The Enclosed Document Is Provided For Your Convenience.

Please Email ALL Questions:

MailTo:ContractAdministration@TampaGov.net

Please Let Us Know If You Plan To Bid

City of Tampa
Contract Administration Department
306 E. Jackson St. #280A4N
Tampa, FL 33602
(813)274-8456

CITY OF
TAMPA, FLORIDA

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS
PROPOSAL, BID BOND, FORM OF NOTICE OF AWARD,
AGREEMENT, PERFORMANCE BOND AND
SPECIFICATIONS

FOR

Contract 14-C-00016

BLUE SINK MFL PUMPING STATION

City of Tampa
CONTRACT ADMINISTRATION DEPARTMENT
TAMPA MUNICIPAL OFFICE BUILDING
306 E. JACKSON STREET - 4TH FLOOR NORTH
TAMPA, FLORIDA 33602

MARCH 2015

CITY OF TAMPA
CONTRACT ADMINISTRATION DEPARTMENT
306 E. Jackson Street 280A4N
Tampa, FL 33602

****

BID NOTICE MEMO

****

Bids will be received no later than 1:30 p.m. on the indicated Date(s) for the following Project(s):

****

CONTRACT NO.: 14-C-00016; Blue Sink MFL Pumping Station

BID DATE: April 7, 2015 ESTIMATE: $2,000,000 SCOPE: The project comprises construction of a new pumping station with two raw water pumps and vacuum priming system, furnish and install electrical and instrumentation controls, two floating intake structures with suction pipes from the Sink to the new pumping station, a new water discharge main from the pumping station to the Sink, a raw water crossing of Blue Sink, sanitary sewer and water service, with all associated work required for a complete project in accordance with the Contract Documents. PRE-BID CONFERENCE: Tuesday, March 24, 2015, 10:00 a.m. on site at 151 W. 115th Ave., Tampa, FL 33612. Attendance is not mandatory, but recommended.

****

Bids will be opened in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida 33602. Pre-Bid Conference is held at the same location unless otherwise indicated. Plans and Specifications and Addenda for this work may be examined at, and downloaded from, www.demandstar.com. Backup files are available at http://www.tampagov.net/contract-administration/programs/construction-project-bidding. Subcontracting opportunities may exist for City certified Small Local Business Enterprises (SLBEs). A copy of the current SLBE directory may be obtained at www.Tampagov.net. Phone (813) 274-8456 for assistance. Email Technical Questions to: contractadministration@tampagov.net .

TABLE OF CONTENTS

NOTICE TO BIDDERS
CITY OF TAMPA, FLORIDA
Contract 14-C-00016; Blue Sink MFL Pumping Station

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., April 07, 2015, in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida, there to be publicly opened and read aloud.

The proposed work is to include, but not be limited to, construction of a new pumping station with two raw water pumps and vacuum priming system, furnish and install electrical and instrumentation controls, two floating intake structures with suction pipes from the Sink to the new pumping station, a new water discharge main from the pumping station to the Sink, a raw water crossing of Blue Sink, sanitary sewer and water service, with all associated work required for a complete project in accordance with the Contract Documents.

The Instructions to Bidders, Proposal, Form of Bid Bond, Agreement, Form of Public Construction Bond, Specifications, Plans and other Contract Documents are posted at DemandStar.com. Backup files may be downloaded from http://www.tampagov.net/dept_contract_administration/programs_and_services/construction_project_bidding/index.asp. One set may be available for reference at the office of the Contract Administration Department, Municipal Office Building, Fourth Floor North, City Hall Plaza, Tampa, Florida 33602.

Each Proposal must be submitted on the Proposal form included in the Specifications and must be accompanied by a certified check or cashier's check on a solvent bank or trust company in compliance with Section 255.051, Florida Statutes, made payable to the City of Tampa, in an amount of not less than five per cent of the total bid, or a Bid Bond, of like amount, on the form set forth in the Contract Documents, as a guarantee that, if the Proposal is accepted, the Bidder will execute the Proposed Contract and furnish a Public Construction Bond within twenty (20) days after receipt of Notice of Award of Contract.

The City of Tampa reserves the right to reject any or all Bids and to waive any informalities in the Bid and/or Bid Bond. Acceptance or rejection of Proposals will be made as soon as practicable after the Proposals are received, but the City reserves the right to hold Proposals for ninety (90) days from the date of Opening.

Bid Protest Procedures: Unless subsequently indicated otherwise, in a revised posting on the Department's web page for Construction Project Bidding, the City of Tampa intends to award the referenced project to the lowest bidder listed in the tabulation posted on or about the date of Bid Opening. A bidder aggrieved by this decision may file a protest not later than 4:30 P.M., five (5) business days from the first posting thereof, pursuant to City of Tampa Code Chapter 2, Article V, Division 3, Section 2-282, Procurement Protest Procedures. Protests not conforming therewith shall not be reviewed.

Communication with City Staff

Pursuant to City of Tampa Ordinance 2010-92, during the solicitation period, including any protest and/or appeal, NO CONTACT initiated by bidders or responders with City officers or employees, other than the individuals specified below is permitted:
Director of Contract Administration, David Vaughn
Contracts Management Supervisor, Jim Greiner
Contract Officer, Jody Gray
The City's Legal Department staff
The City's Contract Administration Department staff.
Technical Questions and Requests For Information should be directed to the Department via
ContractAdministration@tampagov.net

"A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids 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 Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list." Refer to Section 287.133 Florida Statues.

In accordance with the City of Tampa's Equal Business Opportunity Ordinance, a Goal may have been established for subcontracting with Small Local Business Enterprises, SLBEs, certified by the City. Links to further information and a list of SLBEs are on the Department's Construction Project Bidding Web page. A link to the current complete directory of SLBEs is on the Minority Business Development Office Website.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.01 GENERAL:

The proposed work is the Blue Sink MFL Pumping Station in the City of Tampa, as required for a complete project, as shown on the plans and detailed in the specifications. The work is located on land owned or controlled by the City of Tampa.

I-1.02 FORM PREPARATION AND PRESENTATION OF PROPOSALS: Replace the second sentence with the following: Submission of the entire specification book is not required.

I-1.03 ADDENDA – Section I-2.03 is replaced with the following: No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the City of Tampa, Contract Administration Department, 306 E. Jackson St., 4th Floor, Tampa, Florida 33602 and then emailed to ContractAdministration@tampagov.net. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be posted on DemandStar.Com and on the Department's web page, with notice given to all prospective bidders at the respective fax numbers or e-mail addresses furnished, for such purposes. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-1.04 SIGNATURE OF BIDDERS: Section I-2.07 is replaced with the following:

Proposals must be signed in ink by the Bidder with signature in full. When firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more partners. When a corporation is a bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office. The Proposal shall also bear the seal of the corporation attested by its secretary.

If the bidder referred to in Section I-2.07 is a corporation, it must submit; upon request, a copy of its filed Articles of Incorporation. In addition, if the bidder was incorporated in another state, it must establish that it is authorized to do business in the State of Florida. If the bidder is using a fictitious name, it must submit upon request, proof of registration of such name with the Clerk of the Circuit Court of the Country where its principal place of business is. Failure to submit what is required is grounds to reject the bid of that bidder.

I-1.05 TIME FOR COMPLETION:

The work shall be arranged to be completed in accordance with a progress schedule approved by the Construction Engineer.

The time for completion of this project, referred in Article 4.01 of the Agreement, shall be 365 consecutive calendar days. The period for performance shall start from the date indicated in the Notice To Proceed.

I-1.06 LIQUIDATED DAMAGES:

The amount of liquidated damages, referred to in Article 4.06 of the Agreement, for completion of this project shall be $500.00 per calendar day.

I-1.07 BASIS OF AWARD OF CONTRACT:

The basis of award referred to in Item I-2.11 of Instructions to Bidders shall be the greatest amount of work, which can be accomplished within the funds available as budgeted. The award may be made on the basis of the total bid, base bid, alternates(s) if any, unit bids if any, or any combination thereof deemed to be in the best interest of the City.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

Unless all bids are rejected, the award will be made within 90 days after opening proposals.

I-1.08 GROUND BREAKING CEREMONY:

Arrangement may be made by the City in coordination with the Contractor, for construction to commence with a Ground Breaking Ceremony. Details will be discussed at the pre-construction conference.

I-1.09 INSURANCE:

The insurance required for this project shall be as indicated on Pages beginning with INS-1. Before commencing work, the Contractor shall provide the evidence of the insurance required on a Certificate of Insurance accompanied by evidence of authority to bind the insurance company or companies such as agents license, power of attorney, or letter of authority.

I-1.10 EQUAL BUSINESS OPPORTUNITY PROGRAM / SLBE / REQUIREMENTS

In accordance with the City of Tampa's Equal Business Opportunity Ordinance, a goal of 30% has been established for subcontracting with Small Local Business Enterprises, (SLBEs), certified by the City. The goal is based upon the availability of the firms listed on the Goal Worksheet and as posted in the "SLBEs" link under this Contract's notice on the Department's Construction Project Bidding web page.

BIDDERS MUST SOLICIT ALL SLBEs ON THAT LIST and provide documentation of emails, faxes, phone calls, letters, or other communication with the firms as a first step to demonstrate Good Faith Efforts to achieve the goal. The list is formatted to facilitate e-mail solicitations to the listed firms by copying and pasting e-mail addresses.

Bidders may explore other opportunities for subcontracting with SLBEs by consulting the current directory of all certified SLBEs posted on the Minority Business Development Office web page.

GOOD FAITH EFFORT COMPLIANCE PLAN REQUIRED - When a Goal has been established, the Bidder must submit, with its bid, completed to the fullest extent possible, a Good Faith Effort Compliance Plan using the form GFECP contained herein. Additional documentation is required whenever an SLBE subcontractor's low quote is not utilized. Supplemental information or documentation concerning the Bidder's Compliance Plan may be required prior to award as requested by the City.

DIVERSITY MANAGEMENT INITIATIVE, DMI, DATA REPORTING FORMS REQUIRED - Bidders must submit, with its bid, "DMI-Solicited" forms listing all subcontractors solicited and "DMI-Utilized" forms listing all subcontractors to be utilized. Supplemental forms, documentation, or information may be submitted at bid time or as requested by the City.

After an award, "DMI-Payments" forms are to be submitted with payment requests to report payments to subcontractors.

Bidders may visit the Minority Business Development Office's web page at TampaGov.net for other information about the SLBE program, FAQ's, and the latest SLBE directory of certified firms.

I-1.11 BID SECURITY:

Surety companies shall have a rating of not less than B+ Class VI as evaluated in the most recently circulated Best Key rating Guide Property-Liability.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.12 PUBLIC CONSTRUCTION BOND:

The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be issued and executed by (a) surety company(ies) acceptable to the City of Tampa and licensed to underwrite contracts in the State of Florida. After execution of the Agreement and before commencing work, the Contractor must provide the City a certified copy of the officially recorded Bond.

I-1.13 AGREEMENT
Section 2 – Powers of the City's Representatives
Add the following:
Article 2.05 CITY'S TERMINATION FOR CONVENIENCE:

The City may, at any time, terminate the Contract in whole or in part for the City's convenience and without cause. Termination by the City under this Paragraph shall be by a notice of termination delivered to the Contractor, specify the extent of termination and the effective date.

Upon receipt of a notice of termination, the Contractor shall immediately, in accordance with instructions from the City, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

(a) cease operations as specified in the notice;
(b) place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete continued portions of the Contract;
(c) terminate all subcontracts and orders to the extent they relate to the Work terminated;
(d) proceed to complete the performance of Work not terminated; and
(e) take actions that may be necessary, or that the City may direct, for the protection and preservation of the terminated Work.

The amount to be paid to the Contract by the City because of the termination shall consist of:

(a) for costs related to work performed on the terminated portion of the Work prior to the effective date including termination costs relative to subcontracts that are properly chargeable to the terminated portion of the Work.
(b) the reasonable costs of settlement of the Work terminated, including accounting, legal, clerical and other expenses reasonable necessary for the preparation of termination settlement proposals and supporting data; additional costs of termination and settlement of subcontracts excluding amounts of such settlements; and storage, transportation, and other costs incurred which are reasonably necessary for the preservation, protection or disposition of the terminated Work; and
(c) a fair and reasonable profit on the completed Work unless the Contractor would have sustained a loss on the entire Contract had it been completed.

Allowance shall be made for payments previously made to the Contractor for the terminated portion of the Work, and claims which the City has against the Contractor under the Contract, and for the value of materials supplies, equipment or other items that are part of the costs of the Work to be disposed of by the Contractor.

I-1.14 Section 5 – subcontracts and Assignments, Article 5.01, Page A-7, Last Paragraph:
Change "…twenty-five (25) percent… "to fifty-one (51) percent…"

Section 10-Payments, Article .05 Partial Payments, 1st Paragraph, 1st Sentence:
Change "…fair value of the work done, and may apply for…" to "…fair value of the work done, and shall apply for…"

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.15 Contractors must utilize the U.S. Department of Homeland Security's E-Verify Systems to verify the employment eligibility of all persons employed during the term of the contract to perform employment duties within the State of Florida and all persons, including subcontractors, assigned by the contractor to perform work pursuant to the contract.

I-1.16 GENERAL PROVISIONS; G-2.02 Copies Furnished to Contractor: Replace the first paragraph with the following:

The Contractor shall acquire for its use copies of the plans and specifications as needed. The documents may be downloaded from the City's web site, at
http://www.tampagov.net/dept_contract_administration/programs_and_services/construction_project_bidding/index.asp

I-1.17 PAYMENT DISPUTE RESOLUTION

Any dispute pertaining to pay requests must be presented to the City pursuant to Executive Order 2003-1.

I-1.18 SCRUTINIZED COMPANIES.

For Contracts $1,000,000 and greater, if the City determines the Contractor submitted a false certification under Section 287.135(5) of the Florida Statutes, or if the Contractor has been placed on the Scrutinized Companies with Activities in the Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, the City shall either terminate the Contract after it has given the Contractor notice and an opportunity to demonstrate the City's determination of false certification was in error pursuant to Section 287.135(5)(a) of the Florida Statutes, or maintain the Contract if the conditions of Section 287.135(4) of the Florida Statutes are met.

I-1.19 FLORIDA'S PUBLIC RECORDS LAW

4.33.3 The City of Tampa is a public agency subject to Chapter 119, Florida Statutes. In accordance with Florida Statutes, 119.0701, if applicable, Contractor shall comply with Florida's Public Records Law. Specifically, the Contractor shall:

1. Keep and maintain public records that ordinarily and necessarily would be required by the City in order to perform the service;

2. Provide the public with access to such public records on the same terms and conditions that the City would provide the records and at a cost that does not exceed that provided in Chapter 119, Florida Statutes, or as otherwise provided by law;

3. Ensure that public records that are exempt or that are confidential and exempt from public record requirements are not disclosed except as authorized by law;

4. Meet all requirements for retaining public records and transfer to the City, at no cost, all public records in possession of the contractor upon termination of the contract and destroy any duplicate public records that are exempt or confidential and exempt. All records stored electronically must be provided to the City in a format that is compatible with the information technology systems of the agency.

4.33.4 The failure of Contractor to comply with the provisions set forth in this Article shall constitute a Default and Breach of this award and the City shall enforce the Default in accordance with the provisions set forth in the DEFAULT/RE-AWARD section of this document.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.20 Contractor Qualifications

The Contractor shall have a minimum of 5 successfully completed similar projects (in the size and scope) in the past 5 years.

The following minimum subcontractor's qualifications have been established per area of work:

1. YARD PIPING – Minimum of 5 successful similar (in size and scope) installations in the past 5 years. Two of these projects shall have FDOT involvement. Licensed utility contractor.

2. ASPHALT ROAD IMPROVEMENTS – Minimum of 5 successful similar (in size and scope) installations in the past 5 years. Two of these projects shall include FDOT involvement.

3. SITEWORK – Minimum of 5 successful similar (in size and scope) installations in the past 5 years.

3. ELECTRICAL – Per Section 260573 1.2 and a minimum of 5 successful similar (in size and scope) industrial type installations in the past 5 years. A&A Electric and Cogburn Brothers are pre-approved.

5. BUILDING CMU – Minimum of 5 successful similar (in size and scope) installations in the past 5 years.

6. BUILDING CIP CONCRETE – Minimum of 5 successful similar (in size and scope) industrial type installations in the past 5 years.

7. MECHANICAL – Minimum of 5 successful similar (in size and scope) installations in the past 5 years.

8. HVAC – Minimum of 5 successful similar (in size and scope) installations in the past 5 years.

SECTION 2
GENERAL INSTRUCTIONS

I-2.01 BIDDER'S RESPONSIBILITY

Before submitting Proposals, Bidders shall carefully examine the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and make all necessary investigations to inform themselves thoroughly as to the facilities necessary for delivering, placing and operating the necessary construction equipment, and for delivering and handling materials at the site, and inform themselves thoroughly as to all difficulties involved in the completion of all the work in accordance with the Contract Documents.

Bidders must examine the Plans, Specifications, and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done, and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amounts or quantities necessary to complete the work in strict compliance with the Contract Documents.

Elevations of the ground are shown on the Plans and are believed to be reasonably correct, but are not guaranteed to be absolutely so and are presented only as an approximation. Bidders shall satisfy themselves as to the correctness of all elevations.

The City may have acquired, for its own use, certain information relating to the character of materials, earth formations, probable profiles of the ground, conditions below ground, and water surfaces to be encountered at the site of the proposed work. This information, if it exists, is on file at the offices of the Department of Public Works and Bidders will be permitted to see and examine this information for whatever value they consider it worth. However, this information is not guaranteed, and Bidders should satisfy themselves by making borings or test pits, or by such other methods as they may prefer, as to the character, location, and amounts of water, peat, clay, sand, quicksand, gravel, boulders, conglomerate, rock, gas or other material to be encountered or work to be performed.

Various underground and overhead structures and utilities are shown on the plans. The location and dimensions of such structures and utilities, where given, are believed to be reasonably correct, but do not purport to be absolutely so. These structures and utilities are plotted on the Plans for the information of the Bidders, but information so given is not to be construed as a representation or assurance that such structures will be found or encountered as plotted, or that such information is complete or accurate.

I-2.02 FORM, PREPARATION AND PRESENTATION OF PROPOSALS

Each Proposal shall be submitted upon the Proposal Form and in accordance with the instructions included herein. The Proposal Form must not be detached herefrom. All blank spaces for bid prices must be filled in, in both words and figures, with the unit or lump sum prices, or both, for which the Proposal is made. The computed total price for each unit price Contract Item shall be determined by multiplying the estimated quantity of the item, as set forth in the Proposal Form, by the corresponding unit price bid for such item. The resulting product shall be entered in the appropriate blank space under the column headed "Computed Total Price for Item". The lump sum price bid for each lump sum price Contract Item shall also be entered in the column headed "Computed Total Price for Item". If a Proposal contains any omissions, erasures, alterations, additions, or items not called for in the itemized Proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of the Proposal. In case of any discrepancy in the unit price or amount bid for any item in the Proposal, the price as expressed in written words will govern. In no case is the Agreement Form to be filled out or signed by the Bidder.

In the case of certain jobs bid Lump Sum a "Schedule of Unit Prices" must be filled out as an attachment to the Lump Sum proposal. These prices may be used as a guide for the negotiation of change orders, at the City's option.

The proposal must be signed and certified and be presented on the prescribed form in a sealed envelope on/or before the time and at the place stated in the Notice of Bidders, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the Proposal is made.

Unless the apparent low bidder is now engaged in or has recently completed contract work for the City of Tampa, he, if requested, shall furnish to the City, after the opening of bids and prior to award, a summary statement of record of construction experience over the past three (3) years with proper supporting evidence, and, if required by the City, shall also furnish a list of equipment and other facilities pertinent to and available for the proper execution of the proposed work, and a statement of financial resources to the extent necessary to establish ability to carry on the proposed work. The City may make further investigations as considered necessary with respect to responsibility of the Bidder to whom it appears may be awarded the Contract.

If forwarded by mail, the sealed envelope containing the Proposal, endorsed as directed above, must be enclosed in another envelope addressed as specified in the Notice to Bidders and sent by registered mail.

I-2.03 ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the Contract Administration Department, Tampa Municipal Office Building, 4th Floor North, City Hall Plaza, Tampa, Florida 33602. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by certified mail, with return receipt requested, to all prospective bidders at the respective addresses furnished, for such purposes, not later than three (3) working days prior to the date fixed for the opening of the Proposals, and if requested, a copy will be delivered to the prospective bidder's representative. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-2.04 BID SECURITY

Each Proposal must be accompanied by a certified or cashier's check issued by a solvent bank or trust company and payable at sight to the City of Tampa, in compliance with Section 255.051 Florida Statutes, or a Bid Bond upon the form provided herein, in an amount of not less than five percent of the sum of the computed total amount of the Bidder's Proposal as a guarantee that if the Proposal is accepted, the Bidder will execute and fill in the proposed Contract and Public Construction Bond within twenty (20) days after notice of award of the Contract. Certified checks shall have all necessary documentary revenue stamps attached if required by law. Surety on Bid Bonds shall be a duly authorized surety company authorized to do business in the State of Florida, and all such Bonds shall be issued or countersigned by a local resident producing agent, and satisfactory evidence of the authority of the person or persons executing such Bond to Execute the same shall be submitted with the Bond. Bid Bonds shall be issued by a surety company acceptable to the City.

Within ten (10) days after the opening of Proposals, the bid security of all but the three lowest Bidders will be returned. The bid security of the remaining two Bidders whose Proposals are not accepted will be

returned within ten (10) days after the execution of the Contract, or, if no such Contract has been executed, within ninety (90) days after the date of opening Proposals. The bid security of the Bidder whose Proposal is accepted will be returned only after he has duly executed the Contract and furnished the required Public Construction Bond and insurance.

Should it be necessary for the City to retain the bid security and said bid security is in the form of checks, the checks of these Bidders will be returned if replaced by Bid Bonds in an amount equal to the amount of the checks of such Bidders in such form and issued by a surety company acceptable to the City.

A Bidder may withdraw his Proposal before the time fixed for the opening of Proposals, without prejudice to himself, by communicating his purpose, in writing, to the Mayor and City Council, and when his communication is received, the Proposal will be handed to him or his authorized agent unopened. No Bidder may withdraw his Proposal within ninety (90) days after the day of opening Proposals.

The Bidder whose Proposal is accepted shall enter into a written contract, upon the Agreement form included herein, for the performance of the work and furnish the required Public Construction Bond within twenty (20) days after written notice by the City of Award of Contract has been served on such Bidder personally or after receipt of the written notice by registered mail to such Bidder at the address given in his Proposal.

If the Bidder to whom a Contract is awarded refuses or neglects to execute it or fails to furnish the required Public Construction Bond within twenty (20) days after receipt by him of the Notice of Award of Contract, the amount of his bid security shall be forfeited and shall be retained by the City as liquidated damages, and not as a penalty, it being now agreed that said sum is a fair estimate of the amount of damages that the City will sustain in case said Bidder fails to enter into a Contract and furnish the required Public Construction Bond. If a Bid Bond was furnished, the full amount of the Bond shall become due and payable as liquidated damages caused by such failure. The full amount of the bid security shall be forfeited as liquidated damages without consideration of the fact that an award may be less than the full amount of the Bidder's Proposal, excepting that the award shall be within the conditions of said Proposal relating to the basis of consideration for an award. No plea of mistake in the bid or misunderstanding of the conditions of forfeiture shall be available to the Bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

I-2.05 LAWS AND REGULATIONS
The Bidder who is awarded the Contract must comply with all laws of the State of Florida, and all applicable Ordinances of the City of Tampa respecting labor and compensation and with all other statutes, ordinances, rules and regulations applicable and having the force of law.

I-2.06 PUBLIC CONSTRUCTION BOND
The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be executed by a surety company acceptable to the City of Tampa and licensed to underwrite contracts in the State of Florida. Surety companies shall have a rating of not less than: B+ Class VI as evaluated in the most recently circulated BEST'S KEY RATING GUIDE PROPERTY-LIABILITY.

I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS
Proposals must be signed in ink by the Bidder with signature in full. When a firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more of the partners. When a corporation is a Bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office. The Proposal shall also bear the seal of the corporation attested by its secretary. Anyone signing the Proposal as agent must file with it legal evidence of his authority to do so.

Bidders who are nonresident corporations shall furnish to the City a duly certified copy of their permit to transact business in the State of Florida, signed by the Secretary of State, within ten days of the notice to do so. Such notice will be given to Bidders who are nonresident corporations, to whom it appears an award will be made, and the copy of the permit must be filed with the City before the award will be made. Failure to promptly submit this evidence of qualification to do business in the State of Florida may be basis for rejection of the Proposal.

I-2.08 REJECTION OF PROPOSALS
The City reserves the right to reject any Proposal if investigation of the Bidder fails to satisfy the City that such Bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all Proposals will be rejected if there is reason to believe that collusion exists among Bidders. Proposals will be considered irregular and may be rejected if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alternates, or irregularities of any kind. The City reserves the right to reject any or all Proposals and to waive such technical errors as may be deemed best for the interests of the City.

I-2.09 QUANTITIES ESTIMATED ONLY
The estimate of quantities of the various items of work and materials, if set forth in the Proposal Form, is approximate only and is given solely to be used as a uniform basis for the comparison of Proposals. The quantities actually required to complete the Contract work may be less or more than so estimated, and if awarded a Contract for the work specified, the Contractor agrees that he will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work assumed for comparison of Proposals and quantities of work actually performed. The City further reserves the right to vary the quantities in any amount.

I-2.10 COMPARISON OF PROPOSALS
Except jobs bid on a "One Lump Sum" basis, proposals will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantity of each time and the corresponding unit price of each item, and including any lump sum prices on individual items.

The computed total prices for individual Contract Items and the total computed price for the entire Contract, as entered by the Bidder in the Proposal Form, are for convenience only and are subject to correction in the tabulation and computation of the Proposals.

I-2.11 BASIS OF AWARD
The Contract will be awarded, if at all, to the lowest responsible Bidder or Bidders, as determined by the City and by the terms and conditions of the Contract Documents. Unless all bids are rejected, the award will be made within ninety (90) days after the opening of Proposals. The successful Bidder will be required to possess, or obtain, a valid City Occupational License.

I-2.12 INSURANCE REQUIRED
The successful Bidder and his subcontractors will be required to procure and pay for insurance covering the work in accordance with the provisions of Article 6.02 of the Agreement as indicated on special instructions pages beginning with INS-1.

I-2.13 NO ASSIGNMENT OF BID
No Bidder shall assign his bid or any rights thereunder.

I-2.14 NONDISCRIMINATION IN EMPLOYMENT
Contracts for work under this Proposal will obligate the contractors and subcontractors not to discriminate in employment practices.

Bidders must, if requested, submit with their initial bid a signed statement as to whether they have previously performed work subject to the President's Executive Order Nos. 11246 and 11375.
Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the Contract.

Successful Bidders must, if requested, submit a list of all subcontractors who will perform work on the project and written,

signed statement from authorized agents of the labor pools with which they will or may deal for employees on the work together with supporting information to the effect that said labor pools practices and policies are in conformity with Executive Order No. 11246 and that said labor pools will affirmatively cooperate in or offer no hindrance to the recruitment, employment and equal treatment of employees seeking employment and performing work under the Contract, or a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish them prior to the award of the Contract.

I-2.15 LABOR STANDARDS
The Bidder's attention is directed to the Contract Provisions of the Labor Standards for federally assisted projects which may be attached to and made a part of the Agreement.

I-2.16 NOTICE TO LABOR UNIONS
If applicable, the successful Bidder will be required to provide Labor Unions and other organizations of workers a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers", and such form may be made a part of the Agreement.

I-2.17 NOTICE TO PROSPECTIVE FEDERALLY-ASSISTED CONSTRUCTION CONTRACTORS
A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted to said Secretary prior to the award of a federally-assisted construction and Contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The form of certification may be bound herein following the form of Bid Bond.

Contractors receiving federally-assisted construction Contract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractor for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause:

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT
FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

"A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause."

"Contractors receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide from the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause."

The United States requires a pre-award conference if a proposed construction contract exceeds one million dollars to determine if the the prospective contractor is in compliance with the Equal Employment Opportunity requirements of Executive Order 11246 of September 24, 1965. In such instances, a meeting may be scheduled at which the prospective contractor must specify what affirmative action he has taken or proposed to take to assure equal employment opportunity which must be approved by the United States before award of the contract will be authorized.

Bidders must be prepared to submit an Equal Employment Opportunity (EEO) plan at a pre-award conference. The plan must include bidding opportunities offered by the Bidder to minority subcontractors.

On October 13, 1971, President Nixon issued Executive Order 11246 emphasizing the government's commitment to the promotion of minority business enterprise. Accordingly, the United States is firmly committed to the utilization of available resources to support this important program. U.S. agencies are most interested in realizing minority participation on the subject. Achieving equal employment opportunity compliance is required through Executive Order 11246. WE cannot emphasize too strongly that minority subcontractors be extended subcontractors bidding opportunities as but one step in your affirmative action policy.

Due to the importance of this contract, U.S. Agencies may conduct an EEO Conference prior to the award of the Contract. It is suggested that the responsive Bidder confirm the minority subcontractors he contacted for bids or quotations in his EEO plan submitted at the conference.

I-2.18 EEO AFFIRMATIVE ACTION REQUIREMENTS
By the submission of a Proposal, each Bidder acknowledges that he understands and will agree to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under any contract awarded pursuant to solicitation. Each Bidder agrees that if awarded a contract, he will similarly bind contractually each subcontractor. In policies, each Bidder further understands and agrees that if awarded a contract, he must engage in Affirmative Action directed to promoting and ensuring equal employment opportunity in the work force used under the contract (and he must require contractually the same effort of all subcontractors whose subcontracts exceed $100,000). The Bidder understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the project. * * * * * * * END of SECTION * * * * * * *

CITY OF TAMPA INSURANCE REQUIREMENTS

During the life of the award/contract the Awardee/Contractor shall provide, pay for, and maintain insurance with companies authorized to do business in Florida, with an A.M. Best rating of B+ (or better) Class VII (or higher), or otherwise be acceptable to the City if not rated by A.M. Best. All insurance shall be from responsible companies duly authorized to do business in the State of Florida.

All commercial general liability insurance policies (and Excess or Umbrella Liability Insurance policies, if applicable) shall provide that the City is an additional insured as to the operations of the Awardee/Contractor under the award/contract including the additional insured endorsement, the subrogation wavier endorsement, and the Severability of Interest Provision. In lieu of the additional named insured requirement, if the Awardee/Contractor's company has a declared existing policy which precludes it from including additional insureds, the City may permit the Contractor to purchase an Owners and Contractors Protective Liability policy. Such policy shall be written in the name of the City at the same limit as is required for General Liability coverage. The policy shall be evidenced on an insurance binder which must be effective from the date of issue until such time as a policy is in existence and shall be submitted to the City in the manner described below as applicable to certificates of insurance.

The insurance coverages and limits required must be evidenced by a properly executed Acord 25 Certificate of Insurance form or its equivalent. Each Certificate must be personally manually signed by the Authorized Representative of the insurance company shown in the Certificate with proof that he/she is an authorized representative thereof. Thirty days' written notice must be given to the City of any cancellation, intent not to renew, or reduction in the policy coverages, except in the application of the aggregate liability limits provisions. Should any aggregate limit of liability coverage be reduced, it shall be immediately increased back to the limit required by the contract. The insurance coverages required herein are to be primary to any insurance carried by the City or any self-insurance program thereof.

The following coverages are required:

A. Commercial General Liability Insurance shall be provided on the most current Insurance Services Office (ISO) form or its equivalent. This coverage must be provided to cover liability arising from premises and operations, independent contractors, products and completed operations, personal and advertising injury, contractual liability, and XCU exposures (if applicable). Completed operations liability coverage shall be maintained for a minimum of one-year following completion of work. The amount of Commercial General Liability insurance shall not be less than the amount specified.

(a) $1,000,000 per occurrence and a $2,000,000 general aggregate for projects valued at $2,000,000 or less. General aggregate limit for projects over that price shall equal or exceed the price of the project. An Excess or Umbrella Liability insurance policy can be provided to meet the required limit. Risk Management may be contacted for additional information regarding projects of this nature.

B. Automobile Liability Insurance shall be maintained in accordance with the laws of the State of Florida, as to the ownership, maintenance, and use of all owned, non-owned, leased, or hired vehicles. The amount of Automobile Liability Insurance shall not be less than the amount specified.

(a) $500,000 combined single limit each occurrence bodily injury & property damage- for projects valued at $100,000 and under

(b) $1,000,000 combined single limit each occurrence bodily injury & property damage – for projects valued over $100,000

C. Worker's Compensation and Employer's Liability Insurance shall be provided for all employees engaged in the work under the contract, in accordance with the Florida Statutory Requirements. The amount of the Employer's Liability Insurance shall not be less than:

(a) $500,000 bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each employee – for projects valued at $100,00 and under
(b) $1,000,000 bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each –for projects valued over $100,000

D. Excess Liability Insurance or Umbrella Liability Insurance may compensate for a deficiency in general liability, automobile, or worker's compensation insurance coverage limits. If the Excess or Umbrella policy is being provided as proof of coverage, it must name the City of Tampa as an additional insured **(IF APPLICABLE).**

E. Builder's Risk Insurance, specialized policy designed to cover the property loss exposures that are associated with construction of buildings. The amount of coverage should not be less than the amount of the project. **(IF APPLICABLE).**

F. Installation Floater- a builder's risk type policy that covers specific type of property during its installation, is coverage required for highly valued equipment or materials such as compressors, generators, or other machinery that are not covered by the builder's risk policy **(IF APPLICABLE).**

G. Longshoreman's & Harbor Worker's Compensation Act/Jones Act coverage shall be maintained for work being conducted upon navigable water of the United States. The limit required shall be the same limit as the worker's compensation/employer's liability insurance limit **(IF APPLICABLE).**

H. Professional Liability shall be maintained against claims of negligence, errors, mistakes, or omissions in the performance of the services to be performed and furnished by the Awardee/Contractor or any of its subcontractors when it acts as a DESIGN PROFESSIONAL. The amount of coverage shall be no less than amount specified **(IF APPLICABLE).**

(a) $1,000,000 per incident and general aggregate. Note all claims made policies must provide the date of retroactive coverage.

The City may waive any or all of the above referenced insurance requirements based on the specific nature of goods or services to be provided under the award/contract.

ADDITIONAL INSURED - The City must be included as an additional insured by on the general and (Excess or Umbrella liability policies) if applicable. Alternatively, the Contractor may purchase a separate owners protective liability policy in the name of the City in the specified amount as indicated in the insurance requirements.

CLAIMS MADE POLICIES - If any liability insurance is issued on a claims made form, Contractor agrees to maintain uninterrupted coverage for a minimum of one year following completion and acceptance of the work either through purchase of an extended reporting provision, or through purchase of successive renewals with a retroactive date not later than the beginning of performance of work for the City. The retroactive date must be provided for all claims made policies.

CANCELLATION/NON-RENEWAL - Thirty (30) days written notice must be given to the City of any cancellation, intent to non-renew or material reduction in coverages (except aggregate liability limits). However, ten (10) days notice may be given for non-payment of premium. Notice shall be sent to the City of Tampa Department of Public Works, 306 E. Jackson Street, Tampa, FL 33602.

NUMBER OF POLICIES - General and other liability insurance may be arranged under single policies for the full amounts required or by a combination of underlying policies with the balance provided by an excess or umbrella liability insurance policy.

WAIVER OF SUBROGATION - Contractor waives all rights against City, its agents, officers, directors and employees for recovery of damages to the extent such damage is covered under the automobile or excess liability policies.

SUBCONTRACTORS - It is the Contractor's responsibility to require all subcontractors to maintain adequate insurance coverage.

PRIMARY POLICIES - The Contractor's insurance is primary to the City's insurance or any self insurance program thereof.

RATING - All insurers shall be authorized to do business in Florida, and shall have an A.M. Best rating of B+ (or better), Class VII (or higher), or otherwise be acceptable to the City if not rated by A.M. Best.

DEDUCTIBLES - The Contractor is responsible for all deductibles. In the event of loss which would have been covered but for the presence of a deductible, the City may withhold from payment to Contractor an amount equal to the deductible to cover such loss should full recovery not be obtained under the insurance policy.

INSURANCE ADJUSTMENTS - These insurance requirements may be increased, reduced, or waived at the City's sole option with an appropriate adjustment to the Contract price.

Document updated on 12/22/2009 by RLD (Risk Management)

City of Tampa MBD Office

U-WMBE Goal Setting Firms Report

10/6/14

ASPHALT PAVING SERVICES

BUN Construction Co., Inc. **Federal Number** 59-3362663

4202 E. Martin Luther King Blvd.
Tampa, FL 33610

Phone (813) 931-8270
Fax (813) 931-9185

Minority African American
Contact Bart Nwagbuo

E-mail bunconstruction@tampabay.rr.com

E.S. Concrete Services, Inc. **Federal Number** 59-3119582

726 East Harbor Dr. South
St. Petersburg, FL 33705

Phone (727) 821-5029
Fax (727) 821-5029

Minority African American
Contact Enoris Sly

E-mail enorisslysr@yahoo.com

Howard Sealcoating & Land Clearing **Federal Number** 65-0802138

1911N. 57th St
Tampa, FL 33619

Phone (305) 693-8972
Fax (305) 693-8985

Minority African American
Contact Leroy Howard

E-mail lhoward@asphaltfl.com

City Wide Paving, LLC **Federal Number** 27-0559624

2508 N. 32nd St.
Tampa, FL 33605

Phone (813) 325-4250
Fax (813) 849-1723

Minority African American
Contact Reginald Young

E-mail citywidepavingcwp@yahoo.com

CONCRETE (SIDEWALKS, DRIVEWAYS, FORM & FINISH)

E.S. Concrete Services, Inc. **Federal Number** 59-3119582

726 East Harbor Dr. South
St. Petersburg, FL 33705

Phone (727) 821-5029
Fax (727) 821-5029

Minority African American
Contact Enoris Sly

E-mail enorisslysr@yahoo.com

Paragon Building Contractors, Inc. **Federal Number** 59-2464751

1201 W. Waters Ave.
Tampa, FL 33604

Phone (813) 935-1600
Fax (813) 932-1108

Minority African American
Contact Al Davis

E-mail paragonb@tampabay.rr.com

Denson Construction, Inc. **Federal Number** 59-3571944

P.O. Box 3081
Plant City, FL 33564

Phone (863) 709-1001
Fax (863) 709-1071

Minority African American
Contact Ralph (Pete) Denson

E-mail Pete@denson-construction.com

City of Tampa MBD Office

U-WMBE Goal Setting Firms Report

10/6/14

CONCRETE (SIDEWALKS, DRIVEWAYS, FORM & FINISH)

L.S. Curb Service, Inc. **Federal Number** 59-3252745

4206 James L. Redman Pkwy
Plant City, FL 33567

Phone (813) 737-1524
Fax (813) 650-8654

Minority African American
Contact Leaford Shakes

E-mail lshakes@lscurb.com

Powell Concrete, LLC **Federal Number** 83-0467921

1410 Swift Ct.
Kissimmee, FL 34759

Phone (863) 438-4454
Fax (863) 496-1227

Minority African American
Contact Earl Powell

E-mail powellconcrete1@yahoo.com

Allen Masonry & General Contracting, Inc. **Federal Number** 20-1580292

6215 Travis Blvd.
Tampa, FL 33610

Phone (813) 627-9231
Fax

Minority African American
Contact Steve Allen

E-mail allenmasonrygc@gmail.com

ELECTRICAL SERVICES

Brown & Brown Electric, Inc. **Federal Number** 59-2283934

6555 N.W. 9th Ave. S-205
Ft. Lauderdale, FL 33310-5003

Phone (954) 938-8986
Fax (954) 938-9272

Minority African American
Contact Winston Brown

E-mail winston@brownandbrownelectric.com

Acktel Electric Company, Inc. **Federal Number** 59-3579225

P.O. Box 52292
Jacksonville, FL 32201-2292

Phone (904) 356-1274
Fax (904) 356-1374

Minority African American
Contact Sedley Huey

E-mail acktelel@bellsouth.net

All-In-One Electric, Inc. **Federal Number** 04-3689273

1201 W Waters Ave.
Tampa, FL 33604

Phone (813) 849-6331
Fax (813) 514-0473

Minority African American
Contact Rodney Jones

E-mail allinoneelectric@msn.com

City of Tampa MBD Office

U-WMBE Goal Setting Firms Report

10/6/14

ELECTRICAL SERVICES

Prime Electric, LLC **Federal Number** 20-1137443

1229 W. Main St
Leesburg, FL 34748

Phone (352) 728-5966
Fax (352) 728-5921

Minority African American
Contact Wylie Hamilton

E-mail wylie@primeelectricllc.net

MDH Enterprises, Inc. **Federal Number** 55-0849332

281 E C St.
Orange City, FL 32763

Phone (386) 789-2672
Fax (866) 681-5026

Minority African American
Contact Matize Hoskins

E-mail matize@my-es.com

LANDSCAPING (TREES, LAWN, NEW CONSTRUCTION)

Bay Light, LLC d/b/a Professional Property Services **Federal Number** 59-1341451

10105 11th Street North
Tampa, FL 33612

Phone (813) 972-4057
Fax (813) 971-0882

Minority African American
Contact Hyacinth Robinson

E-mail paulrobinson22@msn.com

Sterling Silver Scape & Sod, Inc. **Federal Number** 59-3171150

P.O. Box 450459
Kissimmee, FL 34745

Phone (407) 846-3225
Fax (407) 846-3207

Minority African American
Contact Sterling Blake

E-mail dahlia@sterlingsilverlandscaping.com

On-Point Group, Inc. **Federal Number** 38-3788119

5608 Puritan Rd
Tampa, FL 33617

Phone (813) 927-2808
Fax (813) 374-0993

Minority African American
Contact Daphne Jones

E-mail d.jones@on-pointgroupinc.com

Sunscape Ground Maintenance, Inc. **Federal Number** 56-2306877

3624 N. 18th St.
Tampa, FL 33605-1145

Phone (813) 247-3100
Fax (813) 247-4013

Minority African American
Contact Demond Bryant

E-mail sunscapegmi@verizon.net

City of Tampa MBD Office

U-WMBE Goal Setting Firms Report

10/6/14

LANDSCAPING (TREES, LAWN, NEW CONSTRUCTION)

Alpha Field Services, LLC **Federal Number** 90-1007218

27251 Wesley Chapel Blvd # 513 **Phone** (813) 900-2687 **Minority** African American
Wesley Chapel, FL **Fax** (813) 907-2810 **Contact** Lorraine Harris

E-mail support@alphafieldservices.com

MECHANICAL CONTRACTING SERVICES

A & R Air Conditioning & Refrigeration, Inc. **Federal Number** 27-2506848

P.O. Box 291048 **Phone** (813) 924-3696 **Minority** African American
Tampa, FL 33687-1048 **Fax** **Contact** Rodney Thomas

E-mail a_rairconditioning@yahoo.com

Just Koolin Air Conditioning and Heating, Inc. **Federal Number** 45-5494658

501 S. Falkenburg Road, Ste A5 **Phone** (813) 444-2594 **Minority** African American
Tampa, FL 33619 **Fax** (813) 354-2594 **Contact** Michael Solomon

E-mail Justkoolinac@gmail.com

PAINTING AND OTHER SERVICES, INTERIOR & EXTERIOR

USAMA Specialty Finishes, Inc. **Federal Number** 59-2877558

P.O. Box 1748 **Phone** (727) 725-9005 **Minority** African American
Safety Harbor, FL 34695-1748 **Fax** (727) 726-7363 **Contact** Muqit Usama

E-mail usama57@verizon.net

Fletcher Painting, Inc. d/b/a/ Fletcher Enterprise **Federal Number** 59-3587717

4355 Fairmont Street #8 **Phone** (407) 290-1188 **Minority** African American
Orlando, FL 32808 **Fax** (407) 290-9309 **Contact** Junior Fletcher

E-mail fletcherent-stacy@cfl.rr.com

City of Tampa MBD Office

U-WMBE Goal Setting Firms Report

10/6/14

PLUMBING CONTRACTOR SERVICES

Reeves Building and Plumbing Contractor, Inc. **Federal Number** 59-3011515
P.O. Box 11724 **Phone** (813) 238-6197 **Minority** African American
Tampa, FL 33680-1724 **Fax** (813) 238-6197 **Contact** Michael Reeves
E-mail ReevesBuilding@verizon.net

Executive Contractors 1, Inc. **Federal Number** 59-3704552
5607 N 30th Street **Phone** (813) 239-9452 **Minority** African American
Tampa, FL 33610 **Fax** (813) 232-2495 **Contact** Reginald Burns
E-mail executivecontractors1@yahoo.com

Sun City Center Plumbing, LLC **Federal Number** 37-1572699
10049 Creek Bluff Dr. **Phone** (813) 695-8222 **Minority** African American
Riverview, FL 33578 **Fax** (813) 672-0580 **Contact** Rhonda Laseter
E-mail michaellaseter@verizon.net

ROOFING SERVICES (INCLUDING TESTING)

Reeves Building and Plumbing Contractor, Inc. **Federal Number** 59-3011515
P.O. Box 11724 **Phone** (813) 238-6197 **Minority** African American
Tampa, FL 33680-1724 **Fax** (813) 238-6197 **Contact** Michael Reeves
E-mail ReevesBuilding@verizon.net

Pro-Fit Development, Inc. **Federal Number** 43-2013650
4007 N Taliaferro Ave. **Phone** (813) 514-8783 **Minority** African American
Tampa, FL 33603 **Fax** (813) 231-8866 **Contact** Terrance Bradford
E-mail Info@Pro-FitDevelopment.com

SECURITY SYSTEMS AND EQUIPMENT

Integrated Security Consultants, Inc. **Federal Number** 26-1842566
301 North Rome Avenue **Phone** (813) 817-7288 **Minority** African American
Tampa, FL 33606 **Fax** (888) 502-3060 **Contact** Kenneth Stewart
E-mail kstewart@iscsecurity.net

City of Tampa MBD Office

U-WMBE Goal Setting Firms Report

10/6/14

UNDERGROUND UTILITY INSTALLATION

McKenzie Construction & Site Development, LLC **Federal Number** 26-2725853

P.O. Box 47115 **Phone** (813) 438-2615 **Minority** African American
Tampa, FL 33647 **Fax** (857) 222-4452 **Contact** Oliver Fernandez, III

E-mail Dan.fernandez@McKenziesiteDevelopment.com

ECO-2000, Inc. **Federal Number** 59-3648996

P.O. Box 2275 **Phone** (352) 793-9074 **Minority** African American
Bushnell, FL 33513 **Fax** (352) 303-0971 **Contact** Charlie Jones

E-mail waterworks@eco2000inc.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

ASPHALT PAVING SERVICES

BUN Construction Co., Inc. **Federal Number** 59-3362663

4202 E. Martin Luther King Blvd.
Tampa, FL 33610

Phone (813) 931-8270 **Minority** Small Business
Fax (813) 931-9185 **Contact** Bart Nwagbuo
E-mail bunconstruction@tampabay.rr.com

Castco Construction, Inc. **Federal Number** 59-2548614

9001 126th Ave. North
Largo, FL 33773

Phone (727) 585-4714 **Minority** Small Business
Fax (727) 585-5091 **Contact** Israel Castro
E-mail cconstr@tampabay.rr.com

E.S. Concrete Services, Inc. **Federal Number** 59-3119582

726 East Harbor Dr. South
St. Petersburg, FL 33705

Phone (727) 821-5029 **Minority** Small Business
Fax (727) 821-5029 **Contact** Enoris Sly
E-mail enorisslysr@yahoo.com

Johnson's Excavation & Services, Inc. **Federal Number** 59-3031174

1706 East Trapnell Road
Plant City, FL 33566

Phone (813) 752-7097 **Minority** Small Business
Fax (813) 719-9052 **Contact** Donathan Johnson
E-mail sales@jescontracting.com

Parking Lot Striping Service **Federal Number** 59-1522393

P.O. Box 11005
Tampa, FL 33680

Phone (813) 623-1454 **Minority** Small Business
Fax (813) 664-0140 **Contact** Fernando Llop
E-mail lindaplss@aol.com

Howard Sealcoating & Land Clearing **Federal Number** 65-0802138

1911N. 57th St
Tampa, FL 33619

Phone (305) 693-8972 **Minority** Small Business
Fax (305) 693-8985 **Contact** Leroy Howard
E-mail lhoward@asphaltfl.com

City Wide Paving, LLC **Federal Number** 27-0559624

2508 N. 32nd St.
Tampa, FL 33605

Phone (813) 325-4250 **Minority** Small Business
Fax (813) 849-1723 **Contact** Reginald Young
E-mail citywidepavingcwp@yahoo.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

ASPHALT PAVING SERVICES

Superior Construction & Contracting, LLC **Federal Number** 27-0679204

4402 Osborne Ave
Tampa, FL 33614

Phone (813) 712-7325
Fax (813) 868-1163
E-mail Kcurrivan@superiorflorida.net

Minority Small Business
Contact Michael Strouse

CONCRETE (SIDEWALKS, DRIVEWAYS, FORM & FINISH)

Castco Construction, Inc. **Federal Number** 59-2548614

9001 126th Ave. North
Largo, FL 33773

Phone (727) 585-4714
Fax (727) 585-5091
E-mail cconstr@tampabay.rr.com

Minority Small Business
Contact Israel Castro

E.S. Concrete Services, Inc. **Federal Number** 59-3119582

726 East Harbor Dr. South
St. Petersburg, FL 33705

Phone (727) 821-5029
Fax (727) 821-5029
E-mail enorisslysr@yahoo.com

Minority Small Business
Contact Enoris Sly

Parking Lot Striping Service **Federal Number** 59-1522393

P.O. Box 11005
Tampa, FL 33680

Phone (813) 623-1454
Fax (813) 664-0140
E-mail lindaplss@aol.com

Minority Small Business
Contact Fernando Llop

Sunrise Utility Construction, Inc. **Federal Number** 59-3034012

P.O. Box 272293
Tampa, FL 33688-2293

Phone (813) 949-3749
Fax (813) 949-0408
E-mail LMNBOSS@AOL.COM

Minority Small Business
Contact Lisa Nehrboss

Tampa Bay Construction & Engineering, Inc. **Federal Number** 59-3713572

10503 Palm Cove Ave
Tampa, FL 33647

Phone (813) 984-9898
Fax (813) 907-0980
E-mail aerchid@tbcei.com

Minority Small Business
Contact Ahmad Erchid

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

CONCRETE (SIDEWALKS, DRIVEWAYS, FORM & FINISH)

Chet Netherly, LLC d/b/a Anything in Concrete **Federal Number** 20-3926235

246 W Canal Drive
Palm Harbor, FL 34684

Phone (727) 945-7035
Fax (727) 934-0568
E-mail netherlyWCAN@aol.com

Minority Small Business
Contact Chet Netherly

Velez Concrete Construction, Inc. **Federal Number** 83-0373603

3926 E. Eden Roc Circle
Tampa, FL 33634

Phone (813) 493-4762
Fax (813) 882-3455
E-mail velezconcrete99@gmail.com

Minority Small Business
Contact John Velez

Tagarelli Construction, Inc. **Federal Number** 59-3339407

P.O. Box 681
Tarpon Springs, FL 34689

Phone (727) 937-6171
Fax (727) 937-6172
E-mail tagarelli@verizon.net

Minority Small Business
Contact Michael Tagarelli

CMK Construction, Inc. **Federal Number** 20-1609262

2053 Mountain Ash Way
New Port Richey, FL 34655

Phone (727) 243-9234
Fax (727) 848-2026
E-mail manny@cmkconstructioninc.com

Minority Small Business
Contact Manuel Kavouklis

Powell Concrete, LLC **Federal Number** 83-0467921

1410 Swift Ct.
Kissimmee, FL 34759

Phone (863) 438-4454
Fax (863) 496-1227
E-mail powellconcrete1@yahoo.com

Minority Small Business
Contact Earl Powell

Velocity Construction, Inc. **Federal Number** 74-3082984

1320 E. 137th Ave
Tampa, FL 33613

Phone (813) 624-2117
Fax (800) 807-0314
E-mail bconnor@tampabay.rr.com

Minority Small Business
Contact William Connor

Kilgore Construction, LLC **Federal Number** 26-3771464

11697 Walsingham Rd.
Largo, FL 33778

Phone (727) 755-2294
Fax (727) 581-5724
E-mail jo@kilgorellc.com

Minority Small Business
Contact Harold Kilgore

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

CONCRETE (SIDEWALKS, DRIVEWAYS, FORM & FINISH)

Tampa Bay Construction Group **Federal Number** 26-4797153

12651 North Dale Mabry Hwy, Suite 272568
Tampa, FL 33688

Phone (813) 402-8827 **Minority** Small Business
Fax (813) 388-4554 **Contact** Joy Iurato
E-mail get-it-done@mytbcgroup.com

JMJ Site Development, Inc **Federal Number** 27-3413832

P.O. Box 1095
Lithia, FL 33547

Phone (813) 927-2484 **Minority** Small Business
Fax **Contact** Jeff Joaquin
E-mail jmjsitedevelopment@gmail.com

Allen Masonry & General Contracting, Inc. **Federal Number** 20-1580292

6215 Travis Blvd.
Tampa, FL 33610

Phone (813) 627-9231 **Minority** Small Business
Fax **Contact** Steve Allen
E-mail allenmasonrygc@gmail.com

Acclaim Service Group, Inc. **Federal Number** 36-4668231

1324 Seven Springs Blvd., #325
New Port Richey, FL 34655

Phone (727) 848-3200 **Minority** Small Business
Fax (727) 848-3211 **Contact** Jamie Jones
E-mail jamie@acclaimservicegroup.com

ELECTRICAL SERVICES

Apollo Construction & Engineering Services, Inc. **Federal Number** 59-2811166

P.O. Box 5848
Sun City Center, FL 33571-5848

Phone (813) 645-4926 **Minority** Small Business
Fax (813) 645-3351 **Contact** Thomas Kamprath
E-mail tkamprath@apollo-construction.com

Gaylord / Miller Electric Corp **Federal Number** 59-1631953

602 North Oregon Avenue
Tampa, FL 33606

Phone (813) 254-4681 **Minority** Small Business
Fax (813) 254-9473 **Contact** James A. Tepper
E-mail james.gmelectric@verizon.net

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

ELECTRICAL SERVICES

All-In-One Electric, Inc. **Federal Number** 04-3689273

1201 W Waters Ave.
Tampa, FL 33604

Phone (813) 849-6331 **Minority** Small Business
Fax (813) 514-0473 **Contact** Rodney Jones
E-mail allinoneelectric@msn.com

JDP Electric, Inc. **Federal Number** 59-3511620

6600 N. Florida Avenue
Tampa, FL 33604

Phone (813) 234-4004 **Minority** Small Business
Fax (813) 236-0394 **Contact** Jeffrey Priede
E-mail jdpinc@tampabay.rr.com

Mandy Electric, Inc. **Federal Number** 59-2914874

9353 E. Fowler Ave.
Thonotosassa, FL 33592

Phone (813) 264-9234 **Minority** Small Business
Fax (813) 333-9701 **Contact** Armando Hernandez
E-mail lhernandez@mandyselectric.com

Ralph A. Philbrook, III LLC **Federal Number** 61-1460231

3316 Bainbridge Dr.
Holiday, FL 34691

Phone (727) 847-3766 **Minority** Small Business
Fax (727) 845-3567 **Contact** Ralph Philbrook III
E-mail philbrook3llc@aol.com

Crevello Electric, Inc. **Federal Number** 59-3559003

3305 N. Stanley Rd.
Plant City, FL 33565

Phone (813) 986-6106 **Minority** Small Business
Fax (813) 986-9633 **Contact** Bill Crevello
E-mail crevelloelectric@gmail.com

Electrical Handyman Services **Federal Number** 27-2406369

7046-B West Hillsborough Ave
Tampa, FL 33634

Phone (813) 901-8185 **Minority** Small Business
Fax (813) 884-5060 **Contact** Jose Cruz
E-mail ehs915@aol.com

SJM Electric Corporation **Federal Number** 20-4183090

333 North Falkenburg Rd, Suite B201
Tampa, FL 33619

Phone (813) 684-7459 **Minority** Small Business
Fax (813) 654-0420 **Contact** Scott Mroczkowski
E-mail scott@sjmelectric.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

ELECTRICAL SERVICES

Best Price Electric Service, LLC — **Federal Number** 27-1211988

P.O. Box 6516
Seffner, FL 33583

Phone (813) 927-1668
Fax (813) 409-3154
E-mail BestPriceElectricServ@hotmail.com

Minority Small Business
Contact Frank Fleites

Manatee Electric, Inc. — **Federal Number** 59-3454485

845 Thompson Road
Lithia, FL Fl

Phone (813) 645-7000
Fax (813) 654-7568
E-mail john@reliableelectricusa.com

Minority Small Business
Contact John Babuka

Slentz Electric, Inc. — **Federal Number** 59-1996013

1202 Gary Ave
Ellenton, FL 34222

Phone (941) 722-9227
Fax (941) 722-3318
E-mail georgeperry2@gmail.com

Minority Small Business
Contact George Perry

A American Electrical Contractor, Inc. — **Federal Number** 59-2603773

9170 126th Avenue N
Largo, FL 33773

Phone (727) 588-0126
Fax (727) 588-9170
E-mail mark.aaec@yahoo.com

Minority Small Business
Contact Mark Comerford

Rhythms Electric Corporation — **Federal Number** 27-3150153

433 37th Ave NE
St. Petersburg, FL 33704

Phone (727) 460-8779
Fax
E-mail rhythmselectric@me.com

Minority Small Business
Contact Mathew Krchmar

TAMCO Electric, Inc. — **Federal Number** 59-1396630

P.O. Box 579
Tampa, FL 33614

Phone (813) 986-3472
Fax (813) 986-5979
E-mail atrujill@tampabay.rr.com

Minority Small Business
Contact Steven Moates

FENCE INSTALLATION SERVICE

Rejas Iron Works, LLC — **Federal Number** 26-4701980

104 W. Hanlon St.
Tampa, FL 33604

Phone (813) 237-1442
Fax (813) 315-6151
E-mail miguel@rejasironworks.com

Minority Small Business
Contact Miguel Martinez

Best Made Enterprises, Inc. — **Federal Number** 59-3498525

4133 Causeway Blvd.
Tampa, FL 33619

Phone (813) 248-5266
Fax (813) 248-1299
E-mail BestMadeEntInc@aol.com

Minority Small Business
Contact Karen Flores

West Coast Fence of Tampa, Inc. — **Federal Number** 59-3656003

6801 Benjamin Rd.
Tampa, FL 33634

Phone (813) 886-5097
Fax (813) 886-5849
E-mail John@wcftampa.com

Minority Small Business
Contact John Gavaghan

Communication Support Network, Inc. — **Federal Number** 03-0379746

1984 Iowa Ave. NE
St. Petersburg, FL 33703

Phone (813) 966-5200
Fax (813) 932-5421
E-mail csn2@tampabay.rr.com

Minority Small Business
Contact Sara Armstrong

JEB Management Inc. dba Good Neighbor Fence Co. — **Federal Number** 03-0416868

5011 20th Avenue South
Tampa, FL 33619

Phone (813) 968-1921
Fax (813) 241-6070
E-mail info@fence4u.biz

Minority Small Business
Contact Jeffrey Bognolo

Ortzak Technology, LLC — **Federal Number** 45-4837502

13014 N. Dale Mabry Hwy, Suite 623
Tampa, FL 33618

Phone (813) 961-6023
Fax (813) 961-6023
E-mail dcastro@ortzak.com

Minority Small Business
Contact Daniel Castro

KMG Fence, LLC — **Federal Number** 13-4226271

3617 E. 10th Ave Unit A
Tampa, FL 33605

Phone (813) 241-4600
Fax (813) 241-4611
E-mail

Minority Small Business
Contact Karen Grimsley

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

IRRIGATION SYSTEMS, LABOR AND MATERIALS TO INSTALL

Aqua Pro Irrigation & Outdoor Services, LLC **Federal Number** 59-3387591

375 Douglas Road East
Oldsmar, FL 34677

Phone (813) 814-4437
Fax (813) 814-9710
E-mail ken@aquaproirrigation.com

Minority Small Business
Contact Martha Wagenbrenner

LANDSCAPING (TREES, LAWN, NEW CONSTRUCTION)

Morelli Landscaping, Inc **Federal Number** 59-1877993

4855 162nd Avenue North
Clearwater, FL 33762

Phone (727) 535-6263
Fax (727) 536-6855
E-mail vjmorelli@tampabay.rr.com

Minority Small Business
Contact Joe Morelli

Infante's Services, Inc. **Federal Number** 59-3648843

18620 Gunn Hwy.
Odessa, FL 33556

Phone (813) 926-2271
Fax (813) 926-1431
E-mail charlotte@infanteservices.com

Minority Small Business
Contact Renee Infante

Bay Light, LLC d/b/a Professional Property Services **Federal Number** 59-1341451

10105 11th Street North
Tampa, FL 33612

Phone (813) 972-4057
Fax (813) 971-0882
E-mail paulrobinson22@msn.com

Minority Small Business
Contact Hyacinth Robinson

Baron's Landscaping Services, Inc. **Federal Number** 65-0837654

P.O. Box 4047
Tampa, FL 33677

Phone (813) 404-1509
Fax (813) 476-6255
E-mail baronslawncare@aol.com

Minority Small Business
Contact Randy Conte

Sunbelt Sod & Grading Company **Federal Number** 13-4250933

819 - 9th St. N.E.
Ruskin, FL 33570

Phone (813) 641-9855
Fax (813) 645-7263
E-mail sunbeltsod@verizon.net

Minority Small Business
Contact Lesley Silva

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

LANDSCAPING (TREES, LAWN, NEW CONSTRUCTION)

NPC Mowing & Landscaping **Federal Number** 03-0555858

P.O. Box 292873 6441 Eureka Springs Road
Tampa, FL 33687-2873

Phone (813) 967-4386 **Minority** Small Business
Fax (352) 668-3295 **Contact** John Woodhouse
E-mail Jwoodho793@aol.com

Cardinal Landscaping Services of Tampa, Inc. **Federal Number** 59-3394554

817 E. Okaloosa Ave.
Tampa, FL 33604

Phone (813) 915-9696 **Minority** Small Business
Fax (813) 915-9695 **Contact** Mark Mantei
E-mail Mike@cardinallandscape.com

Nelson's Tree Farm and Nursery, Inc. **Federal Number** 59-3404710

19139 Geraci Rd.
Lutz, FL 33549

Phone (813) 917-6608 **Minority** Small Business
Fax (813) 350-9139 **Contact** Kimberly Martinez
E-mail kimberly.martinez33@gmail.com

Williams Landscape Management Co., Inc. **Federal Number** 54-3516370

PO Box 311444 5711 N. 50th St.
Tampa, FL 33610

Phone (813) 628-8048 **Minority** Small Business
Fax (813) 628-8048 **Contact** Tony Williams
E-mail tonywilliams@wlmslandscape.com

On-Point Group, Inc. **Federal Number** 38-3788119

5608 Puritan Rd
Tampa, FL 33617

Phone (813) 927-2808 **Minority** Small Business
Fax (813) 374-0993 **Contact** Daphne Jones
E-mail d.jones@on-pointgroupinc.com

Jungle Scapes **Federal Number** 26-2517542

1717 E. Busch Blvd., Suite 1101
Tampa, FL 33626

Phone (813) 516-9950 **Minority** Small Business
Fax (813) 902-7221 **Contact** Hulsey Ebanks, Jr.
E-mail info@jungle-scapes.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

LANDSCAPING (TREES, LAWN, NEW CONSTRUCTION)

Pine Lake Services, Inc. **Federal Number** 27-3360158

2122 Henley Rd.
Lutz, FL 33548

Phone (813) 948-4736 **Minority** Small Business
Fax (813) 909-0386 **Contact** Maria Martinez
E-mail Ivan@pinelakeservices.com

Roque Landscaping, LLC **Federal Number** 27-2430577

9024 Duke Drive
Tampa, FL 33615

Phone (813) 385-6282 **Minority** Small Business
Fax (813) 443-3207 **Contact** Juan Roque
E-mail yndi12@univision.com

Breit Turf Management, LLC **Federal Number** 27-3737949

P.O. Box 13551
Tampa, FL 33681

Phone (813) 732-3221 **Minority** Small Business
Fax **Contact** Edward Breit
E-mail breitturf1@gmail.com

Sunscape Ground Maintenance, Inc. **Federal Number** 56-2306877

3624 N. 18th St.
Tampa, FL 33605-1145

Phone (813) 247-3100 **Minority** Small Business
Fax (813) 247-4013 **Contact** Demond Bryant
E-mail sunscapegmi@verizon.net

Evolve Professional Landscape Management, LLC **Federal Number** 27-2323571

P.O. Box 2362
Bartow, FL 33831

Phone (863) 205-3769 **Minority** Small Business
Fax (863) 223-0275 **Contact** Joseph Bustos
E-mail office@evolveyourlawn.com

The PROS Investment Corp. **Federal Number** 59-3609725

1227 E Madison, #1003
Tampa, FL 33602

Phone (813) 230-3331 **Minority** Small Business
Fax (813) 333-2938 **Contact** Kevin Knowles
E-mail kvknowles@prosinvest.com

A J Landscaping, LLC **Federal Number** 21-0159888

P.O. Box 2381
Valrico, FL 33596

Phone (813) 643-1781 **Minority** Small Business
Fax (813) 643-1781 **Contact** Alberto Pereiro
E-mail as@aslandscapingllc.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

LANDSCAPING (TREES, LAWN, NEW CONSTRUCTION)

Alpha Field Services, LLC **Federal Number** 90-1007218

27251 Wesley Chapel Blvd # 513
Wesley Chapel, FL

Phone (813) 900-2687 **Minority** Small Business
Fax (813) 907-2810 **Contact** Lorraine Harris
E-mail support@alphafieldservices.com

MECHANICAL CONTRACTING SERVICES

Apollo Construction & Engineering Services, Inc. **Federal Number** 59-2811166

P.O. Box 5848
Sun City Center, FL 33571-5848

Phone (813) 645-4926 **Minority** Small Business
Fax (813) 645-3351 **Contact** Thomas Kamprath
E-mail tkamprath@apollo-construction.com

George G. Solar & Company, Inc. **Federal Number** 59-1314899

4407 W. South Ave.
Tampa, FL 33614

Phone (813) 875-9148 **Minority** Small Business
Fax (813) 879-2315 **Contact** George Solar
E-mail georgesolarcompany@verizon.net

McLain Plumbing & Mechanical **Federal Number** 59-3261752

2403 East 4th Ave
Tampa, FL 33634

Phone (813) 876-9046 **Minority** Small Business
Fax (813) 873-9895 **Contact** Sandra McLain
E-mail sandramclain01@yahoo.com

First Plumbing & Air Conditioning of FL, Inc. **Federal Number** 59-3389067

13932 Methodist Church Rd.
Dover, FL 33527

Phone (813) 770-0361 **Minority** Small Business
Fax (813) 764-9638 **Contact** Timothy Trujillo
E-mail firstplumbing@msn.com

Dynamic Heating & Cooling, Inc. **Federal Number** 20-5499872

19239 N. Dale Mabry Hwy # 3211
Lutz, FL 33548

Phone (813) 928-3646 **Minority** Small Business
Fax (813) 949-7489 **Contact** Darwin Encarmicion
E-mail darwin@dynamichvac.us

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

MECHANICAL CONTRACTING SERVICES

Main Commercial Cooking & Refrigeration Services **Federal Number** 59-2327199

16705 Scheer Blvd.
Hudson, FL 34667

Phone (727) 868-8586
Fax (727) 868-8650
E-mail dee.costello@maincomm.com

Minority Small Business
Contact Martin Castello

Baez Enterprises Corp **Federal Number** 33-1095056

7818 N. Armenia Ave., Suite 4
Tampa, FL 33604

Phone (813) 932-8140
Fax (813) 932-8142
E-mail ebaez@acrexperts.net

Minority Small Business
Contact Ervis Baez

A & R Air Conditioning & Refrigeration, Inc. **Federal Number** 27-2506848

P.O. Box 291048
Tampa, FL 33687-1048

Phone (813) 924-3696
Fax
E-mail a_rairconditioning@yahoo.com

Minority Small Business
Contact Rodney Thomas

Just Koolin Air Conditioning and Heating, Inc. **Federal Number** 45-5494658

501 S. Falkenburg Road, Ste A5
Tampa, FL 33619

Phone (813) 444-2594
Fax (813) 354-2594
E-mail Justkoolinac@gmail.com

Minority Small Business
Contact Michael Solomon

PJ Ireland & Associates, Inc. **Federal Number** 59-3261978

1252 East Lake Dr
Tarpon Springs, FL 34688

Phone (727) 937-7272
Fax (727) 939-3443
E-mail peter.pjimechanical@gmail.com

Minority Small Business
Contact Kathleen Ireland

Global Sanchez, Inc. **Federal Number** 65-0277078

816 Manatee Ave. E., Suite 18
Brandenton, FL 34208

Phone (941) 758-2551
Fax (941) 739-6383
E-mail MARKETING@global-sanchez.com

Minority Small Business
Contact Philip Feikema

Leaf Mechanical, Inc. d/b/a Ravti **Federal Number** 45-4694795

5003 W. Spring Lake Dr.
Tampa, FL 33629

Phone (813) 444-2577
Fax
E-mail alexanderirangel@gmail.com

Minority Small Business
Contact Alexander Rangel

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

MECHANICAL CONTRACTING SERVICES

Frostys Air Conditioning — **Federal Number** 65-1027035

8906 Eagle Watch Dr.
Riverview, FL 33578

Phone (813) 672-4130
Fax (813) 318-2905
E-mail laurafrostyair@gmail.com

Minority Small Business
Contact Laura Pearman

Stress Free Construction, LLC — **Federal Number** 46-1339562

4501 East Columbus Drive
Tampa, FL 33605

Phone (813) 737-2477
Fax (813) 621-5363
E-mail david@tampastressfree.com

Minority Small Business
Contact David Lowrey

PAINTING AND OTHER SERVICES, INTERIOR & EXTERIOR

USAMA Specialty Finishes, Inc. — **Federal Number** 59-2877558

P.O. Box 1748
Safety Harbor, FL 34695-1748

Phone (727) 725-9005
Fax (727) 726-7363
E-mail usama57@verizon.net

Minority Small Business
Contact Muqit Usama

Harry's Painting & Enterprises, Inc. — **Federal Number** 59-2820441

5250 Avery Road
New Port Richey, FL 34652

Phone (727) 848-1950
Fax (727) 847-3474
E-mail hp@harryspainting.com

Minority Small Business
Contact Sherrie Satterfield

Diversified Coatings & Finishes, Inc. — **Federal Number** 59-3460053

12540 Green Oak Lane
Dade City, FL 33525

Phone (813) 494-5543
Fax (352) 567-1718
E-mail bobcookdcf@gmail.com

Minority Small Business
Contact Bob Cook

Federico's Painting Corp — **Federal Number** 20-3279278

6615 Winding Oak Dr.
Tampa, FL 33625

Phone (813) 908-1404
Fax (813) 908-1404
E-mail federico_de_la_pava@hotmail.com

Minority Small Business
Contact Federico De La Pava

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

PAINTING AND OTHER SERVICES, INTERIOR & EXTERIOR

Gulf Coast Contracting, LLC — **Federal Number** 20-1424580

P.O. Box 2178
Tarpon Springs, FL 34688-2178

Phone (727) 938-6081 **Minority** Small Business
Fax (727) 937-0967 **Contact** Manuel Gialousis
E-mail gulfcoastoffL@aol.com

C&C Painting Contractors Inc. — **Federal Number** 59-3617521

8372 Standish Bend Dr.
Tampa, FL 33615

Phone (813) 886-7100 **Minority** Small Business
Fax (813) 886-7102 **Contact** Carlos Cubas
E-mail carlos@ccpainting.com

CMK Construction, Inc. — **Federal Number** 20-1609262

2053 Mountain Ash Way
New Port Richey, FL 34655

Phone (727) 243-9234 **Minority** Small Business
Fax (727) 848-2026 **Contact** Manuel Kavouklis
E-mail manny@cmkconstructioninc.com

Shepard Contractors, Inc. — **Federal Number** 59-3708146

15624 Shoal Creek Pl
Odessa, FL 33556

Phone (813) 855-1115 **Minority** Small Business
Fax (813) 926-0358 **Contact** Kenneth Shepard
E-mail shepardcontractors@hotmail.com

Kimszal Contracting Inc. — **Federal Number** 20-3450022

3435 Chessington Drive
Land O' Lakes, FL 34638

Phone (813) 949-1750 **Minority** Small Business
Fax (813) 948-0451 **Contact** Edward Kimszal
E-mail edkimszal@msn.com

Leo's Construction, Inc. — **Federal Number** 51-0456226

1320 Illinois Ave.
Palm Harbor, FL 34683

Phone (727) 858-0266 **Minority** Small Business
Fax **Contact** Travis Smudde
E-mail LeosConstructionInc@yahoo.com

Elite Industrial Painting, Inc. — **Federal Number** 90-0658000

55 Dodecanese Blvd
Tarpon Springs, FL 34689

Phone (727) 487-3636 **Minority** Small Business
Fax (727) 940-5224 **Contact** Theofilos Manglis
E-mail Thmanglis@yahoo.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

PAINTING AND OTHER SERVICES, INTERIOR & EXTERIOR

Universal Contracting Services, Inc. **Federal Number** 20-1452205

11311 Hollyglen Drive
Tampa, FL 33624

Phone (813) 966-1508
Fax
E-mail ucs@email.com

Minority Small Business
Contact Hadeel Eishesbaiy

West Star Painting, Inc. **Federal Number** 59-3295920

1717 Virginia Ave
Palm Harbor, FL 34683

Phone (727) 253-4637
Fax (727) 772-7417
E-mail weststarpainting@aol.com

Minority Small Business
Contact Flora Giannas

PLUMBING CONTRACTOR SERVICES

Apollo Construction & Engineering Services, Inc. **Federal Number** 59-2811166

P.O. Box 5848
Sun City Center, FL 33571-5848

Phone (813) 645-4926
Fax (813) 645-3351
E-mail tkamprath@apollo-construction.com

Minority Small Business
Contact Thomas Kamprath

Henry Gonzalez Plumbing Co., Inc. **Federal Number** 59-0908271

P.O. Box 4620
Tampa, FL 33677

Phone (813) 251-1980
Fax (813) 254-6610
E-mail main@henrygonzalezplumbing.com

Minority Small Business
Contact Henry Gonzalez

Reeves Building and Plumbing Contractor, Inc. **Federal Number** 59-3011515

P.O. Box 11724
Tampa, FL 33680-1724

Phone (813) 238-6197
Fax (813) 238-6197
E-mail ReevesBuilding@verizon.net

Minority Small Business
Contact Michael Reeves

Ciccarello & Son, Inc. **Federal Number** 59-3492581

7117 N. Armenia Ave., #C
Tampa, FL 33604

Phone (813) 933-5512
Fax (813) 933-5225
E-mail jciccarello@ciccarelloandson.com

Minority Small Business
Contact Judy Ciccarello

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

PLUMBING CONTRACTOR SERVICES

McLain Plumbing & Mechanical — **Federal Number** 59-3261752

2403 East 4th Ave
Tampa, FL 33634

Phone (813) 876-9046 **Minority** Small Business
Fax (813) 873-9895 **Contact** Sandra McLain
E-mail sandramclain01@yahoo.com

First Plumbing & Air Conditioning of FL, Inc. — **Federal Number** 59-3389067

13932 Methodist Church Rd.
Dover, FL 33527

Phone (813) 770-0361 **Minority** Small Business
Fax (813) 764-9638 **Contact** Timothy Trujillo
E-mail firstplumbing@msn.com

Johnny Doan Management, Inc. — **Federal Number** 06-1677200

418 E. Old Hillsborough Ave.
Seffner, FL 33584

Phone (813) 689-8179 **Minority** Small Business
Fax (813) 689-8170 **Contact** James Dunger
E-mail tommyseffner@aol.com

Executive Contractors 1, Inc. — **Federal Number** 59-3704552

5607 N 30th Street
Tampa, FL 33610

Phone (813) 239-9452 **Minority** Small Business
Fax (813) 232-2495 **Contact** Reginald Burns
E-mail executivecontractors1@yahoo.com

Llona Plumbing, Inc. — **Federal Number** 56-2444131

P.O. Box 4479
Tampa, FL 33673-0325

Phone (813) 477-1870 **Minority** Small Business
Fax (813) 251-2420 **Contact** Laureano Llona
E-mail llonaplumbing@verizon.net

Larson Plumbing, Inc. — **Federal Number** 59-3254656

3205 E. 8th Ave.
Tampa, FL 33605

Phone (813) 242-0911 **Minority** Small Business
Fax (813) 242-0048 **Contact** Christopher Larson
E-mail Chris@larsonplumbing.net

Florida Industrial Plumbing, L.L.C. — **Federal Number** 59-3600500

410 Glen ridge Avenue
Tampa, FL 33617

Phone (813) 987-2809 **Minority** Small Business
Fax (813) 354-2642 **Contact** Sharon Gaskin
E-mail fip@tampabay.rr.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

PLUMBING CONTRACTOR SERVICES

Sun City Center Plumbing, LLC **Federal Number** 37-1572699

10049 Creek Bluff Dr.
Riverview, FL 33578

Phone (813) 695-8222 **Minority** Small Business
Fax (813) 672-0580 **Contact** Rhonda Laseter
E-mail michaellaseter@verizon.net

JVA Plumbing, Inc. **Federal Number** 27-3906735

P.O. Box 320582
Tampa, FL 33679

Phone (813) 841-5874 **Minority** Small Business
Fax (813) 254-0256 **Contact** Janet Varon
E-mail jva@jvaconstruction.com

Cass Plumbing, Inc. **Federal Number** 04-3661322

P.O. Box 272876
Tampa, FL 33688

Phone (813) 265-9200 **Minority** Small Business
Fax (813) 269-2541 **Contact** David Casss
E-mail support@cassplumbingtampabay.com

Global Sanchez, Inc. **Federal Number** 65-0277078

816 Manatee Ave. E., Suite 18
Brandenton, FL 34208

Phone (941) 758-2551 **Minority** Small Business
Fax (941) 739-6383 **Contact** Philip Feikema
E-mail MARKETING@global-sanchez.com

Paradiso Group, Inc. **Federal Number** 22-3964822

4207 Grainary Ave
Tampa, FL 33624

Phone (813) 629-6948 **Minority** Small Business
Fax (813) 961-4629 **Contact** Pasquale Paradiso
E-mail paradisoplumbing@verizon.net

Stress Free Construction, LLC **Federal Number** 46-1339562

4501 East Columbus Drive
Tampa, FL 33605

Phone (813) 737-2477 **Minority** Small Business
Fax (813) 621-5363 **Contact** David Lowrey
E-mail david@tampastressfree.com

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

ROOFING SERVICES (INCLUDING TESTING)

Reeves Building and Plumbing Contractor, Inc. **Federal Number** 59-3011515

P.O. Box 11724
Tampa, FL 33680-1724

Phone (813) 238-6197 **Minority** Small Business
Fax (813) 238-6197 **Contact** Michael Reeves
E-mail ReevesBuilding@verizon.net

Pro-Fit Development, Inc. **Federal Number** 43-2013650

4007 N Taliaferro Ave.
Tampa, FL 33603

Phone (813) 514-8783 **Minority** Small Business
Fax (813) 231-8866 **Contact** Terrance Bradford
E-mail Info@Pro-FitDevelopment.com

Roesch Housemovers, Inc. **Federal Number** 42-1712176

14320 North Blvd
Tampa, FL 33613

Phone (813) 373-5716 **Minority** Small Business
Fax (813) 373-5716 **Contact** Alta Post
E-mail scottpost.homes@yahoo.com

Precision Roofing Solutions, Inc. **Federal Number** 26-4325793

P.O. Box 271450
Tampa, FL 33688-1450

Phone (813) 264-6262 **Minority** Small Business
Fax (813) 264-6224 **Contact** Daniel Dalfino
E-mail dan@prstampa.com

SECURITY SYSTEMS AND EQUIPMENT

Integrated Security Consultants, Inc. **Federal Number** 26-1842566

301 North Rome Avenue
Tampa, FL 33606

Phone (813) 817-7288 **Minority** Small Business
Fax (888) 502-3060 **Contact** Kenneth Stewart
E-mail kstewart@iscsecurity.net

SIGNS, AND SIGN KITS (NOT OTHERWISE

Sign-Age of Tampa Bay, Inc. **Federal Number** 59-3011930

4400 140th Ave N. Suite 250
Clearwater, FL 33762

Phone (727) 536-9400 **Minority** Small Business
Fax (727) 531-2576 **Contact** Bonnie Major
E-mail llevitan@sign-age.com

SIGNS, AND SIGN KITS (NOT OTHERWISE

Apple Sign & Awning, LLC — **Federal Number** 55-0916320

1635 N Dale Mabry HWY #7
Lutz, FL 33548

Phone (813) 948-2220
Fax (813) 948-2403
E-mail Apple.Signs1@verizon.net

Minority Small Business
Contact Madeline Rogers

Sign Solutions of Tampa Bay, Inc. — **Federal Number** 59-3741769

3921 W Martin Luther King Jr. Blvd.
Tampa, FL 33614

Phone (813) 269-5990
Fax (813) 269-5991
E-mail gneave@signsolutionstb.com

Minority Small Business
Contact Georgina Neave

Universal Pavement Marking Inc. — **Federal Number** 59-3245096

P.O. Box 0021
Valrico, FL 33594

Phone (813) 653-0092
Fax (813) 653-0092
E-mail upmarking@aol.com

Minority Small Business
Contact Jon Martin

Z & L Partners, Inc. — **Federal Number** 14-1856255

4520 W. Kennedy Blvd.
Tampa, FL 33609

Phone (813) 639-0066
Fax (813) 639-0067
E-mail ldavis@signsbytomorrow

Minority Small Business
Contact Leslie Davis

UNDERGROUND UTILITY INSTALLATION

Castco Construction, Inc. — **Federal Number** 59-2548614

9001 126th Ave. North
Largo, FL 33773

Phone (727) 585-4714
Fax (727) 585-5091
E-mail cconstr@tampabay.rr.com

Minority Small Business
Contact Israel Castro

Sunrise Utility Construction, Inc. — **Federal Number** 59-3034012

P.O. Box 272293
Tampa, FL 33688-2293

Phone (813) 949-3749
Fax (813) 949-0408
E-mail LMNBOSS@AOL.COM

Minority Small Business
Contact Lisa Nehrboss

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

UNDERGROUND UTILITY INSTALLATION

Tampa Bay Construction & Engineering, Inc. **Federal Number** 59-3713572

10503 Palm Cove Ave
Tampa, FL 33647

Phone (813) 984-9898
Fax (813) 907-0980
E-mail aerchid@tbcei.com

Minority Small Business
Contact Ahmad Erchid

Larsen Civil Construction LLC **Federal Number** 20-3567884

10456 66th Street
Pinellas Park, FL 33782

Phone (727) 547-8100
Fax (727) 547-8101
E-mail jim@larsencivil.com

Minority Small Business
Contact Benjamin Larsen

L & L Site Services, LLC **Federal Number** 33-1119449

3433 Lithia Pinecrest Rd. 5610 Hawkgrove PL.
Valrico, FL 33596

Phone (813) 643-0700
Fax (727) 499-7495
E-mail llsiteservicesllc@verizon.net

Minority Small Business
Contact Chris Langford

GeoMasters, Inc. **Federal Number** 59-3590934

3301 DeSoto Blvd. Suite B
Palm Harbor, FL 34683

Phone (727) 772-1893
Fax (727) 772-6794
E-mail geomastersinc@aol.com

Minority Small Business
Contact Darlene Truluck

Communication Support Network, Inc. **Federal Number** 03-0379746

1984 Iowa Ave. NE
St. Petersburg, FL 33703

Phone (813) 966-5200
Fax (813) 932-5421
E-mail csn2@tampabay.rr.com

Minority Small Business
Contact Sara Armstrong

McKenzie Construction & Site Development, LLC **Federal Number** 26-2725853

P.O. Box 47115
Tampa, FL 33647

Phone (813) 438-2615
Fax (857) 222-4452
E-mail Dan.fernandez@McKenziesiteDevelopment.com

Minority Small Business
Contact Oliver Fernandez, III

City of Tampa MBD Office

SLBE Goal Setting Firms Report

as of 10/6/2014

UNDERGROUND UTILITY INSTALLATION

Secord Contracting Corporation

Federal Number 59-3294450

P.O. Box 26372 4812 N Coolidge Ave
Tampa, Fl. 33622
Tampa, FL 33622

Phone (813) 870-0630

Minority Small Business

Fax (813) 293-4973

Contact Eleanor Secord

E-mail esecord@verizon.net

SLBE Contract Goal

Goal
30%

Instructions Regarding Use of the SLBE Goal Setting List

Bidders must solicit a subcontracting bid from ALL of the firms listed on the SLBEs list provided on the City's web site, and provide documentation of emails, faxes, phone calls, letters, or other communication with the firms a first step in demonstrating Good-Faith Efforts to achieve the goal set for SLBE participation on this contract.

