINE CIRCUIT BREAKERS.
18. THE CONTRACTOR SHALL FURNISH AND INSTALL THE ENTIRE NEW TELEMETRY SYSTEM FOR THE BOOSTER PUMP STATION. THE CONTRACTOR SHALL CONTRACT DATA FLOW SYSTEMS (DFS), THE MANATEE COUNTY TELEMETRY PROVIDER, FOR THE COMPLETE SYSTEM DESIGN AND INSTALLATION. THE CONTRACTOR SHALL INCLUDE ALL COSTS FOR THE DFS TELEMETRY SYSTEM IN THE CONTRACTOR'S BID PRICE FOR THE PROJECT. THE TELEMETRY SYSTEM INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, THE FOLLOWING:
    a) TELEMETRY SYSTEM DESIGN AND ENGINEERING.
    b) TELEMETRY EQUIPMENT INCLUDING ANTENNA, REMOTE TERMINAL UNIT (RTU) AND ALL CABLES, WIRING AND CONNECTIONS.
    c) FCC RADIO FREQUENCY STUDY AND LICENSING.
    d) CONNECTIONS AND PROGRAMMING WITH THE BOOSTER PUMP STATION MAIN CONTROL PANEL (MCP).
    e) PROGRAMMING AND COMMUNICATIONS WITH MANATEE COUNTY WASTEWATER PUMP STATION PS428.
    f) PROGRAMMING AND COMMUNICATIONS WITH MANATEE COUNTY TELEMETRY CENTRAL STATION.

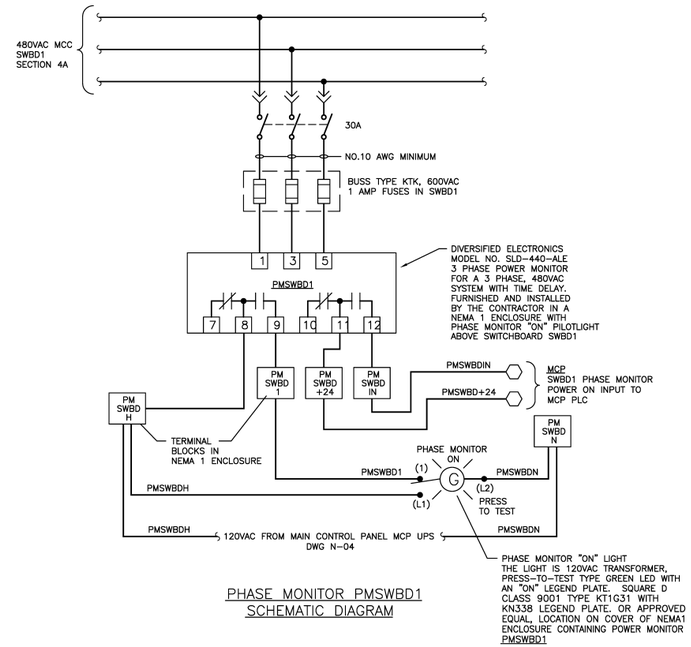
    DFS MAY BE CONTACTED AT PHONE 321-259-5009.
19. THE CONTRACTOR SHALL FURNISH AND INSTALL TRANSFORMER LT1, WALL MOUNTED AT 8'-0" ABOVE FINISHED FLOOR. THE TRANSFORMER SHALL BE COPPER WOUND WITH SIX (6) FULL CAPACITY TAPS. TAPS SHALL BE 2-1/2% WITH TWO (2) ABOVE AND FOUR (4) BELOW NOMINAL. THE TRANSFORMER SHALL BE SCHNEIDER/SQUARE D CLASS 7400, CAT NO. EE30T3HCU.
20. THE CONTRACTOR SHALL FURNISH AND INSTALL 208/120V PANELBOARD LP1 PER PANELBOARD SCHEDULE LP1 ON DWG E-08. PANELBOARD LP1 SHALL BE SCHNEIDER/SQUARE D TYPE NQOD PER SPEC. 16160.



WATT TRANSDUCER JTMCB SCHEMATIC DIAGRAM

PHASE MONITOR PMMCB SCHEMATIC DIAGRAM

MAIN CIRCUIT BREAKER MCB POWER AND PHASE MONITOR



PHASE MONITOR PMSWBD1 SCHEMATIC DIAGRAM

LEGEND:

⬡ ITEMS LOCATED IN THE MCP MAIN CONTROL PANEL

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
POWER AND PHASE MONITOR SCHEMATICS AND SINGLE LINE DIAGRAM NOTES

VERIFY SCALES
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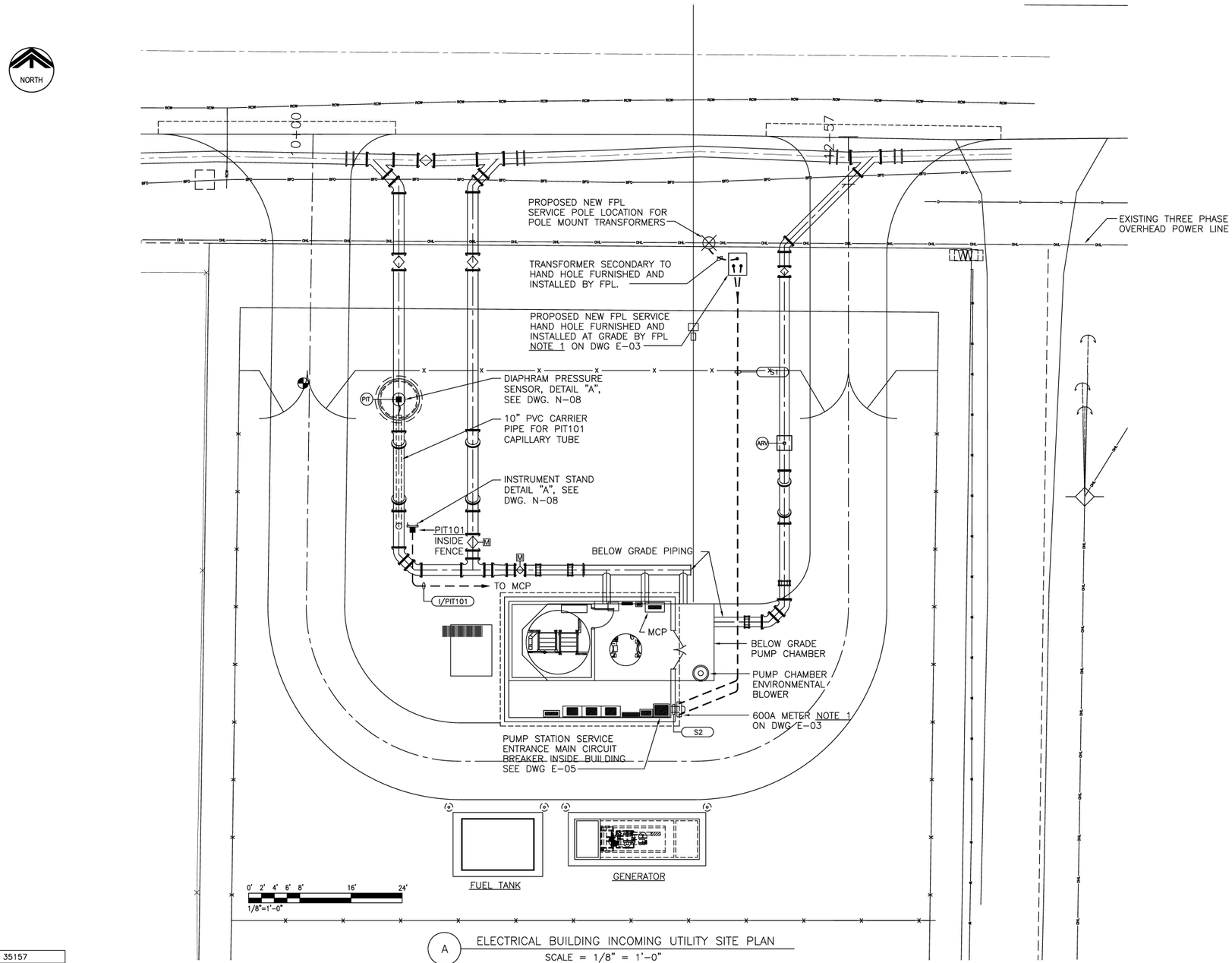

A ELECTRICAL BUILDING INCOMING UTILITY SITE PLAN
SCALE = 1/8" = 1'-0"

NOTES :

1. SEE DWG E-02 FOR SERVICE SINGLE LINE DIAGRAM.
2. SEE DWG E-03 FOR SERVICE NOTES.
3. SEE DWG N-08 FOR INSTRUMENT DETAILS.

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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL
INCOMING UTILITY SITE PLAN

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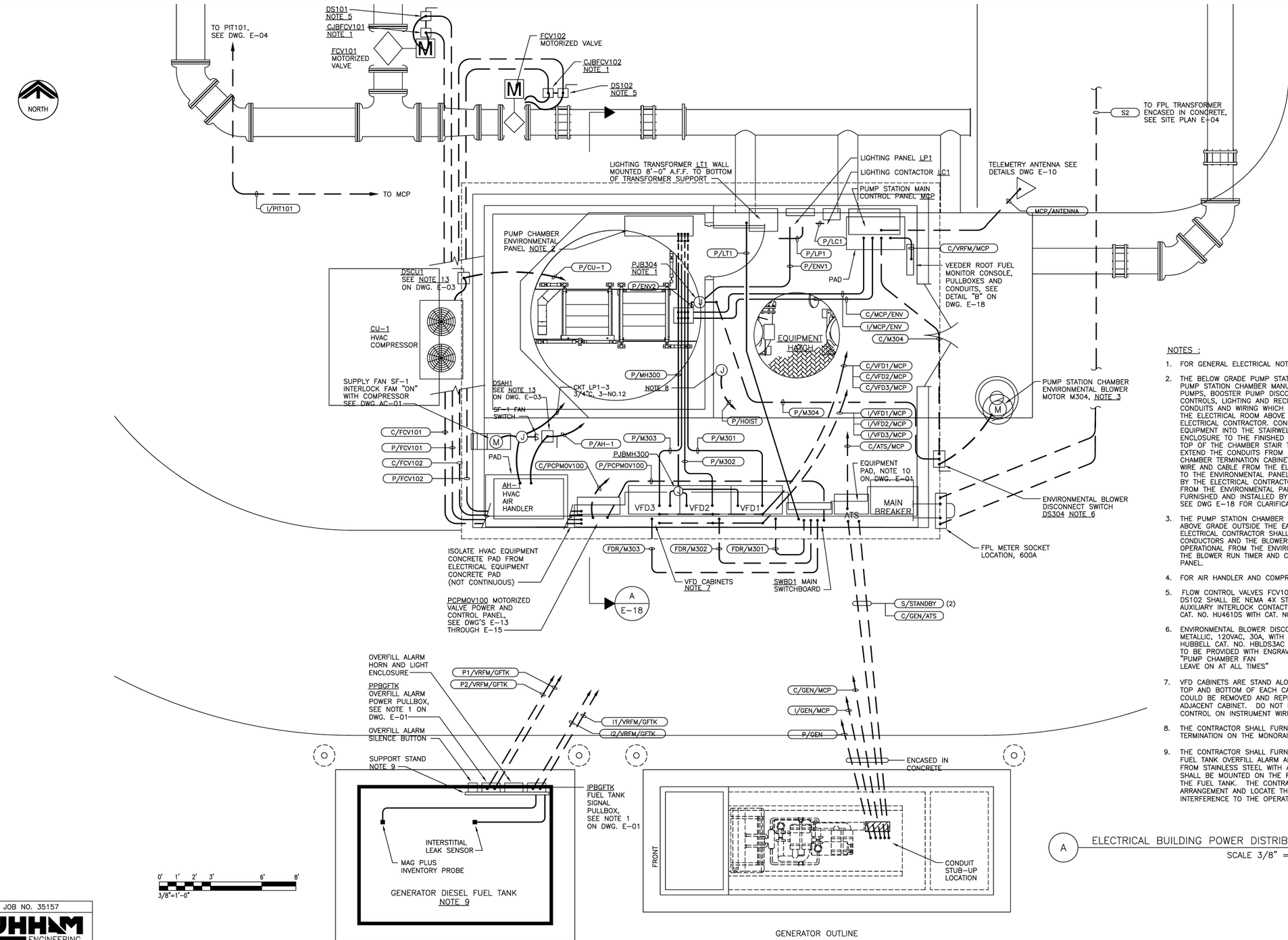

NOTES :

1. FOR GENERAL ELECTRICAL NOTES SEE DWG E-01.
2. THE BELOW GRADE PUMP STATION CHAMBER WILL BE PREWIRED BY THE PUMP STATION CHAMBER MANUFACTURER. THIS WILL INCLUDE THE BOOSTER PUMPS, BOOSTER PUMP DISCONNECT SWITCHES, SUMP PUMPS, INSTRUMENTS, CONTROLS, LIGHTING AND RECEPTACLES IN THE BELOW GRADE CHAMBER. CONDUITS AND WIRING WHICH SERVE THE BELOW GRADE EQUIPMENT FROM THE ELECTRICAL ROOM ABOVE WILL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. CONDUIT WILL ROUTE FROM THE ELECTRICAL ROOM EQUIPMENT INTO THE STAIRWELL ENCLOSURE, DOWN THROUGH THE STAIRWELL ENCLOSURE TO THE FINISHED FLOOR ELEVATION OF THE BUILDING AT THE TOP OF THE CHAMBER STAIR TUBE. THE CHAMBER MANUFACTURER WILL EXTEND THE CONDUITS FROM BUILDING FLOOR ELEVATION DOWN TO THE CHAMBER TERMINATION CABINET CALLED THE ENVIRONMENTAL PANEL. ALL WIRE AND CABLE FROM THE ELECTRICAL EQUIPMENT IN THE BUILDING ABOVE TO THE ENVIRONMENTAL PANEL BELOW SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. ALL CONDUIT AND WIRE BRANCHING OUT FROM THE ENVIRONMENTAL PANEL INTO THE PUMP CHAMBER WILL BE FURNISHED AND INSTALLED BY THE BELOW GRADE CHAMBER MANUFACTURER. SEE DWG E-18 FOR CLARIFICATION.
3. THE PUMP STATION CHAMBER ENVIRONMENTAL AIR BLOWER WILL BE LOCATED ABOVE GRADE OUTSIDE THE EAST END OF THE ELECTRICAL ROOM. THE ELECTRICAL CONTRACTOR SHALL WIRE THIS BLOWER AND PROVIDE ALL CONDUITS, CONDUCTORS AND THE BLOWER DISCONNECT SWITCH TO MAKE THE BLOWER FULLY OPERATIONAL FROM THE ENVIRONMENTAL PANEL IN THE BELOW GRADE CHAMBER. THE BLOWER RUN TIMER AND CONTROLS WILL BE LOCATED IN THE ENVIRONMENTAL PANEL.
4. FOR AIR HANDLER AND COMPRESSOR NOTES SEE DWG AC-01.
5. FLOW CONTROL VALVES FCV101 AND FCV102 DISCONNECT SWITCHES DS101 AND DS102 SHALL BE NEMA 4X STAINLESS STEEL, 600V, 30 AMP, 4 POLE WITH AUXILIARY INTERLOCK CONTACTS, 1 N.O. AND 1 N.C. SQUARE D CLASS 3110, CAT. NO. HU461DS WITH CAT. NO. EIK1 AUXILIARY CONTACT KIT, OR APPROVED EQUAL.
6. ENVIRONMENTAL BLOWER DISCONNECT SWITCH DS304 SHALL BE NEMA 4X NON-METALLIC, 120VAC, 30A, WITH AUXILIARY INTERLOCK CONTACT AND GROUND BLOCK, HUBBELL CAT. NO. HBLDS3AC WITH GROUND BLOCK CAT. NO. HBL30RGB. SWITCH TO BE PROVIDED WITH ENGRAVED NAMEPLATE AS FOLLOWS :
"PUMP CHAMBER FAN
LEAVE ON AT ALL TIMES"
7. VFD CABINETS ARE STAND ALONE UNITS. MAKE ALL CONNECTIONS TO THE TOP AND BOTTOM OF EACH CABINET INDIVIDUALLY SO THAT ANY ONE CABINET COULD BE REMOVED AND REPLACED WITHOUT DISTURBING THE WIRING IN THE ADJACENT CABINET. DO NOT FEED THROUGH ANY CABINET WITH POWER, CONTROL ON INSTRUMENT WIRING FOR ANOTHER VFD CABINET.
8. THE CONTRACTOR SHALL FURNISH AND INSTALL A JUNCTION BOX FOR THE TERMINATION ON THE MONORAIL HOIST ELECTRIFICATION SYSTEM CONDUCTORS.
9. THE CONTRACTOR SHALL FURNISH AND INSTALL A SUPPORT STAND FOR THE FUEL TANK OVERFILL ALARM AND PULLBOXES. THE STAND SHALL BE FABRICATED FROM STAINLESS STEEL WITH ALL STAINLESS STEEL HARDWARE. THE STAND SHALL BE MOUNTED ON THE FUEL TANK FOUNDATION AND NOT ATTACHED TO THE FUEL TANK. THE CONTRACTOR SHALL COORDINATE WITH THE FUEL TANK ARRANGEMENT AND LOCATE THE SUPPORT STAND WHERE IT IS NOT AN INTERFERENCE TO THE OPERATION OR FILLING OF THE FUEL TANK.

A ELECTRICAL BUILDING POWER DISTRIBUTION ROUTING PLAN
SCALE 3/8" = 1'-0"

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
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401 NORTH CATTLEMEN ROAD, SUITE 306
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CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL POWER SITE PLAN

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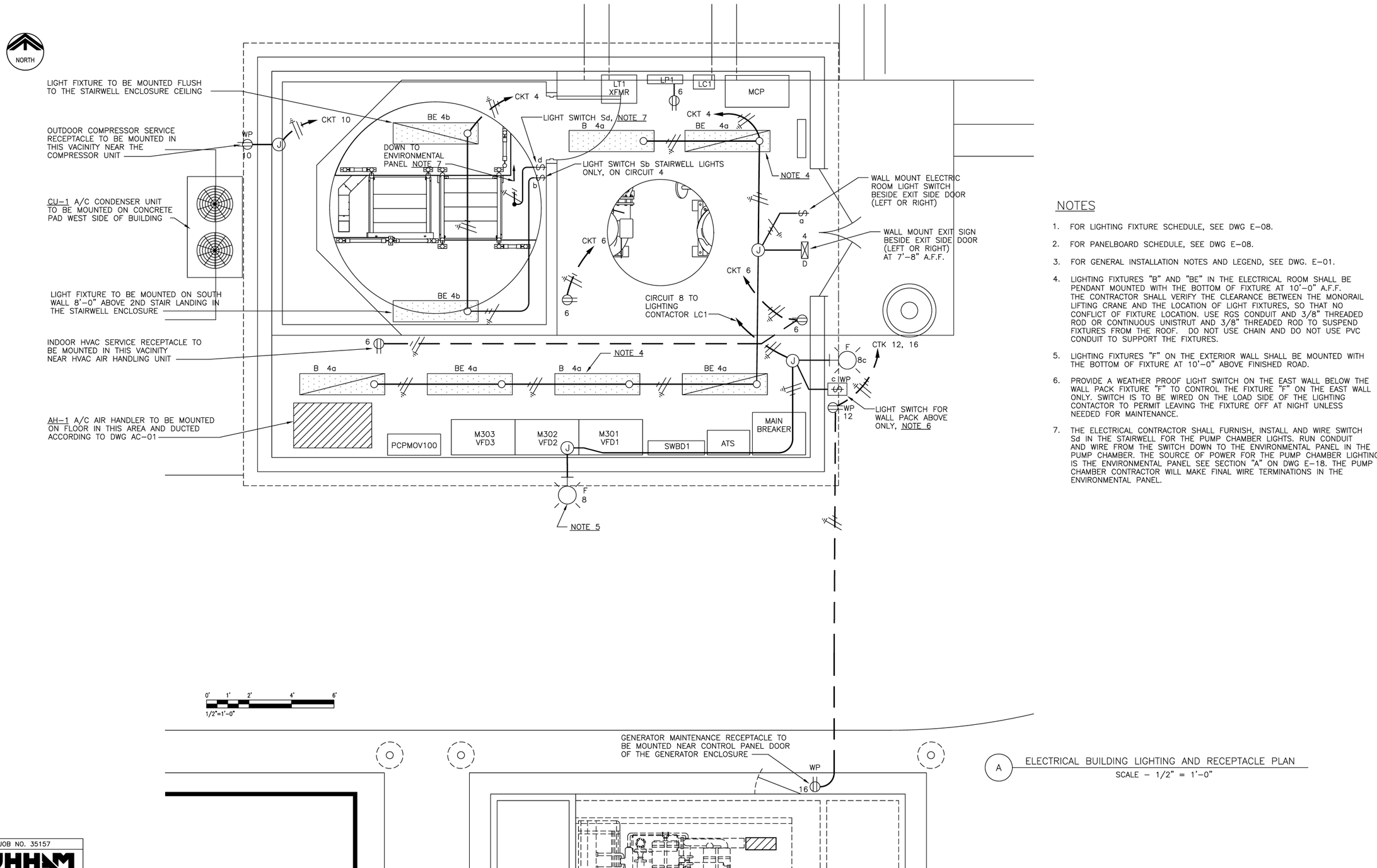

NOTES

1. FOR LIGHTING FIXTURE SCHEDULE, SEE DWG E-08.
2. FOR PANELBOARD SCHEDULE, SEE DWG E-08.
3. FOR GENERAL INSTALLATION NOTES AND LEGEND, SEE DWG. E-01.
4. LIGHTING FIXTURES "B" AND "BE" IN THE ELECTRICAL ROOM SHALL BE PENDANT MOUNTED WITH THE BOTTOM OF FIXTURE AT 10'-0" A.F.F. THE CONTRACTOR SHALL VERIFY THE CLEARANCE BETWEEN THE MONORAIL LIFTING CRANE AND THE LOCATION OF LIGHT FIXTURES, SO THAT NO CONFLICT OF FIXTURE LOCATION. USE RGS CONDUIT AND 3/8" THREADED ROD OR CONTINUOUS UNISTRUT AND 3/8" THREADED ROD TO SUSPEND FIXTURES FROM THE ROOF. DO NOT USE CHAIN AND DO NOT USE PVC CONDUIT TO SUPPORT THE FIXTURES.
5. LIGHTING FIXTURES "F" ON THE EXTERIOR WALL SHALL BE MOUNTED WITH THE BOTTOM OF FIXTURE AT 10'-0" ABOVE FINISHED ROAD.
6. PROVIDE A WEATHER PROOF LIGHT SWITCH ON THE EAST WALL BELOW THE WALL PACK FIXTURE "F" TO CONTROL THE FIXTURE "F" ON THE EAST WALL ONLY. SWITCH IS TO BE WIRED ON THE LOAD SIDE OF THE LIGHTING CONTACTOR TO PERMIT LEAVING THE FIXTURE OFF AT NIGHT UNLESS NEEDED FOR MAINTENANCE.
7. THE ELECTRICAL CONTRACTOR SHALL FURNISH, INSTALL AND WIRE SWITCH Sd IN THE STAIRWELL FOR THE PUMP CHAMBER LIGHTS. RUN CONDUIT AND WIRE FROM THE SWITCH DOWN TO THE ENVIRONMENTAL PANEL IN THE PUMP CHAMBER. THE SOURCE OF POWER FOR THE PUMP CHAMBER LIGHTING IS THE ENVIRONMENTAL PANEL SEE SECTION "A" ON DWG E-18. THE PUMP CHAMBER CONTRACTOR WILL MAKE FINAL WIRE TERMINATIONS IN THE ENVIRONMENTAL PANEL.

JOB NO. 35157

ENG. BUS. NO. 1567 JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

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ENGINEER: ROBERT GARCIA, P.E.
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL BUILDING LIGHTING AND RECEPTACLE PLAN

VERIFY SCALES
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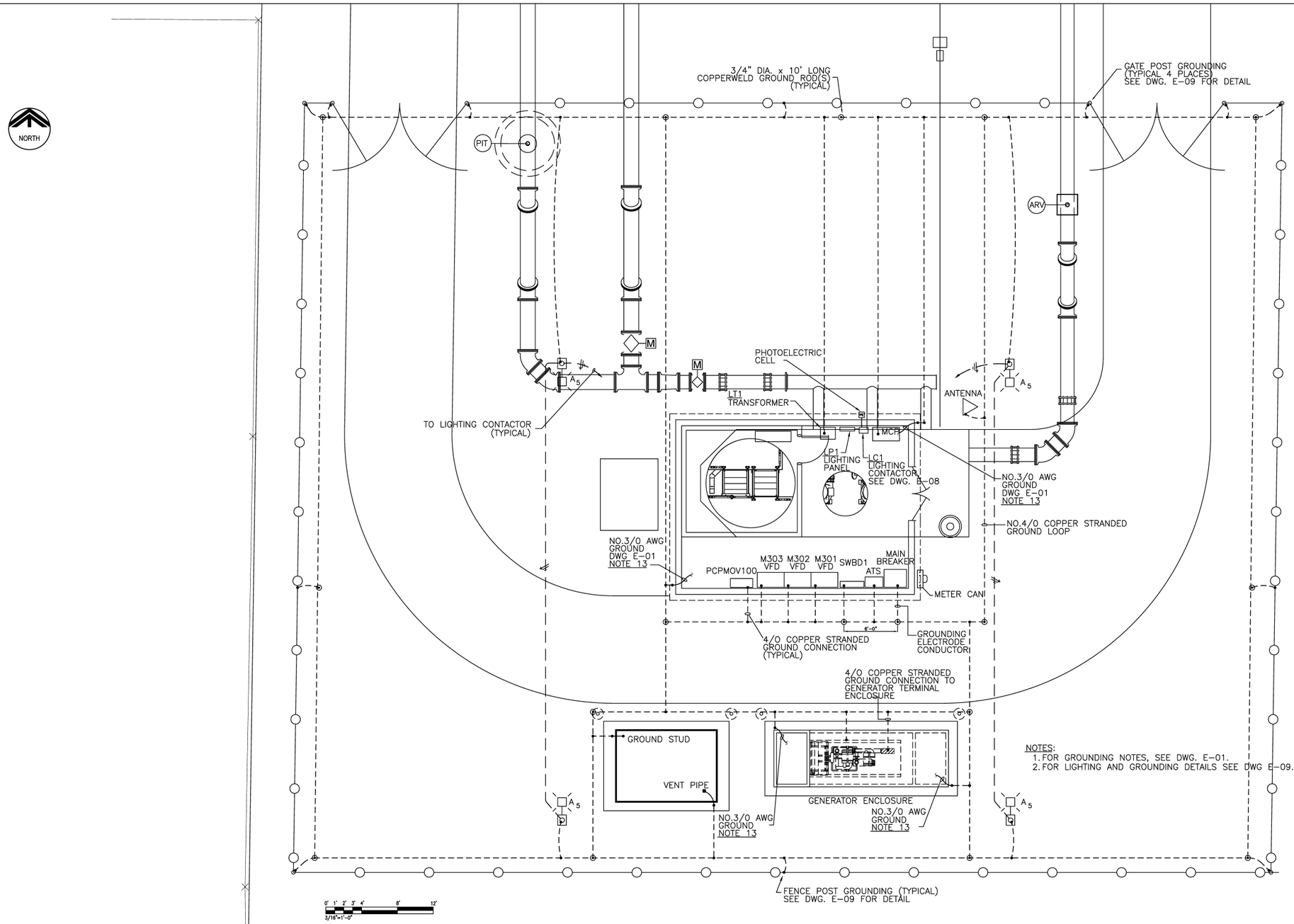

A ELECTRICAL BUILDING, GENERATOR, EXTERIOR LIGHTING AND GROUNDING PLAN

SCALE 3/16" = 1'-0"

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

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PROJECT ENGINEER

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PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

ELECTRICAL LIGHTING AND GROUNDING SITE PLAN

VERIFY SCALES
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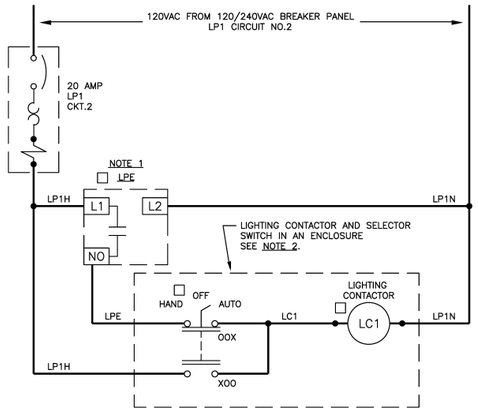

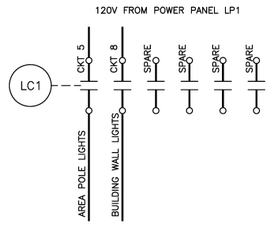

LIGHTING
CONTACTOR CONTROLS

LIGHTING CONTACTOR NOTES:

THE FOLLOWING TAGGED ITEMS ARE FURNISHED & INSTALLED BY THE ELECTRICAL CONTRACTOR:

1. PHOTOCELL IS EQUAL TO CROUSE HINDS NO. DS60 IN A 3/4" CAST ALUMINUM, DEEP TYPE FD BOX, CROUSE HINDS NO. FD2–SA.

2. THE LIGHTING CONTACTOR, SELECTOR SWITCH AND ENCLOSURE SYSTEM IS MADE UP OF THE FOLLOWING ITEMS, ALL FURNISHED AND INSTALLED BY THE ELEC. CONTRACTOR:

   A. ONE (1), 30 AMPERES, 600VAC, SIX (6) POLE ELECTRICALLY HELD LIGHTING CONTACTOR WITH 120VAC, 60HZ COIL, SQUARE D CLASS 8903 TYPE LO60V02.