The list is formatted to facilitate e-mailing of a solicitation to the listed firms by copying and pasting the email addresses.

The SLBE participation Goal is based upon the availability of the certified firms indicated on the attached list. The Goal and Requirements of the City's Equal Business Opportunity Program are stated in the Bid/Contract Document, Specifications.

SOLICITATION FOR SUBCONTRACTOR QUOTES

From:
OUR COMPANY NAME:
TELEPHONE NUMBER:
ADDRESS:
FAX NUMBER:
E-MAIL ADDRESS:

To Subcontractor:

Our firm is in the process of preparing a bid for a **City of Tampa Contract**. Please accept this notice as our request for quotes for the scope of work identified below. Please respond to this request by filling in the information below and returning via e-mail or fax to the address or number provided. Please contact us if you need any assistance in obtaining bonding, lines of credit, insurance, assistance in obtaining necessary equipment, supplies, materials, participation in a City-sponsored mentor-protégé program, or if you have any questions.

Plans and Specs for this project are posted at:
http://www.tampagov.net/dept_contract_administration/programs_and_services/construction_project_bidding/

CONTRACT NO.:
CONTRACT NAME:
CITY'S BID OPENING DATE:
DEADLINE FOR YOUR SUBCONTRACTOR BID OR RESPONSE:
SPECIFIC SCOPE OF WORK:

Please complete and submit with your subcontract bid or response:
YOUR FIRM'S NAME:
MAILING ADDRESS:
CITY:
STATE:
ZIP:
FAX NUMBER:
E-MAIL ADDRESS:
__Yes, my company is interested in quoting this project for the following items of work:

__No, my company will not quote this project for the following reason(s):

(Sample Suggested Sub Solicitation 3-9-9 Tampa MBDO)

PROPOSAL

To the Mayor and City Council of the City of Tampa, Florida:

Name of Bidder _____

_____
Business Phone Number and Email Address

_____
Business Name and Mailing Address

_____
Phone Number and Name of Contact Regarding Permits

_____
Contractor/Qualifiers Name and Federal Identification Number

Date of Proposal _____

(If Bidder is a firm, fill in the following blanks):

Names and Residential Addresses of Partners

_____

_____

(If Bidder is a corporation, fill in the following blanks):

Organized under the laws of the State of _____

Names and Address of President

_____

_____

Name and Address of Vice President

_____

_____

Name and Address of Secretary

_____

_____

Names and Address of Treasurer

_____

_____

The above-named Bidder affirms and declares:

(1) That the Bidder is of lawful age and that no other person, firm or corporation has any interest in this Proposal or in the Contract proposed to be entered into.

(2) That this Proposal is made without any understanding, agreement or connection with any other person, firm, or corporation making Proposal for the same purposes, and is in all respects fair and without collusion or fraud.

(3) That the Bidder is not in arrears to the City of Tampa, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the City of Tampa.

(4) That no officer or employee or person whose salary is payable in whole or in part from the City Treasury is, shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this Proposal, or in the performance of the Contract, or in the supplies, materials, or equipment and work or labor to which it relates, or in any portion of the profits thereof.

(5) That the Bidder has carefully examined the site of the work and that, from his own investigations, he has satisfied himself as to the nature and location of the work, the character, quality, and quantity of materials and the kinds and extent of equipment and other facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, affect the work or its performance.

(6) That the Bidder

_____ Has; Treasury Number _____

_____ Has not
(Check applicable box)

previously performed work under the President's Executive Order Nos. 11246 and 11375.

(7) That the undersigned, as Bidder, also declares that he has carefully examined and fully understands all the component parts of the Contract Documents and agrees that he will execute the Contract and finish the required Performance Bond and will completely perform the work in strict accordance with the terms of the Contract and the Contract Documents therein referred to for the following prices, to wit:

Item No.	Description	Unit	Approx. Quantity	Unit Price in Words		Unit Price		Total Computed Price
1	Furnish all labor, materials and equipment to build a new 2 mgd pumping station with two raw water pumps and vacuum priming system, with all associated electrical and instrumentation controls, in addition to two floating intake structures with suction pipes from the Sink to the new pumping station, a new water discharge main from the pumping station to the Sink, a raw water crossing of Blue Sink, sanitary sewer, water service and all appurtenant work shown on the plans, specified or required for a complete project.	L.S.	1		$		$	
2A	Allowance for all Cost in Aid to Construction (CIAC) for coordination with TECO	L.S.	1	Fifty Thousand Dollars and No/Cents	$	50,000.00	$	50,000.00
2B	Allowance for all Coordination with Brighthouse Networks	L.S.	1	Twenty Thousand Dollars and No/Cents	$	20,000.00	$	20,000.00
2C	Allowance for Payment of Water Department Commitment Letter Fees	L.S.	1	One Thouand Dollars and No/Cents	$	1,000.00	$	1,000.00
2D	Allowance for Payment of Wastewater Department Commitment Letter Fees	L.S.	1	One Thouand Dollars and No/Cents	$	1,000.00	$	1,000.00
3	Allowance for Various Permit Fees	L.S.	1	Ten Thousand Dollars and No/Cents	$	10,000.00	$	10,000.00
4	Contingency	L.S.	1	One Hundred Thousand Dollars and No/Cents	$	100,000.00	$	100,000.00
				TOTAL;			$	

Computed Total Price In Words:

_____

_____ dollars and _____ cents.

Computed Total Price in Figures: $_____

The bidder acknowledges that the following addenda have been received and that the changes covered by the addendum(s) have been taken into account in this proposal: #1 ___ #2 ___ #3 ___ #4___ #5___.

The bidder acknowledges the requirements of the City of Tampa's Equal Business Opportunity Program.

Bidder acknowledges that included in the various items of the proposal and the Total Bid Price are costs for complying with the Florida Trench Safety Act (90096), (Laws of Fla.) effective October 1, 1990. The bidder further identifies the costs to be summarized below:

	Trench Safety Measure (Description)	Unit of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
A.	_____	_____	_____	_____	_____
B.	_____	_____	_____	_____	_____
C.	_____	_____	_____	_____	_____
D.	_____	_____	_____	_____	_____

Total Cost $_____

Signed _____

Failure to complete the above may result in the bid being declared non-responsive.

Accompanying this Proposal is a certified check, cashier's check or Bid Bond (form included herein must be used) on the form at least five (5) percent of the total amount of the Proposal which check shall become the property of the

_____ of _____
(Name of Bank or Surety) (City & State)

City of Tampa, or which bond shall become forthwith due and payable to the City of Tampa, if this Proposal shall be accepted by the City of Tampa and the undersigned shall fail to execute a contract with and to furnish the required Performance Bond and Payment Bond to the City of Tampa within twenty (20) days after the date of receipt of written Notice of Award by the City of Tampa to the undersigned so to do.

Dated _____, 2015

_____
(Name of Bidder)

_____
(Address of Bidder)

_____
(Signature)

_____
(Title)

Where Bidder is a Corporation:

Attest:

_____
Secretary

AFFIX
CORPORATE
SEAL

(ACKNOWLEDGMENT OF PRINCIPAL)

STATE OF)
) SS:
COUNTY OF)

For a Corporation:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 2015 by _____ of _____, a _____ corporation, on behalf of the corporation. He/she is ___ personally known or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

For an Individual:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 2015 by _____ who is ___ personally known to me or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

For a Firm:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 2015 by _____ who signed on behalf of the said firm. He/she is ___ personally known or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

_____

Good Faith Effort Compliance Plan for Small Local Business Subcontracting

City of Tampa - Equal Business Opportunity Program

Contract _____ **Bid Date** _____

Bidder _____

Signature _____ **Date** _____

Name _____ **Title** _____

The following Compliance Plan is a true report of Good Faith Efforts made to accomplish subcontracting goals for Small Local Business Enterprises, SLBEs, on the referenced contract:

□ **The goal for SLBE participation has been met or exceeded. See the DMI form reporting subcontractors to be utilized.**
(Check Box, if appropriate; the remainder of the Compliance Plan need not be reported.)

□ **The goal for SLBE participation has not been met. The following is a recap of Good Faith Efforts made:**
(Check applicable boxes below. Enclose additional documents, and/or add remarks below as needed.)

(1) Soliciting through reasonable and available means the interest of SLBEs that have the capability to perform the work of the contract. The Bidder or Contractor must solicit this interest within sufficient time to allow the SLBEs to respond. The Bidder or Contractor must take appropriate steps to follow up initial solicitations with interested SLBEs. □ See DMI report forms for subcontractors solicited. □ See enclosed supplemental data on solicitation efforts. □ Remarks:

(2) Providing interested SLBEs with adequate information about the plans, specifications, and requirements of the contract, including addenda, in a timely manner to assist them in responding to the solicitation. □ See enclosed sample solicitation. □ Remarks:

(3) Negotiating in good faith with interested SLBEs that have submitted bids. Documentation of negotiation must include the names, addresses, and telephone numbers of SLBEs that were solicited; the date of each such solicitation; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why agreements could not be reached with SLBEs to perform the work. That there may be some additional costs involved in soliciting and using SLBEs is not a sufficient reason for a contractor's failure to meet the goals, as long as such costs are reasonable. Bidders are not required to accept higher quotes in order to meet the goal. □ DMI subcontractor-utilized forms reflect successful negotiations □ This project is of a low-bid nature and negotiations are limited to clarifications of scope and specifications. □ See enclosed document. □ Remarks:

(4) Not rejecting SLBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The SLBEs standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations are not legitimate causes for rejecting or not soliciting bids to meet the goals. □ Not applicable. □ See attached explanation for rejection of a low-bidding subcontractor's bid. □ Remarks:

(5) Making a portion of the work available to SLBE subcontractors and suppliers and to select those portions of the work or material consistent with the available SLBE subcontractors and suppliers, so as to facilitate meeting the goal. □ Sub-Contractors were allowed to bid on their own choice of work or trade without restriction to a pre-determined portion. □ See enclosed comments. □ Remarks:

(6) Making good faith efforts, despite the ability or desire of a Bidder or Contractor to perform the work of a contract with its own organization. A Bidder or Contractor who desires to self-perform the work of a contract must demonstrate good faith efforts unless the goal has been met. □ Sub-Contractors were not prohibited from submitting bids on work not usually sub-contracted. □ Remarks:

(7) Selecting portions of the work to be performed by SLBEs in order to increase the likelihood that the goals will be met. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate SLBE participation, even when the Bidder or Contractor might otherwise prefer to perform these work items with its own forces. □ Sub-Contractors were allowed to bid on their own choice of work or trade without restriction to a pre-determined portion. □ Sub-Contractors were not prohibited from submitting bids on work not usually sub-contracted. □ See enclosed comments. □ Remarks:

(8) Making efforts to assist interested SLBEs in obtaining bonding, lines of credit, or insurance as required by the city or contractor. □ See enclosed sample solicitation □ see enclosed document. □ Remarks:

(9) Making efforts to assist interested SLBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, including participation in a City-sponsored mentor-protégé program. □ See enclosed sample solicitation. □ See enclosed document. □ Remarks:

(10) Effectively using the services of the City and other organizations that provide assistance in the recruitment and placement of SLBEs. □ See enclosed document. □ The following services were used:

Other Supporting Good Faith Efforts: □ See enclosed document. □ Remarks:

Compliance Plan: Guidance For Meeting Good Faith Efforts

1. All firms on the SLBE Goal Setting List must be solicited and documentation provided for email, fax, letters, phone calls, and other communication with the listed firms. The DMI Solicited and DMI-Utilized forms must be completed for all firms solicited or utilized. Other opportunities for subcontracting may be explored by consulting the City of Tampa and/or Hillsborough County certification listings of SLBE's.

2. Solicitation of SLBEs, via written or electronic notification, should provide specific information on the services needed, where plans can be reviewed and assistance offered in obtaining these, if required. Solicitations should be typically be sent a week or more before the bid date. Sample copies of the bidder's solicitations should be provided.

3. With any quotes received, a follow-up should be made whenever needed to confirm scope of work. For any SLBE low quotes rejected, an explanation should be provided detailing negotiation efforts.

4. If a low bid SLBE is rejected or deemed unqualified the contractor must provide an explanation and supporting documentation for this decision.

5. Prime should break down portions of work into economical feasible opportunities for subcontracting. The SLBE directory can be useful in identifying additional subcontracting opportunities and firms not listed in the "SLBE Goal Setting Firms List."

6. Contractor should not preclude SLBEs from bidding on any part of work, even if the Contractor can self-perform the work.

7. Contractor should avoid relying solely on subcontracting out work where availability is not sufficient to attain pre-determined goal.

8. In its solicitations, the Bidder should offer assistance to SLBEs in obtaining bonding, insurance, etc, if required of subcontractors by the City or Prime Contractor.

9. In its solicitation, the Bidder should offer assistance in obtaining equipment for a specific job to SLBEs, if needed.

10. Contractor should use the services offered by such agencies as the Minority Business Development Office of the City of Tampa, Hillsborough County and the NAACP Empowerment Center for the recruitment and placement of SLBEs.

City of Tampa –DMI -Schedule of All Sub-(Contractors/Consultants/Suppliers) Solicited

(FORM MBD-10)

Contract No.:_____ Contract Name:_____

Contractor Name:_____ Address:_____

Federal ID:_____Phone:_____ Fax:_____ Email:_____

[] No Firms were contacted/solicited for this contract.

[] No Firms were contacted because:_____

[] See attached documents with supplemental information.

NIGP Code General Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

This DMI Schedule Must Be Submitted with the Bid or Proposal (Do Not Modify This Form)

S = SLBE W=WMBE Federal ID	Company Name Address Phone & Fax	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic Am. AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade or Services NIGP Code (listed above)	Contact Method L=Letter F=Fax E=Email P=Phone	Quote or Resp. Rec'd Y/N

It is hereby certified that the information provided is an accurate and true account of contacts and solicitations for sub – contracting opportunitieson this contract. ***This form must be completed and submitted with the bid or proposal***.Modifying or failing to sign DMI forms may result in Non-Compliance and/or deemed non-responsive.

Signed:_____ Name/Title:_____ Date:_____

Note: Detailed Instructions for completing this form are on the next page

Instructions for completing The Sub-(Contractors/Consultants/ Suppliers) Solicited Form (Form MBD-10)

This form must be submitted with all bids or proposals. All subcontractors (regardless of ownership or size) solicited and subcontractors from whom unsolicited quotations were received must be included on this form. The instructions that follow correspond to the headings on the form required to be completed.Note: Ability or desire to self-perform all work shall not exempt the prime from Good Faith Efforts when Goal has been established.

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business.
- **Address.** The physical address of your business.
- **Federal ID.**FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Firms were contacted/solicited for this contract.** Checking the box indicates that a pre-determined Subcontract Goal was not set by the City resulting in your business not using subcontractors and will self-perform all work. If during the performance of the contract you employ subcontractors, the City must pre-approve subcontractors. Use of the "Sub-(Contractors/Consultants/Suppliers) Payments" form must be submitted with your invoices. Note: Certified SLBE or WMBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors.
- **No Firms were contacted because.** Provide brief explanation why no firms were contacted/solicited.
- **See attached documents.**Check box, if after you have completed the DMI Form in its entirety, you are providing any additional documentation relating to the form.All DMI data not submitted on the MBD Form-10 must be in the same format and have all requested data from MBD Form-10 included.

The following instructions are for information of any and all subcontractors solicited.

- **"S" = SLBE, "W" = WMBE.** Enter "**S**" for firms Certified by the City as Small Local Business Enterprises and/or "**W**" for firms Certified by the City as Women/Minority Business Enterprise.
- **Federal ID.**FIN. A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials** Indicate the trade, service, or material provided by the subcontractor. NIGP codes are listed at top section of document.
- **Contact Method L=letter, F=fax, E=Email, P=Phone.** Indicate with letter the method of soliciting for bid.
- **Quote or Resp. (response) Rec'd (received) Y/N**. Indicate "Y" Yes if you received a quotation or if you received a response to your solicitation. Indicate "N" No if you received no response to your solicitation from the subcontractor.

If any additional information is required or you have any questions, you may call the Minority Business Development Office at (813) 274-5522.

City of Tampa –DMI Schedule of Sub-(Contractors/Consultants/Suppliers) to be Utilized

(FORM MBD-20)

Contract No.:_____ Contract Name:_____

Contractor Name:_____ Address:_____

Federal ID:_____Phone:_____ Fax:_____ Email:_____

[ ] See attached documents.

[ ] No Subcontracting (of any kind) will be performed on this contract.

NIGP Code General Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

This DMI Schedule Must Be Submitted with the Bid or Proposal (Do Not Modify This Form)

Enter "S" for firms Certified as Small Local Business Enterprises, "W" for firms Certified as Women/Minority Business Enterprise

S = SLBE W=WMBE Federal ID	Company Name Address Phone & Fax	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic Am. AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade, Services, or Materials NIGP Code Listed above	Amount of Quote. Letter of Intent if available.	Percent of Scope/Contract %

Total Subcontract/Supplier Utilization $_____

Total SLBE Utilization $ _____

Total WMBE Utilization $ _____

Percent SLBE Utilization of Total Bid/Proposal Amt. _____% Percent WMBE Utilization of Total Bid/Proposal Amt. _____%

It is hereby certified that the following information is a true and accurate account of utilization for sub-contracting opportunities on this contract. ***This form must be completed and submitted with the bid or proposal.*** Modifying or failing to sign DMI forms may result in Non-Complianceand/or deemed non-responsive.

Signed:_____ Name/Title:_____ Date:_____

Note: Detailed Instructions for completing this form are on the next page.

Instructions for completing The Sub-(Contractors/Consultants/ Suppliers) to be Utilized Form

(Form MBD-20)

This form must be submitted with all bids or proposals. All subcontractors projected to be utilized must be included on this form.

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business.
- **Address.** The physical address of your business.
- **Federal ID.**FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Subcontracting (of any kind) will be performed on this contract.** Checking box indicates your business will not use subcontractors when no Subcontract Goal has been set by the City, but will self-perform all work. When subcontractors are utilized during the performance of the contract, the "Sub-(Contractors/Consultants/Suppliers) Payments" form must be submitted with your invoices. Note: Certified SLBE or WMBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors.
- **See attached documents.** Check if you have provided any additional documentation relating to the utilization of subcontractors.
-

The following instructions are for information of Any and All subcontractors to be utilized.

- **Federal ID.**FIN. A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **"S" = SLBE, "W" = WMBE.** Enter "**S**" for firms Certified by the City as Small Local Business Enterprises and/or "**W**" for firms Certified by the City as Women/Minority Business Enterprise.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials (NIGP code if Known)** Indicate the trade, service, or material provided by the subcontractor. NIGP codes are available at http:/www.tampagov.net/mbd.
- **Amount of Quote, Letters of Intent** (required for both SLBEs and WMBEs)
- **Percent of Work/Contract.** Indicate the percent of the total contract price the subcontract(s) represent.
- **Total Subcontract/Supplier Utilization.** – Provide total dollar amount of all subcontractors/suppliers projected to be used for the contract. (Dollar amounts may not apply to CCNA proposals.)
- **Total SLBE Utilization.** Provide total dollar amount for all projected SLBE subcontractors/Suppliers used for this contract. (Dollar amounts may not apply to CCNA proposals.)
- **Total WMBE Utilization.** Provide total dollar amount for all projected WMBE subcontractors/Suppliers used for this contract. (Dollar amounts may not apply to CCNA proposals.)
- **Percent SLBE Utilization.** Total amount allocated to SLBEs divided by the total bid amount. (Dollar amounts may not apply to CCNA proposals.)
- **Percent WMBE Utilization.** Total amount allocated to WMBEs divided by the total bid/proposal amount. (Dollar amounts may not apply to CCNA proposals.)

If any additional information is required or you have any questions, you may call the Minority Business Development Office at (813) 274-5522.

TAMPA BID BOND
Contract 14-C-00016; Blue Sink MFL Pumping Station

KNOW ALL MEN BY THESE PRESENTS, that we, _____

_____

(hereinafter called the Principal) and _____

(hereinafter called the Surety) a Corporation chartered and existing under the laws of the State of _____, with its principal offices in the City of _____, and authorized to do business in the State of Florida, are held and firmly bound unto the City of Tampa, a Municipal Corporation of Hillsborough County, Florida, in the full and just sum of 5% of the amount of the (Bid) (Proposal) good and lawful money of the United States of America, to be paid upon demand of the City of Tampa, Florida, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally and firmly these presents.

WHEREAS, the Principal is about to submit, or has submitted to the City of Tampa, Florida, a Proposal for the construction of certain facilities for the City designated Contract 14-C-00016, Blue Sink MFL Pumping Station.

WHEREAS, the Principal desires to file this Bond in accordance with law, in lieu of a certified Bidder's check otherwise required to accompany this Proposal.

NOW, THEREFORE: The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within twenty (20) days after the date of receipt of written Notice of Award, execute a contract in accordance with the Proposal and upon the terms, conditions and price set forth therein, in the form and manner required by the City of Tampa, Florida and execute a sufficient and satisfactory Public Construction Bond payable to the City of Tampa, Florida in an amount of one hundred percent (100%) of the total contract price, in form and with security satisfactory to said City, then this Bid Bond obligation is to be void; otherwise to be and remain in full force and virtue in law, and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid City, upon demand, the amount thereof, in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 2015.

Principal _____

BY _____

TITLE _____

BY _____

TITLE _____

(SEAL)

_____
Producing Agent

_____
Producing Agent's Address

_____
Name of Agency

_____
The addition of such phrases as "not to exceed" or like import shall render the (Bid) (Proposal)non-responsive.

AGREEMENT

For furnishing all labor, materials and equipment, together with all work incidental thereto, necessary and required for the performance of the work for the construction of Contract 14-C-00016 in accordance with your Proposal dated _____, amounting to a total of $_____ as completed in accordance with subsections I-2.09 and I-2.10 of the Instruction to Bidders.

THIS AGREEMENT, made and entered into in triplicate, this ____ day of _____, 2015, between the City of Tampa, Florida, hereinafter called the City, and hereinafter called the Contractor.

WITNESSETH that, in consideration of the mutual stipulations, agreements, and covenants herein contained, the parties hereto have agreed and hereby agree with each other, the Party of the First Part for itself, its successors and assigns, and the Party of the Second Part for itself, or himself, or themselves, and its successors and assigns, or his or their executors, administrators and assigns, as follows:

Contract 14-C-00016; Blue Sink MFL Pumping Station, shall include, but not be limited to, build a new pumping station with two raw water pumps and vacuum priming system, furnish and install electrical and instrumentation controls , two floating intake structures with suction pipes from the Sink to the new pumping station, a new water discharge main from the pumping station to the Sink, a raw water crossing of Blue Sink, sanitary sewer and water service with all associated work required for a complete project in accordance with the Contract Documents.

Contract Documents referred to in Article 1.01 of this Agreement also includes this volume, applicable standard drawings, the plans and any provisions referred to whether actually attached or not.

TAMPA AGREEMENT

SECTION 1
GENERAL

ARTICLE 1.01 THE CONTRACT

Except for titles, subtitles, headings, running headlines, and tables of contents (all of which are printed herein merely for convenience), the following, except for such portions thereof as may be specifically excluded, constitute the Contract:

The Notice to Bidders;
The Instructions to Bidders, including Special Instructions and General Instructions;
The Proposal;
The Bid Bond;
The Certification of Nonsegregated Facilities;
The Notice of Award;
The Agreement;
The Performance Bond;
The Notice To Proceed;
The Specifications, including the General Provisions, the Workmanship and Materials, the Specific Provisions or the Contract Items
The Plans;
All Supplementary Drawings Issued after award of the Contract;
All Addenda issued by the City prior to the receipt of proposals;
All provisions required by law to be inserted in this Contract, whether actually inserted or not.

ARTICLE 1.02 DEFINITIONS

The following words and terms, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless different meaning is clear from the context:

(a)"City" shall mean the City of Tampa, Florida, represented by its Mayor and City Council, Party of the First Part, or such other City official as shall be duly empowered to act for the City on matters relating to this Contract.

(b)"Contractor" shall mean the Party of the Second Part hereto, whether corporation, firm or individual, or any combination thereof, and its, their, or his successors, personal representatives, executors, administrators, and assigns, and any person, firm or corporation who or which shall at any time be substituted in the place of the Party of the Second Part under this Contract.

(c)"Engineer" shall mean the Director of the Department or his duly authorized representative.

(d)"Consultant" shall mean the engineering or architectural firm or individual employed by the City to consult with and advise the City in the construction of the project.

(e)"Surety" shall mean any person, firm or corporation that has executed as Surety the Contractor's Performance Bond securing the performance of this Contact.

(f)"The Work" shall mean everything expressly or implied required to be furnished and done by the Contractor under the Contract, and shall include both Contract Work and Extra Work.

(g)"Contract Work" shall mean everything expressly or implied required to be furnished and done by the Contractor by any one or more of the Contract parts referred to in Article 1.01 hereof, except Extra Work, as hereinafter defined; it being understood that, in case of any inconsistency in or between any part or parts of this Contract, the Engineer shall determine which shall prevail.

(h)"Contract" or "Contract Documents" shall mean each of the various part of the Contract referred to in Article 1.01 hereof, both as a whole and severally.

(i)"Extra Work" shall mean work other than that required either expressly or implied by the contract in its present form.

(j)"Plans" shall mean only those drawings specifically referred to as such in these documents, or in any Addendum. Drawings issued after the execution of the Contract to explain further, or to illustrate, or to show changes in the work, will be known as "Supplementary Drawings" and shall be binding upon the Contractor with the same force as the Plans.

(k)"Specifications" shall mean all of the directions, requirements, and standards of performance applying to the work, as hereinafter detailed and designated as such, or which may be issued in an addendum.

(l)"Addendum or Addenda" shall mean the additional contract provisions issued in writing prior to the receipt of bids.

(m)"Notice" shall mean written notice. Notice shall be served upon the Contractor, either personally or by leaving the said notice at his residence or with any employee found on the work, or addressed to the Contractor at the residence or place of business given in his proposal and deposited in a postpaid wrapper in any post office box regularly maintained by the United States Post Office.

(n)"Project" shall mean the entire improvement package or related work. The "project" may consist of several different, but related, contracts.

(o)"Site" shall mean, and be limited to, the area upon or in which the Contractor's operations are carried on and such other appropriate areas as may be designed as such by the Engineer.

(p)"Subcontractor" shall mean any person, firm, or corporation, other than employees of the Contractor, who or which contracts with the Contractor to furnish, or actually furnishes labor, or labor and materials, or labor and equipment or labor, materials, and equipment at the site.

(q)Whenever in the Contract the words "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import are used, they shall imply the direction, requirement, permission, order, designation, or prescription of the Engineer; and "approved", "acceptable", "satisfactory", "in the judgement of", and words of like import shall mean approved by, or acceptable to, or satisfactory to, or in the judgment of the Engineer.

(r)Whenever in the Contract the word "day" is used, it shall mean calendar day.

(s)"Final Acceptance" shall mean acceptance of the

work as evidenced by an official resolution of the City. Such acceptance shall be deemed to have taken place only if and when an approving resolution has been adopted by the City Council. The final acceptance shall be signed only after the City has assured itself by tests, inspection, or otherwise, that all of the provisions of the Contract have been carried out to its satisfaction.

(t)"Eastern Standard Time" shall be construed as the time being observed in the City on the day proposals are received or other documents issued or signed.

SECTION 2
POWERS OF THE CITY'S REPRESENTATIVES

ARTICLE 2.01 THE ENGINEER

It is covenanted and agreed that the Engineer, in addition to those matters elsewhere herein expressly made subject to his determination, direction, or approval, shall have the power, subject to such express provisions and limitations herein contained as are not in conflict herewith, and subject to review by the Mayor and City Council:

(a)To monitor the performance of the work.

(b)To determine the amount, kind, quality, sequence, and location of the work to be paid for hereunder and, when completed, to measure such work for payment.

(c)To determine all questions of an engineering character in relation to the work, to interpret the Plans, Specifications and Addenda.

(d)To determine how the work of this Contract shall be coordinated with the work of other contractors engaged simultaneously on this project.

(e)To make minor changes in the work as he deems necessary, provided such changes do not result in a net increase in the cost to the City or to the Contractor of the work to be done under the Contract.

(f)To amplify the Plans, add explanatory information and furnish additional Specifications and Drawings consistent with the intent of the Contract Documents.

The power of the Engineer shall not be limited to the foregoing enumeration, for it is the intent of this Contract that all of the work shall be subject to his determinations and approval, except where the determination or approval of someone other than the Engineer is expressly called for herein and except as subject to review by the Mayor and City Council. All orders of the Engineer requiring the Contractor to perform work as Contract work shall be promptly obeyed by the Contractor.

The Engineer shall not, however, have the power to issue an extra work order, and the performance of such work on the order of the Engineer without previously obtaining written confirmation thereof from the Mayor in accordance with Article 7.02 hereof may constitute a waiver of any right to extra compensation therefor. The Contractor is warned that the Engineer has no power to change the terms and provisions of this Contract, except minor changes where such change results in no net increase in the Contract Price.

ARTICLE 2.02 DIRECTOR

The Director of the Department in addition to those matters expressly made subject to his determination, direction or approval in his capacity as "Engineer", shall also have the power:

(a)To review any and all questions in relation to this Contract and its performance, except as herein otherwise specifically provided, and his determination upon such review shall be final and conclusive upon the Contractor.

(b)With the approval of the Mayor and City Council to authorize modifications or changes in the Contract so as to require: (1) the performance of extra work, or (2) the omission of Contract work whenever he deems it in the interest of the City to do so, or both.

(c)To suspend the whole or any part of the work whenever, in his judgment, such suspension is required: (1) in the interest of the City generally, or (2) to coordinate the work of the various Contractors engaged on this project, or (3) to expedite the completion of the entire project, even though the completion of this particular Contract may be thereby delayed, without compensation to the Contractor for such suspension other than extending the time for the completion of the work, as much as it may have been, in the opinion of the City, delayed by such a suspension.

(d)If, before the final acceptance of all the work contemplated herein, it shall be deemed necessary to take over, use, occupy, or operate any part of the completed or partly completed work, the Engineer shall have the right to do so and the Contractor will not, in any way, interfere with or object to the use, occupation, or operation of such work by the City after receipt of notice in writing from the Engineer that such work or part thereof will be used by the City on and after the date specified in such notice. Such taking over, use, occupancy or operation of any part of the completed or partially completed work shall not constitute final acceptance or approval of any such part of the work.

ARTICLE 2.03 NO ESTOPPEL

The City shall not, nor shall any department, officer, agent, or employee thereof, be bound, precluded, or estopped by any determination, decision, acceptance, return, certificate, or payment made or given under or in connection with this Contract by any officer, agent or employee of the City at any time either before or after final completion and acceptance of the work and payment therefor: (a) from showing the true and correct classification, amount, quality, or character of the work done, or that any determination, decision, acceptance, return certificate or payment is untrue, incorrect or improperly made in any particular, or that the work or any part thereof does not in fact conform to the requirements of the Contract Documents, and (b) from demanding and recovering from the Contractor any overpayments made to him or such damages as it may sustain by reason his failure to comply with the requirements of the Contract of Documents, or both.

ARTICLE 2.04 NO WAIVER OF RIGHTS

Neither the inspection, nor any order, measurements or certificate of the City or its employees, officers, or agents, nor by any order of the City for payment of money, nor any money, nor payments for or acceptance of the whole or any part of the work by the City, nor any extension of time, nor any changes in the Contract, Specifications or Plans, nor any possession by the City or its employees shall operate as a

waiver of any provisions of this Contract, nor any power herein provided nor shall any waiver of any breach of this Contract be held as a waiver of any other subsequent breach.

Any remedy provided in this Contract shall be taken and construed as cumulative, namely, in addition to each and every other suit, action, or legal proceeding. The City shall be entitled as of right to an injunction against any breach of the provisions of this Contract.

SECTION 3
PERFORMANCE OF WORK

ARTICLE 3.01 CONTRACTOR'S RESPONSIBILITY
The Contractor shall do all the work and furnish, at his own cost and expense, all labor, materials, equipment, and other facilities, except as herein otherwise provided, as may be necessary and proper for performing and completing the work under this Contract. The Contractor shall be responsible for the entire work until completed and finally accepted by the City.

The work shall be performed in accordance with the true intent and meaning of the Contract Documents. Unless otherwise expressly provided, the work must be performed in accordance with the best modern practice, with materials as specified and workmanship of the highest quality, all as determined by and entirely to the satisfaction of the Engineer.

Unless otherwise expressly provided, the means and methods of construction shall be such as the Contractor may choose, subject, however, to the approval of the Engineer. Only adequate and safe procedure, methods, structures and equipment shall be used. The Engineer's approval or the Engineer's failure to exercise his right thereon shall not relieve the Contractor of obligations to accomplish the result intended by the Contract, nor shall such create a cause of action for damages.

ARTICLE 3.02 COMPLIANCE WITH LAWS
The Contractor must comply with all local, State and Federal laws, rules, ordinances and regulations applicable to this Contract and to the work done hereunder, and must obtain, at his own expense, all permits, licenses or other authorization necessary for the prosecution of the work.

No work shall be performed under this Contract on Sundays, legal holidays or after regular working hours without the express permission of the Engineer. Where such permission is granted, the Engineer may require that such work be performed without additional expense to the City.

ARTICLE 3.03 INSPECTION
During the progress of the work and up to the date of final acceptance, the Contractor shall, at all times, afford the representatives of the City, the Florida Department of Environmental Regulation, and if applicable, the Federal Environmental Protection Agency and the Federal Department of Labor every reasonable, safe and proper facility for inspecting the work done or being done at the site. The inspection of any work shall not relieve the Contractor of any of his obligations to perform proper and satisfactory work as herein specified. Finished or unfinished work found not to be in strict accordance with the Contract shall be replaced as directed by the Engineer, even though such work may have been previously approved and payment made therefor.

The City shall have the right to reject materials and workmanship which are defective or require their correction. Rejected work and materials must be promptly removed from the site, which must at all times be kept in a reasonably clean and neat condition.

Failure or neglect on the part of the City to condemn or reject bad or inferior work or materials shall not be construed to imply an acceptance of such work or materials, if it becomes evident at any time prior to the final acceptance of the work by the City. Neither shall it be construed as barring the City at any subsequent time from the recovery of damages of such a sum of money as may be needed to build anew all portions of the work in which inferior work or improper materials were used, wherever found.

Should it be considered necessary or advisable by the City at any time before final acceptance of the entire work to make examinations of work already completed, by removing or tearing out all or portions of such work, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material for that purpose. If such work is found to be defective in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the work shall be considered an item of extra work to be paid for in accordance with the provisions of Article 7.02 hereof.

ARTICLE 3.04 PROTECTION
During performance and until final acceptance, the Contractor shall be under an absolute obligation to protect the finished and unfinished work against any damage, loss, or injury. The Contractor shall take proper precaution to protect the finished work from loss or damage, pending completion and the final acceptance of all the work included in the entire Contract, provided that such precaution shall not relieve the Contractor from any and all liability and responsibility for loss or damage to the work occurring before final acceptance by the City. Such loss or damage shall be at the risk of and borne by the Contractor, whether arising from acts or omissions of the Contractor or others. In the event of any such loss or damage, the Contractor shall forthwith repair, replace, and make good the work without extension of time therefor, except as may be otherwise provided herein.

The provisions of this Article shall not be deemed to create any new right of action in favor of third parties against the Contractor or the City.

ARTICLE 3.05 PRESERVATION OF PROPERTY

The Contractor shall preserve from damage all property along the line of the work, or which is in the vicinity of or is in anywise affected by the work, the removal or destruction of which is not called for by the Plans. This applies, but is not limited, to the public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, public streets (except natural wear and tear of streets resulting from legitimate use thereof by the Contractor), and wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition by the Contractor and at his own expense.

In case of failure on the part of the Contractor to restore such property, or make good such damage or injury, the City may, upon forty-eight (48) hour written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract. Nothing in this clause shall prevent the Contractor from receiving proper compensation for the removal, damage, or replacement of any public or private property not shown on the Plans, when this is made necessary by alteration of grade or alignment authorized by the Engineer, provided that such property has not been damaged through fault of the Contractor, his employees or agents.

ARTICLE 3.06 BOUNDARIES
The Contractor shall confine his equipment, apparatus, the storage of materials, supplies and apparatus of his workmen to the limits indicated on the plans, by law, ordinances, permits or direction of the Engineer.

ARTICLE 3.07 SAFETY AND HEALTH REGULATIONS
The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL91-54).

ARTICLE 3.08 TAXES
All taxes of any kind and character payable on account of the work done and materials furnished under this Contract shall be paid by the Contractor and shall be deemed to have been included in his bid. The laws of the State of Florida provide that sales and use taxes are payable by the Contractor upon the tangible personal property incorporated in the work and such taxes shall be paid by the Contractor and shall be deemed to have been included in his bid.

ARTICLE 3.09 ENVIRONMENTAL CONSIDERATIONS
The Contractor, in the performance of the work under this Contract, shall comply with all Local, State and Federal laws, statutes, ordinances, rules and regulations applicable to protection of the environment; and, in the event he violates any of the provisions of same, he shall be answerable to the Local, State and Federal agencies designated by law to protect the environment. In the event the City receives, from any of the environmental agencies, a citation which is occasioned by an act or omission of the Contractor or his subcontractor or any officers, employees or agents of either, it is understood and agreed that the Contractor shall automatically become a party-respondent under said citation; and the City immediately shall notify the Contractor and provide him with a copy of said citation.

The Contractor shall comply with the requirements of the citation and correct the offending conditions(s) within the time stated in said citation and further shall be held fully responsible for all fines and/or penalties.

SECTION 4
TIME PROVISIONS

ARTICLE 4.01 TIME OF START AND COMPLETION
The Contractor must commence work within thirty (30) days subsequent to the date of the receipt of the "Notice to Proceed" by the City unless otherwise provided in the Specific Provisions and Special Instructions. Time being of the essence of this Contract, the Contractor shall thereafter prosecute the work diligently, using such means and methods of construction as well as secure its full completion in accordance with the requirements of the Contract Documents no later than the date specified therefor, or on the date to which the time for completion may be extended.

The Contractor must complete the work covered by this Contract in the number of consecutive calendar days set forth in the Instructions to Bidders, unless the date of completion is extended pursuant to the provisions of Article 4.05 hereof. The period for performance shall start from the date of signing of this Agreement by the City.

The actual date of completion will be established after a final inspection as provided in Article 4.07 hereof.

ARTICLE 4.02 PROGRESS SCHEDULE
To enable the work to be laid out and prosecuted in an orderly and expeditious manner, the Contractor shall submit to the Engineer a proposed progress schedule within fifteen (15) days after the award of this Contract.

The schedule shall state the Contract starting date, time for completion and date of completion and shall show the anticipated time of starting and completion of each of the various operations to be performed under this Contract, together with all necessary and appropriate information regarding sequence and correlation of work and an estimated time required for the delivery of all materials and equipment required for the work. The proposed schedule shall be revised as directed by the Engineer until finally approved by him, and, after such approval, shall be strictly adhered to by the Contractor. The approved progress schedule may be changed only with the written permission of the Engineer.

If the Contractor shall fail to adhere to the approved progress schedule or the schedule as revised, he shall promptly adopt such other or additional means and methods of construction as will make up for the time lost, and will assure completion in accordance with the contract time.

ARTICLE 4.03 APPROVAL REQUESTS
From time to time, as the work progresses and in the sequence indicated by the approved schedule, the Contractor must submit to the Engineer a specific request, in writing, for each item of information or approval required of him by the Contract. These requests must be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow for the time the Engineer may take to act upon such submissions or resubmissions. The Contractor shall not have any right to an extension of time on account of delays due to his failure to submit his requests for the required information or the required approval in accordance with these requirements.

ARTICLE 4.04 COORDINATION WITH OTHER CONTRACTORS
During progress of the work, other Contractors may be engaged in performing other work on this project or on other projects on the site. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other Contractors in such manner as the Engineer may direct.

ARTICLE 4.05 EXTENSION OF TIME
If such an application is made, the Contractor shall be entitled to an extension of time for delay in completion of the work should the Contractor be obstructed or delayed in the commencement, prosecution or completion of any part of said work by any act or delay of the City, or by acts or omissions of other Contractors on this project, or by a riot, insurrection, war, pestilence, acts of public authorities, fire, lightning, hurricanes, earthquakes, tornadoes, floods, extremely abnormal and excessive inclement weather as indicated by the records of the local weather bureau for a five-year period preceding the date of the Contract, or by strikes, or other causes, which causes of delay mentioned in this Article, in the opinion of the City, are entirely beyond the expectation and control of the Contractor.

The Contractor shall, however, be entitled to an extension of time for such causes only for the number of days of delay which the City may determine to be due solely to such causes and only to the extent that such occurrences actually delay the completion of the project and then only if the Contractor shall have strictly complied with all of the requirements of Articles 4.01, 4.02, 4.03 and 4.04 hereof. It is hereby understood that the determination by the Engineer as to the order and sequence of the work shall not in itself constitute a basis for extension of time.

The determination made by the City on an application for an extension of time shall be binding and conclusive on the Contractor.

Delays caused by failure of the Contractor's materialmen, manufacturers, and dealers to furnish approved working drawings, materials, fixtures, equipment, appliances, or other fittings on time or failure of subcontractors to perform their work shall not constitute a basis of extension of time.

The Contractor agrees to make no claim for damages for delay in the performance of this Contract occasioned by any act or omission to act of the City or any of its representatives or because of any injunction which may be brought against the City or its representatives and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the work as provided herein.

ARTICLE 4.06 LIQUIDATED DAMAGES
It is mutually agreed between the parties that time is the essence of this Contract and that there will be on the part of the City considerable monetary damage in the event the Contractor should fail to complete the work within the time fixed for completion in the Contract or within the time to which such completion may have been extended.

The amount per day set forth in the Instructions to Bidders is hereby agreed upon as the liquidated damages for each and every calendar day that the time consumed in completing the work under this Contract exceeds the time allowed.

This amount shall, in no event, be considered as a penalty or otherwise than as the liquidated and adjusted damages to the City because of the delay and the Contractor and his Surety agree that the stated sum per day for each such day of delay shall be deducted and retained out of the monies which may become due hereunder and if not so deductible, the Contractor and his Surety shall be liable therefor.

ARTICLE 4.07 FINAL INSPECTION
When the work has been completed in accordance with the requirements of the Contract and final cleaning up performed, a date for final inspection of the work by the Engineer shall be set by the Contractor in a written request therefor, which date shall be not less than ten (10) days after the date of such request. The work will be deemed complete as of the date so set by the Contractor if, upon such inspection, the Engineer determines that no further work remains to be done at the site.

If such inspection reveals interms of work still to be performed, however, the Contractor shall promptly perform them and then request a reinspection. If, upon such inspection, the Engineer determines that the work is complete, the date of final completion shall be deemed to be the last day of such reinspection.

SECTION 5
SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 5.01 LIMITATIONS AND CONSENT
The 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 thereunder to any other person, firm or corporation unless the previous written consent of the City shall first be obtained thereto and the giving of any such consent to a particular subcontract or assignment shall not dispense with the necessity of such consent to any further or other assignment.

Before making any subcontract, the Contractor must submit a

written statement to the Engineer, giving the name and address of the proposed contractor, the portion of the work and materials which he is to perform and furnish and any other information tending to prove that the proposed subcontractor has the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and conditions of this Contract.

If the City finds that the proposed subcontractor is qualified, the Contractor will be notified in writing. The City may revoke approval of any subcontractor when such subcontractor evidences an unwillingness or inability to perform his work in strict accordance with these Contract Documents. Notice of such revocation of approval will be given in writing to the Contractor.

The Contractor will promptly, upon request, file with the City a conformed copy of the subcontract. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of these Contract Documents, insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontracts that the City may exercise over the Contractor under provisions of these Contract Documents.

The Contractor shall be required to perform with his own forces at least twenty-five (25) percent of the work, unless written consent to subcontract a greater percentage of the work is first obtained from the City.

ARTICLE 5.02 RESPONSIBILITY
The approval by the City of a subcontractor shall not relieve the Contractor of any of his responsibilities, duties, and liabilities hereunder. The Contractor shall be solely responsible to the City for the acts or defaults or omissions of his subcontractor and of such subcontractor's officers, agents, and employees, each of whom shall for all purposes be deemed to be the agent or employee of the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and the City.

SECTION 6
SECURITY AND GUARANTY

ARTICLE 6.01 CONTRACT SECURITY
The Contractor shall execute and deliver to the City a Performance Bond on the form as provided herein, in an amount at least equal to one hundred (100) percent of the full Contract price, such Bond to be executed by a surety company acceptable to the City. The surety on such Performance Bond shall be a surety company duly authorized to do business in the State of Florida, and the Bond shall be issued or countersigned by a local resident producing agent of such surety company who is a resident of the State of Florida, regularly commissioned and licensed in said State, and satisfactory evidence of the authority of the person or persons executing such Bond shall be submitted with the Bond. The Performance Bond shall serve as security for the faithful performance of this Contract, including maintenance and guaranty provisions, and for the payment of all persons performing labor and furnishing materials in connection with the Contract. The premiums on the Performance Bond shall be paid by the Contractor.

If, at any time, the City shall become dissatisfied with any surety or sureties then upon the Performance Bond, or if for any other reason such bond shall cease to be adequate security for the City, the Contractor shall, within five days after notice so to do, substitute an acceptable Bond in such form and sum and signed by such other sureties as may be satisfactory to the City. The premiums on such Bond shall be paid by the Contractor. No further partial payments shall be deemed due or shall be made until the new sureties have qualified.

ARTICLE 6.02 CONTRACTORS INSURANCE
Insurance required shall be as indicated on Special Instructions pages beginning with "INS-1"

ARTICLE 6.03 AGAINST CLAIMS AND LIENS
The City may withhold from the Contractor as much as any approved payments to him as may, in the opinion of the City, be necessary to secure (a) just claims of any persons supplying labor or materials to the Contractor or any of his subcontractors for the work then due and unpaid; (b) loss due to defective work not remedied, or (c) liability, damage, or loss due to injury to persons or damages to the work or property of other contractors, subcontractors, or others, caused by the act or neglect of the Contractor or of any of his subcontractors. The City shall have the right, as agent for the Contractor, to apply any such amounts so withheld in such manner as the City may deem proper to satisfy such claims or to secure such protection. Such application of such money shall be deemed payments for the account of the Contractor.

ARTICLE 6.04 MAINTENANCE AND GUARANTY
The Contractor hereby guarantees all the work furnished under this Contract against any defects in workmanship and materials for a period of one year following the date of final acceptance of the work by the City. Under this guarantee, the Contractor hereby agrees to make good, without delay, at his own expense, any failure of any part of the work due to faulty materials or manufacture, construction, or installation, or the failure of any equipment to perform satisfactorily all the work put upon it within the limits of the Contract Documents, and further, shall make good any damage to any part of the work caused by such failure. It is hereby agreed that the Performance Bond shall fully cover all guarantees contained in this Article.
It is also agreed that all warranties, expressed or implied, inure to the benefit of the City and are enforceable by the City.

SECTION 7
CHANGES

ARTICLE 7.01 MINOR CHANGES
The City reserves the right to make such additions, deductions, or changes to this Contract from time to time as

it deems necessary and in a manner not materially affecting the substance thereof or materially changing the price to be paid in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed. This Contract shall in no way be invalidated by any such additions, deductions, or changes, and no claim by the Contractor shall be made for any loss of anticipated profits thereby.

Construction conditions may require that minor changes be made in the location and installation of the work and equipment to be furnished and other work to be performed hereunder, and the Contractor when ordered by the Engineer, shall make such adjustments and changes in said locations and work as may be necessary, without additional cost to the City, provided such adjustments and changes do not alter the character, quantity of cost of the work as a whole, and provided further that Plans and Specifications showing such adjustments and changes are furnished to the Contractor by the City within a reasonable time before any work involving such adjustment and changes is begun. The Engineer shall be the sole judge of what constitutes a minor change for which no additional compensation shall be allowed.

ARTICLE 7.02 EXTRA WORK

The City may at any time by a written order and without notice to the sureties require the performance of such extra work as it may find necessary or desirable. An order for extra work shall be valid only if issued in writing and signed by the Mayor and the work so ordered must be performed by the Contractor.

The amount of compensation to be paid to the Contractor for any extra work as so ordered shall be determined as follows:

(a)By such applicable unit prices, if any, as are set forth in the Proposal; or

(b)If no such unit prices are set forth then by a lump sum or other unit prices mutually agreed upon by the City and the Contractor; or

(c)If no such unit prices are set forth in the Proposal and if the parties cannot agree upon a lump sum or other unit prices then by the actual net cost in money to the Contractor of the extra work performed, which cost shall be determined as follows:

(1) For all labor and foreman in direct charge of the authorized operations, the Contractor shall receive the current local rate of wages to be agreed upon, in writing, before starting such work for each hour that said labor and foremen are actually engaged thereon, to which shall be added an amount equal to 25 percent of the sum thereof which shall be considered and accepted as full compensation for general supervision, FICA taxes, contributions under the Florida Unemployment Compensation Act, insurance, bond, subcontractor's profit and overhead, the furnishing of small tools and miscellaneous equipment used, such as picks, shovels, hand pumps, and similar items.

(2) For all materials used, the Contractor shall receive the actual cost of such materials delivered at the site or previously approved delivery point as established by original receipted bills. No percentage shall be added to this cost.

(3) For special equipment and machinery such as power-driven pumps, concrete mixers, trucks, and tractors, or other equipment, required for the economical performance of the authorized work, the Contractor shall receive payment based on the average local area rental price for each item of equipment and the actual time of its use on the work. No percentage shall be added to this sum.

(4) Records of extra work done under this procedure shall be reviewed at the end of each day by the Contractor or his representative and the Engineer. Duplicate copies of accepted records shall be made and signed by both Contractor or his representative and the Engineer, and one copy retained by each.

Request for payment for approved and duly authorized extra work shall be submitted in the same form as Contract work or in the case of work performed under paragraph (c) (1) above upon a certified statement supported by receipted bills. Such statement shall be submitted for the current Contract payment for the month in which the work was done.

ARTICLE 7.03 DISPUTED WORK

If the Contractor is of the opinion that any work required, necessitated, or ordered violates the terms and provisions of this Contract, he must promptly notify the Engineer, in writing, of his contentions with respect thereto and request a final determination thereof. If the Engineer determines that the work in question is Contract work and not extra work or that the order complained of is proper, he will direct the Contractor to proceed and the Contractor shall promptly comply. In order, however, to reserve his right to claim compensation for such work or damages resulting from such compliance, the Contractor must, within five (5) days after receiving notice of the Engineer's determination and direction, notify the City in writing that the work is being performed or that the determination and direction is being complied with under protest. Failure of the Contractor to notify shall be deemed as a waiver of claim for extra compensation or damages therefor.

Before final acceptance by the City, all matters of dispute must be adjusted to the mutual satisfaction of the parties thereto. Final determinations and decisions, in case any questions shall arise, shall constitute a condition precedent to the right of the Contractor to receive the money therefor until the matter in question has been adjusted.

ARTICLE 7.04 OMITTED WORK

The City may at any time by a written order and without notice to the sureties require the omission of such Contract work as it may find necessary or desirable.

An order for omission of work shall be valid only if signed by the Mayor and the work so ordered must be omitted by the Contractor. The amount by which the Contract price shall be reduced shall be determined as follows:

(a) By such applicable unit prices, if any, as are set forth in the Contract; or

(b) By the appropriate lump sum price set forth in the Contract; or

(c) By the fair and reasonable estimated cost to the City

of such omitted work as determined by the Engineer and approved by the City.

SECTION 8
CONTRACTOR'S EMPLOYEES

ARTICLE 8.01 CHARACTER AND COMPETENCY
The Contractor and his subcontractors shall employ upon all parts of the work herein contracted for only competent, skillful, and trustworthy workers. Should the Engineer at any time give notice, in writing, to the Contractor or his duly authorized representative on the work that any employee in his opinion is incompetent, unfaithful, disorderly, careless, unobservant of instructions, or in any way a detriment to the satisfactory progress of the work, such employee shall immediately be dismissed and not again allowed upon the site.

ARTICLE 8.02 SUPERINTENDENCE
The Contractor shall give his personal supervision to the faithful prosecution of the work and in case of his absence shall have a competent, experienced, and reliable supervisor or superintendent, acceptable to the Engineer on the site who shall follow without delay all instructions of the Engineer in the prosecution and completion of the work and every part thereof, in full authority to supply workers, material, and equipment immediately. He shall keep on hand at all times copies of the Contract Documents.

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES
The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination regarding race, creed, color, sex or national origin and must not maintain or provide facilities that are segregated on the basis of race, color, creed or national origin.

ARTICLE 8.04 RATES OF WAGES
On federally assisted projects, the rates of wages to be paid under this Contract shall not be less than the rates of wages set forth in Section 12 of this Agreement.

On other projects, no wage rate determination is included. Florida's Prevailing Wage Law (Section 215.19, Florida Statutes) was repealed effective April 25, 1979.

ARTICLE 8.05 PAYROLL REPORTS
The Contractor and each subcontractor shall, if requested to do so, furnish to the Engineer a duly certified copy of his payroll and also any other information required by the Engineer to satisfy him that the provisions of the law as to the hours of employment and rate of wages are being observed.

Payrolls shall be prepared in accordance with instructions furnished by the City and on approved forms. The Contractor shall not carry on his payroll any persons not employed by him. Subcontractor's employees shall be carried only on the payrolls of the employing subcontractor.

SECTION 9
CONTRACTOR'S DEFAULT

ARTICLE 9.01 CITY'S RIGHT AND NOTICE
It is mutually agreed that: (a) if the Contractor fails to begin work when required to do so, or (b) if at any time during the progress of the work it shall appear to the Engineer that the Contractor is not prosecuting the work with reasonable speed, or is delaying the work unreasonably and unnecessarily, or (c) if the force of workmen or quality or quantity of material furnished are not sufficient to insure completion of the work within the specified time and in accordance with the Specifications hereto attached, or (d) if the Contractor shall fail to make prompt payments for materials or labor or to subcontractors for work performed under the Contract, or (e) if legal proceedings have been instituted by others than the City in such manner as to interfere with the progress of the work and may subject the City to peril of litigation or outside claims of (f) if the Contractor shall be adjudged a bankrupt or make an assignment for the benefit of creditors, or (g) if in any proceeding instituted by or against the Contractor an order shall be made or entered granting an extension of time of payment, composition, adjustment, modification, settlement or satisfaction of his debts or liabilities, or (h) if a receiver or trustee shall be appointed for the Contractor or the Contractor's property, or (i) if the Contract or any part thereof shall be sublet without the consent of the City being first obtained in writing, or (j) if this Contract or any right, monies, or claim thereunder shall be assigned by the Contractor, otherwise than as herein specified, or (k) if the Contractor shall fail in any manner of substance to observe the provisions of this Contract, or (l) if any of the work, machinery, or equipment shall be defective, and shall not be replaced as herein provided, or (m) if the work to be done under this Contract shall be abandoned, then such fact or conditions shall be certified by the Engineer and thereupon the City without prejudice to any other rights or remedies of the City, shall have the right to declare the Contractor in default and so notify the Contractor by a written notice, setting forth the ground or grounds upon which such default is declared and the Contractor must discontinue the work, either as a portion of the work or the whole thereof, as directed.

ARTICLE 9.02 CONTRACTOR'S DUTY UPON DEFAULT
Upon receipt of notice that his Contract is in default, the Contractor shall immediately discontinue all further operations on the work or such part thereof, and shall immediately quit the site or such part thereof, leaving untouched all plant, materials, equipment, tools, and supplies.

ARTICLE 9.03 COMPLETION OF DEFAULTED WORK
The City, after declaring the Contractor in default, may then have the work completed or the defective equipment or machinery replaced or anything else done to complete the work in strict accordance with the Contract Documents by such means and in such manner, by Contract with or without public letting, or otherwise, as it may deem advisable,

utilizing for such purpose without additional cost to the City such of the Contractor's plant, materials, equipment, tools, and supplies remaining on the site, and also such subcontractors as it may deem advisable.

The City shall reimburse all parties, including itself, for the expense of such completion, including liquidated damages, if any, and the cost of reletting. The City shall deduct this expense from monies due or to become due to the Contractor under this Contract, or any part thereof, and in case such expense is more than the sum remaining unpaid of the original contract price, the Contractor and his sureties shall pay the amount of such deficiency to the City.

ARTICLE 9.04 PARTIAL DEFAULT
In case the City shall declare the Contractor in default as to a part of the work only, the Contractor shall discontinue such part, shall continue performing the remainder of the work in strict conformity with the terms of the Contract, and shall in no way hinder or interfere with any other contractor or person whom the City may engage to complete the work as to which the Contractor was declared in default.

SECTION 10
PAYMENTS

ARTICLE 10.01 PRICES
For the Contractor's complete performance of the work, the City will pay and the Contractor agrees to accept, subject to the terms and conditions hereof, the lump sum prices or unit prices in the Contractor's Proposal and the award made therein, plus the amount required to be paid for any extra work ordered under Article 7.02 hereof, less credit for any work omitted pursuant to Article 7.04 hereof. Under unit price items, the number of units actually required to complete the work under the Contract may be more than stated in the Proposal. The Contractor agrees that no claim will be made for any damages or for loss of profits because of a difference between the quantities of the various classes of work assumed and stated in the Proposal Form as a basis for comparing Proposals and the quantities of work actually performed.

The sum as awarded for any lump sum Contract or lump sum Contract Item shall represent payment in full for all of the various classes of work, including materials, equipment, and labor necessary or required to complete, in conformity with the Contract Document, the entire work shown, indicated or specified under the lump sum Contract or lump sum Contract Item.

The amount as awarded as a unit price for any unit price Contact Item shall represent payment in full for all the materials, equipment, and labor necessary to complete, in conformity with the Contract Documents, each unit of work shown, specified, or required under the said unit price Contract Item.

No payment other than the amount as awarded will be made for any class of work included in a lump sum Contract Item or a unit price Contract Item, unless specific provision is made therefor in the Contract Documents.

ARTICLE 10.02 SUBMISSION OF BID BREAKDOWN
Within fifteen (15) days after the execution of this Contract, the Contractor must submit to the Engineer in duplicate an acceptable breakdown of the lump sums and unit prices bid for items of the Contract, showing the various operations to be performed under the Contract, as described in the progress schedule required under Article 4.02 hereof, and the value of each of such operations, the total of such items to equal the total price bid. The Contractor shall also submit such other information relating to the bid prices as may be required and shall revise the bid breakdown as directed. Thereafter, the breakdown may be used for checking the Contractor's applications for partial payments hereunder but shall not be binding upon the City or the Engineer for any purpose whatsoever.

ARTICLE 10.03 REPORTS, RECORDS AND DATA
The Contractor shall furnish to the Engineer such schedules of quantities and costs, progress schedules, reports, invoices, delivery tickets, estimates, records, and other data as the Engineer may request concerning work performed or to be performed and the materials furnished under the Contract.

ARTICLE 10.04 PAYMENTS BY CONTRACTOR
The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which such services are rendered, (b) for all materials, tools, and equipment delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each subcontractor's interest therein; and proof of such payments or releases therefor shall be submitted to the Engineer upon request.

ARTICLE 10.05 PARTIAL PAYMENTS
On or about the first of each month, the Contractor shall make and certify an estimate, on forms prescribed by the City, of the amount and fair value of the work done, and may apply for partial payment therefor. The Contractor shall revise the estimate as the Engineer may direct. When satisfactory progress has been made, and shows that the value of the work completed since the last payment exceeds one percent (1%) of the total Contract price in amount, the Engineer will issue a certificate that such work has been completed and the value thereof. The City will then issue a voucher to the Contractor in accordance with the following schedule:

FOR CONTRACT AMOUNTS UNDER $250,000
(A)In the amount of ninety percent (90%) of the value of the work completed as certified until construction is one hundred percent (100%) complete (operational or beneficial occupancy), the withheld amount may be reduced below ten percent (10%), at the Engineer's option, to only that amount necessary to assure completion.

FOR CONTRACT AMOUNTS OVER $250,000

(A)In the amount of ninety percent (90%) of the value of the work completed as certified until construction is fifty percent (50%) complete.

(B)When the dollar value, as determined by the Engineer, of satisfactorily completed work in place is greater than fifty percent (50%) of the original contract price, vouchers for partial payment will be issued by the City to the Contractor in the amount of one hundred percent (100%) of the value of the work, above 50%, completed as certified for that payment period.

(C)If the Contractor has performed satisfactorily and the work is substantially complete (operational or beneficial occupancy) the withheld amount may be reduced, at the Engineer's option, to only that amount necessary to assure completion.

In addition to the Conditions set forth in (A), (B), and (C) above, payments will always be less any sums that may be retained or deducted by the City under the terms of any of the contract documents and less any sums that may be retained to cover monetary guarantees for equipment, materials or progress performance.

Payment on estimates made on or about the first of the month may be expected on or about the 20th of the month.

Unless specified otherwise in the Contract Items, the delivered cost of equipment and nonperishable materials suitably stored at the site of the work and tested for adequacy may be included in the Contractor's application for partial payment provided, however, that the Contractor shall furnish evidence satisfactory to the City that the Contractor is the unconditional owner and in possession of such materials or equipment. The amount to be paid will be 90 percent of the invoice cost to the Contractor which cost shall be supported by receipted bills within 30 days of the date of payment by the City to the Contractor. Such payment shall not relieve the Contractor from full responsibility for completion of the work and for protection of such materials and equipment until incorporated in the work in a permanent manner as required by the Contract Documents.

Before any payment will be made under this Contract, the Contractor and every subcontractor, if required, shall deliver to the Engineer a written, verified statement, in satisfactory form, showing in detail all amounts then due and unpaid by such Contractor or subcontractor to all laborers, workmen, and mechanics, employed by him under the Contract for the performance of the work at the site thereof, for daily or weekly wages, or to other persons for materials, equipment, or supplies delivered at the site of the work during the period covered by the payment under consideration.

ARTICLE 10.06 FINAL PAYMENT

Under determination of satisfactory completion of the work under this Contract as provided in Article 4.07 hereof, the Engineer will prepare the final estimate showing the value of the completed work. This estimate will be prepared within 30 days after the date of completion or as soon thereafter as the necessary measurements and computations can be made. All prior certificates and estimates, being approximate only, are subject to correction in the final estimate and payment.

When the final estimate has been prepared and certified by Engineer, he will submit to the Mayor and City Council the final certificate stating that the work has been completed and the amount based on the final estimate remaining due to the Contractor. The City will then accept the work as fully completed and will, not later than 30 days after the final acceptance, as defined in Article 1.02, of the work done under this Contract, pay the Contractor the entire amount so found due thereunder after deduction of all previous payments and all percentages and amounts to be kept and retained under provisions of this Contract; provided, however, and it is understood and agreed that, as a precedent to receiving final payment, the Contractor shall submit to the City a sworn affidavit that all bills for labor, service, materials, and subcontractors have been paid and that there are no suits pending in connection with this work. The City, at its option, may permit the Contractor to execute a separate surety bond in a form satisfactory to the City. The surety bond shall be in the full amount of the suit or suits.

Neither the final payment nor any part of the retained percentage shall be paid until the Contractor, if required, shall furnish the City with a complete release from any should remain unsatisfied after all payments are made, the Contractor shall refund to the City all monies which the City may be compelled to pay in discharging such claim, including incidental costs and attorney's fees.

ARTICLE 10.07 ACCEPTANCE OF FINAL PAYMENT

The acceptance by the Contractor, or by anyone claiming by or through him, of the final payment shall operate as and shall be a release to the City and every officer and agent thereof from any and all claims and liability to the Contractor for anything done or furnished in connection with the work or project and for any act or neglect of the Contractor or of any others relating to or affecting the work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or the Performance Bond.

SECTION 11
MISCELLANEOUS PROVISIONS

ARTICLE 11.01 CONTRACTOR'S WARRANTIES

In consideration of, and to induce the award of this contract to him, the Contractor represents and warrants:

(a)That he is not in arrears to the City upon debt or contract, and he is not a defaulter, as surety, contractor, or otherwise.

(b)That he is financially solvent and sufficiently experienced and competent to perform the work.

(c)That the work can be performed as called for by the Contract Documents.

(d)That the facts stated in his proposal and the information given by him are true and correct in all respects.

(e)That he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be

furnished for the completion of this Contract, and that his information was secured by personal investigation and research.

ARTICLE 11.02 PATENTED DEVICES, MATERIAL AND PROCESSES

It is mutually understood and agreed that Contract prices include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work. Whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify and save harmless the City, its officers, agents and employees from any and all claims for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract, and shall indemnify the said City, its officers, agents, and employees for any costs, expenses, and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

ARTICLE 11.03 SUITS AT LAW

In case any action at law or suit in equity may or shall be brought against the City or any of its officers, agents, or employees for or on account of the failure, omission, or neglect of the Contractor or his subcontractors, employees, or agents, to do or perform any of the covenants, acts, matters, or things by this Contract undertaken to be done or performed by the Contractor of his subcontractors, employees, or agents, or from any injuries done to property or persons and caused by the negligence or alleged negligence of the Contractor of his subcontractors, employees, or agents, or in any other manner arising out of the performance of this Contract, then the Contractor shall immediately assume and take charge of the defense of such actions or suits in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor, and the Contractor shall also indemnity and save harmless the City, its officers, agents, and employees from any and all loss, cost or damage whatever arising out of such actions or suits, in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor.

The Contractor shall and does hereby assume all liability for and agrees to indemnify the City or its Engineer against any or all loss, costs, damages, and liability for any or by reason of any lien, claims or demands, either for materials purchased or for work performed by laborers, mechanics, and others and from any damages, costs, actions, or causes of action and judgement arising from injuries sustained by mechanics, laborers, or other persons by reason of accidents or otherwise, whether caused by the carelessness or inefficiency or neglect of said Contractor, his subcontractors, agents, employees, workmen or otherwise.

ARTICLE 11.04 CLAIMS FOR DAMAGES

If the Contractor shall claim compensation for any damage sustained, other than for extra or disputed work covered by Article 7.02 and 7.03 hereof, by reason of any act or omission of the City, its agents, or any persons, he shall, within five days after sustaining such damage, make and deliver to the Engineer a written statement of the nature of the damage sustained and of the basis of the claim against the City. On or before the 15th of the month succeeding that in which any damage shall have been sustained, the Contractor shall make and deliver to the Engineer an itemized statement of the details and amounts of such damage, duly verified by the Contractor. Unless such statements shall be made delivered within the times aforesaid, it is stipulated that and all claims for such compensation shall be forfeited and invalidated, and the Contractor shall not be entitled to payment on account of such claims.

ARTICLE 11.05 NO CLAIMS AGAINST INDIVIDUALS

No claim whatsoever shall be made by the Contractor against any officer, agent, employee of the City for, or on account of, anything done or omitted to be done in connection with this Contract.

ARTICLE 11.06 LIABILITY UNAFFECTED

Nothing herein contained shall in any manner create any liability against the City on behalf of any claim for labor, services, or materials, or of subcontractors, and nothing herein contained shall affect the liability of the Contractor or his sureties to the City or to any workmen or materialsmen upon bond given in connection with this Contract.

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

Whenever there appears in this Agreement, or in the other Contact Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

ARTICLE 11.08 UNLAWFUL PROVISIONS DEEMED STRICKEN

If this contract contains any unlawful provisions not an essential part of the Contract and which shall not appear to have a controlling or material inducement to the making thereof, such provisions shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the Contract without affecting the binding force of the remainder.

ARTICLE 11.09 LEGAL PROVISIONS DEEMED INCLUDED

Each and every provision of any law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein and if, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon application of either party the Contract shall forthwith be physically amended to make such insertion.

ARTICLE 11.10 DEATH OR INCOMPETENCY OF CONTRACTOR

In the event of death or legal incompetency of a Contractor who shall be an individual or surviving member of a contracting firm, such death or adjudication of incompetency

shall not terminate the Contract, but shall act as default hereunder to the effect provided in Article 9.01 hereof and the estate of the Contractor and his surety shall remain liable hereunder to the same extent as though the Contractor had lived. Notice of default, as provided in Article 9.01 hereof, shall not be required to be given in the event of such death or adjudication of incompetency.

ARTICLE 11.11 NUMBER AND GENDER OF WORDS

Whenever the context so admits or requires, all references herein in one number shall be deemed extended to and including the other number, whether singular or plural, and the use of any gender shall be applicable to all genders.

ARTICLE 11.12 ACCESS TO RECORDS

Representatives of Federal Agencies, if applicable, and the State of Florida shall have access to the work whenever it is in preparation of progress. On federally assisted projects the Federal Agency, the Comptroller General of the United States, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcription thereof.

SECTION 12
LABOR STANDARDS

ARTICLE 12.01 LABOR STANDARDS

The Contractor shall comply with all of the regulations set forth in "Labor Standards Provisions for Federally Assisted Construction Contracts", which may be attached, and any applicable Florida Statutes.

ARTICLE 12.02 NOTICE TO LABOR UNIONS

If required, the Contractor shall provide Labor Unions and other organizations of workers, and shall post, in a conspicuous place available to employees or applicants for employment, a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers" attached to and made a part of this Agreement.

ARTICLE 12.03 SAFETY AND HEALTH REGULATIONS

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). Nothing in these Acts shall be construed to supersede or in any manner affect any worker's compensation law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment.

ARTICLE 12.04 EEO AFFIRMATIVE ACTION REQUIREMENTS

The Contractor understands and agrees to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under this Contract. The Contractor also agrees to similarly bind contractually each subcontractor. In policies, the Contractor agrees to engage in Affirmative Action directed at promoting and ensuring equal employment opportunity in the work force used under the Contract (and the Contractor agrees to require contractually the same effort of all subcontractors whose subcontractors exceed $100,000). The Contractor understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the Contract.

ARTICLE 12.05 PREVAILING RATES OF WAGES

Florida's prevailing wage law was repealed effective April 25, 1979.

For Federally assisted projects, appropriate prevailing wage rate determinations are indicated on pages beginning with WR-1.

* * * * * * *

IN WITNESS THEREOF, the parties have hereunto set their hands and seals, and such of them as are corporation have caused these present to be signed by their duly authorized officers.

CITY OF TAMPA, FLORIDA

_____
Bob Buckhorn, Mayor
(SEAL)

ATTEST:

_____
City Clerk

Approved as to Form:
The execution of this document was authorized by Resolution No. _____

_____
Justin R. Vaske, Assistant City Attorney

Contractor

By:_____
(SEAL)

Title:

ATTEST:

_____
Secretary

STATE OF)
) SS:
COUNTY OF)

For a Corporation:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 2015 by _____ of _____, a _____ corporation, on behalf of the corporation. He/she is ___ personally known or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

For an Individual:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 2015 by _____ who is ___ personally known to me or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

For a Firm:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 2015 by _____ who signed on behalf of the said firm. He/she is ___ personally known or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

_____

PUBLIC CONSTRUCTION BOND

Bond No. (enter bond number)_____

Name of Contractor:_____

Principal Business Address of Contractor:_____

_____

Telephone Number of Contractor:_____

Name of Surety (if more than one list each):_____

_____

Principal Business Address of Surety:_____

_____

Telephone Number of Surety:_____

Owner is The City of Tampa, Florida

Principal Business Address of Owner: 306 E Jackson St, Tampa, FL 33602

Contract Administration Department (280A4N)

Telephone Number of Owner: 813/274-8456

Contract Number Assigned by City to contract which is the subject of this bond:_____

Legal Description or Address of Property Improved or Contract Number is:_____

_____

_____

_____

General Description of Work and Services:_____

_____

_____

_____

KNOW ALL MEN BY THESE PRESENTS That we, _____

_____
(Name of Contractor)

as Principal, hereinafter called CONTRACTOR, of the State of _____, and

_____(Name of Surety)
a corporation organized and existing under and by virtue of the laws of the State of _____, and regularly authorized to do business in the State of Florida, as SURETY, are held and firmly bound unto the City of Tampa, a municipal corporation organized and existing under the laws of the State of Florida, hereinafter called Owner, in the penal sum of _____Dollars and _____Cents ($_____), lawful money of the United States of America, for the payment whereof well and truly to be made, we bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the contract dated _____, _____, 20___, between Principal and Owner for construction of _____, the contract being made a part of this bond by reference, in the time and in the manner prescribed in the contract; and

2. Promptly makes payments to all claimants, as defined in Section 255.05(1) (Section 713.01), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the work provided for in the contract; and

3. Pays Owner all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Principal under the contract; and

4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.

5. Contractor and Surety acknowledge that the Work for which this bond has been issued may be one of several such contract documents for a group of projects. This bond does not secure covenants to pay for or to perform design services survey or program management services. The Owner/Obligee is expected to reasonably account for damages that are caused to Owner with respect to Principal's (Contractor's) default in performance of the scope of the Work incorporated by reference into the bond, and notwithstanding any contractual or common law remedy permitted to Owner as against Contractor, the obligation of Surety for any damages under this bond shall be determined by the cost of completion of the Work less the contract balance unpaid upon default of Contractor for the Work plus liquidated damages at the rate of $500.00 per day for delays by the Contractor and/or Surety in reaching substantial completion.

6. The notice requirements for claimants and conditions for entitlement to payment set forth in Section 255.05, Fla. Stat. and the limitations period to actions upon Section 255.05, Fla. Stat. bonds apply to claimants seeking payment from surety under this bond. Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05, Florida Statutes.

7. The Surety, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the contract documents or other Work to be performed hereunder, or the specifications referred to therein shall in any way affect its obligations under this bond, and it does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to Work or to the specifications.

8. The above SURETY states that it has read all of the Contract Documents made by the CONTRACTOR with the CITY, hereto attached, and the terms and conditions of the contract and work, and is familiar therewith and in particular those portions of the Agreement concerning the guaranty of such CONTRACTOR for a period of one year following the date of the final acceptance of the completed work under the Contract by the CITY, all of which this BOND includes.

DATED ON _____, 20___

_____
(Name of Principal)

_____
(Principal Business Address)

By _____

Title _____

_____
Telephone Number of Principal

Countersignature:

_____
(Name of Local Agency)

_____
(Address of Resident Agent)

By _____

Title _____

_____
Telephone Number of Local Agency

_____
(Name of Surety)

_____
(Surety Address)

By _____
(As Attorney in Fact)*

_____
Telephone Number of Surety

Accepted by City of Tampa:

By _____
Bob Buckhorn, Mayor

Date: _____ 20____

Approved as to legal sufficiency:

By _____
Assistant City Attorney

Date: _____, 20____

*(As Attorney in Fact) attach Power of Attorney and Current Certificate with Original Signature

SPECIFICATIONS
GENERAL PROVISIONS

SECTION 1
SCOPE AND INTENT

G-1.01 DESCRIPTION
The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

G-1.02 WORK INCLUDED
The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits. 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.

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

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 plant and equipment, prior approval of the Engineer notwithstanding.

G-1.03 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES
Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, and all other appurtenances and facilities pertaining thereto whether owned or controlled by the City, other governmental bodies or privately owned by individuals, firms, or corporations, and used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work.

The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.

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 directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the City or other governmental body which are shown on the Plans to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefor.

Where public utility installations or structures owned or controlled by the City 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 paid for as extra work as provided for in Article 7.02 of the Agreement.

The Contractor shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.

All City and other governmental utility departments and other owners of public utilities, which may be affected by the work, will be informed in writing by the Engineer within two weeks after the execution of the Contract or Contracts covering the work. Such notice will set out, in general, and direct attention to, the responsibilities of the City and other governmental

utility departments and other owners of public utilities for such installations and structures as may be affected by the work and will be accompanied by one set of Plans and Specifications covering the work under such Contract or Contracts.

In addition to the general notice given by the Engineer, the Contractor shall give written notice to all City and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight (48) 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 "Underground Utility Notification Center for Excavators (Call Candy)".

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.

SECTION 2
PLANS AND SPECIFICATIONS

G-2.01 PLANS
The Plans referred to in the Contract Documents bear the general project name and number as shown in the Notice To Bidders.

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.

G-2.02 COPIES FURNISHED TO CONTRACTOR
After the Contract has been executed, the Contractor will be furnished with five sets of paper prints, the same size as the original drawings, of each sheet of the Plans and five copies of the Specifications. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

The Contractor shall furnish each of the subcontractors, manufacturers, and material suppliers such copies of the Contract Documents as may be required for his work.

G-2.03 SUPPLEMENTARY DRAWINGS
When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and five paper prints thereof will be given to the Contractor.

The Supplementary Drawings shall be binding upon the Contractor with the same force as the Plans. Where such Supplementary Drawings require either less or more than the estimated quantities of work, credit to the City or compensation therefor to the Contractor shall be subject to the terms of the Agreement.

G-2.04 CONTRACTOR TO CHECK PLANS AND DATA
The Contractor shall verify all dimensions, quantities, and details shown on the Plans, Supplementary Drawings, Schedules, Specifications, or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions as full instructions will be furnished by the Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

G-2.05 SPECIFICATIONS
The specifications consist of four parts, the General Provisions, the Technical Specifications, the Special Provisions and the Contract Items. The General Provisions and Technical Specifications contain general requirements which govern the work. The Special Provisions and the Contract Items modify and supplement these by detailed requirements for the work and shall always govern, whenever there appears to be conflict.

G-2.06 INTENT
All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

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

SECTION 3
WORKING DRAWINGS

G-3.01 SCOPE
The Contractor shall promptly prepare and submit layout, detail and shop drawings to insure proper construction, assembly, and installation of the work using those materials and methods as hereafter specified under the Technical Specifications, Special Provisions and Contract Items.

These drawings shall accurately and distinctly present the following:

a. All working and erection dimensions.
b. Arrangements and sectional views.
c. Necessary details, including complete information for making connections between work under this Contract and work under other Contracts.
d. Kinds of materials and finishes.
e. Parts listed and description thereof.

Drawings for mechanical equipment shall present, where applicable, such data as dimensions, weight and performance characteristics. These data shall show conformance with the performance characteristics and other criteria incorporated in the Plans and Specifications.

Each drawing shall be dated and shall contain the name of the project, Division number and description, the technical specifications section number, names of equipment or materials and the location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material. The Engineer will return unchecked any submittal which does not contain complete data on the work and full information on related matters.

Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.

The Contractor shall review all working drawing submittals before transmitting them to the Engineer to determine that they comply with requirements of the Specifications. Drawings which are incomplete or are not in compliance with the Contract Documents shall not be submitted for processing by the Engineer. The Contractor shall place his stamp of approval on all working drawings submitted to the Engineer to indicate compliance with the above.

G-3.02 APPROVAL
If the working drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of submittal; otherwise approval of such submittals shall not constitute approval of the departure. Approval of the drawings shall constitute approval of the subject matter thereof only and not of any structure, material, equipment, or apparatus shown or indicated.

The approval of drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract and not indicated on the drawings. No work called for by working drawings shall be done until such drawings have been approved by the Engineer.

The procedure in seeking approval of the working drawings shall be as follows:

1.The Contractor shall submit four complete sets of drawings and other descriptive data together with one copy of a letter of transmittal to the Engineer for approval. The letter of transmittal shall contain the name of the project, contract number, technical specifications section number, the name of the Contractor, a list of drawings with numbers and titles, and any other pertinent information.

2.Drawings or descriptive data will be stamped "Approved", "Approved Subject to Corrections Marked", or "Examined and Returned for Correction" and one copy with a letter of transmittal will be returned to the Contractor.

3.If a drawing or other data is stamped "Approved", the Contractor shall insert the date of approval on five additional copies of the document and transmit the five copies to the Engineer together with one copy of a letter of transmittal containing substantially the same information as described in Instruction 1. above.

4.If a drawing or other data is stamped "Approved Subject to Corrections Marked", the Contractor shall make the corrections indicated and proceed as in Instruction 3., above.

5.If a drawing or data is stamped "Examined and Returned for Correction", the Contractor shall make the necessary corrections and resubmit the documents as set forth in Instruction 1., above. The letter of transmittal shall indicate that this is a resubmittal.

The Contractor shall revise and resubmit the working drawings as required by the Engineer, until approval thereof is obtained.

SECTION 4
MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS
All materials, appliances, and types or methods of construction shall be in accordance with the Specifications and shall, in no event, be less than that necessary to conform to the requirements of any applicable laws, ordinances, and codes.

All materials and equipment shall be new, unused, and correctly designed. They shall be of standard first grade quality, produced by expert personnel, and intended for the use for which they are offered. Materials or equipment which, in the opinion of the Engineer, are inferior or of a lower grade than indicated, specified, or required will not be accepted.

The quality of Workmanship and Materials entering into the work under this Contract shall conform to the requirements of the pertinent sections, clauses, paragraphs, and sentences, both directly and indirectly applicable thereto, of that part of the Technical Specifications, whether or not direct reference to such occurs in the Contract Items.

Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA and other

generally accepted standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, and the like, shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

Equipment shall be of the approximate dimensions as indicated on the Plans or as specified, shall fit the spaces shown on the Plans with adequate clearances, and shall be capable of being handled through openings provided in the structure for this purpose. The equipment shall be of such design that piping and electrical connections, ductwork, and auxiliary equipment can be assembled and installed without causing major revisions to the location or arrangement of any of the facilities.

Machinery parts shall conform exactly to the dimensions shown on the working drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. All grease lubricating fittings on equipment shall be of a uniform type. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI and applicable state and local codes.

G-4.02 MANUFACTURER

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

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

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

G-4.03 REFERENCE TO STANDARDS

Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for proposals, even though reference has been made to an earlier standard, and such standards are made a part hereof to the extent which is indicated or intended.

Reference to a technical society, organization or body may be made in the Specifications by abbreviations, in accordance with the following list:

AASHTO for American Association of State Highway and Transportation Officials (formerly AASHO)
ACI for American Concrete Institute
AGMA for American Gear Manufacturer's Association
AFBMA for Anti-Friction Bearing Manufacturer's Association
AISC for American Institute of Steel Construction
AISI for American Iron and Steel Institute
ANSI for American National Standards Institute
ASCE for American Society of Civil Engineers
ASTM for American Society for Testing and Materials
ASME for American Society of Mechanical Engineers
AWS for American Welding Society
AWWA for American Water Works Association
AWPA for American Wood Preservers Association
CEMA for Conveyor Equipment Manufacturers Association
CIPRA for Cast Iron Pipe Research Association
IEEE for Institute of Electrical and Electronic Engineers
IPCEA for Insulated Power Cable Engineers Association
NEC for National Electrical Code
NEMA for National Electrical Manufacturers Association
SAE for Society of Automotive Engineers
SHBI for Steel Heating Boiler Institute
Fed.Spec. for Federal Specifications
Navy Spec. for Navy Department Specifications
U.L.,Inc. for Underwriters' Laboratories, Inc.

When no reference is made to a code, standard or specification, the Standard Specifications of the ANSI, the ASME, the ASTM, the IEEE, or the NEMA shall govern.

G-4.04 SAMPLES

The Contractor shall, when required, submit to the Engineer for approval typical samples of materials and equipment. The samples shall be properly identified by tags and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work, so that rejections thereof will not cause delay. A letter of transmittal, in duplicate, from the Contractor requesting approval must accompany all such samples.

G-4.05 EQUIVALENT QUALITY

Whenever, in the Contract Documents, an article, material, apparatus, equipment, or process is called for by trade name or by the name of a patentee, manufacturer, or dealer or by reference to catalogs of a manufacturer or dealer, it shall be understood as intending to mean and specify the article, material, apparatus, equipment or process designated, or any

equal thereto in quality, finish, design, efficiency, and durability and equally serviceable for the purposes for which it is intended.

Whenever material or equipment is submitted for approval as being equal to that specified, the decision as to whether or not such material or equipment is equal to that specified shall be made by the Engineer.

Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the designated material or equipment.

Neither the approval by the Engineer of alternate material or equipment as being equivalent to that specified nor the furnishing of the material or equipment specified, shall in any way relieve the Contractor of responsibility for failure of the material or equipment, due to faulty design, material, or workmanship, to perform the functions required of them by the Specifications.

G-4.06 DELIVERY
The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete thw work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid a delay in, or impediment of, the progress of the work of any related Contractor.

G-4.07 CARE AND PROTECTION
The Contractor shall be solely responsible for properly storing and protecting all materials, equipment, and work furnished under the Contract from the time such materials and equipment are delivered at the site of the work until final acceptance thereof. He shall, at all times, take necessary precautions to prevent injury or damage by water, freezing, or by inclemencies of the weather to such materials, equipment and work. All injury or damage to materials, equipment, or work resulting from any cause whatsoever shall be made good by the Contractor.

The Engineer shall, in all cases, determine the portion of the site to be used by the Contractor for storage, plant or for other purposes. If, however, it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the work or interference with the work to be done by any other Contractor, the Contractor shall remove and restack such materials at his own expense.

G-4.08 TOOLS AND ACCESSORIES
The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

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

G-4.09 INSTALLATION OF EQUIPMENT
The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

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

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

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

G-4.10 OPERATING INSTRUCTIONS
The Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation and care of all equipment installed hereunder, except for equipment that may be furnished by the City.

The Contractor shall also furnish and deliver to the Engineer three complete sets for permanent files, identified in accordance with Subsection G-3.01 hereof, of instructions, technical bulletins and any other printed matter, such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair, of the equipment installed and the ordering of spare parts, except for equipment that may be furnished by the City.

In addition to the above three copies, the Contractor shall furnish any additional copies that may be required for use during construction and start-up operations.

G-4.11 SERVICE OF MANUFACTURER'S ENGINEER
The Contract prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall 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 City, such engineer or superintendent shall make all adjustments and tests required by the Engineer to provide that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the City in the proper operation and maintenance of such equipment.

SECTION 5
INSPECTION AND TESTING

G-5.01 GENERAL
The Contractor's attention is hereby directed to Article 3.03 of the Agreement.

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

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

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 and equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the City.

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

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

G-5.02 COSTS
All inspection and testing of materials furnished under this Contract will be performed by the City or duly authorized inspection engineers or inspection bureaus without cost to the Contractor, unless otherwise expressly specified.

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

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

G-5.03 INSPECTIONS OF MATERIALS
The Contractor shall give notice, in writing to the Engineer, sufficiently 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 or 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 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.

G-5.04 CERTIFICATE OF MANUFACTURE
When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

G-5.05 SHOP TESTS OF OPERATING EQUIPMENT
Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.

Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.

The cost of the shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

G-5.06 PRELIMINARY FIELD TESTS
As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments, and replacements required.

G-5.07 FINAL FIELD TESTS
Upon completion of the work and prior to final payment, all equipment and appliances installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment, and instruments necessary for all acceptance tests, at no additional cost to the City.

G-5.08 FAILURE OF TESTS
Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor by replacements or otherwise. 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 those corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees or specified requirements, the City, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the City 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 City may, after the expiration of a period of thirty 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 this Contract.

The City agrees to obtain other equipment within a reasonable time and the Contractor agrees that the City may use the equipment furnished by him without rental or other charges until the new equipment is obtained.

Materials or work in place that fails to pass acceptability tests shall be retested at the direction of the construction engineer all such retests shall be at the Contractor's expense. The rates charged shall be in accordance with the Department of Public Works current annual inspection contract which is available for inspection at the offices of the Department of Public Works.

G-5.09 FINAL INSPECTION
The procedures for final inspection shall be in accordance with the provisions of Article 4.07 of the Agreement. During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all the 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 cosntructed in accordance with the requirements of the Contract Documents.

SECTION 6

TEMPORARY STRUCTURES

G-6.01 GENERAL
All false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the work and which are not herein described or specified in detail, must be furnished, maintained and removed by the Contractor, and he shall be responsible for the safety and efficiency of such works and for any damages that may result from their failure or from their improper construction, maintenance, or operation.

G-6.02 PUBLIC ACCESS
At all points in the work where public access to any building, house, place of business, public road, or sidewalk would be obstructed by any action of the Contractor in executing the work required by this Contract, the Contractor shall provide such temporary structure, bridges or roadway as may be necessary to maintain public access at all times. At least one lane for vehicular traffic shall be maintained in streets in which the Contractor is working. Street closure permits are required from the Department of Public Works.

The Contractor shall provide suitable temporary bridges, as directed by the Engineer, at street intersections when necessary for the maintenance of vehicular and pedestrian traffic.

Prior to temporarily cutting of access to driveways and garages, the Contractor shall give twelve (12) hours notice to affected property owners. Interruptions to use of private driveways shall be kept to a minimum.

G-6.03 CONTRACTOR'S FIELD OFFICE
The Contractor shall erect, furnish and maintain a field office with a telephone at the site during the entire period of construction. He or an authorized agent shall be present at this office at all times while his work is in progress. Readily accessible copies of both the Contract Documents and the latest approved working drawings shall be kept at this field office.

G-6.04 TEMPORARY FENCE
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.

G-6.05 RESPONSIBILITY FOR TEMPORARY STRUCTURES
In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance, or operation and will indemnify and save harmless the City from

all claims, suits or actions and damages or costs of every description arising by reason of failure to comply with the above provisions.

SECTION 7
TEMPORARY SERVICES

G-7.01 WATER
The Contractor shall provide the necessary water supply at his own expense. He shall, if necessary, provide and lay necessary waterlines from existing mains to the place of using, shall secure all necessary permits and pay for all taps to water mains or hydrants and for all water used at the established rates.

G-7.02 LIGHT AND POWER
The Contractor shall provide, at his own expense, temporary lighting and power facilities required for the proper prosecution and inspection of the work. If, in the opinion of the Engineer, these facilities are inadequate, the Contractor will not be permitted to proceed with any portion of the work affected thereby.

G-7.03 SANITARY REGULATIONS
The Contractor shall prohibit and prevent the committing of nuisances on the site of the work or on adjoining property and shall discharge any employee who violates this rule.

Ample washrooms and toilet facilities and a drinking water supply shall be furnished and maintained in strict conformity with the law by the Contractor for use by his employees.

G-7.04 ACCIDENT PREVENTION
Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building and construction codes shall be observed. The Contractor shall comply with the U. S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596), and under Section 107 of the Contract Work. Hours and Safety Standards Act (PL 91-54), except where state and local safety standards exceed the federal requirements and except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act.

G-7.05 FIRST AID
The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when men are employed on the work.

G-7.06 HEATING
The Contractor shall provide temporary heat, at his own expense, whenever required on account of work being carried on during cold weather and to prevent freezing of water pipes and other damage to the work.

SECTION 8
LINES AND GRADES

G-8.01 GENERAL
All work done under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

The Engineer will establish bench marks and base line controlling points. Reference remarks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

G-8.02 SURVEYS
The Contractor shall furnish and maintain, at his own expense, stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the Engineer for setting reference marks. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review of the Engineer.

The Contractor shall keep the Engineer informed a reasonable time in advance as to his need for line and grade reference marks, in order that they may be furnished and all necessary measurements made for record and payment with the minimum of inconvenience to the Engineer or of delay to the Contractor.

It is the intention not to delay the work for the establishment of reference marks but, when necessary, working operations shall be suspended for such reasonable time as the Engineer may require for this purpose.

G-8.03 SAFEGUARDING MARKS
The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

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

G-8.04 DATUM PLANE
All elevations indicated or specified refer to the Mean Sea Level Datum of the U.S.C. & G.S. (N.O.S.) which is 0.80 feet above the Mean Low Water Datum of the U. S. Army

Corps of Engineers.

SECTION 9
ADJACENT STRUCTURES AND LANDSCAPING

G-9.01 RESPONSIBILITY
The responsibility for removal, replacement, relocation, repair, rebuilding or protection of all public utility installations, including poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, sewers, traffic control and fire alarm signal circuit installations and other appurtenances and facilities shall be in accordance with G-1.02 and G-1.03.

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 payment will be made therefor. 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, removal or relocation and reconstruction is necessary to avoid interference with the work, payment therefor will be made as provided for extra work in Article 7.02 of the Agreement.

G-9.02 PROTECTION OF TREES
All trees and shrubs shall be adequately protected by the Contractor with boxes or otherwise and, within the City of Tampa, 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.

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.

The City may order the Contractor, for the convenience of the City, to remove trees along the line of trench excavation. If so ordered, the City will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

G-9.03 LAWN AREAS
Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in the Technical Specifications section.

G-9.04 RESTORATION OF FENCES
Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or Items, or if no specific Item is provided therefor, as part of the overhead cost of the work, and no additional payment will be made therefor.

SECTION 10
PROTECTION OF WORK AND PUBLIC

G-10.01 TRAFFIC REGULATIONS
The Contractor shall arrange his work to comply with Article G-6.02. The work shall be done with the least possible inconvenience to the public and to that end the work may be confined by the Engineer to one block at a time.

G-10.02 BARRIERS AND LIGHTS
During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers, and lights, as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public. Such barriers and signs shall be constructed to State of Florida Department of Transportation standards and placed as recommended by the Traffic Division of the City's Department of Public Works.

No open fires will be permitted.

G-10.03 SMOKE PREVENTIONS
The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production and emission of smoke will be required.

G-10.04 NOISE
The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline motors or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

Except in the event of an emergency, no work shall be done between the hours of 7:00 p.m. and 7:00 a.m., or on Sundays. If the proper and efficient prosecution of the work requires operations during the night, the written permission of the Engineer shall be obtained before starting such items of the work.

G-10.05 ACCESS TO PUBLIC SERVICES
Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

G-10.06 DUST PREVENTION
The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the streets sprinkled with water at all times.

G-10.07 PRIVATE PROPERTY
The Contractor shall so conduct the work that no equipment, material, or debris will be placed or allowed to fall upon private property in the vicinity of the work unless he shall have obtained the owner's written consent thereto and shall have shown this consent to the Engineer.

SECTION 11
SLEEVES AND INSERTS

G-11.01 COORDINATION
When the Contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors, and other like work in floors, roofs, or walls of buildings and structures, they shall be promptly installed in conformity with the construction program. The Contractor who erects the floors, roofs, and walls shall facilitate such work by fully cooperating with the Contractors responsible for installing such appurtenances. The Contractor responsible for installing such appurtenances shall arrange the work in strict conformity with the construction schedule and avoid interference with the work of other contractors.

G-11.02 OPENINGS TO BE PROVIDED
In the event timely delivery of sleeves and other materials cannot be made and to avoid delay, the affected Contractor may arrange to have boxes or other forms set at the locations where the appurtenances are to pass through or into the floors, roofs, walls, or other work. Upon the subsequent installation of these appurtenances, the Contractor erecting the structure shall fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in shall be borne by the Contractor or Contractors required to furnish the sleeves and inserts. Formed openings and later installation of sleeves will not be permitted at locations subject to hydrostatic pressure.

SECTION 12
CUTTING AND PATCHING

G-12.01 GENERAL
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.

SECTION 13
CLEANING

G-13.01 DURING CONSTRUCTION
During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris, and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

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

G-13.02 FINAL CLEANING
At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

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

SECTION 14
MISCELLANEOUS

G-14.01 PROTECTION AGAINST SILTATION AND BANK EROSION
The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed watercourses and drainage ditches.

G-14.02 EXISTING FACILITIES
The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Work shall be scheduled to minimize bypassing during construction. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

G-14.03 USE OF CHEMICALS
All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

* * * * * * *

SUPPLEMENTARY GENERAL PROVISIONS

1.0 GENERAL:

1.1 This Section sets forth modifications to the "General Provisions" of the Contract Documents which are referred to as Specifications, General Provisions.

1.2 Paragraph numbers and titles used herein refer to similarly numbered and titled articles in the General Provisions.

1.3 Only those paragraphs contained herein shall be assumed to be modified. Paragraphs not appearing herein shall apply as written in the General Provisions.

1.4 Any portion of the General Provisions, whether or not modified herein, may be further modified in Special Conditions and in the Instructions to Bidders of these Specifications.

1.5 Where the Supplementary General Provisions, Special Conditions and Instructions to Bidders conflict with the General Provisions, the Supplementary General Provisions, Special Conditions and the Instructions to Bidders shall take precedence.

2.0 MODIFICATIONS TO THE GENERAL PROVISIONS AS FOLLOWS:

2.1 SECTION 1 SCOPE AND INTENT

G-1.02 WORK INCLUDED

The first paragraph shall be deleted in its entirety and replaced by the following paragraph:

"The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. He shall obtain all required permits. 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 incidental thereto. He shall repair or restore all during performance of the work."

2.2 SECTION 3 WORKING DRAWINGS

a. Change to read as follows:

SECTION 3 SHOP DRAWINGS

b. Replace the existing paragraphs in their entirety with the following paragraphs:

G-3.01 SCOPE

Shop drawings, schedules, etc., shall be submitted to the Engineer and/or Architect in quadruplet, accompanied by a letter of transmittal. Subcontractors and suppliers shall submit shop drawings and make requests for approvals through their respective prime Contractors.

The drawings shall be numbered consecutively and shall accurately and distinctly present the following:

(1) Names of equipment or materials, and the locations at which the equipment or materials are to be installed in the work.

(2) All working and erection dimensions.

(3) Arrangement and sectional views.

(4) Necessary details, including complete information for making connections between work under this contract and work under other contracts.

(5) Kinds of materials and finishes.

(6) Parts list and description thereof.

The Engineer and/or Architect may decline to consider any shop drawing that does not contain complete data on the work and full information of related matters.

Fax submittals will not be reviewed.

G-3.02 APPROVAL:

Shop drawings shall be examined by the Contractor prior to his transmitting them to the Engineer and/or Architect. Shop drawings submitted to the Engineer and/or Architect shall bear the Contractor's stamp of approval evidencing that he has examined and checked each drawing and that he has found said drawings to be in accordance with the Contract requirements. Any drawings submitted without this stamp will not be considered by the Engineer and/or Architect and will be returned to the Contractor for re- submission.

If the shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of submittal and the following shall be submitted:

(1) Each request shall include a complete description of the proposed substitute and the name of the material or equipment for which it is to be substituted.

(2) Furnish drawings, cut, manufacturer's printed specifications, performance and test data and any other data or information necessary for a complete evaluation of both the item specified and the proposed substitute item.

Approval of the drawings shall constitute approval of the subject matter thereof only and not of any structure, material, equipment or apparatus shown or indicated.

Approval of the drawings shall be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the quantities of materials and equipment, nor for the proper fitting and construction of the work, nor for the furnishing of materials, tools, equipment, etc., required by this contract and not indicated on the drawings.

No work called for by Shop Drawings shall be done until the said drawings have been approved by the Engineer and/or Architect.

The Contractor shall revise and resubmit the shop drawings as required by the Engineer and/or Architect until approval thereof is obtained.

The City shall retain four (4) copies of all submittals unless the Engineers and/or Architect makes a specific request for additional copies.

Items	Submittals	*Approval
All trade	Fourteen (14) Days	Fourteen (14) Days

*From date of receipt of submittal.

Delays on account of tardy or untimely submittals will not be considered as causes of extension of time of the Contract or increases to the Contract Sum.

G-3.03 JOB SITE:

One (1) copy of all approved submittals SHALL BE available at the Contractor's Office at the job site.

2.3 SECTION 4 MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS

In the first paragraph, second line, delete the word "specifications" and substitute the words "Contract Documents".

G4.03 REFERENCE TO STANDARDS

The following paragraph shall be added in its entirety:

"Compliance with the Standard Building Code, latest edition, and all local electrical and plumbing codes shall be required. In the event of a conflict in code requirements, the most stringent code or standard shall apply."

G-4.05 EQUIVALENT QUALITY

Add the following sentence to paragraph two: "Any professional fees associated with shop drawing review of materials or equipment submitted for approval as equivalent to that specified shall be borne by the Contractor.

2.4 SECTION 5 INSPECTION AND TESTING

G-5.06 PRELIMINARY FIELD TESTS

G-5.07 FINAL FIELD TEST

A. Add the following sentence to BOTH of the above paragraphs:

The Contractor shall provide, at NO EXTRA COST to the City, ALL labor, tools, equipment, materials, etc., for the Engineer and/or Architect to make any field test that may be required in the judgment of the Engineer and/or Architect.

2.5 SECTION 6 TEMPORARY STRUCTURES

G-6.03 CONTRACTOR'S FIELD OFFICE

a. In the last sentence of this paragraph, add the following words: "...and Shop Drawings".

G-6.03 CONTRACTOR'S FIELD OFFICE

A. Delete this paragraph G-6.03 in its entirety.

2.6 SECTION 7 TEMPORARY SERVICES

G-7.01 WATER, G-7.02 LIGHT AND POWER, AND G-7.03 SANITARY REGULATIONS

The Contractor shall provide, at his own cost, water, electricity and washroom/toilet facilities for installation of this project. All water and electricity shall be applied and/or connected by the Contractor.

G-7.07 TELEPHONE

The Contractor shall furnish the Engineer with a telephone number(s) by which the Engineer may contact the site.

2.7 SECTION 14 MISCELLANEOUS

G-14.04 USE OF EXPLOSIVES:

Explosives will not be used on the work except when authorized by the Engineer and/or Architect. The use of same, if authorized, shall conform to laws or ordinances which may pertain to the use of same and the utmost care will be exercised by the Contractor so as not to endanger life or property. The Contractor will assume full responsibility in connection with use of any explosives even though authorized. Explosives will not be stored within the City limits.

G-14.05 OWNERSHIP OF MATERIALS:

The removal of any underground and surface structures as required shall be performed in a careful manner to permit salvaging of as much material, such as pipe and brick, also broken section of sidewalk, as practical for use in repair and maintenance of City-owned facilities.

Such acceptable salvaged material remains the property of the City and shall be placed in stock piles so as not to interfere with new construction work but accessible for loading and hauling by the City or by the Contractor within the free haul limit of six (6) miles. The Engineer and/or Architect shall direct the Contractor as to the location of stockpile.

The paving material, such as vitrified brick, asphalt block and other paving materials removed from the excavated areas and suitable for reuse but not reused in the work, shall also be considered the property of the City. The handling of such materials shall be as set forth elsewhere in the Specifications or Special Provisions.

G-14.06 NOTICE OR SERVICE THEREOF:

All notices, which shall include demands, instructions, requests, approvals and claims, shall be in writing.

Any notice to or demand upon the Contractor shall be sufficiently given if delivered to the office of the Contractor specified in the bid (or to such other office as the Contractor may, from time to time, designate to the City

in writing), or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered, with charges case addressed to such office.

All notices required to be delivered to the City shall, unless otherwise specified in writing to the Contractor, be delivered to Contract Administration Department – Construction Management Division, 3808 East 26th Avenue, Tampa, Florida 33605, and any notice to or demand upon the City shall be sufficiently given if delivered to the office of the said Engineer and/or Architect, or if deposited in the United States mail in a sealed, postage- prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to said Engineer and/or Architect or to such other representative of the City or to such other address as the City may subsequently specify in writing to the Contractor or to its representative at the construction site for such purposes.

Any such notice or demand shall be deemed to have been given or made as of the time of actual delivery or (in the case of mailing) when the same should have been received in due course of post or (in the case of telegram) at the time of actual receipt, as the case may be.

G-14.07 REQUIREMENTS FOR CONTROL OF THE WORK:

Prior to the start of the work included in this contract, a Preconstruction Conference will be held by the Engineer and/or Architect to be attended by the Contractor and representatives of the various utilities and others for the purpose of establishing a schedule of operations which will coordinate the work to be done under this contract with all related work to be done by others within the limits of the project. The Contractor shall be prepared for this meeting and shall present a comprehensive construction schedule for all items of work to be accomplished by him, which will be used as the basis for the development of an overall operational schedule and a list of subcontractors to be used on this work.

All items of work on this contract shall be coordinated so that progress on each related work item will be continuous from week to week. The progress of the work will be reviewed by the Engineer and/or Architect at the end of each week, and if the progress on any item of work during that week is found to be unsatisfactory, the Contractor shall be required to adjust the rate of progress on that item or other items as directed by the Engineer and/or Architect.

The Contractor shall conduct his operations in such a manner as will result in a minimum of inconvenience to occupants of adjacent homes and business establishments and shall provide temporary access as directed or as conditions in any particular location may require.

G-14.08 WORK DIRECTIVE CHANGE:

"A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, 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 the time for completion. "Without invalidating the Agreement, additions, deletions or revisions in the Work may, at any time or from time to time, be authorized by a Change Order or a Work Directive Change. Upon receipt of any such document, the Contractor shall promptly proceed with the work involved."

G-14.09 RESERVED PARKING SIGNS IN PARKING METER AREAS

The Contractor shall reimburse the Department of Public Works, Parking Division, located at 107 N. Franklin Street, Tampa, Florida 33602, for any and all metered parking spaces occupied or made unusable or unavailable as a result of, or because of, construction activity by the Contractor. Private automobiles may not be parked in any reserved space, unless clearly marked as associated with the project.

In order to receive temporary or permanent reserved signs in parking areas which are required by parking meters, there shall first be paid to the Parking Revenue Fund for the elimination of each such meter a charge based on the following schedules:

1. Meter Removal: The charge for removing a meter is ten (10) times the hourly meter fee, with a minimum charge of $12.50. Such charge will be assessed for each day a meter is removed, excluding Saturdays, Sundays, and City holidays.

2. Reservation of Parking Metered Spaces During Hours of City Parking Division Operation: The charge for reservation of a metered space is ten (10) times the hourly meter fee. Such charge will be assessed for each day a meter is reserved. The minimum total charge per rental agreement is $12.50.

3. Reservation of Parking Metered Spaces During Hours of City Parking Division Non- Operation: The charge for reservation of a metered space during hours of non-operation shall be $2.00. Such charge will be assessed for each day a meter is reserved. The minimum charge per rental agreement is $12.50.

4. Reservation of Parking Metered Spaces During Hours of City of Tampa Parking Division Operation and Non-Operation: Meter reservation periods, which include both operation and non-operational hours, shall be charged the operational rate.

In the event that an entire block or area of parking meters are reserved for a period of 90 days or longer, the Contractor may arrange a payment schedule with the Department of Public Works, Parking Division. Said payment schedule will be paid on a monthly basis after a deposit equivalent to the first and last month rental charges has been received by the Parking Division prior to commencement of construction.

Any meter or meters which may sustain damage due to construction activities in the immediate area must be removed. The meter removal/installation charge is $7.50 per meter. Failure to have a meter(s) removed will result in the Contractor being held liable for damage occurring to said meter(s) and further, the Contractor will be required to reimburse the Department of Public Works, Parking Division for meter(s) repaired or replaced.

G-14.10 EROSION AND SEDIMENT CONTROL:

During construction, the Contractor shall provide adequate erosion and sediment controls to prevent adverse effects to the environment and public and private property. He shall construct and maintain control structures necessary to prevent erosion and sediment. He shall conduct and schedule construction operations to avoid, prevent, and minimize erosion and sediment. He shall comply with City, County, State, and Federal codes, laws, and regulations and the plans and specifications for this project pertaining to erosion and sediment prevention and control.

At the Preconstruction Conference, the Contractor shall present a plan for erosion and sediment prevention and control. This plan shall include the operations methods, also temporary and permanent control measures and structures to be used on this project.

G-14.11 ENGINEER'S FIELD OFFICE:

Not Applicable.

G-14.12 PROJECT SIGNS:

The Contractor shall furnish and install, as directed by the Engineer and/or Architect, a project sign of design, size, color, etc., as per drawing page SIGN-1.

G-15.0 NOTIFICATION TO CONTRACTORS:

All Contractors working in City of Tampa buildings and facilities that contain ACM will be provided with a written notice, including contract custodial firms. The notice when applicable will advise Contractors about the possibility of encountering ACM while working for the City and will require Contractors to become familiar with locations of ACM within their work areas. The Contractor Notice shall include the name and phone number of the designated Building Asbestos Contact Person assigned to that building/facility. This notice is provided in Appendix C.

Appendix C

Contractor Notification Requirements

Asbestos-Containing Material (ACM) may be present in the facility. The presence of ACM does not necessarily mean that a hazard exists; however, a hazard may be created when ACM is disturbed and asbestos fibers become airborne. The best way to maintain a safe environment is to avoid the disturbance of ACM.

It is possible that you may encounter ACM while working in the facility. On the bulletin board, there is a summary of known locations of ACM in that building. The summary may or may not be all inclusive. Therefore, workers must exercise caution and be watchful for materials that might contain asbestos. Avoid disturbing ACM or suspected ACM as you carry out your work.

If your work necessitates the disturbance of ACM you shall take whatever precautions that are necessary to protect human health and the environment from asbestos fibers. At minimum, you will comply with all Federal, Sate, and Local responsible for assuring that you are medically certified, trained, and equipped with the proper personal protective devices for safe handling of ACM. You must notify the designated Building Asbestos Contact Person before disturbing any asbestos-containing materials in City-Owned buildings. The designated Building Asbestos Contract Person is listed on the bulletin board with the asbestos location summary.

If you need additional information regarding ACM in a particular building or would like to see a copy of the Operations and Maintenance Plan, contact the Building Asbestos Contact Person responsible for the building for which you will be working.

Comply with all regulatory requirements for removal and disposal.

SPECIAL CONDITIONS

1.0 PRECONSTRUCTION BRIEFING:

The Contractor, upon receiving notice that he has been awarded the contract for the construction of the project, shall make an appointment with the Engineer and/or Architect for said briefing. The Contractor shall bring to this meeting the following:

1. Contract Documents not yet submitted.
2. A detailed Job Progress Schedule.
3. Samples, questions, etc., he feels necessary.
4. List of subcontractors.

Failure to bring the above items to the meeting will result in cancellation of meeting. Once items have been submitted, meeting will be rescheduled by the City. Site access and commencement of work will not be allowed during period between meetings.

Contractor shall have representatives present at meeting that are familiar with, and conversant on, the scope of the work and Contract Document requirements. Failure to have such persons present will also result in cancellation and rescheduling of meeting until such a time when condition is corrected.

Elapsed time as a result of the Contractor's failure to comply with above will not result in an extension of contract time.

2.0 SITE REVIEW:

Before submitting Proposals, Bidders shall carefully examine the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and make all necessary investigations to inform themselves thoroughly as to the facilities for delivering, placing and operating the necessary construction equipment, and for delivering and handling materials at the site, and inform themselves thoroughly as to all difficulties involved in the completion of all the work in accordance with the Contract Documents.

The Contractor shall immediately, upon entering project site for the purpose of beginning work, review project site with the Engineer and/or Architect for the purpose of selecting area(s) to place materials for storage.

The Contractor must exercise proper precaution to verify all figures shown or indicated on the drawings, all existing trees, paved areas; utilities, etc., shall be located before beginning any work, and he shall be held responsible for any error resulting from his failure to exercise such precaution.

2.1 LAYING OUT WORK:

The Contractor shall locate all general reference points and take necessary action to prevent their destruction; lay out his own work and be responsible for all lines, elevations, measurements, grading, trenching, backfilling, utilities and other work to be executed by him for a complete project under this contract.

The Contractor shall lay out all work and have final approval by the Engineer and/or Architect before installation begins. Contractor shall be held responsible for any error resulting from his failure to exercise such approval. Said errors shall be corrected by the Contractor at NO EXTRA COST to the City.

The Contractor shall coordinate with the Parks Department and shall identify each and every tree to remain prior to the start of work. The specific trees to remain shall be approved by the Parks Department.

The final location of all work to be performed shall be made jointly by the Engineer and/or Architect and the Contractor at the project site.

3.0 SAFETY AND HEALTH STANDARDS:

The performance of all construction under this contract shall conform to ALL Local, State, Federal Occupation Safety and Health Act Standards.

At the end of each work day, all work areas shall be left in a safe condition. Barricades and/or warning devices shall be provided for at any open excavations or barriers on the project site.

The Contractor's attention is directed to paragraphs Article 3.07 (page A-10) and Article 12.03 (page A-31) of the Agreement, and paragraph G-7.04 (page G-18) of the General Provisions.

4.0 INFORMATION FOR COLOR SCHEDULES:

Not later than thirty (30) calendar days after authorization to proceed with contract work, the Contractor shall submit to the Engineer and/or Architect the names of all manufacturers and trade names for all materials involving selection based upon color or texture or other design appearance features which are to be used in this project. Where samples are necessary for such selection, furnish same.

If such information is not furnished by Contractor within thirty (30) day period, the Engineer and/or Architect will select colors and textures from products named in the Contract Documents.

5.0 RESPONSIBILITY OF CONTRACTOR:

The Contractor shall take all necessary precautions to protect all project surfaces and adjoining areas from mechanical damage from tools, equipment, materials, supports, etc., and shall provide adequate protection from leaking lubricants or fluids from his equipment.

Damage to said project surfaces and adjoining areas caused by a lack of protection or negligence by the Contractor shall be repaired and/or replaced at NO EXTRA COST to the City and to the full satisfaction of the Engineer and/or Architect.

The Contractor and all subcontractors are charged with the protection of the work and property, but the final responsibility for these provisions rests with the Contractor who shall take complete charge of the project site from start to finish of work.

The Contractor shall take particular precautions to protect existing trees and plant material. All trees and other plant material to remain shall be marked by the City prior to start of work.

Excavation, earthwork or sitework within the drip line of existing trees shall be done either manually or by methods approved by the City of Tampa Parks Department.

If the Contractor damages any tree or plant material in any way he shall be required to replace the damaged tree or plant material as follows:

1. Trees

   a. Replace a 6" caliper or less with a 6" caliper of the same species.

   b. Replace a 7"-10" caliper with two (2) 6" caliper of the same species.

c. Replace a 10"-15" caliper with three 6" caliper of the same species.

d. Replace a 16"-20" caliper with five (5) 6" caliper of the same species.

e. Replace a 21"-36" caliper with ten (10) 6" caliper of the same species.

2. Plant Material

Replace any damaged plant material with an equal size and quantity of the same material.

The replaced trees and plant material shall be guaranteed by the Contractor for a period of six (6) months.

6.0 COORDINATION WITH N.I.C. ITEMS:

The Contractor shall give to the Engineer and/or Architect, in writing, a time schedule for the installation or removal of all N.I.C. items at the beginning of the project. Failure of the Contractor to supply the Engineer and/or Architect with said schedule shall not be used for reason of time extension by the Contractor.

7.0 ELECTRICAL SERVICE LOCATION:

The Contractor shall verify and coordinate the service location with the local power company and the Engineer and/or Architect.

The Contractor shall coordinate with the local power company and shall include in his bid all costs for electrical service to work area(s) under this Contract, including but not limited to new service, connections from existing and/or new service and all required labor, equipment, materials etc. and all other associated electrical work.

8.0 SCHEDULING:

The Contractor shall provide the City with a detailed schedule prior to start of work.

The schedule shall be a fully developed, horizontal bar-chart type Contractor's construction schedule. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".

Unless otherwise directed or approved, prepare schedule on a single 8-1/2" X 14" sheet of plain bond white paper.

Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.

Contractor shall also prepare schedule in accordance with applicable portions of Section 4.02 of the Agreement.

9.0 ASSIGNMENT OF CONTRACT: Not applicable.

10.0 WORKMANSHIP AND MATERIALS:

Workmanship and materials shall be installed in accordance with accepted standards of the specific trade, as defined by the applicable recognized trade association(s). In the event of a conflict between these trade standards and the Contract Documents, the conflict shall be brought to the Engineer's and/or Architect's attention writing and the final decision shall be made by the Engineer and/or Architect.

11.0 RECORD DRAWINGS:

During the course of the work, Contractor shall maintain, at the site, a clean undamaged set of the Contract Documents. Contractor shall mark set, on a daily basis, with location and progress of all contract work, including but not limited to:

1. Sewer, water, stormwater and irrigation fabrication drawings showing to scale all manholes, all distances and angles between manholes, line dimension, grid co-ordinates, trunk lines, inverts and cleanouts,

2. Fencing, roadway, parking and sleeving,

3. Electrical service, and

4. General building location, and/or foundations, structures, etc.

Drawings shall be on site at all times and available for review by the City. Failure of Contractor to have drawings on site and/or up to date may result in suspension of work until situation is corrected. Extension of contract will not be granted for such condition.

At conclusion of work, the Contractor shall provide the City with one complete set of Electronic Record Drawings incorporating changes described above, and four marked hard copy sets of as-built record drawings clean and damaged free shall also be submitted to the City at the same time. Electronic files will be issued to the Contractor by the City of Tampa. These files will be AutoCAD DWG, AutoCAD DWF or Adobe PDF latest versions.

A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, but is evidence that the parties expect that the change directed or documented by an Authorization to Proceed with Extra Work letter 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 the time for completion.

12.0 ON SITE RECYCLABLE CRITERIA:

Contractor shall make reasonable attempts to recycle and/or salvage at least 50% of non-hazardous construction and demolition debris. Contractor shall develop and implement a Construction Waste Management Plan that identifies the materials that are to be diverted from disposal by weight or volume and be directed to a recycling facility. Specific area(s) on the construction site shall be designated for collection and tracking of the designated materials as needed. Location of the recycling area on site shall be coordinated with the project owner's representative on site prior to construction start. The intent of this section is to encourage recycling where practical in the context of the scope of work.

Contractor shall submit the following but not limited to items related to this section:

1. Provide a submittal of the contractor's plan of action to recycle

2. Contractor is required to document all activities with above requirements and provide to the city upon request items that are recyclable, documentation of the quantity of material disposed at a recycling facility.

END OF SPECIAL CONDITIONS

SPECIFIC PROVISIONS

SP-1.G Scope

The work included under these Contract Documents is described in the Proposal.

The Contractor shall furnish all labor, materials and equipment for the accomplishment of all work as described in the Specifications, as shown on the Plans and as directed by the Engineer in accordance with the obvious or expressed intent of the Contract.

SP-2.TP Permits

The Contractor shall have in his possession the proper license to perform the work before submittal of his bid and shall obtain any required City/County building permits and shall obtain and pay for all other licenses and authorizations required for the prosecution of the work, including the cost of all work performed in compliance with the terms and conditions of such permits, licenses and authorizations, whether by himself or others.

City permit fees will be paid by the City.

The Contractor shall require all subcontractors to be currently licensed by the City to perform the proposed work in their respective fields and to obtain permits for the execution of said work. All work shall be performed in accordance with the licenses, permits and the requirements of the current Building and Construction Regulations Chapter of the City of Tampa Code.

The Contractor is responsible to schedule and coordinate with the City Inspectional Services Division of the Department of Housing and Development Coordination all required inspections and tests for all phases of work to obtain final approval thereof.

The Contractor is encouraged to contact the City's Permitting Department and Building Inspections Bureau prior to commencement of work to ascertain their respective requirements.

SP-3 Environmental Protection

The Contractor will be held liable for the violation of any and all environmental regulations. Violation citations carry civil penalties and in the event of willful violation, criminal penalties. The fact that the permits are issued to the City does not relieve the Contractor in any way of his environmental obligations and responsibilities.

SP-4 Pre-Bid Site Access

Pre-Bid Site Access will be granted to all interested contractors that request authorization for this visit during the Pre-Bid Meeting.

SP-5 Working Drawings

Prior to performing any work requiring working drawings, as specified on the Plans and in the Workmanship and Materials Sections, the Contractor shall submit the working drawings in accordance with the General Provisions section headed "Working Drawings."

SP-6 Construction Start

Construction shall not begin prior to receipt by the City of the required permits. If issuance of the Notice to Proceed is delayed due to permit acquisition, the contract time will be extended to suit, but no extra payment will be made to the Contractor.

SP-7 Working hours

Normal working hours for this project will be from 7:00am to 3:30pm, Monday through Friday. If certain phases of the project require work outside of the normal hours, a minimum of 7-days notice must be provided to allow scheduling of City inspectors.

SP-8 Good neighbor practices

Contractor shall perform work in a manner to minimize noise, vibration, dust and debris. Radios or similar devices shall not be played during regular work hours (7 a.m. - 3:30 p.m., Monday through Friday).

Trash and debris shall be removed from the site by the Contractor on a regular basis.

Provide and install barricades, signage, etc. as needed to designate work areas, as well as protection for persons and existing materials to remain, in and adjacent to work areas. Maintain protections as needed throughout the course of the work.

Following each and every work session, leave site in clean and orderly fashion with site protections in place.

Failure to adhere to these practices and site conditions will be cause for work stoppage without additional Contract time.

SP-9 Coordination and Cooperation

In performing work under this Contract, the Contractor shall coordinate his work with that of any adjacent contractors for the City, and others, and cooperate with them in every reasonable way, to the end that there shall be the minimum practicable interference with mutual activities.

SP-10 Testing

The cost of all testing required shall be borne by the Contractor.

SP-11 Monthly Schedules

In addition to the In addition to the Progress Schedule required in Article 4.02 of the Agreement, the Contractor shall submit a monthly schedule with each pay estimate. Pay estimates will not be processed unless accompanied by an updated monthly schedule. The schedule shall be broken down into the following components:

- Procurement status
- Building Construction
- Pump and Vacuum Priming System installation
- Suction and Discharge piping installation
- Equipment testing and acceptance
- Restoration

SP-12 Material and Equipment Approval

The Contractor shall not enter into any subcontracts, or place any order, for the furnishing of any material or equipment until he has received the Engineer's written approval of the manufacturers.

SP-13 Contractor Emergency Response Time

The Contractor must be available to service emergency calls seven (7) days a week, twenty-four (24) hours a day. The response time for emergency calls shall be within two (2) hours. A contact person and telephone number shall be provided to the Engineer for such purposes.

SP-14 Contractor's Field Office

Delete Article G-6.03 Contractor's Field Office on Page G-14 from GENERAL PROVISIONS. The Contractor or an authorized agent shall be present at all times while his work is in progress. Readily accessible copies of both the contract documents and the latest approved working drawings shall be kept at the job site.

SP-15 Sequence of Operations

The Contractor shall develop with the Engineer a complete schedule of operations which, in the opinion of the Engineer, will permit use of the facility at the earliest possible date.

Taking over of parts of the work for operation before completion of the entire project shall not relieve the Contractor of any responsibility for proper integrated operations of all parts of the work, nor shall it act to relieve him of any responsibilities under Article A-6.04 of the Agreement, for guaranty of all parts of the work, for one year after the date of acceptance of all the work on the project.

SP-16 Temporary Work Stoppages

Prior to temporary work stoppages, all streets shall be restored to permit access to all businesses and residences and to allow ingress and egress by local traffic only. The Contractor shall maintain all streets at this condition level for the duration of the shutdown period.

All equipment, except that used for excavation and well pointing, and all materials including, but not limited to, manhole structures, pipe, and stockpiled material shall be removed to either the Contractor's storage lot or to a location outside the project area as approved by the Engineer.

SP-17 Project Photographs

The Contractor will not be required to furnish photographs of the project; however, the Engineer may or may not take photographs of the area immediately prior to and after completion of the construction for record and information. To assure that there will not be any conflict with this photography, the Contractor shall not perform clearing operations or action which will disturb any street or area within the project until the Engineer has been advised thereof and has had adequate opportunity to perform the desired photography.

SP-18 Record Drawings

During the course of the work, Contractor shall maintain, at the site, a clean undamaged set of the Contract Documents. Contractor shall mark set, on a daily basis, with location and progress of all contract work.

Drawings shall be on site at all times and available for review by the City. Failure of Contractor to have drawings on site and/or up to date may result in suspension of work until situation is corrected. Extension of contract will not be granted for such condition.

At conclusion of work, the Contractor shall provide the City with one complete set of Electronic Record Drawings incorporating all changes, and four marked hard copy sets of as-built record drawings clean and damaged free shall also be submitted to the City at the same time. Electronic files will be issued to the Contractor by the City of Tampa. These files will be AutoCAD DWG, AutoCAD DWF or Adobe PDF latest versions.

SP-19 Disposal of Debris

The Contractor shall be solely responsible for removal and proper disposal of debris to locations off of the project site.

SP-20 City Testing

The cost of retesting materials and/or workmanship, which has been initially tested by the City and found to be unacceptable, is to be borne by the Contractor.

SP-21 Electrical Work

Where definite requirements are not set forth in the Specifications, all electrical equipment, materials, and work under this Division shall comply with the requirements of the Occupational Safety and Health Act (OSHA) and shall be in accordance with applicable ANSI, IEEE, IPCEA, and NEMA standards. The work shall be performed in compliance with the latest issue of the NEC, all applicable state and municipal regulations and codes, and the service rules of the Tampa Electric Company, unless otherwise specified or directed. All equipment and materials shall be listed and labeled as complying with the requirements of a Southern Building Code Congress International (SBCCI) recognized testing laboratory for the particular applications wherever available.

Where listing is not available for the device as a whole, refer to the provision entitled "Electrical Equipment Certification" for submittal requirements.

SP-22 Operation and Maintenance Manual, Submittals / Request for Information / Shop Drawings, and Asset Tracking Form

Operation and Maintenance Manuals

The Contractor shall prepare and submit to the Engineer four (4) hardcopies and one (1) high resolution color, bookmarked, and unsecured electronic post document format (PDF) of an Operation and Maintenance Manual for all equipment and associated control systems furnished and installed under this Contract. Black and white copies will not be accepted. When the work reaches 75 to 80 percent completion, the Contractor shall

submit to the Engineer for approval one (1) PDF electronic copy of the manual with all specified material that is available at that time. The submittal shall accompany the Contractor's partial payment request for the specified completion. Within 30 days after approval of the Engineer of the PDF submittal, the Contractor shall furnish to the Engineer four (4) hardcopies of the manual. Appropriate space shall be left in the manual for material not available at the time of submittal. All missing material for the manual shall be submitted with the request for final payment.

Also along with the missing material submitted with the request for final payment, one electronic copy (in pdf format) complete with all the missing material to be included in the earlier submitted hard copies shall be submitted. The manual shall be prepared and arranged as follows:

1. Space shall be provided in the manual for a reduced set of record Contract Drawings, size approximately 11 by 17 inches and folded to 8-1/2 by 11 inches. Drawings will be furnished by the Engineer.

2. One copy of all approved shop drawings and diagrams for all equipment furnished. The shop drawings and diagrams shall be reduced to either 8-1/2 by 11 inches or to 11 inches in the vertical dimension and as near as practicable to 17 inches in the horizontal dimension. Such sheets shall be folded to 8-1/2 by 11 inches.

3. One copy of manufacturer's operating, lubrication and maintenance instructions for all equipment and controls furnished. All equipment operating, lubrication and maintenance instruction and procedures shall be furnished on 8-1/2 by 11 inch commercially printed or typed forms. Such forms shall include equipment name, serial number and other identifying references.

4. One copy of manufacturer's spare parts list for all equipment furnished and prepared as specified in No. 3 above.

5. One valve schedule, giving the valve number, location, fluid and fluid destination for each valve installed and prepared as specified in No. 3 above. All valves in the same piping system shall be grouped together in the schedule. A sample of the valve numbering system to be used will be furnished by the Engineer. Valve numbers may include three or four numerals and a letter.

6. List of electrical relay settings and control and alarm contact settings.

Each copy of the manual shall be assembled in one or more binders, each with title page, typed table of contents, and heavy section dividers with copper reinforced holes and numbered plastic index tabs. Each manual shall be divided into sections headed by the equipment specification section included in "Workmanship and Materials." Binders shall be 3-ring hard-back. All data shall be punched for binding and composition and printing shall be arranged so that punching does not obliterate any data. The cover and binding edge of each manual shall have the project title, Division designation and manual title printed thereon, all as furnished and approved by the Engineer.

Where more than one binder is required, they shall be labeled Vol. 1, Vol. 2, and so on. The table of contents for the entire set, identified by volume number, shall appear in each binder.

The four (4) hardcopies of the manuals and data included therein shall be provided in conformance with the subsection headed "Working Drawings" and, in addition, to the requirements of the General Provisions. The costs of the Operation and Maintenance Manual shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

Submittals / Request for Information / Shop Drawings

Contractor shall prepare and submit up to four (4) hardcopies and one (1) bookmarked, unsecured electronic post document format (PDF) file for all Submittals, RFI, and Shop Drawings. Each electronic submission must be in a high resolution color format and shall be original electronic documents from the manufacturer. Hardcopies shall be high quality printed in color. Scanned printouts or poor quality resolution PDF files will not be accepted.

Asset Tracking Form

The Asset Tracking Form (ATF) is a general spreadsheet that is intended to begin tracking assets and their respective preventative maintenance at an early stage in the project. An ATF shall be prepared and submitted by Contractor (in electronic format) during two phases of the project. The first phase ATF shall be submitted after procurement of each piece of equipment and will include general information and specifications on the equipment such as, but not limited to, model, voltage, amperage, horsepower, material, and preventative maintenance tasks. The second ATF submission shall accompany the final submission of the Operation and Maintenance Manuals. Information included during this submission will include specific information on the equipment such as, but not limited to, serial numbers, equipment number, location, runtime hours, etc.

The City of Tampa will provide a blank electronic copy of the ATF in Microsoft Office 2007. Any submission must be in the same format.

SP-23 Work Directive Change

A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, but is evidence that the parties expect that the change directed or documented by an Authorization to Proceed with Extra Work letter 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 the time for completion.

Without invalidating the Agreement, additions, deletions or revisions in the work may, at any time or from time to time, be authorized by a Change Order or a Work Directive Change. Upon receipt of any such document, the Contractor shall promptly proceed with the work involved.

SP-24 Services of Manufacturers' Representatives

The services of manufacturers' representatives shall be provided on the site as required for the supervision of installation, the adjustment and placing in satisfactory trouble-free operation of such equipment, and instructing City personnel in the operation and maintenance of such equipment for which such specialized services are specified, directed, or required.

Such manufacturers' services shall be of sufficient time and include a minimum period of one 8-hour day for instruction of City personnel. Additional time shall be provided if necessary.

The cost of all services of manufacturers' representatives shall be included in the various Contract Unit Price Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-25 Identification

The Contractor shall provide a Photo I.D. card for each employee. Each Photo I.D. card shall be encapsulated in plastic and be provided with a clip for fastening to each employee's apparel. Each Photo I.D. card shall be approximately 2 inches by 3 inches in size and shall include the following:

1. Employee photograph mounted on the left half of the card.

2. Name of employee and name of Contractor located on the right half of the card.

Each employee shall display the Photo I.D, card on outer apparel at all times when on the plant site.

Any person found on the site without the required Photo I.D. card will be directed to leave the site immediately.

The cost of Photo I.D. cards shall be included in the various Contract Unit Price Items, or in the total

Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-26 Piping and Equipment Identification

All piping and equipment shall be identified as follows:

1. All painted piping and equipment shall be color coded. Such coding on pipelines shall include painted or plastic tape banding at 10-foot intervals. The Engineer will select the colors. Underground pipelines with plastic tape wrapping shall be wrapped with colored tape and include additional colored bands as directed.

   Polyethylene or hot bituminous wrapped underground pipelines shall have plastic tape bands. Polyethylene wrapping for ductile iron sewage or force main piping shall be green. Tape bands shall be placed at 10-foot intervals and all colors shall be selected by the Engineer.

2. All equipment and slide gates shall have an identification nameplate. The nameplates shall be of Type 304 stainless steel, No. 6 finish, not less than No. 16 gauge with indented stamped lettering. Nameplates shall be attached to equipment bases in accessible locations. Nameplates shall be fastened, in a permanent manner arranged not to damage equipment, with not less than four stainless steel fasteners. All nameplates shall be of the same size (approximately 3- by 8-inch) and shall conform to the following standard sample:

Sewage Pump	(Name of item)
SC-P-1	(General type of designation, final list furnished by Engineer) (12 digit number) (Furnished by Engineer)

   Lettering shall be block style in size and spacing to suit the nameplate. A sample nameplate including fastenings shall be submitted to the Engineer for approval prior to manufacture of any of the nameplates. Stainless steel identification nameplates shall not be painted.

3. Piping shall be identified with a designation and directional flow arrow. The designation will be furnished by the Engineer. The designation will comprise a maximum of 20 letters. The designations and flow arrows shall be painted on after completion of color coding using suitable stencils and colors. Designations and

flow arrows shall be arranged to be clearly in view from the normal operating or access space all as directed and approved by the Engineer. Designations and flow arrows shall be located along straight runs at intervals of not more than 50 feet, near valves, branches and junction points, and where pipes pass through walls or ceilings. Underground piping wrapped with polyethylene shall be provided with colored material selected by the Engineer.

The cost of piping and equipment identification shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-27.TP Use of Site for Storage and Field Office

Space, on the site, for storage and field office for the Contractor shall be as directed by the Engineer. Any structures or facilities needed for storage or field office shall be constructed by the Contractor at his own expense and no separate payment will be made therefor. All security requirements for such facilities shall be provided and maintained by the Contractor.

Upon completion of the work, and as directed, the Contractor shall clean up the areas, remove any temporary facilities and finish grade as necessary, all as approved.

SP-28 Protection of Existing Building

The Contractor shall protect the existing buildings as indicated on the Plans. The Contractor shall hire a certified testing company to monitor vibration levels at buildings while construction takes place in the vicinity.

All costs associated with protection of the facilities and vibration monitoring services shall be included in the price of the work to which they are incidental.

SP-29.TP As-Built Plans

During manufacture and construction, installation and testing, records shall be kept of any changes or adjustments made in the work. All such changes shall be incorporated in the "As-Built" plans, shown in red.

The Contractor shall provide the City of Tampa with one (1) hardcopy and (1) electronic high resolution color PDF copy of "As-Built" plans. Plan sheets shall have all deviations from original design annotated in red pencil to clearly show as-built conditions. Relocation of existing facilities and utilities must be clearly noted.

All as-built plans shall be submitted within seven (7) calendar days of the final inspection. The final payment will not be issued until the as-built plans have been submitted to, and accepted by the City. Upon request the City will provide AutoCAD drawings.

SP-30 Safety:

A.Responsibility: Employees shall immediately report any unsafe work practice or unsafe condition to their supervisor(s). The Contractor is solely responsible for the safety of their workers, and shall comply with all applicable requirements [i.e.: 29 CFR 1910 -Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction, etc] and industry safety standards while at the work site. The fact that City personnel may bring un-safe conditions to the attention of any member of the Contractors work force does not relieve the Contractor of this responsibility.

Suggest, all Contractors employees and sub-contractors be given a copy of SP-30.

The Contractor shall have a designated Safety Officer within his organization. At the Pre-Construction meeting, the Contractor shall provide the name and contact information of the Safety Officer to the Engineer.

At the Pre-Construction meeting, the Contractor will be given pertinent safety related information, necessary forms and instructions (i.e.: AWTP Lockout/Tagout Procedures, AWTP Hot Work Permits, etc) that pertain to any work that might be utilized during the contract. The Contractor shall be responsible to disseminate that information to their employees and sub-contractors. Special care shall be taken by the Contractor to ensure that any new employee or sub-contractor to the work site shall be briefed on these safety instructions.

If warranted by the project and directed by the Engineer, the Contractor shall develop and implement a comprehensive health and safety plan for their employees that will cover all aspects of onsite construction operations and activities associated with the contract. This plan must comply with all applicable health and safety regulations and any project specific requirements that the contract has specified.

B.Incident Reporting: All accidents that result in personal injury, illness or property damage shall be immediately reported and investigated, regardless of the extent of injury, illness or property damage. Employees must report accidents within one hour (or as soon as practical) from the time of occurrence to their immediate supervisor who in turn will report it to the City's inspector. The City inspector will record the incident in their daily report and report it to the Risk Management Division (274-5708).

C.Air-Borne Debris: All personnel in close proximity to drilling, sawing, sanding, scraping, spraying, power-washing or other work being done, either in enclosed spaces or in the open, that creates dust or air-borne debris shall wear eye protection [29 CFR 1910.133] and a respirator [29 CFR 1910.134].

D.Hot Work: All welding, soldering, brazing, acetylene cutting or any other work at the AWTP or any pump station; that produces high temperatures shall require a AWTP "Hot Work Permit" and may require one or more fire watches. The number and location of fire watches (if any) shall be a condition of the Hot Work Permit. A current, portable, fully charged fire extinguisher shall be located with each person performing hot work and each fire watch. The Hot Work Permit shall be signed off by the appropriate personnel and maintained in the project file.

E.Confined Spaces: OSHA defines a confined space as having limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. Confined spaces include, but are not limited to: vaults, tanks, manholes, wet-wells, pipelines, utility tunnels, etc.

The Contractor shall take measures [29 CFR 1910.146 (c)(5)] to ensure that atmospheric conditions in confined spaces are not hazardous to occupants. This can be accomplished by forcing a sufficient amount of clean air through the confined space and testing the atmosphere by using a portable certified, calibrated, atmosphere monitor that meets OSHA requirements [29 CFR 1910.146(c)(5)(ii)(C)]. The atmosphere monitor should record oxygen content, flammable gases and vapors and toxic air contaminants, such as the Industrial Scientific TMX-412.

F.Lockout / Tagout Policy: The AWTP Lockout / Tagout program is designed to set standards to help safeguard all employees from hazardous electrical or mechanical energy while they are performing service or maintenance on machines and equipment at the AWTP or any pump station. This program will also identify the practices and procedures to shut down and Lockout or Tagout machines and equipment. The Contractor shall be given a copy of the AWTP "LOCKOUT / TAGOUT

POLICY AND PROCEDURES" instruction and shall make all of his employees and sub-contractors aware of this program.

No padlock (lockout) shall be removed except by the individual that installed it or if not available, by a City of Tampa AWTP team leader.

No tag (tagout) shall be removed except by the individual that installed it or if not available, by a City of Tampa AWTP team leader, except in an Emergency and the tag states "Do Not Use Unless in an Emergency". In that event, the Contractor shall notify the City of Tampa AWTP team leader, who will prepare the necessary follow up report.

G.Trench Safety: Any excavation deeper than four (4) feet shall adhere to the requirements contained in 29 CFR 1926.650 thru 652 and the Florida Trench Safety Act [Florida Statutes, ss 553.60 - 553.64].

H.Open Flames: No fires shall be allowed. No open flames necessary for any construction activity shall ever be left un-attended. A current, portable, fully charged fire extinguisher shall be located with each activity requiring an open flame.

I.Sparks: Any activity lasting more than 10 continuous minutes, that creates sparks, such as grinding or chipping shall have a dedicated fire watch in attendance. A current, portable, fully charged fire extinguisher shall be located with each activity creating sparks, regardless if a fire watch is required or not.

J.First Aid: The Contractor shall furnish appropriate First Aid Kits [29 CFR 1910.151] and shall be responsible to ensure his employees are properly trained to render first aid. If injurious corrosive materials are to be utilized, eye wash and body wash facilities must be provided in the immediate area.

K.Related Costs: All costs associated with these or any safety measures shall be included in the total lump sum contract price or the various contract item unit prices, as applicable, and no separate payment shall be made thereof.

SP-31 TECO Allowance

As indicated in Section 012900, include in the total bid price an allowance of $50,000 for all Cost in Aid to Construction (CIAC) for coordination with TECO.

SP-32 Brighthouse Networks Allowance - As indicated in Section 012900, include in the total Bid Price an allowance of $20,000 for all coordination with Brighthouse Networks.

SP-33 Water Allowance - As indicated in Section 012900, include in the total Bid Price an allowance of $1,000 for payment of Water Department commitment letter fees.

SP-34 Wastewater Allowance - As indicated in Section 012900, include in the total Bid Price an allowance of $1,000 for payment of Wastewater Department commitment letter fees.

SP-35 Permit Allowance

As indicated in Section 012900, Include in the total bid price an allowance of $10,000 for reimbursement of payment of permit fees required, as authorized by OWNER.

SP-36 Contingent Items

As directed by the Engineer, and as indicated in Section 012900, this item is to allow payment for unforeseen circumstances during construction. The contingency will also allow payment for minor unforeseen circumstances not mentioned in the specifications.

The upset limit for contingency allowance is $100,000 and shall be included in the base bid.

END OF SECTION

City of Tampa – DMI Sub-(Contractors/Consultants/Suppliers) Payments

(FORM MBD-30)

[ ] Partial [ ] Final

Contract No.: _____ WO#,(if any):_____ Contract Name:_____

Contractor Name:_____ Address:_____

Federal ID:_____ Phone:_____ Fax:_____ Email:_____

GC Pay Period:_____ Payment Request/Invoice Number:_____ City Department:_____

Total Amount Requested for pay period: $_____ Total Contract Amount(including change orders):$_____

-Type of Ownership - (F=Female M=Male), BF BM = African Am., HF HM = Hispanic Am., AF AM = Asian Am., NF NM = Native Am., CF CM = Caucasian S = SLBE

Type Trade/Work Activity []Sub []Supplier Federal ID	Company Name Address Phone & Fax	Total Sub Contract Or PO Amount	Amount Paid To Date Amount Pending Previously Reported	Amount To Be Paid For This Period Sub Pay Period Ending Date
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$

(Modifying This Form or Failure to Complete and Sign May Result in Non-Compliance)

Certification: I hereby certify that the above information is a true and accurate account of payments to sub – contractors/consultants on this contract.

Signed:_____ Name/Title:_____ Date:_____

Note: Detailed Instructions for completing this form are on the next page

Page 2 of 2 – DMI Payment

Instructions for completing The DMI Sub-(Contractors/Consultants/ Suppliers) Payment Form (Form MBD-30)

This form must be submitted with all invoicing or payment requests where there has been subcontracting rendered for the pay period. If applicable, after payment has been made to the subcontractor, "Waiver and Release of Lien upon Progress Payment", "Affidavit of Contractor in Connection with Final Payment", or an affidavit of payment must be submitted with the amount paid for the pay period. The following will detail what data is required for this form. The instructions that follow correspond to the headings on the form required to be completed. **(Modifying or omitted information from this form my result in non-compliance).**

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **W.O.#** If the report covers a work order number (W.O.#) for the contract, please indicate it in that space.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business.
- **Address.** The physical address of your business.
- **Federal ID.** A number assigned to a business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **Pay Period.** Provide start and finish dates for pay period. (e.g. 05/01/13 – 05/31/13)
- **Payment Request/Invoice Number.** Provide sequence number for payment requests. (ex. Payment one, write 1 in space, payment three, write 3 in space provided.)
- **City Department**. The City of Tampa department to which the contract pertains.
- **Total Amount Requested for pay period.** Provide all dollars you are expecting to receive for the pay period.
- **Total Contract Amount (including change orders).** Provide expected total contract amount. This includes any change orders that may increase or decrease the original contract amount.
- **Signed/Name/Title/Date**. This is your certification that the information provided on the form is accurate.
- **See attached documents.** Check if you have provided any additional documentation relating to the payment data. Located at the bottom middle of the form.
- **Partial Payment.** Check if the payment period is a partial payment, not a final payment. Located at the top right of the form.
- **Final Payment.** Check of this period is the final payment period. Located at the top right of the form.

The following instructions are for information of any and all subcontractors used for the pay period.

- **(Type) of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business or SLBE.
- **Trade/Work Activity.** Indicate the trade, service, or material provided by the subcontractor.
- **SubContractor/SubConsultant/Supplier.** Please indicate status of firm on this contract.
- **Federal ID.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Total Subcontract Amount.** Provide total amount of subcontract for subcontractor including change orders.
- **Amount Paid To Date.** Indicate all dollars paid to date for the subcontractor.
- **Amount Pending, Previously Reported.** Indicate any amount previously reported that payments are pending.
- **Amount To Be Paid for this Period.** Provide dollar amount of dollars requested for the pay period.
- **Sub Pay Period Ending Date.** Provide date for which subcontractor invoiced performed work.

Forms must be signed and dated or will be considered incomplete. The company authorized representative must sign and certify the information is true and accurate. Failure to sign this document or return the document unsigned can be cause for determining a company is in non-compliance of Ordinance 2008-89.

If any additional information is required or you have any questions, you may call the Minority Business Development Office at (813) 274-5522.

SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR

3"

scale: 3"

Sign Information

Building a Better Tampa

Downtown Riverwalk

Creates a waterfront pedestrian walkway connecting the south edge of the CapTrust building with MacDill Park.

$1.5 Million investment
Scheduled for completion in October 2012

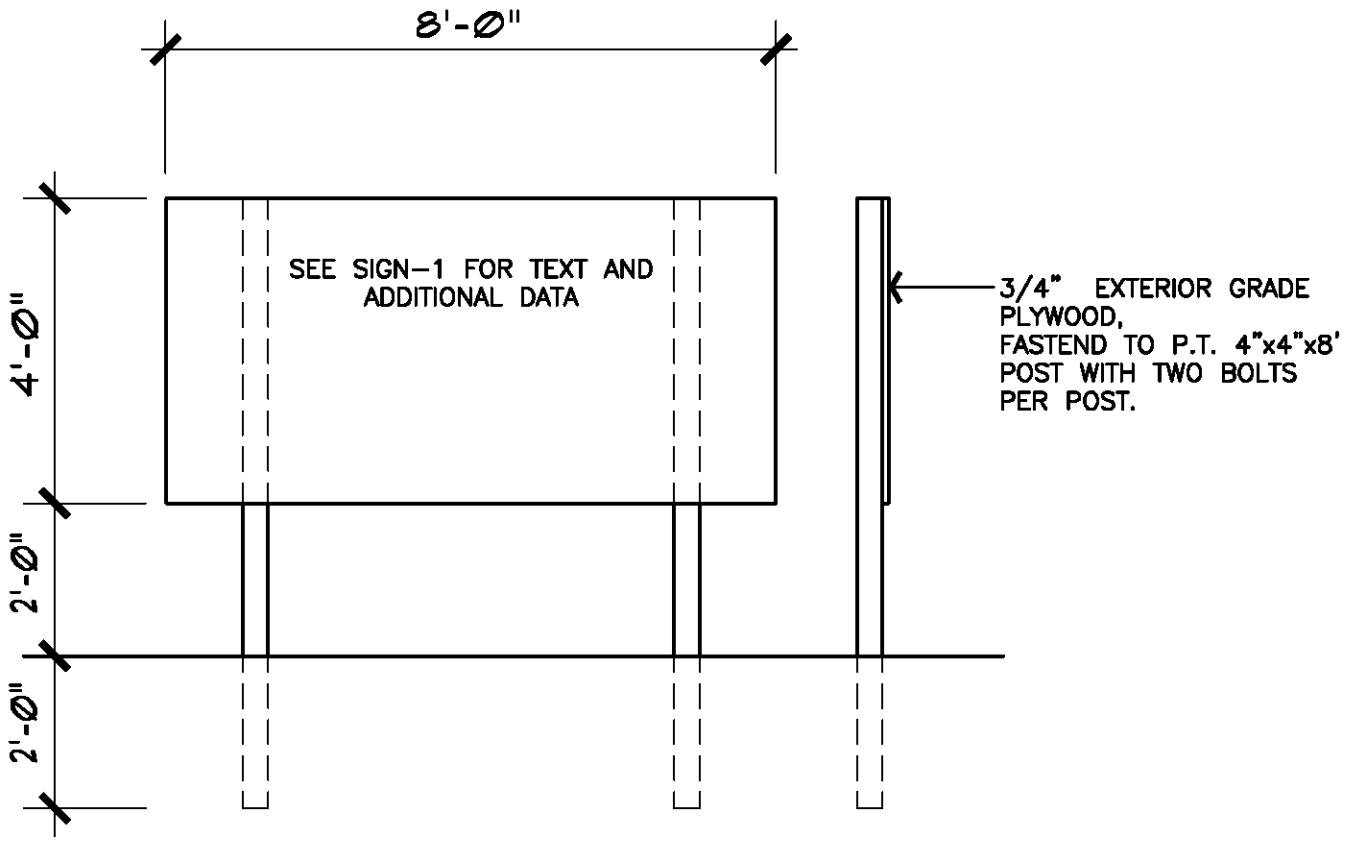
Orion Marine
Construction, Inc.

Colors

Blue: Sherwin Williams Naval SW6244
Green: Sherwin Williams Center Stage SW6920
White: Sherwin Williams Pure White SW7005

Font

Franklin Gothic



CITY OF TAMPA–PROJECT SIGN
REVISED 4/28/04

SECTION 010001 - GENERAL REQUIREMENTS

PART 1 -- GENERAL

1.1 DEFINITIONS

A. OWNER: City of Tampa

B. ENGINER: MWH Americas, 1000 N. Ashley Dr. Tampa, FL 33602.

C. CONTRACTOR: Entity under Contract to the OWNER to perform the WORK.

D. SUBCONTRACTOR or VENDOR: Entity under contract to the CONTRACTOR to perform portions of the Work and/or to supply equipment.

E. PROJECT SITE: OWNER's site, located at the end of 115th Ave. west of the intersection of 115th Ave. and Florida Ave., in the City of Tampa limits.

PART 2 -- SUMMARY OF WORK

2.1 SPECIFICATIONS AND DRAWINGS

A. The Specifications and Drawings included in these Contract Documents establish the performance, quality requirements, location, and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance. There has been no attempt to separate the Specification sections into groups for work of SUBCONTRACTORS or various trades. Should there be questions concerning the applicability or interpretation of a particular Specification section or part of a Specification section or Drawing, the questions should be directed to the CONTRACTOR prior to the submittal of a proposal for the Work under this Contract.

2.2 PROJECT DESCRIPTION

A. A brief description of the WORK is stated in the Request for Proposal. To determine the full scope of the project or any particular part of the Project, coordinate the applicable information in the several parts of these Contract Documents.

B. The following additional information, though not all-inclusive, is given to assist the CONTRACTOR and SUBCONTRACTORS in their evaluation of the Work required to meet the Project objectives.

C. The WORK of this Contract comprises the construction of Blue Sink MFL Pump Station, with associated piping. The work includes construction of a 2 mgd pumping station with two raw water pumps and vacuum priming system located in a Pump Room, and electrical and instrumentation controls located in an Electrical Room. The Work includes construction of a two floating intake structures in Blue Sink, and 16-inch high density polyethylene (HDPE) suction pipes from the Sink to the new pumping station, a new 16-inch ductile iron raw water discharge main from the pumping station to the Sink, an 18-inch HDPE raw water crossing of Blue Sink, a 16-inch ductile iron pipe raw water discharge main, a 4-inch force main and new 8-inch sanitary sewer, water service and all appurtenant work shown on the Plans, specified or required for a complete project.

PART 3 -- SEQUENCE OF OPERATIONS

3.1 SCHEDULING

A. CONTRACTOR shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the OWNER, and in strict accordance with the Contract Documents.

B. Plan the Work and carry it out with minimum interference to the operation of the CONTRACTOR and other SUBCONTRACTORS. Prior to starting the Work, confer with the ENGINEER to develop an approved work Schedule.

C. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions as determined by the CONTRACTOR. The CONTRACTOR shall do this work at such times and at no additional cost to the OWNER.

D. The CONTRACTOR shall provide a plan and sequence of construction to ensure minimum disruption to the OWNER and neighboring community, and shall accept the OWNER's decisions for conflict resolution. The plan shall describe all activities, duration and sequence of execution. The plan shall be subject to the OWNER's review and approval.

E. Overall Project Schedule:

1. General:
    a. CONTRACTOR shall be required to submit, in the style, manner, and quantities, as directed by Section 013216.
    b. The CONTRACTOR shall maintain the Project Master Schedule.
    c. SUBCONTRACTOR's schedules will be used in the development and updating of the Project Master Schedule.
2. Progress Meetings:
    a. Progress meetings shall be held periodically per Section 012000.

3.2 PERMITTING

A. CONTRACTOR shall acquire all required permits associated with the Work, and shall pay all required application and permit fees.

3.3 COORDINATION

A. The OWNER, SUBCONTRACTORS and the CONTRACTOR will be performing work on the site. CONTRACTOR and SUBCONTRACTORS shall cooperate in the coordination of their separate activities in a manner that will provide the least impact to the surrounding community, the least interference with any OWNER's activities on site.

B. If any difficulty or dispute should arise in the accomplishment of the above, the problem shall be brought immediately to the attention of the CONTRACTOR and OWNER.

C. All SUBCONTRACTORS working on this site are subject to this requirement for cooperation, and all shall abide by OWNER's decision in resolving project coordination problems without additional cost to the OWNER.

3.4 EQUIPMENT AND SYSTEM TESTING

A. Specific performance testing of installed equipment and systems shall be conducted by the CONTRACTOR, VENDOR, or Manufacturer's Representative in the presence of the OWNER as required in the section specifying the equipment or system.

B. The CONTRACTOR shall furnish all labor, materials, tools, equipment, instruments, and services necessary to perform the functional and performance testing.

PART 4 -- SITE CONDITIONS

4.1 SITE INVESTIGATION AND REPRESENTATION

A. The CONTRACTOR acknowledges satisfaction as to the nature and location of the Work, the general and local conditions, particularly those bearing upon availability of transportation, access to the site, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, or similar physical conditions at the Site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during the prosecution of the Work, and all other matters which can in any way affect the Work or the cost thereof under this Contract.

B. The CONTRACTOR further acknowledges satisfaction as to character, quality, and quantity of surface and subsurface materials to be encountered from the CONTRACTOR's inspection of the site and from reviewing any available records of exploratory work furnished by the ENGINEER. Failure by the CONTRACTOR to become acquainted with the physical conditions of the site and all the available information will not relieve the CONTRACTOR from responsibility for properly estimating the difficulty or cost of successfully performing the Work.

C. The CONTRACTOR warrants that as a result of examination and investigation of all the aforesaid data, the CONTRACTOR can perform the Work in a good and workmanlike manner and to the satisfaction of the OWNER. The OWNER assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this Contract, unless

1. Such representations are expressly stated in the Contract, and
2. The Contract expressly provides that the responsibility therefore is assumed by the OWNER.

4.2 INFORMATION ON SITE CONDITIONS

A. General: Any information obtained by the ENGINEER regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at the office of the CONTRACTOR upon request. Such information is offered as supplementary information only.

4.3 SUBSURFACE INVESTIGATION

A. Subsurface investigations, including test borings, have been made to indicate subsurface materials at particular locations. OWNER assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the interpretations made of subsurface conditions, and there is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur.

B. The CONTRACTOR may make arrangements with the OWNER for permission to conduct, at the CONTRACTOR's own expense, such additional subsurface investigation as may be necessary to verify existing conditions.

4.4 DIFFERING SUBSURFACE CONDITIONS

A. In the event subsurface or latent physical conditions are found materially different from those indicated in these Documents, and differing materially from those ordinarily encountered and generally recognized as inherent in the character of work covered in these Contract Documents, the CONTRACTOR shall promptly, and before such conditions are disturbed, notify the ENGINEER and OWNER in writing of such changed conditions.

B. The ENGINEER and OWNER will investigate such conditions promptly and following this investigation, the CONTRACTOR shall proceed with the Work, unless otherwise instructed by the ENGINEER and OWNER. If the CONTRACTOR finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for performing the Work, then any adjustments in cost and time will be addressed as indicated in the Terms and Conditions. The OWNER will make the final decision on all Change Orders to the Contract regarding any adjustment in cost or time for completion.

4.5 UTILITIES

A. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the OWNER, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.

B. CONTRACTOR shall be responsible for identifying and locating any utilities before starting construction. Damage to any such utilities must be repaired by the CONTRACTOR at no additional cost to the OWNER.

4.6 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

A. Where the CONTRACTOR's operations could cause damage or inconvenience to utilities or services, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the CONTRACTOR.

B. The CONTRACTOR shall notify all utility offices which are affected by the construction operation at least 48 hours in advance. Under no circumstances shall the CONTRACTOR expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, the CONTRACTOR shall locate, expose, and provide temporary support for all existing underground utilities.

C. The CONTRACTOR shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the OWNERs thereof to that end.

D. The CONTRACTOR shall be solely and directly responsible to the OWNER and utility operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.

E. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the OWNER and the proper authority. Cooperate with said authority and the OWNER in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted by the OWNER of the utility and the OWNER.

F. The CONTRACTOR shall replace, at the CONTRACTOR's own expense, all existing utilities or structures removed or damaged during construction. The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the CONTRACTOR as herein provided, shall be done by methods approved by the OWNERs of such utilities.

4.7 INTERFERING STRUCTURES

A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground.

4.8 FIELD RELOCATION

A. During the progress of construction, it is expected that relocations of the Work may be necessary. Such relocations shall be made only with OWNER approval. If existing structures are encountered which prevent the construction, and which are not properly shown on the Drawings, notify the ENGINEER and OWNER before continuing with the construction in order that the ENGINEER may make such field revisions as necessary to avoid conflict with the existing structures. If the CONTRACTOR shall fail to so notify the ENGINEER and OWNER when an existing structure is encountered, and shall proceed with the construction despite this interference, the CONTRACTOR shall do so at their own risk.

PART 5 -- TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

See Section 015100 Temporary Utilities.

5.1 LAYOUT OF TEMPORARY FACILITIES

A. Should the CONTRACTOR require space in addition to that indicated on the Drawings, the CONTRACTOR shall make their own arrangements for storage of materials and equipment in locations off the construction site. For the allocated space, the CONTRACTOR shall submit to the OWNER for approval the proposed plan and layout for all temporary offices, sanitary facilities, temporary construction roads, storage buildings, storage yards, temporary water service and distribution, and temporary power service and distribution.

5.2 CONTRACTOR'S WORK AREA

A. The CONTRACTOR shall limit their operations and storage of equipment and materials to areas shown on the Drawings and or as directed by the OWNER. The CONTRACTOR shall not disturb any areas specifically delineated by the OWNER.

B. The CONTRACTOR shall maintain the area during construction in a manner that will not obstruct operations of any existing street areas. The CONTRACTOR shall proceed with their work in an orderly manner, maintaining the construction site free of debris and unnecessary equipment and/or materials.

5.3 TEMPORARY WATER

A. The CONTRACTOR shall be responsible for coordinating the installation of a temporary hydrant meter and associated backflow protection device(s). Any temporary installation shall meet all pertinent regulations. CONTRACTOR shall bear the costs of this temporary hydrant meter and associated temporary water connection(s).

5.4 WATER FOR TESTING

A. The CONTRACTOR shall be responsible for providing the necessary water required for testing.

5.5 TEMPORARY ELECTRIC POWER

A. CONTRACTOR shall provide power to the site for construction activities. The permanent facility power supply will be utilized for facility testing and startup.

5.6 SAFETY REQUIREMENTS FOR TEMPORARY ELECTRIC POWER

A. Temporary electric power installation shall meet the construction safety requirements of OSHA, state, and other governing agencies.

5.7 SANITARY FACILITIES

A. The CONTRACTOR will provide chemical toilets of suitable type and shall maintain the facilities in a sanitary condition at all times. The chemical toilet shall be of watertight construction so that no contamination of the area can result from its use. The facilities shall conform to code requirements and be acceptable to the sanitary authorities. Upon completion of the Work, the sanitary facilities shall be removed and the area restored to its original condition.

5.8 TEMPORARY TELEPHONE SERVICE

A. The CONTRACTOR shall furnish onsite telephone service for themselves during the period of construction as they determine necessary.

5.9 STORAGE OF MATERIALS

A. All materials shall be stored in a manner that ensures the preservation of their quality and fitness for the Work. Materials and or earth shall be stored within the boundaries designated on the drawings unless otherwise approved by the OWNER in writing.

5.10 STORAGE BUILDINGS/TRAILERS

A. The CONTRACTOR shall erect or provide as-approved, temporary storage buildings and/or trailers as specified in Section 015500 of the various sizes as required for the protection of equipment and materials. At or near the completion of the Work, the temporary storage buildings/trailers shall be dismantled, removed from the site, and remain the property of the CONTRACTOR.

B. Upon completion of the work, the area shall be returned to its original condition, unless modified by the project itself.

C. Combustible materials (paints, solvents, fuels, etc.) shall be stored in a well ventilated building removed from other buildings.

5.11 STORAGE YARDS

A. The CONTRACTOR shall construct temporary storage yards for the storage of materials that are not subject to damage by weather conditions. Materials such as pipe, reinforcing and structural steel, shall be stored on pallets or racks, off the ground, and stored in a manner to allow ready access for inspection and inventory. Temporary gravel surfacing of the storage yards shall meet with the approval of the OWNER.

5.12 FENCING

A. Any fence, or part thereof, that is damaged or removed during the course of the work, beyond the project intent, shall be replaced or repaired by the CONTRACTOR and shall match existing conditions 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 OWNER.

B. 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 o additional payment will be made therefore.

5.13 DEBRIES AND WASTE DISPOSAL FACILITIES

A. The CONTRACTOR shall provide trash and debris bins, dumpster, and containers for proper disposal of waste material. Construction and demolition debris shall be separated from organic, paper, and office material.

B. 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.

PART 6 -- SAFETY AND CONVENIENCE

6.1 CONSTRUCTION SAFETY PROGRAM

A. The CONTRACTOR shall develop a Safety Plan for this project and maintain it for the duration of this Contract.

B. 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.

C. 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.

D. 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.

6.2 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

A. Authorized government officials shall at all times have safe access to the Work, and the CONTRACTOR shall provide proper facilities for such access and inspection.

6.3 TRAFFIC MAINTENANCE AND SAFETY

A. Comply with all rules and regulations of the state, county, and city authorities regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by express permission of the OWNER. Conduct the Work so as to assure the least possible obstruction to traffic and normal commercial pursuits. Protect all obstructions within traveled roadways by installing approved signs, barricades, and lights where necessary for the safety of the public. The convenience of the general public and residents adjacent to the Project, and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

6.4 PROTECTION OF PROPERTY

A. The CONTRACTOR shall protect stored materials, cultivated trees and crops, and other items located adjacent to the proposed work. Notify property OWNERs affected by the construction at least one week in advance of the time construction begins. During construction operations, construct and maintain such facilities as may be required to provide access by all property OWNERs to their property. No person shall be cut off from access to their residence or place of business for a period exceeding 8 hours, unless the CONTRACTOR has made special arrangements with the affected persons and has received OWNER approval.

B. The CONTRACTOR shall 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 Drawings, and the removal, relocation and reconstruction of such items called for on the Drawings or specified shall be included in the various Contract Items and no separate payments will be made therefore.

C. CONTRACTOR shall repair or restore all structures and property that are damaged or disturbed during performance of the work. CONTRACTOR is expressly advised that the protection of buildings, structures, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. 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 surrounding property OWNER(s).

D. CONTRACTOR shall, before starting operations, attain a professional videographer to document existing conditions of the project site and surrounding properties. A DVD copy of the site documentation video should be submitted to the OWNER prior to site mobilization or and onsite construction.

6.5 FIRE PREVENTION AND PROTECTION

A. The CONTRACTOR shall perform all work in a fire-safe manner. The CONTRACTOR shall supply and maintain on the Site adequate fire-fighting equipment capable of extinguishing incipient fires. The CONTRACTOR shall comply with applicable federal, state, and local fire-prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241) shall be followed.

6.6 ACCESS FOR POLICE, FIRE, AND POSTAL SERVICE

A. Notify the fire department and police department before closing any street or portion thereof. No closing shall be made without the OWNER's approval. Notify said departments when the streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without special written permission from the fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access.

B. Maintain postal service facilities in accordance with the requirements of the U.S. Postal Service. If required, move mailboxes to temporary locations designated by the U.S. Postal Service, and at the completion of the Work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

PART 7 -- TEMPORARY ENVIRONMENTAL CONTROL

7.1 NOISE CONTROL

A. CONTRACTOR shall take every action possible to minimize noise caused by construction operations. Operate in compliance with any applicable ordinances, regulations, rules and laws in effect in area pertaining to noise. Should noise levels come into question, CONTRACTOR shall provide certified noise testing/analysis at the request of the OWNER to demonstrate compliance with applicable standards.

B. CONTRACTOR shall provide equipment that operates with least possible noise. Provide electrically operated equipment in work area to extent possible. Equip air intake of compressors with silencers, and provide machinery operated by gearing with a type of gearing designed to reduce noise to a minimum. Equip internal combustion engines with mufflers. Maintain equipment silencing features in good condition and use at all times.

7.2 AIR POLLUTION CONTROL

A. CONTRACTOR shall exercise every reasonable precaution to keep air pollution to a minimum throughout life of Project.

7.3 WATER CONTROL

A. CONTRACTOR shall keep excavations free from water while site grading, structural work, pipe laying, or other construction is in progress.

1. Surface Drainage:

a. Control drainage and stormwater in accordance with the Project stormwater pollution prevention plan.

b. Intercept and divert upstream surface drainage away from work site by use of dikes, curb walls, ditches, pipes, sumps, or other means.

c. Intercept and divert work site surface drainage away from excavation by use of dikes, curb walls, ditches, pipes, sumps, or other means.

d. Design surface drainage systems so they do not cause erosion on or offsite or cause unwanted flow of water.

e. Remove surface drainage system when no longer required.

f. Remove debris and restore site to original condition.

2. Dewatering:

a. All dewatering activities shall meet the requirements of the Site Dewatering Permit.

b. Provide and maintain ditches of adequate size to collect surface water and seepage that could enter excavations. Divert into a sump that can be drained or pumped into drainage channels, or storm sewers if approved by OWNER and jurisdictional agency concerned.

c. Maintain trenches free of standing water until backfill operations are complete.

d. Install sedimentation ponds or other approved means as required to reduce visible particles from being carried by water diverted into storm sewers or flowing offsite (this is further clarified to mean no discharge of water having any visible turbidity shall be permitted). Provide treatment facilities as required to prevent construction originated pollutants from entering adjacent streams or property.

e. Should a storm sewer become blocked or have its capacity reduced due to the construction of the Work, make arrangements with the jurisdictional agency for cleaning the sewer.

f. Backfill drainage ditches, sumps, and sedimentation ponds when no longer required, with granular material, concrete, or other material as approved by OWNER.

7.4 DEBRIS CONTROL

A. The CONTRACTOR shall proceed with construction cleanup on a daily basis, as construction progresses. Cleanup consists of removal of mud, oil, grease, trash, used forms, scrap, debris, excess materials, and any other items that are unsightly or can cause the tripping or slipping of workmen, ladders, or equipment.

B. Dispose of construction waste material in an authorized disposal area.

C. CONTRACTOR shall remove and become the OWNER of all excess construction debris and excavated material.

D. All construction site entrances/exists shall be temporarily protected with gravel to prevent debris and earth from spreading to public and or private roadways.

7.5 POLLUTION CONTROL

A. CONTRACTOR shall take all actions necessary to avoid contaminating water in adjacent water courses or water impoundments such as lakes, reservoirs, etc. CONTRACTOR shall not discharge pollutants such as turbid water, chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste into or alongside streams, impoundments or into natural or man-made channels leading to them. Do not discharge water used during work on Project that has become contaminated into rivers, streams, or impoundments.

B. CONTRACTOR shall conduct all earthwork, moving of equipment, water control of excavations or other operations likely to create silting, so as to minimize pollution of rivers, streams, and impoundments. Do not deposit excavated material in or so near to rivers, streams, or impoundments that it will be washed away by high water or runoff.

7.6 EROSION CONTROL

A. CONTRACTOR shall use proper and acceptable methods of soil erosion and sedimentation control for exposed earthwork and assume obligation for fines and related costs resulting from failure to provide adequate protection against soil erosion.

PART 8 -- PRESERVATION, RESTORATION, AND CLEANUP

8.1 SITE RESTORATION AND CLEANUP

A. At all times during the Work, keep the premises clean and orderly, and upon completion of the Work, repair all damage caused by equipment and leave the project free of rubbish or excess materials of any kind.

B. Stockpile excavated materials in a manner that will cause the least damage to adjacent lawns, grassed areas, gardens, shrubbery, or fences, regardless of whether these are on private property, or on state, county, or city rights-of-way. Material stockpiles shall

be surrounded by turbidity barriers and covered with plastic sheeting as necessary to prevent erosion and water pollution.

C. Remove all excavated materials from grassed and planted areas, and leave these surfaces in a condition equivalent to their original condition.

D. All existing drainage ditches and culverts shall be reopened and graded and natural drainage restored, unless otherwise indicated on the Drawings. Restore culverts, broken or damaged, to their original condition and location.

8.2 DUST PREVENTION

A. CONTRACTOR shall give all unpaved streets, roads, detours, or haul roads used in the construction area an approved dust-preventive treatment or periodically water to prevent dust. Applicable environmental regulations for dust prevention shall be strictly enforced.

B. All construction site entrances/exists shall be temporarily protected with gravel to prevent debris and earth from spreading to public and or private roadways.

8.3 PRESERVATION OF IRRIGATION AND DRAINAGE DITCHES

A. After backfilling of the trenches, restore storm drain ditches destroyed, damaged, or otherwise modified during construction to a condition equivalent, in the opinion of the OWNER, to the condition of the ditch before construction, or as shown on the Drawings. Ditches so reconstructed shall be built in their original locations and have their original vertical profiles.

PART 9 -- SUBMITTALS DURING CONSTRUCTION

9.1 GENERAL

A. Requirements in this Section are in addition to any specific requirements for submittals specified in other Sections of these Specifications and the Contract.

B. Submittals shall be delivered to the ENGINEER and OWNER (via the onsite City Inspector's office).

C. Submitted data shall be fully sufficient in detail for determination of compliance with the Contract Documents. Submittal numbering shall be consistent with that identified in Supplement A.

D. Review, acceptance, or approval of substitutions, schedules, Shop Drawings, lists of materials, and procedures submitted or requested by the OWNER shall not add to the Contract amount, and all additional costs which may result therefore shall be solely the obligation of the CONTRACTOR.

E. No equipment or material for which listings, drawings, or descriptive material is required shall be installed until the CONTRACTOR has received approved copies of the Shop Drawings.

F. No "Or Equal" material or equipment shall be installed without approval by the ENGINEER and OWNER. The OWNER will evaluate a maximum of one proposed "or

equal" product and or service of each type. Should the OWNER find the proposed product and or service is not equal to that specified, CONTRACTOR shall provide the specified product without additional cost to the OWNER.

G. The review of drawings by the ENGINEER and OWNER will be limited to general design requirements only, and shall in no way relieve the CONTRACTOR from responsibility for errors or omissions contained therein.

H. Submittals will be acted upon by the ENGINEER and OWNER as promptly as possible. Delays caused by the need for resubmittals shall not constitute reason for an extension of Contract time.

9.2 SUBMITTAL PROCEDURE

A. The CONTRACTOR shall submit four copies, including one in Portable Document Format (PDF) on a Compact Disc (CD), to the ENGINEER for review. The CONTRACTOR shall concurrently submit to the OWNER four copies, including one in PDF format on CD to the OWNER for review.

B. The CONTRACTOR shall make submittals in sufficient time to allow the ENGINEER and OWNER not less than 30 calendar days for examining each submittal or resubmittal.

C. If any submittal deviates from these Contract Specifications or Drawing, the CONTRACTOR shall attach a letter shall accompanying the submittal describing and explaining the reason for each deviation.