   B. ONE (1) THREE (3) POSITION, MAINTAINED, OIL TIGHT SELECTOR SWITCH WITH A BLACK LEVER OPERATOR, A CONTACT BLOCK AND A "HAND–OFF–AUTO" LEGEND PLATE. SQUARE D CLASS 9001 TYPE KS43BH1 AND KN360 LEGEND PLATE.

   C. ONE (1) NEMA 1 ENCLOSURE CONTINUOUS HINGE CLAMP COVER WITH BACK PANEL 14" x 12" x 8"D HOFFMAN ENG. CAT. NO. A–14128CH WITH A–14P12 BACK PANEL.

   D. ONE (1) 1" x 2–3/4" BLACK LAMINATED PHENOLIC NAMEPLATE ENGRAVED WITH WHITE LETTERS AS DETAILED BELOW

AREA LIGHTING
CONTACTOR

FIXTURE SCHEDULE

SYMBOL	MANUFACTURER	CATALOG NO.	DESCRIPTION	LAMP	MOUNTING	VOLTAGE	MOUNTING HEIGHT	REMARKS
A	AMERICAN	AME–2–T3–150S –1–BOA6– BZ–SF120	HIGH PRESSURE SODIUM	150W	POLE NOTE 1	120	SEE DETAIL	SHIELDS – NOTE 2 6" ARM SEE DETAIL ON DWG. E–09.
B	LITHONIA	AF10232120 GLR	FLUORESCENT INDUSTRIAL	(2) 32W SPX41K	PENDANT	120	SEE PLAN	ENERGY SAVING BALLAST, LAMPS, INTERNAL FUSE
BE	LITHONIA	AF10232120 GLR–EL14	FLUORESCENT INDUSTRIAL WITH EMERGENCY BATTERY PACK	(2) 32W SPX41K	PENDANT	120	↓	ENERGY SAVING BALLAST, LAMPS, INTERNAL FUSE, 2 LAMP BATTERY PACK
D	LITHONIA	LEPW1R120ELNSD	LED RED EXIT SIGN W/WHITE HOUSING	LED	UNIVERSAL	120	↓	MAINTENANCE FREE NICKEL CADMIUM BATTERY W/AUTO SOLID STATE CHARGER
E	LITHONIA	DM232120GEB– GLR–EL14DW	DAMP LOCATION FLUORESCENT	(2) 32W SPX41K	WALL	120	↓	ENERGY SAVING BALLAST, LAMPS, INTERNAL FUSE, 2 LAMP BATTERY PACK
F	VISIONARE SILHOUETTE	SIL–2T3–100S–1 DL–BZ–SF100	HIGH PRESSURE SODIUM	100W	WALL DOWN LIGHT	120	↓	HIGH POWER FACTOR, BALLAST, SINGLE FUSE, BRONZE

FIXTURE SCHEDULE NOTES:

1. AREA LIGHTING POLE SHALL BE HAPCO CATALOG NO. SSA12D4–4–BM. SQUARE STRAIGHT ALUMINUM POLE WITH FULL BASE COVER HARDWARE PACK 3/4" x 17" x 3" ANCHOR BOLTS, AND STAINLESS STEEL HARDWARE THAT MUST SHOW CERTIFICATION FOR SUPPORTING THE FIXTURE "A" IN 130 MPH OR THE SOUTHERN BUILDING CODE WIND LOAD REQUIREMENTS.

2. FIXTURE TYPE "A" SHALL HAVE CUTOFF SHIELDS ON ALL 4 SIDES OF THE FIXTURE MEETING THE REGULATIONS OF MANATEE COUNTY LAND DEVELOPMENT CODE (LDC) SECTION 709 FOR LIGHTING. THE LIGHTING FOR PUMP STATION FENCED AREA SHALL MEET REGULATIONS OF LCD709 WITH LIGHTING CUTOFF WITHIN THE PROPERTY LINES, SEE DWG E–17 FOR LIGHTING PHOTOMETRICS AND CUTOFF SHIELD DETAILS.

DISTRIBUTION PANEL SCHEDULE
LP1

SERVICE: 208/120V – 3 PHASE – 4 WIRE
TYPE: NEMA 1 SURFACE MOUNT (20W x 5–3/4"D)

150 AMP MAIN CIRCUIT BREAKER
BOLT ON BRANCH BREAKERS

CKT NO.	SERVING	CONN. LOAD (KW)	AMPS		AMPS	CONN. LOAD (KW)	SERVING	CKT NO.
1	MCP CABINET	–	30		20	–	ELECTRICAL ROOM LIGHTING CONTACTOR CONTROL	2
3	HVAC SUPPLY FAN SF–1	–	20		20	–	ELECTRICAL ROOM INDOOR LIGHTING	4
5	PUMP STATION AREA LIGHT POLES	–	20		20	–	ELECTRICAL ROOM INDOOR RECEPTACLES	6
7	ENVIRONMENTAL PANEL 120/208V SUPPLY NOTE 1	–	3P 50		20	–	ELECTRICAL BUILDING OUTDOOR WALL LIGHTING	8
9		–			20	–	ELECTRICAL ROOM HVAC SERVICE RECEPTACLES	10
11		–			20	–	ELECTRICAL ROOM OUTDOOR RECEPTACLES	12
13	VEEDER ROOT FUEL MONITOR CONSOLE	–	15		20	–	GENERATOR BATTERY CHARGER	14
15	VEEDER ROOT FUEL OVERFILL ALARM HORN/LIGHT	–	15		20	–	GENERATOR MAINTENANCE RECEPTACLE	16
17	SPARE	–	20		30	2.5	GENERATOR ENGINE BLOCK HEATER	18
19	SPARE	–	20		20	–	SPARE	20
21	SPACE	–	–		–	–	SPACE	22
23	SPACE	–	–		–	–	SPACE	24
25	SPACE	–	–		–	–	SPACE	26
27	SPACE	–	–		–	–	SPACE	28
29	SPACE	–	–		–	–	SPACE	30

TOTAL CONNECTED LOAD: ϕ_A = KW ϕ_B = KW ϕ_C = KW

PANELBOARD LP1 NOTES :

1. THE CONTRACTOR SHALL VERIFY THE FINAL POWER REQUIREMENTS OF THE PUMP CHAMBER ENVIRONMENTAL PANEL AND ADJUST THE CIRCUIT BREAKER(S) SIZE AND NUMBER OF POLES TO SUIT.

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
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PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL SCHEDULES AND MISCELLANEOUS DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
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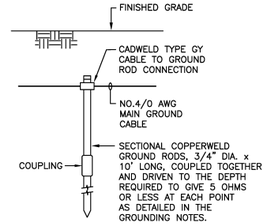
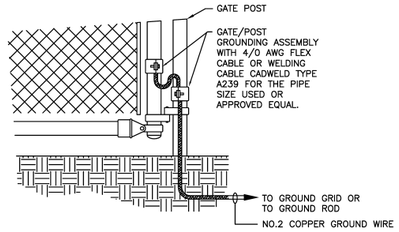


GROUND ROD DETAIL
N.T.S.



TYPICAL GATE GROUNDING DETAIL
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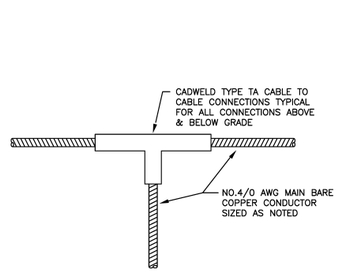

GROUND LOOP CONNECTION DETAIL
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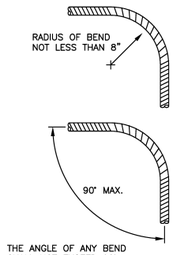
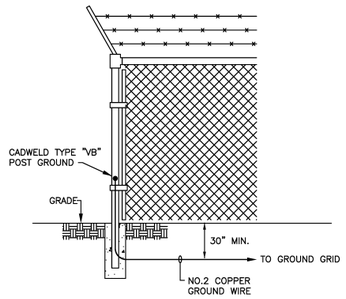


LIGHTNING PROTECTION CONDUCTOR
N.T.S.



CHAIN LINK FENCE POST GROUNDING DETAIL
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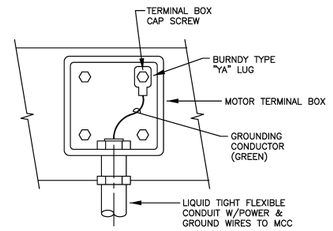

MOTOR TERMINAL BOX GROUND CONNECTION DETAIL
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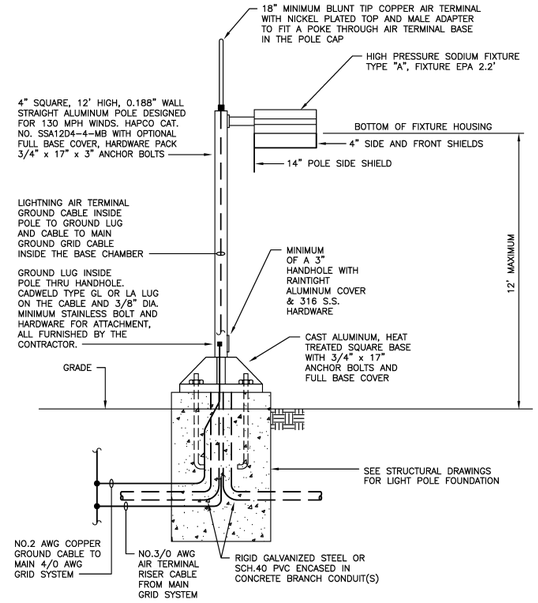

FREE-STANDING FIXTURE TYPE "A" DETAIL
N.T.S.

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DATE APRIL 2010

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FL. REG. NO.: 31103
PROJECT ENGINEER

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CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
BOOSTER PUMP STATION TRANSFORMER GROUNDING AND MISCELLANEOUS DETAILS

VERIFY SCALES
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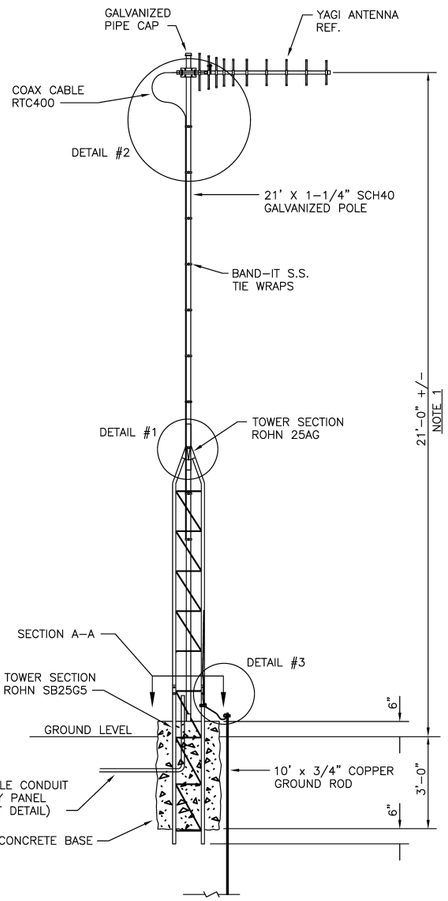

ANTENNA ELEVATION
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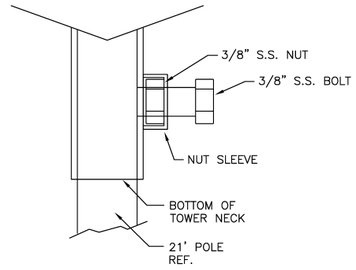

DETAIL NO.1 POLE SWIVEL BOLT SIDE VIEW
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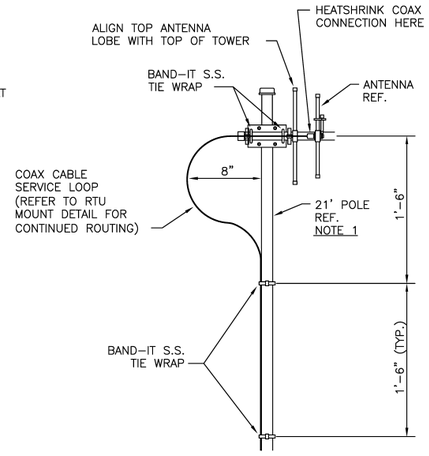

DETAIL NO.2 COAX CABLE MOUNTING AND ROUTING
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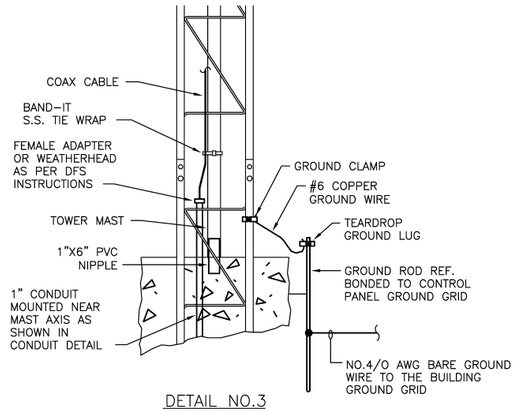

DETAIL NO.3 GROUNDING DETAIL
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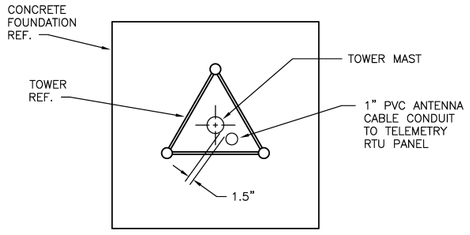

CONDUIT DETAIL TOP VIEW
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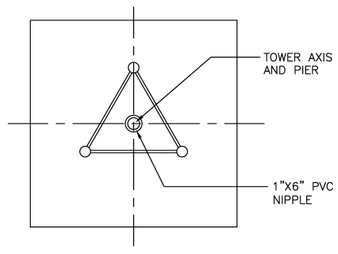

SECTION A-A
N.T.S.

STRUCTURAL DESIGN CODES
1. ASCE 7-02
2. ANSI/TIA/F/A-222-F-1996

NOTES:

1. THE FINAL ANTENNA TOWER REQUIREMENTS SHALL BE BASED ON DFS RADIO STUDY.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE TOWER LOCATION WITH THE OWNER/ENGINEER. TOWER PLACEMENT IS RECOMMENDED WITHIN 15' OF THE PUMP CONTROL PANEL. A 1" PVC CONDUIT IS REQUIRED FROM THE CONTROL PANEL TO THE ANTENNA TOWER WHEN RUNNING COAX CABLE UNDERGROUND. A FEMALE ADAPTER OR WEATHERHEAD IS REQUIRED ON THE TOWER SIDE OF THE CONDUIT. ALL REQUIRED CONDUIT SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR.
3. GROUNDING AND BONDING OF THE ANTENNA TOWER, TOWER GROUND ROD, PUMP CONTROL PANEL AND POWER UTILITIES GROUND ROD ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE GROUND LUGS AND TAPS FOR ALL LOCATIONS MUST BE BONDED TOGETHER USING A CONTINUOUS SINGLE 6 AWG SOLID BARE COPPER WIRE MINIMUM.

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P.O. BOX 5106 LAKELAND, FLORIDA 33807

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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
BOOSTER PUMP STATION ANTENNA DETAILS

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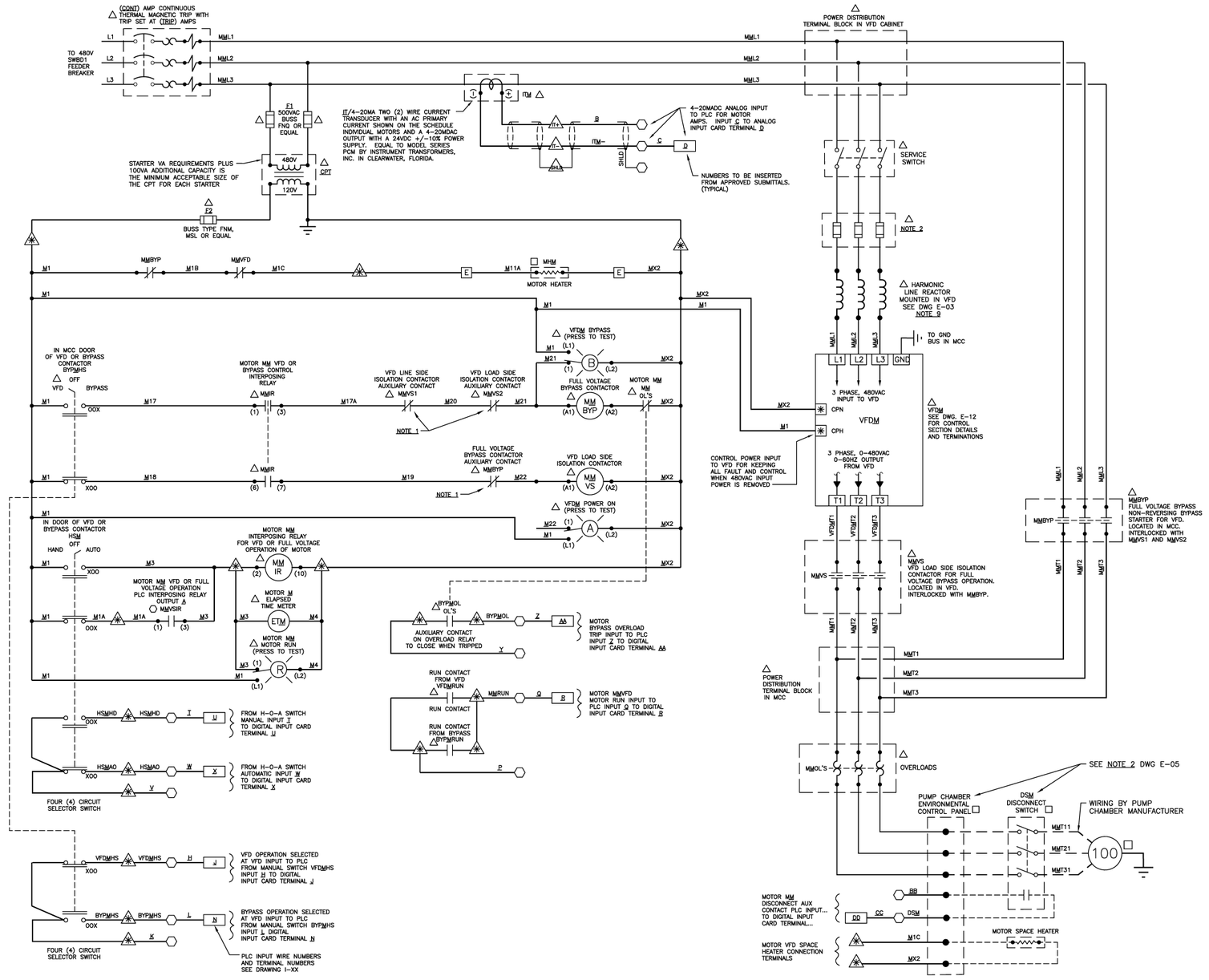

MOTORS M301, M302 AND M303
VFD WITH A
FULL VOLTAGE BYPASS
TYPICAL SCHEMATIC DIAGRAM

LEGEND:

- ⬡ ITEMS OR DEVICES LOCATED IN MASTER CONTROL PANEL (MCP)
- □ ITEMS OR DEVICES LOCATED IN THE FIELD, REMOTE TO ANY PANELS
- △ ITEMS LOCATED IN THE VFD CABINET
- ✳ DESIGNATES TERMINAL NUMBERS OR INFORMATION THAT WILL BE PUT ON THE DRAWINGS FROM THE SUBMITTALS BY THE PLC, OR VFD SUPPLIER THAT IS SELECTED AND APPROVED.
- M DESIGNATES THE MOTOR NUMBER CONTROLLED BY THE VFD THAT WILL BE INSERTED WHERE INDICATED TO COMPLETE THE WIRE AND DEVICE NUMBERS SHOWN IN THE TYPICAL DIAGRAM, M301, M302 AND M303.

NOTES:

1. NORMALLY CLOSED AUXILIARY CONTACTS ON CONTACTOR WILL BE LATE CLOSING OR DELAYED CLOSING AFTER ALL POWER POLES OF THE ACTUATING CONTACTOR ARE OPENED TO PREVENT THE ISOLATION AND BYPASS CONTACTORS FROM BEING ENERGIZED AT THE SAME TIME.
2. CONTRACTOR TO COORDINATE WITH THE VFD SUPPLIER TO SEE IF LINE SIDE SEMICONDUCTOR TYPE FAST ACTING FUSES SUCH AS BUS TYPE JLS TYPE J FUSES ARE REQUIRED TO MEET U.L. AND V.F.D. MANUFACTURER REQUIREMENTS.

WIRE AND DEVICE NUMBERS SCHEDULE

EQUIPMENT NO. & DESCRIPTION	M	HP	VFD	CONT	TRIP	CPT	IT	DS	A	B	C	D	F1	F2	G	H	J	K	L	N	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD
BOOSTER PUMP NO.1 MOTOR M301	301	100	1	250	225	✳	0-150	200A	–	–	–	–	✳	✳	NOT USED	–	–	–	–	–	–	–	–	NOT USED	–	–	–	–	–	–	–	–	–	–
BOOSTER PUMP NO.2 MOTOR M302	302	100	2	250	225	✳	0-150	200A	–	–	–	–	✳	✳	NOT USED	–	–	–	–	–	–	–	–	NOT USED	–	–	–	–	–	–	–	–	–	–
BOOSTER PUMP NO.3 MOTOR M303	303	100	3	250	225	✳	0-150	200A	–	–	–	–	✳	✳	NOT USED	–	–	–	–	–	–	–	–	NOT USED	–	–	–	–	–	–	–	–	–	–

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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL VFD SCHEMATIC DIAGRAM FOR PUMP MOTORS M301, M302 & M303

VERIFY SCALES
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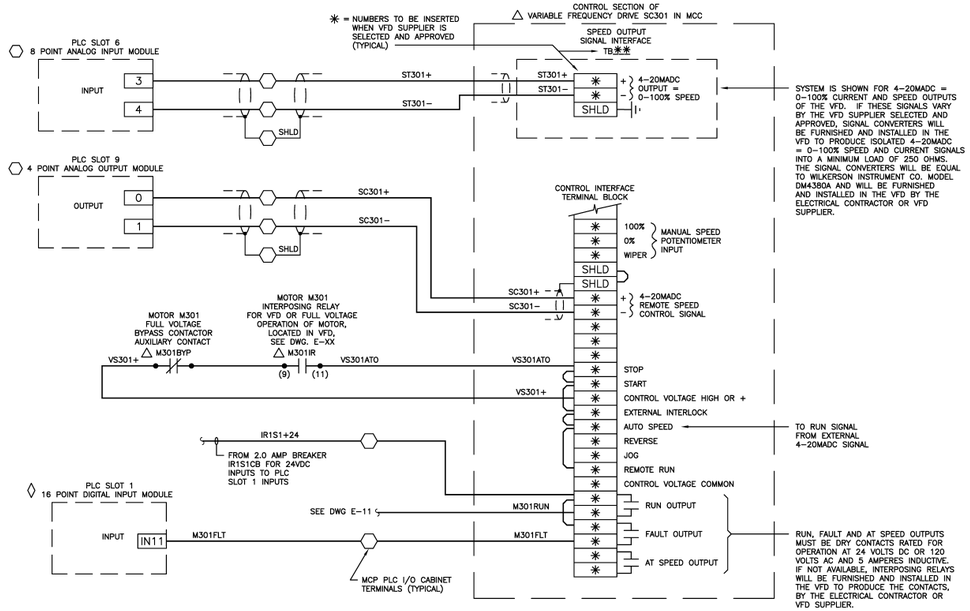
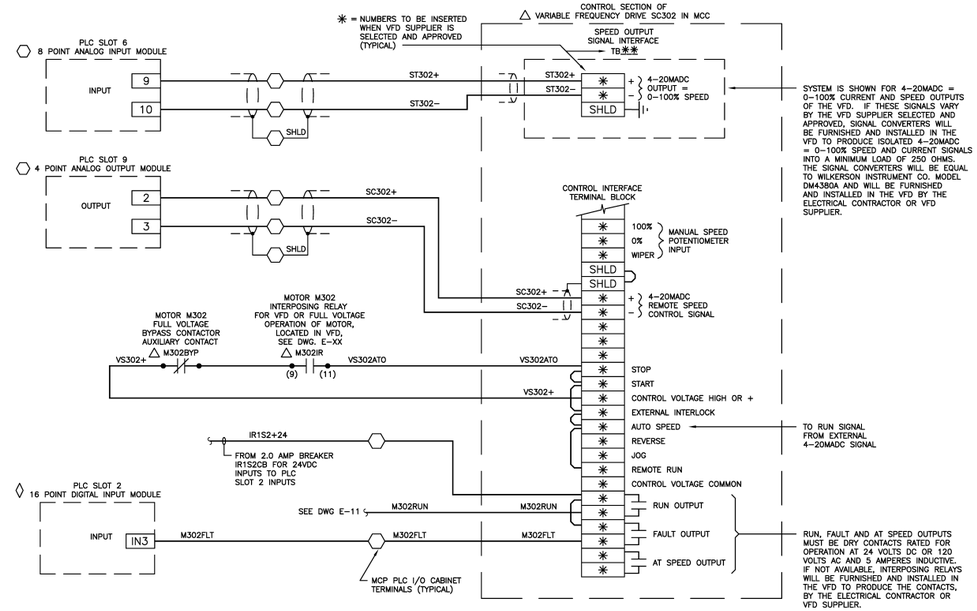
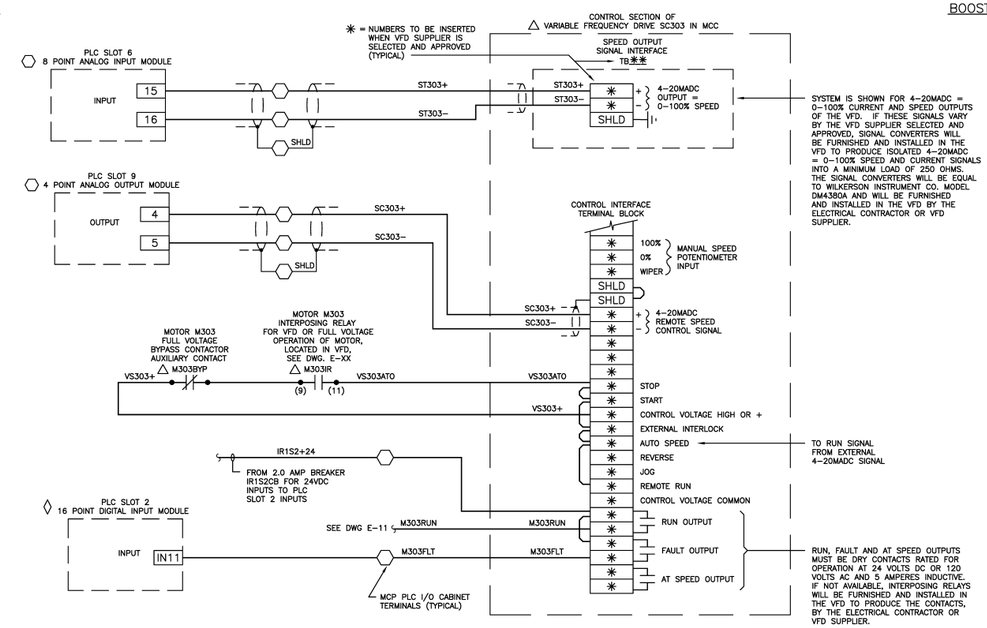


CONTROL INPUT AND OUTPUT
SCHEMATIC FOR NO.1
BOOSTER PUMP VFD MOTOR M301



CONTROL INPUT AND OUTPUT
SCHEMATIC FOR NO.2
BOOSTER PUMP VFD MOTOR M302



CONTROL INPUT AND OUTPUT
SCHEMATIC FOR NO.3
BOOSTER PUMP VFD MOTOR M303

LEGEND:

- ⬡ ITEMS OR DEVICES LOCATED IN MASTER CONTROL PANEL (MCP) IN THE ELECTRICAL ROOM
- □ ITEMS OR DEVICES LOCATED IN THE FIELD, REMOTE TO ANY PANELS
- △ ITEMS OR DEVICES LOCATED IN THE VARIABLE FREQUENCY DRIVE IN THE ELECTRICAL ROOM
- ✳ DESIGNATES TERMINAL NUMBERS THAT WILL BE PUT ON THE DRAWINGS FROM THE SUBMITTALS BY THE PLC, THE MCC OR VFD SUPPLIER THAT IS SELECTED AND APPROVED.