D. Submittals shall be delivered in heavy paper covers or three-ring hard cover binders.

E. Each submittal shall have a unique package and submittal number.

F. Shop Drawings shall be accurate, distinct, and complete, and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Subcontract Drawings and Specifications.

G. Shop Drawings shall be submitted only by the CONTRACTOR, who shall indicate by a signed stamp on the Shop Drawings, or other approved means, that the CONTRACTOR has checked and approved the Shop Drawings, and that the Work shown is in accordance with Contract requirements and has been checked for dimensions and relationship with work of all other trades involved. The practice of submitting incomplete or unchecked Shop Drawings for the ENGINEER or OWNER to correct or finish will not be acceptable, and Shop Drawings which, in the opinion of the ENGINEER or OWNER, clearly indicate that they have not been checked by the CONTRACTOR will be considered as not complying with the intent of the Contract Documents and will be returned to the CONTRACTOR for resubmission in the proper form.

H. All submittals shall be accompanied with a transmittal letter prepared in duplicate containing the following information:

1. Date
2. Project Title and Number
3. CONTRACTOR's name and address

4. The number of each Shop Drawings submitted.
5. Notification of Deviations from Contract Documents.
6. Submittal Log Number referencing the Specification Section Number.

I. No partial submittals will be reviewed. Submittals not complete will be returned to the CONTRACTOR for re-submittal. Shop drawings shall be complete and detailed and shall consist of fabrication, erection, and setting drawings, manufacturer's scaled drawings, and wiring and control diagrams. Equipment data shall include manufacturer's catalog sheets, brochures, diagrams, illustrations and other standard descriptive data and shall be clearly marked to identify pertinent materials, products or models.

J. The review of shop drawings, equipment data, schedules, and/or O&M data by the OWNER will 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.

K. When the Shop Drawings have been reviewed by the ENGINEER and OWNER, three sets of submittals will be returned to the CONTRACTOR appropriately stamped. These sets shall bear the stamps of both the ENGINEER and the OWNER. The most restrictive response between the OWNER and the ENGINEER shall serve as the net response to the CONTRACTOR.

L. When reviewed by the ENGINEER and OWNER, each of the submittals will be identified as having received such review being so stamped and dated. Submittals stamped "APPROVED AS NOTED" or "DISAPPROVED, “REVISE AND RESUBMIT" and with required corrections shown will be returned to the CONTRACTOR for correction and re-submittal.

M. 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 OWNER and ENGINEER.

N. Re-submittals will be handled in the same manner as first submittals. On re-submittals the CONTRACTOR shall direct specific attention, in writing or on resubmitted shop drawings, to revisions other than the corrections requested by the ENGINEER or OWNER on previous submissions. The CONTRACTOR shall address and make any corrections required by the ENGINEER or OWNER.

O. When the shop drawings and/or equipment data have been approved or approved as noted by the ENGINEER and OWNER, the CONTRACTOR shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the ENGINEER and OWNER.

P. Shop drawings and other submittal data shall be reviewed by the ENGINEER and OWNER for each original submittal and for the first re-submittal. Thereafter, review time for subsequent re-submittals shall be charged to the CONTRACTOR at the option of the OWNER, on a time and materials basis.

Q. The CONTRACTOR shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by ENGINEER and OWNER of the necessary shop drawings and/or equipment data.

R. 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.

S. 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 and OWNER, with approval.

T. The CONTRACTOR shall not use shop drawings as a means of proposing alternate items to demonstrate compliance with the Drawings and Specifications.

U. The review of such Shop Drawings and catalog cuts by the ENGINEER and or OWNER shall not relieve the CONTRACTOR from responsibility for correctness of dimensions, fabrication details, and space requirements, or for deviations from the Contract Drawings or Specifications, unless the CONTRACTOR has called attention to such deviations in writing by a letter accompanying the Shop Drawings and the ENGINEER and OWNER approves the change or deviation in writing at the time of submission; nor shall review by the ENGINEER or OWNER relieve the CONTRACTOR from the responsibility for errors in the Shop Drawings.

V. The CONTRACTOR agrees that shop drawing submittals processed by the CONTRACTOR do not become Contract Documents and are not Change Orders; that the purpose of the Shop Drawing review is to establish a reporting procedure and is intended for the CONTRACTOR’s convenience in organizing their work and to permit the ENGINEER and or OWNER to monitor the CONTRACTOR's progress and understanding of the design.

9.3 SHOP DRAWING REQUIREMENTS

A. Shop Drawings referred to herein shall include Shop Drawings and other submittals for both shop and field-fabricated items. The CONTRACTOR shall submit, as applicable, the following for all prefabricated or manufactured structural, mechanical, electrical, plumbing, process systems, and equipment:

1. Shop Drawings or equipment drawings, including dimensions, size and location of connections to other work, and weight of equipment.

2. Catalog information and cuts.

3. Installation or placing drawings for equipment, drives, and bases.

4. Supporting calculations for equipment and associated supports specified to be

designed by equipment manufacturers or suppliers.

5. Complete manufacturer's specifications, including materials description and paint system.

6. List of materials and supplies required for the equipment prior to, and during startup.

7. List of materials and supplies furnished with the equipment.

8. Samples of finish colors for selection.

9. Special handling instructions.

10. Requirements for routine maintenance required prior to plant startup.

11. List of all requested exceptions to the Contract Documents.

12. Operation and Maintenance Manuals (draft and final) for any equipment furnished.

B. The submittals shall include satisfactory identification of items, units, and assemblies in relation to the Specification section number, and the system or equipment identification or tag number shown on the Drawings, the Process and Instrumentation Diagram (P&ID), or as provided in the applicable Specification section.

C. Should the CONTRACTOR propose any item on their Shop Drawings, or incorporate an item into the Work, and that item should subsequently prove to be defective, unsatisfactory or inconsistent with the Contract Documents, regardless of the OWNER or ENGINEER’s review, the CONTRACTOR shall, at the CONTRACTOR’s expense, replace the item with another item that will perform satisfactorily, is not defective and is in full compliance with the Contract.

9.4 AS-BUILTS

A. The CONTRACTOR will prepare a set of As-Builts for the Project which will include the changes made in materials, equipment, locations, dimensions of the Work and other criteria specified in Section 01720. Each month, the CONTRACTOR shall submit to the OWNER a copy of the working As-Builts with each pay application. The CONTRACTOR shall maintain a set of As-Builts onsite and shall update the Drawings continuously.

9.5 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The CONTRACTOR shall furnish eight hard copies and one electronic version of a complete instruction manual for installation, operation, maintenance, and lubrication requirements for each component of mechanical and electrical equipment or system provided. All equipment manufacturers and/or suppliers shall be made aware of these requirements and all associated costs shall be included in the costs for furnishing the equipment or system. Each instruction manual furnished shall be fixed in hard-back cover, which is clearly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number, and the Specification section where the item is specified.

B. Electronic versions shall be submitted in PDF format on a CD properly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number, and the Specification section where the item is specified.

9.6 SPARE PARTS AND SPECIAL TOOLS

A. As required for each item of equipment and as specified in corresponding Specification Sections.

B. All equipment, spare parts, and special tools provided by CONTRACTOR, shall be properly marked to identify the associated equipment by name, P&ID tag number (if applicable), and manufacturer part number. Parts shall be packaged in a manner for protection against damage from the elements during shipping, handling, and long-term storage. All spare parts and special tools shall be packaged complete and shipped at one time in appropriately sized, hinged-covered, hard plastic or metal boxes. The boxes shall be marked to indicate all contents by name and part number. Parts shall be numbered and named in accordance with the Operation and Maintenance Manual identification system.

C. CONTRACTOR shall supply a list of recommended spare parts in addition to those required by the Specifications.

9.7 EQUIPMENT IDENTIFICATION PLATES AND TAGS

A. Provide manufacturer's standard equipment identification plate, securely mounted on each separate equipment component with manufacturer, model number, serial number, and any other information required to obtain service or replacement parts from manufacturer.

B. Provide a 16-gauge, Type 316 stainless steel equipment tag, 3-inch minimum diameter, securely mounted to each item of equipment using stainless steel wire rope and crimps or other approved mounting method by the CONTRACTOR. Tag shall have 3/8-inch high engraved type black enamel filled letters with the equipment name and number as shown on the P&ID Drawings.

9.8 SAMPLES AND TEST SPECIMENS

A. Where required in the Specifications, and as determined necessary by the OWNER, test specimens or samples of materials, appliances, and fittings to be used or offered for use in connection with the Work shall be submitted to the OWNER at the CONTRACTOR's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.

B. All samples and test specimens shall be submitted in ample time to enable the OWNER to make any tests or examinations necessary, without delay to the Work. The CONTRACTOR will be held responsible for any loss of time due to CONTRACTOR's neglect or failure to deliver the required samples to the OWNER, as specified.

C. Samples also shall be taken during the course of the Work, as required by the OWNER.

D. Laboratory tests and examinations that the OWNER elects to make in its own laboratory will be made at no cost to the CONTRACTOR, except that, if a sample of any material or equipment proposed for use by the CONTRACTOR fails to meet the Specifications, the cost of testing subsequent samples shall be borne by the CONTRACTOR.

E. All tests required by the Specifications to be performed by an independent laboratory shall be made at the sole expense of the CONTRACTOR.

F. Material used in the Work shall conform to the submitted samples and test certificates as approved by the OWNER.

9.9 TOXIC SUBSTANCES

A. The State of Florida has prepared a list of toxic substances. The CONTRACTOR shall review the list to determine if any materials which he will be installing are listed.

B. The CONTRACTOR will notify the OWNER in writing three (3) days prior to use of any toxic substances in the construction of the facility.

C. The CONTRACTOR shall comply with all State, Federal and Local Regulations for the use of any toxic substances.

9.10 LEAD

A. No lead product shall be used on this project.

B. The use of solder or paint which contains lead is not acceptable on this project.

C. The General CONTRACTOR is responsible for notifying all SUBCONTRACTORS and Suppliers that no lead is acceptable on this project.

D. The General CONTRACTOR, Plumbing SUBCONTRACTOR, Mechanical SUBCONTRACTOR, Electrical SUBCONTRACTOR, and Painting SUBCONTRACTOR, shall provide written certification, prior to substantial completion, that no lead has been used on this project and agrees to replace any lead if discovered at no expense to the OWNER. The certification shall be addressed to the OWNER.

9.11 ASBESTOS

A. No asbestos, or products containing asbestos, shall be used on this project.

B. The CONTRACTOR shall be responsible for notifying all SUBCONTRACTORS and Suppliers of this requirement.

C. If by Independent Test Laboratory, the OWNER discovers any asbestos products have been used on this project, the CONTRACTOR will be liable for necessary consulting fees, removal of asbestos products and installation of new product of similar value.

D. The General CONTRACTOR, the Mechanical SUBCONTRACTOR, Electrical SUBCONTRACTOR, Floor SUBCONTRACTOR, Ceiling Tile SUBCONTRACTOR, and Insulation SUBCONTRACTOR shall provide, prior to substantial completion, a certification by the President of the Construction Company stating that no asbestos

products have been used on this project and referring to the Agreement to remove any asbestos products, if discovered, addressed to the OWNER.

9.12 CERTIFICATES OF COMPLIANCE WITH SPECIFIED STANDARDS AND CODES

A. Certificate of Compliance shall be furnished for materials specified to a recognized standard or code prior to the use of any such materials in the Work. Sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the Specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the Work and the lot so certified shall be clearly identified in the certificate.

B. All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the CONTRACTOR of responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents and any such material not conforming to such requirements will be subject to rejection whether in place or not.

C. The OWNER reserves the right to refuse permission for use of material on the basis of a Certificate of Compliance.

D. The form of the Certificate of Compliance and its disposition shall be as directed by the OWNER.

9.13 CERTIFICATES OF DESIGN

A. Where required in the Specifications, CONTRACTOR shall provide engineering design services by a professional ENGINEER licensed in the State of Florida. Design documents shall be signed and sealed.

PART 10 -- TESTING/CHECKOUT/STARTUP SERVICES

10.1 GENERAL

A. The CONTRACTOR shall test and check out all systems furnished and/or installed by the CONTRACTOR. Piping and valves shall be pressure tested and point-to-point continuity tests shall be completed for wiring. See detailed specifications for testing and checkout requirements.

B. During testing, problems arising from the CONTRACTOR’s errors and omissions shall be corrected by the CONTRACTOR at their own expense.

C. The CONTRACTOR shall inform in advance the OWNER of when testing will be performed, as defined per Section 017500.

PART 11 -- MANUFACTURER'S SERVICES DURING CONSTRUCTION

11.1 GENERAL

A. Competent and experienced technical representatives shall represent the manufacturers of all equipment and systems as may be necessary to resolve assembly, equipment malfunctioning, controls problems, or installation problems at the Worksite which are attributable to, or associated with, the equipment furnished.

B. Provide the minimum number of person-days and trips to the Site specified in the individual Specification sections. These person-days are for the services specified and are not for resolving problems associated with installation, testing, or startup of systems or equipment that are due to deficiencies in the supplied system, equipment, or their associated installation, operation or maintenance instructions/manuals.

11.2 MANUFACTURER'S CERTIFICATION

A. Manufacturer's representative shall certify in writing stating that the equipment has been installed in accordance with the manufacturer's recommendation and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed and that the proper electrical and mechanical connections have been made. Said certification shall be forwarded to CONTRACTOR and OWNER upon completion.

11.3 INSTALLATION ASSISTANCE AND INSPECTION

A. The appropriate manufacturer’s representative shall be present to instruct the CONTRACTOR and SUBCONTRACTOR on the proper installation procedures for the specified system or equipment. The manufacturer’s representative will also inspect the ongoing installation activities to confirm that they meet all manufacturers’ recommendations.

11.4 FUNCTIONAL TESTING

A. Inspection and testing of materials will be provided by the CONTRACTOR unless otherwise specified. 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 normally takes over the operation thereof.

B. The appropriate manufacturer's representative shall be present and assist with the initial test, which shall include, but not be limited to, checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Initial equipment and system adjustment and calibrations shall be performed in the presence of the OWNER, and with the assistance of, the CONTRACTOR. The above-mentioned manufacturer's certification shall include the statement that proper adjustments have been made, and that the equipment or system is ready for plant startup and operation.

11.5 OPERATIONAL READINESS TEST (ORT) ASSISTANCE

A. The appropriate manufacturer’s representative shall be present to assist the Process Instrumentation and Control Systems (PICS) Supplier with the ORT in accordance with Division 40, Instrumentation and Control for Process Systems. This assistance shall

include confirmation of all signals between the manufacturer's system or equipment and the PICS, as well as confirmation of proper operation of all controls internal to the manufacturer's system or equipment. Upon completion a copy of Operational Readiness Test documentation of said test shall be submitted to the OWNER.

11.6 SERVICES DURING PERFORMANCE TESTING AND PLANT STARTUP

A. Where plant startup services are called for in the Technical Specifications, or when technical assistance is necessary due to any malfunction of the equipment furnished, the manufacturer's representative shall furnish such services. The manufacturer's representative shall also assist with final performance and demonstration testing, as required by the Specifications. These services shall continue until such times as the applicable equipment has been successfully performance tested and has been accepted by the OWNER for full-time operation; appropriate manufacturer's representative shall be present to assist the Process Instrumentation and Control Systems (PICS) Supplier with the ORT in accordance with Division 40, Instrumentation and Control for Process Systems. This assistance shall include confirmation of all signals between the manufacturer's system or equipment and the PICS, as well as confirmation of proper operation of all controls internal to the manufacturer's system or equipment. Upon completion a copy of Operational Readiness Test documentation of said test shall be submitted to the OWNER.

11.7 TRAINING OF OWNER'S PERSONNEL

A. The manufacturer's representative shall furnish detailed instructions to the OWNER's personnel for operation of the specified equipment. These training services shall include pre-startup classroom, onsite equipment instruction, and post-startup classroom, as stated in the Technical Specifications.

B. The training session shall include theory, as appropriate, as well as specific operation and maintenance requirements. Training shall include both classroom and field training sessions. As a minimum, each training session shall be given twice to allow all required OWNER staff to attend. Training handouts shall be prepared for each attendee. An electronic version of the handouts shall be submitted to the OWNER at least one week prior to the training.

C. All training sessions shall be video recorded by the CONTRACTOR. Upon the completion of training the CONTRACTOR shall submit training DVD(s) to the OWNER. The OWNER shall be granted the rights to copy and distribute the DVD as required.

-END OF SECTION-

SECTION 11000 - SUMMARY OF WORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The WORK to be performed under this Contract shall consist of furnishing plant, tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The WORK shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the OWNER.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The WORK of this Contract comprises the construction of Blue Sink MFL Pump Station, with associated piping. The work includes construction of a 2 mgd pumping station with two raw water pumps and vacuum priming system located in a Pump Room, and electrical and instrumentation controls located in an Electrical Room. The Work includes construction of a two floating intake structures in Blue Sink, and 16-inch high density polyethylene (HDPE) suction pipes from the Sink to the new pumping station, a new 16-inch ductile iron raw water discharge main from the pumping station to the Sink, an 18-inch HDPE raw water crossing of Blue Sink, a 16-inch ductile iron pipe raw water discharge main, a 4-inch force main and new 8-inch sanitary sewer, water service, all necessary dewatering and all appurtenant work shown on the Plans, specified or required for a complete project.

B. The WORK is located at the OWNER's site, located at the end of 115th Ave. west of the intersection of 115th Ave. and Florida Ave., in the City of Tampa limits.

1.3 CONTRACT METHOD

A. The WORK hereunder will be constructed under a single lump sum contract.

1.4 WORK BY OTHERS

A. The OWNER will separately contract pipeline construction that will connect to this project and which will be located on the City's FC-100 Stormwater Pond, on which a portion of this project is located. Location of the project by others is shown on the Plans, and coordination requirements are noted on the Plans. Coordination with this work by others will be required. Where 2 or more contracts are being performed at one time on the same Site or adjacent land in such manner that work under one contract may interfere with work under another, the OWNER will determine the sequence and order of the Work in either or both contracts. When the Site of one contract is the necessary or convenient means of access for performance of work under another, the OWNER may grant privilege of access or other reasonable privilege to the contractor so desiring, to the extent, amount, and in manner and at time that the OWNER may determine. No OWNER determination of method or time or sequence or order of the work or access privilege shall be the basis for a claim for delay or damage except under provisions of the General Conditions for temporary suspensions of the work. The CONTRACTOR

shall conduct its operations so as to cause a minimum of interference with the work of such other contractors, and shall cooperate fully with such contractors to allow continued safe access to their respective portions of the Site, as required to perform work under their respective contracts.

B. Interference With Work On Utilities: The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the WORK, and shall schedule the WORK so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.5 WORK SEQUENCE

A. The CONTRACTOR shall complete the Blue Sink MFL Pump Station project and tie in the 16-inch discharge raw water main to the 16-inch raw water main being constructed by others. (The tie-in point is shown at pipeline Station 10+00 on Drawing C-1 of the Plans, at the western boundary of the Project.) Final testing under actual operating conditions will occur when the 16-inch raw water pipeline constructed by others is completed and placed in service from the FC-100 Stormwater Pond to its termination point.

1.6 CONTRACTOR USE OF SITE

A. The CONTRACTOR's use of the Site shall be limited to its construction operations, including on-Site storage of materials, on-Site fabrication facilities, and field offices.

1.7 OWNER USE OF THE SITE

A. The OWNER may utilize all or part of the FC-100 Stormwater Pond during the entire period of construction for the conduct of the OWNER's normal operations (maintenance and use of the pond for stormwater retention). The CONTRACTOR shall cooperate and coordinate with the OWNER to facilitate the OWNER's maintenance operations and to minimize interference with the CONTRACTOR's operations at the same time. In any event, the OWNER shall be allowed access to the Site during the period of construction.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 011400 – CONSTRUCTION CONSTRAINTS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. WORK shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the public and to the operation and maintenance of existing businesses and residents adjacent to the pump station site and pipeline alignment.

B. The CONTRACTOR shall incorporate the construction and schedule constraints of this Section in preparing the construction schedules required under Section 013216 – CPM Construction Schedule.

1.2 EXISTING FACILITIES

A. The CONTRACTOR shall perform the WORK without interference to existing businesses, utilities, or residents.

B. Unless indicated otherwise, temporary pumping, piping, power, lighting, controls, instrumentation, alarms, security devices, and safety devices shall be provided by the CONTRACTOR whenever its activity or interruption due to its activity affects any existing facilities.

C. The construction constraints in this Section do not include every item affecting the completion of the WORK, but are intended to describe the sequence of critical events necessary to minimize disruption. It shall be understood and agreed by the CONTRACTOR that the critical events described are not inclusive and that additional items of WORK not included may be required to minimize disruption and ensure compliance. Deviation from or modification of these suggested sequences is permitted if techniques and methods known to the CONTRACTOR will result in reducing disruption, and if deviation is approved in advance by the ENGINEER.

1.3 UTILITY CONNECTIONS

A. Making connections to existing utilities shall be thoroughly planned in advance, and required equipment, materials, and labor shall be on hand at the time of undertaking the connections. WORK shall be completed as quickly as possible and with as little delay as possible and shall proceed continuously (24 hours a day and seven days a week) if necessary to complete modifications and/or connections in the minimum time.

B. The cost of any temporary facilities and night, weekend, or holiday activity and overtime payments required during process interruptions shall be included in the WORK.

1.4 PERMITS

A. The CONTRACTOR shall abide by the conditions of permits and shall obtain proof of satisfaction of conditions from issuers of permits prior to acceptance of the WORK by the OWNER.

B. Conditions affecting the CONTRACTOR are found in the following permits. Copies of Items 1-9 below are attached to this Section as supplements.

1. Florida Department of Transportation Utility Permit (for water and sewer service connection WORK in Florida Avenue)

2. City of Tampa Water Department water service permit

3. City of Tampa Wastewater Department sewer service permit

4. Florida Department of Environmental Protection Construction Permit for Wastewater (4-inch force main and 8-inch gravity sewer in 115th Ave. and Florida Ave.)

5. Florida Department of Environmental Protection Construction Permit for Water Construction (2-inch water service in 115th Ave. and Florida Ave.) administered by the Hillsborough County Health Department.

6. USACOE Environmental Resource Permit

7. SWFWMD Environmental Resource Permit

8. SWFWMD Water Use Permit

9. Hillsborough County Environmental Protection Commission Miscellaneous Activities Permit

10. City of Tampa Development Services permit

11. SWFWMD Well Construction Permit and Well Completion Report. These permits shall be obtained by the CONTRACTOR's well drilling subcontractor for construction of the water level monitoring well work required by this contract.

12. USEPA NPDES General Permit for Stormwater Discharge and associated Stormwater Pollution Prevention Plan. This permit shall be obtained by the CONTRACTOR.

1.5 SCHEDULE CONSTRAINTS

A. General: It is the CONTRACTOR's responsibility to coordinate and plan the construction activities to integrate each schedule constraint into performance of the overall WORK.

B. The listing of schedule constraints below does not mean that every constraint or special condition has been identified. The list does not substitute for the CONTRACTOR's coordination and planning for completion of the WORK within the Contract Times.

C. The following constraints affect the construction schedule.

1. The 16-inch raw water main being constructed under separate contract by others must be completed prior to operational testing of the Blue Sink MFL Pump Station.

PART 1 -- PRODUCTS (NOT USED)

PART 2 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 012000 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. The Contractor shall cooperate and coordinate with the Engineer to schedule and administer the preconstruction meeting, monthly progress meetings, and specifically called meetings throughout the progress of the Work. The ENGINEER shall:

   a. Prepare agenda for meetings.

   b. Make physical arrangements for meetings.

   c. Preside at meetings.

   d. Take and distribute meeting minutes.

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

3. The Owner shall attend meetings to ascertain that the Work is expedited consistent with Contract Documents and construction schedules.

B. Related Requirements Described Elsewhere:

   1. Project Record Documents: Section 017200.

1.2 PRECONSTRUCTION MEETING

A. Engineer will schedule a preconstruction meeting no later than twenty (20) days after date of Notice to Proceed. The meeting shall be scheduled at the convenience of all parties.

B. Location: At the Tippin Water Treatment Plant unless specified otherwise by the Owner.

C. Attendance:

1. Owner's representative.

2. Engineer and his professional consultants.

3. Resident project representative.

4. Contractor and his superintendent.

5. Major subcontractors.

6. Representatives of major suppliers and manufacturers as appropriate.

7. Governmental and Utilities representatives as appropriate.

8. Others as requested by the Contractor, Owner, and Engineer.

D. The purpose of the preconstruction meeting is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.

E. The suggested agenda for the preconstruction meeting would include the following:

1. Distribution and discussion of:
   a. List of major subcontractors and suppliers.
   b. Projected schedules.
   c. Schedule of Values.

2. Critical work sequencing: Relationships and coordination with other contracts and/or work and continuing water repump plant operation.

3. Major equipment deliveries and priorities.

4. Project coordination: Designation and responsible personnel.

5. Procedures and processing of:
   a. Field decisions.
   b. Proposal requests.
   c. Request for Information.
   d. Submittals.
   d. Change Orders.
   f. Applications for Payment.

6. Submittal of Shop Drawings, project data and samples.

7. Adequacy of distribution of Contract Documents.

8. Procedures for maintaining Record Documents

9. Use of premises:
   a. Office, work, and storage areas.
   b. Owner's requirements.
   c. Access and traffic control.

10. Construction facilities, controls, and construction aids.

11. Temporary utilities.

12. Safety and first aid procedures.

13. Check of required Bond and Insurance certifications.

14. Completion time for contract and liquidated damages.

15. Request for extension of Contract Time.

16. Procedures for periodic monthly (or whatever interval is deemed appropriate or necessary, however, a minimum of monthly meetings will be required) progress meetings, for all involved.

17. Security procedures.

18. Procedures for making partial payments.

19. Guarantees on completed work.

20. Equipment to be used.

21. Project layout and staking of work.

22. Project inspection.

23. Labor requirements.

24. Laboratory testing of material requirements.

25. Provisions for material stored on site and monthly inventory of materials stored.

26. Requirements of other organizations such as utilities, highway departments, building departments.

27. Rights-of-way and easements.

28. Housekeeping procedures.

29. Liquidated damages.

30. Posting of signs and installation of Project Sign.

31. Pay request submittal dates.

32. Equal opportunity requirements.

1.3 MONTHLY PROGRESS MEETINGS

A. The ENGINEER shall schedule regular periodic meetings. The progress meetings will be held a minimum of once every thirty (30) days and at other times as required by the

progress of the Work. The first meeting shall be held within thirty (30) days after the preconstruction meeting or thirty (30) days or less after the date of Notice to Proceed.

B. Hold called meetings as required by progress of the Work.

C. Location of the meetings: Tippin Water Treatment Plant, 7125 N. 30th Street, Tampa, Florida 33610.

D. Attendance:

1. Engineer and his professional Subconsultants as needed.

2. Resident Project Representative.

3. Contractor and his Superintendent.

4. Owner's representatives.

5. Subcontractors (active on the site, as appropriate to the agenda).

6. Others as appropriate to the agenda (suppliers, manufacturers, other subcontractors, etc.).

E. The purpose of the meetings will be to review the progress of the Work.

F. The suggested agenda for the progress meetings will include but not be limited to the following:

1. Review approval of minutes of previous meeting.

2. Review of Work progress since previous meeting and Work scheduled (3-week look ahead schedule).

3. Field observations, problems, conflicts.

4. Problems which impede construction schedule.

5. Review of off-site fabrication, delivery schedules.

6. Corrective measures and procedures to regain projected schedule.

7. Status of approved Construction Schedule and revisions to the Construction Schedule as appropriate.

8. Progress schedule during succeeding work period.

9. Coordination of schedules.

10. Review status of submittals and submittal schedule, expedite as required.

11. Maintenance of quality standards.

12. Pending changes and substitutions.

13. Shop drawing problems.

14. Review proposed changes for:

    a. Effect on Construction Schedule and on completion date.

    b. Effect on other contracts of the Project.

15. Critical/long lead items.

16. Other business.

G. The Contractor is to attend progress meetings and is to study previous meeting minutes and current agenda items, and be prepared to discuss pertinent topics and provide specific information including but not limited to:

1. Status of all submittals and what specifically is being done to expedite them.

2. Status of all activities behind schedule and what specifically will be done to regain the schedule.

3. Status of all material deliveries, latest contact with equipment manufacturer, and specific actions taken to expedite materials.

4. Status of open deficiencies and what is being done to correct the same.

H. The Contractor is to provide a current submittal log at each progress meeting in accordance with Section 010001: Shop Drawings, Working Drawings, and Samples.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

- END OF SECTION -

SECTION 012900 - MEASUREMENT AND PAYMENT

PART 1 -- GENERAL

1.1 SCOPE

A. Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.

1.2 APPLICATIONS FOR PAYMENTS

A. Applications shall be consistent with Article 10.05 of the Tampa Agreement.

B. Draft Progress Payment Applications: Submit a draft pay application for City review prior to sending the original copies.

C. Final Progress Payment Applications:

1. Submit five (5) original copies after approval of draft copy. No copies of signatures or stamps will be allowed.

2. Submit typed applications on 8-1/2 inch x 11 inch white paper including the following:
   a. Updated project schedule (11”x17”)
   b. Updated Schedule of Values
   c. Copy of working As-Built drawings (11”x17”)
   d. All subcontractor release of liens (012900 Supplement No. 1)
   e. Copy of all new subcontracts
   f. City of Tampa Sub-(Contractors/Consultants/Suppliers) Payments Form (012900 Supplement No. 2)
   g. Updated City of Tampa Schedule of Sub- Contractors/Consultants/Suppliers) to be Utilized Form (012900 Supplement No. 3)
   h. City of Tampa, Contract Administration Department, Inventory List for Materials Stored on Site (012900 Supplement No. 4)
   i. City of Tampa, Material Ownership Certificate (012900 Supplement No. 5)
   k. City of Tampa, Payment Certificate for Labor, Materials & Equipment (01207 Supplement No. 5)
   l. City of Tampa, Certificate of Contractor (01207 Supplement No. 5)
   m. City of Tampa, Certificate (01207 Supplement No. 5)

n. City of Tampa, Final Payment Affidavit (if applicable) (01207 Supplement No. 6)

1.3 CONTRACT ITEM NO. 1: BLUE SINK PUMPING STATION AND SITE IMPROVEMENTS

A. Description: Under Contract Item 1 - Blue Sink Pumping Station and Site Improvements, furnish all labor, materials, equipment, services, testing, and incidentals to perform those operations necessary to construct the Blue Sink Pumping Station and all site improvements as shown on the Plans and as specified. This item includes all work shown on the Plan and specified, except that specifically included in other Contract Items. This item includes all work, labor, equipment, and materials necessary to completely construct the following: building foundation; pumping station building; permeable drive; drainage structures, sidewalk; asphalt parking; floor drains and drain piping; sump pump and sump pump piping; transformer; standing seam metal roof; all architectural work and finishes; lighting; HVAC; fencing; landscaping; irrigation system; all raw water piping, including suction piping header in Blue Sink, 16-inch HDPE raw water suction piping from Blue Sink to the new pumping station, ductile iron suction piping in the Pump Room, ductile iron discharge piping inside the Pump Room, including all fittings, valves, gauges, and Venturi meter; all air valves; and all other work necessary to incidental to the complete installation of all pump station suction and discharge piping; furnishing and installing raw water pumps, raw water pump vacuum priming system, variable frequency drives; transformers; all other electrical equipment; instrumentation; and all other equipment as shown on the Plans and as specified and not specifically included in other contract items. The WORK includes the 2" water service from the connection in Florida Ave. to the existing 12" water main to the station. The WORK includes the 4-inch force main from the pumping station site to a new sanitary manhole and the 8" gravity sewer from the new manhole to the existing manhole in Florida Ave. Contract Item 1 – Blue Sink Pumping Station and Site Improvements also includes any coordination work required by the Contractor with Tampa Electric Company (TECO) for providing electrical service and Brighthouse Networks for providing cable service. Only direct charges by TECO shall be paid under Contract Item No. 2A “Tampa Electric Company Allowance”. Only direct charges by Brighthouse shall be paid under Contract Item No. 2B “Network Cable Service Allowance”. All other labor, materials, equipment and service required to provide electrical service and cable service shall be included in Contract Item 1. The asphalt paving inside the pumping station permanent fencing is included in this Contract Item, as well as the pavement demolition and reconstruction outside of the station site within the right of way of 115th Ave., and the pavement repair and overlay in Florida Ave. Any work in 115th Ave. or Florida Ave., including restoration of curb, sidewalk and sodding is also included in this Contract Item.

B. Measurement and Payment: The Blue Sink Pump Station and Site Improvements will be the total cost to construct and complete the as shown, specified and ordered in writing by the ENGINEER.

C. Payment: Payment for Blue Sink Pump Station and Site Improvements will be made at the lump sum price for Contract Item No. 1.

1.4 CONTRACT ITEM NO. 2A: TAMPA ELECTRIC COMPANY ALLOWANCE

A. Description: The WORK under Contract Item 2A - Tampa Electric Company Allowance, TECO shall install all primary power and pull all wire and conduit for the primary side of the transformer. The primary power shall be constructed in 115th Avenue. The cost to be paid under this allowance shall be supported by TECO’s invoice.

B. Payment: Include in the total bid price an allowance of $50,000 for all Cost in Aid to Construction (CIAC) for coordination with TECO.

1.5 CONTRACT ITEM NO 2B: NETWORK CABLE SERVICE ALLOWANCE

A. Description: The WORK under Contract Item 2B – NETWORK CABLE SERVICE ALLOWANCE, Brighthouse Networks shall install all cable within the right of way to a box inside the Electrical Room to achieve a symmetrical 10 MBPs VPN connection. The cost to be paid under this allowance shall be supported by Brighthouse Networks invoice.

B. Payment: Include in the total bid price an allowance of $20,000.00 for all coordination with Brighthouse Networks.

1.6 CONTRACT ITEM NO 2C: WATER DEPARTMENT COMMITMENT LETTER FEES ALLOWANCE

A. The WORK under Contract Item 2C is for the CONTRACTOR to pay all Tampa Water Department fees outlined in the Water Service Commitment Letter. The OWNER has paid the water service application fees.

B. Payment: Include in the total bid price an allowance of $1000.00 for payment of water department commitment letter fees.

1.7 CONTRACT ITEM NO 2D: WASTEWATER DEPARTMENT COMMITMENT LETTER FEES ALLOWANCE

A. The WORK under Contract Item 2D is for the CONTRACTOR to pay all Tampa Wastewater Department fees outlined in the wastewater service commitment letter. The OWNER has paid the wastewater service application fees.

B. Payment: Include in the total bid price an allowance of $1000.00 for payment of sewer department commitment letter fees.

1.8 CONTRACT ITEM 3: PERMIT ALLOWANCE

A. Description: The WORK under Contract Item 3 – Permit Allowance, includes reimbursement for payment of permit fees required as authorized by OWNER. All other costs associated with obtaining permits shall be included in Contract Item No. 1. Prior to bidding the project the Owner has been issued the following:

1. Water Use Permit (SWFWMD)
2. Site and Building Permit plan approvals-- Owner has paid review fees, Contractor to pay permit fees (City of Tampa)
3. Environmental Resource Permit (SWFWMD)
4. Miscellaneous Activities in Wetlands Authorization (HCEPC)
5. Water Service Commitment (City of Tampa)
6. Sanitary Sewer Service Commitment (City of Tampa)
7. Utility Permit (FDOT)
8. Wastewater Collection / Transmission System (FDEP)

9. Water System Construction (FDEP/Hillsborough County Health Department)

B. Payment: Include in the total bid price an allowance of $10,000 for various permit fees. Fully document and obtain prior approval by OWNER of any amount of permit fees charged to the permit allowance.

1.9 CONTRACT ITEM 4: PROJECT ALLOWANCE

A. Description: The WORK under Contract Item 4 – Project Allowance, includes furnishing all labor, materials, equipment and services required due to authorized additional work.

B. Payment: Include in the total bid price an allowance of $100,000 for Contract Item 4.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 012973 - SCHEDULE OF VALUES

PART 1 -- GENERAL

1.1 GENERAL

A. This Section defines the process whereby the Schedule of Values (lump sum price breakdown) shall be developed and incorporated into the cost loading function of the CPM Schedule in accordance with the requirements of Section 013216 – CPM Construction Schedule.

B. Monthly progress payment amounts will be determined from the monthly progress updates of the CPM Schedule activities.

C. Develop the Schedule of Values independent of but simultaneous with the development of the CPM Schedule activities and logic.

1.2 PRELIMINARY SCHEDULE OF VALUES

A. Submit a preliminary Schedule of Values for the major components of the WORK at the Preconstruction Conference in accordance with the requirements of Section 011000 – Summary of Work.

B. At a minimum, submit proposed values for the following major WORK components of Contract Item 1 - Blue Sink Pumping Station and Site Improvements:

1. the total value of electrical WORK;

2. the total value of instrumentation and control WORK;

3. the total value of protective coatings WORK;

4. the total value of yard mechanical WORK inclusive of excavation, pipe installation, testing and backfill of pipe, and all incidental WORK associated with underground pipe installations;

5. the total value of mechanical WORK:

    a. exclusive of yard mechanical WORK included in Item 4 above, but including piping, valves, equipment, tanks, and appurtenances;

6. the total value of structural reinforced concrete WORK:

    a. inclusive of excavation, dewatering, subgrade preparation, backfill, and incidental WORK for new structures;

    b. break down this total value shall be broken down into separate values for each new structure constructed as a part of the WORK;

    c. miscellaneous and minor concrete WORK may be listed as one item in this breakdown;

7. the total value of buildings:

    a. inclusive of architectural WORK, doors, windows and other incidental systems and features;

8. the total value of site civil WORK, inclusive of clearing and grubbing, paving, grading and drainage WORK, and;

9. the total value of other WORK not specifically included in the above items.

C. Review and Revisions

1. The CONTRACTOR and ENGINEER shall meet and jointly review the preliminary Schedule of Values and make any adjustments in value allocations if, in the opinion of the ENGINEER, these are necessary to establish fair and reasonable allocation of values for the major WORK components.

2. Front-end loading will not be accepted.

3. The ENGINEER may require reallocation of major WORK components from items in the above listing if in the opinion of the ENGINEER such reallocation is necessary.

4. This review and any necessary revisions shall be completed within 15 Days from the date of Notice to Proceed.

1.3 DETAILED SCHEDULE OF VALUES

A. Prepare and submit a detailed Schedule of Values to the ENGINEER within 30 Days from the date of Notice to Proceed.

B. Base the detailed Schedule of Values on the accepted preliminary Schedule of Values for major WORK components.

C. Because the ultimate requirement is to develop a detailed Schedule of Values sufficient to determine appropriate monthly progress payment amounts through cost loading of the CPM Schedule activities, furnish a sufficiently detailed breakdown in order to meet this requirement.

D. The ENGINEER will be the sole judge of acceptable numbers, details and description of values established.

E. If, in the opinion of the ENGINEER, a greater number of Schedule of Values items than proposed is necessary, add the additional items so identified by the ENGINEER.

F. Submit the minimum detail of breakdown of the major WORK components as follows; furnish greater detail if requested by the ENGINEER:

1. Mobilization: no breakdown required;

2. Section 013216 – CPM Construction Schedule: break down by submittal;

3. Break down the electrical WORK, as follows:

a. Conduit and raceway installation, cable and wire installation, electrical equipment installation, terminations, and lighting; and,

b. Exterior electrical WORK;

4. Break down instrumentation and control WORK by structure;

5. Protective Coating WORK:

6. Yard Piping WORK:

   a. Break down into individual pipelines running from and to Contract termination points.

   b. Each pipeline shall be an individual pay item unless otherwise allowed by the ENGINEER.

7. Break down mechanical WORK within each structure in order to identify individual piping systems, equipment installation by equipment name and number, and equipment testing and checkout.

8. Break down concrete structures into excavation, subgrade preparation, and appurtenant pre-foundation WORK, concrete foundation construction, slabs on grade, and the like (provide sufficiently detailed breakdown in order to accommodate necessary Schedule detail), hydrostatic structure testing, where required, and backfill.

9. Break down buildings into masonry erection, roofs, decks, siding and soffit WORK, insulation, doors/windows/louvers, and other items determined to be necessary for the establishment of pay and schedule activity items.

10. Break down civil site WORK into paving, excavation cut and fill, removal of existing pipe, clearing and grubbing, and other items determined to be necessary for the establishment of pay and schedule activity items.

11. Break down pre-commissioning and commissioning based on completion milestones for each.

12. Break down other WORK not specifically included in the above items, as necessary for the establishment of pay and schedule activity items.

G. Adjustments and Acceptance

1. The CONTRACTOR and ENGINEER shall meet and jointly review the detailed Schedule of Values within 35 Days from the date of Notice to Proceed, at which time the value allocations and extent of detail shall be reviewed in order to determine if necessary adjustments to the values are required, and to determine if sufficient detail has been proposed in order to allow acceptable cost loading of the CPM Schedule activities.

2. Make necessary adjustments to the value allocation or level of detail, and submit a revised detailed Schedule of Values within 40 Days from the date of Notice to Proceed.

3. Following acceptance of the detailed Schedule of Values, incorporate the values into the cost loading portion of the CPM Schedule.

4. Concurrently develop the CPM activities and logic with the development of the detailed Schedule of Values; however, it shall be necessary to adjust the detailed Schedule of Values to correlate to individual Schedule activities.

5. It is anticipated that instances will occur, due to the independent but simultaneous development of the Schedule of Values and the CPM Schedule activities, where interfacing these 2 documents will require changes to each document.

6. Schedule activities may need to be added to accommodate the detail of the Schedule of Values, and Schedule of Value items may need to be added to accommodate the detail of the CPM Schedule activities.

7. Where such instances arise, propose changes to the Schedule of Values and to the CPM Schedule activities in order to satisfy the CPM Schedule cost loading requirements.

1.4 CROSS-REFERENCE LISTING

A. To assist in the correlation of the Schedule of Values and the CPM Schedule, provide a cross-reference listing to be furnished in 2 parts:

1. In the first part, list each scheduled activity with the breakdown of the respective valued items making up the total cost of the activity; and,

2. In the second part, list the valued item with the respective schedule activity or activities that make up the total indicated cost.

B. In the case where a number of schedule items make up the total cost for a valued item (shown in the Schedule of Values), indicate the total cost for each Schedule of Value item.

C. Update and submit these listings in conjunction with the CPM monthly submittals as indicated in Section 013216 – CPM Construction Schedule.

D. Incorporate approved Change Orders reflected in the CPM Schedule into the Schedule of Values as a single unit identified by the Change Order number.

1.5 CHANGES TO SCHEDULE OF VALUES

A. Changes to the CPM Schedule which additional activities not included in the original schedule but included in the original WORK (schedule omissions) shall have values assigned as approved by the ENGINEER.

B. Reduce other activity values in order to provide equal value adjustment increases for added activities, as approved by the ENGINEER.

C. In the event that the CONTRACTOR and ENGINEER agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 013216 - CPM CONSTRUCTION SCHEDULE

PART 1 -- GENERAL

1.1 GENERAL

A. The CONTRACTOR shall schedule the WORK in accordance with this Section.

B. Development of the schedule, monthly payment requisitions and project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling.

C. The CPM schedule and related reports should be prepared with the current version of Primavera Project Planner (P3) or SureTrak software.

1.2 DEFINITIONS

A. CPM Scheduling: The term shall be interpreted to be generally as outlined in the Association of General Contractors (AGC) publication, "The Use of CPM in Construction." except that either "i-j" arrow diagrams or precedence diagramming format may be utilized. In the case of conflicts between this Section and the AGC document, this Section shall govern.

B. Float: Unless otherwise indicated herein, float and total float are synonymous. Total float is the period of time measured by the number of Days each non-critical path activity may be delayed before it and its succeeding activities become part of the critical path. If a non-critical path activity is delayed beyond its float period, then that activity becomes part of the critical path and controls the end date of the WORK. Thus, delay of a non-critical path activity beyond its float period will cause delay to the project itself.

1.3 SCHEDULING QUALIFICATION SUBMITTALS

A. CONTRACTOR shall submit a statement of computerized CPM capability within 10 Days after Notice to Proceed to verify that either: (1) the CONTRACTOR has in-house capability qualified to use CPM techniques and the Primavera P3 or SureTrak software or (2) that the CONTRACTOR will arrange for the services of a CPM consultant so qualified. In either event the statement shall identify the individual who will perform the CPM scheduling and shall describe the construction projects required below. The statement shall also identify the contact persons for the referenced projects with current telephone and address information.

B. Criteria: The individual performing scheduling shall have successfully applied computerized CPM technique to at least 2 projects of similar nature, scope, and value not less than one half the Total Bid Price of this project.

1.4 INITIAL SCHEDULE SUBMITTALS

A. Where submittals are required hereunder, the CONTRACTOR shall submit 4 copies of each submittal item.

B. The CONTRACTOR shall submit 2 schedule documents at the Preconstruction Conference which serve as the CONTRACTOR's plan of operation for the initial 60 Day

period of the Contract Times and identify the manner in which the CONTRACTOR intends to complete the WORK within the Contract Times.

1. 60 Day Plan of Operation: During the initial 60 Days of the Contract Times, the CONTRACTOR shall conduct operations in accordance with a 60 Day bar chart type schedule. The chart so prepared shall show accomplishment of the CONTRACTOR's early activities (mobilization, permit acquisition, submittals necessary for early material and equipment procurement, submittals necessary for long lead equipment procurement, CPM submittals, initial sitework and other submittals and activities required in the first 60 Days).

2. Project Overview Bar Chart: The overview bar chart shall indicate the major components of the WORK and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the WORK will be made substantially complete and placed into service in order to meet the required milestones. Sufficient detail shall be included to subdivide major components in such activities as (1) excavation, (2) foundation subgrade preparation, (3) foundation concrete, (4) completion of structural concrete, (5) major mechanical WORK, (6) major electrical WORK, (7) instrumentation and control WORK, and (8) other important WORK for each major facility within the overall project scope. Planned durations and start dates shall be indicated for each WORK item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 11-inches by 17-inches in size. No more than 4 sheets shall be employed to present this overview information.

C. The ENGINEER and the CONTRACTOR shall meet to review and discuss the 60 Day plan of operation and project overview bar chart within 5 Days after submittal to the ENGINEER. The ENGINEER's review and comment on the schedules will be limited to conformance with the sequencing and milestone requirements in the Contract Documents. The CONTRACTOR shall make corrections to the schedules necessary to comply with the requirements and shall adjust the schedules to incorporate any missing information requested by the ENGINEER.

1.5 CPM SCHEDULE SUBMITTALS

A. Original CPM Schedule Submittal: Within 45 Days after the commencement date stated in the Notice to Proceed, the CONTRACTOR shall submit for review by the ENGINEER a hard copy of the CPM schedule and the computerized schedule report tabulations. The CONTRACTOR shall also submit a CD or other acceptable electronic format that contain the schedule submittal information. The data shall be compatible with Primavera P3 or SureTrak to generate network diagrams and schedule reports identical to the hard copies submitted. This submittal shall have already been reviewed and approved by the CONTRACTOR's Project Manager, superintendent, and estimator prior to submission. The CPM schedule shall be a time-scaled network diagram of the "i-j" activity-on-arrow or precedence type. The network diagram shall describe the activities to be accomplished and their logical relationships and shall show the critical path.

B. The computerized schedule report tabulations shall include the following:

1. Report of activities sorted by activity number: Activity numbers, where practical, shall correlate to the area numbers designated on the Contract Drawings as further defined in Section 11000 – Summary of Work.

2. Report of activities sorted by early start date.

3. Report of activities sorted by total float.

4. Report of activities sorted by responsibility code. Responsibility codes shall be established for the CONTRACTOR, ENGINEER, OWNER, Subcontractors, Suppliers, etc. These codes shall be identified in the Network Diagram.

5. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities.

C. Analysis

1. Early Completion

a. The CONTRACTOR may show early completion on the original CPM submittal if that is its plan.

b. An original CPM submittal showing early completion shall either be accompanied by:

1) Request for change of Contract Times at zero change of Contract Price, accompanied by documentation demonstrating that the Bid was based on early completion, or

2) Demonstration in the submittal that the time difference between early completion and the original Contract Time is total float.

c. An early completion schedule unaccompanied by one of these will not be accepted.

d. The ENGINEER will analyze a request for Change Order in accordance with the General Conditions.

2. Float Ownership: Neither the OWNER nor the CONTRACTOR owns the float time. The project owns the float time. Liability for delay to the project completion date rests with the party causing the delay. For example, if Party A is responsible for consuming a portion of the float time and Party B later consumes the remainder of the float time plus additional time beyond the float time, Party B is responsible for the time that is a delay past the completion date. Party A would not be responsible for any delay since it did not consume all the float time, additional float time remained after its delay, and the completion date was unaffected by its tardiness.

D. Original CPM Schedule Review Meeting: The CONTRACTOR shall, within 55 Days from the commencement date stated in the Notice to Proceed, meet with the ENGINEER to review the original CPM schedule submittal. The CONTRACTOR shall have the Project Manager, superintendent, and the scheduler in attendance. The ENGINEER's review will be limited to conformance with the Contract Documents. However, the review may also include:

1. Clarifications of the design intent.

2. Directions to include activities and information missing from the submittal.

3. Requests to the CONTRACTOR to clarify and revise the schedule.

E. Revisions to the Original CPM Schedule: Within 65 Days after the commencement date stated in the Notice to Proceed, the CONTRACTOR shall revise the original CPM schedule submittal to address review comments from the original CPM schedule review meeting and resubmit the network diagrams and reports for the ENGINEER's review. The ENGINEER, within 14 Days from the date that the CONTRACTOR submitted the revised schedule will either (1) accept the schedule as submitted, or (2) advise the CONTRACTOR in writing to review any part or parts of the schedule which either do not meet the requirements or are unsatisfactory for the ENGINEER to monitor the progress and status of WORK or evaluate monthly payment requests by the CONTRACTOR. The ENGINEER may accept the schedule conditional upon the first monthly CPM schedule update correcting deficiencies identified. When the schedule is accepted, it shall be considered as the "Original CPM Construction Schedule" until an updated schedule has been submitted. The ENGINEER reserves the right to require that the CONTRACTOR adjust, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of WORK or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

F. Acceptance

1. Acceptance of the CONTRACTOR's schedule by the ENGINEER and OWNER will be based solely upon compliance with the requirements. By way of the CONTRACTOR assigning activity durations and proposing the sequence of the WORK, the CONTRACTOR agrees to utilize sufficient and necessary management and other resources to perform WORK in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.

2. Submission of the CONTRACTOR's progress schedule to the ENGINEER shall not relieve the CONTRACTOR of total responsibility for scheduling, sequencing, and pursuing the WORK to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed WORK.

G. Monthly Updates and Periodic CPM Schedule Submittals

1. Following acceptance of the CONTRACTOR's original CPM schedule, the CONTRACTOR shall monitor the progress of the WORK and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Each schedule update submittal shall be complete including information requested in the original schedule submittal and be in the schedule report format indicated below. Each update shall continue to show WORK activities including those already completed. Completed activities shall accurately depict "as built" information by indicating when the WORK was actually started and completed.

2. Neither the submission nor the updating of the CONTRACTOR's original schedule submittal nor the submission, updating, change, or revision of any other report, curve, schedule, or narrative submitted by the CONTRACTOR, nor the ENGINEER's review or acceptance of any such report, curve, schedule, or narrative shall have the effect of amending or modifying in any way the Contract Times or milestone dates or of modifying or limiting in any way the CONTRACTOR's obligations under the Contract. Only a signed, fully executed Change Order can modify contractual obligations.

3. The monthly schedule update submittal will be reviewed with the CONTRACTOR during a monthly construction progress meeting held on the 20th Day of each month. The goal of these meetings is to enable the CONTRACTOR and the ENGINEER to initiate appropriate remedial action to minimize any known or foreseen delay in completion of the WORK and to determine the amount of WORK completed since the last schedule update. The status of the WORK will be determined by the percent complete of each activity in the updated CPM schedule. These meetings are considered a critical component of the overall monthly schedule update submittal, and the CONTRACTOR shall have appropriate personnel attend. As a minimum, the CONTRACTOR's Project Manager and superintendent shall attend these meetings. The CONTRACTOR shall plan on the meeting taking no less than 6 hours. Within 7 Days after the monthly progress meeting, the CONTRACTOR shall submit the revised CPM schedule, the revised CPM computerized tabulations, the revised successor/predecessor report, the project status reports as defined below and the CONTRACTOR's Application for Payment. Within 5 Days of receipt of the revised submittals, the ENGINEER will either accept or reject the monthly schedule update submittal. If rejected, the update shall be corrected and resubmitted by the CONTRACTOR before the Application for Payment for the update period will be processed.

H. Schedule Revisions: The CONTRACTOR shall highlight or otherwise identify changes to the schedule logic or activity durations made from the previous schedule. The CONTRACTOR shall modify any portions of the CPM schedule which become infeasible because activities are behind schedule or for any other valid reason.

1.6 CHANGE ORDERS

A. Upon approval of a Change Order or upon receipt by the CONTRACTOR of authorization to proceed with additional WORK, the change shall be reflected in the next submittal of the CPM Schedule. The CONTRACTOR shall utilize a sub-network in the schedule depicting the changed WORK and its effect on other activities. This sub-network shall be tied to the main network with appropriate logic so that a true analysis of the critical path can be made. Whenever the CONTRACTOR believes that a Change Order will extend the Contract Times, the sub-network analysis herein shall be submitted with the price proposal for the change. If the CONTRACTOR does not submit the sub-network demonstrating that the change affects the Contract Times, then no subsequent claim for additional time due to the change will be accepted.

1.7 CPM STANDARDS

A. Construction Schedules: Construction schedules shall include a graphic network diagram and computerized schedule reports as required below for status reporting.

B. Networks: The CPM network shall be in a form of a time scaled "i-j" activity-on-arrow or precedence type diagram and may be divided into a number of separate sheets with suitable match lines relating the interface points among the sheets. Individual sheets shall not exceed 36-inches by 60-inches.

C. Construction and procurement activities shall be presented in a time-scaled format with a calendar time line along the entire sheet length. Each activity arrow or node shall be plotted so that the beginning and completion dates of each activity are accurately represented along the calendar time line. Every activity shall use symbols that clearly distinguish between critical path activities, non-critical activities, and free float for each

non-critical activity. Activity items shall be identified by their activity number, responsibility code, duration, and dollar value. Non-critical path activities shall show total float time in scale form by utilizing a dotted line or some other graphical means.

D. Duration Estimates: The duration estimate for each activity shall be computed in Days and shall represent the single best estimate considering the scope of the WORK and resources planned for the activity. Except for certain non-labor activities such as curing of concrete or delivery of materials, activity duration shall not exceed 10 Days nor be less than one Day, unless otherwise accepted by the ENGINEER.

1.8 SCHEDULE REPORT FORMAT

A. Schedule Reports: Schedule reports shall be prepared based on the CPM schedule, shall be submitted on paper and floppy disk or CD, depending on file size, and shall include the following minimum data for each activity:

1. Activity numbers and responsibility codes.
2. Work Order No.
3. CIP No.
4. Estimated activity duration.
5. Activity description.
6. Activity percent completion.
7. Early start date (calendar dated).
8. Early finish date (calendar dated).
9. Late start date (calendar dated).
10. Late finish date (calendar dated).
11. Status (whether critical).
12. Total float for each activity.
13. Free float for each activity.

B. Project Information: Each Schedule Report shall be prefaced with the following summary data:

1. Project name.
2. CONTRACTOR name.
3. Type of tabulation.
4. Project duration.
5. Contract Times (as revised by Change Orders).

6. The commencement date stated in the Notice to Proceed.

7. The data date and plot date of the CPM Schedule.

8. If an update, cite the new schedule completion date.

1.9 PROJECT STATUS REPORTING

A. The CONTRACTOR shall furnish monthly project status reports (overview bar chart and a written narrative report) in conjunction with the revised CPM schedules as indicated above. Status reporting shall be in the form below.

B. The CONTRACTOR shall prepare and submit monthly an overview bar chart schedule of the major project components. The overview bar chart schedule shall be a summary of the current CPM schedule (original and as updated and adjusted throughout the entire construction period). The major project components shall be represented as time bars which shall be subdivided into various types of WORK including demolition, excavation and earthwork, yard piping, concrete construction, and mechanical, electrical and instrumentation installations. Major components shall include each new structure by area designation, sitework, modifications to existing structures, tie-ins to existing facilities, and plant startups.

C. Each major component and subdivision shall be accurately plotted consistent with the project overview bar chart above. It shall represent the same status indicated by early start and finish activity information contained in the latest update of the CPM schedule. In addition, a percent completion shall be indicated for each major component and subdivision. The initial submittal of the overview bar chart schedule shall be made at the time that the revised original CPM schedule is submitted to the ENGINEER. The CONTRACTOR shall amend the overview schedule to include any additional detail required by the ENGINEER. The CONTRACTOR shall include any additional information requested by the ENGINEER at any time during the construction of the WORK.

D. The CONTRACTOR shall prepare monthly written narrative reports of the status of the project for submission to the ENGINEER. Status reports shall include:

1. The status of major project components (percent complete, amount of time ahead or behind schedule) and an explanation of how the project will be brought back on schedule if delays have occurred.

2. The progress made on critical activities indicated on the CPM schedule.

3. Explanations for any lack of WORK on critical path activities planned for the last month.

4. Explanations for any schedule changes, including changes to the logic and to activity durations.

5. A list of the critical activities scheduled to be performed in the next 2 months.

6. The status of major material and equipment procurement.

7. The value of materials and equipment properly stored at the Site but not yet incorporated into the WORK.

8. Any delays encountered during the reporting period.

9. An assessment of inclement weather delays and impacts to the progress of the WORK.

E. The CONTRACTOR may include any other information pertinent to the status of the WORK. The CONTRACTOR shall include additional status information requested by the ENGINEER.

1.10 INCLEMENT WEATHER PROVISIONS OF THE SCHEDULE

A. The CONTRACTOR's schedule shall include at least the number of Days of delay due to unusually severe weather as required by the Contract conditions.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 013300 - CONTRACTOR SUBMITTALS

PART 1 -- GENERAL

1.1 GENERAL

A. Wherever submittals are required by the Contract Documents, submit them to the ENGINEER.

B. Within 7 Days after the date of commencement as stated in the Notice to Proceed, submit the following items for review:

1. Submittal Schedule
    a. Submit a preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("or equal") submittals listed in the Bid.
    b. Base the schedule of submittals on CONTRACTOR's priority, planned construction sequence and schedule, long-lead items, and size of submittal package.
    c. Allow time for resubmittals.

2. Submit a list of permits and licenses the CONTRACTOR shall obtain, indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

1.2 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference of Section 011000 – Summary of Work, submit the following items to the ENGINEER for review:

1. a revised schedule of Shop Drawings, Samples, and proposed Substitution ("or-equal") submittals listed in the Bid;

2. a list of permits and licenses the CONTRACTOR shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit;

3. a preliminary schedule of values in accordance with Section 012973 – Schedule of Values;

4. a 60-day plan of operation in accordance with Section 013216 – CPM Construction Schedule;

5. a project overview bar chart in accordance with Section 013214 – Bar chart Construction Schedule; and,

6. a detailed layout of the field office required under Section 015200 – Field Office, Equipment, and Services; the office shall not be shipped to the Site until the layout is approved.

1.3 SHOP DRAWINGS

A. Wherever called for in the Contract Documents or where required by the ENGINEER, furnish copies as described in Section 010001 9.2.A.

B. Whenever the CONTRACTOR is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the State of Florida wherein the Project is located, unless otherwise indicated.

C. Transmittal Form

1. Shop Drawing submittals shall be accompanied by the ENGINEER's standard submittal transmittal form, a reproducible copy of which is available from the ENGINEER.

2. A submittal without the form, or where applicable items on the form have not been completed, will be returned for resubmittal.

D. Organization

1. Use a single submittal transmittal form for each technical specification Section or item or class of material or equipment for which a submittal is required.

2. A single submittal covering multiple Sections will not be accepted, unless the primary specification references other Sections for components: For example, if a pump Section references other Sections for the motor, shop-applied protective coating, anchor bolts, local control panel, and variable frequency drive, a single submittal would be accepted, whereas a single submittal covering vertical turbine pumps and horizontal split-case pumps would not be accepted.

3. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components.

4. Relate the submittal components to specification paragraph and subparagraph, Drawing number, detail number, schedule title, room number, or building name, as applicable.

5. Unless otherwise indicated, match terminology and equipment names and numbers used in the submittals with those used in the Contract Documents.

E. Format

1. Minimum sheet size shall be 8-1/2 inches by 11 inches, and maximum sheet size shall be 24 inches by 36 inches.

2. Number every page in a submittal in sequence.

3. Collate and staple or bind, as appropriate, each copy of a submittal; the ENGINEER will not collate sheets or copies.

4. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports.

5. Present a sufficient level of detail for assessment of compliance with the Contract Documents.

6. Numbering

   a. Assign to each submittal a unique number including specification section.

   b. Number the submittals sequentially, with the submittal numbers clearly noted on the transmittal.

   c. Assign original submittals a numeric submittal number followed by a letter of the alphabet in order to distinguish between the original submittal and each resubmittal: For example, if submittal "25-A" requires a resubmittal, the first resubmittal will bear the designation "25-B" and the second resubmittal will bear the designation "25-C," and so on.

F. Disorganized submittals that do not meet the requirements of the Contract Documents will be returned without review.

G. ENGINEER's Review

1. Except as otherwise indicated, the ENGINEER will return prints of each submittal to the CONTRACTOR with comments noted thereon, within 30 Days following receipt by the ENGINEER.

2. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the ENGINEER by the first resubmittal on an item.

3. The OWNER reserves the right to withhold monies due to the CONTRACTOR to cover additional costs of the ENGINEER's review beyond the first resubmittal.

4. The ENGINEER'S maximum review period for each submittal or resubmittal will be 30 Days; thus, for a submittal that requires 2 resubmittals before it is complete, the maximum review period could be 90 Days.

H. If a submittal is returned to the CONTRACTOR marked "NO EXCEPTIONS TAKEN," formal revision and resubmission will not be required.

I. If a submittal is returned marked "MAKE CORRECTIONS NOTED," the CONTRACTOR shall make the corrections on the submittal, but formal revision and resubmission will not be required.

J. Resubmittals

1. If a submittal is returned marked "AMEND-RESUBMIT," the CONTRACTOR shall revise the submittal and resubmit the required number of copies.

2. Resubmittal of portions of multi-page or multi-drawing submittals will not be accepted: For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as "AMEND-RESUBMIT," the submittal as a whole is deemed "AMEND-RESUBMIT," and 10 drawings are required to be resubmitted.

3. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

K. Rejected Submittals

1. If a submittal is returned marked "REJECTED-RESUBMIT," it shall mean either that the proposed material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with Section 016000 – Products, Materials, Equipment, and Substitutions.

2. In the first 2 cases, the CONTRACTOR shall prepare a new submittal and shall submit the required number of copies.

3. In the latter case, the CONTRACTOR shall submit the substitution request according to the requirements of Section 016000 – Products, Materials, Equipment, and Substitutions.

4. The resubmittal of rejected portions of a previous submittal will not be accepted.

L. The fabrication of an item may commence only after the ENGINEER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

M. Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the contract requirements.

N. Review by CONTRACTOR

1. Submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission to the ENGINEER.

2. Each submittal shall be dated and signed by the CONTRACTOR as being correct and in strict conformance with the Contract Documents.

3. In the case of Shop Drawings, each sheet shall be so dated and signed.

4. Any deviations from the Contract Documents shall be noted on the transmittal sheet.

5. The ENGINEER will only review submittals that have been so verified by the CONTRACTOR.

6. Non-verified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

O. Conformance

1. Corrections or comments made on the CONTRACTOR's Shop Drawings during review shall not relieve the CONTRACTOR from compliance with Contract Drawings and Specifications.

2. Review is for conformance to the design concept and general compliance with the Contract Documents only.

3. The CONTRACTOR shall be responsible for confirming and correlating quantities and dimensions, fabrication processes and techniques, coordinating WORK with the trades, and satisfactory and safe performance of the WORK.

1.4 SAMPLES

A. Quantity

1. The CONTRACTOR shall submit the number of samples indicated by the Specifications.

2. If the number is not indicated, submit not less than 3 samples.

3. Where the quantity of each sample is not indicated, submit such quantity as necessary for proper examination and testing by the methods indicated.

B. Identification and Distribution

1. Individually and indelibly label or tag each sample, indicating the salient physical characteristics and the manufacturer's name.

2. Upon acceptance by the ENGINEER, one set of the samples will be stamped and dated by the ENGINEER and returned to the CONTRACTOR, one set of samples will be retained by the ENGINEER, and one set shall remain at the Site in the ENGINEER's field office until completion of the WORK.

C. Selection

1. Unless otherwise indicated, the ENGINEER will select colors and textures from the manufacturer's standard colors and standard materials, products, or equipment lines.

2. If certain samples represent non-standard colors, materials, products, or equipment lines that will require an increase in Contract Times or Price, the CONTRACTOR shall clearly state so on the transmittal page of the submittal.

D. The CONTRACTOR shall schedule sample submittals such that:

1. Sample submittals for color and texture selection are complete so the ENGINEER has 45 Days to assemble color panels and select color- and texture-dependent products and materials without delay to the construction schedule; and,

2. After the ENGINEER selects colors and textures, the CONTRACTOR has sufficient time to provide the products or materials without delay to the construction schedule.

3. The Contract Times will not be extended for the CONTRACTOR's failure to allow enough review and approval or selection time, failure to submit complete samples requiring color or texture selection, or failure to submit complete or approvable samples.

1.5 QUALITY CONTROL (QC) SUBMITTALS

A. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the ENGINEER that the CONTRACTOR has satisfied certain requirements of the Contract Documents.

B. Unless otherwise indicated, QC submittals shall be submitted:

1. Before delivery and unloading, for the following types of submittals:
    a. Manufacturers' installation instructions
    b. Manufacturers' and Installers' experience qualifications
    c. Ready mix concrete delivery tickets
    d. Design calculations
    e. Affidavits and manufacturers' certification of compliance with indicated product requirements
    f. Laboratory analysis results
    g. Factory test reports

2. Within 30 Days of the event documented for the following types of submittals:
    a. Manufacturers' field representative certification of proper installation
    b. Field measurement
    c. Field test reports
    d. Receipt of permit
    e. Receipt of regulatory approval

C. The ENGINEER will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures above for Shop Drawings and samples will not apply.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 013553 – SITE SECURITY

PART 1 -- GENERAL

1.1 SECURITY PROGRAM

A. The CONTRACTOR shall:

1. Protect WORK from theft, vandalism, and unauthorized entry.
2. Initiate program at mobilization.
3. Maintain program throughout construction period until OWNER'S occupancy.

1.2 ENTRY CONTROL

A. The CONTRACTOR shall:

1. Restrict entry of persons and vehicles into Site.
2. Allow entry only to authorized persons with proper identification.
3. Maintain log of workmen and visitors and make log available to OWNER on request.
4. Coordinate access of OWNER'S personnel to Site.

B. The CONTRACTOR shall control the entrance of persons and vehicles.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 014213 - ABBREVIATIONS OF INSTITUTIONS

PART 1 -- GENERAL

1.1 GENERAL

A. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of the Specifications, the following acronyms or abbreviations which may appear shall have the meanings indicated herein.

1.2 ABBREVIATIONS

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Bearing Manufacturer's Association – ABMA
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
AF&PA	American Forest and Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AIHA	American Industrial Hygiene Association
AIIM	Association for Information and Image Management
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMA	Acoustical Material Association
AMCA	Air Movement and Control Association International, Inc
ANS	American Nuclear Society
ANSI	American National Standards Institute, Inc.
APA	The Engineered Wood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air-Conditioning and Refrigeration Institute
ASA	Acoustical Society of America
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society of Nondestructive Testing
ASQ	American Society for Quality
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWCI	American Wire Cloth Institute
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute

AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
CABO	Council of American Building Officials
CDA	Copper Development Association
CEMA	Conveyors Equipment Manufacturer's Association
CGA	Compressed Gas Association
CLFMI	Chain Link Fence Manufacturer's Institute
CLPCA	California Lathing and Plastering Contractors Association
CMAA	A division/section of the Material Handling Industry of America
CRSI	Concrete Reinforcing Steel Institute
DCDMA	Diamond Core Drilling Manufacturer's Association
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EI	Energy Institute
EIA	Electronic Industries Alliance
EPA	Environmental Protection Agency
ETL	Electrical Test Laboratories
FCC	Federal Communications Commission
FCI	Fluid Controls Institute
FEMA	Federal Emergency Management Association
FHWA	Federal Highway Administration
FM	Factory Mutual System
FPL	Forest Products Laboratory
HI	Hydronics Institute, Hydraulic Institute
HSWA	Federal Hazardous and Solid Waste Amendments
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
ICCEC	Electrical Code
ICC-ES	International Code Council Evaluation Service
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IFC	International Fire Code
IFGC	International Fuel Gas Code
IMC	International Mechanical Code
IME	Institute of Makers of Explosives
IPC	International Plumbing Code, Association Connecting Electronic Industries
IRC	International Residential Code
ISA	Instrument Society of America
ISDI	Insulated Steel Door Institute
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
ITU-T	Telecommunications Standardization Sector of the International Telecommunications Union
LPI	Lightning Protection Institute
LRQA	Lloyd’s Register Quality Assurance
MBMA	Metal Building Manufacturer's Association
MIL	Military Standards (DoD)

MPTA	Mechanical Power Transmission Association
MSS	Manufacturers Standardization Society
NAAMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
DASMA	Door and Access Systems Manufacturers Association International
NAPF	National Association of Pipe Fabricators
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NCCLS	National Committee for Clinical Laboratory Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association or National Fluid Power Association
NISO	National Information Standards Organization
NIST	National Institute of Standards and Technology
NLGI	National Lubricating Grease Institute
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NWWDA	National Wood Window and Door Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PPI	Plastic Pipe Institute
RCRA	Resource Conservation and Recovery Act
RIS	Redwood Inspection Service, a division of the California Redwood Association, CRA
RMA	Rubber Manufacturers Association
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SDI	Steel Door Institute, Steel Deck Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPFA	Steel Plate Fabricator’s Association
SPIB	Southern Pine Inspection Bureau
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Society for Protective Coating
SSPWC	Standard Specifications for Public Works Construction
STLE	Society of Tribologists and Lubricating Engineers
TAPPI	Technical Association of the Worldwide Pulp, Paper, and Converting Industry
TFI	The Fertilizer Institute
TIA	Telecommunications Industries Association
TPI	Truss Plate Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WDMA	National Window and Door Manufacturers Association
WEF	Water Environment Federation
WI	Woodwork Institute
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 014219 - REFERENCE STANDARDS

PART 1 -- GENERAL

1.1 GENERAL

A. Titles of Sections and Paragraphs**:** Titles and subtitles accompanying specification sections and paragraphs are for convenience and reference only and do not form a part of the Specifications.

B. Applicable Publications**:** Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is indicated, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Contract is advertised for Bids shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth in the Specifications or shown on the Drawings will be waived because of any provision of or omission from said standards or requirements.

C. Specialists, Assignments**:** In certain instances, specification text requires (or implies) that specific WORK is to be assigned to specialists or expert entities who must be engaged to perform that WORK. Such assignments shall be recognized as special requirements over which the CONTRACTOR has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the WORK; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of WORK is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of Contract requirements remains with the CONTRACTOR.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The CONTRACTOR shall construct the WORK in accordance with the Contract Documents and the referenced portions of those referenced codes, standards, and specifications.

B. References to “Building Code” or “Standard Building Code” shall mean the Florida Building Code of the International Code Council. Similarly, references to "Mechanical Code" or "Uniform Mechanical Code," "Plumbing Code" or "Uniform Plumbing Code," "Fire Code" or "Uniform Fire Code," shall mean Florida Mechanical Code, Florida Plumbing Code and Florida Fire Code of the International Code Council (ICC). "Electric Code" or "National Electric Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA). The latest edition of the codes as approved by the Municipal Code and used by the local agency as of the date that the WORK is advertised for Bids shall apply to the WORK herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the ENGINEER for clarification and direction prior to ordering or

providing any materials or furnishing labor. The CONTRACTOR shall bid for the most stringent requirements.

D. References to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

E. References to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

1.3 REGULATIONS RELATED TO HAZARDOUS MATERIALS

A. The CONTRACTOR shall be responsible that all WORK included in the Contract Documents, regardless if indicated or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other federal, state, and local regulations governing the storage and conveyance of hazardous materials, including petroleum products.

B. Where no specific regulations exist and the OWNER has not waived the requirement in writing, chemical, hazardous, and petroleum product piping and storage in underground locations shall be double containment piping and tanks or be installed in separate concrete trenches and vaults with an approved lining that cannot be penetrated by the chemicals.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 014500 - QUALITY CONTROL

PART 1 -- GENERAL

1.1 DEFINITION

A. Specific quality control requirements for the WORK are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the WORK beyond furnishing of manufactured products. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.

1.2 INSPECTION AT PLACE OF MANUFACTURE

A. Unless otherwise indicated, all products, materials, and equipment shall be subject to inspection by the ENGINEER at the place of manufacture.

B. The presence of the ENGINEER at the place of manufacturer, however, shall not relieve the CONTRACTOR of the responsibility for providing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the CONTRACTOR, and said duty shall not be avoided by any act or omission on the part of the ENGINEER.

1.3 SAMPLING AND TESTING

A. Unless otherwise indicated, all sampling and testing will be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the OWNER reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the ENGINEER will assure the OWNER that the quality of the workmanship is in full accord with the Contract Documents.

B. Any waiver by the OWNER of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the testing or other quality assurance requirements originally indicated, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial WORK, shall not be construed as a waiver of any requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the ENGINEER reserves the right to make independent investigations and tests, and failure of any portion of the WORK to meet any of the requirements of the Contract Documents, shall be reasonable cause for the ENGINEER to require the removal or correction and reconstruction of any such WORK in accordance with the General Conditions.

1.4 INSPECTION AND TESTING SERVICE

A. Inspection and testing laboratory service shall comply with the following:

1. Unless indicated otherwise by the Technical Specifications, the CONTRACTOR shall appoint, employ, and pay for services of an independent firm to perform inspection and testing required by the Contract Documents. The independent

testing firm shall be approved by the OWNER. Cost of testing required by the contract documents shall be paid by the CONTRACTOR.

2. The ENGINEER or independent firm will perform inspections, testing, and other services as required by the ENGINEER under Paragraph 1.3C above.

3. Reports of testing, regardless of whether the testing was the ENGINEER'S or the CONTRACTOR'S responsibility, will be submitted to the ENGINEER in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

4. The CONTRACTOR shall cooperate with the OWNER or independent firm and furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.

5. The CONTRACTOR shall coordinate with the independent testing firm and notify ENGINEER and OWNER 48 hours prior to the expected time for operations requiring inspection and laboratory testing services to provide the ENGINEER and OWNER opportunity to observe any testing or sampling performed.

6. Retesting required because of non-conformance to requirements shall be performed by the same independent firm on instructions by the ENGINEER. The CONTRACTOR shall bear all costs from such retesting.

7. For samples and tests required for CONTRACTOR'S use, the CONTRACTOR shall make arrangements with an independent firm for payment and scheduling of testing. The cost of sampling and testing for the CONTRACTOR'S use shall be the CONTRACTOR'S responsibility.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 INSTALLATION

A. **Inspection**: The CONTRACTOR shall inspect materials or equipment upon the arrival on the job site and immediately prior to installation, and reject damaged and defective items.

B. **Measurements**: The CONTRACTOR shall verify measurements and dimensions of the WORK, as an integral step of starting each installation.

C. **Manufacturer's Instructions**: Where installations include manufactured products, the CONTRACTOR shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

- END OF SECTION -

SECTION 015000 - MOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

A. CONTRACTOR shall mobilize as required for the proper performance and completion of the WORK and in accordance with the Contract Documents.

B. Mobilization shall include at least the following items:

1. Moving onto the Site CONTRACTOR's equipment necessary for the first month of operations.

2. Installing temporary construction power, wiring, and lighting facilities.

3. Establishing fire protection system.

4. Developing construction water supply.

5. Providing field offices for the CONTRACTOR, complete with furnishings, equipment, and utility services.

6. Providing on-Site communication facilities, including communication equipment.

7. Providing on-Site sanitary facilities and potable water facilities.

8. Arranging for and erection of CONTRACTOR's WORK and storage yards.

9. Constructing and implementing security features and requirements complying with Section 013553 – Site Security.

10. Obtaining required permits.

11. Having OSHA required notices and establishing safety programs.

12. Having the CONTRACTOR's superintendent at the Site full time.

13. Submitting initial submittals.

1.2 PAYMENT FOR MOBILIZATION

A. The CONTRACTOR's attention is directed to the condition that no payment for mobilization, or any part thereof, will be recommended for payment under the Contract until mobilization items listed above have been completed.

PART 1 -- PRODUCTS (NOT USED)

PART 2 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 015010 - PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.1 GENERAL

A. The CONTRACTOR shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

1.2 RIGHTS-OF-WAY

A. The CONTRACTOR shall not do any WORK that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon the rights-of-way involved until notified that the OWNER has secured authority therefor from the proper party.

B. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure, or replace the same.

1.3 PROTECTION OF STREET OR ROADWAY MARKERS

A. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced. Survey markers or points disturbed by the CONTRACTOR shall be accurately restored after street or roadway resurfacing has been completed.

1.4 RESTORATION OF PAVEMENT

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base, and pavement. Temporary and permanent pavement shall conform to the requirements of the affected pavement owner. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be

trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.5 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The CONTRACTOR shall protect underground Utilities and other improvements which may be impaired during construction operations, regardless of whether or not the Utilities are indicated on the Drawings. The CONTRACTOR shall take all possible precautions for the protection of unforeseen Utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Except where the Drawings indicate Utilities have been field located during design or certain Utility locations shall be exposed as part of the WORK, the CONTRACTOR shall be responsible for exploratory excavations as it deems necessary to determine the exact locations and depths of Utilities which may interfere with its work. All such exploratory excavations shall be performed as soon as practicable after Notice to Proceed and, in any event, a sufficient time in advance of construction to avoid possible delays to the CONTRACTOR's progress. When such exploratory excavations show the Utility location as shown on the Drawings to be in error, the CONTRACTOR shall so notify the ENGINEER.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the Utility.

D. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the CONTRACTOR, be notified by the OWNER to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the ENGINEER a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

E. Utilities to be Removed: Where the proper completion of the WORK requires the temporary or permanent removal and/or relocation of an existing Utility or other improvement which is indicated, the CONTRACTOR shall remove and, without unnecessary delay, temporarily replace or relocate such Utility or improvement in a manner satisfactory to the ENGINEER and the owner of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the Utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

F. OWNER's Right of Access: The right is reserved to the OWNER and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-

way, or easement for the purpose of making changes in their property made necessary by the WORK of this Contract.

G. Underground Utilities Indicated: Existing Utility lines that are indicated or the locations of which are made known to the CONTRACTOR prior to excavation and that are to be retained, and all Utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the CONTRACTOR, unless otherwise repaired by the owner of the damaged Utility. If the owner of the damaged facility performs its own repairs, the CONTRACTOR shall reimburse said owner for the costs of repair.

H. Underground Utilities Not Indicated: In the event that the CONTRACTOR damages existing Utility lines that are not indicated or the locations of which are not made known to the CONTRACTOR prior to excavation, a verbal report of such damage shall be made immediately to the ENGINEER and a written report thereof shall be made promptly thereafter. The ENGINEER will immediately notify the owner of the damaged Utility. If the ENGINEER is not immediately available, the CONTRACTOR shall notify the Utility owner of the damage. If directed by the ENGINEER, repairs shall be made by the CONTRACTOR under the provisions for changes and extra work.

I. Costs of locating and repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such Utility facilities not indicated in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the WORK which was interrupted or idled by removal or relocation of such Utility facilities, and which was necessarily idled during such work will be paid for as extra work.

J. Approval of Repairs: All repairs to a damaged Utility or improvement are subject to inspection and approval by an authorized representative of the Utility or improvement owner before being concealed by backfill or other work.

K. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the WORK shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the ENGINEER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.6 TREES OR SHRUBS WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

A. General: Except where trees or shrubs are indicated to be removed, the CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or OWNER. Existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the OWNER. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

B. Trimming: All tree trimming shall be done by a certified arborist. Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch. Spikes shall not be used for climbing live trees. Cuts over 1-1/2 inches in diameter shall be coated with a tree paint product that is waterproof, adhesive, and elastic, and free from kerosenes, coal tar, creosote, or other material injurious to the life of the tree.

C. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency and/or the OWNER if any tree or shrub is damaged by the CONTRACTOR's operations. If, in the opinion of said agency or the OWNER, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree or shrub at its own expense. The tree or shrub shall be of a like size and variety as the one damaged, or, if of a smaller size, the CONTRACTOR shall pay to the owner of said tree a compensatory payment acceptable to the tree or shrub owner, subject to the approval of the jurisdictional agency or OWNER. The size of the tree or shrub shall be not less than 2-inch caliper nor less than 6 feet in height. Planting of replacement trees and shrubs shall be in accordance with Section 329300 – Landscaping. Unless otherwise indicated, the CONTRACTOR shall water and maintain the replacement trees and shrubs for 12 months after planting.

1.7 LAWN AREAS

A. Lawn or landscaped areas damaged during construction shall be repaired to match the pre-construction condition to the satisfaction of the land owner and the OWNER.

1.8 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 015100 - TEMPORARY UTILITIES

PART 1 -- GENERAL

1.1 GENERAL

A. The types of utility services required for general temporary use at the Site include the following:

Water service (potable for certain uses)
Sanitary sewer
Electric power service
Telephone service

1.2 JOB CONDITIONS

A. Scheduled Uses: The CONTRACTOR, in conjunction with establishing the progress schedule, shall establish a schedule for implementation and termination of service for each temporary utility at the earliest feasible time, and when acceptable to OWNER, change over from temporary utility service to permanent service.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. The CONTRACTOR shall provide either new or used materials and equipment, that are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided by utility company, the CONTRACTOR shall provide the remaining portion with matching and compatible materials and equipment and shall comply with recommendations of the utility company.

PART 3 -- EXECUTION

3.1 INSTALLATION OF TEMPORARY UTILITY SERVICES

A. General: Wherever feasible, the CONTRACTOR shall engage the utility company to install temporary service to the Site, or as a minimum, to make connection to existing utility service; locate services where they will not interfere with WORK, including installation of permanent utility services; and maintain temporary services as installed for required period of use; and relocate, modify or extend as necessary from time to time during that period as required to accommodate WORK in progress.

B. Approval of Electrical Connections: Temporary connections for electricity shall be subject to approval of the power company representative, and shall be removed in like manner at the CONTRACTOR's expense prior to final acceptance of the WORK.

C. Separation of Circuits: Circuits used for power purposes shall be separate from lighting circuits.

D. Construction Wiring: Wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. Electrical facilities shall conform to the requirements of State and local jurisdictions and Subpart K of the OSHA Safety and Health Standards for Construction.

3.2 INSTALLATION OF POWER DISTRIBUTION SYSTEM

A. Power: The CONTRACTOR shall provide power required for its operations under the Contract and shall provide and maintain temporary power lines required to perform the WORK in a safe and satisfactory manner.

B. Temporary Power Distribution: The CONTRACTOR shall provide a weatherproof, grounded, temporary power distribution system sufficient for performance of the entire WORK, including temporary electrical heating where indicated, operation of test equipment and test operation of building equipment and systems which cannot be delayed until permanent power connections are operable, temporary operation of other temporary facilities, including permanent equipment and systems which must be placed in operation prior to use of permanent power connections (pumps, HVAC equipment, elevators, and similar equipment), and power for temporary operation of existing facilities (if any) at the Site during change-over to new permanent power system. Provide circuits of adequate size and proper power characteristics for each use; run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations and will result in minimal interference with performance of the WORK; provide rigid steel conduit or equivalent raceways for wiring which must be exposed on grade, floors, decks, or other exposures to damage or abuse.

3.3 INSTALLATION OF LIGHTING

A. Construction Lighting: WORK conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper performance and to afford adequate facilities for inspection and safe working conditions.

B. Temporary Lighting: The CONTRACTOR shall provide a general, weatherproof, grounded temporary lighting system in every area of construction as soon as overhead floor/roof deck structure has been installed to provide sufficient illumination for safe working and traffic conditions. Run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations on grade, floors, decks, or other areas of possible damage or abuse.

3.4 WATER SUPPLY

A. General: The CONTRACTOR shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes. Coordinate with the Tampa Water Department for obtaining temporary water service connection and provide facilities necessary to convey the water from the source to the point(s) of use. All fees and costs associated with temporary water service are the responsibility of the CONTRACTOR.

3.5 INSTALLATION OF SANITARY FACILITIES

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of CONTRACTOR's employees. Toilets at construction sites shall conform to the requirements of Subpart D, Section 1926.51 of the OSHA Standards for Construction. Provide separate field office facilities in conformance with Section 015200 – Field Offices, Equipment, and Services.

B. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of sanitary and organic wastes. Wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the Site in accordance with laws and regulations pertaining thereto.

3.6 INSTALLATION OF COMMUNICATIONS

A. Telephone Services: The CONTRACTOR shall provide and maintain during the progress of the WORK not less than one telephone in good working order at its own field construction office at or near the Site. Each such telephone shall be connected to an established exchange for toll service and with other telephones utilized by the CONTRACTOR.

B. Telephone Use: The CONTRACTOR shall permit the ENGINEER, the OWNER, or their authorized representatives or employees free and unlimited use of said telephone facilities for calls that do not involve published toll charges. Calls originated by the ENGINEER, the OWNER, their authorized representatives or employees which involve toll or message unit charges shall be billed to the OWNER by the CONTRACTOR at the rates charged by the telephone company.

3.7 OPERATIONS AND TERMINATIONS

A. Inspections: Prior to placing temporary utility services into use, the CONTRACTOR shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.

B. Protection: The CONTRACTOR shall maintain distinct markers for underground lines, and protect from damage during excavating operations.

C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the CONTRACTOR shall promptly remove installation unless requested by ENGINEER to retain it for a longer period. The CONTRACTOR shall complete and restore WORK which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.

D. Removal of Water Connections: Before final acceptance of the WORK on the project, temporary connections and piping installed by the CONTRACTOR shall be entirely removed, and affected improvements shall be restored to original condition or better, to the satisfaction of the ENGINEER and to the agency owning the affected utility.

- END OF SECTION -

SECTION 015200 - FIELD OFFICE, EQUIPMENT AND SERVICES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide transport and locate the OWNER's field office, and provide equipment and related services at the Site.

B. The office shall be located close to the CONTRACTOR's field office, at a spot designated by the ENGINEER.

1.2 FIELD OFFICE SCHEDULE

A. Transport, location and set-up of the OWNER's field office, shall be provided at the Site, ready for exclusive use by the ENGINEER and the OWNER'S representative and staff within 14 Days after the commencement date stated in the Notice to Proceed. The CONTRACTOR'S attention is directed to the condition that no payment requests for any portion of mobilization will be approved until the field office has been provided. The provisions for such payment are included in Section 015000 - Mobilization.

B. Unless released earlier by the ENGINEER in writing, field office(s) shall be maintained in full operation at the Site with all utilities connected and operable until the Notice of Completion has been executed or recorded. Upon execution or recordation of the Notice of Completion, or upon early release of the field office by the ENGINEER, the CONTRACTOR shall remove the field office within 14 Days from said date, and shall restore the Site occupied by the field office to the condition indicated.

PART 2 -- PRODUCTS

2.1 OFFICE FACILITIES

A. General: The OWNER will provide a field office for the use of its staff and the ENGINEER. The field office is a pre-fabricated metal building that is transportable on a low boy or flat bed trailer. The field office is located at the David L. Tippin Water Treatment Facility, on North 30th Street in Tampa, Florida. The OWNER will assist the CONTRACTOR by loading the field office on the trailer at the plant and unloading the field office at the plant at the conclusion of construction. The CONTRACTOR shall be responsible for securing the field office on the trailer. The CONTRACTOR shall furnish transport for the field office, provide 230V single phase electrical service to a 100 amp main breaker for the field office at the job site, set the office on concrete blocks, level the office and provide hurricane anchors for the office. The CONTRACTOR shall provide necessary electrical wiring, and shall furnish electricity, potable drinking water, and a private, portable, outside toilet.

2.2 FIELD OFFICE FURNISHINGS

A. The CONTRACTOR shall furnish the following items in good condition for the OWNER's field office:

1 each	Bottled water dispenser unit (supplying both hot and cold water) and bottled water service and supply of paper cups
1 each	IKEA Desk: Fredrik Desk 55x28" BLK-BRN/SLV 801.159.88 IKEA Chair: Vilgot SWV CHR BLK NA 401.931.91 to be turned over to the OWNER at the end of the project.
4 each	IKEA wall shelving (QTY 4): EFF WALL CAB FRM-LO 33.5" 900.723.37, or equal, to be turned over to the OWNER at the end of the project.

2.3 FIELD OFFICE SERVICES

A. A private, portable outside toilet. Sanitary waste material shall be regularly pumped out and the toilet cleaned. Toilet paper shall be furnished for each toilet facility.

B. Regular daily janitorial services shall be furnished during working hours as necessary. Offices shall be swept, dusted, and waste receptacles emptied. Toilet facilities shall be sanitized and cleaned as necessary and paper supplies shall be replenished.

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 015500 - SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.1 HIGHWAY LIMITATIONS

A. The CONTRACTOR shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the WORK. It shall be the CONTRACTOR's responsibility to construct and maintain any haul roads required for its construction operations.

1.2 TEMPORARY CROSSINGS

A. General: Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 300-feet shall be provided. The CONTRACTOR shall cooperate with parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.

B. Temporary Bridges: Wherever necessary, to maintain vehicular crossings, the CONTRACTOR shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the responsible individuals or authorities to omit such temporary bridges or steel plates, which written consent shall be delivered to the ENGINEER prior to excavation. Such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the CONTRACTOR shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.

C. Street Use: Nothing herein shall be construed to entitle the CONTRACTOR to the exclusive use of any public street, alleyway, or parking area during the performance of the WORK hereunder, and it shall conduct its operations to not interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the ENGINEER and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the ENGINEER or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the WORK shall be kept accessible to fire-fighting equipment. Temporary provisions shall be made by the CONTRACTOR to assure the use of sidewalks and the proper functioning of gutters, storm drain inlets, and other drainage facilities.

D. Traffic Control: For the protection of traffic in public or private streets and ways, the CONTRACTOR shall provide, place, and maintain necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of

the "Manual of Uniform Traffic Control Devices, Part VI - Traffic Controls for Street and Highway Construction and Maintenance Operations," published by U.S. Department of Transportation, Federal Highway Administration (ANSI D6.1) and the entity having jurisdiction over the roadway.

1. The CONTRACTOR shall take necessary precautions for the protection of the WORK and the safety of the public. Barricades and obstructions shall be illuminated at night, and lights shall be kept burning from sunset until sunrise. The CONTRACTOR shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions. Signs, signals, and barricades shall conform to the requirements of Subpart G, Part 1926, of the OSHA Safety and Health Standards for Construction.

2. The CONTRACTOR shall submit 3 copies of a traffic control plan to the entity having jurisdiction over the roadway for approval a minimum of 2 weeks prior to construction. The jurisdictional entity shall be allowed access to observe these traffic control plans in use and to make any changes as field conditions warrant. Any changes required shall supersede these plans and be done solely at the CONTRACTOR's expense.

3. The CONTRACTOR shall remove traffic control devices when no longer needed, repair damage caused by installation of the devices, and shall remove post settings and backfill the resulting holes to match grade.

E. Temporary Street Closure: If closure of any street is required during construction, the CONTRACTOR shall apply in writing to the ENGINEER and any other jurisdictional agency at least 30 Days in advance of the required closure. A Detour and Traffic Control Plan shall accompany the application.

F. Temporary Driveway Closure: The CONTRACTOR shall notify the owner or occupant (if not owner-occupied) of the closure of the driveways to be closed more than one 8 hour work day at least 3 working days prior to the closure. The CONTRACTOR shall minimize the inconvenience and minimize the time period that the driveways will be closed. The CONTRACTOR shall fully explain to the owner/occupant how long the closure will take and when closure will start.

1.3 CONTRACTOR'S WORK AND STORAGE AREA

A. The OWNER will designate and arrange for the CONTRACTOR's use, a portion of the 115th Avenue right of way, as shown on the Plans, adjacent to the WORK for its exclusive use during the term of the Contract as a storage and shop area for its construction operations on the WORK. Note that this area will also have the existing pavement removed, new pavement provided and the right of way restored.

B. The CONTRACTOR shall make its own arrangements for any necessary off-Site storage or shop areas necessary for the proper execution of the WORK.

C. The CONTRACTOR shall construct and use a separate storage area for hazardous materials used in constructing the WORK.

1. For the purpose of this paragraph, hazardous materials to be stored in the separate area are products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition,

whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, 2 part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.

2. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.

3. The CONTRACTOR shall develop and submit to the ENGINEER a plan for storing and disposing of the materials above.

4. The CONTRACTOR shall obtain and submit to the ENGINEER a single EPA number for wastes generated at the Site.

5. The separate storage area shall meet the requirements of authorities having jurisdiction over the storage of hazardous materials.

6. Hazardous materials that are delivered in containers shall be stored in the original containers until use. Hazardous materials delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

1.4 PARKING

A. The CONTRACTOR shall:

1. When space on the Site is not available, the CONTRACTOR shall arrange for additional parking at his own location

2. The CONTRACTOR shall direct its employees to park in approved areas.

3. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The CONTRACTOR shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 015719 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.1 DUST ABATEMENT

A. The CONTRACTOR shall prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity of the Site. The CONTRACTOR shall be responsible for any damage resulting from dust originating from its operations. Dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the ENGINEER.

B. Storage Piles: Enclose, cover, water (as needed), or apply non-toxic soil binders according to manufacturer's specifications on material piles (i.e. gravel, sand, dirt) with a silt content of 5 percent or greater.

C. Active Areas of Site: Water active construction areas and unpaved roads as needed and as requested by ENGINEER.

D. Inactive Areas of Site: Apply non-toxic soil stabilizers according to manufacturer's specifications to inactive construction areas, or water as needed to maintain adequate dust control.

E. Vehicle Loads: Cover or maintain at least 2-feet of freeboard vertical distance between the top of the load and the top of the trailer sides on trucks hauling dirt, sand, soil, or other loose materials off of the Site.

F. Roads: When there is visible track-out onto a paved public road, install wheel washers where the vehicles exit and enter onto the paved roads and wash the undercarriage of trucks and any equipment leaving the Site on each trip. Sweep the paved street at the end of each shift with a Mobil Athey or similar water spray pick-up broom-type street sweeper as necessary or as directed.

G. Vehicle Speeds: If watering of unpaved roads is not sufficient to control dust, reduce vehicle speeds to 15 mph or less on such roads.

1.2 STORMWATER POLLUTION PREVENTION

A. CONTRACTOR shall minimize stormwater pollution from the Site in accordance with the project's Storm Water Pollution Prevention Plan and permit.

1.3 RUBBISH CONTROL

A. During the progress of the WORK, the CONTRACTOR shall keep the Site and other areas for which it is responsible in a neat and clean condition and free from any accumulation of rubbish. The CONTRACTOR shall dispose of rubbish and waste materials of any nature and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal and in conformance with

applicable safety laws and the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.4 SANITATION

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of sanitary and organic wastes. Wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the Site in a manner satisfactory to the ENGINEER and in accordance with Laws and Regulations pertaining thereto.

1.5 CHEMICALS

A. Chemicals used on the WORK or furnished for facility operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer. In addition, see the requirements set forth in paragraph 6.11 of the General Conditions.

1.6 CULTURAL RESOURCES

A. The CONTRACTOR's attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called "cultural resources").

B. In the event potential cultural resources are discovered during subsurface excavations at the Site, the following procedures shall be instituted:

1. The OWNER will issue a temporary Notice to Suspend Work directing the CONTRACTOR to cease construction operations at the location of such potential cultural resources find.

2. The suspension Notice will contain the following:

   a. A clear description of the WORK to be suspended

   b. Instructions regarding issuance of further orders by the CONTRACTOR for material services

   c. Guidance as to the action to be taken on subcontracts

   d. Suggestions to the CONTRACTOR to minimize incurred costs

   e. Estimated duration of the temporary suspension.

3. Such suspension shall be effective until such time as a qualified archeologist can assess the value of the potential cultural resources and make recommendations to the State of Florida Division of Historical Resources.

4. The OWNER will implement appropriate actions as directed by the State of Florida Division of Historical Resources or ENGINEER. The CONTRACTOR shall cease WORK in the area

of a discovery until appropriate actions have been determined in accordance with this paragraph.

5. If human remains are discovered, WORK in the immediate vicinity of the find shall stop. The County Coroner shall be notified.

C. If the archeologist determines that the potential find is a bonafide cultural resource, at the direction of the State of Florida Division of Historical Resources, the OWNER will extend the duration of the suspension.

D. Changes to the Contract Price and Contract Times for suspension due to discovery of a potential cultural resource will be made in the following manner:

1. Contract Times

a. If the WORK temporarily suspended is on the “critical path”, the total number of Days for which the suspension is in effect will be added to the Contract Times.

b. If a portion of WORK at the time of such suspension is not on the “critical path”, but subsequently becomes WORK on the critical path, the Contract Times will be computed from the date such WORK is classified as on the critical path.

2. Contract Price

a. If, as a result of a cultural resources suspension, the CONTRACTOR sustains a loss that could not have been avoided by judicious handling of forces and equipment or redirection of forces or equipment to perform other WORK on the contract, there will be paid an amount based on time and materials for the loss in accordance with the following:

1) Idle Time of Equipment: Compensation for equipment idle time will be determined in accordance with the General Conditions for equipment time and equipment rental time.

2) Idle Time of Labor: Compensation for idle time of workers will be determined in accordance with the General Conditions for labor.

b. Costs of labor will be compensated only to the extent such cost was in fact caused by the suspension.

c. Compensation for loss due to idle time of either equipment or labor will not include markup for profit.

d. The hours for which compensation will be paid will be the actual normal working time during which such suspension lasts, but will in no case exceed eight hours in any single Day.

e. The days for which compensation will be paid exclude Saturdays, Sundays, and legal holidays during the suspension.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 015813 – TEMPORARY PROJECT SIGN

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide one project identification sign, complete, in accordance with the Contract Documents.

PART 2 -- PRODUCTS

2.1 SIGN CONSTRUCTION

A. The sign shall be constructed of 3/4-inch exterior grade plywood, fastened to P.T. 4-inch by 4-inch by 8-feet posts and two bolts per post, and 2-inch by 4-inch cross bracing.

B. The sign face shall be 4 feet vertical by 8 feet horizontal.

2.2 COLORS

A. The OWNER will provide the sign graphics to the CONTRACTOR. Graphics will be multi-color with logos of the City of Tampa and the Southwest Florida Water Management District. The relationships of letter size and logo size shall be as indicated.

PART 3 -- EXECUTION

3.1 SIGN LOCATION

A. The project sign shall be located on the Site as directed by the ENGINEER.

B. The sign shall be set 2 feet above the ground, measured from grade to the lower edge of the plywood sheet.

3.2 REMOVAL

A. Remove the project sign upon preparation of the Notice of Completion.

- END OF SECTION -

SECTION 016500 - START-UP AND DEMONSTRATION

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Scope of Work: Provide material, personnel, and equipment as needed and as specified herein to perform the required start-up and demonstration tests.

B. Also see Section 013300 for related requirements.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 PRELIMINARY FIELD TESTS & OPERATIONAL READINESS TESTS

A. Start-up Certification: Prior to system start-up, submit six (6) copies of CHECK-OUT MEMO's for each individual component, signed by CONTRACTOR, Subcontractor and the manufacturer's representative. All copies shall be provided within the respective copies of the Operation and Maintenance Manual. This form shall be completed and submitted before Instruction in Operation to OWNER or a request for initiating any final inspection(s).

B. Operational Readiness Test (ORT): Prior to system start-up, perform an Operational Readiness Test and submit the completed documentation specified in Section 010001.

C. Demonstrate to the OWNER's Representative that all temporary jumpers and/or bypasses have been removed and that all of the components are operating under their own controls as designated.

D. Coordinate start up activities with the OWNER's operating personnel at the plant site and with the ENGINEER prior to commencing system start-up.

3.2 START-UP TESTS

A. Confirm that all equipment is properly energized, that the valves are set to their normal operating condition and that the flow path through the new work is unobstructed.

B. Initiate start-up and training in accordance with operation and maintenance manuals.

C. Observe the component operation and make adjustments as necessary to optimize the performance of the WORK.

D. The start-up tests will be conducted for two consecutive days. The WORK must operate successfully during the two-day testing period in the manner intended. If the WORK does not operate successfully, or if the start-up is interrupted due to other contracts, the problems will be corrected and the test will start over from day one. The party causing the interruption will be subject to the assessment of actual damages due to delay. During the start-up tests, instruct designated facility operating personnel in the function and operation

of the WORK.

E. The CONTRACTOR shall provide and coordinate all training with the OWNER. All individual equipment and close out training shall consist of two (2) separate sessions on the same material for OWNER's personnel.

G. Coordinate with OWNER for any adjustments desired or operational problems requiring debugging.

H. Make adjustments as necessary.

3.3 168 HOUR (1 WEEK CONTINUOUS) DEMONSTRATION TESTS

A. After all WORK components have been constructed, field tested and started up in accordance with the individual specifications and manufacturer requirements, perform the Demonstration Tests in the presence of the ENGINEER and the OWNER. The demonstration shall be held upon completion of all systems at a date to be agreed upon in writing by the OWNER or his representative.

B. During the demonstration test, operate the WORK and cause various operational circumstances to occur and otherwise show the WORK performs per the design intent. This will include however not be limited to complete checks of all provided equipment, verification all specified I/O is fully functional and all automation is fully functional. Demonstrate the essential features of the equipment and its relationship to other equipment. Prior to the demonstration test, the CONTRACTOR shall submit to the ENGINEER and OWNER two (2) copies of a detailed schedule of operational circumstances to describe the proposed test procedures for approval of completeness. These approved procedures will then be used as the agenda at the demonstration. Coordination of the test schedule will be accomplished through the OWNER.

C. The demonstration test procedures shall follow the example test procedure form provided at the end of this section. Provide similar test procedure forms for each section of the work to cover all aspects and features specified.

D. Acceptability of the WORK's performance will be based on the WORK performing as specified, under these actual and simulated operating conditions and providing a water pumping facility as defined in the Contract Documents. The intent of the demonstration tests is for the CONTRACTOR to demonstrate to the OWNER and the ENGINEER that the WORK will function as a complete and operable system under normal as well as emergency operating conditions and is ready for acceptance.

E. Demonstrate the essential features of the whole system as it applies to the WORK, including the electrical equipment, mechanical equipment, piping, structures, finishes, controls, instrumentation, power distribution and lighting systems. Use the approved procedures and circumstances to demonstrate the system. Any minor deficiencies found shall be noted and included on a punch list attached to the Certificate of Completed Demonstration. The system shall be demonstrated only once, after completion of start-up tests. If circumstances arise that interrupt the test procedures (such as weather, unforeseen process problems, or problems caused by the CONTRACTOR whether or not

the problems are the fault of the Contractor, etc.), then the test shall be terminated and rescheduled to a later date after the problem is corrected. The test shall be run in its entirety if so directed by the OWNER.

F. Certificate of Completed Demonstration: Submit six (6) copies of the CERTIFICATE OF COMPLETED DEMONSTRATION for the work, signed by the CONTRACTOR, Subcontractor, ENGINEER, and OWNER and insert one copy in each Operation and Maintenance Manual. A sample CERTIFICATE OF COMPLETED DEMONSTRATION form is provided at the end of this section.

MANUFACTURER'S CHECK-OUT CERTIFICATION

____ OWNER City of Tampa, Florida No. Copies 5
____ ENGINEER: _____ No. Copies 1 Date_____
____ ARCHITECT: _____ No. Copies ___
____ CONTRACTOR: _____ No. Copies ___ Check-out ___
____ FIELD: _____ No. Copies ___ Memo No. _____
____ **OWNER:** _____ **No. Copies** ___

PROJECT DATA **CONTRACT DATA**

NAME: _____
NUMBER: _____
LOCATION: **City of Tampa, FL** **DATE:** _____
OWNER: **City of Tampa, FL** **DRAWING NO:** _____
OTHER: _____ **SPECIFICATION SECTION:** _____

Name of Equipment Checked: _____
Name of Manufacturer of Equipment: _____

1. The equipment furnished by us has been checked on the job by us. We have reviewed (where applicable) the performance verification information submitted to us by the CONTRACTOR.

2. The equipment is properly installed, except for items noted below.*

3. The equipment is operating satisfactorily, except for items noted below.*

4. The written operating and maintenance information (where applicable) has been presented to the CONTRACTOR, and gone over with him in detail. Five (5) copies of all applicable operating and maintenance information and parts lists have been furnished to him for insertion in each of the Operation and Maintenance Manuals.

Checked By: _____
Name of Manufacturer's Rep.

_____
Address and Phone No. of Rep.

_____
Signature/Title/Person Making Check

_____
Date Checked

_____
Name of General Contractor

_____
Authorized Signature/Title/Date

_____
Name of Subcontractor

_____
Authorized Signature/Title/Date

* Manufacturer's Representative Notations: Exception noted at time of check were:

Manufacturer's Representative to note any limitation on adequacy of related equipment that directly affects operation, performance or function of equipment checked. (No comment presented herein will indicate complete adequacy of related systems or equipment):

DEMONSTRATION TEST PROCEDURES (SAMPLE)

PROJECT DATA **CONTRACT DATA**

NAME: _____
NUMBER: _____
LOCATION: City of Tampa, FL **DATE:** _____
OWNER: City of Tampa, FL **DRAWING NO:** _____
OTHER: _____ **SPECIFICATION SECTION:** _____

TEST AREA: _____ SHEET: __ OF ____
DATE VERIFIED: _____
TEST DESCRIPTION: _____ VERIFIED BY

1. Pump Capacity Verification

   A. Shutoff Head - Record pressure of each pump under dead head conditions (pump against closed valve).

      Pump 1 ____ psig (actual) ____ psig (expected) _____

      Pump 2 ____ psig (actual) ____ psig (expected) _____

   B. Pump-down test for each pump from wetwell with valve open. Ten-minute runs at steady pressure after flow has been fully establish.

      Pump 1 ____ gpm (calculated) ____ psig
      ____ gpm (from cert. curve @ above pressure) _____

      Pump 2 ____ gpm (calculated) ____ psig
      ____ gpm (from cert. curve @ above pressure) _____

   C. Flowmeter verification
      ____ gpm (calculated)
      ____ gpm (reading) _____

   D. Pump valve operation observed
      _____

   E. Pump control functions observed:

      1. Hand mode _____

      2. Auto mode (level control) _____

CERTIFICATE OF COMPLETED DEMONSTRATION

____ OWNER: City of Tampa, Florida No. Copies 5

____

____ ENGINEER: _____ No. Copies 1

____ ARCHITECT: _____ No. Copies ____

____ CONTRACTOR: _____ No. Copies ____

____ FIELD: _____ No. Copies _ Demonstration

____ OWNER: _____ No. Copies _ Issue Date

PROJECT DATA **CONTRACT DATA**

NAME: _____

NUMBER: _____

LOCATION: **City of Tampa, FL** **DATE:** _____

OWNER: **City of Tampa, Florida** **DRAWING NO:** _____

OTHER: _____ **SPECIFICATION SECTION:** _____

NOTE TO CONTRACTOR:
Submit five (5) copies of all information listed below for checking in order to receive approval at least one week before scheduled demonstration of the WORK. After all information has been approved by the ENGINEER, give the OWNER a Demonstration of Completed Systems as specified and have the OWNER sign five copies of this form. After this has been done, a written request for a final inspection of the system shall be made.

MEMORANDUM:
This certificate is for the information of all concerned that the OWNER has been given a Demonstration of Completed Systems on the work covered under this Specification Section. This conference consisted of the system operation, a tour on which all major items of equipment were explained and demonstrated, and the following items were given to the OWNER:

(a) OWNER's copy of Operation and Maintenance Manual for equipment or systems specified under this section containing approved submittal sheets on all items, including the following:

(1) Maintenance information published by manufacturer on equipment items.

(2) Printed warranties by manufacturers on equipment items.

(3) Performance verification information as recorded by the CONTRACTOR.

(4) Check-out Memo's on equipment by manufacturer's representative.

(5) Written operating instructions on any specialized items.

(6) Explanation of guarantees and warranties on the system.

(b) Prints showing actual "As-Built" conditions.

(c) A demonstration of the System in Operation and of the maintenance procedures which will be required. Minor deficiencies to be corrected which were noted in the demonstration are attached, along with a copy of the actual test procedures performed.

_____
(Name of Contractor)

By: _____
(Authorized Signature, Title & Date)

_____
(Name of Subcontractor)

By: _____
(Authorized Signature, Title & Date)

Operations and Maintenance Manual, Instruction Prints, Demonstration & Instruction in Operation Received:

CITY OF TAMPA, FLORIDA
(Name of Owner)

By: _____
(Authorized Signature, Title & Date)

_____
(Name of Contractor)

By: _____
(Authorized Signature, Title & Date)

END OF SECTION

SECTION 017000 - CONTRACT CLOSEOUT

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Scope of Work: Comply with requirements stated in the General Conditions and Requirements of the Contract and in specifications for administrative procedures in closing out the WORK.

1.2 SUBSTANTIAL COMPLETION

A. The WORK may not be considered substantially complete unless the punch list items that remain, as identified by the ENGINEER and OWNER, can be completed within thirty (30) days. All painting, finishes, fencing, cleanup, final grading, grassing and landscape planting shall have been completed and ready for inspection before substantial completion is given. After (or concurrent with) the Demonstration Tests, with any minor deficiencies noted, the CONTRACTOR wishing to consider the WORK substantially complete, shall have work completed as follows and submit to the OWNER:

1. A written notice that the WORK is substantially complete.

2. A list of items to be completed or corrected and explanations thereof.

3. All Operations and Maintenance manuals have been submitted and approved in accordance with the contract documents.

4. All equipment has been checked-out by the equipment manufacturer and Certificates of Manufacturer's Check-Out has been submitted in accordance with the Contract documents.

5. All start-up and demonstration testing completed and Certificates of Completed Demonstration submitted are in accordance with the Contract documents.

6. Project Record Documents are complete and have been submitted, reviewed and approved in accordance with the Contract documents.

7. The pumping facility is fully-operational and is able to pump water at acceptable pressure and the plant can be started up and operated in automatic mode.

8. All training of OWNER's personnel is completed.

9. All areas to be used and occupied are safe, operable in automatic and complete.

10. All deficiencies noted on inspection reports or non-conformances are corrected or the correction plan is approved.

11. All inspections shall have been performed and passed by the local code officials. Documentation of satisfying this requirement has been submitted to the OWNER.

12. Transfer of all spares and expendables has been made to the OWNER with a full accounting of the quantities and amounts due.

B. Within a reasonable time after receipt of such notice, the OWNER will make an inspection, if necessary, to determine the status of completion.

C. Should OWNER determine that the WORK is not substantially complete:

1. The OWNER will promptly notify CONTRACTOR in writing, giving the reasons therefore.

2. CONTRACTOR shall remedy the deficiencies in the WORK and send a second written notice of substantial completion to the OWNER.

3. OWNER will re-inspect the WORK.

D. When OWNER finds that the WORK is substantially complete as defined above, the OWNER shall:

1. Prepare a tentative Certificate of Substantial Completion, with a tentative list of items to be completed or corrected before final inspection.

2. After consideration of any objections made by the OWNER as provided in the General Conditions of the Contract, the OWNER will execute the Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

1.3 FINAL INSPECTION AFTER COMPLETION

A. When CONTRACTOR considers the WORK is complete with all minor deficiencies completed or corrected, he shall submit written certification to the OWNER that:

1. Contract Document requirements have been met.

2. WORK has been inspected for compliance with Contract Documents.

3. WORK has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of OWNER's representative and are operational.

5. All minor deficiencies have been corrected or completed and the WORK is ready for final inspection.

B. OWNER will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

C. Should OWNER consider that the WORK is incomplete or defective:

1. OWNER will promptly notify the CONTRACTOR in writing, listing the incomplete or defective work.

2. CONTRACTOR shall take immediate steps to remedy the stated deficiencies, and send a second written certification to OWNER that the WORK is complete.

3. OWNER will re-inspect the WORK.

D. When the OWNER finds that the WORK is acceptable under the Contract Documents, he shall request the CONTRACTOR to make closeout submittals.

1.4 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Evidence of compliance with requirements of governing authorities.

B. Evidence of Payment and Release of Liens, including Release of Liens from all listed Subcontractors and those submitting a Notice to OWNER (to the City.).

C. Certificate of Insurance for Products and Completed Operations.

1.5 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. See Section 010001, 012900 and 012900 Supplement 6.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 017200 - PROJECT RECORD DOCUMENTS

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Scope of Work: Maintain at the site for the Owner one record copy of:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other modifications of 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.
9. Schedules

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples on site apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with CSI format with section numbers as provided herein.

C. Maintain documents in a clean, dry, legible, condition and in good order. **Do not use record documents for construction purposes**.

D. Make documents and samples available at all times for inspection by the Owner.

E. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated "Record Documents" for review by the Engineer and Owner. **Payment may be withheld if record documents are not satisfactorily maintained.**

1.3 MARKING DEVICES

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

1.4 RECORDING

A. Stamp each document "PROJECT RECORD" with a rubber stamp having 1 inch high letters.

B. **Record information concurrently with construction progress. Do not conceal any work until required information is recorded.**

C. Drawings: Legibly and clearly mark, to scale, each drawing to record actual construction:

1. Depths of various elements of foundation in relation to finish first floor datum.

2. All underground piping and conduit with elevations and dimensions; change in piping location; horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements; actual installed pipe material, class, etc.; orientation of bell & spigot joints; orientation of mechanical joints; and other as directed by the Owner

3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

4. Field changes of dimension and detail.

5. Changes made by Field Order or by Change Order.

6. Details not on original contract drawings.

7. Equipment and piping relocations.

8. Major architectural and structural changes including relocation of doors, windows, etc.

9. Architectural schedule changes according to Contractor's records and shop drawings.

10. Wire by wire and connection by connection diagrams inclusive of power, instrumentation and control wiring. As-Built diagrams shall utilize the same wire labeling convention utilized in the field. Spare wires and their corresponding labels shall also be shown. Wire type and size shall be shown.

D. 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.

E. Shop Drawings (after final review and approval): Provide six sets of record shop drawings within the Operation and Maintenance Manual, for each process equipment, piping, electrical system and instrumentation system.

1.5 SUBMITTAL

A. At Contract closeout, deliver Record Documents to the Owner.

B. Accompany submittal with transmittal letter in duplicate, containing:

1. Date

2. Project title and number

3. Contractor's name and address

4. Title and number of each Record Document

5. Signature of Contractor or his authorized representative.

C. Contractor shall submit the handwritten As-Builts to the ENGINEER to be transferred into AutoCAD.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 017300 - OPERATING & MAINTENANCE DATA AND TRAINING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope of Work:

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

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

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

1.2 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.

2. Familiar with requirements of this Section.

3. Skilled as a technical writer to the extent required to communicate essential data.

4. Skilled as draftsman competent to prepare required drawings.

1.3 FORM OF SUBMITTALS

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

B. Format:

1. Size: 8 1/2-inches x 11 inches.

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. Reduce larger drawings and fold to size of text pages but not larger than 11 inches x 17 inches.

5. Provide fly-leaf for each separate products, or each piece of operating equipment.

a. Provide typed description of products 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 structure as applicable.

c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three D-ring binders with durable and cleanable plastic covers.

2. Maximum post width: 2 inches.

3. When multiple binders are used, correlate the data into related consistent groupings.

1.4 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in systematic order.

1. Contractor, name of responsible principal, address and telephone number.

2. A list of each product required to be included, indexed to content of the volume.

3. List, with each product, name, address and telephone number of:

a. Subcontractor or installer, manufacturer and supplier name, address and telephone number.

b. A list of each product required to be included, indexed to content of the volume.

c. Identify area of responsibility of each.

d. Local source of supply for parts and replacement name, address and telephone number.

4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Data:

1. Include only those sheets which are pertinent to the specific product.

2. Annotate each sheet to:

a. Clearly identify specific product or part installed.

b. Clearly identify data applicable to installation.

c. Delete references to inapplicable information.

3. Operation and maintenance information as herein specified.

4. Record shop drawings as submitted and approved with all corrections made for each product.

C. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:

a. Relations of component parts of equipment and systems.

b. Control and flow diagrams.

c. Listing of cross references between page and/or drawing numbers to wire numbers and components. (.dwg format)

2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

3. Do not use Project Record Documents as maintenance drawings.

D. Written text, as required to supplement product data for the particular installation:

1. Organize in consistent format under separate headings for different procedures.

2. Provide logical sequence of instructions of each procedure.

E. Copy of each warranty, bond and service contract issued.

1. Provide information sheet for Owner's personnel, give:

a. Proper procedures in event of failure.

b. Instances which might affect validity of warranties or bonds.

1.5 MANUAL FOR MATERIALS AND FINISHES

A. Submit six (6) copies of complete manual in final form.

B. Content: for applied materials and finishes:

1. Manufacturer's data, giving full information on products.

a. Catalog number, size, and composition.

b. Color and texture designations.

c. Information required for reordering special manufactured products.

2. Instructions for care and maintenance.

a. Manufacturer's recommendation for types of cleaning agents and methods.

b. Cautions against cleaning agents and methods which are detrimental to product.

c. Recommend schedule for cleaning and maintenance.

C. Content, for moisture protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.

a. Applicable standards.

b. Chemical composition.

c. Details of installation.

2. Instructions for inspection, maintenance and repair.

D. Additional requirements for maintenance data: Respective sections of Specifications.

1.6 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit eight (8) 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.

d. Summary of information listed on equipment and motor data plates.

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 lubrication required.

5. Manufacturer's printed operating and maintenance instructions.

6. Description of sequence of operation by control manufacturer.

7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

   a. Predicted life of parts subject to wear.

   b. Items recommended to be stocked as spare parts.

8. As-installed control diagrams by controls manufacturer.

9. Each Contractor's coordination drawings.

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.

13. Approved record shop drawings with all corrections made, and a copy of the warranty statement, check-out memo, and demonstration test procedures and certification.

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

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 manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

8. Other data as required under pertinent sections of specifications.

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

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

1.7 SUBMITTAL SCHEDULE

A. Submit to the Owner two (2) copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 90 days after Notice to Proceed.

B. Submit two (2) copies of completed data in preliminary form no later than 20 days following Owner's review of the last shop drawing of a product and/or other submittal specified under Section 010001, but no later than delivery of equipment. One copy will be returned with comments to be incorporated into the final copies and the other copy will be retained on-site for use in any early training.

C. Submit six (6) copies of approved manual in final form directly to the offices of the Owner within 10 days after the reviewed copy or last item of the reviewed copy is returned.

D. Provide six (6) copies of addenda to the operation and maintenance manuals as applicable and certificates as specified within 30 days after final inspection.

1.8 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to demonstration test, 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. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

C. Instructors shall be fully qualified personnel as outlined within the individual equipment specifications. If no specific training specifications are listed with the equipment, the Contractor shall provide the instruction with qualified Contractor personnel.

D. The instructors shall provide for and prepare lesson scopes and handouts for up to

twenty individuals designated by the Owner that outline the items to be covered. Three separate sessions, two for operation and one for maintenance instruction shall be provided consecutively to accommodate shift schedules. Handouts shall be submitted to the Owner with at least one week's notice prior to the training sessions.

E. All instruction sessions shall be video taped with portable video cameras and tapes supplied by the Contractor. Video taping shall be made by the Contractor under the direction of the Owner with DVD compatible taping equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

- END OF SECTION -

SECTION 017400 - WARRANTIES AND BONDS

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. Compile specified warranties and bonds, as in the General Conditions and as specified in these Specifications.

2. Submit to Owner.

B. The CONTRACTORS one year warranty shall be consistent with Section 6 of the Tampa Agreement.

1.2 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: Two (2) each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product 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: Instances which might affect the validity or warranty or bond.
7. Contractor, name of responsible principal, address and telephone number.

1.3 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8 1/2-inches x 11 inches, punch sheets for standard three-post binder. Fold larger sheets to fit into binders. The Contractor shall submit warranties in a separate/stand-alone binder.
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 (3) D-ring binder, with durable and cleanable plastic covers and maximum ring size of two inches.

1.4 WARRANTY SUBMITTALS REQUIREMENTS

A. For all material, submit a warranty from the product manufacturer. The manufacturer's warranty period shall be concurrent with Contractor's for one (1) year, unless otherwise specified, commencing at the time the entire project obtains final acceptance by Owner.

B. The Contractor shall be responsible for obtaining certificates for material warranty for all major items which list for more than $1,000. The Owner reserves the right to request warranties for material not classified as major. The Contractor shall still warrant material not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.

C. In the event that the material manufacturer or supplier is unwilling to provide a one (1) year warranty commencing at the time of Owner’s final acceptance, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two-year warranty from the manufacturer shall not relieve Contractor of the one-year warranty starting at the time of Owner’s final acceptance of the equipment.

D. All major equipment shall have extended warranties as specified in the appropriate specification section. Additionally all major equipment valued at more than $1,000 replacement cost shall contain a certificate from the manufacturer verifying correct installation and operational demonstration by the Contractor prior to final acceptance by the Owner.

E. Owner shall incur no labor or equipment cost during the guarantee period.

F. Guarantee shall cover all necessary labor, and materials resulting from faulty or inadequate design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the Manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

- END OF SECTION -

SECTION 017430 - PRESSURE PIPE TESTING AND DISINFECTION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall test and disinfect, as applicable, pipelines and appurtenant piping, in accordance with the Contract Documents.

1. The water service to the pumping station shall require pressure testing with water and disinfection.

2. Potable water piping in the pump station shall require pressure testing with water and disinfection.

3. All other piping shall require pressure testing. Test pipes carrying liquid with water. Test vacuum piping with compressed air.

B. The CONTRACTOR shall be responsible for dechlorinating all disinfection water prior to discharge.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Furnish:

1. A testing plan and schedule, including method for water conveyance, control, disposal, and disinfection shall be submitted in writing for approval.

PART 2 -- PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. All test equipment, chemicals for chlorination and dechlorination, temporary valves, bulkheads, and other water control equipment, and choice of disinfectant shall be as determined by the CONTRACTOR. No materials shall be used which would be injurious to the WORK

B. Chlorine for disinfection may be in the form of sodium hypochlorite solution, or calcium hypochlorite granules or tablets.

1. Use of liquid/gaseous chlorine for disinfection of liquid/gaseous sulfur dioxide for disinfection is not allowed.

2. Sodium and calcium hypochlorite shall be in accordance with ANSI/AWWA B300 - Hypochlorites.

C. Dechlorination agents may be sodium bisulfate, sodium sulfite, or sodium thiosulfate.

PART 3 -- EXECUTION

3.1 GENERAL

A. Water for testing and disinfecting pipelines shall be furnished by the CONTRACTOR.

B. All pressure pipelines shall be tested; those for potable water shall be disinfected. All chlorinating and testing operations shall be performed in the presence of the ENGINEER.

C. Disposal of flushing water and water containing chlorine shall be by methods acceptable to the ENGINEER.

D. Disinfection operations shall be scheduled as late as possible during the Contract Time to maximize the degree of sterility of the facilities at the time the WORK is accepted by the OWNER. Bacteriological testing shall be performed by the City of Tampa Water Department at the OWNER'S expense. Should the bacteriological testing fail, the CONTRACTOR shall reimburse the OWNER for all retests.

3.2 HYDROSTATIC TESTING OF PIPELINES

A. Prior to hydrostatic testing, pipelines shall be flushed or blown out as appropriate. The CONTRACTOR shall test pipelines in sections. Sections to be tested shall be defined by isolation valves in the pipeline. Where such valves are not present or leaking, the CONTRACTOR shall install temporary bulkheads or plugs for the purpose of testing. The CONTRACTOR shall assume all existing valves leak while bidding. Pipelines constructed of butt-fusion welded high density polyethylene (HDPE) pipe shall be tested separately from pipes with joints. Sections that do not have isolation valves shall be tested in approximate one-half mile segments or less. Sections that have a zero leakage allowance shall be tested as a unit. No section of the pipeline shall be tested until field-placed concrete or mortar has attained an age of 14 Days. The test shall be made by closing valves when available or by placing bulkheads and filling the line slowly with water. The CONTRACTOR shall be responsible for ascertaining that test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to or movement of the adjacent pipe. Unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test to avoid movement and damage to piping and equipment. Remove or protect any pipeline-mounted devices that may be damaged by the test pressure. The CONTRACTOR shall provide sufficient temporary tappings in the pipelines to allow for trapped air to exit. After completion of the tests, such taps shall be permanently plugged. Care shall be taken that air relief valves are open during filling.

B. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the release valves at a reasonable velocity. The air within the pipeline shall be allowed to escape completely. The differential pressure across the orifices in the air release valves shall not be allowed to exceed 5 psi at any time during filling. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb water and to allow the escape of air from air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the ENGINEER shall be taken.

C. Pressure Testing Procedure for Pipelines Carrying Liquids:

1. The CONTRACTOR shall provide all necessary equipment and instrumentation (pressure gauges, volume gauges, hoses pumps, test pipe, test fittings, etc.) required for flushing and testing of the piping systems. Pressure gauges shall be marked in graduated increments that do not exceed 2 pounds per square inch. Gauges used to measure the volume of water necessary to raise post-test line pressure back to the highest pressure achieved during the test duration will be marked in graduated increments which do not exceed 5 ounces. If requested by the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER certified test data for the pressure gauges and recorders used on hydrostatic equipment.

2. Water for test purposes shall be supplied by the CONTRACTOR.

3. Tests shall be made in sections not to exceed 1/2 mile. Testing shall be conducted in the presence of and to the satisfaction of the ENGINEER as a condition precedent to the approval and acceptance of the system. Not less than 3 days notice shall be given prior to start of such tests, and such testing shall not be scheduled until preliminary testing by the CONTRACTOR has indicated that the test section is ready for testing. The schedule and procedures for testing shall be determined by the CONTRACTOR and reviewed with the ENGINEER prior to testing.

4. The duration of each pressure test shall be at least 2 hours with a test pressure of 100 psi. At no time shall the test or line pressure exceed 120 psi. If required by the ENGINEER, pump test equipment will be equipped with pressure relief valves pre-set to 120 psi. Each valved section of pipe shall be slowly filled with water and a pump shall be connected to the low point of the section being tested.

5. Before conducting the test, the CONTRACTOR shall backfill all pipe and reaction blocking unless the ENGINEER directs certain joints or connections to be left uncovered. When reaction blocking is provided, the pressure test shall not be made until adequate curing time for the blocking has been allowed.

6. Before application of the test pressure, all air shall be expelled from the pipe. To accomplish this, taps will be made, if necessary, at points of highest elevation and afterward tightly stopped with tapered brass plugs, all at the CONTRACTOR's expense.

7. At the end of the 2-hour test period, the CONTRACTOR will be required to pump the lines back up to the highest pressure obtained during the duration of the test period.

8. Pressure tests shall be made between valves to demonstrate the ability of the valve to sustain pressure. All piping systems shall be tested in accordance with these test methods in addition to any other tests required by local plumbing codes or building authorities.

9. Throughout the duration of the test, the CONTRACTOR is required to maintain a minimum pressure in excess of 100 psi. The CONTRACTOR is advised that, should the test pressure fall to or below 100 psi any time during the 2-hour test, the test will be considered invalid and a retest will be required. Therefore, it is advised

that the CONTRACTOR pump water into the line as the test pressure approaches 100 psi.

10. The CONTRACTOR is warned that pressure testing against existing valves is done at his own risk. Failure of these valves to hold test pressure will not relieve the CONTRACTOR of the pressure testing. All exposed pipe, fittings, valves and joints shall be carefully examined for leaks. Any cracked or defective pipe, fittings, valves or other appurtenances discovered as a consequence of the pressure test shall be removed and replaced with acceptable material. All leaking or defective joints shall be repaired, corrected or replaced. After all necessary replacements and corrections have been made, the test shall be repeated to the satisfaction of the ENGINEER.

11. If the pipeline fails the pressure test twice, then the CONTRACTOR shall be required to retest the pipeline and provide to the ENGINEER certification by a Professional Engineer registered in the State of Florida, that the pipeline has passed the test in accordance with these standards prior to the City of Tampa Water Department scheduling and witnessing the pressure test

D. Leakage Testing for Pipelines: The maximum allowable leakage for distribution and transmission pipelines shall be calculated as follows:

1. Concurrently with pressure testing, pipelines shall be subjected to leakage tests.

2. Visible pipelines shall have no visible leakage.

3. Seamless or butt-fusion pipelines will no joints shall have no allowable leakage.

4. Leakage measurements shall not be started until a constant test pressure has been established in excess of 100 psi.

5. The duration of each leakage test shall be at least 2 hours and the test pressure shall be as specified for the pressure tests. Leakage is defined as the quantity of water that must be supplied into the pipeline or section thereof to maintain the established test pressure after the air in the pipeline has been expelled and the pipe filled with water plus that volume of water required at the conclusion of the test to bring the line pressure back up to the highest pressure obtained during the duration of the test period.

6. The maximum allowable leakage for buried pipelines with joints shall not exceed the number of gallons per hour (gph) as determined by the following formula:

   L = SD x (P)^(1/2)/133,200

   where,

   L - allowable leakage, gph

   S - length of pipeline tested, feet

   D - nominal diameter of the pipe, inches

   P - average test pressure during the leakage test, psi gage

7. Leakage detection at mechanical joints shall be stopped by tightening the gland (not to exceed required torque) and leaking slip joints shall be cut out and entirely replaced or if permission is given by the ENGINEER, it may be repaired by a suitable clamp. Any split, cracked or defective pipe, fittings, valves, or hydrants discovered as a result of this test shall be removed and replaced by the CONTRACTOR with sound material and then test shall be repeated.

8. If the pipeline fails the test twice, the CONTRACTOR shall be required to retest the pipeline and provide the ENGINEER certification by a Professional Engineer registered in the State of Florida that the pipeline has passed the test in accordance with these standards.

3.3 DISINFECTING PIPELINES

A. General: The CONTRACTOR shall disinfect the water mains in accordance with the applicable section of the latest AWWA Specification C651, as summarized below. Any of the methods specified below is acceptable, however, the CONTRACTOR if directed, shall use the method specified by the Construction Manager.

1. Slug Method: The slug method consists of: a) Completely filling the main in order to remove air pockets, b) flushing the main with a velocity of not less than 2.5 feet per second (fps) in order to remove particles, c) at a point not more than 10 feet downstream of the water source flushing the new main; chlorine is to be continuously injected for a sufficient period to develop a solid column or "slug" of chlorinated water, d) the slug of chlorinated water is to move through the main exposing all interior surfaces to a chlorine concentration of approximately 100 mg/L for at least a 3 hour period.

2. Continuous Feed Method: The continuous feed method consists of a) completely filling the main to remove air pockets, b) flushing the main with a velocity not less than 2.5 fps, c) at a point not more than 10 feet downstream of the water source flushing the new main; chlorine is to be injected in the new main at a constant rate sufficient to establish a 25 mg/L chlorine concentration throughout the main. The chlorinated water shall be retained in the main for at least 24 hours and have a residual of not less than 10 mg/L free chlorine prior to flushing.

3. Testing: Upon completion of the hydrostatic test and disinfection, the CONTRACTOR shall contact the ENGINEER or the Tampa Water Department's Construction Section requesting a bacteria test. The CONTRACTOR shall install sample taps on the new main and at the end of each new branch of the piping system. The CONTRACTOR shall flush the chlorinated disinfection water from the piping system until a free chlorine residual of 1 to 1.5 mg/L is maintained. The CONTRACTOR shall pull a water sample on 2 consecutive days allowing 24 hours for each sample to be processed.

   The CONTRACTOR shall coordinate the scheduling of the sampling procedure a minimum of one-week in advance of wanting the sample to be pulled. Due to the varying workload, the sample will be scheduled and pulled as the schedule permits. All failed samples, or samples that are not ready at the time of collection, will be charged to the CONTRACTOR at the current rate it costs the Department per sample.

Due to the requirements from the FDEP, the CONTRACTOR may be required to remobilize to the job site thirty to forty-five days after the samples have been cleared to perform necessary meter transfers and/or cut and plugs.

Samples for bacterial analysis will be taken and analyzed by the City of Tampa Water Department. The sampling process may only begin on Mondays or Wednesdays. Two consecutive approved samples, taken 24 hours apart, will be required. Those samples will be pulled by the Water Department 24 hours apart. If the first sample is taken on Monday, the second sample must be taken on Tuesday. If the first sample is taken on Wednesday, the second sample will be taken on Thursday. No samples will be taken on Friday and the sampling process will not begin on Tuesday or Thursday. All drilling and tapping equipment shall be sterilized as directed by the Construction Manager.

After completing the testing and sterilizing and regardless of ground conditions, all sample taps and corporation stops shall be removed from the pipe by the CONTRACTOR and replaced with tapered brass plugs.

B. Chlorinating Valves: During the process of chlorinating the pipelines, valves and other appurtenances shall be operated from closed to full open to closed while the pipeline is filled with the heavily-chlorinated water.

C. Final Flushing: After the applicable retention period, the heavily chlorinated water shall be flushed from the pipeline until chlorine measurements show that the concentration in the water leaving the pipeline is no higher than that generally prevailing in the system or is acceptable for domestic use. Any release of chlorinated water shall comply with federal, state, and local regulation and the permits for the project. Chlorine in excessive amounts shall be treated before discharge.

3.4 CONNECTIONS TO EXISTING SYSTEM

A. Where connections are to be made to an existing potable water system, the interior surfaces of all pipe and fittings used in making the connections shall be swabbed or sprayed with a one percent hypochlorite solution before installation. Thorough flushing shall be started as soon as the connection is completed and shall be continued until discolored water is eliminated.

- END OF SECTION -

SECTION 024119 - DEMOLITION AND RECONSTRUCTION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall demolish existing civil, landscaping, structural, electrical, and other facilities as indicated, and reconstruction of any damaged existing facilities not shown for demolition, in accordance with the Contract Documents.

1.2 COORDINATION

A. The CONTRACTOR shall carefully coordinate the WORK in areas where existing facilities are interconnected with new facilities and where existing facilities remain operational. The WORK as indicated is not all-inclusive, and the CONTRACTOR shall be responsible to perform the reconstruction indicated plus that which can be reasonably inferred from the Contract Documents as necessary to complete the Project. The Specifications and Drawings identify the major facilities that shall be demolished and reconstructed, but auxiliary utilities such as water, drainage, and electrical wiring are not necessarily shown.

B. The CONTRACTOR shall note that the Drawings used to indicate demolition are based on observable features of the existing facilities. The existing conditions are shown on the Contract Drawings to clarify the scope of WORK as much as possible. Prior to Bidding, the CONTRACTOR shall conduct a comprehensive survey at the Site to verify the correctness and exactness of the Drawings, the scope of WORK, and the extent of auxiliary utilities.

C. While demolition is being performed, the CONTRACTOR shall provide adequate access for any businesses or residents in the area, and the City of Tampa Stormwater Division of the Department of Public Works on the FC-100 Stormwater Pond property. The CONTRACTOR shall erect and maintain fences, warning signs, barricades, and other devices around the demolition and subsequent construction as required for the protection of the CONTRACTOR's employees and others. The CONTRACTOR shall remove such protection when demolition and construction activities are complete, or as WORK progresses, or when requested by the ENGINEER.

1.3 CONTRACTOR SUBMITTALS

A. Demolition and construction activities and procedures, including operational sequences, shall be submitted to the ENGINEER for approval. The procedures shall provide for safe conduct of the WORK, careful removal and disposition of materials and equipment, protection of existing facilities which are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection and reconnection of utility services. The procedures shall include a detailed description and time schedule of the methods and equipment to be used for each operation and the sequence of operation.

1.4 DEMOLITION

A. Existing pavement, structures, piping, electrical, utilities, and related appurtenances such as anchors, supports, and hardware indicated or required to be demolished as part of the WORK shall be removed and disposed of unless otherwise indicated. Removal of

buried structures, utilities, and appurtenances includes the related excavation and backfill as required. Removed items shall be disposed of offsite by the CONTRACTOR.

B. Items to be removed are indicated on the Plans.

1.5 SALVAGE

A. There are no items designated for salvage.

1.6 ABANDONMENT

A. Items of existing equipment, piping, valves, electrical, utilities, and appurtenances to be abandoned shall be prepared by the CONTRACTOR as indicated on the Plans.

1.7 RECONSTRUCTION

A. Existing civil, landscaping, structural, and electrical WORK disturbed or damaged by reconstruction activities shall be repaired and reconstructed.

B. Damaged items shall be repaired or replaced with new items to restore items or surfaces to a condition equal to and matching that existing prior to damage.

1.8 DISPOSAL

A. The CONTRACTOR shall be responsible for the offsite disposal of debris resulting from reconstruction in compliance with local, state, and federal codes and requirements.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall coordinate demolition and reconstruction WORK with the OWNER and ENGINEER. Unless otherwise indicated, the CONTRACTOR shall be responsible for the sequence of activities. WORK shall be performed in accordance with applicable safety rules and regulations.

B. The CONTRACTOR shall verify that any utilities connected to structures, equipment, and facilities to be removed, replaced, or abandoned are rendered inoperable, replaced with new utilities, or adequately bypassed with temporary utilities before proceeding with demolition and reconstruction.

C. The CONTRACTOR shall take precautions to avoid damage to adjacent facilities and to limit the WORK activities to the extent indicated. If reconstruction beyond the scope indicated is required, the CONTRACTOR shall obtain approval from the ENGINEER prior to commencing.

3.2 PROTECTION OF EXISTING FACILITIES

A. Before beginning any reconstruction, the CONTRACTOR shall carefully survey the existing facilities and examine the Specifications and Drawings to determine the extent

of demolition and coordination with the WORK. Existing facilities not subject to demolition shall be protected and maintained in accordance with Section 015010 - Protection of Existing Facilities. Damaged existing facilities shall be repaired to the previous condition or replaced.

B. Persons shall be afforded safe passages around areas of demolition.

C. Structural elements shall not be overloaded. The CONTRACTOR shall be responsible for shoring, bracing, or adding new supports as may be required for adequate structural support as a result of WORK performed under this Section. The CONTRACTOR shall remove temporary protection when the WORK is complete or when so authorized by the ENGINEER.

D. The CONTRACTOR shall carefully consider bearing loads and capacities before placement of equipment and material on Site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the CONTRACTOR shall consult with the ENGINEER prior to the placement of such equipment or material.

3.3 DEMOLITION, SALVAGE, AND RELOCATION

A. The Contract Documents indicate existing facilities to be demolished. Auxiliary utilities including such services as water, drainage, electrical wiring, and instrumentation are not necessarily indicated. The CONTRACTOR shall verify the scope of the WORK to demolish the facilities indicated; coordinate its removal and submit an outage plan in accordance with Section 011400 - Construction Constraints. The removal of existing facilities for demolition shall include the following requirements:

1. Auxiliary utility support systems shall be removed.

2. The area shall be thoroughly cleaned such that little or no evidence of the previous facility installation will remain.

3. Asphalt and concrete pavement, curbs, and gutters shall be removed as necessary to perform reconstruction. The limits of removal shall be sawcut. When the required improvements have been constructed, new asphalt and concrete pavement, curbs, and gutters shall be placed to match the original unless otherwise indicated. Work in City or State right-of-way shall comply with the regulations of the jurisdictional agency and any permit conditions.

4. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to their full extent.

5. Below-grade areas and voids resulting from demolition of structures shall be completely filled. Fill and compaction shall be in accordance with Section 313000 - Earthwork. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.

6. When existing pipe is removed, the CONTRACTOR shall plug the resulting open ends whether or not so indicated. Where removed piping is exposed, the remaining piping shall be blind-flanged or fitted with a removable cap or plug.

7. Electrical reconstruction shall be conducted by the CONTRACTOR in a safe and proper manner to avoid injury from electrical shock to the OWNER's and CONTRACTOR's personnel. Electrical equipment to be shut off for a period of time

shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable. At no time shall electrical wiring or connections which are energized or could become energized be accessible to CONTRACTOR, OWNER, or other personnel without suitable protection or warning signs.

3.4 ABANDONMENT

A. Existing facilities to be abandoned shall be prepared as indicated. Where existing buried piping is to be abandoned, the CONTRACTOR shall remove the abandoned pipe for a distance of 5 feet from any connecting structures. Openings at the existing structures shall be repaired. The remaining pipe shall be capped at both ends prior to backfill. Buried piping, 12 inches diameter or greater shall be completely filled with flowable fill where indicated.

3.5 DISPOSAL

A. Demolition and removal of debris shall minimize interference with roads, streets, walks, and other adjacent occupied or used facilities that shall not be closed or obstructed without permission from the OWNER. Alternate routes shall be provided around closed or obstructed traffic ways.

B. Site debris, rubbish, and other materials resulting from reconstruction operations shall be legally removed and disposed. No trace of these structures shall remain prior to placing of backfill in the areas from which structures were removed.

C. Refuse, debris, and waste materials resulting from demolition and clearing operations shall not be burned.

3.6 OCCUPANCY AND POLLUTION CONTROL

A. Water sprinkling, temporary enclosures, chutes, and other suitable methods shall be used to limit dust and dirt rising and scattering in the area. The CONTRACTOR shall comply with government regulations pertaining to environmental protection.

B. Water shall not be used if it creates hazardous or objectionable conditions such as flooding or pollution.

3.7 CLEANING

A. During and upon completion of WORK, the CONTRACTOR shall promptly remove tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by WORK in a clean, approved condition.

B. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as requested by the ENGINEER or directed by governing authorities, and adjacent areas shall be returned to condition existing prior to start of WORK.

C. The CONTRACTOR shall clean and sweep the street and road access areas as required to prevent nuisance dust and debris from spreading outside the designated construction areas.

- END OF SECTION -

SECTION 030130 - CONCRETE REPAIR AND REHABILITATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. This Section applies to the concrete repairs required at the Blue Sink Pump Station.

B. Repair defects in newly placed concrete as required in Section 033100 – Cast-in-Place Concrete.

C. Provide all materials and equipment necessary to accomplish the WORK.

D. Repair damage to concrete and concrete surfaces which results from construction activities.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ACI 201.1R-92 Guide for Making a Condition Survey of Concrete in Service

ACI 546R-96 Concrete Repair Guide

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Submit manufacturer's product information and recommended placement procedures for repair materials.

2. Submit detailed drawings showing proposed methods for supporting existing structures, equipment, and piping during demolition and repair activities.

1.4 QUALIFICATIONS OF CONCRETE RESTORATION FIRMS

A. The concrete restoration WORK shall be performed by an experienced firm customarily engaged in performing similar repair work on cast-in-place concrete structures.

B. The restoration firm shall have completed at least 5 similar projects in the last 5 years.

C. The restoration firm shall be certified by the manufacturer of the repair materials.

1.5 QUALITY ASSURANCE

A. Field Tests of Cement Based Mortars and Grouts

1. The ENGINEER will take compression test specimens during construction from the first placement of each type of mortar or grout, and at intervals thereafter as selected by the ENGINEER in order to ensure continued compliance with the indicated requirements.

2. The CONTRACTOR shall assist the ENGINEER in obtaining specimens for testing.

3. The compression tests and fabrication of specimens for repair mortar and non-shrink grout will be performed as specified in ASTM C 109 – Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).

4. A set of 3 specimens will be made for testing at 7 days, 28 days, and additional time periods as appropriate.

5. Any material, already placed, which fails to meet the indicated performance requirements is subject to removal and replacement as part of the WORK.

6. The cost of laboratory tests on mortar and grout will be paid by the CONTRACTOR.

7. The CONTRACTOR shall supply all necessary materials for fabricating the test specimens.

B. Repair Concrete

1. Repair concrete shall be tested as required in Section 033100 – Cast-in-Place Concrete.

C. Epoxy Grout

1. Epoxy grout shall be tested as required in Section 036000 – Grouting.

D. Construction Tolerances

1. Construction tolerances shall comply with the requirements of Section 033100 – Cast-in-Place Concrete, except as otherwise indicated.

PART 2 -- PRODUCTS

2.1 REPAIR MORTAR

A. Provide repair mortar as a pre-packaged, 2-component, polymer-modified, cementious, non-sag mortar, specifically formulated for the repair of surface defects.

B. Provide the mortar with a penetrating corrosion inhibitor.

C. Repair mortar shall have the following properties:

Physical Property	Value	ASTM Standard
Compressive Strength (min.)		C-109
at 7 days	6000 psig	
at 28 days	7000 psig	
Bond Strength (min.)		C-882 (modified)
at 28 days	2200 psig	
Freeze/Thaw resistance (min.)		C-666
300 cycles	98 percent	

D. Provide a minimum repair thickness of 1/4 inch, unless otherwise indicated.

E. Repair Mortar Manufacturer, or Equal

1. **Sika Corporation, SikaTop 123 Plus**

2.2 NON-SHRINK GROUT

A. Provide non-shrink grout conforming to the requirements of Section 036000 – Grouting.

2.3 CONCRETE MATERIALS

A. Cement

1. Use Type II Portland cement unless otherwise indicated.

2. Where repairs are to be made on wall surfaces open to view blend white Portland cement with the Type II cement as needed in order to match the color of the adjacent concrete surface.

B. Repair Concrete

1. Where required, provide repair concrete composed of structural concrete with maximum one- inch coarse aggregate meeting the requirements of Section 033100 – Cast-in-Place Concrete.

2. Provide a minimum repair thickness of 3 inches.

C. Cement Grout

1. Provide cement grout that meets the requirements of Section 036000 – Grouting.

2. Provide a minimum repair thickness of one inch.

D. Miscellaneous Materials

1. For concrete construction materials not covered specifically in this Section, conform to the requirements of Section 033100 – Cast-in-Place Concrete.

2.4 AGGREGATE

A. Obtain the permission of the manufacturer and ENGINEER before using aggregate to extend repair mortar and non-shrink grout products.

B. If allowed and unless otherwise indicated, provide aggregate consisting of 3/8-inch clean, washed gravel or crushed stone as required in Section 033100 – Cast-in-Place Concrete.

2.5 BONDING AGENT AND ANTI-CORROSION COATING

A. Provide a bonding agent that is a solvent-free, moisture-tolerant, epoxy-modified, cementitious product, specifically formulated as a bonding agent and anti-corrosion coating.

B. Bonding Agent Manufacturer, or Equal

1. **Sika Corporation, Armatec 110 EpoCem**

2.6 EPOXY GROUT

A. Provide an epoxy grout conforming to the requirements of Section 036000 – Grouting.

2.7 EPOXY RESIN

A. For crack injection, provide a 2-component, moisture-tolerant, low-viscosity, high-strength epoxy resin adhesive that is specially formulated for that usage.

B. Provide a minimum bond strength of 2900 psig when tested per ASTM C 882 – Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear at 14 days, moist cured.

C. Epoxy Resin Manufacturer, or Equal

1. **Sika Corporation, Sikadur 35, Hi-Mod LV**

2.8 FORMWORK

A. Where needed, provide formwork that meets the requirements of Section 031100 – Concrete Forming.

2.9 REINFORCEMENT STEEL

A. Where required, provide reinforcing steel that meets the requirements of Section 032100 – Reinforcement Steel.

2.10 POLYURETHANE SEALANT

A. Provide a 2-part polyurethane, gun-grade sealant.

B. Polyurethane Sealant Manufacturer, or Equal

1. **Sika Corporation, Sikaflex – 2C**

2.11 POLYURETHANE CHEMICAL GROUT

A. Use polyurethane chemical grout for non-structural crack repair.

B. Polyurethane Chemical Grout Manufacturer, or Equal

1. **Sika Corporation, SikaFix HH**

PART 3 -- EXECUTION

3.1 GENERAL

A. Repairs

1. Repair techniques will be reviewed during the pre-construction meeting between the CONTRACTOR, ENGINEER, and OWNER.

2. Choose repair materials to match the adjacent concrete surface in color and texture.

3. Apply repair materials in strict accordance with the manufacturer's printed instructions, including temperature and moisture requirements throughout application and curing.

4. Protect adjacent portions of the structure, including all valves, pipes, and mechanical equipment from debris generated by repair activities.

B. Structural Stability

1. Use caution not to weaken the structural capacity of a beam, column, wall, slab, walkway, or other concrete member during concrete removal.

2. For severely deteriorated concrete members, consult with the ENGINEER before removing a major portion of any structural member.

3. Shoring may be required in order to support the structure and to protect workers.

C. Provide off-Site disposal of debris generated as a result of repair procedures.

D. Provide concrete construction procedures not specifically addressed in this Section in accordance with the requirements of Section 033100 – Cast-in-Place Concrete.

3.2 REPAIR SEQUENCING

A. Unless otherwise indicated, perform concrete repairs in the following sequence, with no activity in an area being started until previous activities in that area have been completed, including curing, cleanup, and the like:

1. removal of equipment, miscellaneous metals, and other surface features that would interfere with the repair;

2. removal of concrete sections which require complete replacement;

3. surface preparation hydroblasting over the entire area to be repaired;

4. crack repair;

5. repair of other surface damage, or defects;

6. patching of holes in concrete;

7. replacement of concrete sections which require complete replacement;

8. new construction;

9. application of protective coatings;

B. For areas which require combinations of surface damage or defects and patching of holes in concrete, perform these repairs at the same time.

C. Limit the size of the repair area in order to permit the repairs to be performed together, without sacrificing the quality of the individual repairs.

3.3 CRACK REPAIR

A. Structural versus Non-Structural Cracks

1. Cracks are defined by the ENGINEER as non-structural cracks or structural cracks.

2. Repair structural cracks with epoxy resin.

3. Repair non-structural cracks with polyurethane chemical grout.

B. Efflorescence

1. Prior to the crack repair, clean efflorescence from the cracks and the surrounding area.

2. Clean the efflorescence by light hydro-blasting or scrubbing.

C. Pressure Injection:

1. General

a. The indicated repair materials have been selected to minimize the loss of material during the injection process. The areas selected for crack repair are to be identified by the Contractor, Engineer or Construction Manager.

b. In order to avoid excessive loss of injected material at the lower exposed portions of the cracks, space the injection ports a distance no greater than the thickness of the wall being repaired.

2. Open through thickness structural cracks with lengths of at least 3 feet on each side of the wall, at least 2 feet of length on the foundation or floor slab are to be injected unless they do not accept grout. All 3 foot long minimum or greater through thickness cracks greater than a minimum 40 mil thickness in the walls are to be

injected unless they do not accept grout. All 2 foot long minimum through thickness cracks greater than 30 mil thickness in the foundation and floor slabs are to be injected unless they do not accept grout. Perform structural crack repairs by pressure injection in accordance with the manufacturer's directions, and in accordance with the following basic procedure:

a. Rout the crack when unsound and foreign materials are present on the surface to establish the surface as a sound material.

b. Remove any contamination by flushing with water or solvent, allowing adequate time for air-drying or blow out the solvent with compressed air.

c. Install the injection ports in accordance with the manufacturer's directions.

d. Sealing

    1) Seal the surface in order to keep the pressure injecting materials from leaking out before it has set or gelled.

    2) Seal a surface by brushing an epoxy over the surface of the crack and allowing it to harden.

    3) Use high injection pressures to cut-out the cracks in a 'V' shape, fill with an epoxy, and strike off flush with the surface.

    4) Surface patching or sealant shall be performed where needed to provide for complete penetration of the injected polyurethane grout and to prevent wastage. Seal surface of crack with fast setting hydraulic cement or high strength epoxy gel; i.e., Denepox Rapidgel by De Neef Construction Chemicals, Inc. or equivalent. The floor surface along the cracks shall be cleaned and all wasted grout and surface seal material shall be completely removed from the concrete surface following completion of the repair work

e. Inject the repair materials, with consideration of the following items:

    1) Carefully select the pressure of the hydraulic pump or other device, because too much pressure can extend the existing cracks and cause more damage.

    2) For vertical cracks, start by pumping material into the entry port at the lowest elevation until the material level reaches the entry port above, then cap the lower injection port and repeat the process at successively higher ports until the crack has been completely filled.

    3) For horizontal cracks, start at one end of the crack and work to the other end, filling the crack until the pressure can be maintained.

    4) For very fine cracks, start the injection of repair material at the widest end and proceed toward the thinner end, using low-viscosity repair material.

f. Cleanup

    1) Remove the surface seal by grinding or other appropriate means.

    2) Coat fittings and holes at injection ports with an epoxy patching compound.

    3) If crack repairs are part of repair for surface defects, painting with epoxy is not necessary and surface preparation may be started after crack repairs have been completed.

3. Open through thickness cracks with lengths of at least 3 feet on each side of the wall, at least 2 feet of length on the foundation or floor slab are to be injected unless they do not accept grout. All 3 foot long minimum or greater through thickness cracks greater than a minimum 15 mil thickness in the walls are to be injected unless they do not accept grout. All 2 foot long through thickness cracks greater than 10 mil thickness in the floors are to be injected unless they do not accept grout. Perform non-structural crack repairs in accordance with the manufacturer's directions, and in accordance with the following basic procedure:

    a. Rout the crack when unsound and foreign materials are present on the surface to establish the surface as a sound material.

    b. Remove contamination by flushing with water or solvent, allowing adequate time for air-drying or blow out the solvent with compressed air.

    c. Install the injection ports in accordance with the manufacturer's directions.

    d. Moisture

        1) For non-structural cracks, moisture must be present for the chemical grout to react.

        2) Prior to injecting the repair materials, inject the crack with a small amount of water in order to completely moisten the crack.

    e. Inject the repair materials, with consideration of the following items:

        1) Carefully select the pressure of the hydraulic pump or other device, because too much pressure can extend the existing cracks and cause more damage.

        2) For vertical cracks, start by pumping material into the entry port at the lowest elevation until the material level reaches the entry port above, cap the lower injection port and repeat the process at successively higher ports until the crack has been completely filled, and then, starting again at the lowest port, re-inject into all ports in order to ensure that all voids are properly sealed off.

        3) For horizontal cracks, start at one end of the crack and work to the other end, filling the crack until the pressure can be maintained.

        4) For very fine cracks, start the injection of repair material at the widest end and proceed toward the thinner end.

    f. Cleanup

        1) Remove excess surface material by grinding or other appropriate means.

        2) Coat fittings and holes at injection ports with an epoxy patching compound.

        3) If crack repairs are part of repair for surface defects, painting with epoxy is not necessary and surface preparation may be started after crack repairs have been completed.

3.4 REPAIR OF OTHER SURFACE DAMAGE, OR DEFECTS

A. Repair other surface damage, and defects which are 1/4 inch deep or shallower, using the repair mortar. Repair scaling and pop-outs using repair mortar.

1. Surface Preparation

    a. Prior to repair, prepare the surface in accordance with the repair mortar manufacturer's recommendations with the following minimum requirement.

    b. Remove unsound concrete from surfaces by high-pressure water blasting, using a minimum pressure of 10,000 psigg and maximum pressure of 40,000 psigg.

    c. Clean exposed reinforcement by water blasting or wire brushing.

2. Repairing Surface Defects

    a. Clean the concrete surface after removing unsound concrete, repairing cracks, and cleaning reinforcement.

    b. Ensure that the concrete surface and reinforcement are free of form-release agents, curing compounds, surface hardeners, oils, grease, food, chemicals, and other contaminants.

    c. Remove dust, including new dust generated by surface preparation or scarifying.

    d. Prior to application of the bonding agent, apply anti-corrosion coating to exposed rebar in accordance with the manufacturer's recommendations, allow the coating to dry, reapply the coating, and allow to dry again.

    e. Prior to applying the repair mortar, apply bonding agent in accordance with the manufacturer's recommendations.

    f. Apply repair mortar in accordance with the manufacturer's recommendations, using a minimum repair material thickness of 1/4 inch.

    g. Fully consolidate the repair material, working the material into the substrate to completely fill all pores and voids in the area to be filled.

    h. Bring the repair surface into alignment with the adjacent existing surfaces in order to provide a uniform, even surface.

    i. Match the repair surface to adjacent existing surfaces in texture by applying necessary coatings and surface treatments.

    j. Float-finish the repaired surface using wood or sponge floats.

3. Provide strip joint in newly placed mortar at the location of repaired cracks.

4. Curing

    a. Curing of repair mortar to receive waterproofing shall be as follows:

        1) Keep the mortar continuously wet by the application of water for a minimum period of at least 7 consecutive days, beginning immediately after the mortar has reached final set;

        2) Weight the curing blankets or otherwise held them in place in order to prevent being dislodged by wind or other causes, and to be substantially in contact with the concrete surface;

        3) Ensure that edges are continuously held in place; and,

        4) Keep the curing blankets and concrete continuously wet by the use of sprinklers or other means, both during and after normal working hours.

b. If the repair mortar is not to receive waterproofing, provide curing in accordance with the manufacturer's recommendations except that the minimum cure period shall be 7 days.

c. During cold weather, maintain the repair material temperature above 50 degrees F for at least 3 days after placement.

B. Repair other surface damage, and defects using repair mortar.

1. Surface Preparation

a. Remove all delaminated concrete and all unsound concrete beyond the spalled or delaminated area.

b. Boundaries

1) Determine the boundaries of the patch by sawcuts to a depth of at least 1/4 inch up to one inch deep.

2) Refer to the Structural Drawings for sawcut locations.

3) Where the sawcut locations are not shown on the Drawings, the boundaries shall be layouts designed to reduce boundary edge length.

4) Avoid excessive or complex edge conditions.

c. Sawcuts

1) Perform sawcuts perpendicular to the surface or slightly undercut.

2) Construct sawcuts in maximum 1/4-inch increments.

3) After each incremental cut, inspect the cut surface in order to ensure that the existing reinforcement has not been cut.

4) If at any depth the reinforcement becomes exposed, terminate the sawcut and notify the ENGINEER.

d. Chip away concrete within the repair area to a depth sufficient to expose sound concrete over the entire repair area, or to a minimum depth required by patching material, whichever is greater.

e. Base the selection of partial depth concrete removal equipment on the size of repair area, depth of concrete to be removed, and the location of the deteriorated concrete such as wall, slab-on-grade, underside or top of elevated slab.

f. Removal

1) The maximum allowable pneumatic chipping hammer shall be a 30-lb class hammer.

2) Hydroblast removal shall use a maximum pressure of 40,000 psig.

3) Sand blasting is not permitted.

4) Hydroblast concrete removal is recommended for large area of surface defects.

5) Remove water blasting debris daily in order to prevent it from setting up.

6) If a chipping hammer is used, ensure that the existing reinforcement is not damaged during the concrete removal operations.

7) Remove protrusions, such as mortar spatter or fins, by grinding or by striking with a hammer or other tool.

g. Reinforcement

1) Remove concrete from around reinforcement when the rebar is rusted, more than half the rebar perimeter is already exposed, the concrete bond around the rebar is broken, and if the concrete is unsound or honey-combed.

2) Remove concrete in order to provide a clear space of minimum one inch on each side of the reinforcement, such that the rebar can be cleaned and the repair material will completely surround the rebar.

3) Clean exposed reinforcement by water blasting or wire brushing.

4) After fully exposing and cleaning the reinforcement, check for steel deterioration, and if the cross-sectional area of the steel has been reduced by more than 10 percent, whether by deterioration, surface preparation, or a combination of both, provide additional reinforcement.

5) Consult with the ENGINEER before adding or replacing rebar.

2. Repairing Surface Defects

a. Clean the concrete surface after removing unsound concrete, repairing cracks, and cleaning the reinforcement.

b. Ensure that the concrete surface and reinforcement are free of form-release agents, curing compounds, surface hardeners, oils, grease, food, chemicals, and other contaminants.

c. Remove dust, including new dust generated by surface preparation or scarifying.

d. Prior to application of the bonding agent, apply anti-corrosion coating to exposed rebar in accordance with the manufacturer's recommendations, allow the coating to dry, reapply the coating, and allow to dry again.

e. Prior to applying the repair mortar, apply bonding agent in accordance with the manufacturer's recommendations.

f. Repair Mortar

1) Apply repair mortar in accordance with the manufacturer's recommendations.

2) Apply a minimum and maximum thickness of each lift of repair material in accordance with the manufacturer's recommendations, with the minimum thickness being not less than 1/4 inch.

g. Fully consolidate the repair material, working the material into the substrate to completely fill all pores and voids in the area to be filled.

h. Bring the repair surface into alignment with the adjacent existing surfaces in order to provide a uniform, even surface.

i. Match the repair surface to adjacent existing surfaces in texture by applying necessary coatings and surface treatments.

j. Float-finish the repaired surface using wood or sponge floats.

k. For repaired surfaces to receive a protective coating, brush-finish the surface in order to produce a roughened substrate for the coating.

l. Minimum and maximum ambient and surface temperatures shall be as recommended by repair material manufacturer.

3. Curing

a. Curing of repair mortar to receive waterproofing shall be as follows:

1) Keep the mortar continuously wet by the application of water for a minimum period of at least 7 consecutive days, beginning immediately after the mortar has reached final set;

2) Weight the curing blankets or otherwise held them in place in order to prevent being dislodged by wind or other causes, and to be substantially in contact with the concrete surface;

3) Ensure that edges are continuously held in place; and,

4) Keep the curing blankets and concrete continuously wet by the use of sprinklers or other means, both during and after normal working hours.

b. If the repair mortar is not to receive waterproofing, provide curing in accordance with the manufacturer's recommendations except that the minimum cure period shall be 7 days.

c. During cold weather, maintain the repair material temperature above 50 degrees F for at least 3 days after placement.

3.5 REPLACEMENT OF CONCRETE SECTIONS WHICH REQUIRE COMPLETE REPLACEMENT

A. Replace defective concrete where identified byt the ENGINEER to be completely replaced.

B. At these locations, remove the concrete in accordance with the requirements of this Section.

C. Provide sawcuts in accordance with the procedures described herein.

D. After removal of the concrete, prepare the area and provide repair concrete in accordance with the requirements of this Section.

E. Unless otherwise indicated, match the finished cross-section of the repaired concrete to the cross-section of the adjacent undamaged concrete.

3.6 PATCHING OF HOLES IN CONCRETE

A. General

1. For the purposes of this Section, holes are defined as penetrations completely through the concrete member and with interior surfaces approximately perpendicular to the surface of the existing member.

2. Interior surface areas which are inclined and do not meet this criteria shall be chipped as needed to meet this requirement.

3. The perimeter of holes at the surface shall form a regular shape composed of curved or straight line segments.

4. Provide the minimum depth of placement for the material used; score the existing concrete by sawcutting, and chip as needed to meet this requirement.

5. Roughen the interior surface of holes less than 12 inches in diameter to a minimum of 0.125-inch amplitude, and roughen larger holes to a minimum of 0.25-inch amplitude.

6. At holes, coat the existing surface to be repaired with a bonding agent.

B. Patching Small Holes

1. For holes which are less than 12 inches in their least dimension and extend completely through concrete members, fill with non-shrink grout as required in Section 036000 – Grouting.

C. Patching Large Holes

1. Fill holes which are larger than 12 inches in their least dimension with non-shrink grout.

2. Provide large holes which are normally in contact with water or soil with hydrophilic waterstop placed in a groove, approximately 1/16 inch deep.

3. Grind the groove into the interior edge of the hydrophilic waterstop.

4. Alternatively, bond the hydrophilic waterstop to the surface using an epoxy grout which completely fills all voids and irregularities beneath the waterstop material.

5. Install the waterstop in accordance with the requirements of Section 033200 – Joints in Concrete.

6. Provide reinforcing steel in layers matching existing reinforcement location, except that concrete cover as required in the Contract Documents for the service condition shall be provided.

7. For holes smaller than 48 inches, provide reinforcement consisting of a minimum of No. 5 bars at 12 inches on center in each layer required.

8. At holes larger than 30 inches, drill the reinforcement and grout into the existing concrete.

9. For holes larger than 48 inches, refer to the Drawings for reinforcement details.

3.7 APPLICATION OF PROTECTIVE COATINGS

A. Apply protective coatings in accordance with the project specifications.

- END OF SECTION -

SECTION 031100 - CONCRETE FORMING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall furnish concrete formwork, bracing, shoring, and supports for cast-in-place concrete and shall design and construct falsework, all in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Manufacturer’s design information demonstrating compliance with requirements for the following:

1. Form ties and related accessories, including taper tie plugs, if taper ties are used.

2. Form gaskets.

3. Form release agent, including NSF certification if not using mineral oil.

4. Manufacturer's design information on formwork, form materials, and locations for use.

1.3 QUALITY ASSURANCE

A. Tolerances: The variation from required lines or grade shall not exceed 1/4-inch in 10-feet, non-cumulative, and there shall be no offsets or visible waviness in the finished surface. Other tolerances shall be within the tolerances of ACI 117 - Standard Tolerances for Concrete Construction and Materials

PART 2 -- PRODUCTS

2.1 GENERAL

A. Except as otherwise expressly accepted by the ENGINEER, lumber brought on the Site for use as forms, shoring, or bracing shall be new material. Forms shall be smooth surface forms and shall be of the following materials:

Walls	Steel, fiberglass, or plywood panel
Columns	Steel, plywood or fiberglass
Roof and floor	Plywood
All other WORK	Steel panels, fiberglass, plywood or tongue and groove lumber

B. Form materials that may remain or leave residues on or in the concrete shall be certified as compliant with NSF Standard 61 – Drinking Water System Components.

2.2 FORM AND FALSEWORK MATERIALS

A. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20 - American Softwood Lumber Standard

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork, shall conform to the requirements of PS 1 – Construction and Industrial Plywood, for Concrete Forms, Class I, and shall be edge sealed.

3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade indicated. Metal forms shall accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

4. Steel leave in place forms shall not be used.

B. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

C. Forms and falsework to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 psf minimum. The minimum design load for combined dead and live loads shall be 100 psf.

2.3 FORM TIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties or other removable form tie fasteners having a circular cross-section shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties for water-retaining structures shall have integral waterstops that tightly fit the form tie so that they cannot be moved from mid-point of the tie. Form ties shall be **ST-4 Hex Head Snap Tie by MeadowBurke** or equal.

B. Removable taper ties may be used when approved by the ENGINEER. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie**.** Use **HD-9 Taper-Tie** by **MeadowBurke** or equal.

PART 3 -- EXECUTION

3.1 GENERAL

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of forms, and any forms that are unsafe or inadequate in any respect shall promptly be removed from the WORK and replaced. Provide worker protection from protruding reinforcement bars in accordance with applicable safety codes. A sufficient number of forms of each kind shall be available to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state, and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by CONTRACTOR's personnel and by the ENGINEER and shall be in sufficient number and properly installed. During concrete placement, the CONTRACTOR shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. Concrete forms shall conform to the shape, lines, and dimensions of members required, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

C. Forms shall be removed unless approved otherwise by the ENGINEER.

3.2 FORM DESIGN

A. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the ENGINEER. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 033100 - Cast-in-Place Concrete. The size, number, and location of such form windows shall be as acceptable to the ENGINEER.

3.3 CONSTRUCTION

A. Vertical Surfaces: Vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of

concrete shall be added to the indicated thickness of a concrete member where concrete is permitted to be placed against trimmed ground in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the ENGINEER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties that cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.

2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls that are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout that shall match the color and texture of the surrounding wall surface.

3.4 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the ENGINEER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the ENGINEER.

3.5 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this WORK shall be done with care so as to avoid injury to the concrete. No heavy loading on green

concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28 Day strength in Section 033100. No forms shall be disturbed or removed under an individual panel or unit before the concrete in the adjacent panel or unit has attained 75 percent of the 28 Day strength and has been in place for a minimum of 7 Days. The time required to establish said strength shall be as determined by the ENGINEER who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7 Day minimum, then that time shall be used as the minimum length of time. Forms for vertical walls of waterholding structures shall remain in place at least 36 hours after the concrete has been placed. Forms for parts of the WORK not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347 - Guide to Formwork for Concrete.

3.6 MAINTENANCE OF FORMS

A. Forms shall be maintained in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the ENGINEER. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the CONTRACTOR shall perform the oiling at least 2 weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.7 FALSEWORK

A. The CONTRACTOR shall be responsible for the design, engineering, construction, maintenance, and safety of falsework, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction and the requirements herein.

B. Falsework shall be designed and constructed to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.

C. Falsework shall be placed upon a solid footing, safe against undermining, and be protected from softening. When the falsework is supported on timber piles, the maximum calculated pile loading shall not exceed 20 tons. When falsework is supported on any portion of the structure which is already constructed, the load imposed by the falsework shall be spread, distributed, and braced in such a way as to avoid any possibility of damage to the structure.

- END OF SECTION -

SECTION 032100 - REINFORCEMENT STEEL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide reinforcement steel and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Furnish shop bending diagrams, placing lists, and drawings of reinforcement steel prior to fabrication.

2. Diagrams

a. The shop bending diagrams shall show the actual lengths of bars to the nearest inch, measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface.

b. Include bar placement diagrams that clearly indicate the dimensions of each bar splice.

3. Reinforcement

a. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed.

b. Said details of reinforcement steel for fabrication and erection shall conform to ACI 315 - Details and Detailing of Concrete Reinforcement, and the indicated requirements.

1.3 QUALITY ASSURANCE

A. Materials Testing

1. If requested by the ENGINEER, furnish samples from each heat of reinforcement steel in a quantity adequate for testing.

2. Costs of initial tests will be paid by the OWNER.

3. Costs of additional tests if material fails initial tests shall be the CONTRACTOR’s responsibility.

PART 2 -- PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. Materials that may remain or leave residues on or within the concrete shall be certified as compliant with NSF Standard 61- Drinking Water System Components.

2.2 REINFORCEMENT STEEL

A. Reinforcement steel for cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Bar and spiral reinforcement shall conform to ASTM A 615 - Deformed and Plain Billet - Steel Bars, for Grade 60 reinforcement, unless otherwise indicated.