JOB NO. 35157

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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL VFD WIRING DIAGRAM
FOR PUMP MOTORS M301, M302 & M303

VERIFY SCALES
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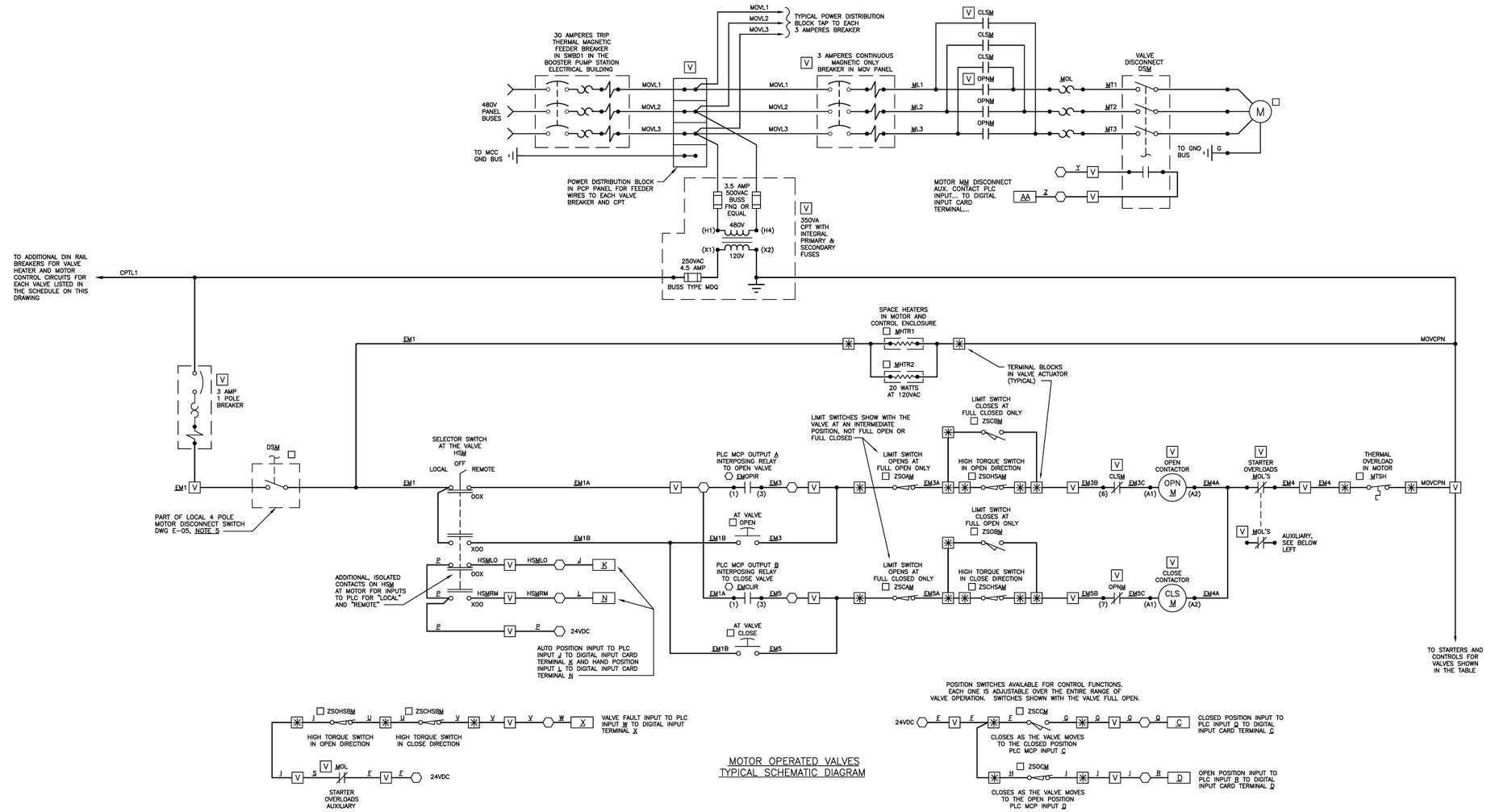
POWER AND CONTROL PANEL PCPMOV100 WIRE AND DEVICE NUMBERS SCHEDULE																											
EQUIPMENT NO. & DESCRIPTION	M	PCP	OUTPUT A	OUTPUT B	INPUT C	INPUT D	E	F	G	H	I	J	K	L	N	P	Q	R	S	T	U	V	W	X	Y	Z	AA
FCV101	101	–	–	–	–	–	FCV	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FCV102	102	–	–	–	–	–	FCV	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

LEGEND:

- □ ITEMS LOCATED IN THE FIELD
- ⬡ ITEMS OR TERMINAL LOCATED IN MAIN PLC I/O CONTROL PANEL
- [V] ITEMS IN MOTOR OPERATED VALVE (MOV) POWER AND CONTROL PANEL PCPMOV100
- [*] TERMINALS IN VALVE ACTUATOR ASSEMBLY. TERMINAL NUMBERS TO BE INSERTED WHEN THE VALVE SUPPLIER IS SELECTED AND APPROVED.



MOTOR OPERATED VALVES
TYPICAL SCHEMATIC DIAGRAM

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
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CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
BOOSTER PUMP STATION MOTOR OPERATED VALVE SCHEMATIC DIAGRAM FOR FCV MOV VALVES

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. E-13

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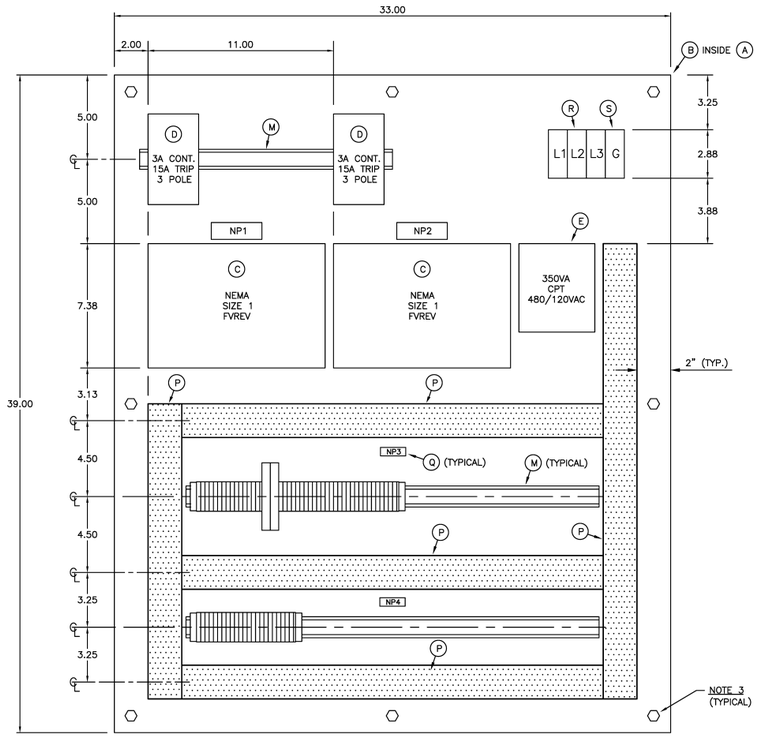

MOTOR OPERATED VALVES
CONTROL PANEL PCPMOV100
INTERNAL BACK PANEL LAYOUT
SCALE: 1 : 4

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
A	1	NEMA 12, SINGLE DOOR, 14 GAUGE STEEL ENCLOSURE WITH OUTSIDE DIMENSIONS OF 42" HIGH, 36" WIDE AND 12" DEEP. THE ENCLOSURE IS HOFFMAN CAT. NO. A423612LP.
B	1	WHITE ENAMEL PAINTED STEEL PANEL TO GO IN ITEM "A" THAT IS 39" HIGH AND 33" WIDE. HOFFMAN CAT. NO. A42P36.
C	2	SEIMENS NEMA SIZE 1, 3 PHASE, MAGNETIC, FULL VOLTAGE, REVERSING, 460VAC MAXIMUM OPEN TYPE STARTER WITH 120VAC OPERATING COILS. STARTER IS CAT. NO. 22DSB32AF WITH NO. ESP100 SOLID STATE OVERLOAD ADJUSTABLE FROM 0.75 TO 3.0 AMPERES FOR A 1 HP 480VAC MOTOR, FLA = 2.1. CONTRACTOR TO MATCH OVERLOADS TO THE FINAL APPROVED MOTOR.
D	2	SEIMENS 3 AMPERES CONTINUOUS, 3 POLE, 480VAC, TYPE ED6 UL LISTED MOTOR CIRCUIT PROTECTOR WITH AN ADJUSTABLE RANGE OF 10 TO 30 AMPERES AND AN EXTERNAL LOCKING MECHANISM. THIS BREAKER SHALL BE UL APPROVED IN A UL508A PANEL AS AN ASSEMBLY WITH THE ITEM "C" STARTER. SEIMENS CAT. NO. ED63A003 WITH A CAT. NO. ED2HPL PADLOCKING DEVICE.
E	1	CUTLER HAMMER 350VA CONTINUOUS, 240/480VAC PRIMARY TO 120VAC SECONDARY, OPEN TYPE CONTROL POWER TRANSFORMER WITH TWO (2) PRIMARY AND ONE (1) SECONDARY FUSE BLOCKS AND FINGER SAFE TERMINALS. CATALOG NO. C0350E2AFBQFS CATALOG NO. C0350E2AFBQFS WITH SIX (6) BUSS TYPE FNQ-R-3 1/2, 500VAC, 3.5 AMPERES TIME DELAY PRIMARY FUSES AND FOUR (4) BUS TYPE MDQ-4 1/2, 250VAC, 4.5 AMPERES TIME DELAY SECONDARY FUSES AND FINGER SAFE FUSE BLOCK COVERS CATALOG NO. FSKFB
F	54	PHOENIX TYPE UK5N, PART NO. 3004362 COMPRESSION CLAMP TERMINAL BLOCK, 6.2mm WIDE, NO.10-24 AWG WIRE, GRAY BODY. THE TERMINALS WILL BE MARKED AS PER THE DRAWINGS WITH COMPUTER PRINTED, VERTICAL MARKED TYPE ZBM6-CMS MARKERS.
G	6	PHOENIX TYPE UK5NBU, PART NO. 3004388 COMPRESSION CLAMP TERMINAL BLOCK, 6.2mm WIDE, NO.10-24 AWG WIRE, BLUE BODY. SAME MARKERS AS ITEM "P".
H	6	PHOENIX TYPE USLKG5, PART NO. 0441504 COMPRESSION CLAMP GROUNDING TERMINAL BLOCK, 6.2mm WIDE, NO.10-24 AWG WIRE, GREEN AND YELLOW BODY. SAME MARKERS AS ITEM "P".
J	4	PHOENIX TYPE E/UK, PART NO. 12014422 END STOP.
K	3	PHOENIX TYPE D-UK4/10, PART NO. 3003020 GRAY END SECTION FOR TYPE UK5N TERMINALS.
L	3	PHOENIX TYPE ISSB1106, 10 POLE JUMPER BAR WITH TEN (10) SCREWS FOR TYPE UK5N TERMINALS. PART NO. 0301505.
M	3 (3M)	ONE METER LENGTH OF ALUMINUM DIN, 2-3/4", ALLEN-BRADLEY CAT. NO. 1492-DR6. ELEVATED TOP HAT RAIL. ELEVATE ALL DIN RAIL TO PUT T-BLOCKS NEAR TOP OF WIRING DUCT.
N	2	3 AMP, 240VAC MAXIMUM, SINGLE POLE, THERMAL MAGNETIC, DIN RAIL MOUNT CIRCUIT BREAKER WITH A TRIP RESET BUTTON AND "OFF-ON" BUTTON. E.T.A. NO. 201-3A
P	2	2" WIDE x 3" HIGH, 6' LONG, WHITE PVC, SLOTTED SIDE WIRING DUCT WITH 2" WIDE SOLID PVC COVER. THE WIRING DUCT IS PANDUIT NO. G2X3WH6 AND THE COVER IS NO. C2WH6.
Q	5	LAMINATED PHENOLIC BLACK NAMEPLATES WITH WHITE CORE ENGRAVED TO SHOW WHITE LETTERS AS PER THE NAMEPLATE SCHEDULE ON THIS DRAWING.
R	1	3 POLE POWER DISTRIBUTION TERMINAL BLOCK WITH MAIN TERMINALS FOR ONE (1) NO.14 - 2/0 AND BRANCH TERMINALS FOR SIX (6) NO.14 - 4 CABLES. SQUARE D CLASS 9080 TYPE LBA362106.
S	1	1 POLE POWER DISTRIBUTION TERMINAL BLOCK WITH A MAIN TERMINAL FOR ONE (1) NO.14-2/0 AND BRANCH TERMINAL FOR FOUR (4) NO.14-4 CABLES. SQUARE D CLASS 9080 TYPE LBA162104.

PANEL NAMEPLATE SCHEDULE

	N.P. NO.	FIRST LINE	SECOND LINE	THIRD LINE	SIZE
	1	FLOW CONTROL VALVE	FCV101	PUMP STATION BYPASS	1" x 3"
	2	FLOW CONTROL VALVE	FCV102	PUMP STATION INFLUENT	1" x 3"
	3	TB1			1/2" x 1-1/2"
	4	CTB			1/2" x 1-1/2"
NOTE 2	5	MOTOR OPERATED VALVES	POWER & CONTROL PANEL	PCPMOV100	2" x 4"

NOTES

1. ALL BILL OF MATERIAL QUANTITIES WILL BE VERIFIED BY THE PANEL FABRICATOR AS ALL MATERIAL REQUIRED TO COMPLETE THE PANEL AS DETAILED ON THE DRAWINGS WILL BE FURNISHED AND INSTALLED BY THE PANEL FABRICATOR.
2. THE NAMEPLATE SHALL BE ON THE FRONT OF THE PANEL.
3. BOTTOM OF WIREWAY SHALL HAVE CUTOUTS FOR BACK PANEL MOUNTING BOLTS AS REQUIRED.
4. FOR TERMINAL BLOCK DETAILS, SEE DWG. E-15.
5. FURNISH A 11" x 17" LAMINATED PANEL WIRING SCHEMATIC PERMANENTLY ATTACHED TO THE INTERIOR OF THE PANEL DOOR.
6. ALL CONTROL PANELS SHALL BE UL508 LISTED AND LABELED AS A COMPLETED ASSEMBLY. THE PANEL FABRICATOR SHALL FURNISH AND INSTALL ALL ITEMS NOT SPECIFICALLY DETAILED IN THE DRAWINGS REQUIRED TO HAVE THE PANELS UL LISTED AND LABELED. ALL INSPECTIONS, APPROVALS AND MODIFICATIONS REQUIRED TO HAVE THE COMPLETED PANEL LABELED AND LISTED BY UL SHALL BE FURNISHED BY, AND THE RESPONSIBILITY OF, THE PANEL FABRICATOR AND CONTRACTOR.
7. WHITE INSULATION ON THE WIRE SHALL BE USED ONLY FOR NEUTRAL CONDUCTORS AND GREEN SHALL BE USED ONLY FOR GROUND CONDUCTORS.
8. ALL CONTROL WIRE SHALL BE NO.16 AWG TYPE TFF OR MTW UNLESS NOTED AS LARGER IN THE NOTES OR ON THE DRAWINGS. ALL POWER WIRING SHALL BE A MINIMUM OF NO.12 AWG TYPE THHN/THWN AND AS SIZED ON THE CONDUIT AND CABLE SCHEDULE.
9. WIREWAY TO BE FILLED TO ONLY 50% CAPACITY INSIDE THE PANEL.
10. ALL WIRE SHALL BE MARKED ON BOTH ENDS WITH WHITE HEAT SHRINK MARKERS PRINTED IN BLACK WITH A MACHINE. NO HAND WRITTEN OR EXPANDED DOT MATRIX MARKERS WITH HAND WRAPPED CLEAR LAMINATION SHALL BE ACCEPTABLE. THE NUMBERS AND LETTERS MUST BE LETTER QUALITY WHERE ALL LINES AND SHAPES APPEAR AS SOLID.

JOB NO. 35157

ENG. BUS. NO. 1567
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DESIGNED W. LAHEY
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ENGINEER: ROBERT GARCIA, P.E.
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MOTORIZED VALVES POWER & CONTROL PANEL
PCPMOV100 LAYOUT AND DETAILS

VERIFY SCALES
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JOB NO. 7880C.10
DRAWING NO. E-14

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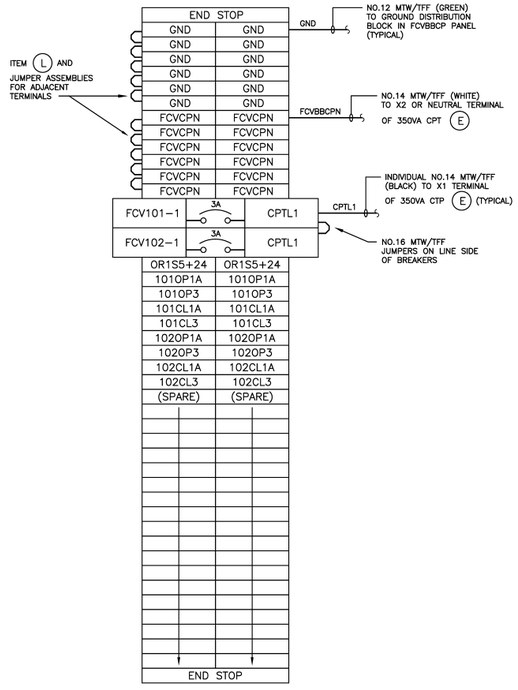
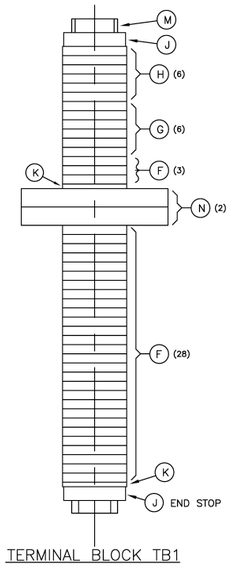


LAYOUT AND MARKING FOR TERMINAL BLOCK TB1 ON INTERNAL BACK PANEL OF PANEL PCPMOV100

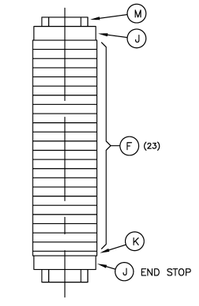
END STOP	
IR1S3+24	IR1S3+24
ZSCC101	ZSCC101
ZSOC101	ZSOC101
ZSCC102	ZSCC102
ZSOC102	ZSOC102
(SPARE)	(SPARE)
(SPARE)	(SPARE)
HS101LOC	HS101LOC
HS101RMT	HS101RMT
HS102LOC	HS102LOC
HS102RMT	HS102RMT
(SPARE)	(SPARE)
(SPARE)	(SPARE)
ZSHSB101	(SPARE)
1010L	(SPARE)
ZSHSB102	(SPARE)
1020L	(SPARE)
(SPARE)	(SPARE)
(SPARE)	(SPARE)
(SPARE)	(SPARE)
(SPARE)	(SPARE)
(SPARE)	(SPARE)
(SPARE)	(SPARE)
END STOP	

LAYOUT AND MARKING FOR TERMINAL BLOCK CTB ON INTERNAL BACK PANEL OF PANEL PCPMOV100



TERMINAL BLOCK TB1 ON INTERNAL BACK PANEL OF PANEL PCPMOV100

APPROX. HALF SCALE



TERMINAL BLOCK CTB ON INTERNAL BACK PANEL OF PANEL PCPMOV100

APPROX. HALF SCALE

TERMINAL BLOCK ITEM DIMENSIONS

FOR ITEM DESCRIPTION SEE B.O.M. DWG. E-95

(F) (G) (H)	1.67"W (42.5mm) x 0.24" THICK (6.2mm)
(J)	1.67"W (42.5mm) x 0.37" THICK (9.5mm)
(K)	1.67"W (42.5mm) x 0.07" THICK (1.8mm)
(N)	3.15"W (80mm) x 0.49" THICK (12.5mm)

WIRE NOTES:

1. ALL WIRE WILL BE NO.16 AWG TYPE MTW(UL)/TEW/TFF UNLESS NOTED OTHERWISE IN THE NOTES OR ON THE DRAWINGS.
2. ALL WIRE WILL BE MARKED ON BOTH ENDS WITH WHITE HEAT SHRINK MARKERS PRINTED IN BLACK WITH A MACHINE. NO HAND WRITTEN OR EXPANDED DOT MATRIX MARKERS OR HAND WRAPPED CLEAR LAMINATION WILL BE ACCEPTABLE. THE NUMBERS AND LETTERS MUST BE LETTER QUALITY WHERE ALL LINES AND SHAPES APPEAR AS SOLID.
3. WHITE INSULATION ON THE WIRE WILL BE USED ONLY FOR NEUTRAL CONDUCTORS AND GREEN WILL BE USED ONLY FOR GROUND CONDUCTORS.
4. MOTOR CIRCUIT PROTECTOR "D" AND STARTER "C" MUST BE UL508 APPROVED AS AN ASSEMBLY BY THE CONTRACTOR. ANY MODIFICATIONS TO BREAKER MANUFACTURER OR TYPE TO HAVE THE BREAKER AND STARTER UL508 APPROVED SHALL BE FURNISHED BY THE CONTRACTOR.

NOTES:

1. ALL TERMINALS SHOWN WITHOUT MARKERS SHALL HAVE A BLANK PHOENIX TYPE ZBM6-CMS MARKER FOR FUTURE MARKING. TYPICAL FOR ALL TERMINAL BLOCKS.

JOB NO. 35157

ENG. BUS. NO. 1587 JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

Last Opened by: 6-24-10 04:07pm DPerry

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MOTORIZED VALVE POWER & CONTROL PANEL PCPMOV100
TERMINAL BLOCKS - LAYOUTS AND DETAILS

VERIFY SCALES
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JOB NO. 7880C.10
DRAWING NO. E-15

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CONDUIT & WIRE SCHEDULE

CONDUIT NO.	SIZE	TYPE	FROM	TO	USE	REMARKS	NO. REQ'D/SIZE	INSULATION TYPE	INSULATION VOLTS
S1 (2)	3" (2)	PVC 80	POWER COMPANY SERVICE POLE AND HAND HOLE	POWER COMPANY METER AT BUILDING	SERVICE ENTRANCE 480V POWER, 3 PHASE, 4 WIRE	ENCASED IN CONCRETE	4–350Kcmil 1–NO.1 GND IN EA. CONDUIT	THHN/ THWN	600
S2 (2)	3" (2)	↓	POWER COMPANY METER AT BUILDING	MCB MAIN CIRCUIT BREAKER INCOMING LUGS	SERVICE ENTRANCE 480V POWER, 3 PHASE, 4 WIRE	ENCASED IN CONCRETE	4–350Kcmil 1–NO.1 GND IN EA. CONDUIT	↓	↓
FDR/MCB/ ATS (2)	3" (2)	PVC 80	MCB MAIN CIRCUIT BREAKER 600A BREAKER	NORMAL FEED AUTOMATIC TRANSFER SWITCH	480V POWER 3 PHASE 3 WIRE		3–350Kcmil 1–NO.1 GND IN EA. CONDUIT		
FDR/ATS/ SWBD1 (2)	3" (2)	↓	LOAD SIDE AUTOMATIC TRANSFER SWITCH	SWBD1 MAIN SWITCHBOARD 600 AMP	480V POWER 3 PHASE 3 WIRE		3–350Kcmil 1–NO.1 GND IN EA. CONDUIT		
P/MCP	3/4"	↓	MCP MAIN CONTROL PANEL	LP1 LIGHTING PANEL	120VAC POWER TO MCP		2–NO.10 1–NO.10 GND		
P/GEN	1"	↓	GENERATOR CONTROL PANEL	LP1 LIGHTING PANEL	120VAC POWER TO GENERATOR HEATERS AND BATTERY CHARGER	ENCASED IN CONCRETE	2–NO.10 4–NO.12 1–NO.10 GND	↓	↓
I/GEN/MCP	1"	RGS/ CONC.	↓	MCP MAIN CONTROL PANEL	GENERATOR INSTRUMENTATION SIGNALS – SPARE CONDUIT	↓	CONDUIT ONLY W/PULL STRING	–	–
C/GEN/MCP	3/4"	PVC 80	↓	MCP MAIN CONTROL PANEL	24VDC DIGITAL INPUTS	↓	8–NO.14	THHN/ THWN	600
S/STANDBY (2)	3" (2)	↓	GENERATOR 600 AMP BREAKER	STANDBY FEED AUTOMATIC TRANSFER SWITCH	480V POWER, 3 PHASE, 3 WIRE	↓	3–350Kcmil 1–NO.1 GND IN EA. CONDUIT	↓	↓
C/GEN/ATS	3/4"	↓	GENERATOR CONTROL PANEL	AUTOMATIC TRANSFER SWITCH	GENERATOR CONTROLS START–STOP–STATUS	↓	10–NO.14 1–NO.14 GND	↓	↓
C/ATS/MCP	3/4"	↓	MCP MAIN CONTROL PANEL	AUTOMATIC TRANSFER SWITCH	24VDC DIGITAL INPUTS ATS STATUS		6–NO.14	↓	↓
I/MCB/MCP	3/4"	RGS	MCB MAIN CIRCUIT BREAKER	MCP MAIN CONTROL PANEL	MCB INSTRUMENTATION SIGNALS 4–20MADC KWH INPUT		(2) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
C/MCB/MCP	3/4"	PVC 80	MCB MAIN CIRCUIT BREAKER	MCP MAIN CONTROL PANEL	24VDC DIGITAL INPUTS PHASE MONITOR STATUS		4–NO.14	THHN/ THWN	600
SWPD1/PM	3/4"	↓	SWBD1 MAIN SWITCHBOARD 30A FUSIBLE SWITCH	SWBD1 MAIN SWITCHBOARD POWER MONITOR, PM	480V 3 PHASE POWER		3–NO.12 1–NO.12 GND	↓	↓
C/SWBD1/ MCP	3/4"	↓	SWBD1 PHASE MONITOR	MCP MAIN CONTROL PANEL	24VDC DIGITAL INPUT PHASE MONITOR STATUS		4–NO.14		
SWBD1/SPD	3/4"	↓	SWBD1 MAIN SWITCHBOARD 30A BREAKER	SWBD1 MAIN SWITCHBOARD SURGE PROTECTOR, SPD	480V 3 PHASE POWER		3–NO.10 1–NO.10 GND	↓	↓
P/LT1	1"	↓	SWBD1 MAIN SWITCHBOARD 45A BREAKER	LT1 LIGHTING TRANSFORMER	480V 3 PHASE POWER		3–NO.8 1–NO.10 GND	↓	↓
P/LP1	1–1/4"	FLEX METAL COND.	LT1 LIGHTING TRANSFORMER	LP1 LIGHTING PANEL	208/120VAC POWER		4–NO.2 1–NO.8 GND	↓	↓
P/LC1	1"	PVC 80	LP1 LIGHTING PANEL CIRCUITS	LC1 LIGHTING CONTACTOR	120VAC POWER		6–NO.12 1–NO.12 GND	↓	↓
MCP/ ANTENNA	1"	PVC 80	MCP MAIN CONTROL PANEL RTU SECTION	TELEMETRY ANTENNA	COAX ANTENNA CABLE		BY TELEMETRY CONTRACTOR		
P/AH–1	3/4"	PVC 80	SWBD1 MAIN SWITCHBOARD 20A BREAKER	A/C AIR HANDLER DSAH1 DISCONNECT SWITCH, THEN TO AH1	480V 3 PHASE POWER		3–NO.12 1–NO.12 GND	THHN/ THWN	600
P/CU–1	3/4"	↓	SWBD1 MAIN SWITCHBOARD 30A BREAKER	A/C COMPRESSOR UNIT DSCU1 DISCONNECT SWITCH, THEN TO CU1	480V 3 PHASE POWER		3–NO.10 1–NO.10 GND	THHN/ THWN	600
P/ENV1	1"	PVC 80	LP1 LIGHTING PANEL	PJB304 JUNCTION BOX IN STAIRWELL	120VAC POWER TO ENVIRONMENTAL PANEL		4–NO.8 1–NO.8 GND	THHN/ THWN	600
P/ENV2	1"	↓	PJB304 JUNCTION BOX IN STAIRWELL	ENVIRONMENTAL CONTROL PANEL	120VAC POWER TO ENV. PANEL AND 120VAC POWER TO ENVIRONMENTAL BLOWER M304		4–NO.8 1–NO.8 GND 3–NO.12	↓	↓
C/MCP/ENV	1"	↓	MCP MAIN CONTROL PANEL	↓	24VDC DIGITAL INPUTS ENVIRONMENTAL CONTROLS PUMP STATION STATUS		24–NO.14	↓	↓
I/MCP/ENV	1"	RGS	MCP MAIN CONTROL PANEL	↓	ENV. INSTRUMENTATION SIGNALS PIT401 DISCHARGE PRESSURE	(2) CABLES SPARE	(3) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
P/VRFM	1"	PVC 80	LP1 LIGHTING PANEL	VEEDER ROOT FUEL MONITOR POWER PULLBOX VRFMPB	120VAC POWER	NO.12 GND, DEDICATED BARRIER GROUNDING IN VRFM CONSOLE	4–NO.14 1–NO.14 GND 1–NO.12 GND	THHN/ THWN	600
P/VRFM/ CONSOLE	3/4"	↓	VEEDER ROOT FUEL MONITOR POWER PULLBOX VFFMPB	VEEDER ROOT FUEL MONITOR CONSOLE	120VAC POWER		2–NO.14 1–NO.14 GND 1–NO.12 GND	↓	↓
P1/VRFM/ GFTK	1"	↓	↓	FUEL TANK OVERFILL ALARM POWER PULLBOX PPBGFTK	120VAC POWER TO ALARMS AND ALARM RELAY TO CONSOLE		4–NO.14 1–NO.14 GND	↓	↓
P2/VRFM/ GFTK	1"	↓	↓	FUEL TANK OVERFILL ALARM POWER PULLBOX PPBGFTK	SPARE CONDUIT		PULL STRING ONLY	–	–
C/VRFM/ MCP	3/4"	↓	VEEDER ROOT FUEL MONITOR CONSOLE	MCP MAIN CONTROL PANEL	24VDC DIGITAL INPUT TO MCP PLC GENERATOR FUEL LEVEL LOW		2–NO.14 PLUS ONE PULL STRING	THHN/ THWN	600
I1/VRFM	1"	↓	↓	VEEDER ROOT FUEL MONITOR SIGNAL PULLBOX IPBVRFM	MAG PLUS INVENTORY PROBE AND INTERSTATIAL LEAK SENSOR CABLES		(2) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
I2/VRFM	1"	↓	↓	VEEDER ROOT FUEL MONITOR SIGNAL PULLBOX IPBVRFM	SPARE CONDUIT		PULL STRING ONLY	–	–
I1/VRFM/ GFTK	1"	↓	VEEDER ROOT FUEL MONITOR SIGNAL PULLBOX IPBVRFM	GENERATOR FUEL TANK SIGNAL PULLBOX IPBGFTK	MAG PLUS INVENTORY PROBE AND INTERSTATIAL LEAK SENSOR CABLES	(2) SPARE CABLES TO COIL UP IN BOXES IPBVRFM AND IPBGFTK	(4) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
I2/VRFM/ GFTK	1"	↓	VEEDER ROOT FUEL MONITOR SIGNAL PULLBOX IPBVRFM	GENERATOR FUEL TANK SIGNAL PULLBOX IPBGFTK	SPARE CONDUIT		PULL STRING ONLY	–	–