2. Welded Reinforcement

   a. Bar and spiral reinforcement that is welded shall conform to ASTM A 706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement, for Grade 60 reinforcement, unless otherwise indicated.

   b. The carbon equivalent in reinforcing that is welded shall not exceed 0.55 percent.

3. Welded Wire Reinforcement

   a. Welded wire reinforcement shall conform to ASTM A 185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement, and the indicated Details.

   b. Welded wire reinforcement with longitudinal wire of W4 size wire and smaller shall be in flat sheets or in rolls with a cored diameter not less than 10-inches.

   c. Welded wire reinforcement with longitudinal wires larger than W4 size shall be in flat sheets only.

B. Accessories

1. Accessories shall include necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement.

2. Bar Supports

   a. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice, including special requirements for supporting epoxy-coated reinforcing bars.

   b. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating that extends at least 1/2 inch from the concrete surface.

   c. Plastic shall be gray in color.

3. Concrete Blocks

a. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength as required for the concrete in which they are located.

b. Wire ties shall be embedded in concrete block bar supports.

C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775 - Epoxy - Coated Reinforcing Steel Bars.

2.3 EPOXY GROUT

A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled.

B. Epoxy grout shall be in conformance with the requirements of Section 036000 – Grout.

PART 3 -- EXECUTION

3.1 GENERAL

A. Reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the Building Code and the indicated supplementary requirements.

3.2 FABRICATION

A. General

1. Reinforcement steel shall be accurately formed to the dimensions and shapes indicated, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318 - Building Code Requirements for Reinforced Concrete, except as modified by the Drawings.

2. Bars shall be bent cold.

3. Bars shall be bent in accordance with the requirements of ACI 318.

4. Fabricate reinforcement bars for structures in accordance with accepted bending diagrams, placing lists, and placing drawings.

B. Fabricating Tolerances

1. Bars used for concrete reinforcement shall conform to the following fabricating tolerances:

a. Sheared Length: plus and minus one inch

b. Depth of Truss Bars: plus zero, minus 1/2 inch

c. Stirrups, Ties and Spirals: plus and minus 1/2 inch

d. Other Bends: plus and minus one inch

3.3 PLACEMENT

A. Reinforcement steel shall be accurately positioned as indicated, and shall be supported and wired together to prevent displacement using annealed iron wire ties or suitable clips at intersections.

B. Reinforcement steel shall be supported by concrete, plastic or metal support spacers, or metal hangers that are sufficiently strong and rigid to prevent any displacement of the reinforcement steel.

C. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous.

D. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks.

E. For concrete over formwork, provide concrete, metal, plastic, or other acceptable bar chairs and spacers.

F. Limitations on the use of bar support materials shall be as follows.

1. Concrete Dobies
    a. permitted at any location except where architectural finish is required
    b. required for slabs on grade and surfaces in contact with or above ozonated process water
2. Wire bar supports will be permitted only at slabs over dry areas, interior dry wall surfaces, and exterior wall surfaces.
3. Plastic bar supports will be permitted at every location except on-grade.

G. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.

H. Bars additional to those indicated that may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at no additional expense to the OWNER.

I. Except where in conflict with the Building Code, unless otherwise indicated reinforcement placing tolerances shall be within the limits in Section 7.5 of ACI 318.

J. Moving Bars

1. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items.
2. If bars are moved more than one bar diameter or enough to exceed the above tolerances, the resulting arrangement of bars shall be as reviewed and accepted by the ENGINEER.

K. Storage and Handling

1. Epoxy-coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating.

2. Non-abrasive slings made of nylon and similar materials shall be used.

3. Specially coated bar supports shall be used.

4. Chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.

L. Accessory Spacing

1. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars.

2. When used to space the reinforcing bars from wall forms, the forms and bars shall be located such that there is no deflection of the accessory when the forms are tightened into position.

3.4 SPACING OF BARS

A. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars, nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than one inch.

B. Where reinforcement in beams or girders is placed in 2 or more layers, the clear distance between layers shall be not less than one inch.

C. In columns, the clear distance between longitudinal bars shall be not less than 1-1/2 times the bar diameter, nor less than 1-1/2 times the maximum size of the coarse aggregate, nor less than 1-1/2 inches.

D. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.

3.5 SPLICING

A. General

1. Reinforcement bar splices shall only be used at indicated locations.

2. When it is necessary to splice reinforcement at points other than where indicated, the character of the splice shall be as reviewed and accepted by the ENGINEER.

3. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

B. Splices of Reinforcement

1. The length of lap for reinforcement bars, unless otherwise indicated, shall be in accordance with ACI 318, Section 12.15.1 for a Class B splice.

2. Welded Wire Reinforcement

   a. Laps of welded wire reinforcement shall be in accordance with ACI 318.

   b. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet.

   c. Wires shall be staggered and tied in such a manner that they cannot slip.

3. Splices in column spiral reinforcement, when necessary, shall be made by welding or by a lap of 1-1/2 turns.

C. Bending or Straightening

1. Reinforcement shall not be straightened or re-bent in a manner which will injure the material.

2. Bars shall be bent or straight as indicated.

3. Do not use bends different from the bends indicated.

4. Bars shall be bent cold, unless otherwise permitted by the ENGINEER.

5. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the ENGINEER.

D. Unless indicated otherwise, mechanical coupler spacing and capacity shall match the spacing and capacity of the reinforcing indicated for the adjacent section.

3.6 CLEANING AND PROTECTION

A. Reinforcement steel shall always be protected from conditions conducive to corrosion until concrete has been placed around it.

B. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

C. Where there is delay in depositing concrete, the reinforcement shall be re-inspected and, if necessary, re-cleaned.

3.7 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

A. Hole Preparation

1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than 1/4 inch greater than the diameter of the outer surface of the reinforcing bar deformations.

2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless indicated otherwise.

3. The hole shall be drilled by methods that do not interfere with the proper bonding of epoxy.

4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling, and the location of holes shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.

5. The hole shall be blown clean with clean, dry compressed air to remove dust and loose particles.

B. Embedment

1. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole.

2. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets.

3. The hole shall be filled to a depth that insures excess material will be expelled from the hole during dowel placement.

4. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy.

5. The bar shall be inserted slowly enough to avoid developing air pockets.

- END OF SECTION -

SECTION 033100 - CAST-IN-PLACE CONCRETE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide cast-in-place concrete, as indicated in accordance with the Contract Documents.

B. The following types of concrete are covered in this Section:

1. Structural Concrete
    a. Regular Mix: Roof, floor slabs, columns, walls, pavements, and other concrete items not indicated otherwise in the Contract Documents.
    b. Thick Section Mix: For 12-inch and thicker walls, slabs on grade, pavements, and footings. This type of concrete may be used at the indicated locations at the CONTRACTOR's option if the ENGINEER agrees.
    c. Pea Gravel Mix: At the bottom 6 inches of walls.
2. Other Concretes
    a. Sitework Concrete
        1) concrete to be used for curbs, gutters, catch basins, sidewalks, fence and guard post embedment, underground duct bank encasement, and other concrete appurtenant to electrical facilities, unless otherwise indicated
    b. Lean Concrete
        1) concrete to be used for thrust blocks, pipe trench cut-off blocks, and cradles that are indicated as unreinforced
        2) Lean concrete shall be used as protective cover for dowels intended for future connections.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Mix Designs

1. Prior to beginning the WORK and within 14 Days of the Notice to Proceed, submit preliminary concrete mix designs which shall show the proportions and gradations of materials proposed for each class and type of concrete.

2. Mix designs shall be checked through trial batch and laboratory testing by an independent testing laboratory acceptable to the ENGINEER.

3. Costs related to trial batch and related laboratory testing shall be CONTRACTOR’s responsibility as part of the WORK.

4. Since laboratory trial batches require 35 calendar days to complete, the CONTRACTOR shall test a minimum of 2 mix designs for each class of concrete.

C. Delivery Tickets

1. Where ready-mix concrete is used, the CONTRACTOR shall furnish delivery tickets at the time of delivery of each load of concrete.

2. Each ticket shall show the state-certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, the amount of water in the aggregate added at the batching plant, and the amount allowed to be added at the Site for the specific design mix.

3. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

D. Test Data: Test data relating to the cement, aggregate, and admixtures shall be less than 6 months old.

E. Furnish the following submittals in accordance with ACI 301 – Structural Concrete:

1. mill tests for cement

2. admixture certification, including chloride ion content

3. aggregate gradation test results and certification

4. materials and methods for curing

1.3 CONCRETE CONFERENCE

A. The ENGINEER will chair a meeting to review the detailed requirements of the CONTRACTOR's proposed concrete design mixes and to determine the procedures for producing proper concrete construction no later than 14 Days after the Notice to Proceed.

B. Parties involved in the concrete WORK shall attend the conference, including the following at a minimum:

1. CONTRACTOR's representative

2. testing laboratory representative

3. concrete subcontractor

4. reinforcing steel subcontractor and detailer

5. concrete supplier

6. admixture manufacturer's representative

C. The conference shall be held at a time and place proposed by the CONTRACTOR and accepted by the ENGINEER.

D. The conference shall be held at least 5 Days after acceptance.

1.4 QUALITY ASSURANCE

A. General

1. Tests on component materials and for compressive strength and shrinkage of concrete shall be performed as indicated.

2. Tests for determining slump shall be in accordance with ASTM C 143 – Test Method for Slump of Hydraulic Cement Concrete.

3. Testing for aggregate shall include sand equivalence, reactivity, organic impurities, abrasion resistance, and soundness, according to ASTM C 33 – Concrete Aggregates.

4. The cost of trial batch laboratory tests on cement, aggregates, and concrete shall be the CONTRACTOR's responsibility.

5. The cost of laboratory tests on field-placed cement, aggregates, and concrete will be the ENGINEER'S responsibility.

6. The CONTRACTOR shall be responsible for the cost of any tests and investigations of WORK that is determined to be Defective WORK.

7. The testing laboratory shall meet or exceed ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation.

8. Concrete for testing shall be furnished by the CONTRACTOR, and the CONTRACTOR shall assist the ENGINEER in obtaining samples and disposal and cleanup of excess material.

B. Field Compression Tests

1. Compression test specimens shall be taken during construction from the first placement of each type of concrete and at intervals thereafter as selected by the ENGINEER to insure continued compliance with the Specifications.

2. Each set of specimens shall be a minimum of 5 cylinders.

3. Compression test specimens for concrete shall be made in accordance with Section 9.2 of ASTM C 31 – Practices for Making and Curing Concrete Test Specimens in the Field.

4. Specimens shall be 6 inches diameter by 12 inches tall cylinders.

5. Compression tests shall be performed in accordance with ASTM C 39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.

6. One test cylinder shall be tested at 7 Days, and 2 test cylinders tested at 28 Days.

7. The remaining cylinders shall be held to verify test results, if needed.

C. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be in accordance with ACI 318 – Building Code Requirements for Reinforced Concrete, Chapter 5 "Concrete Quality," and as indicated.

2. A statistical analysis of compression test results shall be performed according to ACI 214 – Recommended Practice for Evaluation of Strength Test Methods.

3. The standard deviation of the test results shall not exceed 640 psi, when ordered at equivalent water content as estimated by slump.

4. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for subsequent batches of the type of concrete affected.

5. When the standard deviation of the test results exceeds 640 psi, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 psi below or the average of any 3 consecutive tests being below the required compressive strength is 1 in 100.

6. The required average strength shall be calculated by Criterion No. 3 of ACI 214 using the actual standard deviation.

7. Concrete that fails to meet the ACI requirements and the indicated requirements is subject to removal and replacement.

D. Aggregate Testing: Aggregate testing shall be performed for the trial batch in the Article below entitled “Trial Batch and Laboratory Tests” prior to construction and every 12 months during construction to determine continued compliance.

E. Shrinkage Tests

1. Drying shrinkage tests shall be performed for the trial batches indicated in the Article below entitled "Trial Batch and Laboratory Tests," for the first placement of each class of structural concrete except pea gravel mix, and during placement to determine continued compliance.

2. Neither structural pea gravel nor structural C-R pea gravel mix need to be tested for shrinkage.

3. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age.

4. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001 inch at each test age.

5. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004 inch, the results obtained from that specimen shall be disregarded.

6. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage.

7. Compression test specimens shall be taken in each case from the same concrete used for preparing drying shrinkage specimens.

8. These tests shall be considered a part of the normal compression tests for the project.

9. Allowable shrinkage limitations are indicated in PART 2 - PRODUCTS, below.

10. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gauge length of 10-inches, and fabricated, cured, dried, and measured in accordance with ASTM C 157 – Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete, modified as follows:
    a. Specimens shall be removed from molds at an age of 23 hours, plus or minus one hour, after trial batching, and shall be placed immediately in water at 70 degrees F, plus or minus 3 degrees F, for at least 30 minutes.
    b. Specimens shall be measured within 30 minutes thereafter to determine original length and then shall be submerged in saturated lime water at 73 degrees F, plus or minus 3 degrees F.
    c. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7 Days.
    d. This length at age 7 Days shall be the base length for drying shrinkage calculations ("0" days drying age).
    e. Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F, plus or minus 3 degrees F, and 50 percent relative humidity, plus or minus 4 percent, for the remainder of the test.
    f. Measurements to determine shrinkage, expressed as percentage of base length, shall be performed and reported separately for 7, 14, 21, and 28 Days of drying after 7 Days of moist curing.

F. Construction Tolerances

1. The CONTRACTOR shall set and maintain concrete forms and perform finishing operations to ensure that the completed WORK is within tolerances.

2. Surface defects and irregularities are defined as finishes and are different from tolerances.

3. Tolerance is the permissible variation from lines, grades, or dimensions indicated on the Drawings.

4. Where tolerances are not indicated, permissible deviations shall be in accordance with ACI 117 – Standard Tolerance for Concrete Construction and Materials.

5. The following non-cumulative construction tolerances apply to finished walls, columns and slabs unless otherwise indicated:

ITEM	TOLERANCE
Variation of the constructed linear outline from the established position in plan.	in 10 feet: 1/4 inch in 20 feet or more: 1/2 inch
Variation from the level or from the grades indicated.	in 10 feet: 1/4 inch in 20 feet or more: 1/2 inch
Variation from plumb	in 10 feet: 1/4 inch in 20 feet or more: 1/2 inch
Variation in the thickness of slabs and walls.	minus 1/4 inch plus 1/2 inch
Variation in the locations and sizes of slabs and wall openings	plus or minus 1/4 inch

PART 2 -- PRODUCTS

2.1 CONCRETE MATERIALS

A. General

1. Materials shall be classified as acceptable for potable water use in accordance with NSF Standard 61.

2. Cement for concrete that will contact potable water shall not be obtained from kilns that burn metal rich hazardous waste fuel.

3. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage.

4. Cement reclaimed from cleaning bags or leaking containers shall not be used.

5. Cement shall be used in the sequence of receipt of shipments.

B. Materials and storage of materials shall comply with ACI 301, as applicable.

C. Materials for concrete shall conform to the following requirements:

1. Cement

a. Cement shall be standard brand Portland cement conforming to ASTM C 150 – Portland Cement, for Type II or Type V.

b. A minimum of 85 percent of cement by weight shall pass a 325 screen.

c. A single brand of cement shall be used throughout the WORK, and prior to its use, the brand shall be accepted by the ENGINEER.

d. The cement shall be suitably protected from exposure to moisture until used.

e. Cement that has become lumpy shall not be used.

f. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling.

g. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the ENGINEER, if requested, regarding compliance with the Specifications.

2. Water

a. Water for mixing and curing shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities.

b. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.

c. Agricultural water with high total dissolved solids (greater than 1000 mg/L TDS) shall not be used.

3. Aggregates

a. Aggregates shall be obtained from pits acceptable to the ENGINEER, shall be non-reactive, and shall conform to ASTM C 33 – Concrete Aggregates.

b. The maximum size of coarse aggregate shall be as indicated, and the substitution of lightweight sand for fine aggregate will not be permitted.

c. Coarse Aggregates

1) Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock, or a combination thereof.

2) The coarse aggregates shall be prepared and handled in 2 or more size groups for combined aggregates, with a maximum size greater than 3/4 inch.

3) When the aggregates are proportioned for each batch of concrete, the 2 size groups shall be combined (also refer to the Article below entitled "Trial Batch and Laboratory Tests").

d. Fine Aggregates

1) Fine aggregates shall be natural sand or a combination of natural and manufactured sand that is hard and durable.

2) When tested in accordance with ASTM D 2419 – Test Methods for Sand Equivalent Value of Soils and Fine Aggregate, the sand equivalency shall not be less than 75 percent for an average of 3 samples, nor less than 70 percent for an individual test.

3) The gradation of fine aggregate shall conform to ASTM C 33 when tested in accordance with ASTM C 136 for the fineness modulus of the sand used, including the optional grading in Section 6.2.

4) The fineness modulus of sand used shall not be greater than 3.1.

5) When tested in accordance with ASTM C 33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

e. Combined Aggregates

1) Combined aggregates shall be well graded from coarse to fine sizes and shall be uniformly graded between screen sizes to produce concrete that has optimum workability and consolidation characteristics.

2) Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

3) When tested in accordance with ASTM C 33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions or 10.5 percent after 100 revolutions.

f. When tested in accordance with ASTM C 33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

g. When tested in accordance with ASTM C 33, the loss resulting after 5 cycles of the soundness test shall not exceed 10 percent for fine aggregate and 12 percent for coarse aggregate when using sodium sulfate.

4. Ready-mixed concrete shall conform to the requirements of ASTM C 94 – Ready Mixed Concrete.

5. Admixtures

a. Admixtures shall be compatible and shall be furnished by a single manufacturer capable of providing qualified field service representation.

b. Admixtures shall be used in accordance with manufacturer's recommendations.

c. If the use of an admixture is producing an inferior end result, the CONTRACTOR shall discontinue use of the admixture.

d. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be non-toxic after 30 days.

e. Air Content

1) An air-entraining agent meeting the requirements of ASTM C 260 – Air Entraining Admixtures for Concrete shall be used.

2) Concrete floors to receive a dry-shake floor hardener shall have an air content not to exceed 3 percent.

3) The OWNER reserves the right, at any time, to sample and test the air-entraining agent.

4) The air-entraining agent shall be added to the batch in a portion of the mixing water.

5) The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

6) Air content shall be tested at the point of placement.

7) The air entraining agent shall be **Micro-Air** by **Master Builders**; **Daravair** by **W.R. Grace**; **Sika AEA-15** by **Sika Corporation**; or equal

f. Set-Controlling and Water-Reducing Admixtures

1) Admixtures may be added at the CONTRACTOR's option, subject to the ENGINEER's approval, to control the set, effect water reduction, and increase workability.

2) The cost of adding an admixture shall be the CONTRACTOR's responsibility.

3) Concrete containing an admixture shall be first placed at a location determined by the ENGINEER.

4) Admixtures shall conform to ASTM C 494 – Chemical Admixtures for Concrete.

5) The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

6) Concrete shall not contain more than one water-reducing admixture, unless it can be demonstrated that the proposed mix will meet the indicated drying shrinkage requirements.

7) The set-controlling admixture may be either with or without water-reducing properties.

8) Where the air temperature at the time of placement is expected to be consistently greater than 80 degrees F, a set-retarding admixture such as **Plastocrete 161MR** by **Sika Corporation**, **Pozzolith or Delvo** by **BASF**, **Daratard** by **W.R. Grace**, or equal shall be used.

9) Where the air temperature at the time of placement is expected to be consistently less than 40 degrees F, a non-corrosive set accelerating admixture such as **Plastocrete 161FL** by **Sika Corporation**, **Pozzutec 20** by **BASF**, **Daraset** by **W.R. Grace**, or equal shall be used.

10) Mid-Range Water Reducers

    a) General use water-reducing admixtures shall be mid-range and shall conform to ASTM C 494, Type A and F.

    b) Use **Daracem** by **W.R. Grace, Polyheed** by **BASF, Sikament** by **Sika Corporation,** or equal.

    c) The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

11) High-Range Water Reducers

    a) High-range water reducers shall conform to ASTM C 494, Type F or G.

    b) Use **ADVA** by **W.R. Grace, ViscoCrete** by **Sika Corporation, Glenium** by **BASF,** or equal.

    c) The high-range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.

    d) No more than 14 ounces of water reducer per sack of cement shall be used.

    e) The water reducer shall be considered as part of the mixing water when calculating the water/cement ratio.

    f) If the high-range water reducer is added to the concrete at the Site, it may be used in conjunction with the same water reducer added at the batch plant.

    g) Concrete shall have a slump of 3 inches, plus or minus 1/2 inch, prior to adding the high-range water reducing admixture at the Site.

h) The high-range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician.

i) A standby system shall be provided and tested prior to each day's operation of the primary system.

j) Concrete shall be mixed at mixing speed for a minimum of 70 mixer revolutions or 5 minutes after the addition of the high-range water reducer, unless recommended otherwise by the manufacturer.

g. Other Admixtures

1) Flyash

a) Flyash shall not be used for below grade concrete.

b) For other concrete, fly ash may be substituted for not more than 15 percent, by weight, of cement in structural concrete and not more than 30 percent, by weight, for sitework concrete, and not more than 50 percent, by weight, of cement in other concrete.

c) Fly ash shall conform to ASTM C618 and shall not have loss-on-ignition greater than 3 percent.

d) The water/cement ratio shall be calculated based on cement plus fly ash.

2) Ground Blast Furnace Slag Cement

a) Slag cement shall not be used for concrete sections containing process water in water or wastewater treatment plants or potable water.

b) Slag cement shall conform to ASTM C989 – Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars, Grade 100 or 120.

c) Blended cements shall conform to ASTM C595 – Blended Hydraulic Cements, Type 1S, or ASTM C1157 – Performance Specification for Hydraulic Cement.

d) Slag cement substitution, if used, shall be not less than 25, nor more than 50 percent by weight of cement.

e) Slag cement substitution shall not be used with fly ash substitution.

f) The water/cement ratio shall be calculated based on cement plus slag cement.

2.2 CURING MATERIALS

A. Concrete Curing Blanket

1. Polyethylene Sheets

a. Polyethylene sheets for use as concrete curing blanket shall be white and shall have a nominal thickness of 6 mils.

b. The loss of moisture when determined in accordance with ASTM C 156 – Test Method for Water Retention by Concrete Curing Materials, shall not exceed 0.055 grams per square centimeter of surface.

2. Polyethylene-Coated Waterproof Paper

   a. Polyethylene-coated waterproof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, shall have a nominal thickness of 2-mils, and shall be permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A – Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).

   b. The loss of moisture, when determined in accordance with ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.

3. Polyethylene-Coated Burlap

   a. Polyethylene-coated burlap for use as concrete curing blanket shall be 4 mils thick, with white opaque polyethylene film impregnated or extruded into one side of the burlap.

   b. The burlap shall weigh not less than 9 ounces per square yard.

   c. The loss of moisture, when determined in accordance with ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.

B. Curing Mats

1. Curing mats for use in Curing Method 6, below, shall be heavy shag rugs or carpets or cotton mats quilted at 4 inches on center.

2. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

C. Evaporation Retardant

1. An evaporation retardant shall be used.

2. The evaporation retardant shall be:

   a. **Confilm** by **MBT/Degussa Building Systems**;

   b. **Eucobar** by **Euclid Chemical Company**;

   c. **E-CON** by **L & M Construction Chemicals, Inc.**;

   d. or equal.

2.3 NON-WATERSTOP JOINT MATERIALS

A. Materials for non-waterstop joints in concrete shall conform to the following requirements:

1. The preformed joint filler shall be a non-extruding neoprene sponge or polyurethane type conforming to Section 033200 – Joints in Concrete.

2. The elastomeric joint sealer shall conform to Section 079213 – Sealants and Caulking.

3. Mastic Joint Sealer

   a. The mastic joint sealer shall be a material:

      1) that does not contain evaporating solvents;

2) that will tenaciously adhere to concrete surfaces;

3) that will remain permanently resilient and pliable;

4) that will not be affected by the continuous presence of water;

5) that will not in any way contaminate potable water;

6) and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement from expansion and contraction.

b. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants.

c. The sealer shall be capable of meeting the indicated test requirements, if testing is required by the ENGINEER.

2.4 MISCELLANEOUS MATERIALS

A. Bonding Agents

1. Bonding agents shall be epoxy adhesives.

2. Bonding agents for bonding freshly-mixed, plastic concrete to hardened concrete shall be:

a. **Sikadur 32 Hi-Mod Epoxy Adhesive** by **Sika Corporation**;

b. **Concresive Liquid (LPL)** by **MBT/Degussa Building Systems**;

c. **BurkEpoxy MV** by **Edoco**;

d. or equal.

3. Bonding agents for bonding hardened concrete or masonry to steel shall be:

a. **Sikadur 31 Hi-Mod Gel** by **Sika Corporation**;

b. **BurkEpoxy NS** by **Edoco**;

c. **Concresive Paste (LPL)** by **MBT/Degussa Building Systems**;

d. or equal.

B. Vapor Retarder

1. The vapor retarder shall be placed under the pump room and electrical room floor slabs. The vapor barrier shall be 8 mils thick, Class A, 3-ply, nylon or polyester cord-reinforced high density polyethylene sheet laminated to a non-woven geotextile fabric, in accordance with ASTM E 1745 – Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

2. The vapor retarder shall be **Reef Industries, Inc., Griffolyn T-65 G**, or equal.

3. Provide granular material above the vapor retarder, consisting of crushed stone, gravel, or sand with the following size distribution and meeting the deleterious substance limits of ASTM C 33 for fine aggregates:

Sieve Size	Percentage Passing
3/8-inch	100
4.75 mm	85-100
No. 100	10 – 30

4. Seams in the vapor retarder sheet shall be sealed with tape, adhesive, or other material as recommended by the sheet manufacturer for the areas to be sealed and based on the sheet material.

2.5 CONCRETE DESIGN REQUIREMENTS

A. General

1. Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated.

2. The exact proportions in which these materials are to be used for different parts of the WORK shall be determined during the trial batches.

3. In general, the mix shall be designed to produce a concrete capable of being deposited to obtain maximum density and minimum shrinkage, and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface.

4. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items.

5. The proportions shall be changed whenever necessary or desirable to meet the required results, and such changes shall be subject to review by the ENGINEER.

B. Fine Aggregate Composition

1. In mix designs for structural concrete, except for 1/2-inch and 3/8-inch maximum size aggregate, the percentage of fine aggregate in total aggregate by weight shall be as indicated in the following table:

FINE AGGREGATE	
Fineness Modulus	Percent (maximum)
2.7 or less	41
2.7 to 2.8	42
2.8 to 2.9	43
2.9 to 3.1	44

2. For other concrete, the maximum percentage of fine aggregate of total aggregate by weight shall not exceed 50 percent.

C. Water/Cement Ratio

1. The indicated water/cement ratio is for a saturated-surface dry condition of aggregate.

2. Throughout every Day, the added batch water shall be adjusted for the total free water in the aggregates, which shall be determined as follows:

   a. The total moisture content of all aggregate shall be calculated by ASTM C 566 – Test Method for Total Moisture Content of Aggregate by Drying.

   b. Subtract the moisture absorbed by the coarse aggregate, calculated by ASTM C 127 – Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

   c. Subtract the moisture absorbed by the fine aggregate, calculated by ASTM C 128 – Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate.

D. Concrete Property Tables

1. The maximum cement contents (determined from the maximum W/C Ratios and maximum Water Contents given in the Concrete Property Tables below) are intended to minimize drying shrinkage and heat of hydration of the concrete.

2. It is understood that the indicated maximum cement contents may require additional water reducing agent for the workability required by the CONTRACTOR'S methods, and may not result in the least costly concrete mix for the required concrete strength.

3. If the CONTRACTOR wishes to increase the maximum cement content for any mix, the CONTRACTOR must notify the ENGINEER in writing and submit the request within 30 days of the Notice to Proceed.

4. Increases in cement content shall be at the CONTRACTOR'S expense.

Type of WORK	Regular Mix (roof, floor slabs, walls, pavements, and other concrete items not categorized elsewhere)
Min 28 Day Compressive Strength, psi	4000
Max Aggregate Size, in	1
Cement Content per cubic yard, lb, minimum	564
Water content per cubic yard, lb, maximum	254

Max W/C Ratio by weight	0.45
Total Air Content, percent	3 to 6, all others
Slump	4 inches +/- 1 in with high-range water reducer: 7 inches +/- 2 in

Type of WORK	Sitework Concrete (curbs, gutters, sidewalks, catch basins, fence embedments, encasements, and ductbanks)	Lean Concrete (thrust blocks, pipe trench cut-off blocks, and cradles)
Min 28 Day Compressive Strength, psi	3000	2000
Max Aggregate Size, in	1	1
Cement Content per cubic yard, lb, minimum	470	376
Water content per cubic yard, lb, maximum	254	270
Max W/C Ratio by weight	0.50 normal	0.60
Total Air Content, percent	3 to 6 all others	3 to 6 all others
Slump	4 inches +/- 1 in ductbanks and encasements: 5 inches +/- 1 in	4 inches +/- 1 in

NOTE: The CONTRACTOR is cautioned that the limiting parameters above are not a mix design. Admixtures may be required to achieve workability required by the CONTRACTOR's construction methods and aggregates. The CONTRACTOR shall be responsible for providing concrete with the required workability and strength.

E. Adjustments to Mix Design

1. The CONTRACTOR may elect to decrease the water/cement ratio to achieve the strength and shrinkage requirements and/or add water reducers, as required to achieve workability.

2. The mixes shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish, and the CONTRACTOR shall be entitled to no additional compensation because of such changes.

3. Any changes to the accepted concrete mix design shall be submitted to the ENGINEER for review and shall be tested again in accordance with the indicated requirements.

2.6 CONSISTENCY

A. The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete that can be worked properly into place without segregation and which can be compacted by vibratory methods to give the desired density, impermeability, and smoothness of surface.

B. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, in order to maintain uniform production of a desired consistency.

C. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143 – Test Method for Slump of Hydraulic Cement Concrete.

D. The slumps shall be as indicated with the concrete properties.

2.7 TRIAL BATCH AND LABORATORY TESTS

A. The CONTRACTOR shall only use a mix design for construction that has first met the trial batch testing requirements.

B. Before placing any concrete, a testing laboratory selected by the ENGINEER shall prepare a trial batch of each class of structural concrete, based on the preliminary concrete mixes submitted by the CONTRACTOR.

C. Aggregate Proportions

1. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties.

2. If one size range produces an acceptable mix, a second size range need not be used.

3. Such adjustments will be considered refinements to the mix design and will not be the basis for extra compensation to the CONTRACTOR.

4. Concrete shall conform to the indicated requirements whether the aggregate proportions are from the CONTRACTOR's preliminary mix design or whether the proportions have been adjusted during the trial batch process.

5. The trial batch shall be prepared using the aggregates, cement, and admixture proposed for the project.

D. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage and 6 compression test specimens from each batch.

E. The determination of compressive strength shall be made by testing 6-inch diameter by 12-inch high cylinders, which have been made, cured, and tested in accordance with

ASTM C 192 – Practice for Making and Curing Concrete Test Specimens in the Laboratory, and ASTM C 39.

F. The testing schedule shall be 3 compression test cylinders tested at 7 Days and 3 at 28 Days.

G. The average compressive strength for the 3 cylinders tested at 28 Days for any given trial batch shall be not less than 125 percent of the indicated compressive strength.

H. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C 136 – Method for Sieve Analysis of Fine and Coarse Aggregates, and values shall be provided for percent passing each sieve.

2.8 MEASUREMENT OF CEMENT AND AGGREGATE

A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the CONTRACTOR and acceptable to the ENGINEER.

B. Weighing Tolerances

Material	Percent of Total Weight
Cement	1
Aggregates	3
Admixtures	3

2.9 MEASUREMENT OF WATER

A. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the ENGINEER and capable of measuring the water in variable amounts within a tolerance of one percent.

B. The water feed control mechanism shall be capable of being locked in position in order to constantly deliver the required amount of water to each batch of concrete.

C. A positive, quick-acting valve shall be used for a cut-off in the water line to the mixer, and the operating mechanism shall prevent leakage when the valve is closed.

2.10 READY-MIXED CONCRETE

A. General

1. At the CONTRACTOR'S option, ready-mixed concrete may be used if it meets the indicated requirements as to materials, batching, mixing, transporting and placement, and is in accordance with ASTM C 94 and the following supplementary requirements.

2. Ready-mixed concrete shall be delivered to the WORK, and discharge shall be completed within one hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever occurs first.

3. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted.

4. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted.

5. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the ENGINEER.

B. Counters

1. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified.

2. The counter shall be of the resettable, recording type and shall be mounted in the driver's cab.

3. The counters shall be actuated at the time of starting the mixers at mixing speeds.

C. Mixing

1. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment.

2. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed.

3. Materials, including the mixing water, shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

D. Uniformity

1. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading.

2. If slump tests taken at approximately the 1/4- and 3/4-point of the load during discharge result in slumps differing by more than one inch when the required slump is 3 inches or less, or if they differ by more than 2 inches when the required slump is more than 3 inches, the mixer shall not be used on the WORK unless the causative condition is corrected and satisfactory performance is verified by additional slump tests.

3. Mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

E. Each batch of ready-mixed concrete delivered to the Site shall be accompanied by a delivery ticket that is furnished to the ENGINEER in accordance with the Paragraph in Part 1 of this Section entitled "Delivery Tickets."

PART 3 -- EXECUTION

3.1 PROPORTIONING AND MIXING

A. Proportioning of the mix shall conform to ACI 301.

B. Mixing shall conform to ACI 301.

C. Slumps shall be as indicated.

D. Re-tempering of concrete or mortar that has partially hardened will not be permitted.

3.2 PREPARATION OF SURFACES FOR CONCRETING

A. General

1. Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon.

2. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Vapor Retarder Sheet

1. The sheet shall be installed under the pump room and electrical room, on-grade building floor slabs of occupiable (non-hydraulic) structures and at other locations as indicated.

2. Sand Base

a. The sand base shall be at least 2 inches thick within the foundation line after moistening and compaction by mechanical means.

b. The sand surface shall be flat and level within a tolerance of plus zero inches to minus 3/4 inch.

3. Place, protect, and repair defects in sheet according to ASTM E 1643 – Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs, and the manufacturer's written instructions.

4. Seams shall be lapped and sealed in accordance with ASTM E 1643.

5. Granular material above the sheet shall be moistened and compacted to 2 inches thickness, within the same flatness criteria as the sand base.

6. Vapor retarder sheet shall extended to overlap the wall waterproofing a minimum of 12” or to finished grade when a waterproofing membrane is not required.

C. Joints in Concrete

1. Construction joints are defined as concrete surfaces upon which or against which concrete is to be placed, but placement of concrete has been stopped or interrupted and the ENGINEER has determined that the new concrete cannot be incorporated integrally with the concrete previously placed.

2. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding.

3. Except where coated joint surfaces have been indicated, the joint surfaces shall be cleaned of laitance, loose or defective concrete, foreign material, and be roughened to a minimum 1/4-inch amplitude.

4. Cleaning and roughening shall be accomplished by hydroblasting or sandblasting (exposing aggregate) followed by thorough washing.

5. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.

6. Gravel

   a. After the surfaces have been prepared, each approximately horizontal construction joint shall be covered with a 6-inch lift of a pea gravel mix.

   b. The gravel mix shall be placed and spread uniformly.

   c. Wall concrete shall follow immediately and shall be placed upon the fresh pea gravel mix.

D. Placement Interruptions

1. When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent WORK.

2. Such construction joints shall be made only where acceptable to the ENGINEER.

E. Embedded Items

1. No concrete shall be placed until the formwork, the installation of parts to be embedded, the reinforcement steel, and the preparation of surfaces involved in the placing have been completed and accepted by the ENGINEER at least 4 hours before the placement of concrete.

2. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.

3. Inserts or other embedded items shall conform to the indicated requirements.

4. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations as indicated or shown by Shop Drawings, and shall be acceptable to the ENGINEER before any concrete is placed.

5. Accuracy of placement shall be the responsibility of the CONTRACTOR.

F. Casting New Concrete Against Old Concrete

1. Where concrete is to be cast against old concrete (defined as any concrete which is greater than 60 Days old), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting or sandblasting to expose aggregate.

2. The joint surface shall be coated with an epoxy bonding agent unless determined otherwise by the ENGINEER.

G. Water

1. No concrete shall be placed in any structure until water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes or other means, and carried out of the forms, clear of the WORK.

2. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set.

3. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete.

4. Pumping or other necessary dewatering operations for removing ground water, if required, shall be subject to review by the ENGINEER.

H. Corrosion Protection

1. Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be positioned and supported prior to placement of concrete such that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement.

2. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

I. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall be provided, where practicable, during the placement of concrete.

J. Anchor bolts shall be accurately set and shall be maintained in position by templates while embedded in the concrete.

K. Cleaning

1. The surfaces of metalwork to be in contact with the concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.3 HANDLING, TRANSPORTING, AND PLACING

A. General

1. The placement of concrete shall conform to the applicable portions of ACI 301 and the indicated requirements.

2. No aluminum materials shall be used in conveying any concrete.

B. Non-Conforming WORK or Materials

1. Concrete which during or before placing is found not to conform to the indicated requirements will be rejected and shall be immediately removed from the WORK.

2. Concrete that is not placed in accordance with these requirements or which is of inferior quality shall be removed and replaced.

C. Unauthorized Placement

1. No concrete shall be placed except in the presence of an authorized representative of the ENGINEER.

2. The CONTRACTOR shall notify the ENGINEER in writing at least 72 hours in advance of the placement of any concrete.

D. Placement in Wall and Column Forms

1. Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete.

2. In such cases, means such as hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation.

3. In no case shall the free fall of concrete below the ends of ducts, chutes, or buggies exceed 4 feet in walls and 8 feet in columns.

4. Concrete shall be uniformly distributed during the process of deposition, and in no case after deposition shall any portion be displaced in the forms more than 6 feet in the horizontal direction.

5. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2 feet, and care shall be exercised to avoid inclined layers or inclined construction joints except where such are required for sloping members.

6. Each layer shall be placed while the previous layer is still soft.

7. The rate of placing concrete in wall forms shall not exceed 5 feet of vertical rise per hour.

8. Sufficient illumination shall be provided in the interior of forms such that the concrete at the places of deposit is visible from the deck or runway.

E. Casting New Concrete Against Old

1. An epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations.

2. This provision shall not apply to joints where waterstop has been provided.

3. Refer to Section 033200 – Joints in Concrete, for other requirements.

F. Conveyor Belts and Chutes

1. Ends of chutes, hopper gates, and other points of concrete discharge throughout the CONTRACTOR's conveying, hoisting, and placement system shall be designed and

arranged such that concrete passing from them will not fall separated into whatever receptacle immediately receives it.

2. Conveyor belts, if used, shall be of a type acceptable to the ENGINEER.

3. Chutes longer than 50 feet will not be permitted.

4. The minimum slopes of chutes shall be such that concrete of the indicated consistency will readily flow in them.

5. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted.

6. Conveyor belts and chutes shall be covered.

G. Placement in Slabs

1. Concrete placement in sloping slabs shall proceed uniformly from the bottom of the slab to the top for the full width of the placement.

2. As the WORK progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

H. Temperature of Concrete

1. The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 50 degrees F.

2. For sections less than 12 inches thick, the temperature of concrete when placed shall be not less than 55 degrees F.

I. Hot or Cold Weather Procedures

1. If required by the ENGINEER, the CONTRACTOR shall submit detailed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete during hot or cold weather.

2. The submittal shall include procedures to be implemented upon abrupt changes in weather conditions or equipment failures.

3. The CONTRACTOR shall not be entitled to additional compensation for satisfying the hot weather placement or the cold weather placement requirements below.

J. Hot Weather Placement

1. If the temperature of the concrete is 85 degrees F or greater, the time between introducing the cement into the aggregates and discharge shall not exceed 45 minutes.

2. If the concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means such as pre-cooling of aggregates, using ice as mixing water, or placing at

night as necessary to maintain the temperature of the concrete below 90 degrees F as it is placed.

3. During the curing period, the maximum temperature decrease measured at the surface of the concrete shall not exceed 50 degrees F in 24 hours nor 5 degrees F in one hour.

K. Cold Weather Placement

1. The placement of concrete shall conform to ACI 306.1 – Cold Weather Concreting, and the following requirements:

a. Remove snow, ice, and frost from the surfaces, including reinforcement, against which concrete is to be placed.

b. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches.

c. Reinforcement and embedded items shall be warmed to above 32 degrees F prior to concrete placement.

d. Maintain the concrete temperature above 50 degrees F for at least 72 hours after placement.

e. Concrete ingredients shall not be heated more than necessary to prevent the temperature of the mixed concrete, as placed, from falling below the minimum temperature criterion.

3.4 PUMPING OF CONCRETE

A. General

1. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment

1. The pumping equipment shall have 2 cylinders and shall be designed to operate with one cylinder in case the other one is not functioning.

2. In lieu of this requirement, the CONTRACTOR may have a standby pump on the Site during pumping.

3. The minimum diameter of the hose conduits shall be in accordance with ACI 304.2R – Placing Concrete by Pumping Methods.

4. Pumping equipment and hose conduits that are not functioning properly shall be replaced.

5. Aluminum conduits for conveying the concrete will not be permitted.

C. Field Control

1. Concrete samples for slump, air content, and test cylinders shall be taken at the placement end of the hose.

3.5 ORDER OF PLACING CONCRETE

A. General

1. The order of placing concrete in the WORK shall be acceptable to the ENGINEER.

2. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints at the indicated locations.

B. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 5 Days for hydraulic structures and 2 Days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the 2 adjacent wall panels have cured at least 10 Days for hydraulic structures and 4 Days for all other structures.

C. Concrete Surfaces

1. The surface of the concrete shall be level whenever a run of concrete is stopped.

2. For a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces.

3. The concrete shall be carried approximately 1/2 inch above the underside of the strip.

4. The strip shall be removed one hour after the concrete is placed, and any irregularities in the edge formed by the strip shall be leveled with a trowel and laitance shall be removed.

3.6 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted throughout the entire depth of the layer which is being consolidated, into a dense and homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete.

B. Vibrators

1. Vibrators shall be Group 3 in accordance with ACI 309 – Consolidation of Concrete, high speed power vibrators (8000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required.

2. Group 2 vibrators may be used only at specific locations when accepted by the ENGINEER.

C. Waterstops

1. Care shall be exercised when placing concrete around waterstops.

2. The concrete shall be carefully worked by rodding and vibrating to make sure that air and rock pockets have been eliminated.

3. Where flat-strip type waterstops have been placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that air and rock pockets have been eliminated.

4. Concrete that is surrounding the waterstops shall be given additional vibration over and above that used for adjacent concrete placement to ensure complete embedment of the waterstops in the concrete.

D. Concrete in Walls

1. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against each surface.

2. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly.

3. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency has been placed in the forms.

4. The vibrating head shall not contact the surfaces of the forms.

5. Care shall be exercised not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.7 FINISHING CONCRETE SURFACES

A. General

1. Concrete surfaces shall be free from fins, bulges, ridges, offsets, bugholes, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface.

2. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions are defined as tolerances and shall be as indicated.

3. These tolerances are to be distinguished from irregularities in finish as indicated.

4. Aluminum finishing tools shall not be used.

B. Formed Surfaces

1. After form removal the CONTRACTOR shall cure, repair defective concrete and correct surface defects.

2. Where architectural finish is required, treatment(s) shall be as indicated. The interior face of the pump room cast in place wall shall received a rubbed finish.

3. Surface holes larger than 1/8” inch in diameter or deeper than 1/4 inch are defined as surface defects in basins and exposed walls.

C. Unformed Surfaces

1. General

a. After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools.

b. Immediately after the concrete has been screeded it shall be treated with a liquid evaporation retardant, and the retardant shall be used again after each operation as necessary to prevent drying shrinkage cracks.

2. The classes of finish for unformed concrete surfaces are defined as follows:

a. Finish U1

1) Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8 inch.

2) No further special finish is required.

b. Finish U2

1) After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades.

2) Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted.

3) Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture.

4) Surface irregularities shall not exceed 1/4 inch.

5) Joints and edges shall be tooled where indicated or as determined by the ENGINEER.

c. Finish U3

1) After the Finish U2 surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks.

2) The finish shall be smooth and free of irregularities.

d. Finish U4

1) Trowel the Finish U3 surface to remove local depressions or high points.

2) In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated.

3) The resulting surface shall be sufficiently rough to provide a nonskid finish.

e. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE	
Area	Finish
grade slabs and foundations to be covered with concrete or fill material	U1
floors to be covered with grouted tile or topping grout	U2
slabs not water bearing	U4
top surface of walls	U3

3.8 CURING AND WATERPROOFING

A. General

1. Concrete shall be cured for not less than 7 Days after placement, in accordance with the methods indicated below for the different parts of the WORK.

Surface to be Cured	Method
unstripped forms	1
wall sections with forms removed and slabs	6
construction joints between footings and walls, and between floor slab and columns	2
encasement and ductbank concrete and thrust blocks	3
concrete surfaces not specifically indicated in this Paragraph	2

B. Method 1

1. Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal.

2. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed.

3. If forms are removed within 7 Days of placing the concrete, curing shall be continued in accordance with Method 6, below.

C. Method 2

1. The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed.

2. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3

1. The surface shall be covered with moist earth not less than 4 hours nor more than 24 hours after the concrete is placed.

2. Earthwork operations that may damage the concrete shall not begin until at least 7 Days after placement of the concrete.

E. Method 6

1. Method 6 shall apply to both walls and slabs.

2. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 7 Days, beginning immediately after the concrete has reached final set or the forms have been removed.

3. Until the concrete surface is covered with the curing mats, the entire surface shall be kept damp by applying water using nozzles that atomize the flow such that the surface is not marred or washed.

4. Curing Mats

   a. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period.

   b. The curing mats shall be weighted or otherwise held substantially in contact with the concrete surface to prevent dislodging by wind or other causes.

   c. Edges shall be continuously held in place.

5. The curing mats and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.

6. Immediately after the application of water has terminated at the end of the curing period, the curing mats shall be removed and the entire concrete surface shall be wetted.

7. The CONTRACTOR shall dispose of excess water from the curing operation in order to avoid damage to the WORK.

F. Waterproofing

1. The exterior surfaces of walls to be backfilled shall be waterproofed in accordance with Specification 071220.

3.9 PROTECTION

A. The CONTRACTOR shall protect the concrete against damage until final acceptance.

B. Weather Protection

1. Fresh concrete shall be protected from damage due to rain, hail, sleet or snow.

2. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.10 CURING DURING COLD WEATHER

A. Water curing of concrete may be reduced to 6 Days during periods when the mean daily temperature in the vicinity of the Site is less than 40 degrees F, provided that during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing has been temporarily discontinued.

B. Compound-Cured Concrete

1. Otherwise, the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50 degrees F.

C. Concrete cured by water shall be protected against freezing temperatures for 72 hours immediately following the 72 hours of protection at 50 degrees F.

D. Discontinuance of Protection

1. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40 degrees F in 24 hours.

2. In the spring, when the mean daily temperature rises above 40 degrees F for more than 3 successive Days, the required 72-hour protection at a temperature not lower than 50 degrees F may be discontinued for as long as the mean daily temperature remains above 40 degrees F, provided that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

E. Artificial Heat

1. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying.

2. The use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound, provided that the use of curing compound for such surfaces is otherwise permitted.

3.11 TREATMENT OF SURFACE DEFECTS

A. General

1. Surface defects are defined in Finishing Concrete Surfaces, above.

2. As soon as forms are removed, the exposed concrete surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in order to secure a smooth, uniform, and continuous surface satisfactory to the Engineer.

3. Plastering or coating of surfaces to be smoothed will not be permitted.

4. No repairs shall be made until after inspection by the ENGINEER.

5. In no case will extensive patching of honeycombed concrete be permitted.

6. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall be repaired as indicated below.

7. Concrete containing extensive voids, holes, honeycombing, or similar depression defects shall be completely removed and replaced.

8. Repairs and replacements shall be performed promptly.

B. Preparation

1. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area.

2. Feathered edges will not be permitted.

3. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of laitance and soft material, plus not less than 1/32-inch depth of the surface film from hard portions by means of an efficient sandblast.

4. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar such that while the repair material is being applied the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends.

C. Materials

1. The material used for repair shall consist of a mixture of one sack of cement to 3 cubic feet of sand.

2. For exposed walls, the cement shall contain such a proportion of **Atlas White** Portland cement as is required to make the color of the patch match the color of the surrounding concrete.

D. Holes

1. Holes left by tie-rod cones shall be reamed with suitably toothed reamers in order to leave the surfaces of the holes clean and rough.

2. Holes then shall be repaired in an approved manner with dry-packed cement grout.

3. Holes left by form-tying devices having a rectangular cross section and other imperfections having a depth greater than their least surface dimension shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

E. Repairs

1. Repairs shall be built up and shaped in such a manner that the completed WORK will conform to the indicated requirements, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures.

2. The surfaces of repaired concrete shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.12 CARE AND REPAIR OF CONCRETE

A. The CONTRACTOR shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until Final Acceptance.

B. Particular care shall be exercised in order to prevent the drying of concrete and to avoid roughening or otherwise damaging the concrete surface.

C. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed WORK, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be repaired or removed and replaced with acceptable concrete to the satisfaction of the ENGINEER.

- END OF SECTION -

SECTION 033200 - JOINTS IN CONCRETE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide joints in concrete, complete and in place, in accordance with the Contract Documents.

B. Joints in concrete structures shall be the types defined below and will be permitted only where indicated, unless specifically accepted by the ENGINEER.

1.2 TYPES OF JOINTS

A. Construction Joints

1. When fresh concrete is placed against a hardened concrete surface, the joint between the pours shall be defined as a construction joint.

2. Unless otherwise indicated, joints in water-bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated.

B. Contraction Joints

1. Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the earlier pour.

2. The slab reinforcement shall be stopped 4-1/2 inches from the joint; which is provided with a sleeve-type dowel, in order to allow shrinkage of the concrete of the later pour.

3. Waterstop and/or sealant groove shall be provided where indicated.

C. Control Joints

1. The function of the control joint is to provide a weaker plane in the concrete where shrinkage cracks would likely occur.

2. Formed Groove

a. A groove, of the shape and dimensions indicated, shall be formed or saw-cut in the concrete and the groove shall then be filled with a joint sealant material.

b. The formed groove shall be placed in the first of the two sections cast at the control joint, in order to assure that the sealant bonds to the second section across the joint and not to the cement paste from the first pour.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Furnish placement drawings showing the location and types of joints for each structure.

2. Test Reports

   a. Furnish certified test reports from the sealant manufacturer on the actual batch of material supplied, demonstrating compliance with the indicated requirements.

   b. Furnish the test reports before using the sealant on the Project.

3. Welding Certification

   a. Furnish copies of the waterstop welding certification by manufacturer or authorized agent of the manufacturer.

   b. Every person who is to be involved with waterstop installation shall be required to have individual certification on file with the ENGINEER, stating that the named individual is certified and trained to install waterstop in accordance with the manufacturer's recommendations and specifications.

4. Furnish manufacturer's information demonstrating compliance of the following with the indicated requirements:

   a. bearing pad

   b. neoprene sponge

   c. preformed joint filler

   d. backing rod

   e. waterstop

   f. slip dowels

   g. PVC tubing

C. Samples

1. Prior to production of the material required under this Section, submit qualification samples of waterstops which accurately represent the material being provided.

2. Such samples shall be extruded or molded sections of each size or shape to be installed.

3. The balance of the material to be used shall not be produced until after the ENGINEER has reviewed the qualification samples.

D. Certificates

1. Furnish written certification from the manufacturer, as an integral part of the shipping form, that the material shipped to the Site meets or exceeds the indicated physical property requirements.

2. Supplier certificates will not be accepted.

1.4 QUALITY ASSURANCE

A. Waterstop Inspection

1. Waterstop field joints shall be subject to inspection, and no such WORK shall be scheduled or started without having made prior arrangements with the ENGINEER for the required inspections.

2. Provide not less than 72 hours notice for the scheduling of such inspections.

3. Field joints in waterstops shall be subject to inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects that would reduce the potential resistance of the material to water pressure at any point.

4. Defective field joints shall be replaced with material that passes inspection, and faulty material shall be removed from the Site and destroyed.

B. The following waterstop defects represent a partial list of defects which shall be grounds for rejection:

1. offsets at joints greater than 1/16 inch or 15 percent of material thickness at any point, whichever is less

2. exterior cracking at the joint due to incomplete bond, which is deeper than 1/16 inch or 15 percent of material thickness at any point, whichever is less

3. any combination of offset or exterior cracking that will result in a net reduction in the cross-section of the waterstop in excess of 1/16 inch or 15 percent of material thickness at any point, whichever is less

4. misalignment of the joint which results in misalignment of the waterstop in excess of 1/2 inch in 10 feet

5. porosity in the welded joint as evidenced by visual inspection

6. bubbles or inadequate bonding which can be detected with a penknife test. (If, while prodding the entire joint with the point of a penknife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.)

7. visible signs of separation when the cooled splice is bent by hand at any sharp angle

8. evidence of burned material

C. Waterstop Samples

1. Prior to use of the waterstop material in the field, a sample of a prefabricated (shop made fitting) mitered cross and a tee constructed of each size or shape of material to be used shall be submitted.

2. Samples shall be prefabricated (shop made fitting) so that the material and workmanship represent the fittings to be provided.

3. In addition, field samples of prefabricated fittings (crosses, tees, and the like) will be selected at random by the ENGINEER for testing by a laboratory at the OWNER's expense.

4. When tested, the tensile strength across the joints shall be at least 1120 psi for PVC waterstops.

D. Construction Joint Sealant

1. The CONTRACTOR shall prepare adhesion and cohesion test specimens at intervals of 5 Days while sealants are being installed.

2. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:

a. Sealant specimen shall be prepared between 2 concrete blocks (1-inch by 2-inch by 3-inch).

b. Spacing between the blocks shall be one inch.

c. Coated spacers (2-inch by 1-1/2-inch by 1/2-inch) shall be used to set and hold sealant cross-sections of 1/2-inch by 2-inch with a width of one inch.

d. The sealant shall be cast and cured in accordance with the manufacturer's recommendations, except that the curing period shall be not less than 24 hours.

e. Following the curing period, the gap between the blocks shall be widened to 1-1/2 inches, and spacers shall be used to maintain this gap for 24 hours prior to inspection for failure.

1.5 SPECIAL CORRECTION OF DEFECTS REQUIREMENT

A. The CONTRACTOR shall furnish a 5-year written warranty of the entire sealant installation against faulty and/or incompatible materials and workmanship, together with a statement that the CONTRACTOR agrees to repair or replace, to the satisfaction of the OWNER, any defective areas which become evident within the 5-year period.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Joint materials shall be listed as compliant with NSF Standard 61.

2.2 WATERSTOPS

A. PVC Waterstops

1. Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the indicated requirements of this Section.

2. No reclaimed or scrap material shall be used.

3. The CONTRACTOR shall obtain from the waterstop manufacturer and shall furnish to the ENGINEER for review, current test reports and a written certification of the

manufacturer that the material to be shipped to the Site meets the physical requirements as outlined in the U.S. Army Corps of Engineers Specification CRD-C572-PVC Waterstops, and those indicated.

4. Flatstrip and Center-Bulb Waterstops

   a. Flatstrip and center-bulb waterstops shall be manufactured such that at no place shall the thickness of waterstops, including the center bulb type, be less than 3/8 inch.

   b. The waterstop shall be provided with hog rings installed at 12 inches on centers along the waterstop.

   c. Shapes shall be as indicated, or as acceptable to the ENGINEER.

5. When tested in accordance with the indicated test standards, the waterstop material shall meet or exceed the following requirements:

Physical Property, Sheet Material	Value	ASTM Std
Tensile Strength-min, psi	2000	D 638, Type IV
Ultimate Elongation-min, percent	350	D 638, Type IV
Low Temp Brittleness, max degrees F	-35	D 746
Stiffness in Flexure, min, psi	600	D 747
Accelerated Extraction (CRD-C572		
Tensile Strength-min, psi	1500	D 638, Type IV
Ultimate Elongation, min, percent	300	D 638, Type IV
Effect of Alkalies (CRD-C572		
Change in Weight, percent	plus 0.25/minus 0.10	------
Change in Durometer, Shore A	plus and minus 5	D 2240
Finish Waterstop		
Tensile Strength-min, psi	1400	D 638, Type IV
Ultimate Elongation, min percent	280	D 638, Type IV

B. When types of waterstops not listed above are indicated, they shall be subjected to the same requirements as those listed in this Section.

2.3 JOINT SEALANT FOR WATER-BEARING JOINTS

A. The joint sealant shall be a polyurethane polymer designed for bonding to concrete which is continuously submerged in water.

B. No material will be accepted which has an unsatisfactory history as to bond or durability when used in the joints of water-retaining structures.

C. Joint sealant material shall meet the following requirements (73 degrees F and 5 percent R.H.):

Work Life, minutes	45 - 180
Time to Reach 20 Shore A Hardness (at 77 degrees F, 200 gram quantity), max	24 hours
Ultimate Hardness (ASTM D 2240, Shore A)	20 - 45
Tensile Strength (ASTM D 412), min	175 psi
Ultimate Elongation (ASTM D 412), minimum	400 percent
Tear Resistance (Die C, ASTM D 624), pounds per inch of thickness, min	75
Color	Light Gray

D. Polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:

1. Sealant shall be 2-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ASTM C 920 – Elastomeric Joint Sealant, or Federal Specification TT-S-0227 E(3) - Sealing Compound, Elastomeric Type, Multicomponent, for Caulking, Sealing, and Glazing Buildings and Other Structures, for 2-part material, as applicable.

2. For vertical joints and overhead horizontal joints, only "non-sag" compounds shall be used, conforming to the requirements of ASTM C 920, Class 25, Grade NS, or Federal Specification TT-S-0227 E(3), Type II, Class A.

3. For plane horizontal joints, use the self-leveling compounds meeting the requirements of ASTM C 920 Class 25, Grade P, or Federal Specification TT-S-0227 E(3), Type I.

4. For joints subject to either pedestrian or vehicular traffic, a compound providing non-tracking characteristics and having a Shore A hardness range of 35 to 45 shall be used.

5. Primer materials, if recommended by the sealant manufacturer, shall conform to the printed recommendations of the manufacturer.

E. Sealant Manufacturers

1. Sealants shall be **PSI-270** as manufactured by **Polymeric Systems Inc., Sikaflex 2C,** as manufactured by **Sika Corporation, Pelseal (with Viton) 2112/2012,** or equal.

F. Sealants for non-waterstop joints in concrete shall be in conformance with the requirements of Section 079213 – Sealants and Caulking.

2.4 JOINT MATERIALS

A. Joint Filler

1. Joint filler for expansion joints in waterholding structures shall be neoprene conforming to ASTM D 1056, Type 2C5-E1.

2. Joint filler material in other locations shall be of the preformed non-extruding type, constructed of cellular neoprene sponge rubber or polyurethane of firm texture.

3. Bituminous fiber type will not be accepted.

4. Non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction, for Type I, except as otherwise indicated.

PART 3 -- EXECUTION

3.1 GENERAL

A. Waterstops shall be embedded in the concrete across joints as indicated.

B. Waterstops shall be fully continuous for the extent of the joint.

C. Splices necessary to provide such continuity shall conform to the printed instructions of the waterstop manufacturer.

D. The CONTRACTOR shall take suitable precautions and provide means to support and protect the waterstops during the progress of the WORK, and shall repair or replace any waterstops damaged during progress of the WORK at no additional cost to the OWNER.

E. Waterstops shall be stored so as to permit free circulation of air around the waterstop material.

F. When any waterstop is installed in the concrete on one side of a joint while the other portion of the waterstop remains exposed to the atmosphere for more than 2 Days, suitable precautions shall be taken to shade and protect the exposed waterstop from direct rays of the sun during the entire exposure time until the exposed portion of waterstop is embedded in concrete.

3.2 SPLICES IN PVC WATERSTOPS

A. Splices in PVC waterstops shall be performed by heat sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations.

B. It is essential that:

1. The material shall not be damaged by heat sealing.
2. The splices shall have a tensile strength of not less than 80 percent of the unspliced material.
3. The continuity of the waterstop ribs and of its tubular center axis shall be maintained.
4. No edge welding will be accepted.

C. Butt joints of the ends of 2 identical waterstop sections may be made while the material is in the forms.

D. Other Joints

1. Joints with waterstops involving more than 2 ends to be jointed together, and joints that involve an angle cut, alignment change, or the joining of 2 dissimilar waterstop sections, shall be prefabricated prior to placement in the forms, allowing not less than 24-inch long strips of waterstop material beyond the joint.

2. Upon inspection and approval, such prefabricated waterstop joint assemblies shall be installed in the forms and the ends of the 24-inch strips shall be butt-welded to the straight run portions of waterstop in place in the forms.

E. Where a centerbulb waterstop intersects and is jointed with a non-centerbulb waterstop, care shall be taken to seal the end of the centerbulb, using additional PVC material if needed.

3.3 JOINT CONSTRUCTION

A. Setting Waterstops

1. In order to eliminate faulty installation that may result in joint leakage, particular care shall be taken as to the correct positioning of the waterstops during installation.

2. Adequate provisions shall be made to support and anchor the waterstops during the progress of the WORK and to ensure proper embedment in the concrete.

3. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints.

4. The center axis of the waterstops shall be coincident with the joint openings.

5. Thoroughly work the concrete in the vicinity of joints for maximum density and imperviousness.

B. Waterstop Placement

1. In placing waterstops in the forms, means shall be provided to prevent them from being folded over by the concrete as it is placed.

2. Waterstops shall be held in place with light wire ties on 12-inch centers, which shall be passed through hog rings at the edge of the waterstop and tied to the curtain of reinforcing steel.

3. Horizontal waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked.

4. In placing concrete around horizontal waterstops with their flat face in a horizontal plane, the concrete shall be worked under the waterstops by hand in order to avoid the formation of air and rock pockets.

C. In placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.

D. Waterstop in vertical wall joints shall terminate 6 inches from the top of the wall, where such waterstop does not connect with any other waterstop and is not to be connected to a future concrete placement.

E. Joint Location

1. Construction joints and other types of joints shall be provided where indicated.

2. If not indicated, construction joints shall be provided at a 25-foot maximum spacing.

3. Where joints are indicated to be spaced greater than 40 feet apart, additional joints shall be provided to maintain the 25-foot maximum spacing.

4. The location of joints, regardless of type, shall be submitted for acceptance by the ENGINEER.

F. Joint Preparation

1. Special care shall be used in preparing concrete surfaces at joints where bonding between 2 sections of concrete is required.

2. Unless otherwise indicated, such bonding shall be required at every horizontal joint in walls.

3. Surfaces shall be prepared in accordance with Section 033100 – Cast-in-Place Concrete.

G. Construction Joint Sealant

1. Construction joints in water-bearing floor slabs and elsewhere as indicated shall be provided with tapered grooves which shall be filled with a construction joint sealant.

2. The material used to form the tapered grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant.

3. After removing the forms from the grooves, laitance and fins shall be removed, and the grooves shall be sand blasted.

4. The grooves shall be allowed to thoroughly dry, after which they shall be blown out and immediately thereafter they shall be primed and filled with the construction joint sealant.

5. The primer shall be furnished by the sealant manufacturer, and no sealant shall be used without a primer.

6. Care shall be used to completely fill the sealant grooves.

7. Areas designated to receive a sealant fillet shall be thoroughly cleaned as outlined for the tapered grooves prior to application of the sealant.

H. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant prior to application.

I. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant.

J. The sealant shall achieve final cure at least 7 Days before the structure is filled with water.

K. The sealant shall be installed by a competent waterproofing specialty contractor with a successful record of performance in similar installations.

L. Mixing

1. Catalyst-cured, 2-part materials shall be thoroughly and uniformly mixed, and special care shall be taken to properly mix the sealer before its application.

2. Before any sealer is placed, the CONTRACTOR shall arrange to have workers performing the WORK carefully instructed on the proper method of mixing and application by a representative of the sealant manufacturer.

M. Failure to Cure

1. Any joint sealant that fails to fully and properly cure after the manufacturer's recommended curing time for the conditions of the WORK shall be completely removed, and the groove shall be thoroughly sandblasted to remove traces of the uncured or partially cured sealant and primer.

2. The groove shall be re-sealed with the indicated joint sealant.

3. Costs of such removal, joint treatment, re-sealing, and appurtenant WORK shall be the CONTRACTOR’s responsibility as part of the WORK.

- END OF SECTION -

SECTION 036000 – GROUTING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide grout, complete and in place, in accordance with the Contract Documents

B. The following types of grout are covered in this Section:

1. Cement Grout
2. Non-Shrink Grout - Class I (cement-based)
3. Non-Shrink Grout - Class II (cement-based)
4. Non-Shrink Epoxy Grout
5. Epoxy Anchor Grout for Post Installed Adhesive Anchors
6. Topping Grout and Concrete/Grout Fill

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

1. Certified testing lab reports for tests indicated herein.

2. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.

3. Certifications that grouts used on the project contain no chlorides or other chemicals that cause corrosion.

4. Manufacturer’s literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the WORK, and location of use. The current ICC-ES or IAPMO-UES report shall be submitted for all epoxy anchor grouts for adhesive anchors.

5. Manufacturer’s certification that its non-shrink grout does not contain aluminum, zinc, or magnesium powders as a method of expansion.

6. Submit manufacturer's written warranty as indicated herein.

7. Name and telephone number of grout manufacturer's representative who will give on-Site service. The representative shall have at least one year of experience with the indicated grouts.

1.3 QUALITY ASSURANCE

A. Field Tests

1. Compression test specimens will be taken from the first placement of each type of grout, and at intervals thereafter selected by the ENGINEER. The specimens will be made by the ENGINEER or its representative.

2. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C 1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink), at intervals during construction selected by the ENGINEER. As a minimum, a set of 3

specimens will be made for testing at 7 Days, 28 Days, and each additional time period as appropriate.

3. Compression tests and fabrication of specimens for topping grout and concrete/grout fill will be performed in accordance with Section 033100 - Cast-in-Place Concrete, at intervals during construction selected by the ENGINEER.

4. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C 579 – Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes, Method B, at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days and each earlier time period as appropriate.

5. The cost of laboratory tests on grout will be paid by the OWNER except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of Defective Work, and re-testing, all as part of the WORK.

6. The CONTRACTOR shall assist the ENGINEER in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens.

B. Construction Tolerances: Construction tolerances shall be as indicated in Section 033100 unless indicated otherwise.

C. Pre-Installation Demonstration and Training

1. Cement and Epoxy-Based Non-Shrink Grouts

a. The grout manufacturer shall give a demonstration and training session for the cement based non-shrink and epoxy grouts to be used on the project, before any installation of grout is allowed.

b. Training session shall use a minimum of 5 bags of cement-based non-shrink class I grout mixed to fluid consistency. Tests shall be conducted for flow cone and bleed tests. Six cubes for testing at 1, 3, and 28 Days shall be made. The remaining grout shall be placed, and curing may be initiated on actual project placements such as baseplates and tie holes to provide on-the-job training for the CONTRACTOR and ENGINEER. The CONTRACTOR employees who will be doing the grouting shall participate in this training and demonstration session. The training session shall include methods for curing the grout.

c. The manufacturer shall mix enough cement-based non-shrink class II grout for a minimum of 15 tie holes and shall train the CONTRACTOR'S employees in how to perform the WORK and cure the grout. The CONTRACTOR shall have the employees assisting in the mixing and sealing of the tie holes.

d. If the project includes patching, throughbolt holes, epoxy anchors, and/or blockouts, the manufacturer shall also train the CONTRACTOR'S employees in the mixing and curing of the epoxy grouts for each of these applications.

e. The CONTRACTOR shall transport the test cubes to an independent test laboratory, obtain the test reports, and report these demonstration and training test cube strengths to the ENGINEER.

2. Epoxy Anchor Grout for Adhesive Anchors

a. Special inspection for all adhesive anchor installations shall be provided:

1) As recommended or required by the ICC-ES or IAPMO-UES report.

2) As required by the enforceable building code.

3) As otherwise indicated in the Contract Documents.

The most stringent of the above requirements shall be used. The cost of special inspection of adhesive anchors shall be paid for by the OWNER.

b. Before installing adhesive anchors in the WORK, adhesive anchor installers shall be trained and qualified at the Site by the manufacturer's representative. Training and qualification for each installer shall include at least:

1) Hole drilling procedure, hole preparation and cleaning techniques, adhesive injection technique and dispenser training/maintenance, rebar dowel preparation and installation, and proof loading/torquing.

2) Anchors installed in both the vertical and horizontal positions in a mock-up concrete panel of adequate size and thickness. Anchors shall be tested in tension. A minimum of 3 anchors shall be tested for each installation position.

3) Anchors shall be tested at 2 times the published allowable tension load or 1-1/4 times the maximum design strength of the anchors in tension as indicated in the ICC-ES or IAPMO-UES report. The test load need not exceed 80 percent of the nominal yield strength of the anchor, based on steel strength, as determined by ACI 318 Appendix D.

4) If any of the 3 test bolts in any installation position fail to reach the test loads, the installer shall be re-tested with the same procedure. Re-testing is required only for the failed installation position.

5) An installer who has 3 consecutive successful bolt tests in the first or second trial is considered qualified for adhesive anchor installation for this project. The manufacturer's representative shall issue a certificate to the qualified installer, and a copy of the certificate shall be filed with the CONTRACTOR and be submitted to the ENGINEER.

6) The test anchor size shall be the largest size adhesive anchor used on the project. The anchor embedment length and edge distances shall be adequate to resist the test loads listed above.

7) Each installer shall be re-qualified every 6 months for the duration of the project by the same qualifying procedure.

8) The certification of each qualified installer shall be available for verification at the Special Inspector's request.

9) Defective anchors noted by the Special Inspector shall be replaced and re-installed by the CONTRACTOR without any additional compensation.

1.4 SPECIAL CORRECTION OF DEFECTS PROVISIONS

A. Manufacturer's Warranty

1. Furnish one year warranty for WORK provided under this section.

2. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to the purchase price of products or materials.

PART 2 -- PRODUCTS

2.1 APPLICATION

A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not.

Application	Type of Grout
Anchor bolts, anchor rods and reinforcing steel required to be set in grout in which the average working or operating temperature will be over 100 degrees F or in high fire risk areas.	Non-Shrink - Class I
Anchor bolts, anchor rods and reinforcing steel required to be set in grout that is not in high temperature or high fire risk areas.	Epoxy Anchor Grout
Storage tanks and other non-motorized equipment and machinery under 30 horsepower	Non-Shrink - Class I
Pumps over 1000 horsepower, unless indicated otherwise	Non-Shrink Epoxy
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink - Class I (Class II where placement time exceeds 20 min.)
Toppings and concrete/grout fill less than 3 inches thick	Topping Grout
Toppings and concrete/grout fill greater than 3 inches thick	Structural Concrete per 03 31 50
Surface repairs	Cement Grout
Repair of holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material	Non-Shrink - Class I
Repair of holes and defects in concrete members which are water bearing or in contact with soil or other fill materials	Non-Shrink - Class II
Any application not listed above, where grout is indicated	Non-Shrink Class I, unless specifically indicated otherwise

2.2 CEMENT GROUT

A. Cement grout shall be composed of one part cement, 3 parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white Portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 Days shall be 4000 psi.

B. Cement grout materials shall be as indicated in Section 033100.

2.3 NON-SHRINK GROUTS (cement-based)

A. General

1. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.

2. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout shall be as recommended by the manufacturer for the particular application.

3. Grout shall not contain chlorides or additives that may contribute to corrosion.

4. Grout shall be formulated to be used at any consistency from fluid to plastic.

5. Cement-based non-shrink grout shall have the following minimum properties when tested at a fluid consistency, at 28 Days:

   a. Minimum tensile splitting strength of 500 psi per ASTM C 496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.

   b. Minimum flexural strength of 1000 psi per ASTM C 580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

   c. Minimum bond strength (concrete to grout) of 1900 psi per modified ASTM C 882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

B. Non-Shrink Grout – Class I

1. Non-Shrink Grout – Class I shall have a minimum 28 Day compressive strength of 5000 psi when mixed at a fluid consistency.

2. Non-Shrink Grout – Class I shall meet the requirements of ASTM C 1107, Grade B or C, when mixed to fluid, flowable, and plastic consistencies.

3. Non-Shrink Grout – Class I shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures. The grout when tested shall not bleed or segregate at maximum allowed water.

4. Non-Shrink Grout – Class I shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C 1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout.

5. Furnish certification that the non-shrink property of grout is not based on gas production or gypsum expansion.

6. Non-Shrink Grout – Class I shall be **Masterflow 713 Plus** by **BASF, Five Star Grout** by **Five Star Products, Sikagrout 212** by **Sika Corporation, Duragrout** by **L&M Construction Chemicals; High-Flow Grout** by **Euclid Chemical Company, CG 200 PC** by **Hilti,** or equal.

C. Non-Shrink Grout – Class II

1. Non-Shrink Grout – Class II shall be a high precision, fluid, extended working time, grout. The minimum 28-Day compressive strength shall be 7500 psi, when mixed at a fluid consistency.

2. Non-Shrink Grout – Class II shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827.

3. Non-Shrink Grout – Class II shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C 1090.

4. Non-Shrink Grout – Class II shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C 827 at temperature extremes of 45 to 90 degrees F in accordance with ASTM C 1107.

5. Non-Shrink Grout – Class II shall meet the requirements of ASTM C 1107, Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C 939.

6. The grout when tested shall not bleed or segregate at maximum allowed water content.

7. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.

8. Non-Shrink Grout – Class II shall be **Masterflow 928** by **BASF, Five Star Fluid Grout 100** by **Five Star Products, Crystex** by **L&M Construction Chemicals,** or equal.

2.4 NON-SHRINK EPOXY GROUT

A. Non-shrink epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, each premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.

B. Epoxy grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827, (modified for epoxy grouts by using an indicator ball with a specific gravity between 0.9 and 1.1).

C. Epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested according to ASTM C 531 – Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

D. The epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C 579, method B.

E. The mixed epoxy grout shall have a minimum working life of 90 to 120 minutes at 70 degrees F.

F. The effective bearing area shall be a minimum of 95 percent EBA in accordance with ASTM C 1339 – Standard Test Method for Flowability and Bearing Area of Chemical-Resistant Polymer Machinery Grouts, for bearing area and flow.

G. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.

H. Non-shrink epoxy grout shall have the following minimum properties when tested at 7 Days:

1. Minimum bond strength to concrete of 3000 psi per ASTM C 882 modified.

2. Minimum bond strength to steel of 1700 psi per ASTM C 882 modified.

3. Minimum flexural strength of 2500 psi per ASTM C 580.

4. Minimum tensile strength of 2000 psi per ASTM C 307 -- Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

I. Non-shrink epoxy grout shall be **Five Star DP Epoxy Grout** by **Five Star Products, Inc., Masterflow 648 CP Plus** by **BASF, Sikadur 42 Grout-Pak** by **Sika Corporation,** or equal.

2.5 EPOXY ANCHOR GROUT

A. Epoxy anchor grout for use in concrete shall be certified for use in accordance with ICC-ES AC 308.

B. Epoxy anchor grout shall conform to ASTM C 881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete, Type IV, Class A, B and C, Grade 3 with the exception of gel time.

C. Heat deflection temperature per ASTM D 648 – Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position shall be a minimum 120 degrees F.

D. Manufacturer shall certify that the epoxy anchor grout will maintain 100 percent of its capacity up to a short term temperature of 110 degrees F and 50 percent of its capacity up to a short term temperature of 150 degrees F.

E. Grout shall come in a 2 chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.

F. Epoxy anchor grout shall be capable of being used in submerged applications once cured.

G. Compressive strength per ASTM D 695 – Standard Test Method for Compressive Properties of Rigid Plastics shall be 10,000 psi minimum.

H. Whenever possible, overhead anchors subject to vibration, anchors in fire-resistive construction or high fire risk areas, and anchors subject to working or operating

temperatures above 100 degrees F shall be cast-in-place anchors. Whenever cast-in-place anchors cannot be used in these applications, use cement based non-shrink grout and oversized holes.

I. Embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar unless otherwise noted on the Contract Documents. Embedment shall not exceed 67 percent of the member depth.

J. Epoxy anchor grout shall be **PE1000+** by **Powers Fasteners; HIT-RE 500-SD** by **Hilti, SET-XP by Simpson Strong-Tie,** or equal.

2.6 TOPPING GROUT AND CONCRETE/GROUT FILL

A. Where fill thickness is 3 inches or greater, structural concrete, as indicated in Section 033100 - Cast-in-Place Concrete, may be used when accepted by the ENGINEER. Omit the coarse aggregate in topping grout used in clarifiers.

B. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and be mixed as indicated. Materials and procedures indicated for normal concrete in Section 033150 - Cast-in-Place Concrete, shall apply unless indicated otherwise.

C. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45. Topping grout in clarifiers shall contain between 750 and 800 pounds of cement per cubic yard with a maximum water cement ratio of 0.42.

D. Coarse aggregate shall be graded as follows:

U.S. Standard Sieve Size	Percent By Weight Passing
1/2 in	100
3/8 in	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

E. Final mix design shall be as determined by trial mix design as indicated in Section 033100, except that drying shrinkage tests are not required.

F. Topping grout and concrete grout/fill shall contain air-entraining agent per Section 033100.

G. Strength: Minimum compressive strength of topping grout and concrete/grout fill at 28 Days shall be 4000 psi.

H. Topping grout used in clarifiers or where the fill thickness is 3 inches or greater shall contain fiber reinforcing, unless otherwise shown on the Contract Documents. Fiber

shall be 100 percent virgin polypropylene fibrillated fibers specifically manufactured in a blended gradation for use as concrete secondary reinforcement. Fibers shall be added at a rate of 1.5 pounds per cubic yard of concrete. Fibers shall conform to ASTM C 1116 – Standard Specification for Fiber-Reinforced Concrete, Type III.

2.7 CURING MATERIALS

A. Curing materials for prepackaged grouts shall be as recommended by the manufacturer.

2.8 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is defined such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.

B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

2.9 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Grout shall be stored in accordance with manufacturer's recommendations.

3.2 GENERAL

A. CONTRACTOR shall arrange for the manufacturer of prepackaged grouts to provide on-Site technical assistance within 72 hours of request, as part of the WORK.

B. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the ENGINEER.

C. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.

D. Surface preparation, curing, and protection of cement grout shall be in accordance with Section 033100. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.

E. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.

F. Shade the WORK from sunlight for at least 24 hours before and 48 hours after grouting.

G. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.3 GROUTING PROCEDURES

A. General: Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

B. Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.

1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout or other thickness if indicated.

2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the ENGINEER, alternate grouting methods shall be submitted by the CONTRACTOR for acceptance by the ENGINEER.

3. Concrete equipment pads for equipment bases that will be epoxy-grouted shall be sized so that, when the equipment base is fully grouted, the epoxy grout is stopped not less than 4 inches from the edge of the pad.

C. Drilled Anchors and Reinforcing Bars

1. General

a. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions and applicable ICC-ES or IAPMO-UES report requirements. Holes shall be drilled, brushed and cleaned in accordance with the manufacturer’s instructions. Drilled anchors shall not be installed until the concrete has reached the required 28 Day compressive strength. Anchors shall not be loaded until the grout has cured for the full cure time indicated by the manufacturer and reached its indicated strength in accordance with the manufacturer's instructions.

b. The CONTRACTOR shall identify the position of reinforcing steel and other embedded items prior to drilling holes. Care shall be exercised in drilling to avoid damaging existing reinforcing or embedded items. The location of drilled holes shall be adjusted to avoid drilling through or cutting any existing reinforcing bars or embedded items. Notify the ENGINEER if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and communications conduit, and piping.

c. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the

manufacturer's ICC-ES or IAPMO-UES report, but shall not be less than 8 diameters for threaded rod or 12 diameters for reinforcing or smooth bars.

d. Core drilling of holes is not allowed.

e. Relocation of drilled holes and adjustments or modifications to anchored or fastened items shall be considered part of the WORK and shall be provided at no additional cost to the OWNER.

f. All abandoned drilled holes shall be filled with Epoxy Anchor Grout.

2. Epoxy Adhesive Anchors

a. Grout shall be proportioned and mixed per the manufacturer’s instructions.

b. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's ICC-ES or IAPMO-UES report, but shall not be less than 8 diameters for threaded rod or 12 diameters for reinforcing or smooth bars.

c. Holes shall be dry.

3. Cement Based Non-Shrink Grout used for Anchorage

a. In places of high temperature or fire hazard, anchor bolts and anchor rods shall be grouted in using cement based non-shrink grout, Class I.

b. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor bolt, anchor rod or reinforcing bar per the manufacturer's ICC-ES or IAPMO-UES report, but shall not be less than 16 diameters for threaded rod or 24 diameters for reinforcing or smooth bars.

c. When the anchor bolt or anchor rod diameter is one-inch or less, the hole diameter shall be a minimum of 2 inches. When the anchor bolt/rod diameter is greater than one-inch, the hole diameter shall be at least twice the anchor bolt/rod diameter.

d. Drilled holes shall be saturated with water for not less than 24 hours before installation of anchor/rod/rebar.

e. The non-shrink grout shall be placed in the holes in a non-sag (trowelable) consistency. The grout shall be placed in the holes before the anchor bolt/rod and then the anchor bolt/rod inserted and vibrated to ensure proper coverage

D. Topping Grout and Concrete/Grout Fill

1. Mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively where accepted by the ENGINEER, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.

2. The minimum thickness of grout topping and concrete/grout fill shall be one-inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.

3. The base slab shall be thoroughly cleaned and wetted to saturated surface dry (SSD) condition per the International Concrete Repair Institute (ICRI) -- Technical Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, prior to placing topping and fill. No topping concrete shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement. If it does dry, it must be immediately removed using wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.

4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.

5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.

6. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the ENGINEER, the tank shall be filled with sufficient water to cover the entire floor for 14 days.

3.4 CONSOLIDATION

A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.5 CURING

A. Cement based grouts shall be cured per Section 033100 and per the manufacturer's recommendations.

- END OF SECTION -

SECTION 042200 - REINFORCED CONCRETE BLOCK MASONRY

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide concrete masonry and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Samples

1. If the required product is a colored and textured unit, the samples shall be colored and textured units. Submit samples of concrete masonry units illustrating colors and textures available for the ENGINEER to choose. Full size samples of the blocks selected shall be submitted for final approval after color selection, if requested.

2. Samples of mortar colors for color selection.

3. A minimum 4-ft square free-standing sample panel shall be prepared for approval before starting masonry WORK. The panel shall remain at the Site for reference until masonry WORK is completed.

C. Documentation

1. Reports from testing masonry units

2. Reports from mortar and grout testing.

3. Reports from testing insulation performance.

D. Grout and mortar mix design

1. Proportions for components

2. Mill tests for cement

3. Admixture certification. Include chloride ion content.

4. Aggregate graduation and certification

5. Lime certification

6. Fly ash certification and chemical analysis.

1.3 QUALITY ASSURANCE

A. Applicable Standards: Concrete masonry shall conform to Florida Building Code (FBC), American Concrete Institute ACI 530 - Building Code Requirements for Masonry Structures, ACI 530.1 - Specification for Masonry Structures, and other applicable codes and standards of the governing authorities.

B. WORK shall conform to the standard of quality established by the approved free-standing sample panel.

C. Concrete block masonry units shall be sampled and tested in accordance with ASTM C 140 - Test Methods of Sampling and Testing Concrete Masonry and Related Units.

D. Testing of Mortar and Grout: The CONTRACTOR shall coordinate with the ENGINEER for the testing of the mortar and grout. The ENGINEER will have the mortar and grout tested to assure compliance with the Specifications and the governing codes by a recognized testing laboratory.

1. Tests shall be taken at the following times:

    a. At commencement of masonry WORK, at least 2 test samples each of mortar and grout shall be taken on 3 successive Days.

    b. At any change in materials or job conditions, at least 2 samples of each modified material, grout, and mortar shall be tested.

    c. Make 4 random tests each of mortar and grout. The random test samples shall be taken when requested by the ENGINEER.

    d. Additional samples and tests may be required whenever, in the judgment of the ENGINEER, additional tests beyond the 4 random tests are necessary to determine the quality of the materials.

    e. The costs of tests and test reports, except for any additional tests requested by the ENGINEER, shall be paid by the ENGINEER as part of the WORK. The costs of the additional tests and reports, when reports verify compliance with the Contract Documents, will be paid by the CONTRACTOR. When tests or reports do not verify compliance, the cost of every additional test and report shall be paid by the CONTRACTOR.

2. Samples shall be stored in a moist environment until tested, unless directed otherwise by the ENGINEER or the testing laboratory. Testing for mortar shall be in accordance with ASTM C 270 - Mortar for Unit Masonry. Grout shall be tested per ASTM C 1019 - Standard Test Method for Sampling and Testing Grout.