CONDUIT & WIRE SCHEDULE

CONDUIT NO.	SIZE	TYPE	FROM	TO	USE	REMARKS	NO. REQ'D/SIZE	INSULATION TYPE	INSULATION VOLTS
FDR/M301	2–1/2"	PVC 80	SWBD1 MAIN SWITCHBOARD 225A BREAKER	VFD1 CABINET IN ELECTRICAL ROOM	480V POWER 3 PHASE		3–NO.4/0 1–NO.4 GND	THHN/ THWN	600
P/M301	3"	↓	VFD1 CABINET IN ELECTRICAL ROOM	PUMP CHAMBER ENVIRONMENTAL CONTROL PANEL FOR PUMP M301	480V POWER 3 PHASE	NOTE 3	3–NO.2/0 1–NO.4 GND	EPR/ HYPALON THHN/THWN	2000 600
C/VFD1/MCP	1"	↓	↓	MCP MAIN CONTROL PANEL	PUMP MOTOR M301 CONTROLS DIGITAL INPUTS AND OUTPUTS		20–NO.14	THHN/ THWN	600
I/VFD1/MCP	1"	RGS	↓	MCP MAIN CONTROL PANEL	INSTRUMENTATION SIGNALS ANALOG SPEED AND CURRENT		(4) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
FDR/M302	2–1/2"	PVC 80	SWBD1 MAIN SWITCHBOARD 225A BREAKER	VFD2 CABINET IN ELECTRICAL ROOM	480V POWER 3 PHASE		3–NO.4/0 1–NO.4 GND	THHN/ THWN	600
P/M302	3"	↓	VFD2 CABINET IN ELECTRICAL ROOM	PUMP CHAMBER ENVIRONMENTAL CONTROL PANEL FOR PUMP M302	480V POWER 3 PHASE	NOTE 3	3–NO.2/0 1–NO.4 GND	EPR/ HYPALON THHN/THWN	2000 600
C/VFD2/MCP	1"	↓	↓	MCP MAIN CONTROL PANEL	PUMP MOTOR M302 CONTROLS DIGITAL INPUTS AND OUTPUTS		20–NO.14	THHN/ THWN	600
I/VFD2/MCP	1"	RGS	↓	MCP MAIN CONTROL PANEL	INSTRUMENTATION SIGNALS ANALOG SPEED AND CURRENT		(4) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
FDR/M303	2–1/2"	PVC 80	SWBD1 MAIN SWITCHBOARD 225A BREAKER	VFD3 CABINET IN ELECTRICAL ROOM	480V POWER 3 PHASE		3–NO.4/0 1–NO.4 GND	THHN/ THWN	600
P/M303	3"	↓	VFD3 CABINET IN ELECTRICAL ROOM	PUMP CHAMBER ENVIRONMENTAL CONTROL PANEL FOR PUMP M303	480V POWER 3 PHASE	NOTE 3	3–NO.2/0 1–NO.4 GND	EPR/ HYPALON THHN/THWN	2000 600
C/VFD3/MCP	1"	↓	↓	MCP MAIN CONTROL PANEL	PUMP MOTOR M303 CONTROLS DIGITAL INPUTS AND OUTPUTS		20–NO.14	THHN/ THWN	600
I/VFD3/MCP	1"	RGS	↓	↓	INSTRUMENTATION SIGNALS ANALOG SPEED AND CURRENT		(4) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600
P/M304	3/4"	PVC 80	ENVIRONMENTAL BLOWER M304 JUNCTION BOX PJB304 IN THE STAIRWELL	ENVIRONMENTAL BLOWER M304 DISCONNECT SWITCH DS304 THEN TO BLOWER MOTOR	480V POWER 3 PHASE		3–NO.12 1–NO.12 GND	THHN/ THWN	600
C/M304	3/4"	PVC 80	MCP MAIN CONTROL PANEL	ENVIRONMENTAL BLOWER DS304 DISCONNECT SWITCH	BLOWER MOTOR M304 DISCONNECT AUX. CONTACT DIGITAL INPUT		2–NO.14	THHN/ THWN	600
P/PCP MOV100	3/4"	PVC 80	SWBD1 MAIN SWITCHBOARD 30A BREAKER	MOTORIZED VALVE POWER AND CONTROL PANEL PCPMOV100	480V POWER 3 PHASE		3–NO.10 1–NO.10 GND	THHN/ THWN	600
C/PCP MOV100	1–1/4"	↓	MOTORIZED VALVE POWER AND CONTROL PANEL PCPMOV100	MCP MAIN CONTROL PANEL	PCPMOV100 CONTROLS FOR FCV101 AND FCV102		26–NO.14 1–NO.14 GND	↓	↓
P/FCV101	3/4"	↓	↓	FCV101 DISCONNECT SWITCH THEN TO MOTORIZED VALVE FCV101	480V POWER 3 PHASE		3–NO.12 1–NO.12 GND	↓	↓
C/FCV101	1"	↓	↓	CONTROL JUNCTION BOX CJBFCV101 THEN TO MOTORIZED VALVE FCV101 AND DISCONNECT DS101	FCV101 CONTROLS AND MOTOR HEATER		20–NO.14 1–NO.14 GND	↓	↓
P/FCV102	3/4"	↓	↓	FCV102 DISCONNECT SWITCH THEN TO MOTORIZED VALVE FCV102	480V POWER 3 PHASE		3–NO.12 1–NO.12 GND	↓	↓
C/FCV102	1"	↓	↓	CONTROL JUNCTION BOX CJBFCV102 THEN TO MOTORIZED VALVE FCV102 AND DISCONNECT DS102	FCV102 CONTROLS AND MOTOR HEATER		20–NO.14 1–NO.14 GND	↓	↓
C/LSL/LD /MCP	3/4"	PVC 80	MCP MAIN CONTROL PANEL	CJBFUEL CONTROL JUNCTION BOX AT GENERATOR FUEL TANK	LSL/LPS GENERATOR FUEL TANK LOW LEVEL SWITCH/ LEAK DETECTOR SWITCH		8–NO.14 1–NO.14 GND	THHN/ THWN	600
P/HOIST	3/4"	PVC 80	SWBD1 MAIN SWITCHBOARD 20A BREAKER	MONORAIL HOIST TERMINATION JUNCTION BOX	480V POWER 3 PHASE		3–NO.12 1–NO.12 GND	THHN/ THWN	600
P/MH300	3/4"	PVC 80	ENVIRONMENTAL PANEL	PJBMH300 POWER J–BOX ABOVE CABINET FOR SPLIT TO VFD301, VFD302 AND VFD303	120VAC POWER TO BOOSTER PUMP MOTOR HEATERS VIA ENVIRONMENTAL PANEL		6–NO.12 1–NO.12 GND	THHN/ THWN	600
P/MH301	3/4"	↓	PJBMH300 POWER J–BOX ABOVE CABINET FOR SPLIT TO VFD301, VFD302 AND VFD303	VFD1 CABINET IN ELECTRICAL ROOM	↓		2–NO.12 1–NO.12 GND	↓	↓
P/MH302	3/4"	↓	↓	VFD2 CABINET IN ELECTRICAL ROOM	↓		2–NO.12 1–NO.12 GND	↓	↓
P/MH303	3/4"	↓	↓	VFD3 CABINET IN ELECTRICAL ROOM	↓		2–NO.12 1–NO.12 GND	↓	↓
I/PIT101	1"	PVC 80	MCP MAIN CONTROL PANEL	BOOSTER PUMP STATION SUCTION LINE PRESSURE TRANSMITTER PIT101	4–20mA SIGNAL TO MCP ANALOG INPUT	(1) CABLE SPARE	(2) 2/C NO.18 SHLD TC, HWC HW1010180 AND 1–NO.14 GND	PVC/PVC THHN/ THWN	300 600

NOTES :

1. ALL WIRING INCLUDING LOW VOLTAGE CONTROL, DATA AND INSTRUMENTATION CABLES SHALL BE LISTED SUITABLE FOR USE IN WET LOCATIONS, AS DEFINED BY THE NEC, WHERE INSTALLED IN RACEWAYS BELOW GRADE. ALL CABLES USED IN NEC DEFINED WET LOCATIONS MUST BE ACCEPTABLE TO THE MANATEE COUNTY BUILDING DIVISION AND THE CITY OF BRADENTON. ALL WIRING INSTALLED BY THE CONTRACTOR THAT IS NOT ACCEPTABLE TO THE MANATEE COUNTY BUILDING DIVISION AND THE CITY OF BRADENTON, SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE FOR LABOR AND MATERIAL.
2. THE MAIN CONDUIT AND CABLE RUNS ONLY ARE SHOWN ON THIS DRAWING SCHEDULE. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL INTERCONNECTION POWER, CONTROL AND INSTRUMENTATION CABLES AND CONDUITS REQUIRED TO COMPLETE THE INSTALLATION AND MAKE IT AN INTEGRATED OPERATING SYSTEM. THE INTERCONNECTION CONDUITS AND CABLES SHALL INCLUDE, BUT NOT BE LIMITED TO, THOSE DETAILED ON EQUIPMENT, CONTROL, POWER AND INSTRUMENTATION SUBMITTALS PRESENTED BY THE CONTRACTOR DURING CONSTRUCTION, THAT ARE NOT SHOWN ON THE DRAWINGS.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL 2000 VOLT INSULATED CABLE FOR THE BOOSTER PUMP MOTOR FEEDERS. THE PHASE CONDUCTORS SHALL BE NO.2/0 AWG DLO CABLE, ANIXTER PART NO. 5N–2021 OR APPROVED EQUAL. THE GROUNDING CONDUCTOR MAY BE 600V, TYPE THHN/THWN.

JOB NO. 35157

ENG. BUS. NO. 1567 JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

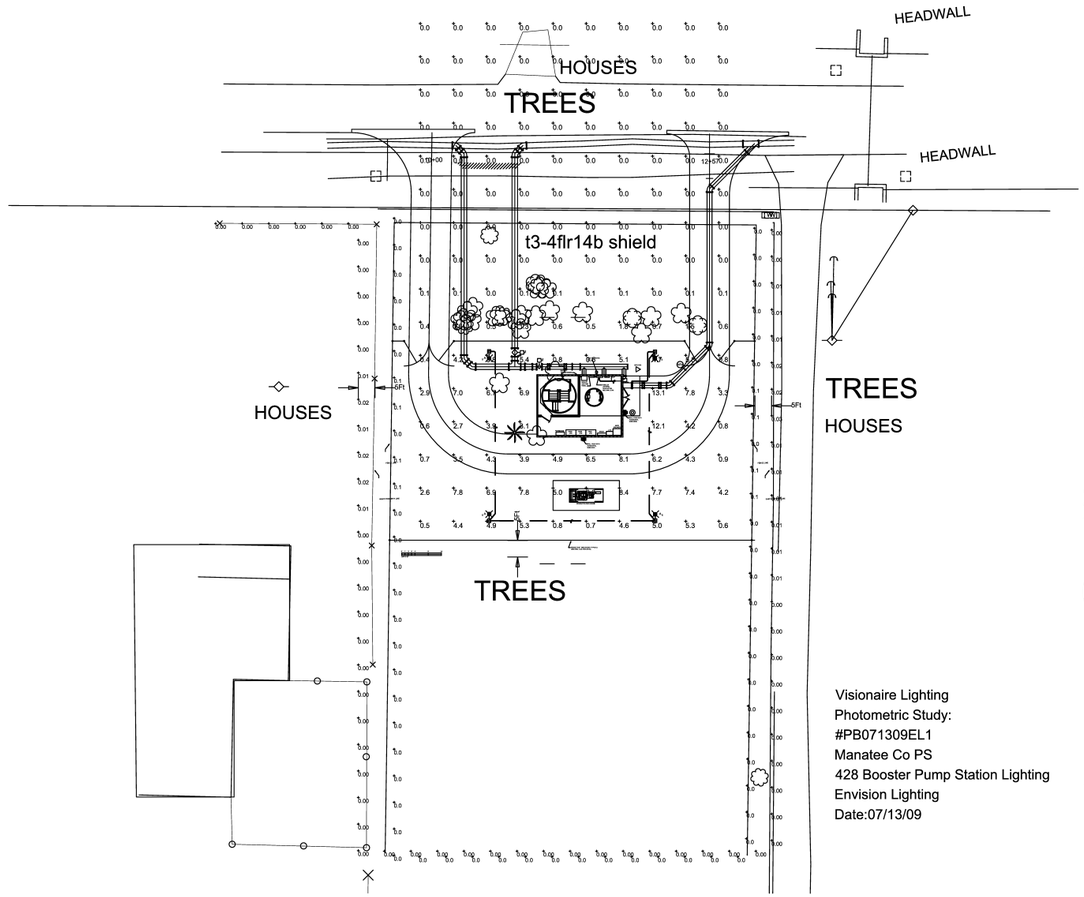
MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL
CABLE AND CONDUIT SCHEDULE

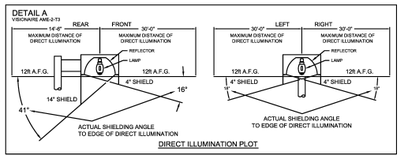
VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

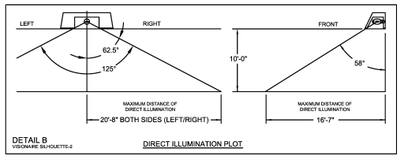
JOB NO. 7880C.10
DRAWING NO. E-16

Last Copied by: 6-24-10 04:07pm DPerry

FILENAME: Last Saved By: cad 5-28-10 01:32pm C:\Documents and Settings\DPerry\Desktop\ps428\E-16 XREFS: 3624bdr







SITE PLAN

SCALE

THE FIXTURES ON THIS LAY-OUT HAVE BEEN APPROVED BY THE IDA.

BASED ON THE INFORMATION PROVIDED, ALL DIMENSIONS AND LUMINAIRE LOCATIONS SHOWN REPRESENT RECOMMENDED POSITIONS. THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING OR FUTURE FIELD CONDITIONS.

THIS LIGHTING PATTERN REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY CONDITIONS TAKEN UNDER CONTROLLED CONDIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY OF AMERICA APPROVED METHODS. ACTUAL PERFORMANCE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERENCE IN LAMPS, AND OTHER VARIABLE CONDITIONS. It is the responsibility of the owner to ensure compliance to all standards in effect

Visionaire Lighting
Photometric Study:
#PB071309EL1
Manatee Co PS
428 Booster Pump Station Lighting
Envision Lighting
Date:07/13/09

VISIONAIRE LIGHTING
Performance In A Whole New Light

Luminaire Schedule

Symbol	Qty	Label	Arrangement	Lumens	LLF	Description
	4	A	SINGLE	16000	1.000	Visionaire American AME-2 T3-150PS-Single @ 12' mtg. ht. 14_3-sided sh
	2	B	SINGLE	9500	1.000	Visionaire Silhouette SIL-2 T3-100HPS-WALL MOUNT @ 10' mtg ht.

Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts	Illuminance	Fc	1.65	13.1	0.0	N.A.	N.A.
Leeds Line	Illuminance	Fc	0.01	0.01	0.00	N.A.	N.A.
Property Line	Illuminance	Fc	0.01	0.1	0.0	N.A.	N.A.

File name: PB071309EL2

www.visionairelighting.com
Phone: (310) 512-6480 Fax: (310) 512-6486
19645 Rancho Way-Rancho Domiguez, CA. 90220

POINT-BY-POINT CALCULATION
Illuminance at Grade (Footcandles)

VISIONAIRE LIGHTING
Performance In A Whole New Light

PROJECT NAME: Manatee Co PS 428 Booster Pump Station Lighting

LIGHTING LAY-OUT CALCULATION BY:
LIGHTING ENGINEER: LEE HALDEMAN
Email: jdaldeman@visionairelighting.com

REV:

DRAWING:
PB071309EL2

DATE:
13July09

NOTE :

THE ELECTRICAL ENGINEER OF RECORD DOES NOT CERTIFY THIS DRAWING OR THE LIGHTING CALCULATIONS DEPICTED. THE INFORMATION ON THIS SHEET IS PROPRIATARY TO VISIONAIRE LIGHTING AND IS INCLUDED WITH THE PROJECT DRAWINGS FOR REVIEW BY THE MANATEE COUNTY PLANNING DEPARTMENT

Last Opened by: 6-04-10 04:07pm DPerry

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010
PROJECT ENGINEER

FILENAME: Last Saved By: cad 5-28-10 04:10pm C:\Documents and Settings\DPerry\Desktop\ps428IE-17 XREFS: 3624bdr

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL
AREA LIGHTING CALCULATIONS

VERIFY SCALES
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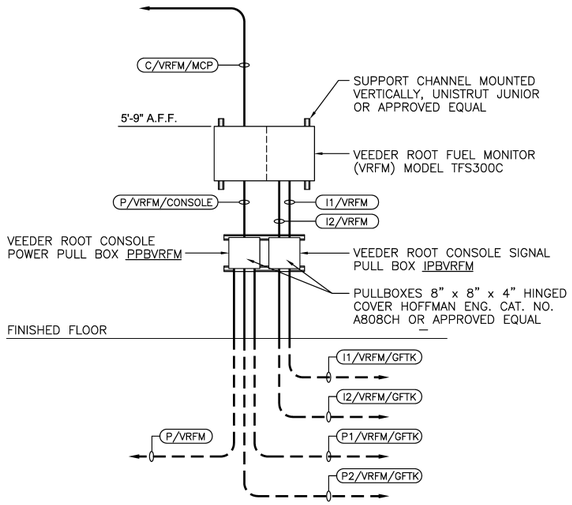
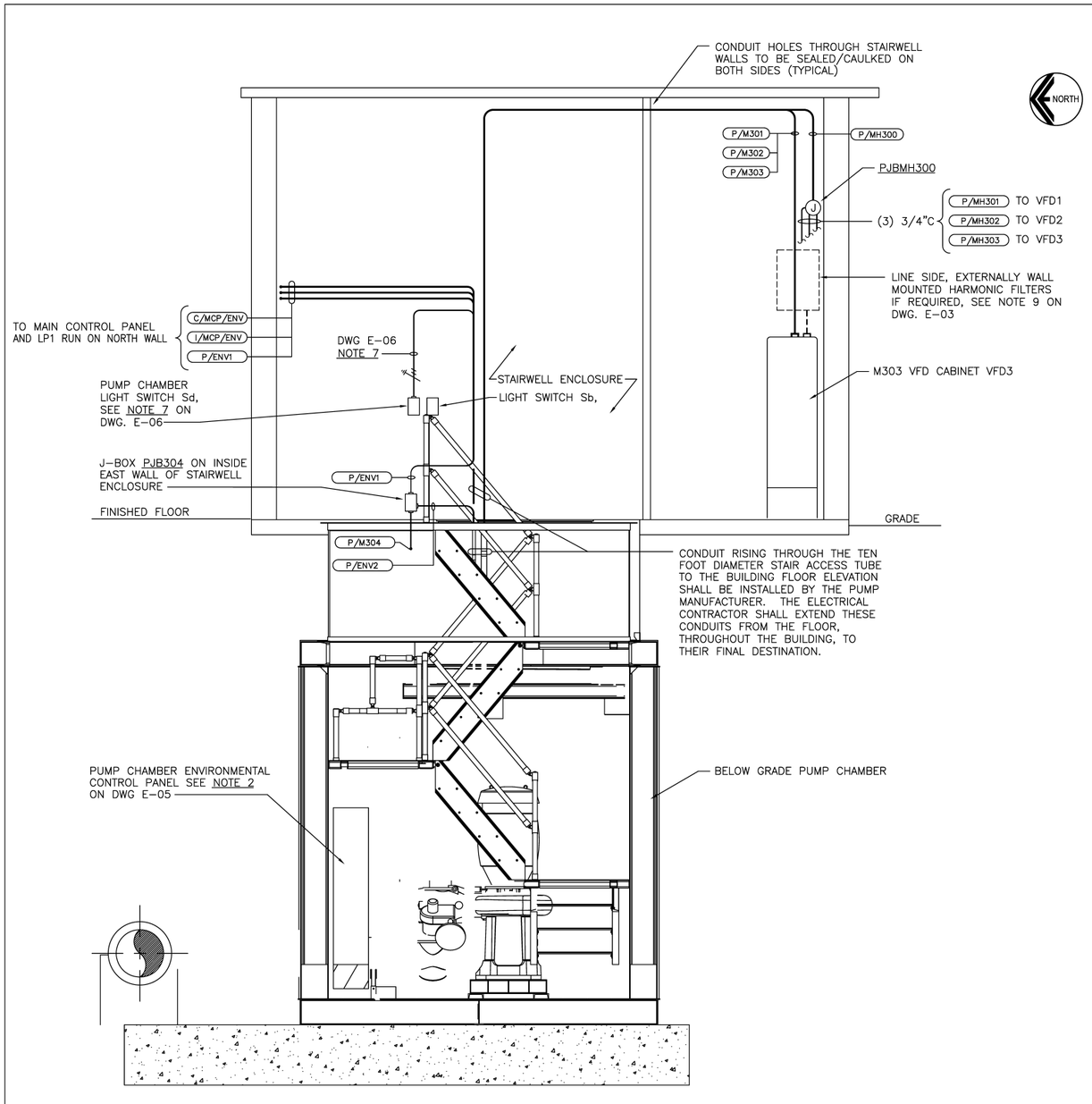
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. E-17



B VEEDER ROOT FUEL MONITOR MOUNTING DETAIL
DRAWING E-05 N.T.S.



A ELECTRICAL BUILDING AND PUMP CHAMBER SECTION LOOKING EAST
SCALE ½" = 1'-0"

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING
P.O. BOX 5106 LAKELAND, FLORIDA 33807

Last Opened by: 6-04-10 04:07pm DPerry

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN DLA
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
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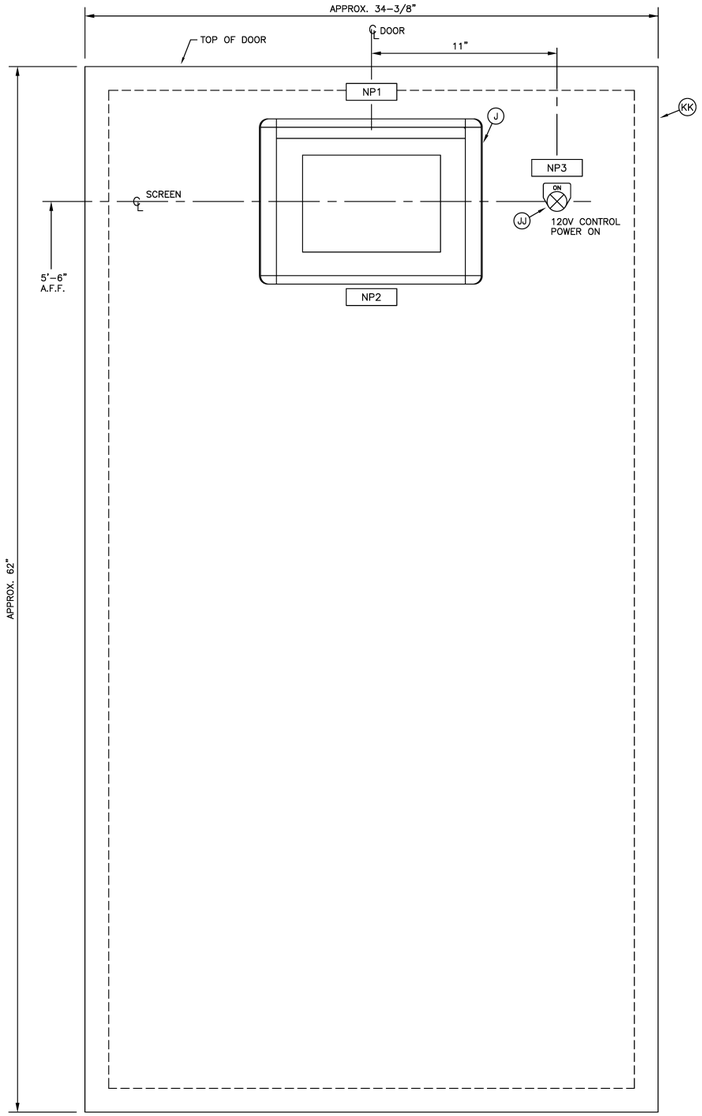
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL BUILDING ELEVATION

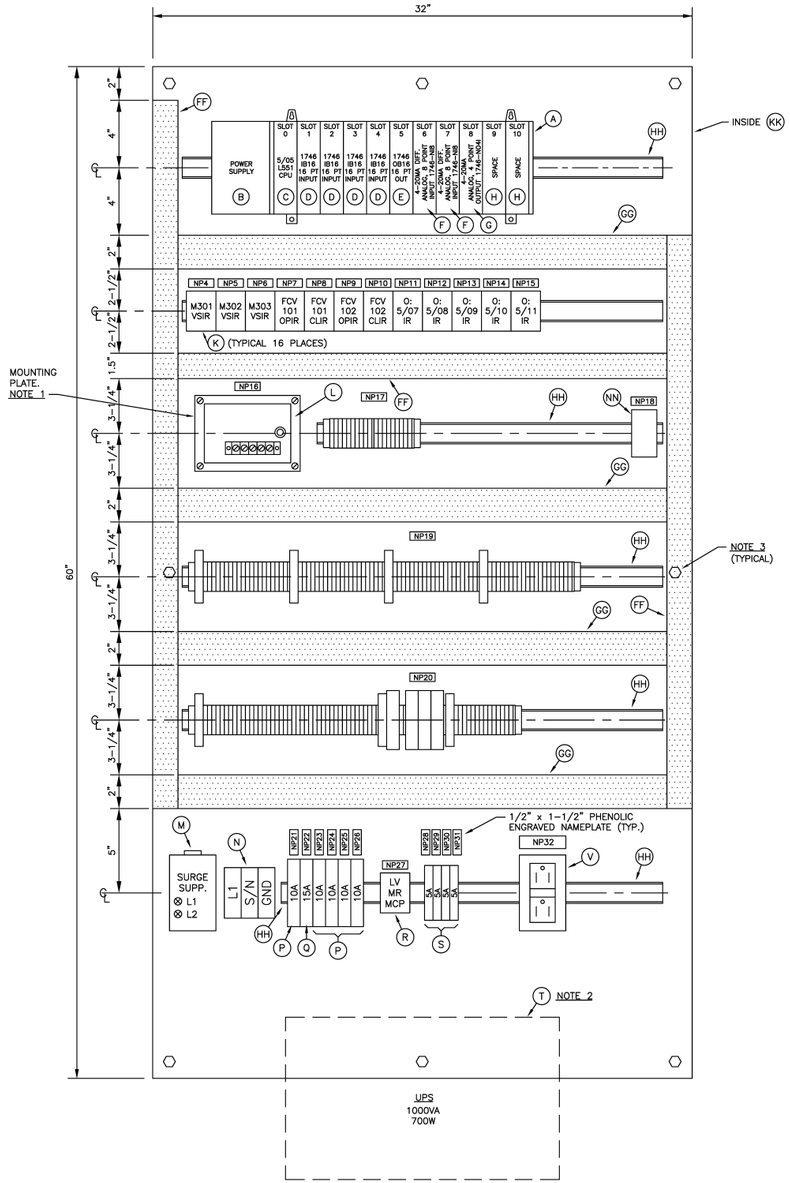
VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. E-18

FILENAME: Last Saved By: cad 5-28-10 01:34pm C:\Documents and Settings\DPerry\Desktop\ps428\E-18 XREFS: 7880C10-03-010-101; 3624bdr



MCP DOOR FRONT LAYOUT
SCALE: 1/4" = 1'-0"



MCP INTERNAL BACK PANEL LAYOUT
SCALE: 1/4" = 1'-0"

NOTES:

1. PANEL FABRICATOR WILL FURNISH AND INSTALL A 4-1/2" x 6-1/4" x 1/8" ALUMINUM PLATE TO THE BACK OF ITEM "L" POWER SUPPLY FOR MOUNTING THE POWER SUPPLY TO THE BACK PLATE WITH FRONT ACCESSIBLE SCREWS.
2. UPS POWER SUPPLY SHALL BE LOCATED ON THE INSIDE BOTTOM OF THE ENCLOSURE. THE UPS UNIT IS 9.6" HIGH, 6.2" WIDE, 16.2" LONG AND WEIGHS 35 LBS.
3. BOTTOM OF WIREWAY SHALL HAVE CUTOUTS FOR BACK PANEL MOUNTING BOLTS AS REQUIRED.
4. FOR TERMINAL BLOCK DETAILS, SEE DWG. N-03.
5. FOR BILL OF MATERIALS AND NAMEPLATE SCHEDULE, SEE DWG. N-02.
6. FURNISH A 11" x 17" LAMINATED PANEL WIRING SCHEMATIC PERMANENTLY ATTACHED TO THE INTERIOR OF THE PANEL DOOR.
7. ALL CONTROL PANELS SHALL BE UL508 LISTED AND LABELED AS A COMPLETED ASSEMBLY. THE PANEL FABRICTOR SHALL FURNISH AND INSTALL ALL ITEMS NOT SPECIFICALLY DETAILED IN THE DRAWINGS REQUIRED TO HAVE THE PANELS UL LISTED AND LABELED. ALL INSPECTIONS, APPROVALS AND MODIFICATIONS REQUIRED TO HAVE THE COMPLETED PANEL LABELED AND LISTED BY UL SHALL BE FURNISHED BY, AND THE RESPONSIBILITY OF, THE PANEL FABRICATOR AND CONTRACTOR.
8. WHITE INSULATION ON THE WIRE SHALL BE USED ONLY FOR NEUTRAL CONDUCTORS AND GREEN SHALL BE USED ONLY FOR GROUND CONDUCTORS.
9. ALL CONTROL WIRE SHALL BE NO.16 AWG TYPE TFF OR MTW UNLESS NOTED AS LARGER IN THE NOTES OR ON THE DRAWINGS. ALL POWER WIRING SHALL BE A MINIMUM OF NO.12 AWG TYPE THHN/THWN AND AS SIZED ON THE CONDUIT AND CABLE SCHEDULE.
10. WIREWAY TO BE FILLED TO ONLY 50% CAPACITY INSIDE THE PANEL.
11. ALL WIRE SHALL BE MARKED ON BOTH ENDS WITH WHITE HEAT SHRINK MARKERS PRINTED IN BLACK WITH A MACHINE. NO HAND WRITTEN OR EXPANDED DOT MATRIX MARKERS WITH HAND WRAPPED CLEAR LAMINATION SHALL BE ACCEPTABLE. THE NUMBERS AND LETTERS MUST BE LETTER QUALITY WHERE ALL LINES AND SHAPES APPEAR AS SOLID.

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN JP
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MAIN CONTROL PANEL MCP
PANEL LAYOUT AND DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. N-01

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FILENAME: Last Saved By: cad 5-28-10 01:36pm C:\Documents and Settings\DPerry\Desktop\ps428\N-01 XREFS: 3624bdr

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
A	1	PLC I/O CHASSIS ASSEMBLY FOR I/O MODULES WITH CHASSIS INTERCONNECT CABLE IF REQUIRED.
B	1	POWER SUPPLY FOR PLC.
C	1	PROCESSOR MODULE WITH 64K WORDS MEMORY.
D	6	12 POINT, 24 VOLTS DC, (10–30VDC) INPUT MODULE.
E	1	12 POINT, 24 VOLTS DC (10–50VDC) OUTPUT MODULE.
F	3	4 POINT, +/–10VDC OR +/–20MADC, ANALOG INPUT MODULE.
G	2	4 POINT, 0–20MADC ANALOG OUTPUT MODULE.
H	AS REQ'D	EMPTY SLOT FILLER.
J	1	OPERATOR INTERFACE TERMINAL (OIT), COLOR TOUCH SCREEN WITH COMMUNICATION CABLE TO PLC.
K	12	24VDC COIL, DPDT RELAY WITH A LIGHT ACROSS THE COIL, AN EIGHT (8) PIN ROUND PLUG–IN BASE AND A COLOR CODED ENCAPSULATED COIL. SQUARE D CLASS 8501 TYPE KPD12P14–V53 WITH AN OMRON NO. PF083A SOCKET. (OR APPROVED EQUAL)
L	1	24 VOLT DC, 10 AMPERE OUTPUT, 120 VOLT, 50–400HZ INPUT POWER SUPPLY WITH SCREW TERMINALS FOR INPUT & OUTPUT CONNECTIONS AND A SURFACE MOUNTING CASE. ACOPIAN NO. U24Y1000. (OR APPROVED EQUAL)
M	1	SINGLE PHASE, 120/240VAC, FAIL–SAFE AND FUSED, STATUS INDICATING, SOLID STATE, UL LISTED, LESS THAN 5 NANOSECONDS RESPONSE TIME SURGE PROTECTOR WITH 40K AMPS MAXIMUM SURGE CAPACITY, 360 JOULES MAXIMUM ENERGY ABSORPTION, MAXIMUM ALLOWABLE L–N VOLTAGE OF 150V RMS AND AN INTIAL CLAMPING VOLTAGE OF 240 VOLTS NOMINAL. EDCO MODEL EMC–240B. (OR APPROVED EQUAL)
N	1	3 POLE POWER DISTRIBUTION TERMINAL BLOCK WITH MAIN TERMINALS FOR ONE (1) NO.14–2/0 AND BRANCH TERMINALS FOR SIX (6) NO.14–4 CABLES. SQUARE D CLASS 9080 TYPE LBA362106. (OR APPROVED EQUAL)
P	5	10 AMP, 240VAC MAXIMUM, SINGLE POLE, THERMAL MAGNETIC, DIN RAIL MOUNT CIRCUIT BREAKER. SQUARE D CLASS 720, CAT. NO. QOU110. (OR APPROVED EQUAL)
Q	1	15 AMP, 240VAC MAXIMUM, SINGLE POLE, THERMAL MAGNETIC, DIN RAIL MOUNT CIRCUIT BREAKER. SQUARE D CLASS 720, CAT. NO. QOU115. (OR APPROVED EQUAL)
R	1	SINGLE PHASE VOLTAGE BAND, UNDER AND OVER VOLTAGE LIMIT MONITOR RELAY FOR 120VAC NOMINAL SYSTEM. UNDER VOLTAGE RANGE OF 90–120VAC, AND OVER VOLTAGE OF 120–150VAC, OCTAL BASE, AND LOCKNUT ADJUSTMENT. DIVERSIFIED ELECTRONICS MODEL VBA–120–ALA WITH AN OMRON NO. PF083A SOCKET. (OR APPROVED EQUAL)
S	4	5 AMP, 240VAC MAXIMUM, SINGLE POLE, THERMAL MAGNETIC, DIN RAIL MOUNT CIRCUIT BREAKER WITH A TRIP RESET BUTTON AND "OFF–ON" BUTTON. E.T.A. NO. 42–01–5A. (OR APPROVED EQUAL)
T	1	1000VA/700W, 120VAC, 8.3 AMPS, LINE–INTERACTIVE UPS WITH HOT–SWAPPABLE SEALED, MAINTENANCE–FREE, LEAD–ACID BATTERY. POWERWARE NO. PW9120–1000 (OR APPROVED EQUAL)
U	32	BLACK PHENOLIC NAMEPLATES ENGRAVED TO SHOW WHITE LETTERS, THE SIZE AND ENGRAVING AS SHOWN ON THE SCHEDULES.
V	1	15 AMP, 125 VOLT, GROUND FAULT INDICATION (GFI) RECEPTACLE IN A DIN RAIL UTILITY BOX. THE RECEPTACLE IS HUBBELL NO. DRUBGF115. (OR APPROVED EQUAL)
W	AS REQ'D	PHOENIX TYPE UK5N, PART NO. 3004362 COMPRESSION CLAMP TERMINAL BLOCK, 6.2mm WIDE, NO.10–24 AWG WIRE, GRAY BODY. THE TERMINALS WILL BE MARKED AS PER THE DRAWINGS WITH COMPUTER PRINTED, VERTICAL MARKED TYPE ZBM6–CMS MARKERS. (OR APPROVED EQUAL)
X	AS REQ'D	PHOENIX TYPE UK5NBU, PART NO. 3004388 COMPRESSION CLAMP TERMINAL BLOCK, 6.2mm WIDE, NO.10–24 AWG WIRE, BLUE BODY. SAME MARKERS AS ITEM "W". (OR APPROVED EQUAL)
Y	AS REQ'D	PHOENIX TYPE USLKG5, PART NO. 0441504 COMPRESSION CLAMP GROUNDING TERMINAL BLOCK, 6.2mm WIDE, NO.10–24 AWG WIRE, GREEN AND YELLOW BODY. SAME MARKERS AS ITEM "W". (OR APPROVED EQUAL)
Z	AS REQ'D	PHOENIX TYPE E/UK, PART NO. 1201442 END STOP. (OR APPROVED EQUAL)

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
AA	9	PHOENIX TYPE D–UK4/10, NO. 3003020 GRAY END SECTION FOR TYPE UK5N TERMINALS. (OR APPROVED EQUAL)
BB	6	PHOENIX TYPE FBI10–6, 10 POLE JUMPER BAR WITH TEN (10) SCREWS FOR TYPE UK5N TERMINALS, PART NO. 0203250. (OR APPROVED EQUAL)
CC	4	PHOENIX PLUGGABLE SURGE PROTECTOR FOR TWO (2) 4–20MADC SIGNALS, MCR–PLUGTRAB PT SERIES, CAT. NO. 2838228, TYPE PR2X2–24DC–ST AND CAT. NO. 2639208, TYPE PT2X2–BE BASE. (OR APPROVED EQUAL)
DD	AS REQ'D	2 AMP, 240VAC MAXIMUM, SINGLE POLE, THERMAL MAGNETIC, DIN RAIL MOUNT CIRCUIT BREAKER WITH A TRIP RESET BUTTON AND "OFF–ON" BUTTON. E.T.A. NO. 42–01–2A. (OR APPROVED EQUAL)
EE	AS REQ'D	8 AMP, SAME AS ITEM "DD". E.T.A. CAT. NO. 42–01–8A. (OR APPROVED EQUAL)
FF	2	1–1/2" WIDE x 3" HIGH, 6' LONG, WHITE PVC, SLOTTED SIDE WIRING DUCT WITH 1–1/2" WIDE SOLID PVC COVER. THE WIRING DUCT IS PANDUIT NO. E1.5X3WH6 AND THE COVER IS NO. C1.5WH6. (OR APPROVED EQUAL)
GG	2	2" WIDE x 3" HIGH, 6' LONG, WHITE PVC, SLOTTED SIDE WIRING DUCT WITH 2" WIDE SOLID PVC COVER. THE WIRING DUCT IS PANDUIT NO. E2X3WH6 AND THE COVER IS NO. C2WH6. (OR APPROVED EQUAL)
HH	6	3' LENGTH OF ALUMINUM DIN RAIL, PRE–DRILLED, 2–1/4" ELEVATED TOP HAT RAIL FOR OMRON TYPE PF SERIES RELAY SOCKETS. ALLEN–BRADLEY CAT. NO. 1492–DR6. (OR APPROVED EQUAL)
JJ	1	NEMA TYPE 4X/13, CORROSION RESISTANT, 120VAC, TRANSFORMER TYPE, 30mm INDICATING LIGHT WITH A GREEN GLASS LENS AND A "POWER ON" LEGEND PLATE. INDICATING LIGHT IS SQUARE D CLASS 9001 TYPE KT1G31 AND THE LEGEND IS NO. KN338. (OR APPROVED EQUAL)
KK	1	ENCLOSURE, NEMA 12, FREE STANDING, SINGLE ACCESS WITH HINGED FRONT DOOR WITH LOCKABLE 3–POINT LATCH, SUITABLE FOR FUTURE SIDE PANEL MOUNTING, HOFFMAN ENGINEERING CAT. NO. A–72361BFS WITH 60" x 32" BACK PANEL CAT. NO. A–72P36F1, 6" HIGH FLOOR STANDING KIT CAT. NO. A–FK0618 AND LIGHTING PACKAGE CAT. NO. A–LF16D24. (OR APPROVED EQUAL)
LL	1	FLUORESCENT LAMP FOR ITEM A–LF16D24 NO. F20T12/CW. (OR APPROVED EQUAL)

NAMEPLATE SCHEDULE

N.P. NO.	FIRST LINE	SECOND LINE	THIRD LINE	SIZE
1	PUMP STATION	MAIN CONTROL PANEL	MCP	1" x 3"
2	OPERATOR INTERFACE	TERMINAL OIT		↓
3	CONTROL POWER			↓
4	M301VSIR			1/2" x 1–1/2"
5	M302VSIR			↓
6	M303VSIR			↓
7	FCV1010PIR			↓
8	FCV101CLIR			↓
9	FCV1020PIR			↓
10	FCV102CLIR			↓
11	O:4/07IR			↓
12	O:4/08IR			↓
13	O:4/09IR			↓
14	O:4/10IR			↓
15	O:4/11IR			↓
16	24VDCPS			↓
17	24VDC TB			↓
18	ETHERNET SWITCH			↓
19	TB1			↓
20	TB2			↓
21	MLB	MAINTENANCE LIGHT		↓
22	CCB	CONTROL POWER		↓
23	GFRB	PANEL RECEPTACLE		↓
24	SPARE			↓
25	SPARE			↓
26	FUEL ALARMS			↓
27	LVMRMCP	LOW VOLTAGE MONITOR		↓
28	24VDCPS			↓
29	PLC			↓
30	PMMCB	MCB POWER MONITOR		↓
31	PMSWBD1	SWBD1 POWER MONITOR		↓
32	15A GFCI	120VAC RECEPTACLE		1" x 3"

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN JP
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

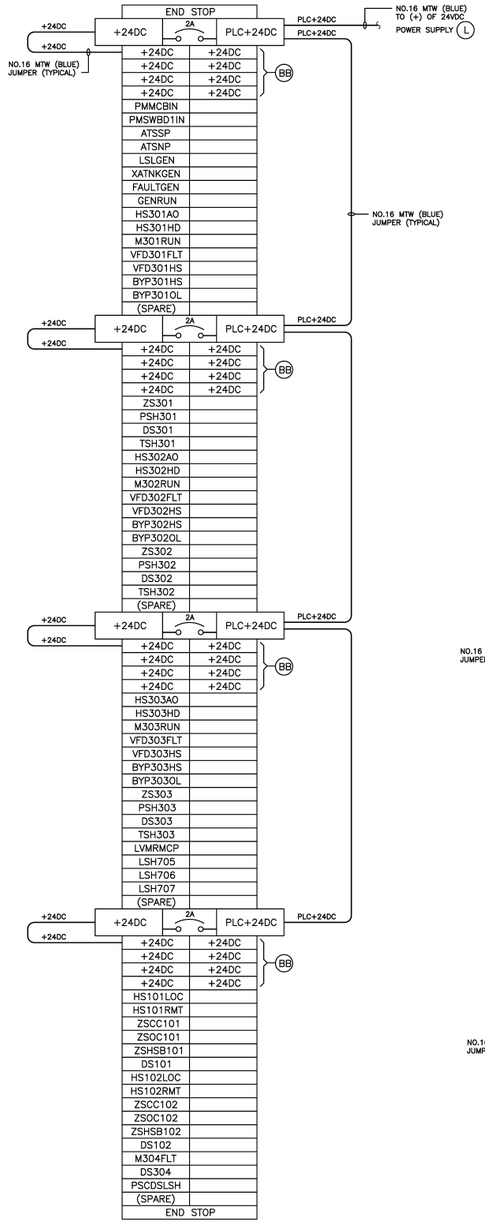
MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MAIN CONTROL PANEL MCP
BILL OF MATERIALS AND NAMEPLATE SCHEDULE

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

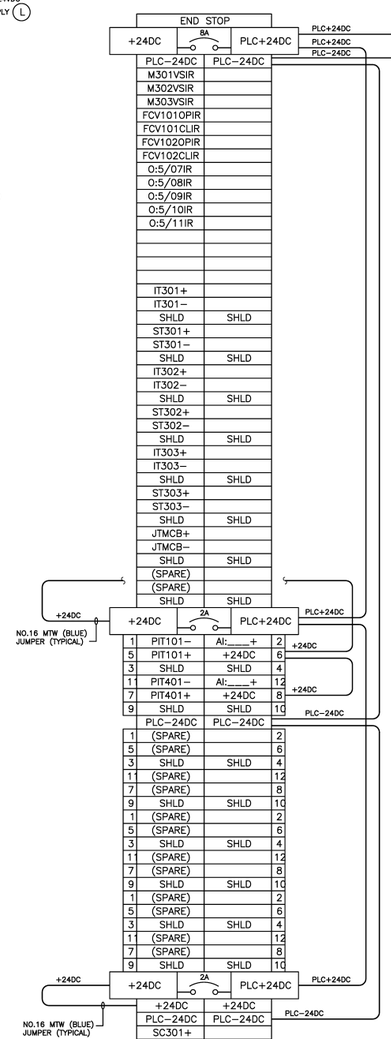
JOB NO. 7880C.10
DRAWING NO. N-02

Last Opened by: 6-04-10 04:07pm DPerry

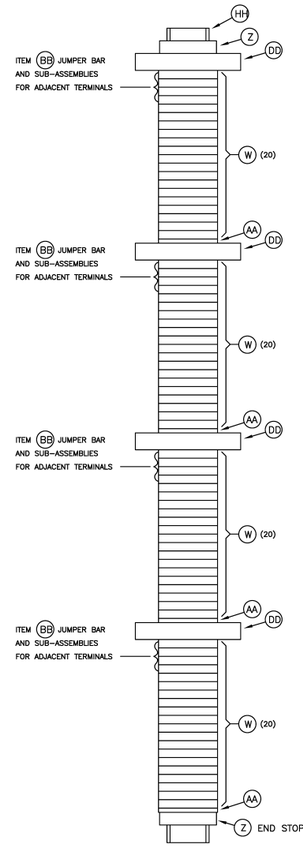
FILENAME: Last Saved By: SMF_DENL 5-28-10 01:37pm C:\Documents and Settings\DPerry\Desktop\ps428\N-02 XREFS: 3624bdr



LAYOUT AND MARKING FOR
TERMINAL BLOCK TB1
ON INTERNAL BACK PANEL
OF MCP PANEL

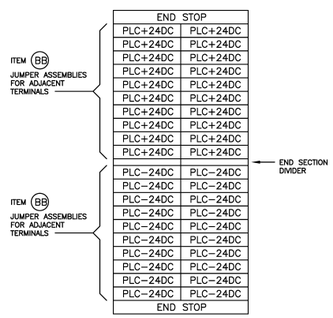


LAYOUT AND MARKING FOR
TERMINAL BLOCK TB2
ON INTERNAL BACK PANEL
OF MCP PANEL

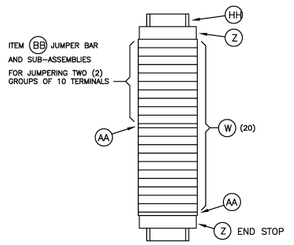


TERMINAL BLOCK TB1
ON INTERNAL BACK PANEL
OF MCP PANEL
APPROX. HALF SCALE

TERMINAL BLOCK TB2
ON INTERNAL BACK PANEL
OF MCP PANEL
APPROX. HALF SCALE



LAYOUT AND MARKING FOR
DC POWER SUPPLY TERMINAL BLOCK
ON INTERNAL BACK PANEL
OF MCP PANEL



APPROX. HALF SCALE

TERMINAL BLOCK
ITEM DIMENSIONS

(W) (X) (Y) 1.67"W (42.5mm) X 0.24" THICK (6.2mm)
(Z) 1.67"W (42.5mm) X 0.37" THICK (9.5mm)
(AA) 1.67"W (42.5mm) X 0.07" THICK (1.8mm)

NOTES:

1. ALL TERMINALS SHOWN WITHOUT MARKERS SHALL HAVE A BLANK PHOENIX TYPE ZBM6−CMS MARKER FOR FUTURE MARKING. TYPICAL FOR ALL TERMINAL BLOCKS.

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN JP
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
MAIN CONTROL PANEL MCP
TERMINAL BLOCKS - LAYOUTS AND DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. N-03

Last Opened by: 6-04-10 04:07pm DPerry

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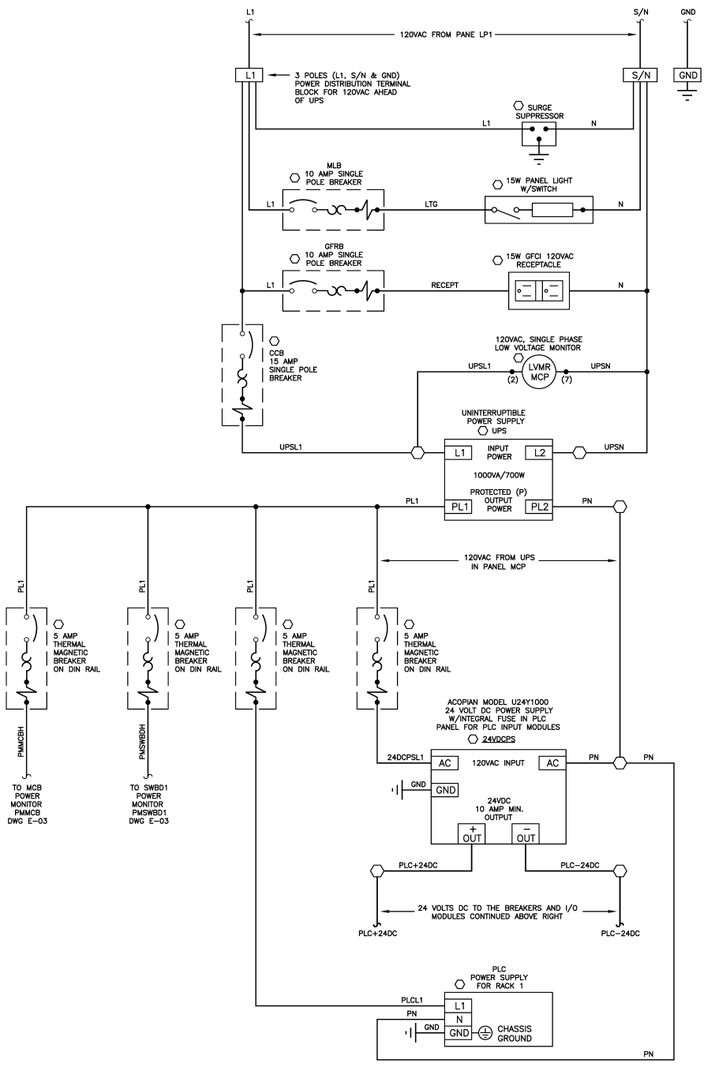
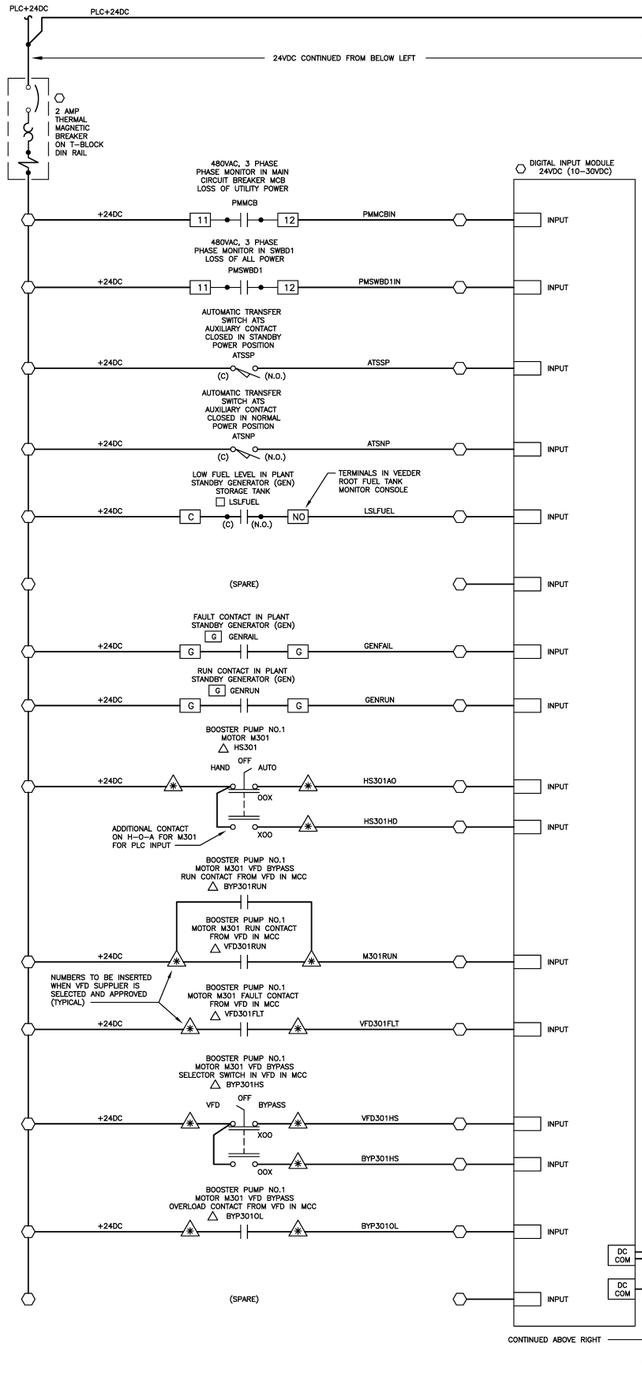
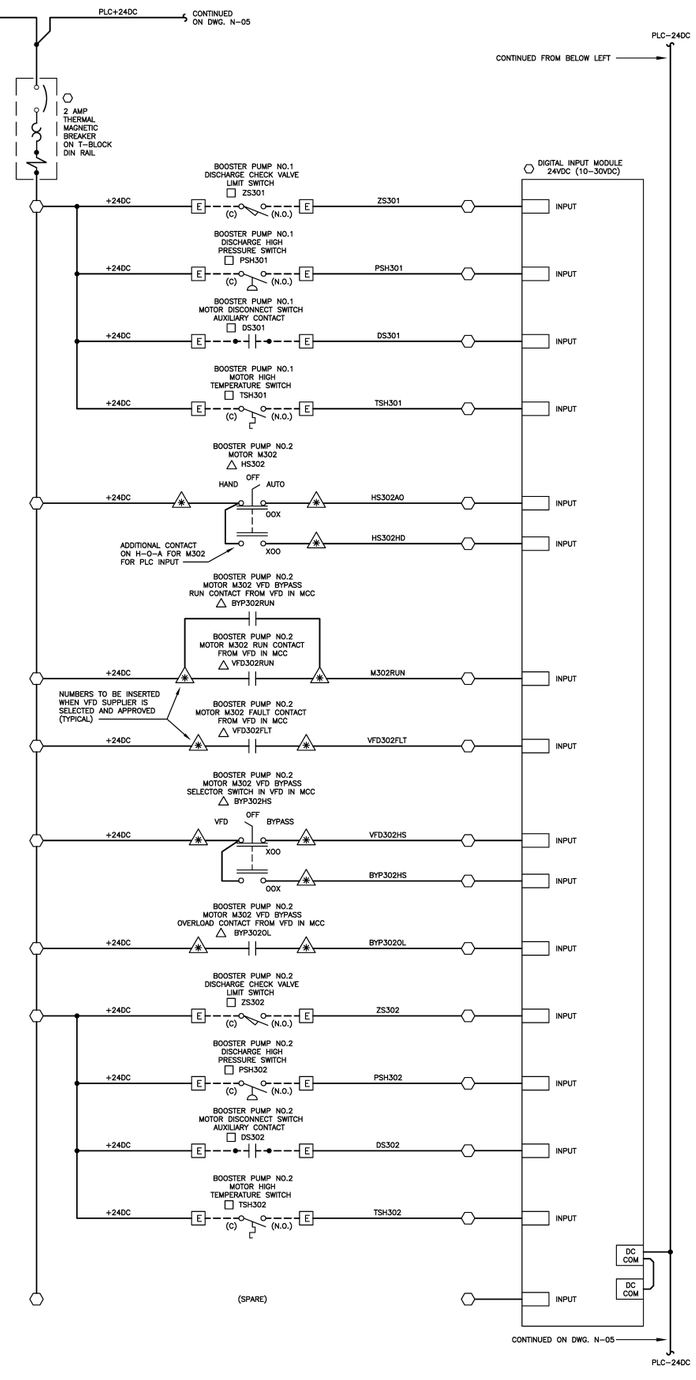