E. Unit Strength Testing: The CONTRACTOR shall coordinate with the ENGINEER for the unit strength testing. The ENGINEER will test the masonry units to assure compliance with the Specifications and the governing Codes. Testing will be by a recognized testing laboratory.

1. Tests will be made of the following items:

    a. Prior to construction, at least 6 masonry units shall be tested for each type of block herein, except separate tests are not required for block which only varies by texture.

    b. At any change in materials during construction, at least 6 masonry units shall be tested.

    c. One set of at least 6 masonry units will be tested for each masonry structure, besides the structure that the sample is part of, or for each week in which block is laid, for each type of block involved; whichever occurs first.

d. Additional sets of at least 6 masonry units shall be tested whenever, in the judgment of the ENGINEER, additional tests are necessary to determine the quality of the materials.

e. The CONTRACTOR shall submit a letter of certification from the CMU Supplier at the time of, or prior to, delivery of the materials to the Site that the materials used in construction are representative of the materials used for testing.

2. The masonry units shall be sampled and tested in accordance with ASTM C 140.

F. Inspection: Whenever required under the provisions of the Building Code, WORK hereunder will be subject to inspection by a Special Inspector selected by the ENGINEER and approved by the local Building Code representative having jurisdiction. Costs of such inspection will be paid by the OWNER. The Special Inspector will work under the supervision of the ENGINEER.

G. Extreme Weather Construction: Cold weather construction shall be per the more stringent of ACI 530.1 and local Code requirements. Hot weather construction shall be per the more stringent of ACI 530.1, and local Code requirements.

H. Product Storage: Cement, lime, and other cementitious materials shall be delivered and stored in dry, weather-tight sheds or enclosures, in unbroken bags, barrels, or other approved containers, plainly marked and labeled with the manufacturers' names and brands. Mortar and grout shall be stored and handled in a manner that prevents the inclusion of foreign materials and damage by water or dampness. Masonry units shall be handled with care to avoid chipping and breakage, and shall be stored as directed in ACI 530.1. Materials stored on newly constructed floors shall be stacked in such manner that the uniformly distributed loading does not exceed 30 psf. Masonry materials shall be protected from contact with the earth and exposure to the weather and shall be kept dry and clean until used.

I. Insulation shall be installed as per manufacturer’s recommendation and shall originate from the manufacturer pre-mixed to ensure consistency. Upon request, a one year product and installation warranty will be issued by both the manufacturer and installer.

J. Insulation shall be installed by an experienced dealer/applicator who has been trained and licensed by the product manufacturer and which has not less than three years direct experience in the installation of the product used.

PART 2 -- PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete masonry units shall conform to ASTM C 90 - Load-Bearing Concrete Masonry Units. Units shall be normal weight units unless indicated otherwise.

B. Concrete masonry units shall be 8-inch by 8-inch by 16-inch modular size as indicated on the drawings, with split faces. Units shall be integrally-colored with color selections from light and medium color range (white, black, and dark green are not included in color range).

C. Bond beam, corner, lintel, sill, and other specially shaped blocks shall be provided where required or necessary. Specially shaped non-structural blocks may be constructed by saw cutting. Color and texture shall match that of adjacent units.

D. Concrete masonry units hidden from view entirely may be natural color units the same size as other adjacent masonry units.

E. Concrete masonry units at interior walls shall be normal weight block 8-inch by 8-inch by 16-inch modular size, as indicated on the drawings, and of natural color. All interior masonry shall be smooth faced, except fire-rated units, shall have recycled masonry content of at least 25 percent.

2.2 MATERIALS

A. Portland cement shall be Type I or II, low alkali, conforming to ASTM C 150 - Portland Cement.

B. Fly Ash shall conform to ASTM C618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete, except that loss on ignition shall not be greater than 3 percent. Fly ash substitution, if used, shall be a minimum of 30 percent by weight of cement, but shall not exceed 40 percent.

C. Ground blast furnace slag cement shall conform to ASTM C989 - Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars, grade 100 or 120. Blended cements shall conform to ASTM C595 – Blended Hydraulic Cements, Type 1S, or ASTM C1157 – Performance Specification for Hydraulic Cement. Slag cement substitution, if used, shall be not less than 25 nor more than 50 percent by weight of cement. Slag cement substitution shall not be used with fly ash substitution.

D. Water-repellant and efflorescence control admixture

1. Provide integral water repellant admixture in block and in mortar in all exterior exposed concrete masonry walls, retaining walls, and other locations as indicated on the drawings as recommended by the manufacturer to obtain ASTM E 514-90- Standard Test Method for Water Penetration and Leakage Through Masonry- test extended to 72 hours, Class E rating, admixtures shall be BASF “Rheopel XD”, Euclid Chemical Company “Eucon Blocktit”, or equal.

a. Refer to Specification 071900- Surface Applied Water Repellents.

E. Hydrated lime shall be Type S conforming to ASTM C 207 - Hydrated Lime for Masonry Purposes.

F. Aggregate for mortar shall conform to ASTM C 144 - Aggregate for Masonry Mortar. Aggregate for grout shall conform to ASTM C 404 - Aggregates for Masonry Grout.

G. Water for mixing shall be clear potable water.

H. Reinforcing steel shall be deformed bars conforming to ASTM A 615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Grade 60.

I. Joint reinforcing

1. Joint reinforcing shall conform to ASTM A 951 – Masonry Joint Reinforcement.

2. The minimum size of longitudinal and cross wires shall be W1.7 (9-gauge). Longitudinal wires shall be deformed. Maximum spacing of cross wires in ladder-type and points of connection of cross wires to longitudinal wire of truss-type shall be 16 inches.

3. Joint reinforcement shall be hot-dip galvanized after fabrication per ASTM A 153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware, Class B.

4. Corners and wall intersections shall use prefabricated corners and tees.

5. Joint reinforcement shall be continuous or

   a. lapped by 54 wire diameters in a grouted cell, or

   b. lapped by 75 wire diameters in a mortared bed joint, or

   c. in alternate bed joints of running bond masonry, lapped a distance not less than 54 diameters plus twice the spacing of the bed joints.

J. Integral water repellant admixture is required for mortar for exterior masonry units, and shall be **BASF Rheopel Mortar Admixture, Euclid Blocktite Mortar Admixture,** or equal. The admixture shall not be detrimental to the bonding or help the process of efflorescence.

K. Admixture for grout shall be **Sika Co., Sika Grout Aid, Type II**, **BASF Pozzolith,** normal, or equal.

L. Masonry cleaner shall be a non-acidic cleaner, **SafEtch by Prosoco, Inc.,** or equal.

2.3 MORTAR

A. Mortar for concrete block masonry shall conform to ASTM C 270 and IBC section 2103.7 for cement-lime Type S, with a minimum 28 Day compressive strength of 1800 psi.

B. Mortar for use with colored masonry units shall have integral color as approved by the ENGINEER.

2.4 GROUT

A. Grout shall conform to ASTM C 476 - Grout for Masonry and have a minimum 28 Day compressive strength of 2000 psi. Where the grout space is less than 4 inches, coarse aggregate shall be omitted.

B. Admixtures may only be used when approved by the ENGINEER. If approved for use, admixtures shall be used in accordance with the manufacturer's published recommendations for the grout.

2.5 INSULATION

A. Insulation for concrete block masonry walls of the Electrical Room shall be foamed-in-place masonry insulation for thermal, sound and fire resistance values.

B. Foamed-in-place insulation for masonry shall be **Core-Fill 500, CfiFOAM Aminoplast,** or equal.

C. Performance Standards

1. Surface Burning Characteristics shall meet a maximum flame spread, smoke developed and fuel contributed of 0, 5, and 0 respectively and ASTM E84.

2. Combustion Characteristics shall be a non-combustable, Class A building material.

3. Thermal Values shall meet an R Value of 4.6 per inch at 32 degrees F and ASTM C-177.

4. Sound Abatement shall have a minimum Sound Transmission Classs (STC) rating of 53, and a minimum Outdoor Indoor Transmission Class (OITC) rating of 44 for 8-inch wall assembly and ASTM E90.

PART 3 -- EXECUTION

3.1 GENERAL

A. Measurements for mortar and grout shall be accurately made. Shovel measurements are not acceptable. Mortar proportions shall be accurately controlled and maintained.

B. WORK shall be performed in accordance with the provisions of ACI 530 and 530.1the IBC, and the local codes for reinforced concrete hollow-unit masonry.

C. The CONTRACTOR shall set or embed anchors, bolts, reglets, sleeves, conduits, and other items as required.

D. Block cutting shall be by machine.

E. Masonry units shall be supported off the ground and shall be covered to protect them from rain. Only clean, dry, uncracked units shall be incorporated.

F. Reinforcing steel shall be cleaned of loose rust and scale, oil, dirt, paint, laitance, or other substances that may be detrimental to or reduce bonding of the steel and concrete.

G. Immediately before starting WORK, concrete upon which the masonry will be laid shall be cleaned with water under pressure.

H. Full mortar joint for first course shall be provided.

I. Units shall be shoved tightly against adjacent units to assure good mortar bond.

J. Equipment for mixing and transporting the mortar and grout shall be clean and free from set mortar, dirt, or other foreign matter.

3.2 MIXING

A. Mortar shall be mixed by placing 1/2 of the water and sand in the operating mixer, after which the cement, lime, and remainder of the sand and water shall be added. After ingredients are in the mixer, they shall be mechanically mixed for not less than 5 minutes. Retempering shall be done on the mortar board by adding water within a basin

formed within the mortar, and the mortar reworked into the water. Mortar that is not used within one hour shall be discarded.

3.3 ERECTION OF CONCRETE BLOCK MASONRY

A. Masonry WORK shall be erected in plane, plumb, level, straight and true to dimensions, and be executed in accordance with acceptable practices of the trade and the tolerances of ACI 530.1.

B. Unless indicated otherwise, masonry shall be laid up in straight uniform courses with running bond.

C. Masonry shall be erected to preserve the unobstructed vertical continuity of the cells measuring not less than 3 inches by 3 inches in cross-section. Walls and cross webs shall be full bedded in mortar. Head (or end) joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells.

3.4 JOINTS

A. Vertical and horizontal joints shall be uniform and approximately 3/8 inch wide. Exterior joints and interior exposed block joints shall be concave-tooled to a dense surface. Special care shall be used in tooling joints so as to match existing construction. Interior or exterior non-exposed masonry and masonry behind plaster shall have flush joints.

3.5 CLEANOUTS

A. Cleanout openings shall be provided at the bottoms of cells to be filled at each lift or pour of grout where such lift or pour is over 4 feet in height. Any overhanging mortar or other obstructions or debris shall be removed from the insides of such cell walls. The cleanouts shall be sealed before grouting and after inspection. Cleanout openings shall match the finished wall in exposed masonry.

3.6 REINFORCEMENT

A. Deep cut bond beam blocks shall be used where horizontal reinforcing steel is embedded. H-block bond beams may be used at locations other than openings.

B. Knock-out openings shall have no steel or joint reinforcing running through the opening. Head, jambs, and sill blocks shall be used to provide an even finish surface to install windows when blocks are removed. Joints at heads, jambs, and sills shall be stacked and continuous.

C. Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 112 diameters of the reinforcement.

3.7 GROUTING

A. Cells containing reinforcing and bond beam spaces shall be filled solidly with grout unless indicated otherwise. Grouting shall not be started until the wall has cured for 24 hours. Grout shall not be poured in more than 5-ft lifts.

B. Grout shall be consolidated at time of pouring by puddling or vibrating. If the grouting operation has been stopped for one hour or longer, horizontal construction joints shall be formed by stopping the grout pour 1-1/2 inches below the top of the uppermost unit.

3.8 PIPE OR CONDUITS EMBEDDED IN MASONRY

A. Pipes, conduits, and sleeves passing vertically or horizontally through the masonry shall not be placed closer than 3 diameters on center, nor shall they impair the strength of the construction. Pipes, conduits, and sleeves passing vertically shall not be placed in the same cell as the vertical reinforcing. Pipes, conduits, and sleeves passing horizontally shall not be placed in a bond beam.

B. Maximum area of vertical conduits, pipes, or sleeves placed in masonry columns or pilasters shall not displace more than 2 percent of the net cross section.

3.9 INSULATION

A. Fill all open cells and voids in hollow concrete masonry walls of the Electrical Room. The foam insulation shall be pressure injected through a series of 5/8-inch to 7/8-inch holes drilled into every vertical column of block cells (every 8-inch on center). Injection holes shall occur immediately under every reinforced horizontal bond beam and as required to completely fill all unreinforced cells. Patch holes with mortar and score to resemble existing surface.

3.10 PROTECTION

A. Wall surfaces shall be protected from droppings of mortar or grout during construction.

3.11 FINISHING AND CLEANING

A. Masonry shall not be wet-finished unless exposed to extreme hot weather or hot wind and then only by using a nozzle-regulated fog spray sufficient only to dampen the face but not of such quantity to cause water to flow down over the masonry.

B. Finish masonry shall be cleaned and pointed in a manner satisfactory to the ENGINEER, based upon the standards established by the approved sample panel.

C. Interior and exterior colored masonry WORK exposed to view shall be cleaned by whip light sandblasting to remove stains and other imperfections.

D. Exposed masonry surfaces of openings and window and door openings such as sills, heads, and jambs shall be finish block surfaces, not formed surfaces, unless indicated otherwise. Closed bottom bond beam blocks shall be used at heads and sills. Pour holes may be used at the sill under window frame and where approved by the ENGINEER.

- END OF SECTION -

SECTION 042300 - GLASS UNIT MASONRY

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide glass block masonry and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 CODES AND STANDARDS

ASTM C 144	Aggregate for Masonry Mortar
ASTM C 150	Portland Cement
ASTM C 207	Hydrated Lime for Masonry
ASTM C 641	Test Method for Staining Materials in Lightweight Concrete Aggregates

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Manufacturer's Information

1. Complete materials list of items proposed.

2. Sufficient data to demonstrate that the proposed glass blocks comply with requirements.

3. Manufacturer's specifications and other data required identifying the quality of proposed accessory and setting materials.

4. Manufacturers recommended installation procedures.

C. Shop Drawings

1. Show proposed arrangement and dimensions of combination panels, methods of anchoring, proposed treatment of joints, locations and details of expansion joints, composition and colors of sealant, and such similar data as is necessary to judge the suitability of the proposed installation and to properly coordinate the preparation and construction of the support system.

2. Samples of glass blocks and accessories.

1.4 QUALITY ASSURANCE

A. Quality of accessories shall be as recommended by the manufacturer subject to acceptance by the ENGINEER.

B. Qualifications of Installers: Throughout the WORK of this Section, at least one person from the CONTRACTOR who is thoroughly familiar with the indicated requirements,

completely trained and experienced in the necessary skills, shall be present at the Site to direct WORK performed under this Section.

C. Adequately skilled workers shall be used so that installation is in strict accordance with the design and the recommendations of the Supplier.

D. As-built dimensions of the supporting structure shall be checked by accurate field measurements before submittal of Shop Drawings. Schedule measurements with construction progress to avoid delay of WORK.

1.5 PRODUCT HANDLING

A. Protection: Materials shall be protected before, during, and after installation.

B. Replacements: In the event of damage, repairs and replacements shall be made as necessary for acceptance by the ENGINEER.

C. Delivery and Storage

1. Glass block and precast concrete units shall be stored in accordance with the recommendations of the manufacturers.

2. Prepared mixes, cement, and adhesive sealants shall be delivered and stored in original, unopened packages and above the ground in a cool, dry location in strict accordance with the manufacturer's instructions.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Glass Block Units: Partially-evacuated, hollow masonry units made of clear, colorless glass. The units shall be **Lightwise Architectural Systems Hurricane Resistant Glass Block Panels** as manufactured by **Pittsburgh Corning,** or equal, 8-inch by 8-inch by 6-inch thickness.

B. Mortar: Type S mortar as recommended by the "American Standard Building Code Requirements for Masonry," in accordance with ASTM C 270.

1. Portland Cement: If ASTM C 150, Type II, waterproof Portland cement is used, it shall be of a type as accepted by the ENGINEER. Masonry cement shall not be used.

2. Lime: A high-calcium lime or a pressure-hydrated dolomitic lime, not less than 92 percent hydrated, conforming to ASTM C 207, Type S.

3. Sand: ASTM C 144 for thin joints. A clean, white, quartzite type, essentially free of iron compounds, tested according to ASTM C 641, and having a Stain Index of 0.

C. Integral Type Water proofer: Metallic-stearate type; **Hydracide Powder** by **Sonneborn**, **PS-235** by **Master Builders Company**, or equal, or latex type, **Laticrete 8510 Admix** by **Laticrete International, Inc**., or equal.

D. Expansion Strips: Glass fiber or polyethylene, as produced by **Pittsburgh Corning Corporation**, or equal.

E. Panel Reinforcing: As manufactured by **Pittsburgh Corning Corporation,** or equal. Galvanized steel double-wire mesh formed of 2 parallel 9-gauge wires, 2 inches on center with electrically-welded cross wires.

F. Panel Anchors: As furnished by **Pittsburgh Corning Corporation,** or equal, shall be 20-gauge perforated steel strips, 24 inches long by 1-3/4 inches wide, galvanized after perforating, embedded at both ends of each row of glass block.

G. Asphalt Emulsion: Water-based asphalt emulsion, **Karnak 100** by **Karnak Chemical Corporation**, or equal.

H. Packing (Backer Rods): Polyethylene foam, neoprene, or equal, filler approved by the sealant manufacturer.

I. Sealants: See Section 079213 - Sealants and Caulking.

2.2 MORTAR

A. Mixture**:** One part Portland cement, 1/2 part lime, and sand equal to between 2-1/4 and 3 times the amount of cementitious material (cement plus lime), all measured by volume, plus an integral type waterproofer. If a waterproof Portland cement is used, the integral type water proofer shall be omitted. Admixtures in the form of setting accelerators and antifreeze compounds shall not be used.

B. Mortar components shall be mixed to a consistency as stiff as will permit good working. Mortar shall be drier than mortar for ordinary masonry. Retempering the mortar after it has taken its initial set shall not be permitted.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General

1. A heavy coat of asphalt emulsion shall be applied to sill area and be allowed to dry before placing.

2. Expansion strips shall be adhered to jambs and head with a continuous full thick bed of asphalt emulsion, making certain that expansion strips extend the full height of the opening from sill to head at the jambs, and from expansion joint to expansion joint at the head.

3. A full mortar bed joint to sill shall be applied.

4. Blocks shall be set with horizontal bands on the exterior of the block. Mortar joints shall be full, not furrowed, using only wood tools to tap glass blocks into position.

5. Panel reinforcing shall be installed in horizontal joints. Reinforcing shall be installed on 16 inch centers in glass panels more than 16 inches high but at least one for each 2 row combination panel and in joints immediately above and below openings within panels. Reinforcing shall run continuously from end to end of panels and

shall be lapped not less than 6 Inches whenever it is necessary to use more than one length. Expansion joints shall not be bridged with reinforcing. Reinforcing shall be installed as follows:

a. Place lower half of mortar in bed joint. Do not furrow.

b. Press panel reinforcing into place.

c. Cover panel reinforcing with upper half of mortar bed and trowel smooth. Do not furrow.

6. Full mortar bed shall be placed for joints not requiring panel reinforcing, not furrowed.

7. Succeeding course of blocks shall be set with horizontal bands on block on the exterior.

8. Joints shall be smoothed while mortar is still plastic and before final set. At this point, spaces requiring sealant shall be raked out to a depth equal to a width of the space. Surplus mortar shall be removed from faces of glass blocks and wiped dry, and joints tooled smooth and concave before mortar takes final set.

9. After final mortar set, packing shall be installed tightly between glass block panel and jamb and head construction, leaving space for sealing. Backer rod and separator shall be inserted per Section 079213 – Sealants and Caulking.

10. Sealant shall be applied evenly to the full depth of recesses as indicated and in accordance with the manufacturer's application manual and instructions. At expansion joints, sealant depth shall be 1/2 of joint thickness but not less than ¼ inch.

11. Surplus mortar shall be removed. The faces of the blocks shall be wiped dry at the time joints are tooled, using an ordinary household scrub brush having stiff bristles to clean glass block. Final cleaning shall be done after mortar block has attained final set but before becoming dry on the block surfaces. Use a damp cloth, not abrasive cleaners (e.g., steel wool, wire brush) to remove mortar or dirt from the faces of glass block.

- END OF SECTION -

SECTION 053000 - METAL DECKING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide steel decking and accessory items, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Specifications and Commercial Standards

AISI	Design of Cold - Formed Steel Structural Members.
SDI	Design Manual for Composite Decks, Form Decks, and Roof Decks.
ASTM A 653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 1008	Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
AWS D1.3	Structural Welding Code-Sheet Steel

B. ICC-ES Research Reports or Florida Product Approval for each type of metal decking used in the WORK.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Prior to the commencement of any WORK, the CONTRACTOR shall submit an affidavit furnished by the deck manufacturer certifying to the yield strength. The CONTRACTOR shall submit gauge and section properties of the metal deck. The CONTRACTOR shall also furnish the diaphragm shear values for the deck using the welding pattern and/or shear capacity indicated. Failure to conform to this requirement shall be justification for rejection of the material.

C. Submit a layout drawing showing the location of deck sheets, end laps, side laps, types and locations of welds and details of accessories.

D. Submit an ICC Research Report or Florida Product Approval for each type of metal decking used in the WORK.

1.4 QUALITY ASSURANCE

A. No insulation, roofing materials, or other permanent coverings shall be placed over the decking until the ENGINEER has inspected it for placement, welds, and accessories. Stored materials and debris shall be removed to facilitate the inspection. Welds found to be defective shall be replaced as a part of the WORK.

1.5 MATERIAL STORAGE

A. Decking stored at the Site before installation shall be stacked on the ground on platforms or pallets and be covered with tarpaulins or other weatherproof covering.

PART 2 -- PRODUCTS

2.1 STEEL DECK

A. Unless indicated otherwise, metal deck shall be manufactured from steel conforming to ASTM A 1008, SS or HSLAS Grades 50. The maximum design working stress in the deck shall not exceed the product of 0.6 times the yield strength.

B. The metal deck structural properties shall be as indicated. The moment of inertia and section modulus of the metal deck unit shall be computed in accordance with the Steel Deck Institute specifications, and in accordance with the American Iron and Steel Institute, "Specification for the Design of Cold-Formed Steel Structural Members."

C. Steel decking shall be galvanized to G90 minimum and conform to the requirements of ASTM A653 and to the applicable requirements of Section 055000 - Miscellaneous Metalwork. Steel deck shall be free of oil, grease, and dirt before dipping.

D. Galvanized steel deck shall be coated in accordance with Section 099100 - Architectural Coatings. Deck shall be free of oil, grease and dirt before coating application.

E. The metal deck shall have sheet length that covers 3 or more spans.

F. The metal deck sheets shall be formed at the longitudinal sides in such a manner that they will overlap and/or interlock. Where the end of sheets overlap, they shall be die-formed in such a manner that the sheet in the next row telescopes and snugly overlaps the sheet laid previously.

G. Plates needed to connect decking to supports or to maintain deck continuity shall be 14-gauge galvanized sheet.

H. Structural steel shapes, including angles and inserts, shall be in accordance with Section 055000.

2.2 MANUFACTURERS

A. The metal decking shall be manufactured by **Verco Manufacturing Company**, **ASC Pacific Inc.**, **Vulcraft Nucor Corporation Inc.,** or equal.

PART 3 -- EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. The CONTRACTOR shall inspect supporting members for correct layout and alignment, and shall not proceed with installation until defects are corrected and supporting members are completely installed and secured.

B. Metal deck sheets and accessories shall be placed in accordance with the manufacturer's recommendations and the Shop Drawings. Roofs having a slope of 1/4-

inch per foot or more shall be installed starting at the low side, to ensure that end laps are shingle fashion.

C. Metal deck sheets shall be positioned on supporting steel framework and adjusted to final position with ends bearing a minimum of 2-inches on supporting members. Units shall be placed end to end, with ribs aligned over the entire length of the run before being permanently fastened.

D. Special care shall be exercised not to damage or overload the deck during installation. The deck shall not be used for storage or as working platforms until permanently secured in position. Construction loads shall not exceed the deck carrying capacity, as recommended by the manufacturer.

E. Openings in the deck shall be cut and fitted neatly and shall be reinforced with structural steel members to distribute the load.

F. Where concrete fill is required, deck shall be installed with closure plates and other accessories as needed to prevent loss of water, cement, and fines during placing and consolidation of the concrete.

G. Edges of any cut openings or any minor surface damage areas shall be repaired in accordance with applicable requirements of the Sections 099600 and 055000.

H. After installation, surfaces shall be cleaned and left free of grime and dirt. The CONTRACTOR shall remove unused materials, tools, scaffolding, and debris from the premises and leave the area broom clean.

3.2 WELDING

A. Care shall be exercised in the selection of electrodes and amperage to provide positive welds and to prevent high amperage blowholes. Welds shall be made from the top side of the deck immediately after alignment.

B. The metal deck shall be welded to supporting members with 1/2-inch effective diameter puddle welds spaced at 12-inches on center at members parallel to the ribs and at every rib valley at members perpendicular to the ribs, unless otherwise indicated. Welding washers shall be used when welding steel deck of less than 0.028-inch thickness. Welding washers shall not be used when welding steel deck of 0.028-inches or greater.

C. Side laps shall be welded with 1-1/2 inch long top seam welds, spaced at 12-inches on center unless indicated otherwise.

D. Welds shall be free of sharp points or edges. Welds shall be cleaned immediately by chipping or wire brushing and shall be coated with a zinc dust type primer paint.

E. Welding shall conform to the applicable requirements of AISC "Light Gauge Steel Design." Welders shall be AWS certified.

- END OF SECTION -

SECTION 054250 - COLD-FORMED METAL TRUSSES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall construct all cold-formed metal trusses and appurtenant WORK, complete, in accordance with the requirements of the Contract Documents.

B. The CONTRACTOR is responsible for coordinating HVAC ductwork, electrical equipment, roof penetrations, pipe hangers, and other equipment that is located near or attached to the trusses. The CONTRACTOR is responsible for eliminating interference between the trusses and equipment.

C. Section includes pre-engineered, pre-fabricated cold-formed steel framing elements. Work includes:

1. Cold-Formed steel roof trusses.

2. Anchorage, bracing and bridging.

1.2 REFERENCE SPECIFIATIONS, CODES AND STANDARDS

A. Codes: 2010 Edition of Florida Building Code.

B. Commercial Standards

ASTM A 370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A 500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003.
ASTM A653	Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A1008	Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A780	Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

American Welding Society (AWS)

AWS D1.1	Structural Welding Code - Steel
AWS D1.3	Structural Welding Code - Sheet Steel

American Iron and Steel Institute

AISI S100	American Iron and Steel Institute, North American Specification for the Design of Cold-Formed Steel Structural Members

AISI S200	North American Standard for Cold-Formed Steel Framing - General Provisions
AISI S214	American Iron and Steel Institute, North American Standard for Cold-Formed Steel Framing – Truss Design
AISI CF06-1	Code of Standard Practice for Cold-Formed Steel Structural Framing

Cold-Formed Steel Council

CFSC CFSBCSI	Cold-Formed Steel Building Components Safety Information

Cold-Formed Steel Engineers Institute

CFSEI Technical Note 551d	Design Guide for Construction Bracing of Cold-Formed Steel Trusses
CFSEI Technical Note 551e	Design Guide for Permanent Bracing of Cold-Formed Steel Trusses

1.3 CONTRACTOR SUBMITTALS

A. Submit under provisions of Section 013300 – Contractor Submittals.

B. Product Data: Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.

C. Truss Design Drawings and Truss Placement Drawings are delegated engineering documents and shall conform to the requirements of the Florida Administrative Code for delegated engineering documents. The qualified Professional Engineer registered in Florida is delegated the responsibility of the Cold-Formed Metal Trusses. Truss design criteria established by the Engineer of Record is provided in the Contract Documents. Truss specialty engineer is responsible for the design of the trusses, complete and in-place including connection at the truss bearing on the support structure.

D. Truss Design Drawings and Calculations: Submit individual truss drawings and truss design calculations, sealed and signed by a qualified Professional Engineer registered in Florida, verifying accordance with local building code and design requirements. and indicating the following:

1. Description of design criteria.

2. Engineering analysis depicting member stresses and truss deflection.

3. Truss member sizes and thickness and connections at truss joints.

4. Truss support reactions.

5. Top chord, Bottom chord and Web bracing requirements.

E. Truss Placement Diagram: Submit final roof plan drawings sealed and signed by a qualified Professional Engineer registered in Florida depicting final installed truss assembly and including the following:

1. Roof truss layouts indicating placement of trusses

2. All truss to truss connections.

3. All truss to structure (bearing) connections.

4. Plan and details for the location of all permanent lateral and diagonal bracing and/or blocking required in the top chord, web, and bottom chord planes. (Diaphragms excluded).

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Fabrication shall be performed in a quality controlled manufacturing environment by a cold-formed steel truss fabricator with experience fabricating Cold-Formed Steel trusses equal in material, design, and scope to the trusses required for this Project.

1. Installation of Cold Formed steel truss roof assembly shall be performed by an installer with experience installing Cold-Formed Steel trusses equal in material, design and scope to the trusses required for this Project.

B. Pre-Installation Meeting: Meet at job site prior to scheduled beginning of installation to review requirements:

1. Attendees: Require attendance by representatives of the following:

a. Installer of this section.

b. Other entities directly affecting, or affected by, construction activities of this section, including but not limited to, the following:

1) Installer of truss support framing.

2) Installer of mechanical systems.

3) Installer of electrical systems.

2. Review potential interface conflicts; coordinate layout and support provisions.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 and AWS D1.3.

1. Qualify welding processes and welding operators in accordance with AWS “Standard Qualification Procedure.”

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer’s unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.

B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.

C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Ultra-Span® Truss Manufacturer.

B. TrusSteel.

C. Or equal.

2.2 COMPONENTS

A. Provide manufacturer's standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete cold-formed steel truss roof assembly.

2.3 MATERIALS

A. Cold-Formed Steel Trusses: Trusses meeting the following specified requirements:

1. AISI "Specifications": Calculate structural characteristics of cold-formed steel truss members according to AISI S100.

2. Structural Performance: Design, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.

a. Design Loads: As specified on the drawings.

b. Deflections: Live load deflection meeting the following (unless otherwise specified):

1) Roof Trusses: Vertical deflection less than or equal to Length/240.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F (67 deg C).

4. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one truss.

5. For all chord and web members: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 50,000 psi.

6. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.

B. Steel truss components: Provide sizes, shapes and minimum material thickness indicated.

1. Design Uncoated-Steel Thickness: 0.0460 inch (1.17 mm).

C. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G90 coating. Trusses shall be coated in accordance with Specification 099100 after erection.

D. Fastenings:

1. Manufacturer recommended self-drilling screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.

2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.

3. Other fasteners as accepted by truss engineer.

2.4 FABRICATION

A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

1. Tolerances specified in AISI S214

2. Fabricate truss assemblies in jig templates.

3. Cut truss members by sawing or shearing or plasma cutting.

4. Fasten cold-formed steel truss members by screw fastening, or other methods as standard with fabricator.

a. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses. Refer to SBCA - CFSBCSI.

C. Fabrication Tolerances:

1. Overall Length: Fabricate each cold-formed steel truss to the maximum allowable tolerance of ½".

2. Overall Height: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows:

a. Truss height up to 5 ft – ¼" tolerance

b. Truss height over 5 ft – ½" tolerance

3. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch (3mm).

PART 3 -- EXECUTION

3.1 EXAMINATION

A. Examine structure, substrates and installation conditions. Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION, GENERAL

A. General:

1. Erection of trusses, including proper handling, safety precautions, installation bracing and other safeguards or procedures is the responsibility of the Contractor and Contractor's installer. Refer to SBCA - CFSBCSI.

2. Exercise care and provide installation bracing required to prevent toppling of trusses during erection. Provide adequate lateral bracing.

B. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.

C. Provide proper lifting equipment, including spreader bar, suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.

D. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.

E. Install trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.

1. DO NOT cut truss members without prior approval of truss engineer.

2. Fasten cold-formed steel trusses by screw fastening, welding or other methods, as standard with fabricator.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to cold-formed truss manufacturer's instructions with screw penetrating joined members by not less than three exposed screw threads.

3. Install trusses in one-piece lengths, unless splice connections are indicated.

4. Provide installation bracing and leave in place until trusses are permanently stabilized.

F. Erection Tolerances:

1. Install trusses to a maximum allowable tolerance variation for level and true to line of 1/8 inch in 10 feet (1:960).

2. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3. Limit out-of-plane bow and plumb per SBCA – CFSBCSI.

3.3 ROOF TRUSS INSTALLATION

A. Install trusses per installation documents.

B. Space trusses per sealed truss drawings.

C. Do not alter, cut, or remove truss members or connections of truss members.

D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.

E. Erect trusses without damaging truss members or connections.

F. Anchor trusses securely at all points of support, per installation documents.

G. Install all continuous bridging and permanent truss bracing per installation documents.

H. Perform all truss to truss connections per installation documents.

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A780 and the manufacturer’s instructions.

- END OF SECTION -

SECTION 055000 - MISCELLANEOUS METALWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide miscellaneous metalwork and appurtenances, complete and in place, as indicated in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Federal Specifications

MIL-G-18015 A (3)	(Ships) Aluminum Planks. (6063-T6)
MIL-PRF-907F	Antiseize Thread Compound, High Temperature

B. Codes

OSHA 1927.10	Fixed Ladders

C. Commercial Standards

AA-M32C22A41	Aluminum Assn.
AASHTO HS-20	Truck Loading
AISC	Manual of Steel Construction
AISI	Design of Light Gauge, Cold-Formed Steel Structural Members
ASTM A 36	Carbon Structural Steel
ASTM A 48	Gray Iron Castings
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 193	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
ASTM A 194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 992	Steel for Structural Shapes for Use in Building Framing
ASTM F 1554	Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength
ANSI/AWS D1.1	Structural Welding Code - Steel
ANSI/AWS D1.2	Structural Welding Code - Aluminum
ANSI/AWS QC1	Qualification and Certification of Welding Inspectors

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Shop Drawings shall conform to AISC recommendations and specifications, and shall show holes, and the like, as may be required for other parts of the WORK.

2. Shop Drawings shall include complete details of members and connections, anchor bolt layouts, schedules for fabrication procedures, and diagrams for the sequence of erection.

C. Welding

1. Submit welder certifications for all welders performing work on the project.

2. Submit Certified Welding Inspector certifications for the inspector.

D. Grating

1. Submit layout drawings for grating, showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners.

2. Submit load and deflection tables for each style and depth of grating used.

E. Anchor Submittals

1. Submit an ICC-ES or IAPMO-UES report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor.

2. Submit manufacturer's recommended installation instructions and procedures for anchors.

3. Upon review by the ENGINEER, these instructions shall be followed specifically.

4. No substitution for the indicated anchors will be considered unless accompanied with an ICC-ES or IAPMO-UES report verifying strength and material equivalency.

5. Complete structural calculations and anchorage details shall be prepared and submitted by the Contractor for all anchors and anchor groups that are shown but not completely detailed (type, size, location, spacing and embedment) on the Contract Documents. Calculations and anchorage details shall be signed and stamped by a Professional Engineer registered in the state in which the project is located.

1.4 QUALITY ASSURANCE

A. Weld procedures and welder qualifications shall be available in the CONTRACTOR's field office for review.

B. The CONTRACTOR shall pay for a Certified Welding Inspector to be on-site inspecting all field welding, including all field welding covered in this specification and other specification sections.

1. The Certified Welding Inspector shall submit reports indicating all welds are in compliance with the relevant specified welding standards.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Steel

Wide Flange Shapes	ASTM A 992
Shapes, Plates, Bars	ASTM A 36
Pipe, Pipe Columns, Bollards	ASTM A 53, Type E or S, Grade B standard weight unless indicated otherwise
HSS	ASTM A 500 Grade B

B. Corrosion Protection

1. Unless otherwise indicated, fabricated steel metalwork which will be used in a corrosive environment and/or will be submerged in water or wastewater shall be coated in accordance with the requirements of Section 099600 – Protective Coating, and shall not be galvanized prior to coating.

2. Other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication.

C. Stainless Steel

1. Unless otherwise indicated, stainless steel metalwork and bolts shall be fabricated from Type 316 stainless steel.

D. Aluminum

1. Unless otherwise indicated, aluminum metalwork shall be fabricated from Alloy 6061-T6.

2. Aluminum in contact with concrete, masonry, wood, porous materials, or dissimilar metals shall have contact surfaces coated in accordance with the requirements of Section 099600 – Protective Coating.

E. Cast Iron

1. Unless otherwise indicated, iron castings shall conform to the requirements of ASTM A 48, Class 50B, or better.

2.2 RAILINGS

A. General

1. Aluminum handrails and railings shall aluminum and shall be component systems, complete with anchors, attachments, balusters, brackets, caps, fasteners, gates (swing with self-latching hardware or be removable), posts, sleeves, trim, and any other related items as required or necessary for a complete installation.

2. Gates and removable rail sections shall be complete with hardware such as self-closing hinges, self-latching latches, hasps, and the like.

3. Railings shall conform to Building Code and OSHA requirements, General Industry Occupational Safety and Health Standards (29CFR1910).

4. The aluminum railing on the pump room landing shall be removeable for pump maintenance and replacement using the monorail.

B. Materials shall conform to the following requirements:

1. Aluminum

a. Aluminum shall be U.S. Alloy 6063 T-5 or T-6.

b. Aluminum pipe rail shall not be less than 1-1/2-inch diameter Schedule 40 pipe.

2. Electrolysis protective material shall be in accordance with the requirements of Section 099600 – Protective Coating.

3. Sleeves shall be of galvanized steel or PVC.

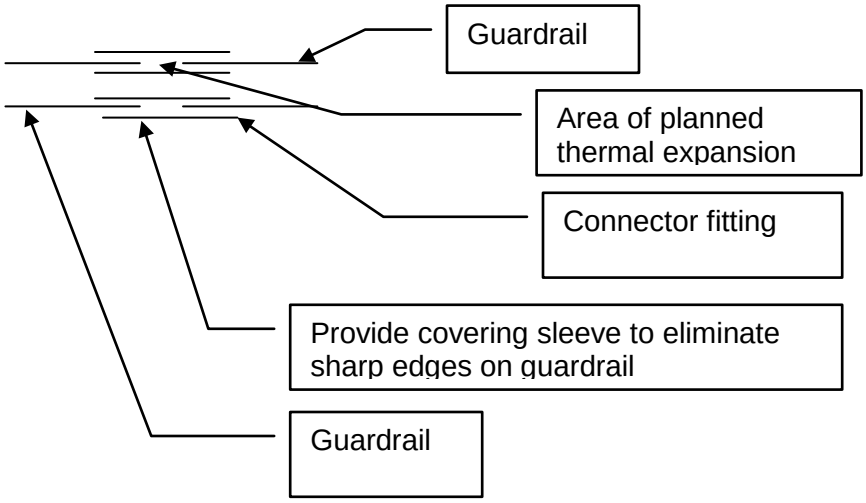
4. Grout for handrail posts shall consist of an inorganic, non-shrink, non-metallic premixed grout in accordance with the requirements of Section 036000 – Grout, with a minimum 28-Day compressive strength of 4,000 psi.

5. Fasteners, screws, and bolts shall be concealed and shall be fabricated from stainless steel.

6. Aluminum welding rods shall be of a type recommended by the aluminum manufacturer for anodized finished products.

7. Kickplates shall be provided on railings and not set in curbs.

C. Pipe railing systems, including handrails, railings, tube caps, and other miscellaneous parts of the rails, shall be provided with a clear anodized finish, AA-M32C22A41. Areas where two sections of railing are joined shall be smooth. Areas where thermal expansion is planned to occur shall be covered with a sleeve smooth to the touch.



D. Manufacturers or Equal

1. **C-V Pipe Rail** by **Crane Veyor Corp.**

2. **Connectorail** by **Julius Blum and Co.**

2.3 METAL STAIRS

A. Metal Stairs

1. Metal stairs shall be composed of aluminum stringers and supports, shall be fabricated in accordance with the standard practice of the National Association of Ornamental Metal Manufacturers, and shall be as indicated.

2.4 GRATING STAIR TREADS

A. Grating stair treads shall be aluminum and shall be designed to support a live load of 100 psf or a concentrated load at mid-span of 300 pounds, whichever creates the higher stress.

B. The maximum deflection due to the uniform live load shall be as required for metal grating, below.

C. Grating stair treads shall be provided with an integral non-slip nosing.

2.5 SAFETY STAIR NOSINGS

A. Safety stair nosing shall be provided on concrete stairs and other locations as indicated.

B. The nosing shall be 3 inches wide and fabricated from extruded aluminum with cast-in abrasive strips and integral extruded anchors.

C. The color of the cast abrasive shall be as selected by the ENGINEER from among the manufacturer's standard colors.

D. The nosing shall be **Amstep Products Style 231-A, Grating Pacific XRS-3, Robertson Grating Products Type 9511,** or equal.

2.6 METAL GRATING

A. General

1. Metal grating shall be aluminum of the indicated design, size, and type.

2. Grating shall be supported around an opening by support members.

3. Where grating is supported on concrete, unless otherwise indicated provide embedded support angles that match the grating material and are mitered and welded at their corners.

4. Banding

a. The grating shall be completely banded at edges and cutouts.

b. The banding material and cross-section shall be equivalent to the bearing bars.

c. The banding shall be welded to each cut bearing bar.

5. The grating pieces shall be fastened to each support in 2 locations.

6. Where grating forms the landing at the top of a stairway, the edge of the grating that forms the top riser shall have an integral non-slip nosing with a width equal to that of the stairway.

7. Where the grating depth is not indicated, provide grating within allowable stress levels and which shall not exceed a deflection of 1/4 inch or the span divided by 180, whichever is less.

8. Design Loading

a. For standard duty plank and safety grating, the loading to be used for determining stresses and deflections shall be the uniform live load of the adjacent floor or 100 psf, whichever is greater, or a concentrated load of 1000 pounds.

b. For heavy duty grating, the loading used for determining stresses and deflections shall be in accordance with AASHTO HS-20.

B. Material

1. Except where indicated otherwise, bar grating shall be fabricated entirely of:

a. aluminum

1) Bearing and Banding Bars: Alloy 6061-T6

2) Cross Bars: Alloy 6063-T5

2. Grating that may be partially or wholly submerged shall be fabricated entirely of Type 316 stainless steel. Stainless steel grating (if used) shall be sandblasted to remove inconsistent coloring associated with the fabrication process.

C. Standard-Duty Grating

1. No single piece of grating shall weigh more than 80 pounds, unless indicated otherwise.

2. Standard duty grating shall be composed of serrated bar grating.

3. Cross bars shall be welded or mechanically locked tightly into position such that there is no movement between the bearing and cross bars.

2.7 METAL DECKING

A. Metal decking shall be of the indicated size and gauge, and shall meet the requirements of the AISI specification for the "Design of Light Gauge, Cold-formed Steel Structural Members."

B. The steel shall be hot-dip galvanized after fabrication.

2.8 BOLTS AND ANCHORS

A. Standard Service (Non-Corrosive Application)

1. Bolts, anchor rods, anchor bolts, washers, and nuts shall be fabricated from steel as indicated.

2. Threads on galvanized bolts, rods and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing.

3. Except as otherwise indicated, steel for bolt material, anchor rods, anchor bolts, and cap screws shall be in accordance with the following requirements:

a. Structural Connections: ASTM A 307, Grade A or B, hot-dip galvanized

b. Headed Anchor Rods and Anchor Bolts: ASTM F1554, Grade 36, hot-dip or mechanically galvanized with Grade A matching nuts

c. High-Strength Bolts, where indicated: ASTM A 325

d. Pipe and Equipment Flange Bolts: ASTM A 193, Grade B-7

B. Corrosive Service

1. Bolts, anchor rods, anchor bolts, nuts, and washers in the locations listed below shall be fabricated from stainless steel as indicated.

a. buried locations

b. submerged locations

c. locations subject to seasonal or occasional flooding

d. inside hydraulic structures below the top of the structure

e. inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump

f. chemical handling areas

g. inside trenches, containment walls, and curbed areas

h. locations indicated or designated by the ENGINEER to be provided with stainless steel bolts

C. Unless otherwise indicated, stainless steel bolts, anchor rods, anchor bolts, nuts, and washers shall be fabricated from Type 316 stainless steel, Class 2, conforming to ASTM A 193 for bolts and to ASTM A 194 for nuts.

D. Coating

1. Threads on stainless steel bolts and rods shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, meeting government specification MIL-A-907E.

2. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.

3. Antiseize lubricant shall be "PURE WHITE" by **Anti-Seize Technology,** Franklin Park, IL, 60131, **AS-470** by **Dixon Ticonderoga Company,** Lakehurst, NJ, 08733, or equal.

E. Bolt Requirements

1. The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts.

3. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads.

4. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

5. Bolts and nuts shall be installed with washers fabricated from material matching the base material of bolts, except that hardened washers for high-strength bolts shall conform to the requirements of the AISC Specification.

6. Lock washers fabricated from material matching the bolts shall be installed where indicated.

7. The length of each bolt shall be such that the bolt extends at least 1/8 inch beyond the outside face of the nut before tightening, except for anchor bolts which shall be flush with the face of the nut before tightening.

F. Adhesive Anchors

1. General

a. Unless otherwise indicated, drilled concrete or masonry anchors shall be adhesive anchors.

b. No substitutions will be considered unless accompanied with a current ICC-ES or IAPMO-UES report verifying strength and material equivalency.

2. Epoxy Anchors

   a. Epoxy adhesive anchors are required for drilled anchors for outdoor installations, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails and reinforcing bars.

   b. Epoxy shall be in accordance with the requirements of Section 036000 – Grout.

   c. Threaded rod shall be galvanized for general purpose applications and fabricated from Type 316 stainless steel for use in corrosive applications.

   d. Epoxy anchors shall not be permitted in areas where the concrete temperature is in excess of 100 degrees F or higher than the limiting temperature recommended by the manufacturer, whichever is lower.

   e. Epoxy anchors shall not be used where anchors are subject to vibration or fire.

   f. Minimum substrate temperatures shall be maintained during the full curing period as required by the manufacturer.

3. Unless otherwise noted, threaded rod shall be galvanized steel.

G. Expanding-Type Anchors

1. Expanding-type anchors, if indicated or permitted, shall be galvanized steel unless otherwise noted, shall be of the expansion type, and shall be **Simpson Strong-Tie Strong-Bolt 2** anchors, **Hilti Kwik-Bolt TZ anchors, Powers Power-Stud+ SD1 or SD2 anchors,** or equal.

2. Lead caulking anchors will not be permitted.

3. Minimum size shall be as indicated on the Contract Documents.

4. Non-embedded buried or submerged anchors shall be fabricated from stainless steel.

H. Non-Shrink Grouted Anchors

1. Grouted anchors, if indicated or permitted, shall be grouted with a non-shrink cementitious grout in accordance with the manufacturer's recommendations.

2. Non-shrink grout material shall be Class B or C in accordance with Section 36000 - Grouting.

PART 3 -- EXECUTION

3.1 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

B. Aluminum Railings

1. Aluminum railing fabrication and installation shall be performed by craftsmen experienced in the fabrication of architectural metalwork.

2. Exposed surfaces shall be free from defects or other surface blemishes.

3. Dimensions and conditions shall be verified in the field.

4. Joints, junctions, miters, and butting sections shall be precision fitted with no gaps occurring between sections, and with surfaces flush and aligned.

5. Electrolysis protection of materials shall be provided.

C. Unless otherwise indicated, provide a 1/2-inch drain line to the nearest floor drain for floor hatches.

3.2 WELDING

A. Method

1. Welding shall be performed by the metal-arc method or gas-shielded arc method as described in the American Welding Society "Welding Handbook" as supplemented by other pertinent standards of the AWS.

2. The qualification of the welders shall be in accordance with the AWS Standards.

B. Quality

1. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained in order to minimize distortion and for control of dimensions.

2. Weld reinforcement shall be as indicated by the AWS Code.

3. Upon completion of welding, remove weld splatter, flux, slag, and burrs left by attachments.

4. Welds shall be repaired in order to produce a workmanlike appearance, with uniform weld contours and dimensions.

5. Sharp corners of material that is to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.

3.3 GALVANIZING

A. Structural steel plates shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123.

B. Any galvanized part that becomes warped during the galvanizing operation shall be straightened.

C. Bolts, anchor rods, anchor bolts, nuts, and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153.

D. Field Repairs

1. Field repairs to damaged galvanizing shall be performed by preparing the surface and applying a coating.

2. Surface preparation shall consist of removing oil, grease, soil, and soluble material by cleaning with water and detergent (SSPC SP1) followed by brush-off blast cleaning (SSPC SP7) over an area extending at least 4 inches into the undamaged area.

3. The coating shall be applied to at least 3 mils dry film thickness, and shall be **Zinc-Clad XI** by **Sherwin-Williams**, **Galvax** by **Alvin Products**, **Galvite** by **ZRC Worldwide**, or equal.

3.4 DRILLED ANCHORS

A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions.

B. Holes shall be roughened with a brush on a power drill, and then cleaned and dried.

C. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength.

D. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

E. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes shall be adjusted to avoid drilling through or cutting any existing reinforcing bars.

F. All abandoned drilled holes shall be filled with Epoxy Anchor Grout.

- END OF SECTION -

SECTION 071220 – WATERPROOFING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide waterproofing and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Society for Testing and Materials (ASTM)

1. ASTM D 2434 Water Penetration Rate

2. ASTM E 96 Water Vapor Permeability

3. ASTM D 412 Elongation

4. ASTM D 6392 Bond Seam Strength Test

5. ASTM D 1434 Methane Permeability

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions.

C. Warranty: Submit a copy of the warranty.

D. Certifications

1. Certification by the waterproofing manufacturer that the waterproofing provided is suitable for, and compatible with, the required installation.

2. Certification by the waterproofing manufacturer that the products supplied comply with local regulations controlling the use of volatile organic compounds (VOCs).

3. Certification of manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, manufacturer's products, and contact information of the consultant firm of record, general contractor, and owner.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor, and owner.

5. Certification by the manufacturer's field representative that surfaces have been prepared and the products have been applied in accordance with the manufacturer's recommendations.

6. When requested by Engineer, furnish other certifications as may be required to show compliance with the Contract Documents.

E. Samples: When requested by ENGINEER, submit samples of the materials proposed. Samples shall be clearly marked to show the manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve CONTRACTOR from compliance with the Contract Documents.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility

1. Waterproofing shall be provided by a single manufacturer.

B. Manufacturer Qualifications

1. Waterproofing manufacturer shall have a minimum of 10 years of waterproofing manufacturing experience.

2. Waterproofing manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications

1. Installer shall have a minimum of 5 years experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

D. Manufacturer's Technical Field Representative

1. The CONTRACTOR shall arrange for a manufacturer's technical field representative to be on Site for at least 3 days, beginning at the start of surface preparation and continuing through application, to train the installers and to supervise the WORK. The manufacturer's technical field representative shall observe as necessary to certify in writing that the completed WORK has been performed according to the manufacturer's instructions.

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish manufacturer's 1-year written warranty to cover defects in materials, products, and manufacturing workmanship.

B. Contractor shall furnish separate, but concurrently running, 5-year written warranty to cover labor.

C. Warranties shall be non-prorated for the entire warranty period.

D. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Waterproofing shall be recommended by the manufacturer for the installation indicated.

2.2 WATERPROOFING

A. Manufacturer and Product, or Equal

1. Subject to the requirements indicated, provide manufacturer and product listed below, or equal:

a. **Volclay Voltex/Voltex DS by CETCO** including accessories recommended by manufacturer.

B. Description

1. Waterproofing shall be a composite comprised of 2 layers of polypropylene geotextiles encapsulating bentonite with geotextile fibers for a continuous bond to concrete placed against it.

C. Performance Characteristics

ASTM D 903 (mod)	Peel Adhesion to Concrete	15 lbs./in.
ASTM E 96	Water Vapor Transmission Rate	0.03 grains per hour/ft^2
ASTM D 5385 (mod)	Hydrostatic Pressure Resistance	230 ft.
ASTM D 5084	Permeability	$1x10^{-10}$ cm./sec.
ASTM D 4632	Grab Tensile Strength	120 lbs.
ASTM D 4833	Puncture Resistance	140 lbs.
ASTM D 1970	Low Temperature Flexibility	Unaffected at -25°F

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with manufacturer's written instructions.

3.2 APPLICATION SCHEDULE

A. Waterproofing shall be installed continuously from 2 feet below the bottom of the slab to 2 inches below finish grade, including the top 2 feet at drilled piers, the bottom and sides of slab, top of slab extensions and exterior face of foundation walls.

B. Refer to Section 033100 – Cast-In-Place, for waterproofing application.

C. Waterproofing shall also be installed elsewhere, where noted on the Contract Drawings.

3.3 PROJECT CONDITIONS

A. Comply with manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding Work from damage that may result from operations under this Section.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the Work under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent Work.

1. Examine substrates, areas, and conditions where waterproofing will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed waterproofing.

    a. Surfaces to receive waterproofing shall be dry, free of oil, dirt, dust and other contaminants and loose materials, and shall be in the proper condition as indicated by the manufacturer prior to the application of the waterproofing materials.

    b. Masonry, concrete, and cementitious products shall have been completely cured and the surface shall be dry and free from frost at the time of application.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR'S acceptance of the substrate, areas, and conditions.

3.5 SURFACE PREPARATION

A. Surface preparation shall be in compliance with the applicable references and with the manufacturer's written instructions.

B. Protrusions, bumps, ridges, and loose substrate surface materials shall be removed by sanding or grinding.

C. Concrete surface to receive waterproofing shall have a rubbed finish to minimize bugholes and honeycombing.

D. Trowelable leveling and patching compounds shall be used per waterproofing manufacturer's written instructions to fill cracks, holes, and depressions.

3.6 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

1. Do not begin waterproofing until penetrations have been installed so that waterproofing will not be penetrated or damaged by subsequent WORK.

2. Do not begin waterproofing before plumbing, electrical, mechanical, and structural items under or passing through waterproofing have been secured in proper positions and appropriately sealed and protected.

3.7 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, and with manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER**.**

B. Particular care shall be given to the application of waterproofing at construction joints.

C. Install waterproofing membrane around the perimeter of the top 2 feet of drilled piers and provide enough material to lap with membrane on underside of slab.

D. Place membrane on void forms beneath the base slab with geotextile fiber on top side so it will be embedded in concrete placed above membrane.

E. Provide laps between adjacent sheets as recommended by the manufacturer.

F. Seal wall and slab penetrations with bentonite seal materials provided by the manufacturer.

G. Connect membrane to walls using washer headed fasteners.

H. Backfill next to walls with care to avoid damaging the waterproofing membrane.

I. Terminate at grade as recommended by the manufacturer.

3.8 CLEANING, FINISHING, AND PROTECTION

A. Waterproofing shall be protected from damage from subsequent construction operations.

B. The CONTRACTOR shall make adjustments required until accepted.

C. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER, at no additional cost to OWNER.

D. When waterproofing WORK is completed, remove unused materials, containers, and equipment, and clean the Site of waterproofing debris.

- END OF SECTION -

SECTION 071900 – SURFACE APPLIED WATER REPELLANTS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide Surface Applied Water Repellants and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Society of Testing and Materials (ASTM):

ASTM C 140	Water Repellency in Water Absorption
ASTM D 3278	Standard Test Method for Flashpoint of Liquids by Small Sealed Closed-End Apparatus
ASTM E 514	Standard Test Method for Water Penetration and Leakage through Masonry

C. Environmental Protection Agency (EPA): Method 24

1.3 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions.

C. Warranty: Submit a copy of the warranty.

D. Certifications**:**

1. Certification by the Surface Applied Water Repellant Manufacturer that the water repellant provided is suitable for, and compatible with, the required installation.

2. Certification by the Surface Applied Water Repellant Manufacturer that the water repellant is suitable for, and compatible with, the masonry, mortar, and admixtures provided under Section 042200 – Reinforced Concrete Block Masonry.

3. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer's products, and contact information of the consultant firm of record, general contractor and owner.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects

with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

5. Certification by the Manufacturer's field representative that surfaces have been prepared and the products have been applied in accordance with the Manufacturer's recommendations.

6. Certification by the Manufacturer that the products provided achieves a Class E rating, when tested in accordance with ASTM E 514.

7. Certification by the Manufacturer that the products supplied complies with local regulations controlling the use of volatile organic compounds (VOCs).

8. Certification by the Manufacturer's field representative that the products provided achieves a passing result when tested in accordance with RILEM Test Method II.4.

9. When requested by the ENGINEER, furnish other certifications as may be required to demonstrate compliance with the Contract Documents.

E. Location of surface applied water repellents will be on all exterior concrete masonry unit surfaces.

F. Samples: When requested by ENGINEER, submit samples of the materials proposed. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish and quality of each item. Approval of samples shall not relieve CONTRACTOR from compliance with the Contract Documents.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Surface Applied Water Repellants shall be provided by a single Manufacturer.

B. Manufacturer Qualifications:

1. Surface Applied Water Repellant Manufacturer shall have a minimum of 20 years of water repellant manufacturing experience.

2. Surface Applied Water Repellants Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installer shall be trained, certified, and authorized by the Manufacturer to install the Manufacturer's product, when applicable.

3. Installers without these qualifications will not be accepted.

D. Manufacturer's Technical Field Representative: The CONTRACTOR shall arrange for a Manufacturer's technical field representative to be on Site, at the beginning of water repellent application (and periodically throughout), to train the installers and to supervise the WORK. The Manufacturer's technical field representative shall observe as necessary to certify in writing that the completed WORK has been performed according to the Manufacturer's instructions.

E. Field Sample:

1. Coordinate field sample with other field samples required in other Sections.

2. Prior to installation, erect sample wall panel mock-up on Site using materials and joint details required for final WORK. Provide special features as directed.

3. The field sample shall not exhibit any deterioration of color or finish of the substrate, including but not limited to discoloration, staining, streaking, and fading.

4. Apply material in accordance with the requirements in Part 3 – Execution, below.

5. Manufacturer's technical field representative shall be present to review technical aspects and conduct the field sample installation.

a. Apply Surface Applied Water Repellant to 2-feet (.61 m) by 2-feet (.61 m) test panel area, in accordance with Manufacturer's written instructions, to determine coverage rates, effectiveness, aesthetics, and desired results.

b. Allow 10 days or until test panels are thoroughly cured before evaluating final appearance and results.

c. Conduct RILEM test method II.4 to evaluate water repellent performance.

d. Do not begin full-scale application until test panels are inspected and approved by the ENGINEER.

e. Do not begin full-scale application until test panels are inspected and approved.

6. Obtain the ENGINEER'S acceptance of qualities of field sample before installation. Modify and/or reconstruct field sample at the direction of ENGINEER until acceptance. Retain field sample during construction as a standard for judging completed WORK. Do not alter, move, or destroy field sample until directed by the ENGINEER.

7. Acceptance of field sample shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1.5 SPECIAL WARRANTY PROVISIONS

A. The CONTRACTOR shall furnish Manufacturer's extended 10-year warranty to cover defects in materials, products, and manufacturing workmanship.

B. The CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover defects in installation and associated labor.

C. All warranty items shall be non-prorated for the entire warranty period.

D. The term of the warranty shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Surface Applied Water Repellant shall be a water-based, clear silane/siloxane sealer designed to provide protection for split-faced, lightweight and standard concrete masonry units.

B. Surface Applied Water Repellant shall be suitable for, and compatible with, masonry mortar, and admixtures in Section 042200 – Reinforced Concrete Block Masonry.

2.2 SURFACE APPLIED WATER REPELLANT

A. Manufacturer and Product, or Equal:

1. Subject to the requirements herein, provide Manufacturer and product listed below, or equal.

a. **Hydrozo, a Division of BASF; Enviroseal PBT.**

2. Description:

a. Surface Applied Water Repellant shall comply with standard specification, ASTM D 3278 (>212 deg F [> 100 deg C]), ASTM C 140 (45 percent reduction in weight gain), ASTM E 514 (99 percent reduction in weight gain), and VOC content shall be less than 2.50 lb/gal (1.13 kg/liter) per EPA method 24.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer’s original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer’s written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 APPLICATION SCHEDULE

A. Surface Applied Water Repellant shall be applied to above grade exposed concrete masonry blocks, and all precast sills and caps.

B. Surface Applied Water Repellant shall also be applied elsewhere, where indicated on the Contract Drawings.

3.3 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

C. Protect against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

C. The CONTRACTOR shall verify coordination with adjacent WORK.

1. Examine substrates, areas, and conditions where the product will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed the product.

    a. Surfaces to receive the product shall be dry, free of oil, dirt, dust and other contaminants and loose materials, and shall be in the proper condition as indicated by the Manufacturer prior to the application of the Surface Applied Water Repellants materials.

    b. Masonry, concrete, and cementitious products shall have been completely cured and the surface shall be dry and free from frost at the time of application.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR's acceptance of the substrate, areas, and conditions.

3.5 SURFACE PREPARATION

A. Surface preparation shall be in compliance with the applicable references and with the Manufacturer's written instructions.

B. Coatings, including curing compounds, form release agents, and other substances shall be removed as recommended by the Surface Applied Water Repellant Manufacturer.

C. Substrate shall be swept to remove all loose materials prior to beginning application.

3.6 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.7 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. Surfaces shall receive complete coats and coverage rates as recommended in writing by the Manufacturer.

3.8 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

3. The surfaces of materials adjoining the product shall be cleaned free of overspray and smears of the product or other soiling due to the installation of the product.

B. Upon completion of the application, the product and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, as determined by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

C. The CONTRACTOR shall make adjustments required and retest until accepted.

D. The product shall be protected from damage from subsequent construction operations.

E. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

F. When the product WORK is completed, remove unused materials, containers, and equipment, and clean the Site of Surface Applied Water Repellant debris.

- END OF SECTION -

SECTION 074216 – METAL ROOF AND SOFFIT PANELS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide metal roof and soffit panels, system support framing, accessories and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

B. The CONTRACTOR shall furnish professional design and engineering services as required for metal roof and soffit panels, accessories and appurtenances as indicated herein.

1. Professional design and engineering services may be provided by the Manufacturer or by an independent licensed structural engineer retained by the CONTRACTOR, either of which shall comply with the requirements indicated.

C. The CONTRACTOR shall coordinate color samples with other Sections through the submittal process.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. The Aluminum Association, Inc. (AA): AA 6061-T6.

C. The American Institute of Steel Construction (AISC).

D. American Society for Testing and Materials (ASTM):

ASTM A 653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D 226	Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 4128	Standard Practice for Identification and Quantitation of Organic Compounds in Water by Combined Gas Chromatography and Electron Impact Mass Spectrometry.
ASTM D 4145	Standard Test Method for Coating Flexibility of Pre-painted Steel
ASTM D 4585	Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation
ASTM E 96	Standard Test Methods for Water Vapor Transmission of Materials

ASTM E 1592	Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E 1646	Standard Test Method for Water Penetration of Exterior Metal of Panel Systems by Uniform Static Air Pressure Difference
ASTM E 1680	Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems
ASTM G 87	Standard Practice for Conducting Moist SO2 Tests

E. American Iron and Steel Institute (AISI): Specification for the Design of Cold-Formed Steel Structural Members

F. Building Code: Refer to the Drawings to determine which building code applies. The applicable building code, defined by the Drawings, is referenced herein as “the CODE.”

G. FM Approval Standards, FM Global: FM Approval Standard 4471 for Class 1 Panel Roofs.

H. National Roofing Contractors Association (NRCA): National Roofing and Waterproofing Manual.

I. Sheet Metal and Air Conditioning Manufacturers National Association (SMACNA).

J. Underwriters Laboratories (UL):

UL 580	Tests for Uplift Resistance of Roof Assemblies

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer’s specifications, technical data, installation methods, maintenance instructions, and the following:

1. Manufacturer’s full-range color charts, indicating custom color availability, for color selection by the OWNER.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification from the Manufacturer that the metal roof and soffit panels are suitable for the installation and that the accessories are compatible with the metal roof and soffit panel system.

2. Certification of product approval compliance.

3. Certification of compliance with the requirements of paragraph 2.1.A.

4. Certification by the Manufacturer that the metal roof panels are suitable for, and compatible with, the roof insulation.

5. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer's products, and contact information of the consultant firm of record, general contractor and owner.

6. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

7. Certification from the Manufacturer that the installer is trained, certified, and authorized by the metal roof and soffit panel Manufacturer to install the Manufacturer's metal wall, roof and soffit panel systems.

8. Certified independent laboratory test results and mill certifications demonstrating that the products and materials comply with the required tests.

9. Certification by the Manufacturer that the metal roof panels do not require a thermal barrier or automatic fire suppression system per the CODE.

10. When requested by the ENGINEER, furnish other certifications as may be required to demonstrate compliance with the Contract Documents.

E. Shop Drawings and Calculations: Complete Shop Drawings showing location and detail of installation, and design calculations.

1. Shop Drawings and Calculations shall be prepared, approved, and stamped by a professional structural engineer licensed in the State of Florida.

2. Shop Drawings shall be drawn to sufficient scale, showing fully-dimensioned layout, including plans, sections, elevations, and details of metal roof and soffit panels, system support framing, accessories, connections to the primary structure, joints, penetration details, preformed metal closures, flashing, gutters, down spouts, soffit panels, trim, fastenings, system caulking sealants, gaskets, appurtenances, locations of framed openings, special project specific conditions, location of custom-cut panels, provisions for expansion and contraction, and relationship to adjacent materials.

   a. Shop Drawings shall include material descriptions, finish, color, details of construction, installation, and accessories of each metal roof and soffit panel type, and accessories.

   b. Design and detail penetrations, including hot pipe penetrations, to be weathertight. Coordinate locations of penetrations.

3. Include erection drawings with written procedures to clearly explain proper installation of fasteners, trim, gaskets and sealants. Erection drawings shall also include notation requiring the installer to coordinate with other trades.

4. Include structural design calculations, in accordance with the AISI Specification for the Design of Cold-Formed Steel Structural Members, for the metal roof and soffit panel system support framing.

5. Include structural design calculations for accessories, including, but not limited to pre-engineered removable access covers and pre-engineered roof curbs.

6. Manufacturer shall review and provide comments on the Shop Drawings and calculations prior to submittal.

F. Samples: The CONTRACTOR shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. Metal Roof Panels:

a. Assembled half panels, with representative panel support framing, showing seam, and appurtenances; one-foot long, in color and finish indicated.

b. 3-inch (76-mm) by 4-inch (102-mm) color samples showing substrate, finish, and color.

2. Soffit panels: 1-foot long (0.30 m) by panel width, in material, profile, finish, and color indicated.

3. Gutter and downspout: 1-foot (0.30 m) long section of each in material, profile, finish, and color indicated.

4. Finish trim, closure pieces, and sealant, 1-foot long (0.30 m) each.

5. Samples of each type fastener required, identified as to use.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Metal roof panels, and soffit panels, shall be provided by a single Manufacturer.

2. System support framing shall be provided by a single Manufacturer.

3. Accessories shall be provided by a single Manufacturer, each.

B. Manufacturer Qualifications:

1. Metal roof and soffit panel Manufacturer shall have a minimum of 20 years of metal panel manufacturing experience.

2. Metal roof and soffit panel Manufacturer shall have a minimum of five (5) similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least five (5) projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installer shall be trained, certified, and authorized by the Manufacturer to install the Manufacturer's product.

3. Installers without these qualifications will not be accepted.

D. A professional structural engineer licensed in accordance with local engineering licensing laws shall design the metal roof and soffit panel system, system support framing, system components, connections, accessories and appurtenances.

E. Performance Tests:

1. Roof panel performance tests shall be conducted by, or witnessed by, a recognized independent laboratory or independent professional engineer. Test results shall be certified by the independent laboratory or by the independent professional engineer who conducted or witnessed the tests.

a. Air infiltration of the roof panel system shall be limited to 0.036 CFM/sq. ft. at a positive pressure differential of 4 psf when tested in accordance with ASTM E 1680.

b. There shall be no uncontrolled water penetration to the building interior when the roof panel system is tested per ASTM E 1646 at a positive pressure differential of 9.2 psf.

c. Allowable uniform uplift load capacity shall be determined in accordance with ASTM E 1592. The factor of safety against ultimate failure of the panel, batten, or clip shall be 1.65, with no increase for wind permitted. Allowable uplift capacity for conditions of gauge, span, or loading other than those tested may be determined by interpolation of the test results. Extrapolation of conditions outside the range of the test will not be permitted.

d. Metal roof panel system shall be successfully tested in accordance with UL 580 and shall maintain a minimum Class 90 uplift rating.

e. Metal roof panel system shall be successfully tested in accordance with FM 4471 for Class 1 approval with a 1-90 windstorm classification and a 1-SH hail storm classification.

f. Metal roof panel system shall withstand a 250-lb concentrated load applied to a 4-square-inch (10-square-centimeters) area at the center of the panel at mid-span between supports with no panel deformation, rib buckling, or panel side lap separation which will adversely affect the weather integrity of the system.

g. Metal roof panels shall be thermal cycle tested a minimum of 100,000 cycles with a minimum of 1-inch (25 mm) of movement relative to the clip anchor. Panel and clips shall show that the wear will not affect structural performance or weather integrity of the system.

1.5 SPECIAL WARRANTY PROVISIONS

A. Material Warranty: The Manufacturer shall warrant that the materials and accessories furnished in accordance with these specifications shall remain free from defects for a period of 1 year from date of shipment.

B. Installation Warranty: At the time of Substantial Completion, the Manufacturer shall warrant that the installation is not defective in and conforms to the Manufacturer's erection drawings, except for reasonable variances not impairing the usefulness thereof.

C. Finish Warranty: The Manufacturer shall warrant against spalling, fading, chalking, peeling, cracking, checking, chipping, or erosion to base metal of the exterior panel finish, for a period of 10 years from the date of Substantial Completion. The finish shall not change color more than eight NBS units for a period of 10 years from the date of Substantial Completion.

D. Weathertight Warranty: Manufacturer shall provide a weathertight warranty against water penetration of the metal roof and soffit panel system, including panel joints and trim conditions for a period of 20 years from date of Substantial Completion.

E. In the event that any panel fails to meet the warranty standards above, the Manufacturer shall, at the Manufacturer's sole cost (including labor and materials), replace or repair the panels, as agreeable to the OWNER throughout the term of the warranty.

F. The CONTRACTOR shall furnish separate, but concurrently running, 5 year written warranty to cover installation and associated labor.

G. The term of the warranties shall begin on the date of Substantial Completion, unless otherwise indicated.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Structural Requirements:

1. Metal roof and soffit panels, including system support framing, accessories, related assemblies, components, appurtenances, and attachment details shall comply with the Florida Building Code requirements and shall be designed and installed for resistance to the structural design criteria indicated in the Contract Documents in accordance with the CODE. Where a conflict occurs between the requirements of this Section and the CODE, the more stringent shall apply.

2. Metal roof and soffit panels shall have a UL Class 1A-90 rating and meet the requirements for wind uplifts resistance UL 580. Roof assembly shall be designed to withstand wind CODE criteria and Florida Product Approvals.

3. The CONTRACTOR shall provide additional non-standard bracing, system support framing members, reinforcements, anchors, and heavier gauge materials in order to conform to the structural design criteria indicated and to other performance requirements indicated.

4. Metal roof and soffit panels, system support framing, including accessories, shall be manufactured and installed to maintain the specified performance requirements, under the structural design criteria indicated, without defects, damage, or failure.

B. Thermal Movements: Metal roof and soffit panel system, including system support framing and accessories, shall be designed to provide for such expansion and contraction of component materials as will be caused by temperature changes without causing buckling, stresses on other cladding components, failure of joints, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other visual or technical detrimental effects.

2.2 METAL ROOF PANELS

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal.

a. Centria Architectural Systems; Structural Standing Seam – SRS 3-1.5, 16.

B. Description:

1. Metal roof panels shall be 16 inches wide (406 mm), structural standing seam metal roof system with minimum 3-inch (76 mm) high, “T” shaped, vertical seam side joint, mechanically seamed with factory-applied sealant. Provide metal roof panels with longitudinal stiffening planks to minimize the effects of “oil canning.”

2. Metal roof panels shall be fabricated from zinc-coated steel conforming to ASTM A 653 SQ Grade 37 with G90 coating. Material shall be minimum 20-gauge with flat smooth surface texture.

3. Separate panel battens shall be fabricated in the same material, gauge, finish, and length as the panels with factory applied sealant, unless otherwise indicated.

4. Metal roof panel system shall be attached to the system support structure with concealed anchor clips designed to allow for thermal movement of the panels. There shall be no exposed fasteners except at panel fixing locations and flashing details.

5. Continuous preformed closed cell neoprene foam sheet shall be provided to seal between the system support framing and the panel system. Sheets shall be 1/8-inch (3.2-mm) thick by 5-inches (127-mm) wide and continuous.

6. Roll-forming of metal roof panels at the Site shall be performed with Manufacturer-owned and operated industrial type rolling mill having a minimum of 12 stands to gradually shape the sheet metal. Installer-owned or rented roll-formers are not acceptable.

7. Metal roof panels shall be formed by continuous end-rolling method providing uniformity of cross-section across panels.

8. Metal roof panels shall be fabricated in full lengths from ridge to eave without end laps.

9. Metal roof panel battens shall be mechanically seamed with a field-operated electric seaming machine provided by the Manufacturer.

2.3 METAL WALL PANELS

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal.

a. **Centria Profile Series; Exposed Fastener Profiles BR5-36, Vertical.**

B. Description:

1. Metal wall panels shall be fabricated from zinc-coated steel conforming to ASTM A 653 SQ Grade 37 with G90 coating. Material shall be minimum 20-gauge (0.91 mm) with flat smooth surface texture.

2. Metal Wall panel depth shall be 1½ inch (38 mm) and 36-inches (914 mm) wide. Length of panel shall be continuous, single length for the entire height of wall panel indicated.

3. Both exterior and interior face sheets of factory-assembled panels shall receive a factory-applied plastic strippable coating to protect finishes during shipping and handling.

4. Metal wall panel face and liner elements shall be roll formed for consistency of shape and joinery.

5. Metal wall panels shall be fabricated in lengths for full vertical wall height coverage. Horizontal seams, splices, or laps will not be acceptable.

2.4 SOFFIT PANELS

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal.

a. **Centria Architectural Systems; Profile IW Series, IW-10A.**

B. Description:

1. Soffit panels shall be 12-inches wide (305 mm), 1 1/2-inches deep (38 mm), 22-gauge, G90 galvanized steel, with concealed fastener, lock-joint design. Panels shall be flush, flat smooth surface texture, unless otherwise indicated.

a. Provide ventilated soffit panels, consisting of 10 percent perforated open area, uniformly spaces holes per panel. Ventilated panels shall be provided in sufficient quantities to account for 20 percent of total soffit panel area. Ventilated panels shall be installed uniformly throughout soffit panel distribution area.

b. Provide non-ventilated soffit panels only where specifically indicated on the Contract Drawings.

2.5 SYSTEM SUPPORT FRAMING

A. General:

1. System support framing includes cold-formed metal support framing members, connections, fasteners, and appurtenances required to secure the metal wall, roof and soffit panels and appurtenances to the primary structural members and/or to load bearing elements or substrates. System support framing includes, but is not limited to: metal studs, channels, tubes, angles, posts, girts, sub-girts, rods, or other shapes as required.

2. System support framing sizes, quantities, spacing, profiles, and shapes on the Contract Drawings are for illustrative purposes only. System support framing shall be determined by the metal wall, roof and soffit panel system professional engineer licensed in accordance with local engineering licensing laws.

    a. The design of the system support framing shall maintain the intent of the Contract Drawings (as determined by the ENGINEER), and in order to maintain the relationship of the metal wall, roof and soffit panels to other building materials as indicated, may require custom fabricated units.

2.6 ACCESSORIES AND APPURTENANCES

A. General:

1. Accessories shall be suitable for, and compatible with, the metal roof and soffit panels, system support framing, and with other system accessories and appurtenances.

2. Preformed metal closures, trim pieces, flashings, sheets, clips, and associated appurtenances shall be as indicated or as otherwise required for weather tightness or completeness, and shall be of the same material, color, and finish as the adjacent panels, unless otherwise indicated.

    a. The minimum face dimensions between flashing breaks shall be 12 inches (305 mm). Thermal expansion of exposed items more than 24 feet (7.3 m) in continuous length shall be accommodated and watertight expansion joints shall be provided at approved locations.

    b. Expansion joints shall be fabricated as approved of materials to match the flashing.

    c. Flashing and trim shall be minimum 20-gauge, formed, extruded metal fabricated with the same finish and color as the exterior face of the adjacent panels, unless otherwise indicated.

B. Roof Underlayment: Shall be one (1) layer of asphalt-saturated, unperforated, 30-lb non-asbestos felt conforming to ASTM D226, Type I.

C. Clips: Concealed anchor clips shall be one piece, 16-gauge, ASTM A 653, G90 galvanized steel, designed to accommodate unlimited, unimpeded panel movement, or 2 piece with 16-gauge G90 galvanized steel top piece and 16-gauge G90 galvanized steel bottom piece designed to accommodate a 3 inch (76 mm) movement range, as determined by the requirements indicated.

D. Fasteners:

1. Concealed anchor clip screws shall be minimum No. 14, self-tapping, hex head type, corrosion resistant finish, with 5/8-inch (16 mm) diameter combination steel and neoprene washers.

2. Exposed screws, where allowed, shall be minimum No. 14 diameter, 316 series stainless steel, self-tapping, hex head with 5/8-inch (16 mm) bonded neoprene and 316 series stainless steel washers. Screws and washers shall be coated with finish and color to match the exterior panel color.

3. Concealed screws shall be minimum No. 14, self-tapping, carbon steel with hex head and corrosion resistant coating.

4. Structural bulbed rivets shall be minimum 3/16-inch (4.8-mm) diameter, standard dome head, aluminum rivet and mandrel, with a weather tight EPDM washer under the head. Rivets shall be painted to match panel color.

5. Exposed exterior fasteners and washers shall match the finish and color of trim and panels.

E. Closures: Closures shall be provided as required for a complete system. Closures shall be combination pre-molded, pre-cut, closed-cell foam neoprene and/or sheet metal to fit the contour of the panels. Metal closures shall be fabricated from the same material, gauge, finish, and color as the exterior metal panel. Ridge closures shall be factory fabricated to panel width. Hip closures shall be cut to length in the field.

F. Sealants:

1. Factory applied side lap sealant shall be a one part, non-skinning, non-drying, synthetic butyl elastomer.

2. Field applied hidden sealant at side laps, end laps, and flashing details shall be gun grade non-skinning butyl elastomer or polymeric non-skinning butyl tape to ensure weather tightness.

3. Exposed sealant shall be as one-part moisture curing, gun grade polyurethane as recommended in writing by the Manufacturer. Color shall match adjacent panels as approved by ENGINEER. Provide custom color as required.

G. Thermal Spacers: Thermal spacers shall be composite metal channel with foam insert.

H. Gutters and Downspouts:

1. Gutters and downspouts shall be of the profile and configuration indicated, 18-gauge, and of same material, finish, as the metal roofing panels.

a. The color of gutters and downspouts shall match the adjacent masonry or flashing to which they are fastened, unless otherwise indicated.

b. Where gutters and downspouts span multiple materials, the portion of the gutter and downspouts shall match each adjacent material respectively.

c. Gutters and downspouts shall be fabricated with lines and corners of exposed units true and accurate. Exposed faces shall be formed flat and free of buckles, excessive waves and tool marks. Uniform neat seams shall be folded back to form a hem on the concealed side of exposed edges.

d. Strainer units at the gutter outlets shall be provided from No. 4 stainless steel screen with 0.35 wires.

e. Adequate fasteners, supports, and straps shall be provided to support the configurations and lengths indicated.

f. Gutters shall be continuous in length where applicable. Thermal expansion and contraction of items more than 15 feet (4.6 m) continuous length shall be accommodated and watertight expansion joints shall be provided at approved locations. Expansion joints shall be fabricated of the same materials, finish, and color to match the associated gutter and/or downspout.

g. Gutters and downspouts shall be designed, fabricated, and installed as indicated, in accordance with Manufacturer's written instructions, and in compliance with SMACNA and NRCA standard practices.

I. Flashing:

1. Flashing and penetration details shall be designed, fabricated, and installed as indicated, in accordance with Manufacturer's instructions, and in compliance with SMACNA and NRCA standard roofing practices.

a. Flashing shall be provided for penetrations. Provide penetration enclosures, including hot pipe penetrations, to be weathertight. Coordinate locations of protruding pipes.

2. Pipe Flashings:

a. Pipe Flashings shall be pre-molded EPDM rubber with metal collar.

b. Pipe flashing shall be **ITW Buildex; DEKTITE**, or equal.

2.7 FINISH AND COLOR

A. Unless otherwise indicated, interior and exterior panel surfaces, and surfaces of accessories, shall be factory finished consisting of 0.8-mil (0.02 mm) primer with 0.8-mil (0.02 mm), 70 percent **Kynar 500 color coat** and 0.8-mil (0.02 mm), 70 percent **or Kynar 500 clear coat**.

1. Finish shall be Centria Architectural Systems; Duragard Plus 3-coat Coating System, or equal.

2. Finish shall be applied by coil coating the flat stock, primer both sides of panel and all around.

3. Finish shall comply with the following minimum criteria:

Total Coating Thickness (ASTM D 4128-94)	2.4 mils (0.06 mm)
Flexibility (T-Bend) (ASTM D 4145)	1T, no cracking or tape removal of film
Abrasion (ASTM D 968)	290 liters minimum
Humidity (ASTM D 4585)	No color change (1500 hours)
Kesternich (ASTM G 87)	No color change, no blisters (30 cycles)
Salt Fog (ASTM B 117)	No creepage, no blisters in field (1000 hours)

4. Color shall be selected and approved by the ENGINEER from Manufacturer's full color range including custom colors, and may be required to exactly match other building components, as determined by the ENGINEER.

a. Tentative color selection: Color shall exactly match colors indicated below, as selected and approved by the ENGINEER.

Metal Roof Panels	
Exterior:	To Be Selected
Interior:	310 Bone White
Metal soffit panels:	To be Selected

b. The OWNER reserves the option of changing this tentative color selection during the submittal process.

c. Color shall be uniform with no variation in shade, and panels of different color batches will not be acceptable.

2.8 FABRICATION

A. The CONTRACTOR shall field verify size, location, and placement of metal roof and soffit panels, system support framing, and appurtenances, shall advise the ENGINEER in writing of any necessary adjustments, and shall make the necessary adjustments prior to fabrication. The CONTRACTOR shall coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments.

1. Metal roof panels and soffit panels shall be prefabricated in full lengths.

2. Spliced panels will not be accepted.

3. Panels and panel components shall be fabricated in the factory for field assembly to the greatest extent possible.

B. Accurate relation of planes and angles shall be maintained, with hairline fit of contacting members.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

1. Materials shall be delivered to Site in a dry and undamaged condition and unloaded per the Manufacturer's instructions. The installer shall inspect materials for damage and stains upon arrival to the Site.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

1. Storage shall be in a manner that will prevent damage or marring of the finish. Materials shall be stored out of contact with the ground in weathertight coverings to keep them dry per the Manufacturer's recommendations. Storage accommodations shall provide good air circulation and protection from surface staining.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.3 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. The CONTRACTOR shall inspect materials for damage and shall confirm conformance with these Specifications, erection drawings, and Shop Drawings prior to installation.

C. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

D. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where metal roof and soffit panels, system support framing, and appurtenances will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed metal panels and appurtenances.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of metal wall, roof and soffit panels, system support framing, and appurtenances. Coordinate delivery with other WORK to avoid delay.

b. Prior to installing the metal roof and soffit panels, the CONTRACTOR and the metal panel installer shall verify final alignment of the system support framing to be in compliance with these specifications with the Contract Drawings, with the erection drawings, and with the Shop Drawings.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR's acceptance of the substrate, areas, and conditions.

E. Metal Roof and Soffit Panels:

1. Do not install roofing until the structure is ready for roofing.

a. Supports shall be in place and bracing and connections tightened before WORK proceeds.

b. Dimensions and support alignment shall be checked with a taut string or wire. Panel misalignment may induce “oil canning” and potentially restrict panel movement.

1) Panel maximum out-of-plane deviation shall be limited to plus or minus 3/16-inch (4.8 mm) from control.

2) Maximum deviation between adjacent panel clips shall be limited to 1/8-inch (3.2 mm) or L/500, whichever is less.

3.4 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.5 INSTALLATION

A. General:

1. Installation shall comply with the requirements of the Contract Documents, with applicable references, with NRCA, with the requirements of the CODE, and with Manufacturer’s written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

2. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

3. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

a. Paint, bituminous coating, or sealant as recommended by the metal panel Manufacturer shall separate dissimilar metals.

4. Horizontal lines shall be level, and vertical lines shall be plumb.

5. Manufacturer shall provide detailed instructions covering the tools, fasteners, sealants, gaskets, and procedures required to assure performance of the metal panel assembly.