120VAC SCHEMATIC DIAGRAM
FOR PLC SECTION OF PANEL MCP

LEGEND:

- □ ITEMS OR DEVICES LOCATED IN THE FIELD, REMOTE TO A PANEL
- △ ITEMS OR DEVICES LOCATED IN VARIABLE FREQUENCY DRIVES
- ⬡ ITEMS OR DEVICES LOCATED IN PLC SECTION OF PANEL MCP
- G ITEMS LOCATED IN THE STANDBY GENERATOR (GEN) SYSTEM
- E ITEMS OR DEVICES LOCATED IN THE PUMP STATION CHAMBER ENVIRONMENTAL CONTROL PANEL
- ---- CONDUIT AND/OR WIRING IN THE PUMP STATION CHAMBER FURNISHED AND INSTALLED BY THE PUMP STATION CHAMBER MANUFACTURER





JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN JP
CHECKED RG
DATE APRIL 2010

ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103
PROJECT ENGINEER

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SARASOTA, FL. 34232
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CA 00008571

MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

MAIN CONTROL PANEL MCP
PLC I/O SCHEMATIC DIAGRAM - 1 OF 4

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. N-04

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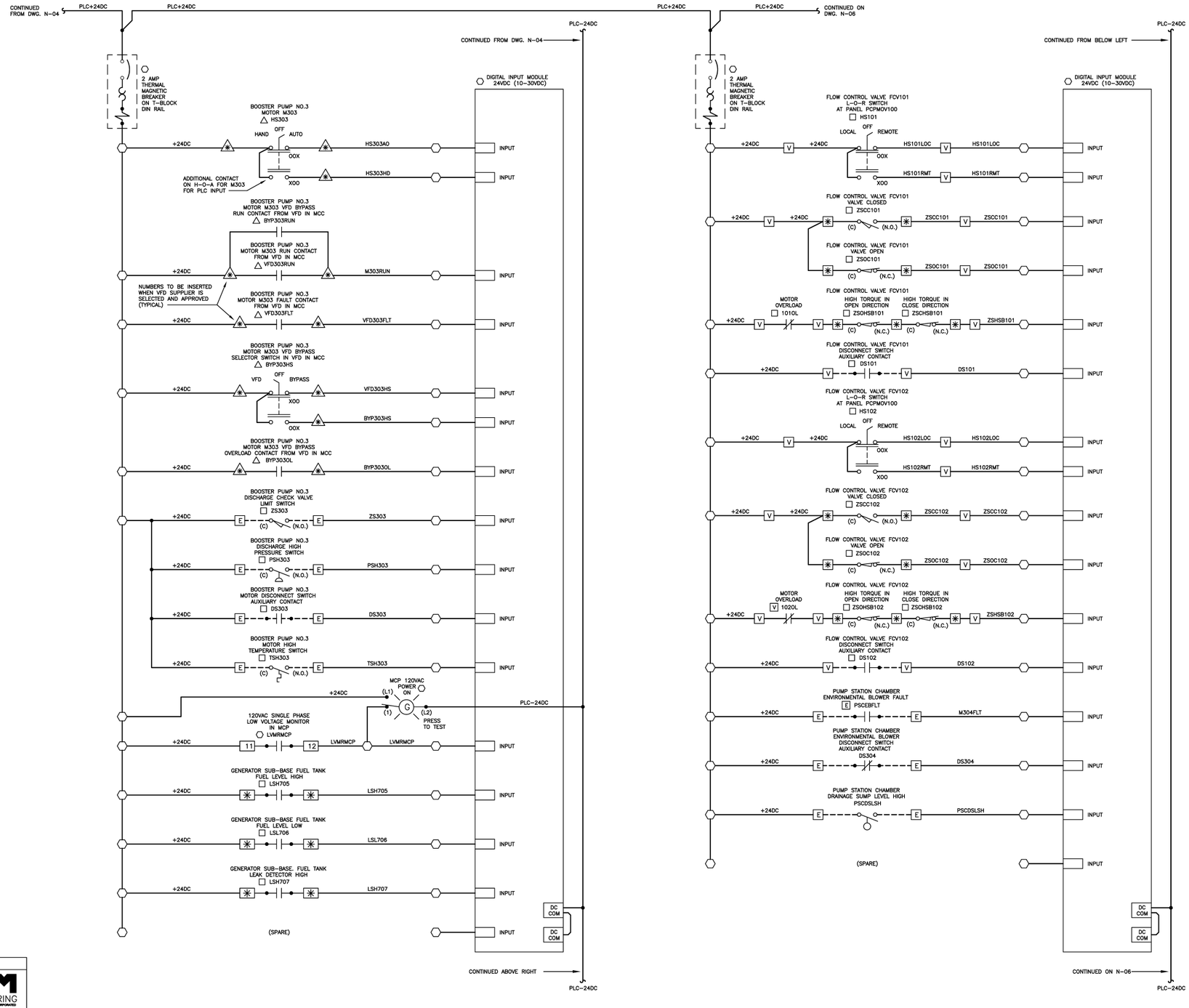

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING
P.O. BOX 5106 LAKELAND, FLORIDA 33807

Last Opened by: 6-04-10 04:07pm DPerry

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MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

MAIN CONTROL PANEL MCP PLC I/O SCHEMATIC DIAGRAM - 2 OF 4

VERIFY SCALES
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0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10

DRAWING NO. N-05

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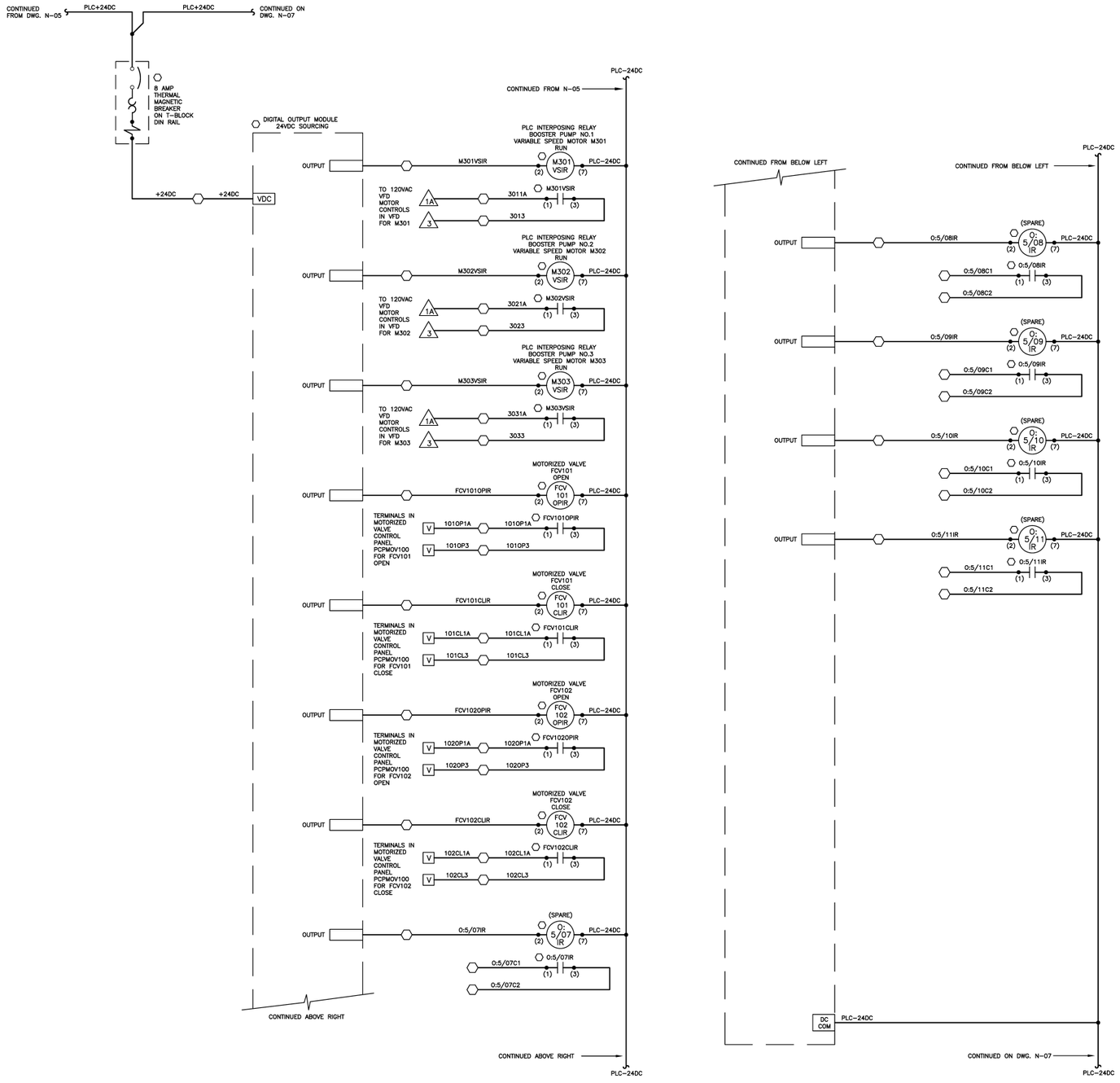

LEGEND:

- □ ITEMS OR DEVICES LOCATED IN THE FIELD, REMOTE TO A PANEL
- △ ITEMS OR DEVICES LOCATED IN VARIABLE FREQUENCY DRIVES
- ⬡ ITEMS OR DEVICES LOCATED IN PLC SECTION OF PANEL MCP
- [V] ITEMS OR DEVICES LOCATED IN MOTORIZED VALVE POWER AND CONTROL PANEL PCPMOV100

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING
P.O. BOX 5106 LAKELAND, FLORIDA 33807

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MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

MAIN CONTROL PANEL MCP
PLC I/O SCHEMATIC DIAGRAM - 3 OF 4

VERIFY SCALES
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0 1"
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JOB NO. 7880C.10
DRAWING NO. N-06

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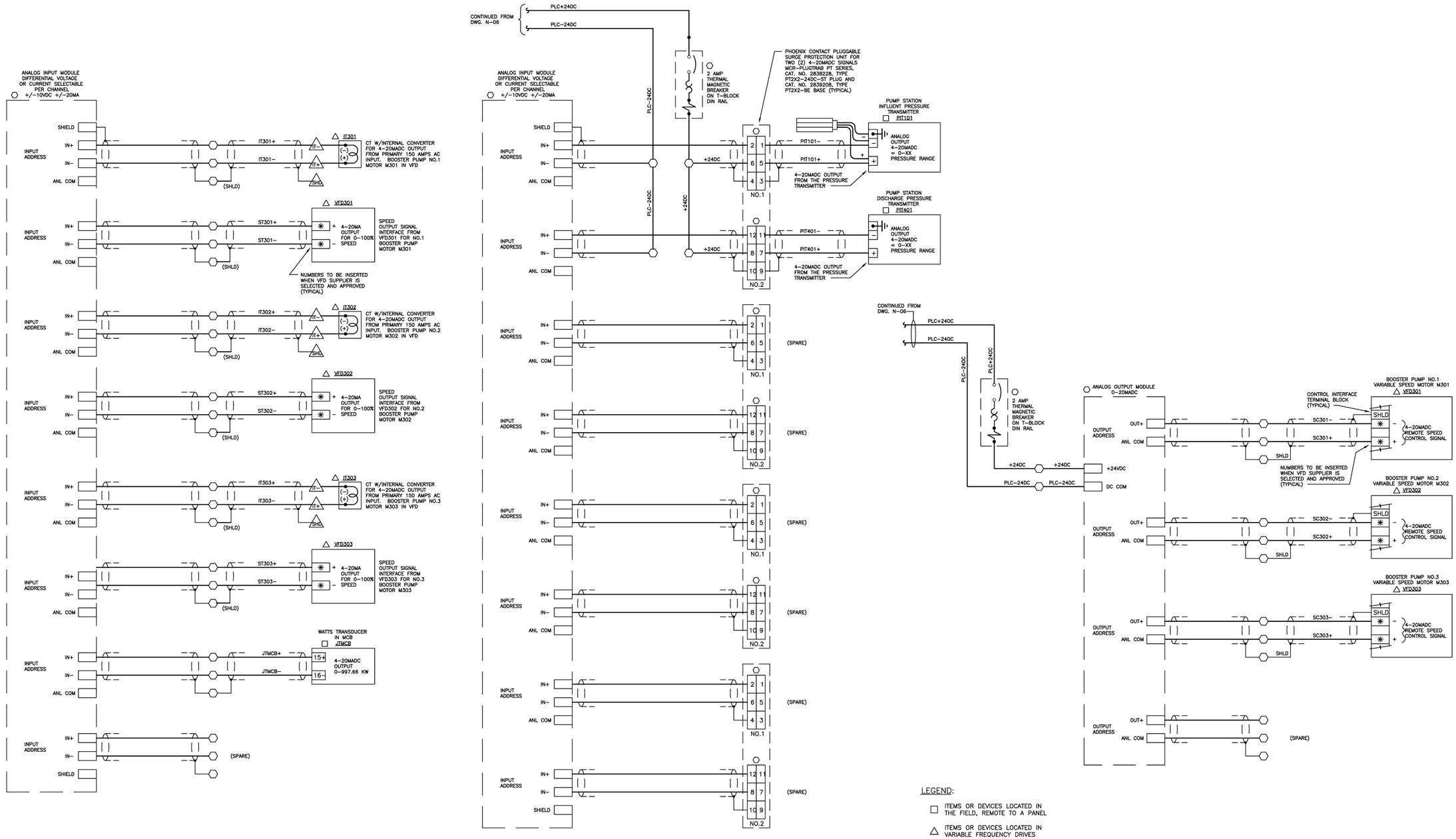

LEGEND:

- □ ITEMS OR DEVICES LOCATED IN THE FIELD, REMOTE TO A PANEL
- △ ITEMS OR DEVICES LOCATED IN VARIABLE FREQUENCY DRIVES
- ⬡ ITEMS OR DEVICES LOCATED IN PLC SECTION OF PANEL MCP

JOB NO. 35157

ENG. BUS. NO. 1567

JHHM ENGINEERING INCORPORATED

P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

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FL. REG. NO.: 31103
PROJECT ENGINEER

carollo
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MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

MAIN CONTROL PANEL MCP
PLC I/O SCHEMATIC DIAGRAM - 4 OF 4

VERIFY SCALES
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0 1"
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JOB NO. 7880C.10

DRAWING NO. N-07

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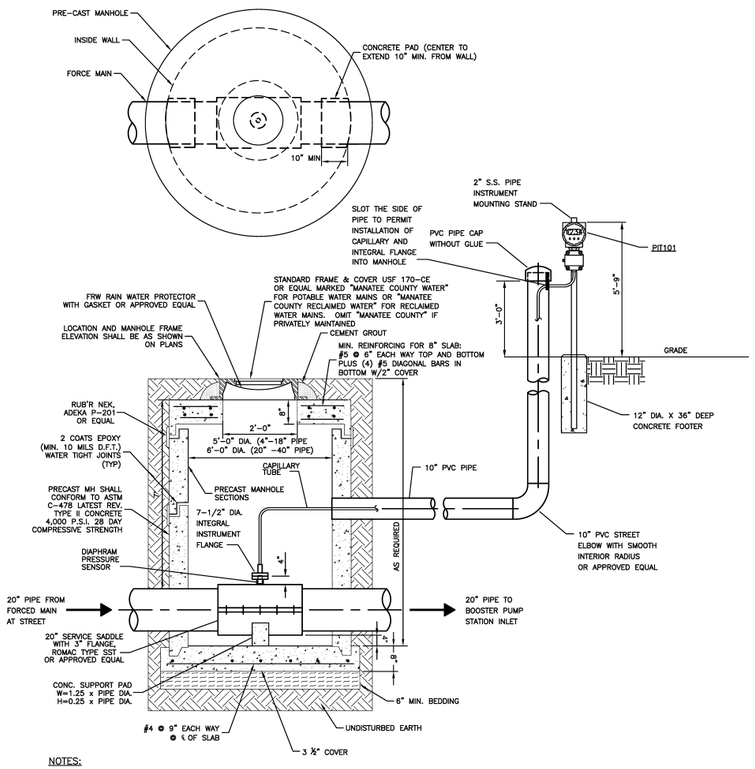
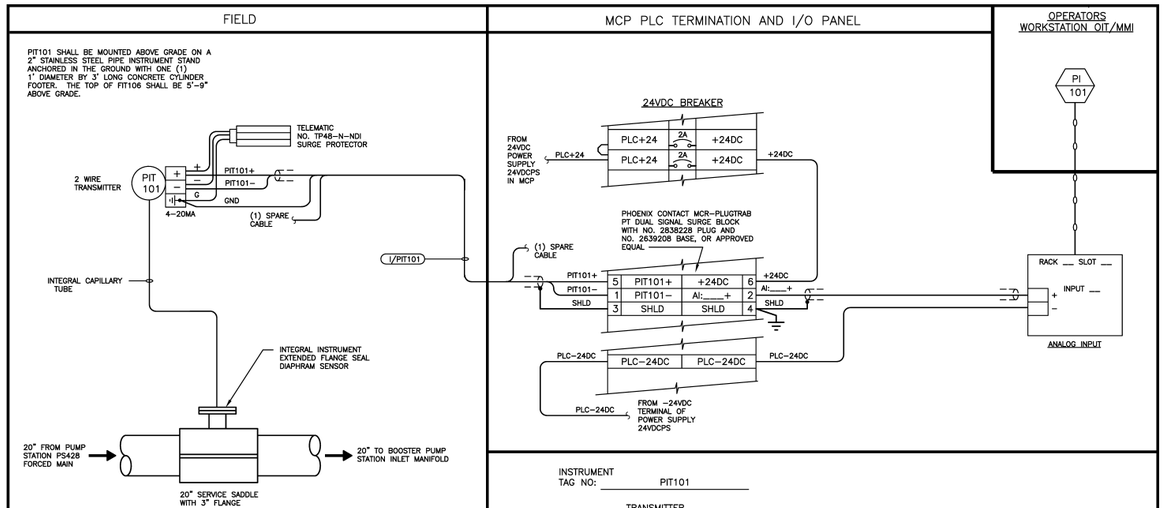


NOTES:

1. FOR MANHOLES WITH LESS THAN 44 INCHES OF COVER FROM TOP-OF-PIPE TO TOP-OF-FRAME, FRAME & COVER TO BE 32-INCH PAMREX WITH 32-INCH OPENING. MINIMUM ALLOWABLE COVER IS 36 INCHES.
2. ALL PIPE PENETRATING MANHOLE SHALL HAVE RESILIENT PIPE TO MANHOLE SEALS PER ASTM C-923.
3. FINAL GRADE TO BE SLOPED AWAY FROM MANHOLE.

(A) PUMP STATION SUCTION PIT101 INSTALLATION DETAIL

SCALE: APPROX. 3/8" = 1'-0"
SEE PLAN DWG. E-04

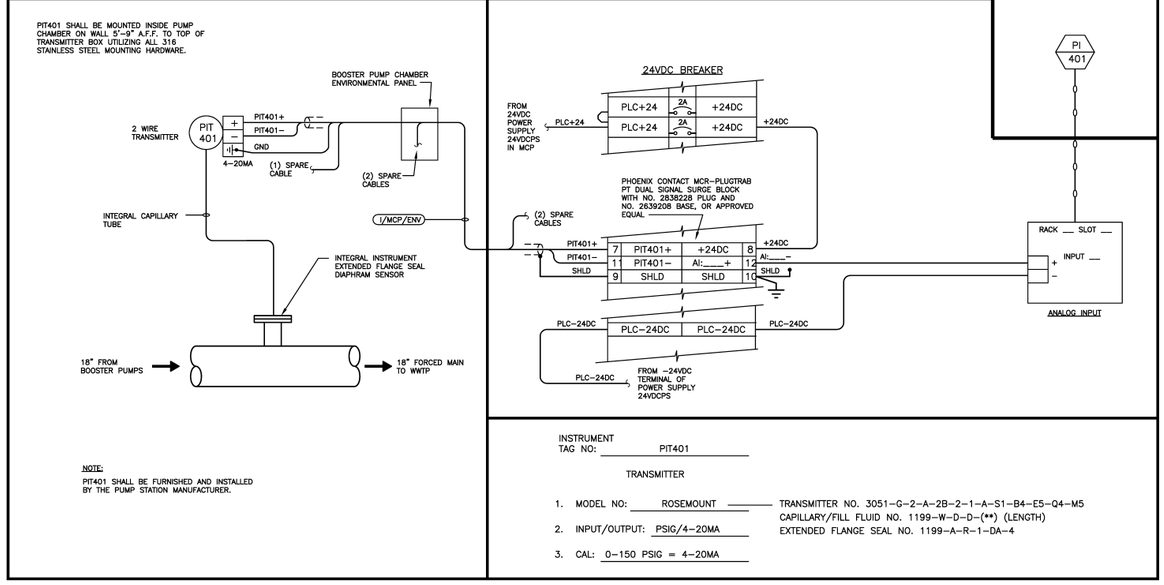


INSTRUMENT TAG NO: PIT101

TRANSMITTER

1. MODEL NO: ROSEMOUNT — TRANSMITTER NO. 3051-G-2-A-2B-2-1-A-S1-B4-E5-Q4-M5
2. INPUT/OUTPUT: PSIG/4-20MA — CAPILLARY/FILL FLUID NO. 1199-W-D-D-(**) (LENGTH)
3. CAL: 0-150 PSIG = 4-20MA — EXTENDED FLANGE SEAL NO. 1199-A-R-1-DA-4

BOOSTER PUMP STATION SUCTION PRESSURE LOOP PIT101



INSTRUMENT TAG NO: PIT401

TRANSMITTER

1. MODEL NO: ROSEMOUNT — TRANSMITTER NO. 3051-G-2-A-2B-2-1-A-S1-B4-E5-Q4-M5
2. INPUT/OUTPUT: PSIG/4-20MA — CAPILLARY/FILL FLUID NO. 1199-W-D-D-(**) (LENGTH)
3. CAL: 0-150 PSIG = 4-20MA — EXTENDED FLANGE SEAL NO. 1199-A-R-1-DA-4

BOOSTER PUMP STATION DISCHARGE PRESSURE LOOP PIT401

JOB NO. 35157

ENG. BUS. NO. 1567
JHHM ENGINEERING INCORPORATED
P.O. BOX 5106 LAKELAND, FLORIDA 33807

REV	DATE	BY	DESCRIPTION

DESIGNED W. LAHEY
DRAWN JP
CHECKED RG
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ENGINEER: ROBERT GARCIA, P.E.
FL. REG. NO.: 31103

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MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
PRESSURE TRANSMITTERS
INSTRUMENT LOOP SHEETS AND DETAIL

VERIFY SCALES
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0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. N-08

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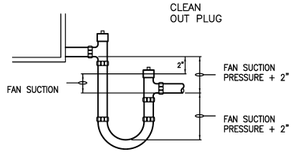
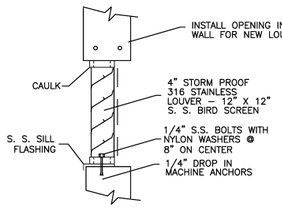
GENERAL HVAC NOTES

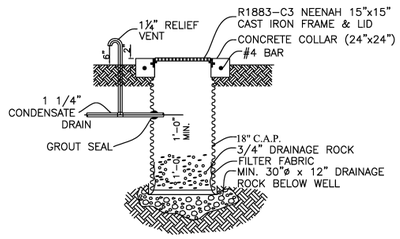
1. DRAWINGS ARE DIAGRAMMATIC. DO NOT SCALE DRAWINGS FOR THE EXACT LOCATION OF EQUIPMENT, PIPING, DUCTWORK, ETC.
2. THESE DRAWINGS ARE NOT INTENDED TO SHOW EVERY MINOR DETAIL, BUT THE CONTRACTOR SHALL FURNISH AND INSTALL ALL ITEMS REQUIRED FOR A COMPLETE ACCEPTABLE WORKING INSTALLATION.
3. ALL WORK SHALL BE PERFORMED BY A LICENSED CONTRACTOR IN A FIRST CLASS WORKMANLIKE MANNER. THE COMPLETED SYSTEM SHALL BE FULLY OPERATIVE AND ACCEPTANCE BY THE ARCHITECT AND/OR ENGINEER MUST BE A CONDITION OF THE CONTRACT.
4. CONTRACTOR SHALL PAY FOR ALL PERMITS, FEES, INSPECTIONS AND TESTS.
5. CONTRACTOR SHALL VISIT THE JOB SITE AND THOROUGHLY FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS.
6. ALL WORK SHALL BE COORDINATED WITH OTHER TRADES TO AVOID INTERFERENCE WITH THE PROGRESS OF CONSTRUCTION.
7. ALL REQUIRED INSURANCE SHALL BE PROVIDED BY THIS CONTRACTOR FOR PROTECTION AGAINST PUBLIC LIABILITY AND PROPERTY DAMAGE FOR THE DURATION OF THE WORK.
8. ALL WORKMANSHIP AND MATERIALS SHALL BE IN STRICT ACCORDANCE WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES, RULES AND ORDINANCES.
9. INSTALLATIONS SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS SET FORTH IN THE LATEST ASHRAE GUIDE.
10. ALL MATERIALS SHALL BE NEW AND SHALL BEAR UNDERWRITER'S LABEL WHERE APPLICABLE.
11. ALL DUCTWORK SHALL CONFORM TO S.M.A.C.N.A. STANDARDS. ALL DUCTWORK SIZES ARE INSIDE DIMENSIONS. ALL SUPPLY AND RETURN DUCT SHALL BE SHEETMETAL.
12. LOW PRESSURE FLEXIBLE DUCT SHALL BE THERMAFIN INSULATED ALUMINIUM. INSTALL HIGH PRESSURE DUCT SEAL AND BAND CLAMPS AT ALL CONNECTIONS. SUPPORT DUCT AT 6 FT. CENTERS.
13. SUBMIT SHOP DRAWINGS ON ALL EQUIPMENT AND OBTAIN APPROVAL PRIOR TO INSTALLATION.
14. CONTRACTOR SHALL ADJUST, TEST AND BALANCE ALL SYSTEMS; SUBMIT COPY OF WORKSHEET TO ENGINEER.
15. CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FREE FROM DEFECTS FOR A PERIOD OF NOT LESS THAN 3 YEARS FROM THE DATE OF ACCEPTANCE, UNLESS OTHERWISE NOTED.
16. CORRECTION OF ANY DEFECTS SHALL BE COMPLETED WITHOUT ADDITIONAL CHARGE AND SHALL INCLUDE REPLACEMENTS OR REPAIR OF ANY OTHER PHASE OF THE INSTALLATION WHICH MAY HAVE BEEN DAMAGED OR IS NOT OPERATING PROPERLY.
17. ARCHITECTURAL AND/OR ENGINEERING EXPENSES THAT ARE INCURRED DUE TO REVISIONS OR SUBSTITUTIONS REQUESTED BY THE CONTRACTOR SHALL BE PAID FOR BY THAT CONTRACTOR.
18. LOW PRESSURE DUCT SHALL BE 24 GA SHEET METAL WITH 1" DUCT WRAP. WHERE DUCT WORK EXPOSED IN MECHANICAL ROOM INSULATE WITH 1 INCH KNAFF DUCT BOARD.



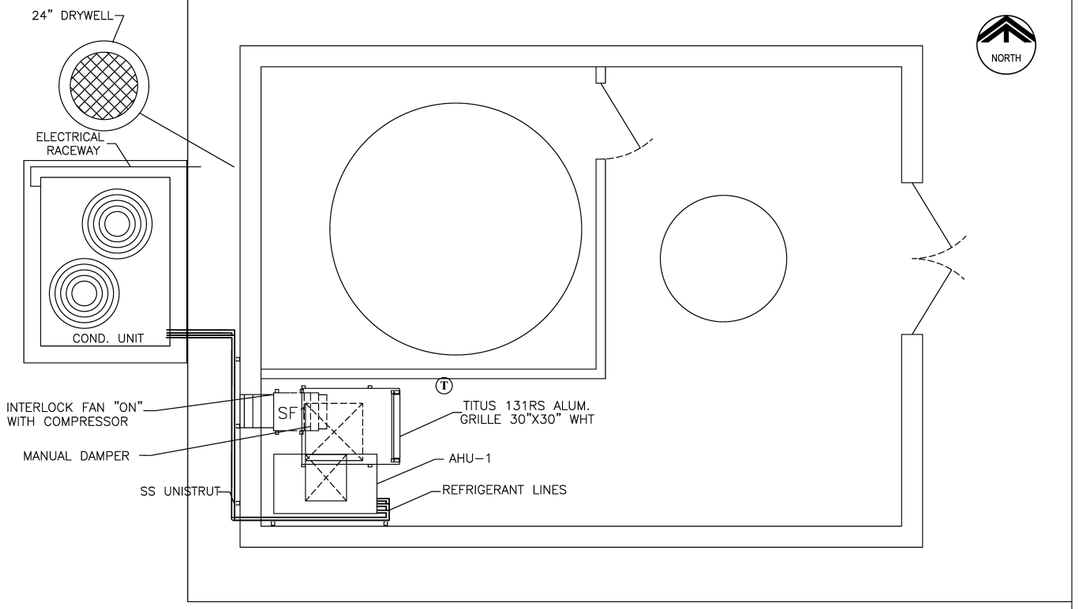
AHU CONDENSATE DRAIN
NOT TO SCALE



STAINLESS INTAKE WALL LOUVER
NOT TO SCALE



CONDENSATE DRYWELL
SCALE: NONE



HVAC PLAN
SCALE: 3/8" = 1'-0"

SPLIT SYSTEM AIR CONDITIONING UNIT SCHEDULE

AIR HANDLING UNIT										CONDENSING UNIT														
DESIG.	CAP. (BUTH)		MODEL	C.F.M.	H.P.	E.S.P.	ELECT.			DESIG.	MODEL	COMPRESSOR		ELECT.			COND. FAN		ELECT.			MCA	MOP	SEER	REMARKS
	SENS.	TOTAL					V.	PH.	CY.			NO.	R.L.A.	V.	PH.	CY.	NO.	F.L.A.	V.	PH.	CY.				
AHU–1	63M	85M	CARRIER 40RM008	3000	2.0	0.25	480	3	60	CU–1	CARRIER 38AUZ–08	1	12.2	460	3	60	1	.8	460	3	60	18.2	30	11.5	

1. PROVIDE FACE SPLIT COIL IN AHU

AIR DISTRIBUTION DEVICE SCHEDULE

MARK	SELECTION BASED ON		SIZE	SHAPE	MATERIAL	FRAME	DAMPER	THROW PATTERN	FINISH	REMARKS
	MAKE	MODEL								
A	TITUS	131 RS	30"X30"	SQ	ALUM.	TYPE–1	NO	2–WAY	WHT.	

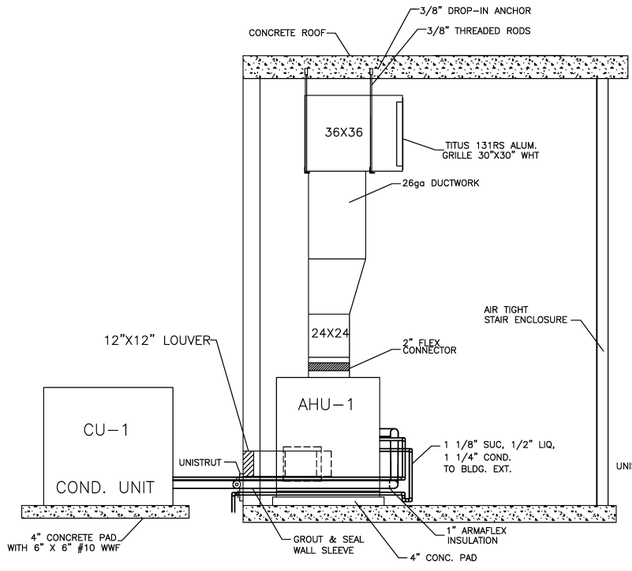
ASHRAE–62 VENTILATION

BUILDING OCCUPANCY – ELECTRIC ROOM UN–OCCUPIED

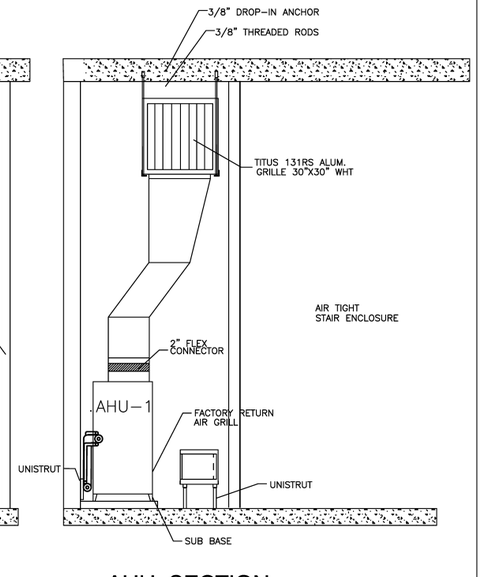
VENTILATION PROVIDED:
ELECTRIC ROOM 120 CFM

FAN SCHEDULE

MARK	SELECTION BASED ON		TYPE	C.F.M.	TSP W G	R.P.M.	MOTOR H.P.	VOLTS	PH
	MAKE	MODEL							
SF–1	GREENHECK	SQ–060G	INLINE BOX FAN	120	.15	1300	1/80	120	1



AHU ELEVATION
SCALE: 3/8" = 1'-0"



AHU SECTION
SCALE: 3/8" = 1'-0"

JOB NO. 35157
ENG. BUS. NO. 1567
JHHM ENGINEERING
JOHN H. HOLLOMAN III
P.O. BOX 5106 LAKELAND, FLORIDA 33807

JOB NO. 09033
FOUR JAYS Consulting, Inc.
1173 Old Dixie Highway Lake Park, Florida 33403
Tel: (561) 844-7988 Fax: (561) 844-7510

REV	DATE	BY	DESCRIPTION

DESIGNED JOHN A. PETREIKIS
DRAWN DLA
CHECKED JAP
DATE APRIL 2010

JOHN A. PETREIKIS P.E.
FL. REG. NO.: 23782
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
ELECTRICAL BUILDING
HVAC PLAN AND DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. AC-01

Last Opened by: 6-04-10 04:07pm DPerry

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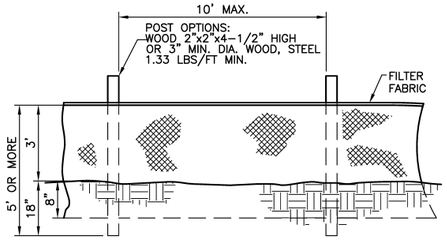
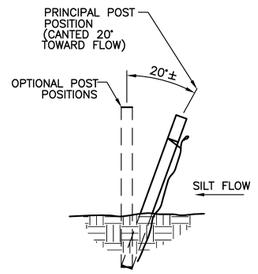
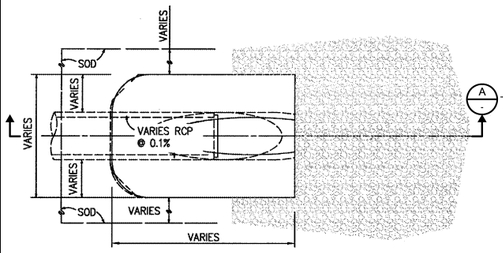


ELEVATION

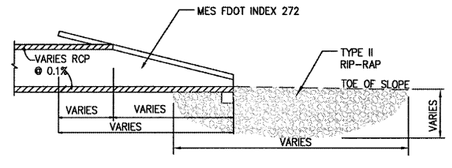


SECTION

C304 TYP J — TYPICAL SILT FENCE — 9-26-06

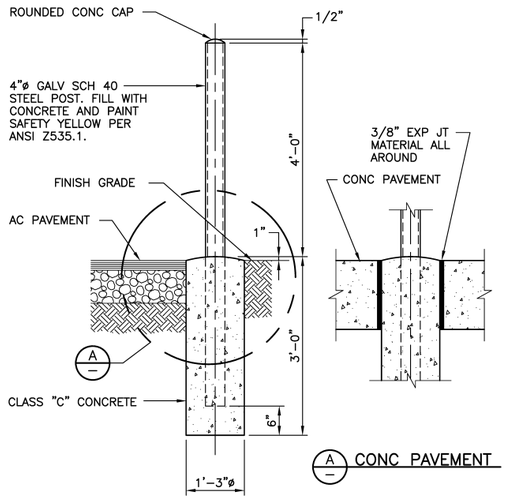


PLAN



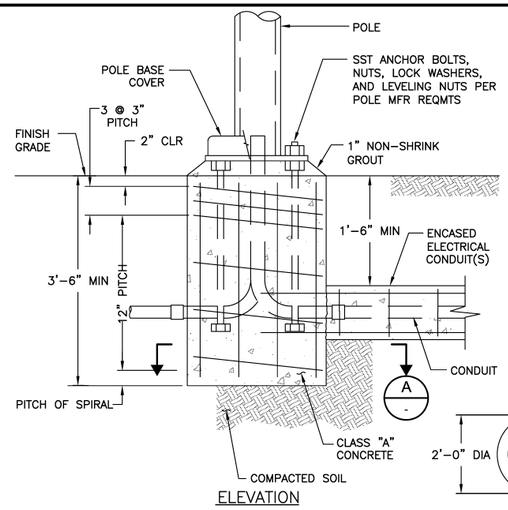
A — SECTION

A C-01 — MITERED END SECTION
SCALE: N.T.S.
FILE: 7880C10-01-C-001

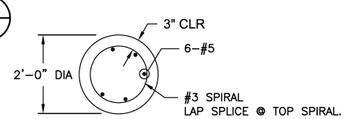


AC PAVEMENT AND FINISH GRADE

C160 TYP N — GUARD POST — 08-01-05

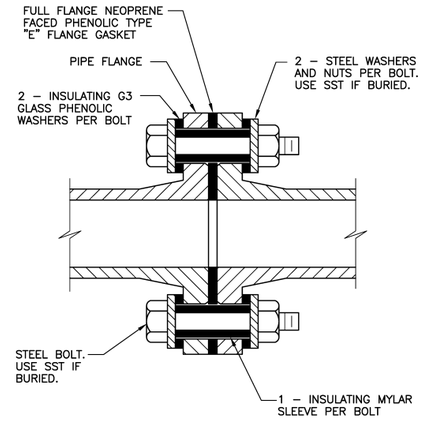


ELEVATION



A — SECTION

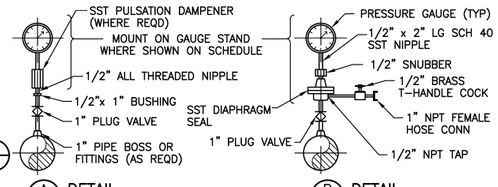
C250 TYP S — LUMINAIRE FOUNDATION

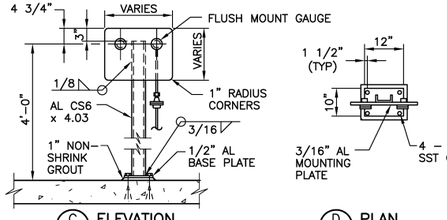


NOTE:

1. COAT ENTIRE ASSEMBLY WITH PETROLATUM SATURATED FABRIC TAPE WRAP SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS.

D062 TYP N — PIPE FLANGE INSULATION — 08-01-05



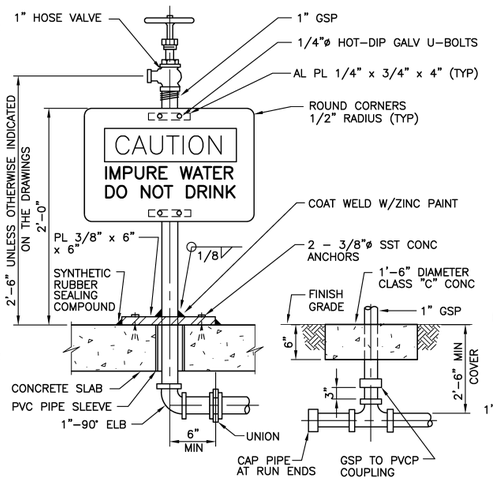


GAUGE STAND

NOTES:

1. ALL GAUGES SHALL BE DUAL SCALE. SCALES ON THE GAUGE FACE SHALL BE MARKED IN PSIG AND FEET OF WATER (FOR POSITIVE READINGS) OR INCHES OF MERCURY (FOR VACUUM READINGS).
2. MOUNTING PLATE DIMENSIONS VARY ACCORDING TO SIZE AND NUMBER OF GAUGES REQUIRED.
3. AT GAUGE STAND, DIAPHRAGM SHALL BE LOCATED BELOW THE MOUNTING PLATE. ONE INCH PIPE SHALL BE ROUTED BETWEEN DIAPHRAGM AND SERVICE PIPE PLUG VALVE. CROSSES WITH THREADED PLUGS SHALL BE USED IN LIEU OF 90° ELBOWS, WITH AT LEAST ONE UNION PER CROSS.
4. COAT ALUMINUM IN CONTACT WITH CONCRETE PER SPECIFICATIONS.

M294 TYP S — PRESSURE GAUGE DETAILS — 08-01-05



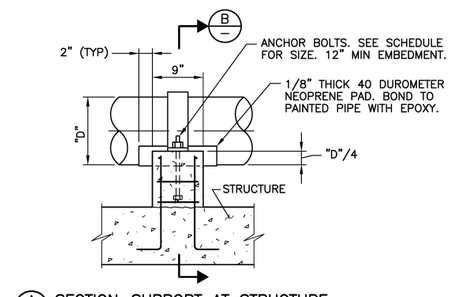
STRUCTURE INSTALLATION

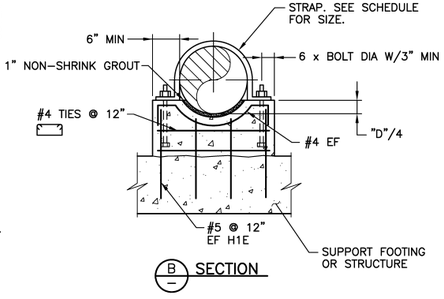
YARD INSTALLATION

NOTES:

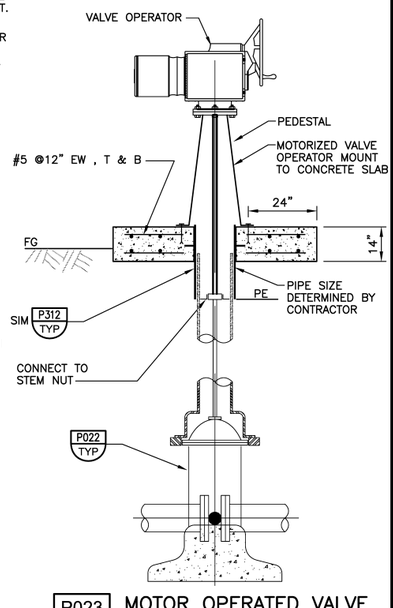
1. SIGN SHALL BE 3/8" THICK PLASTIC RESISTANT TO SUNLIGHT (ULTRAVIOLET) DETERIORATION.
2. SIGN SHALL BE 7" x 10" AND SHALL CONFORM TO THE SPECIFICATIONS.
3. SIGN AS SHOWN IS RATED 90° OFF TRUE POSITION. SIGN SHALL BE MOUNTED TO PERMIT EASY READING.
4. INSTALL HOSE RACK, M280 TYP, AT EACH HOSE VALVE.

M276 TYP NS — 1" HOSE VALVE AND SIGN — 08-01-05





P602 TYP N — CONCRETE PIPE SUPPORT — SHEET 1 OF 2 — 07-31-08



P023 TYP S — MOTOR OPERATED VALVE INSTALLATION DETAIL

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

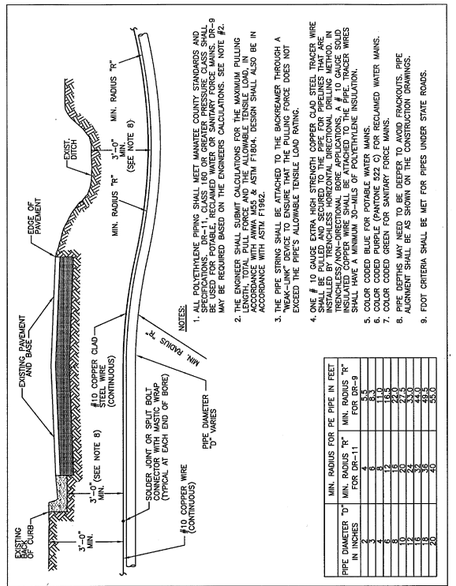
MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
TYPICAL DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. T-01

Last Opened by: 6-04-10 04:01pm: DPerry

FILENAME: Last Saved By: DPerry 6-01-10 04:58pm C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-01-T-01 XREFS: 3624bdr; 7880C10-01-110-401; P602a; P602b MITERED END SECTION;



NOTES:

1. ALL POLYETHYLENE PIPING SHALL MEET MANATEE COUNTY STANDARDS AND SPECIFICATIONS. DR-11 (200 PSI) POLYETHYLENE PIPE CLASS 200 SHALL BE USED FOR POTABLE, RECLAIMED WATER OR SANITARY FORCE MAINS. DR-9 MAY BE REQUIRED BASED ON THE ENGINEERS CALCULATIONS. SEE NOTE #2.
2. THE ENGINEER SHALL SUBMIT CALCULATIONS FOR THE MAXIMUM PULLING LOAD FOR THE INSTALLATION. THE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH AWWA M55 "A STM F1804. DESIGN SHALL ALSO BE IN ACCORDANCE WITH ASTM F1962.
3. THE PIPE STRING SHALL BE ATTACHED TO THE BACKREAMER THROUGH A SWIVEL WHICH SHALL BE CONSTANTLY MONITORED TO ENSURE IT DOES NOT EXCEED THE PIPE'S ALLOWABLE TENSILE LOAD RATING.
4. ONE # 10 GAUGE EXTRA HIGH STRENGTH COPPER CLAD STEEL TRACER WIRE SHALL BE PULLED AND SECURED TO THE PIPE FOR PIPELINES THAT ARE INSTALLED BY DIRECTIONAL BORE METHODS. FOR OPEN CUT METHODS IN TRENCHLESS/NON-DIRECTIONAL BORE APPLICATIONS, A # 10 GAUGE SOLID COPPER WIRE SHALL BE INSTALLED ADJACENT TO THE PIPE. TRACER WIRES SHALL HAVE A MINIMUM 30-MILS OF POLYETHYLENE INSULATION.
5. COLOR CODED BLUE FOR POTABLE WATER MAINS.
6. COLOR CODED PURPLE (PANTONE 522 C) FOR RECLAIMED WATER MAINS.
7. COLOR CODED GREEN FOR SANITARY FORCE MAINS.
8. PIPE DEPTHS MAY NEED TO BE DEEPER TO AVOID FRACKOUTS. PIPE ALIGNMENT SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS.
9. FDOT CRITERIA SHALL BE MET FOR PIPES UNDER STATE ROADS.

PIPE DIAMETER "D" IN INCHES	MIN. RADIUS "R" FOR DR-9	MIN. RADIUS "R" FOR DR-11
2	4	4
3	6	6
4	8	8
6	12	12
8	16	16
10	20	20
12	24	24
14	28	28
16	32	32
18	36	36
20	40	40

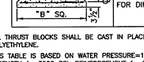
MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	02/05
JAA/KE	10/08
JAA/JEA	02/09

MARCH 17, 2009 — DATE OF APPROVAL

DIRECTIONAL BORE ROADWAY CROSSING — UG-4

THRUST BLOCK DIMENSIONS B ft. x d inches												
PIPE SIZE (IN.)	90°BEND		45°BEND		22.5°BEND		11.25°BEND		DEAD END & TEE		45° WYE	
	B	d	B	d	B	d	B	d	B	d	B	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	3.6	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



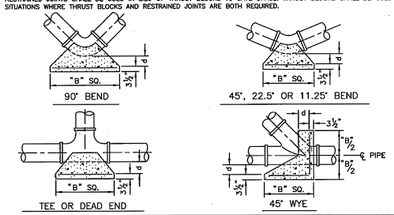
REINFORCEMENT MAT SCHEDULE

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=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.



MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	2/05
JAA/JB	2/09

MARCH 17, 2009 — DATE OF APPROVAL

CONCRETE THRUST BLOCKS — UG-7

REQUIRED LENGTH OF RESTRAINED JOINT PIPE FOR DIP (POLY-WRAPPED)

MAIN PIPE SIZE	HORIZ. BENDS			TEES						REDUCERS						PLUGS	VALVES
	90°	45°	22.5°	SIZE			LENGTH			SIZE			LENGTH				
36	142	59	28	X36 393	X30 318	X24 243	X20 192	X16 165	X12 84	X30 X24 137	X24 X20 247	X20 X16 309	X16 X12 359			453	227
30	124	51	25	X30 337	X24 262	X20 211	X16 189	X12 115	X10 23	X24 X20 213	X20 X16 276	X16 X12				391	196
24	106	44	21	X24 270	X20 211	X16 145	X12 81	X10	X8	X20 X16 178	X16 X12 241	X12 X10				327	164
20	92	38	18	X20 206	X16 161	X12 85	X10 39	X8		X16 X12 145	X12 X10 227	X10 X8				280	140
16	77	32	15	X16 141	X12 107	X10 65	X8 19	X6		X12 X10 103	X10 X8 169	X8 X6				231	116
12	61	25	12	X12 77	X10 59	X8 50	X6 1			X10 X8 59	X8 X6 131					181	91
10	52	22	10	X10 61	X8 54	X6 11				X8 X6 54	X6 X4 125					153	77
8	44	18	9	X8 48	X6 30	X4 1				X6 X4 92						128	64
6	34	14	7	X6 46	X4 1					X4 50						98	49
4	24	10	5	X4 19												69	35

REQUIRED LENGTH OF RESTRAINED JOINT PIPE FOR DIP (NON-WRAPPED)

MAIN PIPE SIZE	HORIZ. BENDS			TEES						REDUCERS						PLUGS	VALVES
	90°	45°	22.5°	SIZE			LENGTH			SIZE			LENGTH				
36	100	42	20	X36 138	X30 104	X24 78	X20 56	X16 38	X12 10	X30 X24 57	X24 X20 114	X20 X16	X16 X12 149			188	94
30	88	37	18	X30 112	X24 87	X20 66	X16 48	X12 10	X10 4	X24 X20 96	X20 X16 100	X16 X12				162	81
24	75	31	15	X24 87	X20 67	X16 50	X12 35	X10 16	X8	X20 X16 78	X16 X12 94	X12 X10				135	68
20	65	27	13	X20 67	X16 52	X12 35	X10 16	X8		X16 X12 61	X12 X10 94	X10 X8				116	58
16	54	22	11	X16 51	X12 44	X10 27	X8 8	X6 1		X12 X10 68	X10 X8 70					96	48
12	43	18	8	X12 53	X10 37	X8 21	X6 1			X10 X8 40	X8 X6 54					75	38
10	37	15	7	X10 45	X8 26	X6 5				X8 X6 21	X6 X4 52					63	32
8	30	13	6	X8 32	X6 12	X4 1				X6 X4 38						53	27
6	24	10	5	X6 19	X4 1					X4 21						41	21
4	17	7	3	X4 8												29	15

NOTE:

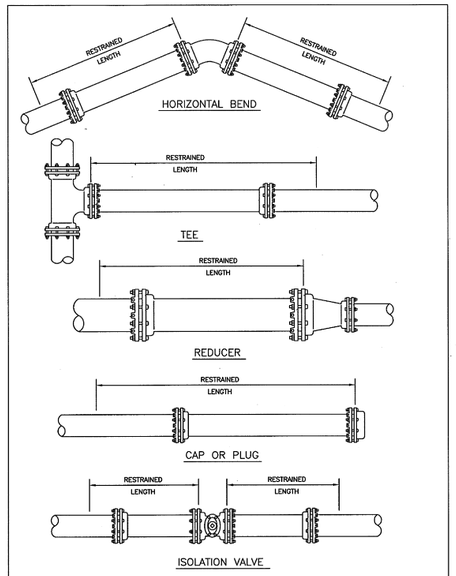
SEE "RESTRAINED LENGTHS FOR PVC PIPE" DETAIL FOR NOTES 1 THROUGH 8 THAT ARE ALSO APPLICABLE TO RESTRAINED LENGTHS FOR DIP.

MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	8/05
JAA/JB	10/08

MARCH 17, 2009 — DATE OF APPROVAL

RESTRAINED LENGTHS FOR DIP — UG-9



MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	8/05
JAA/JB	10/08

MARCH 17, 2009 — DATE OF APPROVAL

RESTRAINED LENGTHS FOR PIPE — UG-10

NOTES:

1.) USE OF TYPE A-2 AND A-3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

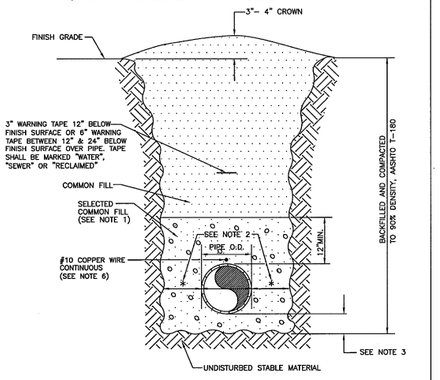
2.) 10" MAX. FOR PIPE DIAMETERS LESS THAN 24"; 12" MAX. FOR PIPE DIAMETER 24" AND LESS THAN 42"; 24" MAX. FOR PIPE DIAMETER 42" AND OVER.

3.) 4" MAX. FOR PIPE 16" DIAMETER & LESS; 6" MAX. FOR PIPE 18" TO 36" DIAMETER; AND 9" MAX FOR PIPE 42" DIAMETER AND LARGER.

4.) PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.

5.) BACKFILL AASHTO M-145 SHALL BE PLACED IN LAYERS NOT TO EXCEED 6 INCHES FOR SELECTED COMMON FILL AND NOT TO EXCEED 12 INCHES FOR COMMON FILL. EACH LAYER SHALL BE THOROUGHLY TAMPED AND/OR ROLLED TO 98% AASHTO T-180 DENSITY.

6.) TRACER WIRE NOT REQUIRED FOR GRAVITY SEWERS.



MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	02/05
JAA/KE	10/08
JAA/JEA	02/09

MARCH 17, 2009 — DATE OF APPROVAL

TRENCH WITH UNIMPROVED SURFACE TYPE A-1 PIPE BEDDING — UG-11

NOTES:

1.) USE OF TYPE A-2 AND A-3 PIPE BEDDING TO BE DETERMINED IN THE FIELD BY THE ENGINEER.

2.) 10" MAX. FOR PIPE DIAMETERS LESS THAN 24"; 12" MAX. FOR PIPE DIAMETER 24" AND LESS THAN 42"; 24" MAX. FOR PIPE DIAMETER 42" AND OVER.

3.) 4" MAX. FOR PIPE 16" DIAMETER & LESS; 6" MAX. FOR PIPE 18" TO 36" DIAMETER; AND 9" MAX. FOR PIPE 42" DIAMETER AND LARGER.

4.) PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.

5.) ASPHALTIC CONCRETE FRICTION COURSE WITH PRIME COAT SHALL BE THE SAME DEPTH AND TYPE AS EXISTING OR A MINIMUM OF ONE INCH, WHICHEVER IS GREATER.

6.) SHEETING ORDERED LEFT IN PLACE TO BE CUT OFF 24" BELOW FINISHED GRADE OR 12" BELOW SUBGRADE.

7.) BASE SHALL BE 8" MINIMUM THICKNESS CRUSHED CONCRETE. SAND ASPHALT BASE WILL BE AN ACCEPTABLE ALTERNATIVE.

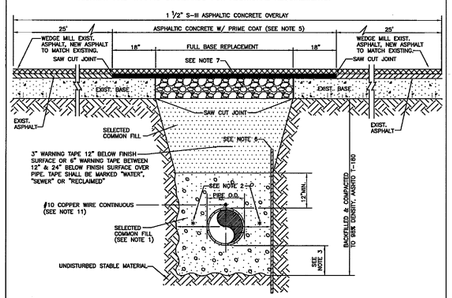
8.) BACKFILL AASHTO M-145 SHALL BE PLACED IN LAYERS NOT TO EXCEED 6 INCHES. EACH LAYER SHALL BE THOROUGHLY TAMPED AND/OR ROLLED TO 98% AASHTO T-180 DENSITY.

9.) TEMPORARY PATCHES WILL BE INSTALLED TO PROVIDE A SMOOTH ALL WEATHER SURFACE AT ALL TIME. 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 11.) ARE MINIMUM REQUIREMENTS. REFER TO MANATEE COUNTY HIGHWAY AND TRAFFIC STANDARDS FOR ADDITIONAL REQUIREMENTS.

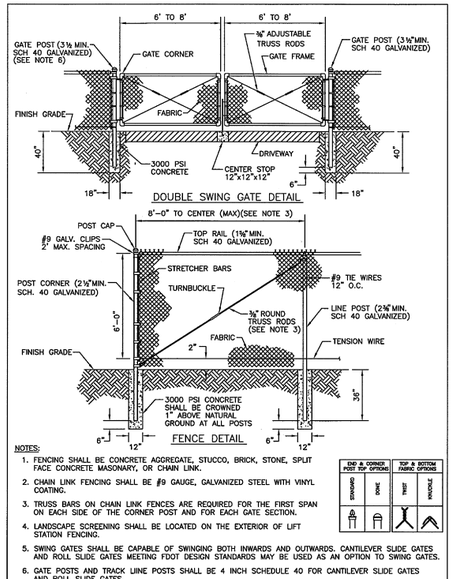


MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	02/05
JAA/JB	10/08
JAA/JEA	02/09

MARCH 17, 2009 — DATE OF APPROVAL

TRENCH WITH ASPHALT PAVEMENT SURFACE TYPE A-1 PIPE BEDDING — UG-12



NOTES:

1. FENCING SHALL BE CONCRETE AGGREGATE, STUCCO, BRICK, STONE, SPLIT FACE CONCRETE MASONARY, OR CHAIN LINK.
2. CHAIN LINK FENCING SHALL BE #9 GAUGE, GALVANIZED STEEL WITH VINYL COATING.
3. TRUSS BARS ON CHAIN LINK FENCES ARE REQUIRED FOR THE FIRST SPAN ON EACH SIDE OF THE CORNER POST AND FOR EACH GATE SECTION.
4. LANDSCAPE SCREENING SHALL BE LOCATED ON THE EXTERIOR OF LIFT STATION FENCING.
5. SWING GATES SHALL BE CAPABLE OF SWINGING BOTH INWARDS AND OUTWARDS. CANTILEVER SLIDE GATES AND ROLL SLIDE GATES MEETING FDOT DESIGN STANDARDS MAY BE USED AS AN OPTION TO SWING GATES.
6. GATE POSTS AND TRACK LINE POSTS SHALL BE 4 INCH SCHEDULE 40 FOR CANTILEVER SLIDE GATES AND ROLL SLIDE GATES.

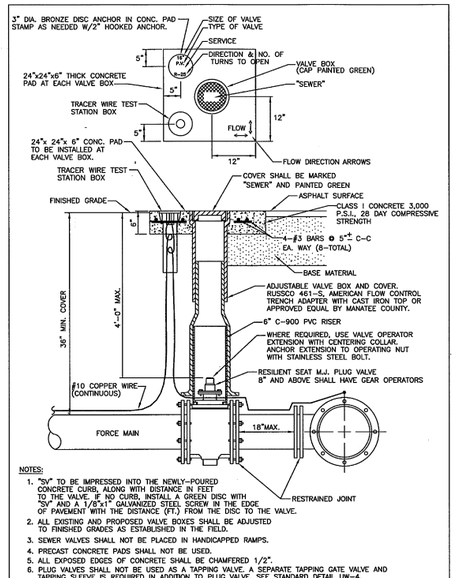
END & CORNER POST TOP OPTIONS		TOP & BOTTOM FABRIC OPTIONS	
STANDARD	DOME	TWIST	KNUCKLE

MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
JAA/KE	02/09

MARCH 17, 2009 — DATE OF APPROVAL

SECURITY FENCING — UG-18



NOTES:

1. "SV" TO BE IMPRESSED INTO THE NEWLY-POURED CONCRETE CURB, ALONG WITH DISTANCE IN FEET TO THE VALVE. IF NO CURB, INSTALL A GREEN DISC WITH "SV" AND A 1/8"x1" GALVANIZED STEEL SCREW IN THE EDGE OF PAVEMENT WITH THE DISTANCE (FT.) FROM THE DISC TO THE VALVE.
2. ALL EXISTING AND PROPOSED VALVE BOXES SHALL BE ADJUSTED TO FINISHED GRADES AS ESTABLISHED IN THE FIELD.
3. SEWER VALVES SHALL NOT BE PLACED IN HANDICAPPED RAMPS.
4. PRECAST CONCRETE PADS SHALL NOT BE USED.
5. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1/2".
6. PLUG VALVES SHALL NOT BE USED AS A TAPPING VALVE. A SEPARATE TAPPING GATE VALVE AND TAPPING SLEEVE IS REQUIRED IN ADDITION TO PLUG VALVE. SEE STANDARD DETAIL UW-4.

MANATEE COUNTY PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	08/05
JAA/JB	10/08
JAA/JEA	02/09

MARCH 17, 2009 — DATE OF APPROVAL

PLUG VALVE, BOX, COVER AND TAG — US-12

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY

PS 428 BOOSTER PUMP STATION

TYPICAL DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10

DRAWING NO. T-02

Last Opened by dl-8-25-10 04:43pm DPerry

FILENAME: Last Saved By: SMF_DENL 5-28-10 01:56pm C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-01-T-02 XREFS: 3624bdr; 7880C10-01-110-400 UG-10; UG-11; UG-12; UG-18; UG-4; UG-7; UG-9; US-12; US-25; UW-12; UW-17; UW-19;

1. CONCRETE CONSTRUCTION SHALL COMPLY WITH ACI "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" (ACI 318) AND "CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES (ACI 350-06) AND COMMENTARY (ACI 350R-06)."
2. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, MINIMUM REINFORCEMENT OF CONCRETE WALLS OR SLABS SHALL BE:
   10" THICK OR LESS – USE #6 @ 12" EW
   MORE THAN 10" THICK – USE #6 @ 12" EWEF
3. WALL REINFORCEMENT AT CORNERS OR JUNCTIONS OF WALLS SHALL BE CONTINUOUS, LAP SPLICED, OR TERMINATED IN AN ACI STANDARD 90 DEGREE HOOK. LAP SPLICES SHALL CONFORM WITH NOTE 12.
4. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, BARS SHALL BE DOWELED. DOWELS SHALL BE THE SAME SIZE AND SPACING AS THE REINFORCEMENT WHICH IS SPLICED TO THE DOWELS.
5. SLABS, BEAMS AND COLUMN REINFORCING BARS SHALL HAVE A MINIMUM EXTENSION OR ANCHORAGE INTO SUPPORTS IN ACCORDANCE WITH ACI 318 AND ACI 350.
6. STIRRUP SUPPORT BARS SHALL BE PROVIDED TO SECURE TOP BARS AGAINST DISPLACEMENT AS REQUIRED.
7. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, CONCRETE COVER OVER #11 AND SMALLER REINF BARS SHALL BE AS FOLLOWS:
   A. SLABS AND JOISTS:
      FORMED CONCRETE SURFACES AND UNFORMED TOP SURFACES FOR DRY CONDITIONS:
         #7 BARS AND SMALLER.....1"
         #8 BARS AND LARGER.....1 1/2"
      FORMED CONCRETE SURFACES AND UNFORMED TOP SURFACES EXPOSED TO WEATHER, IN CONTACT WITH SOIL OR WATER, OR LOCATED OVER WATER.....2"
   B. BEAMS AND COLUMNS:
      FORMED CONCRETE SURFACES FOR DRY CONDITIONS:
         STIRRUPS, SPIRALS, AND TIES.....1 1/2"
         PRINCIPAL REINFORCEMENT.....2"
      FORMED CONCRETE SURFACES EXPOSED TO WEATHER, IN CONTACT WITH SOIL OR WATER, OR BEAMS LOCATED OVER WATER:
         STIRRUPS AND TIES.....2"
         PRINCIPAL REINFORCEMENT.....2 1/2"
   C. WALLS:
      FORMED CONCRETE SURFACES FOR DRY CONDITIONS:
         #7 BARS AND SMALLER.....1"
         #8 BARS AND LARGER.....1 1/2"
      FORMED CONCRETE SURFACES EXPOSED TO WEATHER, OR IN CONTACT WITH SOIL OR WATER.....2"

S101 TYP S REINFORCED CONCRETE NOTES
SHEET 1 OF 3 08-31-07

D. FOOTINGS AND BASE SLABS:
   FORMED VERTICAL CONCRETE SURFACES.....2"
   AT UNFORMED CONCRETE SURFACES CAST AGAINST THE SOIL OR CONCRETE WORK MATS.....3"
   TOP SURFACE OF FOOTINGS AND BASE SLABS.....SAME AS SLABS
8. KEYWAYS AND WATERSTOP SHALL END 3" BELOW THE TOP OF WALLS, UNLESS THERE IS A SLAB ON TOP OF THE WALL, IN WHICH CASE IT SHALL END AT THE BOTTOM OF THE SLAB. IN JOINTS WHERE WATERSTOP TERMINATES AT ADJOINING SLAB OR WALL, WATERSTOP SHALL BE EMBEDDED IN ADJOINING SLAB OR WALL A MINIMUM OF 6".
9. CONCRETE CURING SHALL BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. WHERE WATER CURING IS REQUIRED, MEMBRANE CURING IS NOT ALLOWED. THE CONTRACTOR IS WARNED THAT WATER CURING IS DIFFICULT AT TIMES DUE TO WIND AND DRY CONDITIONS. THE CONTRACTOR SHALL STUDY REQUIREMENTS AND SHALL FURNISH ADEQUATE SYSTEMS TO PROVIDE WATER CURING WHERE REQUIRED. TOP OF WALLS SHALL BE KEPT VISIBLY MOIST AT ALL TIMES AND SHALL BE FLOODED NOT LESS THAN THREE TIMES DAILY.
10. WATERSTOP SHALL BE PLACED IN CONSTRUCTION, AND EXPANSION JOINTS IN WATERBEARING SLABS AND WALLS UNLESS OTHERWISE INDICATED ON THE DRAWINGS, AND IN WALLS AND SLABS SUBJECTED TO GROUNDWATER. WATERSTOP IN THE WALLS SHALL BE CARRIED INTO SLABS AND SHALL BE SPLICED WITH THE WATERSTOP IN THE SLABS.
11. NO BACKFILL SHALL BE PLACED AGAINST WALLS UNTIL:
   A. WALLS HAVE BEEN CAST FULL HEIGHT OF STRUCTURE AND CONCRETE HAS REACHED THE SPECIFIED STRENGTH
   B. CONNECTING SLABS AND BEAMS HAVE BEEN CAST AND CONCRETE HAS REACHED THE SPECIFIED STRENGTH.
12. LAP SPLICES:
   A. WHEN MULTIPLE BARS ARE SPLICED AT THE SAME SECTION, THE CLEAR BAR SPACING IS THE MINIMUM CLEAR DISTANCE BETWEEN THE BARS OUTSIDE THE SPLICE LENGTH LESS ONE BAR DIAMETER.
   B. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, THE BARS AT A LAP SPLICE SHALL BE IN CONTACT WITH EACH OTHER.
   C. FOLLOWING TABULATED VALUES ARE CALCULATED FOR:
      FY = 60,000 PSI FOR REINFORCING BARS
      F'C = 4,000 PSI FOR CONCRETE
   D. TOP BARS ARE HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE BAR.

S101 TYP S REINFORCED CONCRETE NOTES
SHEET 2 OF 3 08-31-07

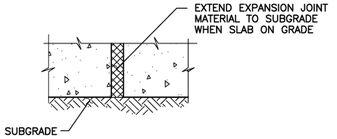
E. HORIZONTAL BARS IN CIRCULAR WALLS OF HYDRAULIC STRUCTURES SHALL BE SPLICED WITH TOP BAR LAP SPLICES. ADJACENT LAP SPLICES SHALL BE STAGGERED HORIZONTALLY BY NOT LESS THAN ONE LAP LENGTH NOR 3 FEET FROM CENTER OF LAP BELOW TO ADJACENT CENTER OF LAP ABOVE, AND SHALL NOT COINCIDE IN VERTICAL ARRAYS MORE FREQUENTLY THAN EVERY THIRD BAR.

REINFORCING BAR LAP SPLICE

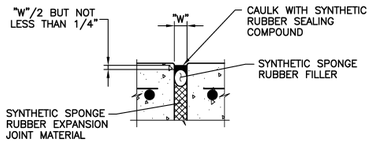
BAR SIZE	MINIMUM COVER (BAR DIA)	MINIMUM CLEAR BAR SPACING (BAR DIA)	LAP SPLICE LENGTH (INCHES)	
			TOP BARS	OTHER BARS
#4	MORE THAN 1	MORE THAN 2	32 *	25 *
	MORE THAN 2	MORE THAN 4	20	15
#5	MORE THAN 1	MORE THAN 2	40 *	31 *
	MORE THAN 2	MORE THAN 4	26	20
#6	MORE THAN 1	MORE THAN 2	48 *	37 *
	MORE THAN 2	MORE THAN 4	30	24
#7	MORE THAN 1	MORE THAN 2	70 *	54 *
	MORE THAN 2	MORE THAN 4	43	33
#8	MORE THAN 1	MORE THAN 2	81 *	62 *
	MORE THAN 2	MORE THAN 4	50	38
#9	MORE THAN 1	MORE THAN 2	90 *	70 *
	MORE THAN 2	MORE THAN 4	56	42
#10	MORE THAN 1	MORE THAN 2	104 *	81 *
	MORE THAN 2	MORE THAN 4	62	48
#11	MORE THAN 1	MORE THAN 2	114 *	88 *
	MORE THAN 2	MORE THAN 4	69	54

NOTES:
1. THE SPLICE LENGTH SHALL BE SELECTED ONLY WHEN BOTH REQUIREMENTS OF THE COVER AND BAR SPACING ARE SATISFIED.
2. * IF THE CLEAR SPACING IS LESS THAN OR EQUAL TO TWO BAR DIAMETERS OR THE COVER IS LESS THAN OR EQUAL TO ONE BAR DIAMETER, THE LAP SPLICE LENGTH SHALL BE INCREASED BY 50 PERCENT.

S101 TYP S REINFORCED CONCRETE NOTES
SHEET 3 OF 3 08-31-07



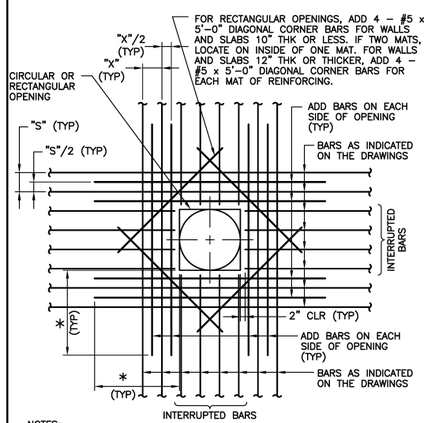
A/1 DETAIL – SLAB ON GRADE



B/1 DETAIL

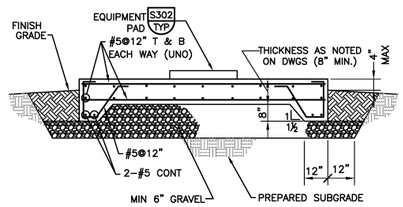
NOTES:
1. FOR WALLS, FORM ALL JOINT EDGES AT 1/4" CHAMFER.
2. FOR SLABS, EDGE TOP OF EXPOSED SLAB JOINT EDGES AT 1/4" RADIUS.
3. FOR UNDERSIDE OF EXPOSED SLABS, FORM JOINT EDGES AT 1/4" CHAMFER.
4. "W" = 1" THICK UNLESS OTHERWISE INDICATED ON THE DRAWINGS. MIN JOINT WIDTH = 3/8".
5. USE A/– AT UNDERSIDE OF SLABS ON GRADE ONLY. USE B/– AT ALL OTHER LOCATIONS.

S130 TYP NS EXPANSION JOINT
02-13-09



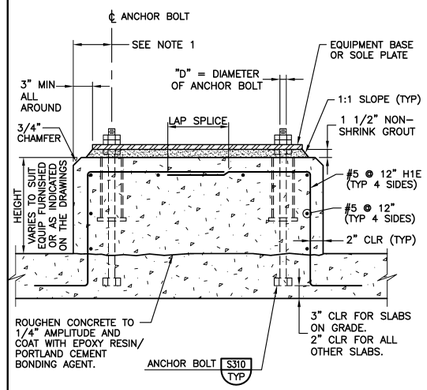
NOTES:
1. AREA OF ADD BARS AT EACH EDGE OF OPENING IN EACH DIRECTION SHALL MATCH 1/2 THE CROSS SECTIONAL AREA OF THE INTERRUPTED BARS.
2. PROVIDE STANDARD ACI HOOKS ON BARS IF STRAIGHT EXTENSION, PAST THE OPENING, CANNOT BE ACHIEVED.
3. PLACE ADD BARS IN SAME PLANES AS INTERRUPTED REINFORCING.
4. PLACE #5 DIAGONAL BARS UNDER INTERRUPTED REINFORCING.
5. * – DIMENSION EQUALS OPENING DIMENSION MEASURED PERPENDICULAR TO ADD BARS PLUS LAP SPLICE LENGTH.

S180 TYP NS ADDITIONAL REINFORCING AT OPENINGS IN CONCRETE SLABS OR WALLS
07-31-08



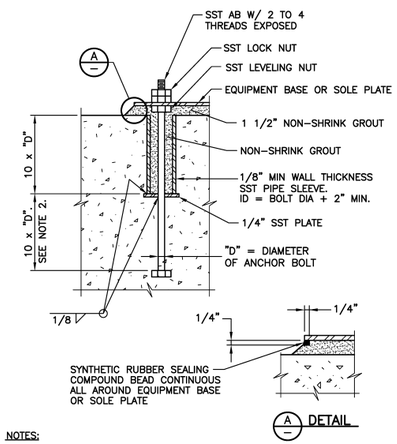
NOTE:
1. DIM REQD TO SUIT EQUIPMENT OR AS NOTED ON DRAWINGS.

S300 TYP EQUIPMENT SLAB DETAIL
02-12-04



NOTES:
1. THE EDGE DISTANCE ON THE ANCHOR BOLTS SHALL NOT BE LESS THAN 6" OR 8 x "D".
2. WHERE CONCRETE SLAB OR BEAM THICKNESS WILL NOT ACCOMMODATE THE ANCHOR BOLT, PROVIDE EXTRA THICKNESS OR SLAB OR BEAM.

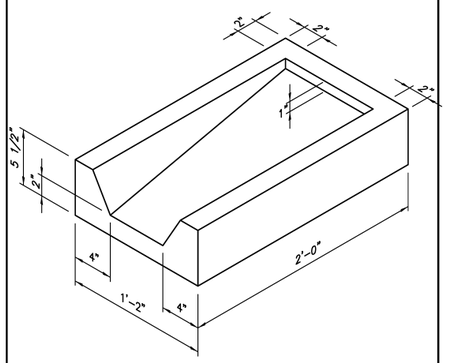
S302 TYP N EQUIPMENT BASE
04-30-07



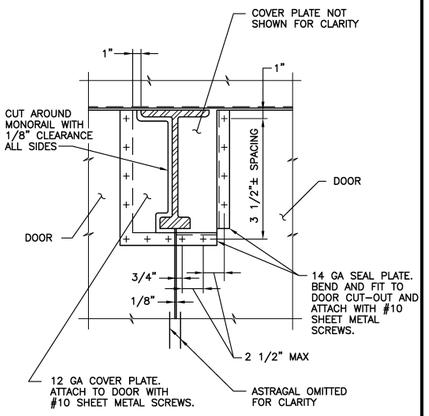
A/– DETAIL

NOTES:
1. ANCHOR BOLT DIAMETER AS INDICATED ON THE DRAWINGS. IF NOT INDICATED ON THE DRAWINGS, THE ANCHOR BOLT SIZE SHALL BE AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.
2. WHERE CONCRETE SLAB OR BEAM THICKNESS WILL NOT ACCOMMODATE THE ANCHOR BOLT, PROVIDE EXTRA THICKNESS OF SLAB OR BEAM.
3. PREFABRICATED PLASTIC ANCHOR BOLT SLEEVE OPTIONAL.
4. DO NOT USE ALL THREAD RODS AS A SUBSTITUTE FOR BOLTS WITH A BOLT HEAD. SMOOTH RODS THREADED AT THE ENDS MAY BE USED IF ACCEPTABLE TO THE ENGINEER. DO NOT WELD NUTS TO THE THREADED RODS.

S310 TYP N ANCHOR BOLT
07-31-08



S804 TYP CONCRETE SPLASH BLOCK
07-14-09



S830 TYP J DOOR CLOSURE PLATE AT MONORAIL
07-14-09

Last Opened by: 6-04-10 04:01pm DPerry

REV	DATE	BY	DESCRIPTION

DESIGNED PAS
DRAWN DMS
CHECKED GLS
DATE APRIL 2010
PROJECT ENGINEER

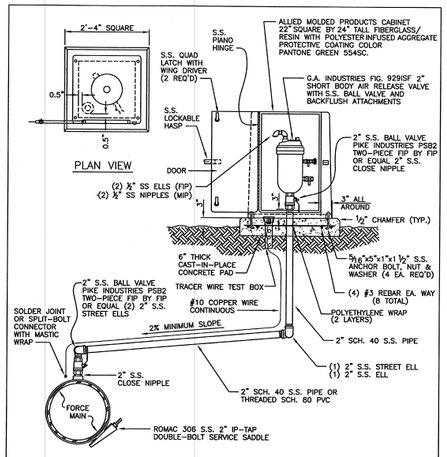
FILENAME: Last Saved By: SMF_DENL 5-28-10 02:01pm C:\Documents and Settings\DPerry\Desktop\ps428\7880C10-01-T-03 XREFS: 3624bdr

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
TYPICAL DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. T-03



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 PER DETAIL US-10 UNLESS IMPRACTICAL, THEN, INSTALLATIONS MAY BE ABOVE-GROUND ONLY WHERE APPROVED AND SPECIFICALLY INDICATED ON THE PLAN.
7. CONCRETE PAD SHALL BY TYPE I CONCRETE W/ 3,000 P.S.I., 28 DAY COMPRESSIVE STRENGTH.

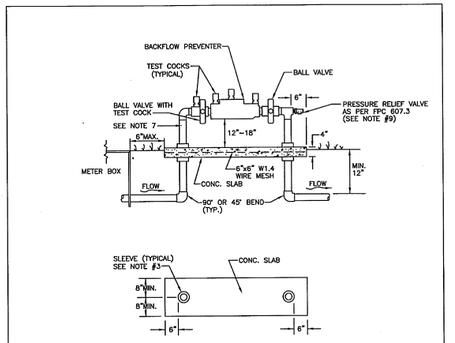
MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

REV.BY	DATE
JAA/JEA	02/09

MARCH 17, 2009
DATE OF APPROVAL

ABOVE-GROUND AIR RELEASE VALVE ASSY. FOR FORCE MAINS

US-25



NOTES:

1. BACKFLOW DEVICE MUST BE INSTALLED IMMEDIATELY DOWNSTREAM OF METER, AS SHOWN ABOVE.
2. COPPER PIPE TYPE "K" OR BRASS PIPE MINIMUM SCHEDULE 40 SHALL BE USED TO A MINIMUM DEPTH OF 12" BELOW GRADE.
3. PIPES PASSING THROUGH OR ENCASED IN CONCRETE MUST BE PROPERLY PROTECTED AND SLEEVED.
4. THE SYSTEM MUST MEET ALL REQUIREMENTS OF THE FLORIDA PLUMBING CODE (LATEST EDITION) AND THE MANATEE COUNTY BACKFLOW PREVENTION ORDINANCE (LATEST EDITION).
5. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1/2".
6. BACKFLOW PREVENTER SHALL BE TESTED AT THE TIME OF INSTALLATION.
7. PRESSURE REDUCING VALVE REQUIRED UPSTREAM OF BACKFLOW IF SYSTEM PRESSURE EXCEEDS 80 PSI.
8. 3' MINIMUM CLEARANCE FROM LANDSCAPING PLANTS TO EDGE OF CONCRETE SLAB AND CLEAR OPENING FOR ACCESS FROM STREET.
9. IN ADDITION TO THE PRV, THE BUILDING DEPT. MAY REQUIRE AN APPROVED DEVICE FOR THERMAL EXPANSION CONTROL.
10. REFER TO STANDARD DETAIL US-15 FOR LIFT STATIONS.

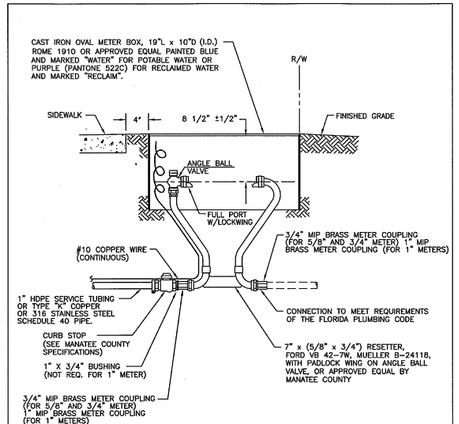
MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

REV.BY	DATE
CLB/KE	03/06
JAA/JB	10/08
JAA/JEA	02/09

MARCH 17, 2009
DATE OF APPROVAL

3/4" & 1" BACKFLOW PREVENTER

UW-12



NOTES:

1. FORD 40 SERIES RESETTERS VB43 AND VB44 OR EQUAL FOR 3/4" OR 1" METERS ALSO ALLOWED.
2. METER BOX AND RESETTER ARE TO BE INSTALLED BY THE INFRASTRUCTURE CONTRACTOR AND SHALL NOT BE SET IN DRAINAGE SWALES, SIDEWALKS OR DRIVEWAYS.
3. SEE TYPICAL SERVICE CONNECTION STANDARD DETAIL UW-19.
4. RESETTER IS NOT REQUIRED ON EXISTING SERVICE LINE REPLACEMENT THAT INITIALLY DID NOT HAVE A RESETTER, UNLESS THE EXISTING SERVICE LINE IS TO BE RELOCATED.
5. WHEN THE DISTANCE BETWEEN THE EDGE OF THE SIDEWALK AND THE R/W IS ONE FOOT (CUL-DE-SAC W/ MEDIAN) A 10 FOOT PUBLIC UTILITY EASEMENT SHALL BE LOCATED IN THE FRONT OF THE LOTS, ADJACENT TO THE R/W.

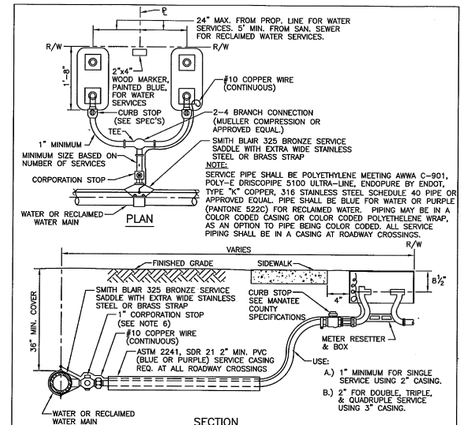
MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

REV.BY	DATE
MH/KE	3/07
JAA/JB	10/08

MARCH 17, 2009
DATE OF APPROVAL

METER BOX ASSEMBLY FOR 5/8" x 3/4", 3/4" & 1" METERS

UW-17



NOTES:

1. ALL SERVICE TAPS TO BE LOCATED IN THE FIELD. TAPS SHALL BE NO CLOSER THAN 2'-0" STAGGERED INTERVALS OR WITHIN 2'-0" FROM BELL OR SPIGOT ENDS.
2. METER BOXES & RESETTERS ARE TO BE INSTALLED BY THE INFRASTRUCTURE CONTRACTOR AND SHALL NOT BE SET IN DRAINAGE SWALES, SIDEWALKS OR DRIVEWAYS.
3. "WM" OR "RWM" TO BE IMPRESSED INTO THE NEWLY POURED CONCRETE CURB ALONG WITH DISTANCE IN FEET TO THE METER. IF NO CURB, INSTALL A BLUE DISC WITH "WM" OR A PURPLE DISC WITH "RWM" AND A 1/8"x 1" GALVANIZED STEEL SCREW IN THE EDGE OF PAVEMENT WITH THE DISTANCE (IN FEET) FROM THE DISC TO THE METER.
4. #10 COPPER WIRE SHALL BE INSTALLED WITH WATER AND RECLAIMED MAIN AND ALL SERVICES. SERVICE WIRE SHALL BE CONNECTED TO THE TRACER WIRE ALONG THE MAIN.
5. WATER AND RECLAIMED WATER SERVICE LINES TO BE 5' MINIMUM FROM SEWER SERVICE PIPES.
6. FOR 2" SERVICES REPLACE CORPORATION STOP WITH 2" RESILIENT WEDGE GATE VALVE W/BOX, LID & TAG. SEE STANDARD DETAIL UW-2. MJ GATE VALVE IN DETAIL UW-2 SHALL BE SUBSTITUTED WITH THREADED FIP GATE VALVE AND BRASS NIPPLE. CENTERING COLLAR NOT REQUIRED ON 2" GATE VALVES.
7. WHEN THE DISTANCE BETWEEN THE EDGE OF THE SIDEWALK AND THE R/W IS ONE FOOT (CUL-DE-SAC W/ MEDIAN) A 10 FOOT PUBLIC UTILITY EASEMENT SHALL BE LOCATED IN THE FRONT OF THE LOTS, ADJACENT TO THE R/W.

MANATEE COUNTY
PUBLIC WORKS DEPARTMENT

REV.BY	DATE
MH/KE	09/06
JAA/KE	10/08
JAA/KE	02/09

MARCH 17, 2009
DATE OF APPROVAL

TYPICAL SERVICE CONNECTION

UW-19

REV	DATE	BY	DESCRIPTION

DESIGNED JMF
DRAWN DVP
CHECKED EP
DATE APRIL 2010
PROJECT ENGINEER

carollo
Engineers...Working Wonders With Water ™
401 NORTH CATTLEMEN ROAD, SUITE 306
SARASOTA, FL. 34232
PHONE: (941) 371-9832 FAX: (941) 371-9873
CA 00008571

MANATEE COUNTY
PS 428 BOOSTER PUMP STATION
TYPICAL DETAILS

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

JOB NO. 7880C.10
DRAWING NO. T-04

Last Opened by: 6-25-10, 04:55pm DPerry

FILENAME: Last Saved By: DPerry 6-01-10 03:43pm C:\pw_working\projectwise\dperry\dms766811\7880C10-01-T-04 XREFS: 3624bdr; 7880C10-01-110-400 UG-10; UG-11; UG-12; UG-18; UG-4; UG-7; UG-9; US-12; US-25; UW-12; UW-17; UW-19;