6. WORK shall be coordinated as required to insure proper flashing and seals to adjoining construction.

7. Install metal roof and soffit panels in one continuous length, without horizontal seams, joints or laps.

B. Roof Panels:

1. Install hand-crimp battens at each clip. Panels must be hand-crimped before workers can stand on the panels.

2. Seam panels and battens together with portable electric seaming machine supplied by the Manufacturer.

3. The installer shall provide walk boards in heavy traffic areas to prevent damage to the panels.

3.6 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, metal roof and soffit panels and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, as determined by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

C. Metal roof and soffit panels, accessories and appurtenances, shall be protected from damage from subsequent construction operations.

D. The CONTRACTOR shall make adjustments required until accepted.

E. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

F. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

G. When metal roof and soffit panel WORK is completed, remove unused materials, containers, and equipment, and clean the Site of metal roof and soffit panel debris.

- END OF SECTION -

SECTION 079213 – SEALANTS AND CAULKING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide sealants and caulking and appurtenant WORK, complete and in place in accordance with the Contract Documents.

B. The CONTRACTOR shall coordinate color samples with other Sections through the submittal process, as required by the ENGINEER.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Society for Testing and Materials (ASTM):

ASTM C 920	Elastomeric Joint Sealants
ASTM D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

C. Sealant, Waterproofing, and Restoration Institute (SWRI).

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions, and the following:

1. Joint width and depth tables.

2. Manufacturer's full range color charts, indicating custom color availability, for color selection by the OWNER.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification by the Manufacturer that the sealant and caulking, including compressible filler and joint backing, is suitable for, and compatible with, the required installation.

2. Certification by the Manufacturer that the sealant and caulking, including compressible filler and joint backing, is suitable for, and compatible with, the substrates and surfaces indicated.

3. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

5. Certification by the Manufacturer's technical field representative that surfaces have been prepared and the products have been applied in accordance with the Manufacturer's recommendations.

6. Certification from an independent testing laboratory that the submitted materials meet the requirements of the references indicated.

7. When requested by the ENGINEER, furnish other certifications as may be required to demonstrate compliance with the Contract Documents.

E. Application Schedule: Furnish a detailed and complete application schedule indicating location and detail of installation.

F. Samples**:** When requested by the ENGINEER, submit samples of the materials proposed. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Sealants and Caulking shall be provided by a single Manufacturer, each.

B. Manufacturer Qualifications:

1. Sealants and caulking Manufacturer shall have a minimum of 20 years of sealants and caulking manufacturing experience.

2. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

D. Manufacturer's Technical Field Representative: The CONTRACTOR shall arrange for a Manufacturer's technical field representative to be on Site for at least 1 day, beginning at the start of surface preparation and continuing through application, to train the installers and to supervise the WORK. The Manufacturer's technical field representative shall observe as necessary to certify in writing that the completed WORK has been performed according to the Manufacturer's instructions.

E. Sealant and caulking WORK shall comply with the following references:

1. SWRI
2. ASTM C 920

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish Manufacturer's 5-year written warranty to cover defects in materials, products, and manufacturing workmanship.

B. The CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover labor.

C. Warranties shall be non-prorated for the entire warranty period.

D. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Sealant and caulking, including compressible filler and joint backing, shall be recommended by the Manufacturer for the installation indicated.

B. Sealant and caulking, including compressible filler and joint backing, shall be suitable for, and compatible with, the required installation.

C. Sealant and caulking, including compressible filler and joint backing, shall be suitable for, and compatible with, the substrates and surfaces indicated.

D. Refer to Section 033200 – Joints in Concrete for joint treatment in concrete hydraulic structures.

E. Colors for sealants and caulking above grade and exposed to view shall be selected by the Owner from Manufacturer's full color range, including custom colors.

2.2 INTERIOR AND EXTERIOR SEALANTS (HORIZONTAL OR SLOPED PLANES)

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

a. **Sonneborn**, a Division of **BASF; Sonolastic SL2**, including primer as recommended by Manufacturer.

B. Description: Two part, pour grade polyurethane base, ASTM C 920, Type M, Grade P, Class 25, Use T, NT, M, A, and I.

2.3 INTERIOR AND EXTERIOR SEALANTS (VERTICAL PLANE)

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

    a. **Sonneborn,** a Division of **BASF; Sonolastic NP2**, including primer as recommended by Manufacturer.

B. Description: Multi-component, gun grade, polyurethane ASTM C 920, Type M, Grade NS Class 25, Use NT, T, M, A, G, and O.

2.4 COMPRESSIBLE FILLER

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

    a. **Sandell Manufacturing Co., Inc., Polyseal.**

B. Description:

1. Compressible filler shall be an impregnated preformed compressible sealant, produced by combining permanently elastic, high density open cell, polyurethane foam with stabilizing acrylics. Compressible filler shall be supplied pre-compressed in a tape form with a PSA on one side.
2. Compressible filler shall be compatible with sealant Manufacturer's product and shall not stain the sealant nor the materials to which applied.

2.5 JOINT BACKING (BACKER ROD)

A. Description:

1. Joint backing for joints in superstructure shall be approved, resilient, closed cell polyethylene rods of diameters to suit joint conditions. Joint backing shall comply with ASTM D 1752, Type II or III.
2. Where joint depth will not allow for a rod and still provide 3/8-inch (9.5 mm) minimum depth of sealant, provide approved bond breaker tape at the bottom of the joint.
3. Joint backing shall be compatible with sealant Manufacturer's product and shall not stain the sealant nor the materials to which applied.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 APPLICATION SCHEDULE

A. Joints noted as “caulk,” “caulking,” or “sealant” shall be caulked as specified herein.

B. Joints to be caulked or sealed include through-bolt holes, door frames, louver and ventilator frames, joints between openings where items pass through exterior walls, concrete masonry, or combination of these surfaces, and as otherwise indicated or required for watertightness, weatherproofing, or airtightness.

1. Sealants and caulking shall be provided at both exterior and interior surfaces of exterior wall penetrations.

C. Sealants and caulking shall be provided at exterior wall joints, between adjacent materials, joints between frames or louvers and adjacent materials, copings, caps, sills, masonry control joints, and other joints and penetrations indicated or required for the completion of the WORK.

D. Sealants and caulking shall be provided at interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete, floor joints in tile, joints in rooms to be airtight, and other joints and penetrations on the Contract Drawings or as required for the completion of the WORK.

E. Sealants and caulking shall also be installed elsewhere, where indicated on the Contract Drawings.

3.3 PROJECT CONDITIONS

A. Comply with Manufacturer’s written instructions, and referenced standards, for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where sealants and caulking will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed sealants and caulking.

a. Surfaces to receive sealants and caulking, including compressible filler and joint backing, shall be dry, free of oil, dirt, dust and other contaminants and loose materials, and shall be in the proper condition as indicated by the Manufacturer prior to the application of the sealant and caulking materials.

b. Masonry, concrete, and cementitious products shall have been completely cured and the surface shall be dry and free from frost at the time of application.

c. Joint shapes and sizes shall be as indicated. Where not indicated, joint shapes and sizes shall be as necessary for job conditions, as directed by the ENGINEER.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR's acceptance of the substrate, areas, and conditions.

3.5 SURFACE PREPARATION

A. Surface preparation shall be in compliance with the applicable references and with the Manufacturer's written instructions.

B. Coatings, including curing compounds, form release agents, and other substances shall be removed as recommended by the sealant and caulking Manufacturer.

C. Protrusions, bumps, ridges, and loose substrate surface materials shall be removed by sanding or grinding.

D. Laitance, efflorescence, and loose mortar shall be removed from the joint cavity.

E. Ferrous metal surfaces shall be cleaned of rust, mill scale, and other coatings by wire brush, grinding, or sandblasting.

F. Protective coatings shall be removed from surfaces to receive sealants and caulking.

1. Solvents used to remove protective coating shall be as recommended by the sealant and caulking Manufacturer, shall be compatible with the adjacent materials and surfaces, shall not damage adjacent finishes, and shall be non-staining.

G. Bituminous or resinous materials shall be removed from surfaces to receive sealants and caulking.

H. Immediately before application of sealant and caulking materials, scrape surfaces to be covered free from foreign materials and brush clean.

I. Substrate shall be swept to remove all loose materials prior to beginning sealant and caulking installation.

3.6 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.7 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, and with Manufacturer's written instructions. Where a conflict

occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. Primer, if recommended by the Manufacturer for the application, shall be applied per the Manufacturer's recommended procedures.

1. Primer shall be used on concrete masonry units, wood, or other porous surfaces in accordance with instructions furnished with the sealant. Primer shall be applied to the joint surfaces to be sealed. Surfaces adjacent to joints shall not be primed.

C. Multi-component sealants shall be mixed according to Manufacturer’s printed instructions. Sealant in guns shall be applied with a nozzle of proper size to fit the width of joint. Sealant shall be installed to the required depth without displacing the backing. Unless otherwise indicated or recommended by the Manufacturer, the installed sealant shall be tooled so that the surface is uniformly smooth and free of wrinkles and to assure full adhesion to the sides of the joint. Sealants shall be installed free of air pockets, foreign embedded matter, ridges, and sags. Sealer shall be applied over the sealant if recommended by the sealant Manufacturer.

D. Sealant depth in joints shall be half of the width of joint, but not less than 1/8-inch (3.2 mm) deep and 1/4-inch (6.4 mm) wide nor more than 1/2-inch (12.7 mm) deep and one-inch wide (25.4 mm). For joints greater than 1-inch (25.4 mm) wide, provide sealant in a 2 to 1 width-to-depth ratio.

E. Joints shall have a rigid filler material installed to proper depth prior to application of sealant.

F. Masking film shall be placed on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Masking shall be removed as soon as possible after joint has been filled and tooled.

G. Backing shall be installed to provide the indicated sealant depth. The installation tool shall be shaped to avoid puncturing the backing.

H. Bond-breaker shall be applied to fully cover the bottom of the joint without contaminating the sides where sealant adhesion is required.

I. A full bead of sealant shall be applied into the joint under sufficient pressure, with the nozzle drawn across sealant, to completely fill the void space and to ensure complete wetting of contact area to obtain uniform adhesion. During application, the tip of the nozzle shall be kept at the bottom of the joint thereby forcing the sealant to fill from the bottom to the top. Sealants shall be tooled immediately after exposure with a caulking tool or soft bristled brush moistened with solvent. The finished sealant-filled joint shall be slightly concave unless otherwise indicated.

3.8 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

3. The surfaces of materials adjoining caulked joints shall be cleaned free of smears of sealant or other soiling due to caulking operations.

B. Sealants and caulking shall be protected from damage from subsequent construction operations.

C. The CONTRACTOR shall make adjustments required until accepted.

D. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

E. When sealant and caulking WORK is completed, remove unused materials, containers, and equipment, and clean the Site of sealant and caulking debris.

- END OF SECTION -

SECTION 084113 – ALUMINUM DOORS AND FRAMES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide aluminum doors and frames and appurtenant WORK, complete, in place, and operational in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. Aluminum Association.

C. American National Standards Institute (ANSI).

D. American Society for Testing and Materials (ASTM):

ASTM B 209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials

E. Building Code: Refer to the Drawings to determine which Building Code applies. The applicable Building Code, defined by the Drawings, is referred to herein as “the CODE.”

F. Federal Specifications:

FS HH-I-529b	Insulation Board, Thermal (Mineral Aggregate).
FS HH-I-530	Insulation Board, Thermal (Urethane).

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer’s specifications, technical data, installation methods, and maintenance instructions.

C. Certifications:

1. Certification by the aluminum door and frame Manufacturer that the aluminum doors and frames provided are suitable for, and compatible with, the required installation.

2. Certification of compliance with the requirements of paragraph 2.1.A.

3. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer’s

products, and contact information of the consultant firm of record, general contractor and owner.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

5. Certification that materials and construction requirements will be met in the final installation.

6. When requested by the ENGINEER, furnish other certifications as may be required to show compliance with the Contract Documents.

D. Shop Drawings: Complete Shop Drawings showing location and detail of installation.

1. Shop Drawings shall be drawn to sufficient scale and shall include dimensions, show elevations and details of construction of each door and frame type, schedule of doors and frames, frame elevations and details, location and installation requirements for hardware, thickness of materials, joints, provisions for expansion and contraction, connections, accessories, and trim. Shop Drawings shall show installation conditions at openings with various wall thickness and materials.

2. Include details of core and edge construction, through-door louvers, vision panels, and trim for openings.

E. Samples**:** The CONTRACTOR shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. 6 inches (152 mm) by 6 inches (152 mm) frame corner construction.

2. 6 inches (152 mm) by 6 inches (152 mm) door panel construction, including glazing provisions, as required.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Aluminum doors and frames shall be provided by a single Manufacturer.

B. Manufacturer Qualifications:

1. Aluminum door and frame Manufacturer shall have a minimum of 20 years of aluminum door and frame manufacturing experience.

2. Aluminum door and frame Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Structural Requirements:

1. Aluminum doors and frames, including related assemblies, components, and attachment details shall comply with the CODE and shall be designed and installed for resistance to the structural design criteria indicated in the Contract Documents in accordance with the CODE. Where a conflict occurs between the requirements of this Section and the CODE, the more stringent shall apply.

2. The CONTRACTOR shall provide additional non-standard bracing, reinforcements, anchors, and heavier gauge materials if required to conform to the structural design criteria indicated and to other performance requirements indicated.

B. Aluminum Alloy for Doors and Frames**:** ASTM B 221, alloy 6063-T5 for extrusions. ASTM B 209, alloy and temper best suited for aluminum sheets and finish required.

C. Refer to Section 087100 – Door Hardware, for door hardware to be provided for Aluminum Doors and Frames.

2.2 ALUMINUM DOORS

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

a. **AluTech Corporation; Series 290I Flush Aluminum Door** modified by the Manufacturer with custom upgraded features as required to comply with the specification.

B. Description:

1. Aluminum flush doors shall be 1¾ inches (44.5 mm) thick, flush design, constructed with extruded aluminum alloy 6063-T5 tubular jamb rails 0.125-inch (3.18 mm) lock side, 0.190-inch (4.8 mm) hinge side) and minimum 0.090-inch (2.29 mm) thick smooth aluminum alloy 5005-H34 face sheets.

2. Door Edge: Door edges shall have rigid aluminum subframe with integral edge caps. No snap-on or applied door edge at hinge or lock edge.

3. Sub-Frame: Aluminum sub-frame shall be 1 3/8 inches (35 mm) x 4½ inches (114 mm) 6063-T5 tubular aluminum with a 1 3/4-inch (44.5 mm) integral edge cap at hinge and lock side with an applied edge cap top and bottom to insure proper protection from the weather. Sub-frame shall be connected by a 3/8-inch (9.5 mm) cadmium plated steel tie rod top and bottom. Overall door tolerance shall be plus or minus 1/16-inch (1.6 mm). Extrusion tolerances shall be as set by the American Aluminum Manufactures Association.

4. Insulated core: All voids between sub-frames shall be filled with an isocyanurate rigid foam board with a minimum R-value of 9. Core shall be laminated between two sheets of 1/8-inch (3.2 mm) tempered hardboard for impact reinforcing. Tempered hardboard shall be the same size as face sheets.

5. Face Sheets: Face sheet shall be one piece 0.090” (2.3 mm) smooth aluminum of anodizing quality with a minimum tensile strength of 22,000 psi. Face sheets shall be concealed under 1/2-inch (13 mm) edge cap full perimeter.

6. Lamination: Sub-frame, insulated core, hardboard and face sheets shall be bonded together with a thermosetting two-component epoxy adhesive under 110 lbs (49.9 kG) pressure to form a water, heat, and chemical resistant bond.

2.3 ALUMINUM FRAMES

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

a. **AluTech Corporation; Frame FR450A.**

B. Description**:**

1. Material: Frame members shall be made of 6063-T6 extruded aluminum alloy with minimum yield strength of 28,750 pound per square inch (mm). All screws and miscellaneous fasteners shall be stainless steel, or other corrosion resistant material.

2. Frames shall be 0.125-inch (3.18 mm) minimum wall thickness, extruded tubular 5 aluminum with pile weather-stripped doorstops. For interior installations, punch single leaf frames to receive 3 silencers. Double leaf interior frames shall receive one silencer per leaf at head.

3. Aluminum door frames shall be 1¾ inches (44.5 mm) x 5¾ inches (146.1 mm) open back with an applied door stop.

4. Frame joints and components shall be factory milled and fitted to hairline cracks. Corners shall be mechanically joined with interlocking 3/16-inch (4.8 mm) wall, aluminum channel clips and flat head stainless steel screws.

5. Construction: Frame shall be squared cut to provide neat hairline joints. Jambs and header shall be fastened with stainless steel screws. All frames shall be mortise for hinges and lock strike plates. Surface mounted hardware shall be drilled and tapped in the field. Hinge, lock and strike reinforcing plate shall be made of 1/4-inch (6.4 mm) aluminum plate.

6. Frames shall be completely fabricated and reinforced for hardware as specified in Section 087100 – Door Hardware.

2.4 PROVISIONS FOR HARDWARE

A. Hardware templates and hardware shall be delivered to the door manufacturer for use in fabrication of aluminum doors and frames. Cut, reinforce, drill, and tap down and frame in accordance with hardware manufacturer's recommendations. Surface-applied hardware, push plates, kick plates, and mop plates shall be drilled and tapped in the field. Provide hinge reinforcements of 1/4-inch (6.4 mm) aluminum flat bar and secure to door edge or frames with stainless steel machine screws.

1. Coordinate additional requirements for required hardware with Specification Section 087100 – Door Hardware.

2. Door Hardware Reinforcement:

a. Components shall be reinforced for hardware installation in accordance with ANSI.

1) Doors shall be completely reinforced for and shop fabricated to receive all specified hardware. Reinforcement shall be 6061-T6 alloy, 0.250-inch (6.35 mm) thick, minimum.

2.5 FINISH AND COLOR

A. All exposed aluminum doors and frames shall be chemically cleaned of all fabricating oils and foreign materials and be given an anodic finish. Finish shall be 313 dark bronze anodize, designation AA-M10-C22-A31, Architectural Class II (0.7 Mil).

2.6 FABRICATION

A. The CONTRACTOR shall field verify size, location, and placement of doors and frames, shall advise the ENGINEER in writing of any necessary adjustments, and shall make the necessary adjustments prior to fabrication. The CONTRACTOR shall coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments.

B. Doors and frames shall be fabricated to be rigid, neat in appearance, and free from defects, including warping, cupping, buckling, or other defects. Metal shall be accurately formed to required sizes and profiles.

C. Doors and frames shall be fit and assembled in the Manufacturer's plant.

D. Doors and frames shall be prepared to receive mortised and concealed door hardware, including cutouts, reinforcing, drilling, and tapping in accordance with final Door Hardware Schedule and templates provided by hardware supplier, and as indicated in the Contract Documents.

1. Comply with applicable requirements of ANSI for preparation for hardware on doors and frames.

2. Include thru-bolting holes as required per hardware template.

3. Do not include unnecessary cutouts in door faces not required by hardware template.

E. Doors and frames shall be reinforced to receive surface-applied hardware. Drilling and tapping for surface-applied door hardware may be done at Site.

F. Fasteners**:** All screws and miscellaneous fasteners shall be stainless steel, or other corrosion resistant material.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

1. Aluminum doors and frames shall be shipped and stored with temporary stiffeners and spacers in place to prevent distortion.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.3 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where doors and frames will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed doors and frames.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of aluminum doors and frames. Coordinate delivery with other WORK to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR's acceptance of the substrate, areas, and conditions.

3.4 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.5 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, with the requirements of the CODE, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

C. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

1. Protection from Dissimilar Materials:

a. Dissimilar Metals:

1) Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or small areas of white bronze, the CONTRACTOR shall protect from direct contact by one or a combination of the following methods:
a) Paint the dissimilar metal with one coat of heavy- bodied bituminous paint.
b) Apply a good quality caulking material between the aluminum and the dissimilar metal.
c) Use a non-absorptive tape or gasket in permanently dry locations.

b. Masonry and Concrete:

1) The CONTRACTOR shall provide aluminum surface in contact with mortar, concrete, or other masonry materials with one coat of heavy-bodied bituminous paint.

D. The CONTRACTOR shall block and reinforce walls as required to support the Aluminum Doors and Frames and appurtenances.

E. Setting Masonry Anchorage Devices: Provide masonry anchorage devices where required for securing frames to in-place concrete or to existing masonry construction. Set anchorage devices opposite each anchor location, in accordance with details on Shop Drawings and anchorage device Manufacturer's instructions.

F. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

G. In new masonry construction, coordinate frame setting to occur after the building of masonry walls. Provide the required anchors.

H. At in-place concrete or masonry construction, set frames and secure in place with the required anchors.

I. Remove spreader bars only after frames or bucks have been properly set and secured.

3.6 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, doors and frames and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

C. Adjusting and cleaning shall consist of ensuring smooth operation, lubricating and testing the doors and frames.

1. Doors and frames shall operate smoothly, quietly, and without squeaking and binding.

D. Doors and frames shall be protected from damage from subsequent construction operations.

E. The CONTRACTOR shall make adjustments required and retest until accepted.

F. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

G. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

1. Remove and replace defective WORK, including doors or frames that are warped, bowed, or otherwise unacceptable.

2. When door and frame WORK is completed, remove unused materials, containers, and equipment, and clean the Site of door and frame debris.

- END OF SECTION -

SECTION 085113 – ALUMINUM WINDOWS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide aluminum windows and appurtenant Work, complete and in place, in accordance with the Contract Documents.

B. CONTRACTOR shall coordinate color samples with other Sections through the submittal process.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Architectural Manufacturer's Association (AAMA):

AAMA 2605	Voluntary Specification, Performance Requirements, and Testing Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels
AAMA 1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections

C. American National Standards Institute (ANSI):

ANSI A 117.1	Accessible and Useable Buildings and Facilities

D. American Society for Testing and Materials (ASTM):

ASTM A 36	Structural Steel
ASTM B 209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
ASTM B 308	Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded
ASTM C 509	Cellular Elastomeric Pre-formed Gasket and Sealing Material
ASTM C 864	Dense Elastomeric Compression Seal Gaskets, Setting Blocks and Spacers
ASTM E 283	Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen

ASTM E 330 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference

ASTM E 331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

E. American Welding Society (AWS).

F. Building Code: Refer to the Drawings to determine which Building Code applies. The applicable Building Code, defined by the Drawings, is referenced herein as the CODE.

G. Federal Specification (FS):

FS TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type

H. Society for Protective Coatings (SSPC):

SSPC Paint 12 Cold-Applied Asphalt Mastic (Extra Thick Film)

I. Flat Glass Marketing Association (FGMA) Glazing Manual.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions, and the following:

1. Manufacturer's full-range color charts, indicating custom color availability for color selection by the OWNER.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification by the aluminum window manufacturer that the aluminum windows provided are suitable for, and compatible with, the required installation.

2. Certification of compliance with the requirements of paragraph 2.1.A.

3. Certified copies of recent test reports of systems similar to the design for this project substantiating performance of system in lieu of re-testing. Other supportive data shall be included as necessary.

4. Certification by the aluminum window manufacturer that the windows are suitable for, and compatible with, the glazing and accessories in Section 088100 – Glazing.

5. Certification of manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, manufacturer's products, and contact information of the consultant firm of record, general CONTRACTOR, and owner.

6. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of five (5) similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general CONTRACTOR, and owner.

7. When requested by the ENGINEER, furnish other certifications as may be required to show compliance with the Contract Documents.

E. Shop Drawings and Calculations: Complete Shop Drawings showing location and detail of installation, and design calculations.

1. Shop Drawings and Calculations shall be prepared, approved, and stamped by a professional engineer licensed per local engineering licensing laws.

2. Shop Drawings shall be drawn to sufficient scale and shall include dimensions, show elevations and details of construction of each window frame type, schedule of window frames, frame elevations and details, location and installation requirements for hardware, thickness of materials, joints, provisions for expansion and contraction, connections, accessories, and trim. Shop Drawings shall show installation conditions at openings with various wall thickness and materials.

a. Shop Drawings shall include material descriptions, finish, color, details of construction, installation, and accessories of each aluminum window type.

b. Shop Drawings shall include thermal breaks, details of special shapes, location and types of exposed fasteners and joints, and joint sealant.

c. Shop Drawings shall indicate typical glazing details, locations of various types and thickness of glazing, and internal sealant requirements and details as recommended by the glazing sealant manufacturer.

F. Samples: The CONTRACTOR shall submit two (2) samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. Corner construction of each frame type, 6-inch (152-mm) by 6-inch (152-mm) legs, and showing glazing provisions.

2. 3 inches (76 mm) by 4 inches (102 mm) color samples showing substrate, finish, and color.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Aluminum windows shall be provided by a single manufacturer.

B. Manufacturer Qualifications:

1. Aluminum window manufacturer shall have a minimum of 20 years of aluminum window manufacturing experience.

2. Aluminum window manufacturer shall have a minimum of five (5) similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of five (5) years' experience in the successful completion of at least five (5) projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

D. A professional engineer licensed per local engineering licensing laws shall design the aluminum windows and connections to the structure.

E. Installation shall be in accordance with the AAMA "Metal Curtain Wall, Window, Storefront and Entrance Guide Specification Manual," the SFM-1 "Aluminum Storefront and Entrance Manual," and other applicable references and with manufacturer's written instructions.

F. Testing Requirements: Components shall be provided that have been previously tested by an independent testing laboratory.

G. Welding shall be performed by AWS qualified welders.

H. In addition to requirements indicated, CONTRACTOR shall comply with applicable provisions of the Aluminum Curtain Wall Design Guide Manual for design, materials, fabrication, and installation of component parts.

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish manufacturer's 2-year written warranty to cover defects in materials, products, and manufacturing workmanship.

B. Furnish manufacturer's extended 20-year warranty to cover the finish.

1. Warranty shall include provisions for failures of the finish including, but not limited to, chalking, crazing, peeling, and fading.

C. The CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover labor.

D. Warranties shall be non-prorated for the entire warranty period.

E. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Structural Requirements:

1. Aluminum windows, including related assemblies, components, and attachment details shall comply with the CODE and shall be designed and installed for resistance to the structural design criteria indicated in the Contract Documents in accordance with the CODE. Where a conflict occurs between the requirements of this Section and the CODE, the more stringent shall apply.

2. The CONTRACTOR shall provide additional non-standard bracing, reinforcements, anchors, and heavier gauge materials in order to conform to the structural design criteria indicated and to other performance requirements indicated.

B. Aluminum windows shall be recommended by the manufacturer for the installation indicated.

C. Aluminum windows shall be suitable for, and compatible with, the required installation.

D. Design Requirements:

1. Supports, anchorage, and accessories shall be provided as required for complete assembly.

2. Aluminum window system manufacturer shall furnish the systems herein, including necessary modifications to meet the indicated requirements and to maintain visual design concepts as approved by the ENGINEER.

3. Perimeter conditions shall allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer's recommended joint design.

4. CONTRACTOR shall not assume glazing, sealant and interior finishes contribute to framing member strength, stiffness, or lateral stability.

5. Assemblies shall be free from vibration harmonics, rattles, wind whistles, and noise due to thermal movement, thermal movement transmitted to other building elements, and wind pressure. Assemblies shall be free from loosening, weakening, or fracturing of attachments by components.

6. Attachment considerations are to take into account Site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening, or fracturing connection between units and building structure or between units themselves.

7. System shall drain any water entering system to the exterior of system.

8. Concealed fastening shall be provided.

9. Uniform color and profile appearance shall be provided at components exposed to view.

E. Performance Requirements:

1. Fixed Windows:

Air Infiltration (ASTM E 283)	Maximum 0.06 cfm/sq ft surface area, at differential static pressure of 6.24 psf
Water Infiltration (ASTM E 331)	No water penetration at test pressure of 8 psf
Maximum Deflection (ASTM E 330)	L/175 of span at structural design criteria indicated, allowable stress with a safety factor of 1.65

F. Thermal Requirements:

1. Fixed Windows:

a. Thermal Transmittance Performance (AAMA 1503): U-Value 0.63.

b. Condensation Resistance Factor (CRF) 63.

G. Aluminum window systems shall accommodate expansion and contraction movement due to surface temperature differentials without causing buckling, stresses on adjacent work, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glazing, failure of joint seals, or other visual or technical detrimental effects.

2.2 ALUMINUM WINDOWS

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide manufacturer and product listed below, or equal.

a. Fixed Windows – **Kawneer Co. Inc.; Trifab Versaglaze 451T Center Glazed Storefront System (with Thermal Break)**.

B. Description:

1. ASTM B 221, alloy 6063-T5 for extrusions; ASTM B 209, alloy 5005-H34 for sheets; or other alloys and temper recommended by manufacturer appropriate for the finish.

2. Internal reinforcing shall be ASTM A 36 for carbon steel; or ASTM B 308 for structural aluminum.

a. Shapes and sizes to suit installation.

b. Steel shall be galvanized and apply shop-coat steel components after fabrication with alkyd type zinc chromate primer complying with FS TT-P-645.

3. Inserts and anchoring devices shall be manufacturer's standard formed or fabricated assemblies, steel or aluminum, of shapes, plates, bars, or tubes.

a. Steel shall be galvanized and apply shop-coat steel components after fabrication with alkyd type zinc chromate primer complying with FS TT-P-645.

4. Fasteners shall be aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with components being fastened.
    a. Exposed fasteners shall not be used.
    b. For concealed locations, manufacturer's standard fasteners shall be provided.
    c. Provide nuts or washers of design having means to prevent disengagement; deforming of fastener threads is unacceptable.

2.3 ACCESSORIES

A. Sill Extensions: Sill extensions shall be a one-piece extruded 0.060 aluminum.

B. Sill extension finish shall be the same as window, custom color to match adjacent exterior wall, as approved by Engineer.

C. Expansion anchor devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

D. Shims: Non-staining, non-ferrous, type as recommended by system manufacturer.

E. Protective Coatings: To separate dissimilar materials, provide cold applied asphalt mastic complying with the SSPC Paint 12, compounded for 30-mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

F. Glazing Gaskets:

1. Compression type design, replaceable, molded or extruded neoprene, or ethylene propylene diene monomer (EPDM).

2. Glazing gasket shall comply with ASTM C 509 or ASTM C 864

3. Profile and hardness shall be as necessary to maintain uniform pressure for watertight seal.

4. Provide in manufacturer's standard black color.

5. Factory molded corners shall be required at exterior.

G. Internal Sealant: Types recommended by sealant manufacturer to remain permanently elastic, tacky, non-drying, non-migrating and weather tight.

H. “Anti-walk” Edge Blocking: “W” shaped EPDM blocks for use in keeping glazing material stationary under vibration or seismic loading. Edge blocking may be used for pressure plate systems.

I. Weatherstripping: Extruded EPDM elastomeric conforming to ASTM C 509 or C 864.

J. Baffles at Weepholes for Aluminum Framed Systems: Type as recommended by system manufacturer and shown in published installation instructions.

K. Sill: Window sill shall be marble and as recommended by system manufacturer. Color shall be as selected by OWNER.

2.4 FINISH AND COLOR

A. Finish system shall be 2.0-mil, PVF2 Kynar 500, formulated by a licensed formulator to contain 70 percent PVF resin and applied by a licensed applicator.

1. Epoxy prime coat shall be applied to exposed sides to a dry film thickness of approximately 0.2-mil. One coat of PVF color coating shall be applied to exposed sides to provide a dry film thickness of not less than 0.8-mil, for a total of 1.0-mil total coating.

2. The surface condition of this finish coat shall be 100 percent free of holidays, drip marks, scratches, roll marks, or abrasions that are visible from a distance of 5-feet in good light when in installed position. Surfaces shall be free of checking, crazing, peeling, or loss of adhesion.

3. Finish shall meet or exceed AAMA 2605.

4. Color shall be selected and approved by the OWNER from manufacturer's full color range including custom colors, and may be required to exactly match other building components, as determined by the OWNER.

a. Color shall be uniform with no variation in shade, and aluminum windows or accessories of different color batches will not be acceptable

2.5 FABRICATION

A. The CONTRACTOR shall field verify size, location, and placement of aluminum windows, shall advise the ENGINEER in writing of any necessary adjustments, and shall make the necessary adjustments prior to fabrication. The CONTRACTOR shall coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments.

1. Aluminum windows shall be assembled before shipment to the Site.

B. Accurate relation of planes and angles shall be maintained, with hairline fit of contacting members.

C. The CONTRACTOR shall make provisions in framing for minimum edge clearance, nominal edge cover, and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and the Flat Glass Marketing Association (FGMA) Glazing Manual.

1. Refer to Section 088100 – Glazing.

D. Welding shall comply with AWS recommendations.

1. Recommended electrodes and methods shall be used to avoid distortion and discoloration.

2. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

E. Holes or slots, deflector plates, water deflectors, and sealant shall be provided to accommodate internal weep and drainage to the exterior.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with manufacturer's written instructions.

3.2 PROJECT CONDITIONS

A. Comply with manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding Work from damage that may result from operations under this Section.

3.3 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the Work under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent Work.

1. Examine substrates, areas, and conditions where aluminum windows and appurtenances will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed aluminum windows.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other work for the installation of aluminum windows. Coordinate delivery with other work to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate the CONTRACTOR'S acceptance of the substrate, areas, and conditions.

3.4 PREPARATION

A. Sequence installation properly with the installation and protection of other Work, so that neither will be damaged by the installation of the other.

3.5 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, with the requirements of the CODE, and with manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

C. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

D. The CONTRACTOR shall block and reinforce walls as required to support the aluminum windows and appurtenances.

E. Horizontal lines shall be level, and vertical lines shall be plumb.

F. Sill extensions shall be provided at exterior aluminum window installations.

G. Tolerances:

1. Limit variations from plumb and level:
   a. ⅛ inch (3.2 mm) in 20 feet (6.1 m) vertically and horizontally.
   b. ¼ inch (6.4 mm) in 40 feet (12.2 m) either direction.

2. Limit offsets in theoretical end-to-end and edge-to-edge alignment:
   a. Allow $\frac{1}{16}$ inch (1.6 mm) where surfaces are flush or less than ½ inch (13 mm) out of flush and separated by not more than 2 inches (51 mm).
   b. ⅛ inch for surfaces separated by more than 2 inches (51 mm).

3. Step in Face: $\frac{1}{16}$ inch (1.6 mm) maximum.
4. Jog in Alignment: $\frac{1}{16}$ inch (1.6 mm) maximum.
5. Location: ¼ inch (6.4 mm) maximum deviation of any member at any location.
6. Tolerances are not accumulative.

H. Sealants:

1. Internal metal-to-metal joints shall be caulked, where required to provide the required performance as components are installed.

2. Perimeter members shall be sealed per manufacturer's installation instructions or as required for unique job conditions. Set other members with internal sealant and

baffles as required by manufacturer's installation instructions. Use ultraviolet resistant sealant as recommended in writing by sealant manufacturer.

3. CONTRACTOR shall coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 079213 – Sealants and Caulking.

4. Seal locations necessary to create and secure continuous enclosure even though Drawings may not indicate locations to be sealed.

5. Seal joints to prevent migration of water vapor or air to interior of building.

I. Glazing:

1. Glazing gaskets and sealant shall be installed in accordance with manufacturer written instructions without exception, including surface preparations.

2. “Anti-walk” edge blocking shall be utilized on vertical edges of glazing.

3. Refer to Section 088100 – Glazing for additional requirements.

3.6 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, aluminum windows and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the Work, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the manufacturer's written instructions.

C. Aluminum windows shall be protected from damage from subsequent construction operations.

D. The CONTRACTOR shall make adjustments required and retest until accepted.

E. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

F. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

G. When aluminum window Work is completed, remove unused materials, containers, and equipment, and clean the Site of aluminum window debris.

- END OF SECTION -

SECTION 087100 – DOOR HARDWARE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide door hardware and appurtenant WORK, complete, in place, and operational in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. Florida Accessibility Code

C. Americans with Disabilities Act (ADA):

ADAAG	Americans with Disabilities Accessibility Guidelines

D. American National Standards Institute (ANSI):

ANSI A 117.1	Accessible and Usable Buildings and Facilities
ANSI A 156.1	Butts and Hinges
ANSI A 156.3	Exit Devices
ANSI A 156.4	Door Controls – Door Closers
ANSI A 156.5	Auxiliary Locks and Associated Products
ANSI A 156.6	Architectural Door Trim
ANSI A 156.7	Template Hinge Dimensions
ANSI A 156.8	Door Controls – Overhead Stops
ANSI A 156.13	Mortise Locks and Latches
ANSI A 156.15	Closer Holder Release Devices
ANSI A 156.16	Auxiliary Hardware
ANSI A 156.18	Material and Finishes

E. Builders' Hardware Manufacturers' Association (BHMA).

F. Building Code: Refer to the Drawings to determine which Building Code applies. The applicable Building Code, defined by the Drawings, is referenced herein as "the CODE."

G. Door and Hardware Institute (DHI): Recommended Procedure for Processing Hardware Schedules and Templates" and "Architectural Hardware Scheduling and Format."

H. National Fire Protection Association (NFPA):

NFPA 80	Fire Doors and Windows
NFPA 101	Life Safety Code

I. Florida Building Code (FBC):

FBC 703	Fire Tests of Door Assemblies

J. Underwriters' Laboratories (UL):

UL 10	Standard for Fire Test Door and Assemblies
UL 10C	Positive Pressure Fire Tests of Door Assemblies

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification by the door hardware Manufacturer that the door hardware provided is suitable for, and compatible with, the required installation.

2. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer's products, and contact information of the consultant firm of record, general contractor and owner.

3. Certification of supplier's qualifications demonstrating compliance with the qualifications requirements indicated.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

5. Submit certification from a recognized testing agency that fire doors have passed tests to meet fire ratings indicated.

6. Certification that materials, construction requirements, and fire ratings will be met in the final installation.

7. Certification for hardware in fire rated openings indicating compliance with UL 10C and FBC 703.

8. When requested by the ENGINEER, furnish other certifications as may be required to show compliance with the Contract Documents.

E. Shop Drawings**:** Complete Shop Drawings showing location and detail of installation.

1. Furnish a complete, detailed hardware schedule. The hardware schedule shall indicate groups, type, style, function, Manufacturer's name, catalog number, location, and finish of each item to be provided, in accordance with the DHI "Architectural Hardware Scheduling Sequence and Format." The hardware schedule shall include the following additional information:

a. List each door opening, organized into "hardware sets" indicating complete designations of every item required for each door opening to function as intended.

b. Location of each hardware set cross-referenced to floor plans and schedules on the Drawings.

c. Door sizes shall be noted on the hardware schedule, and hardware shall be in strict accordance with height, width, and thickness requirements.

d. Special mounting instructions or requirements that vary from standard.

e. Handing and degree of swing of each door.

f. Keying information.

g. Fastenings and other pertinent information.

h. Explanation of all abbreviations, symbols, and codes contained in schedule.

i. The hardware schedule shall also include a complete template list showing template references and data for each item requiring preparation of doors and frames.

j. Submit separate detailed keying schedule for approval indicating clearly how the OWNER's final instructions on keying of locks has been fulfilled.

F. Samples: When requested by the ENGINEER, submit samples of the materials proposed. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Door hardware shall be provided by a single Manufacturer, each.

B. Manufacturer Qualifications**:**

1. Door hardware Manufacturer shall have a minimum of 20 years of door hardware manufacturing experience.

2. Door hardware Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Supplier Qualifications:

1. Supplier shall be a recognized architectural door hardware supplier who has maintained an office and has been furnishing hardware in the project's vicinity for a period of at least 2 years.

2. Supplier shall employ at least one Architectural Hardware Consultant (AHC) who shall be responsible for the preparation and execution of the WORK of this Section and who shall be available to the OWNER, the ENGINEER, and the CONTRACTOR during business hours for consultation about the project's hardware and requirements.

3. Supplier shall be a certified direct distributor and be a full sales and service organization for the Manufacturers proposed.

4. Suppliers without these qualifications will not be accepted.

D. Installer Qualifications:

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installer shall be trained, certified, and authorized by the Manufacturer to install the Manufacturer's product.

3. Installers without these qualifications will not be accepted.

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish Manufacturer's written warranty to cover defects in materials, products, and manufacturing workmanship. The term of the warranty shall be as indicated below:

1. Mortise Locksets: 5 years.

2. Exit Devices: 5 years.

3. Door Closers: 10 years.

B. The CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover labor.

C. Warranties shall be non-prorated for the entire warranty period.

D. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Door hardware shall be recommended by the Manufacturer for the installation indicated.

B. Door hardware shall be suitable for, and compatible with, the required installation.

C. Door hardware shall be best grade, entirely free from imperfections in manufacture and finish. Qualities, weights, and sizes specified herein are the minimum that will be accepted.

D. Hand of door shall be as indicated. If door handing changes prior to fabrication, the CONTRACTOR shall make necessary adjustments at the direction of the ENGINEER.

E. The WORK hereunder shall include fabrication and mounting templates as needed for fabricators and for control of application of hardware items.

1. In addition thereto, the CONTRACTOR shall provide trim, attachments, and fastenings indicated or required for proper and complete installation.

F. Door hardware shall be coordinated with other WORK requiring door hardware or attaching to it. Copies of schedules, templates, etc., shall be furnished in ample time to avoid fabrication and construction delays. Each item of hardware shall be identified according to the approved list and schedule. Hardware shall be made to template.

G. The CONTRACTOR shall furnish the hardware supplier with Shop Drawings from other trades with which hardware must be coordinated. After checking these Shop Drawings, the CONTRACTOR shall promptly supply necessary template information to all concerned as may be required to facilitate the progress of the job.

1. Furnish all templates and schedules required by the Manufacturers of the doors and frames to enable the Manufacturers to make proper provision in their WORK to receive the door hardware. All locks, lock strikes, and flush bolts shall be made to ANSI standard dimensions.

2. Procedures for template information shall be in accordance with the handbook, “Recommended Procedure for Processing Hardware Schedules and Templates.”

2.2 HINGES

A. Manufacturer or Equal**:** Subject to the requirements indicated, provide products from the Manufacturer listed below, or equal.

1. **Hager**
2. **Pemko**

B. Description:

1. Hinges shall conform to ANSI A 156.1/BHMA A 2111 and shall be 5-knuckle design, heavy weight (0.180-inch minimum (4.6 mm)), ball bearing type, with flush tips.

2. Two hinges shall be provided for each door leaf up to and including 5 feet (1.5 m) in height and an additional hinge shall be added for each 2½ feet (.76 m) or fractions thereof of additional door height.

3. Hinges shall be 4½ inches (114.3 mm) by 4½ inches (114.3 mm), except at doors exceeding 36 inches (914 mm) in width.

a. Doors exceeding 36 inches (914 mm) in width shall have 5 inches (127 mm) by 4½ inches (114.3 mm) hinges.

4. Hinges on exterior doors shall be concealed electric and provided with non-removable pins (NRP).

5. Provide hinges with countersunk, Phillips flat-head screws unless otherwise indicated.

2.3 CYLINDERS AND KEYING

A. Manufacturer and Product, or Equal: Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

BEST Access Systems.

B. Description:

1. Locks and cylinders shall be master keyed to the OWNER'S requirements as directed by the ENGINEER.

2. The CONTRACTOR shall have the hardware supplier submit a keying schedule for approval prior to placing an order for the locks and keying of cylinders. The keying schedule shall be coordinated between the OWNER, the ENGINEER, the CONTRACTOR, and the hardware supplier.

C. Keying:

1. Locks and cylinders shall be construction master-keyed. Locks and cylinders to be master-keyed or grandmaster-keyed as directed by the OWNER. The factory shall key locks and cylinders. Furnish the following key amounts:

a. 2 change keys per lock.

b. 3 grand master keys.

c. 6 master keys per master level.

d. 6 construction/temporary keys.

2. Master keys and all high-security or restricted keyway blanks shall be sealed in tamper-proof packaged boxes when shipped from the factory. The boxes shall be shrink-wrapped and imprinted to ensure the integrity of the packaging.

2.4 CARD READERS

A. Manufacturer and Product, or Equal: Subject to the OWNER card reader requirements, provide Manufacturer and product listed below, or equal:

1. **Guardall G-Prox II**

2.5 SURFACE MOUNTED OVERHEAD CLOSERS

A. Manufacturer and Product, or Equal: Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

1. **Dorma 8600 Series**

2. **Sargent 351 Series**

B. Description:

1. Closers shall be ANSI A 156.4, Grade 1 Certified.

2. Closers shall have non-ferrous covers, one-piece, aluminum alloy bodies forged steel arms, and separate valves for adjusting and backcheck, closing and latching cycles, and adjustable spring to provide up to 50 percent increase in spring power.

3. Closers shall be furnished with parallel arm mounting on doors and shall be mounted to permit 180-degree door swing wherever wall conditions permit. Furnish without hold open arms unless otherwise indicated. Closers shall not be installed on exterior or corridor side of doors; install closers on door unless otherwise approved in writing by the ENGINEER.

4. Closers shall be powder coated to match door hardware with a special rust inhibitor (SRI) pretreatment, as recommended in writing by the Manufacturer, applied prior to the powder coating.

5. Where closers or other items have lever or similar arms, attachment to doors shall be with sex bolts only.

6. Closers for out-swinging exterior doors shall be top-jamb-mounted and furnished with adapter plates.

7. The CONTRACTOR shall be responsible to provide the correct arm with the closers.

8. Closers shall be provided with sex bolts for fastening through doors, frames and transoms.

2.6 MORTISE LOCKSETS AND LATCHSETS

A. Manufacturer and Product, or Equal: Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

1. **Stanley 40H Series**

B. Description:

1. Locksets shall be ANSI A 156.13 Series 1000 Grade 1. Functions shall be manufactured in a single sized case formed from minimum 12-gauge steel. Lockset shall have a field-adjustable, beveled armored front, with a 0.125-in (3.2 mm) minimum thickness and shall be reversible without opening the lock body. The lockset shall be 2¾ inch (69.9 mm) backset with a one-piece ¾-inch (19 mm) anti-friction stainless steel latchbolt. The deadbolt shall be a full 1 inch (25.4 mm) throw made of stainless steel and have two hardened steel roller inserts. To insure proper alignment, all trim, shall be thru-bolted and fully interchangeable between rose and escutcheon designs.

2. Function of locksets shall be appropriate for doors use. Hardware supplier shall verify lock functions with the OWNER and the ENGINEER prior to ordering material.

3. Lock strikes shall be non-handed, boxed type of sufficient length and having curved lips to protect the trim and jambs and be so shaped as to avoid the possibility of tearing clothing. Strikes shall be provided with metal strike boxes.

4. Locks shall be provided with the same cylinder and keyway for master keying. They shall be the product of the same Manufacturer as the locksets unless otherwise indicated. The correct cylinders with necessary modifications and components such as cams, collars, rings, retainers, plates, fasteners, etc., shall be provided for other specialty hardware such as exit devices, store front locksets, and sliding door locks where the hardware manufacture specified is different than cylinder Manufacturer.

5. Exit doors shall be openable at all times from the inside without the use of key or any special knowledge or effort.

2.7 ELECTRICAL STRIKES

A. Manufacturer and Product, or Equal**:** Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

1. **Dorma ES Series**

B. Description**:**

1. Strikes shall be compatible with the installation required.

2. All strikes shall be non-handed with a curved lip.

3. All electrical strikes shall be for use with mortise locks or mortise exit devices having a minimum ¾-inch throw. All electrical strikes shall operate at 12 VDC.

2.8 ELECTRO-MECHANICAL LOCKS

A. The electro-mechanical locks shall allow for unlocking of doors from a remote location by means of magnetic card reader. Locks shall be fail close mode (locked when power is off). Locks shall be mortise series of hardened construction unless otherwise specified conforming to BHMA A 156.13, Series 1000, and Grade 1 and shall meet A-117.1 requirements for use by handicapped persons. Operating circuit shall be 12 VDC, 0.62 amps +/-. Lockset and keyways manufacturer shall be the same as all other locks on the project.

2.9 EXIT DEVICES

A. Manufacturer and Product, or Equal**:** Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

1. **Dorma, 9000 Series**

B. Description:

1. Exit devices shall be certified to meet ANSI A 156.3 Grade 1.

2. Exit devices shall be listed by Underwriters Laboratories and shall bear the UL label for life safety in full compliance with NFPA 80 and NFPA 101.

3. Mounting rails shall be formed from a solid single piece of stainless steel, brass, or bronze no less than 0.072-inch (1.83 mm) thick. Push rails shall be constructed of 0.062-inch (1.57 mm) thick material. Painted or anodized aluminum shall not be considered heavy duty and are not acceptable. Hex key dogging shall be standard for all life safety panic hardware. Lever trim shall be available in finishes and designs to match that of the specified locksets.

2.10 LOCK GUARDS

A. Manufacturer or Equal**:** Subject to the requirements indicated, provide products from the Manufacturer listed below, or equal.

1. **McKinney**

B. Description**:** Provide high security, corrosion resistant, surface mounted lock guards with concealed fasteners compatible with the installation, at each exterior door.

2.11 DOOR TRIM AND PROTECTIVE PLATES

A. Manufacturer, or Equal: Subject to the requirements indicated, provide products from the Manufacturer listed below, or equal.

1. **McKinney**
2. **Pemko**

B. Description:

1. Kickplates shall be 0.050-gauge, 2 inches (50.8 mm) less width of door, beveled on 3 sides, and 10 inches (254 mm) high, except where necessary to clear a louver in which case they shall be 8-inches (213 mm) high.

2. Push plates, pull plates, door pulls, and miscellaneous door trim shall be as indicated.

2.12 WALL MOUNTED DOOR STOPS

A. Manufacturer or Equal: Subject to the requirements indicated, provide products from the Manufacturer listed below, or equal.

1. **Ives**
2. **McKinney**

B. Description:

1. Where a door is indicated to open against a wall, wall mounted doorstops, in the form of wall bumpers, shall be provided. Provide convex or concave design as indicated.

2. Wall mounted doorstops shall be non-ferrous, and of the type given in the hardware schedule.

3. Provide door stops with the proper fasteners, as required by the substrate to which stops are to be secured.

2.13 OVERHEAD STOPS WITH HOLD OPEN FUNCTION

A. Manufacturer and Product, or Equal: Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

1. **Rixson**

2. **Dorma Architectural Hardware, series EM**

B. Description:

1. Overhead type door holders shall be of correct size for door, 90 degree openable and allowing for checkmating. Interior doors shall be provided with overhead stops if wall type stops cannot be used.

2. Track, slide, arm, and jamb bracket shall be constructed of extruded bronze and shock absorber spring shall be of heavy tempered steel.

3. Overhead stops shall be of non-handed design.

4. Electromagnetic hold open device; able to be connected to smoke alarm system; UL BMA listed; consisting of completely flush wall mounted electro-magnetic holder and door thru-bolted contact plate; depth as required; with minimum holding force of 25 and maximum of 40 pounds; voltage and mounting height as indicated on the Drawings; steel.

2.14 WEATHERSTRIPPING, GASKETING AND SEALS

A. Manufacturer, or Equal: Subject to the requirements provided by the door manufacturer, provide products from the Manufacturer listed below, or equal.

1. **McKinney**

2. **Pemko**

B. Description:

1. Provide continuous weatherseal on exterior doors.

2. Provide continuous light or sound seals on interior doors where indicated.

3. Provide UL rated fire and smoke seals on all fire rated doors. Provide intumescent seals as required to meet UL 10C and FBC 703. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by Manufacturer.

2.15 THRESHOLDS

A. Manufacturer or Equal: Subject to the requirements indicated, provide products from the Manufacturer listed below, or equal.

1. **McKinney**

2. **Pemko**

B. Description:

1. Provide threshold at each exterior door, and at other locations where indicated. Provided in size and configuration indicated, fabricated to accommodate door hardware and to fit door frames.

2. Thresholds shall be aluminum unless otherwise noted.

3. Threshold units shall comply with ADAAG and ANSI A 117.1.

4. At Fire Rated doors, provide UL rated thresholds.

5. Where adjacent floor material differs, provide threshold as appropriate.

2.16 SILENCERS

A. Manufacturer and Product, or Equal: Subject to the requirements indicated, provide Manufacturer and product listed below, or equal:

1. **McKinney**

2. **Pemko**

B. Description: Interior door frames shall be provided with rubber silencers, 3 for each single door and 2 for each pair of doors.

2.17 FASTENERS

A. Provide necessary screws, bolts, and other fasteners of suitable size and type to secure the hardware into position. The fasteners shall match the hardware in material and finish.

B. The hardware provided, such as expansion bolts, sex bolts, toggle bolts and other approved anchorages shall be coordinated with the job and to each setting condition.

C. Phillips head screws shall be used at exposed conditions. Machine screws shall be used at metal doors and frames.

D. Required screws shall be supplied as necessary for securing door hardware in the appropriate manner. Thru-bolts shall be supplied for exit devices and door closers where required by the CODE and where the appropriate blocking or reinforcing is not present in the door to preclude their use.

2.18 FINISHES

A. Door hardware shall be 630/US 32D (stainless steel satin finish) unless otherwise indicated. Electromagnetic Hold Open Devices shall be manufacturer’s standard brushed zinc finish.

B. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI A 156.18 including coordination with traditional U.S. finishes shown by certain Manufacturers for their products.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with Manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer’s original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

1. Locks, exit devices, door closers, overhead door holders, hinges, kickplates, pulls and push plates, thresholds, and other similar items shall be individually packed in separate, suitable, original, containers as furnished by the hardware Manufacturers. Each container shall be clearly marked with item numbers, article numbers, and names corresponding to those listed in the hardware schedule.

a. Small miscellaneous items that would not require specific location identifications, such as wall mounted stops and silencers may be quantity packed if properly labeled with item numbers and other identification.

2. The CONTRACTOR shall check the hardware upon delivery with the aid of a representative of the hardware supplier’s firm.

B. Store materials carefully in accordance with the Manufacturer’s written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer’s written instructions.

3.2 PROJECT CONDITIONS

A. Comply with Manufacturer’s written instructions for environmental conditions before, during, and after installation.

1. The CONTRACTOR shall make certain that the building is secured and free from weather elements prior to installing interior door hardware.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.3 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where door hardware will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed door hardware.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of door hardware. Coordinate delivery with other WORK to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR'S acceptance of the substrate, areas, and conditions.

3.4 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.5 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, with the requirements of the CODE, Florida Accessibility Code, ADAAG, ANSI A 117.1 and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

1. Mount hardware units at heights indicated in the following applicable publications, except as specifically indicated or required to comply with the governing regulations.

a. The CONTRACTOR shall comply with DHI recommended locations for hardware as applicable for specified doors.

B. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, and true to line, allowing for required movement, including expansion and contraction.

C. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

D. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing WORK specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

3.6 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, door hardware and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

C. Adjusting and cleaning shall consist of ensuring smooth operation, lubricating and testing the door hardware.

1. Door hardware shall operate smoothly, quietly, and without squeaking and binding.

a. The CONTRACTOR shall adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

b. Latches and bolts shall be installed to automatically engage in keepers, whether activated by closers or by manual push. In no case should additional manual pressure be required to engage latch or bolt in keepers.

c. Closers and hinges shall be carefully adjusted to operate the doors noiselessly and evenly, and hinges shall be installed so as not to bind. Closers, closer arms, and hold-open arms shall be attached with sex bolts.

d. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

D. Door hardware shall be protected from damage from subsequent construction operations.

E. The CONTRACTOR shall make adjustments required and retest until accepted.

F. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

G. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

H. When door hardware WORK is completed, remove unused materials, containers, and equipment, and clean the Site of door hardware debris.

I. The hardware Supplier shall do a final inspection prior to Substantial Completion to ensure that all hardware has been correctly installed and is in proper working order, and shall provide a written report of this inspection to the ENGINEER the file.

3.7 HARDWARE SCHEDULE

A. The following schedule is furnished for whatever assistance it may afford the CONTRACTOR. The CONTRACTOR shall not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, the CONTRACTOR shall provide door or item with hardware same as required for similar purposes as accepted by the ENGINEER, and at no additional cost to the OWNER. Quantities listed are for each pair of doors, or for each single door.

B. Abbreviations:

1. BO – By Others.
2. KX – Knox Company.
3. MC – McKinney.
4. RX – Rixson.
5. SA – Sargent.
6. PMD – painted to match door.
7. W/SS – with security studs.

C. Hardware Schedule:

1. IS – Interior Single Doors:

Quantity	Device	Description
Per Spec.	Hinges	Hager BB1191
1	Exit Device (panic/exit only)	Dorma 9400
1	Latchset 15 (passage)	Stanly 40H
1	Closer	Dorma 8600
2	Kickplate	
1	Threshold (where indicated)	Mill Aluminum, See Details

2. ES – Single Exterior Doors:

Quantity	Device	Description
Per Spec.	Hinges	Hager ETW
1	Exit Device (panic/exit only)	Dorma 9400
1	Electric Strike	Dorma ES
1	Latchset 04 (storeroom)	Stanley 40H
1	Card reader	Guardall G-Prox II
1	Closer	Dorma 8600
1	Kickplate	
1	Threshold	Pemko 2005AV Mill Aluminum
1	Weatherstrip/Gasketing	Pemko S88D at Head and Jambs
1	Door Bottom	Pemko 321DN Annodized Aluminum

3. ED – Double Exterior Doors:

Quantity	Device	Description
Per Spec.	Hinges	Hager ETW
1	Removable Mullion	Sargent L980
1	Exit Device (panic/exit only)	Dorma 9400
1	Electric Strike	Dorma ES
1	Latchset 04 (storeroom)	Stanley 40H
1	Card reader	Guardall G-Prox II
2	Closer	Dorma 8600
2	Kickplate	
1	Threshold	Pemko 2005AV Mill Aluminum
1	Weatherstrip/Gasketing	Pemko S88D at Head and Jambs
2	Door Bottom	Pemko 321DNAnnodized Aluminum
2	Meeting Stile	Pemko 355DS Annodized Aluminum

4. KB – Knox Box:

   a. 3200R × 3200RMK Black KX.

   b. Location of Knox Box shown on the Drawings shall be confirmed by the local fire department, and if necessary, relocated per local fire department requirements.

- END OF SECTION -

SECTION 088100 – GLAZING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide glazing and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

B. The CONTRACTOR shall coordinate color samples with other Sections through the submittal process.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. Building Code: Refer to the Drawings to determine which Building Code applies. The applicable Building Code, defined by the Drawings, is referenced herein as “the CODE”.

C. Glazing Association of North America (GANA).

D. National Fire Protection Association (NFPA).

E. Underwriters Laboratories Inc. (UL).

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer’s specifications, technical data, installation methods, maintenance instructions, and the following:

1. Step-by-step glass, glazing, setting, and sealing procedures.

2. Manufacturer’s full-range color charts, indicating custom color for color selection by ENGINEER.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification by the glazing Manufacturer that the glazing provided is suitable for, and compatible with, the required installation.

2. Certification of compliance with the requirements of paragraph 2.1.A.

3. Certified copies of recent test reports of systems similar to the design for this project substantiating performance of system in lieu of re-testing. Other supportive data shall be included as necessary.

4. Affidavit certifying materials meet requirements herein.

5. Certification that the glazing materials have been tested in accordance with the ASTM test methods indicated.

6. Certification by the glass Manufacturer that the glass is suitable for, and compatible with, the frames in Section 085113 – Aluminum Windows.

7. Certification by the Manufacturer that the accessories are suitable for, and compatible with each other, with the glazing, and with the frames in Section 085113– Aluminum Windows.

8. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer's products, and contact information of the consultant firm of record, general contractor and owner.

9. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

10. When requested by ENGINEER, furnish other certifications as may be required to show compliance with the Contract Documents.

E. Shop Drawings: Complete Shop Drawings showing location and detail of installation.

1. Shop Drawings shall indicate thickness, dimension, U-values, R-values, and related data.

2. Include detail glazing methods, framing, and tolerances to accommodate thermal movement.

F. Samples: The CONTRACTOR shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. Twelve-inch (305 mm) by 12-inch (305 mm) samples of each glass type.

2. Twelve-inch (305 mm) by 12-inch (305 mm) samples of each laminated panel type.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Glass shall be provided by a single Manufacturer.

2. Accessories shall be provided by a single Manufacturer, each.

B. Manufacturer’s Qualifications:

1. Glass Manufacturer shall have a minimum of 10 years of glass manufacturing experience.

2. Glass Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of 5 years experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

D. Insulating glass units shall be certified for compliance with seal classification "CBA" by the Insulating Glass Certification Council (IGCC) and tested in accordance with the ASTM test methods indicated.

1.5 SPECIAL WARRANTY PROVISIONS

A. Glass: Furnish Manufacturer's 10-year written warranty to cover defects in materials, products, and manufacturing workmanship.

B. The CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover the installation and associated labor.

C. Warranties shall be non-prorated for the entire warranty period.

D. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Structural Requirements:

1. Glazing products, including related assemblies, components, and attachment details shall comply with the CODE and shall be designed and installed for resistance to the structural design criteria indicated in the Contract Documents in accordance with the CODE. Where a conflict occurs between the requirements of this Section and the CODE, the more stringent shall apply.

2. The CONTRACTOR shall provide additional non-standard bracing, reinforcements, anchors, and heavier gauge materials in order to conform to the structural design criteria indicated and to other performance requirements indicated.

B. Glazing shall be recommended by the Manufacturer for the installation indicated.

C. Glazing and accessories shall be suitable for, and compatible with, the required installation.

2.2 GLASS

A. Each piece of glazing shall bear the Manufacturer's label showing the strength, grade, thickness, type and quality of the material. Labels shall remain in place until the glass has been set and inspected by the ENGINEER except that safety and insulating glass shall have permanently etched labels.

B. When material is not cut to size by the Manufacturer and is furnished from local stock, the glass and glazing CONTRACTOR shall submit an affidavit stating the strength, grade, thickness, type, quality, and Manufacturer of the material furnished.

C. Float glass and annealed glass shall conform to ASTM C 1036, Type 1, Class 1 (clear) or Class 2 (tinted, heat-absorbing, and light-reducing), and Quality q3.

D. Interior Glass (Non-Fire Rated Openings):

1. Manufacturer and Product, or Equal:

a. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal.

1) **Viracon, Acoustical Insulating Glass.**

2. Description:

a. Acoustical insulating units, thickness as indicated, comprised of 2 clear lites, FT glass.

b. 1 1/16- inch (27 mm) total thickness, comprised of one lite 1/4-inch (6.35 mm) thick, one lite 5/16-inch (7.9 mm) thick, with 1/2-inch (12.7 mm) air space.

1) Sound Transmission Class (STC): 40

2.3 ACCESSORIES

A. Glazing compound for non-fire rated glazing shall be Dow, 999-A Glazing Silicone, or equal.

1. Glazing compound shall be acetoxy cure silicone for adhesion to glass and metals. One-part sealant that cures in the presence of atmospheric moisture to produce a durable and flexible glazing and curtainwall seal.

B. Glazing Tape shall be Tremco, No. 440, or equal.

1. Glazing tape shall be compatible with the glazing compound.

C. Setting blocks shall be 85 +/-, 5 durometer and spacer blocks, 50 durometer, shall be closed cell neoprene.

D. Additional material to complete glazing installation shall be as recommended in writing by the Manufacturer.

E. Seals against moisture intrusion as recommended by the Manufacturer. Provide with polyurethane and silicone-based sealants with a 20-year life.

2.4 FABRICATION

A. The CONTRACTOR shall field verify size, location, and placement of glazing, shall advise ENGINEER in writing of any necessary adjustments, and shall make the necessary adjustments prior to fabrication. The CONTRACTOR shall coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments.

1. Glass shall be assembled before shipment to the Site.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer’s original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer’s written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer’s written instructions.

3.2 PROJECT CONDITIONS

A. Comply with Manufacturer’s written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.3 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where glazing and appurtenances will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed glazing

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of glazing. Coordinate delivery with other WORK to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate the CONTRACTOR's acceptance of the substrate, areas, and conditions.

3.4 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.5 INSTALLATION – GENERAL

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, with the requirements of the CODE, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as determined by the ENGINEER.

B. The CONTRACTOR shall provide for a complete installation. Glazing shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

C. Glazing shall be performed in accordance with the GANA standards.

D. Frame elements shall have been painted where required and shall be thoroughly cleaned before glazing commences.

E. Separate dissimilar metals using gasketed fasteners and blocking to eliminate the possibility of electrolytic reaction.

3.6 INSTALLATION OF INTERIOR GLAZING – NON-FIRE RATED OPENINGS

A. Install continuous glazing strip against rabbet.

B. Set glass in place on setting blocks and install another continuous glazing strip around perimeter of glass.

C. Install glazing beads, setting against glazing strips firmly in order to place a small amount of pressure against the strips.

3.7 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, glazing and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, when directed by the ENGINEER.

2. Clean glazing compound from frames around glazing installed under this Section upon completion of the WORK.

3. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

4. Weep holes and drainage channels must be unobstructed and free from dirt and sealant.

C. Glazing shall be protected from damage from subsequent construction operations.

D. The CONTRACTOR shall make adjustments required and retest until accepted.

E. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

F. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

G. When glazing WORK is completed, remove unused materials, containers, and equipment, and clean the Site of glazing debris.

- END OF SECTION -

SECTION 089100 – LOUVERS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide louvers and appurtenant WORK, complete, in place, and operational in accordance with the Contract Documents.

B. The CONTRACTOR shall furnish professional design and engineering services as required for louvers.

1. Professional design and engineering services may be provided by the Manufacturer or by an independent licensed structural engineer retained by the CONTRACTOR, either of which shall comply with the requirements indicated.

C. The CONTRACTOR shall coordinate color samples with other Sections through the submittal process.

D. The CONTRACTOR shall coordinate the requirements herein with the building heating, ventilating, and cooling system; see Division 23 Sections of these Specifications.

E. The CONTRACTOR shall coordinate wiring requirements and current characteristics of motor operators with the building electrical system; see Division 26 Sections of these Specifications.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. Air Movement and Control Association (AMCA):

Standard 500	Test Methods for Louvers, Dampers and Shutters
Standard 511	Certified Ratings Program for Air Control Devices

C. American Architectural Manufacturer’s Association (AAMA):

AAMA 2605	Voluntary Specification, Performance Requirements, and Testing Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

D. American Society for Testing and Materials (ASTM):

ASTM B 211	Aluminum and Aluminum-Alloy Bar, Rod, and Wire
ASTM B 3209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM D 822	Standard Practice for Filtered Open Flame Carbon Arc Exposures of Paint and Related Coatings
ASTM D 2244	Standard Practice for Calculation of Tolerances and color Differences from Instrumentally Measured Color Coordinates

ASTM D 4214 Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

E. Building Code: Refer to the Drawings to determine which building code applies. The applicable building code, defined by the Drawings, is referenced herein as “the CODE”.

F. Sheet Metal and Air Conditioning CONTRACTOR’s National Association (SMACNA): Architectural Sheet Metal Manual (ASMM).

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer’s specifications, technical data, installation methods, and maintenance instructions, and the following:

1. Performance data in accordance with AMCA Standards 500 and 511.

2. AMCA licensed data demonstrating that each louver meets the criteria herein.

C. Manufacturer’s full-range color charts, indicating custom color availability at no additional cost to the OWNER, for color selection by the OWNER.

D. Warranty: Submit a copy of the warranty.

E. Certifications:

1. Certification by the louver Manufacturer that the louvers provided are suitable for, and compatible with the required installation.

2. Certification of compliance with the requirements of paragraph 2.1.A.

3. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer’s products, and contact information of the consultant firm of record, general contractor and owner.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

5. When requested by the ENGINEER, furnish other certifications as may be required to show compliance with the Contract Documents.

F. Shop Drawings and Calculations**:** Complete Shop Drawings showing location and detail of installation, and design calculations.

1. Shop Drawings and Calculations shall be prepared, approved, and stamped by a professional structural engineer licensed in the State of Florida.

2. Shop Drawings shall be drawn to sufficient scale and shall include dimensions, show elevations and details of construction of each louver type, schedule of

louvers, location and installation requirements for hardware, thickness of materials, joints, provisions for expansion and contraction, connections, accessories, and trim. Shop Drawings shall show installation conditions at openings with various wall thickness and materials.

a. Shop Drawings shall include material descriptions, finish, color, details of construction, installation, and accessories of each louver type.

G. Samples: The CONTRACTOR shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. 3 inches (76 mm) by 4 inches (102 mm) color samples showing substrate, finish, and color.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Louvers shall be provided by a single Manufacturer, unless otherwise indicated.

B. Manufacturer Qualifications:

1. Louver Manufacturer shall have a minimum of 20 years of louver manufacturing experience.

2. Louver Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. Installer shall have a minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

D. A professional structural engineer licensed in the State of Florida shall design the louvers and connections to the structure.

E. Fabrication practices, construction details, and installation procedures shall conform to the practices of SMACNA as recommended in the ASMM, as applicable and as required.

F. Louvers shall bear AMCA Certified Ratings Seals for air performance and water penetration ratings

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish Manufacturer's extended 20-year written warranty for the finish. Warranty shall include provisions for failures of the finish including, but not limited to, chalking, crazing, peeling, and fading.

1. Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D 4214

2. Finish color shall not change color or fade in excess of 5 NBS units as determined by ASTM D 2244 and ASTM D 822.

B. The CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover labor.

C. Warranties shall be non-prorated for the entire warranty period.

D. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Structural Requirements:

1. Louvers, including related assemblies, components, and attachment details shall comply with the CODE and shall be designed and installed for resistance to the structural design criteria indicated in the Contract Documents in accordance with the CODE. Where a conflict occurs between the requirements of this Section and the CODE, the more stringent shall apply.

2. The CONTRACTOR shall provide additional non-standard bracing, reinforcements, anchors, and heavier gauge materials in order to conform to the structural design criteria indicated and to other performance requirements indicated.

B. Louvers shall be recommended by the Manufacturer for the installation indicated.

C. Louvers shall be suitable for, and compatible with, the required installation.

D. Design Requirements:

1. Louver system Manufacturer shall furnish the systems herein, including necessary custom modifications to meet the indicated requirements and to maintain the visual design requirements as approved by the ENGINEER.

2. Stationary components of louvers shall be of all-welded design.

3. Aluminum Sheet: ASTM B 3209, Alloy 3003 and 5005 with temper as required for forming or as otherwise recommended by the metal producer to provide the required finish.

4. Aluminum Extrusions: ASTM B 211, Alloy 6063-T5, 6063-T6, or 6061-T6, unless otherwise indicated.

5. Supports, anchorage, and accessories shall be provided as required for complete assembly.

6. Perimeter conditions shall allow for installation tolerances, expansion and contraction of adjacent materials, and sealant Manufacturer's recommended joint design.

7. The CONTRACTOR shall not assume sealant and interior finishes contribute to framing member strength, stiffness, or lateral stability.

8. Assemblies shall be free from vibration harmonics, rattles, wind whistles, and noise due to thermal movement, thermal movement transmitted to other building elements, and wind pressure. Assemblies shall be free from loosening, weakening, or fracturing of attachments by components.

9. Attachment considerations are to take into account Site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening, or fracturing connection between units and building structure or between units themselves.

10. System shall drain any water entering system to the exterior of system.

11. Concealed fastening shall be provided.

12. Uniform color and profile appearance shall be provided at components exposed to view.

E. Expansion and Contraction Requirements: Louver systems shall accommodate expansion and contraction movement due to surface temperature differentials without causing buckling, stresses on adjacent WORK, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other visual or technical detrimental effects.

2.2 ACOUSTICAL LOUVERS

A. Manufacturer and Product, or Equal:

1. Subject to the requirements indicated, provide Manufacturer and product listed below, or equal.

2. Acoustical louvers shall be **Greenheck Model AFJ-601X, Ruskin or equal**

B. Description

1. Louvers meeting the following specifications shall be furnished and installed where shown on the plans and/or as described in schedules.

2. Each factory assembled louver section shall be designed to withstand up to 200 PSF (279.5 MPH wind load equivalent). The louver shall be Florida Product Approved, and comply with an approved impact-resistance standard.

3. Louvers too large for complete factory assembly shall be built up by the installing contractor from factory assembled sections.

4. Louver frames, mullions and section joints shall be adequately supported from the building structure to withstand this wind loading.

5. Louvers shall be acoustical stationary Airfoil blade, fabricated from aluminum.

    a. Louver frame depth shall be 8 in.

    b. Frame and blade material thickness shall be 0.08 in.

    c. Blades will be spaced on 6 in. centers and positioned on a 45 degree angle.

    d. Acoustical material shall be fiberglass insulation. Blades and frames will be mechanically fastened together.

    e. Each louver shall be equipped with a framed, removable, rear-mounted screen of 0.75 in. x 0.051 in. flattened expanded aluminum.

C. Performance

1. Comprehensive louver performance data including airflow resistance, water penetration, Sound Transmission Class (STC), Outdoor Indoor Transmission Class (OITC) and free area shall be submitted for approval. Louvers must be AMCA certified for airflow resistance and water penetration. Acoustical testing must be performed by an independent laboratory.

2.3 ACCESSORIES

A. Sill Extensions/Flashing:

1. Except for FRP stationary blade louvers, sill extensions/flashing shall be one-piece, extruded 0.060, aluminum.

    a. Sill extensions/flashing for FRP stationary blade louvers shall be one-piece fiberglass reinforced plastic to match the FRP louver.

2. Sill extension/flashing finish shall be the same as louver, custom color to match adjacent exterior wall, as approved by the ENGINEER.

B. Insulated Blank-Off Panels:

1. Insulated blank-off panels shall be provided where required to seal-off louver area not connected to ductwork or to cover areas not required for free air. Insulated blank-off panels shall be provided by the louver Manufacturer and shall consist of 2-inch (50.8 mm) glass fiberboard insulation encapsulated and sealed completely in 0.032-inch (.81 mm) aluminum skins, securely fastened to louvers and ductwork.

2. Insulated blank-off panel finish shall be same as louvers, flat black in color, unless otherwise indicated.

C. Screens**:**

1. Bird Screen: Each exterior louver shall be provided with 3/4-inch (19 mm) by 0.051-inch (1.3 mm) mesh aluminum wire bird screen secured within rewireable extruded aluminum frame as approved. Attach to interior face of louver, unless otherwise noted.

2. Insect Screen: For exterior louvers not connected to ductwork, provide separate fiberglass insect screen, frame, and accessories mounted to interior face of bird screen.

   a. Insect screen shall be installed such that it is removable to allow for frequent maintenance and cleaning.

3. Screens shall be secured to louver frames with removable machine screws, spaced at each corner and at 12 inches (305 mm) on center, minimum, between corners

4. Screens and frames shall have same finish as louvers, color shall be black.

5. Fasteners: Fasteners shall be structural-grade aluminum. Provide materials, types, gauges, and lengths to suit unit installation conditions. Phillips flat-head machine screws shall be used for exposed features, unless otherwise indicated.

6. Anchor and inserts: Anchors and inserts shall be non-ferrous metal for exterior installations and elsewhere as required for corrosion resistance. Steel expansion bolt devices shall be used for drilled-in-place anchors. Concrete inserts shall be provided as required.

2.4 FINISH AND COLOR

A. Finish system shall be 1.2-mil (.03 mm), **PVF2 Kynar 500**, formulated by a licensed formulator to contain 70 percent PVF resin and applied by a licensed applicator.

1. The surface condition of this finish coat shall be 100 percent free of holidays, drip marks, scratches, roll marks, or abrasions that are visible from a distance of 5 feet (1.5 m) in good light when in installed position. Surfaces shall be free of checking, crazing, peeling, or loss of adhesion.

2. Finish shall meet or exceed AAMA 2605.

3. Color shall be selected and approved by the OWNER from Manufacturer's full color range including custom colors, and may be required to exactly match other building components, as determined by the OWNER, at no additional cost to the OWNER.

   a. Tentative color selection: To be Selected.

   b. The OWNER reserves the option of changing this tentative color selection during the submittal process.

2.5 FABRICATION

A. The CONTRACTOR shall field verify size, location, and placement of louvers, shall advise the ENGINEER in writing of any necessary adjustments, and shall make the necessary adjustments prior to fabrication. The CONTRACTOR shall coordinate field measurements and Shop Drawings with fabrication and shop assembly to minimize field adjustments.

1. Louvers shall be assembled before shipment to the Site.

2. Accurate relation of planes and angles shall be maintained, with hairline fit of contacting members.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.3 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where louvers and appurtenances will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed louvers.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of louvers. Coordinate delivery with other WORK to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR'S acceptance of the substrate, areas, and conditions.

3.4 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.5 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, with the requirements of the CODE, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

C. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

D. The CONTRACTOR shall block and reinforce walls as required to support the louvers and appurtenances.

E. Horizontal lines shall be level, and vertical lines shall be plumb.

F. Sill extensions shall be provided at exterior louver installations.

3.6 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, louvers and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

C. Louvers shall be protected from damage from subsequent construction operations.

D. The CONTRACTOR shall make adjustments required and retest until accepted.

E. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

F. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

G. When louver WORK is completed, remove unused materials, containers, and equipment, and clean the Site of louver debris.

- END OF SECTION -

SECTION 092900 – GYPSUM BOARD

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide gypsum board and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Society of Testing and Materials (ASTM):

ASTM A 36	Standard Specification for Carbon Structural Steel
ASTM A 653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 36	Standard Specification for Gypsum Wallboard
ASTM C 475	Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 645	Standard Specification for Nonstructural Steel Framing Members
ASTM C 754	Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C 840	Standard Specification for Application and Finishing of Gypsum Board.
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E 96	Standard Test Method for Water Vapor Transmission of Materials
ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E 136	Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C
ASTM E 1677	Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls

C. Building Code: Refer to the Drawings to determine which Building Code applies. The applicable Building Code, defined by the Drawings, is referenced to herein as “the CODE.”

D. Federal Specifications:

QQ-W-461H	Wire, Steel, Carbon (Round, Bare, and Coated)

E. Gypsum Association**:**

GA-203	Installation of Screw-Type Steel Framing Members to Receive Gypsum Board
GA-216	Recommended Specifications for the Application and Finishing of Gypsum Board
GA-253	Recommended Specification for the Application of Gypsum Sheathing.
GA-600	Fire Resistance Design Manual

F. Technical Association of Pulp and Paper Industry (TAPPI)

G. Underwriters Laboratories (UL): Fire Resistance Directory.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, and maintenance instructions.

C. Warranty: Submit a copy of the warranties.

D. Certifications:

1. Certification of compliance with the UL specifications where required.

2. Certification of recycled content as required for select materials herein.

3. Certification by the Manufacturer that the materials provided are suitable for, and compatible with, the required installation.

4. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor, and owner.

E. Shop Drawings**:** Complete Shop Drawings showing location and detail of installation.

1. Shop Drawings shall be drawn to sufficient scale and shall include dimensions, show plans, elevations, and details of construction of each board type, location and installation requirements, thickness of materials, joints, provisions for expansion and contraction, connections, accessories, and trim.

2. Shop drawings shall show installation conditions at adjacent construction, and shall include indications for anchorage devices, blocking, backing, insulation and reinforcement built into the WORK for securing items furnished under other Sections.

F. Samples: When requested by the ENGINEER, submit samples of the materials proposed. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each

item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Gypsum board shall be provided by a single Manufacturer, each.

2. Framing and accessories shall be provided by a single Manufacturer, each.

3. Tape, adhesives, joint and finishing compounds shall be provided by a single Manufacturer, each.

B. Installer Qualifications:

1. A minimum of 5 years' experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

C. WORK of this Section shall conform to applicable portions of GA-203, GA-216, GA-253, and GA-600.

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish Manufacturer's 5-year written warranty to cover defects in materials, products, and manufacturing workmanship.

B. CONTRACTOR shall furnish separate, but concurrently running, 5-year written warranty to cover labor.

C. Warranties shall be non-prorated for the entire warranty period.

D. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Gypsum board, framing, and appurtenances shall be recommended by the Manufacturer for the installation indicated.

B. Gypsum board, framing, and appurtenances shall be suitable for, and compatible with, the required installation.

C. Labeling and Certification: Fire rated materials shall bear testing agency labels and required fire classification numbers.

2.2 FRAMING MEMBERS (FURRING AND NON-LOADBEARING MEMBERS)

A. Manufacturer, or Equal:

1. Subject to the requirements indicated, provide products from the Manufacturer listed below, or equal.

    a. **Dietrich Metal Framing**

B. Description:

1. Galvanize all steel components to ASTM A 653, G60 Standards, unless otherwise indicated.

2. Studs – ASTM C 645, 20-gauge, C-shape, 3-5/8-inch (92 mm) depth unless otherwise indicated, or required.

    a. Stud System Accessories – Provide stud Manufacturer's standard clips, shoes, ties, reinforcements, fasteners, and other accessories as required for a complete stud system.

3. Runners – ASTM C 645 to match studs; type recommended by stud Manufacturer for floor and head support of studs, and for vertical abutment of gypsum board at other WORK.

    a. Provide slip-type deflection track detail to allow for deck and/or structural member deflection at connections to underside of structure.

    b. Provide UL listed "**Fire Track® System**" in required sizes, profiles, and configuration and with necessary accessories (including Fire Track Posi-Clips® if required) by Fire Track Corp., 1-800-394-9875, or equal, for deflection track at fire rated partitions as required.

4. Furring Channels – ASTM C 645, 25-gauge, 2-inch (51 mm) web and flanges – Z-shaped furring channels to receive insulation board; 2-inch (51 mm) hat channels may be used for furred substrates not receiving insulation board.

5. Tie wire or clips used for securing cross-furring to primary members shall be galvanized, soft annealed steel wire. The weight of galvanizing shall be not less than Class 1 as set forth in Federal Specifications QQ-W-461H. Tie wire gauge shall be as set forth in the CODE.

6. Wire hangers supporting main runners in suspended ceilings shall be galvanized steel and the weight of galvanizing shall be not less than Class 1 as set forth in Federal Specifications QQ-W-461H. The gauge of galvanized steel hanger wire shall be as required by the CODE.

2.3 GYPSUM BOARD

A. Manufacturer, or Equal:

1. Subject to the requirements indicated, provide products from one of the Manufacturers listed below, or equal.

    a. **GP Gypsum Corporation**

    b. **National Gypsum Company**

    c. **United Stated Gypsum Company**

B. Gypsum board shall comply with ASTM C 36.

C. Gypsum board shall be 5/8 inch (16 mm) thick with rounded, tapered edges, unless otherwise indicated.

D. Gypsum board shall be fire rated “Type X,” unless otherwise indicated.

E. Gypsum board shall be manufactured domestically.

2.4 GYPSUM BOARD ACCESSORIES

A. Gypsum board accessories shall be manufactured domestically.

B. Tape, joint compound, and finishing compound shall comply with ASTM C 475, and shall be compatible with the gypsum board, as recommended by the gypsum board Manufacturer.

1. Tape shall be fiberglass reinforcing tape.

C. Adhesives for fastening gypsum board-to-gypsum board shall be in accordance with the printed recommendations of the gypsum board Manufacturer.

D. Concealed sealant shall be mastic type, non-shrinking, non-drying, non-migrating, and non-staining, approved for use by the gypsum board Manufacturer.

E. Metal Accessories: Except as otherwise indicated, provide Manufacturer's standard galvanized steel beaded units with face flanges for concealment in joint compound, including corner beads, casing beads, control joints, and edge trim.

1. Provide additional special accessories and shapes as required.

F. Reinforcing for Applied Items:

1. Light-duty applications – minimum 14-gauge galvanized steel sheet attachment plate for toggle bolt applications, unless otherwise indicated.

2. Heavy-duty applications – ASTM A 36 galvanized steel in required thicknesses and shapes with required fasteners.

G. Fasteners shall be corrosion resistant coated complying with the referenced standards.

1. Screws shall be self-drilling, self-tapping, bugle head for use with power tools, length as recommended by Gypsum Association and the CODE.

a. Type “S” for board-to-sheet metal application.

b. Type “G” for board-to-board application.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer’s original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

1. Store in dry, well-ventilated space, protected from moisture and humidity.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 PREINSTALLATION CONFERENCE

A. The WORK of the Section shall be carefully coordinated with the WORK of all other related trades including materials to be built into or applied on gypsum board and items requiring additional supports within partitions.

B. The CONTRACTOR shall meet at the site with the installers of related WORK and review the coordination and sequencing of WORK to ensure that everything to be concealed by WORK of this Section has been accomplished, and that chases, access panels, openings, supplementary framing and blocking, and similar provisions have been completed.

3.3 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions, referenced standards, for environmental conditions before, during, and after installation.

1. Building and areas receiving gypsum board WORK shall be completely dried-in and adjoining materials shall be sufficiently dry before starting or continuing gypsum board installation.

2. All windows, doors, roofing, and other waterproofing and weather proofing cladding and components of the building shell shall in place and complete.

3. Gypsum board shall not be exposed to moisture, excessive or continuous humidity, or water at any time.

4. Maintain a minimum room temperature of 55 degrees F, during application of gypsum board and joint treatment until completely dry or occupied.

5. Provide adequate ventilation as required.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where gypsum board, framing, and appurtenances will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed gypsum board.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR'S acceptance of the substrate, areas, and conditions.

3.5 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.6 INSTALLATION – GENERAL

A. Installation shall comply with the requirements of the Contract Documents, with the requirements of the CODE, with applicable references, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

1. Fire rated assemblies shall be installed in accordance with GA-600 and UL Fire Resistance Directory.

B. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, and true to line, allowing for required movement, including expansion and contraction.

C. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

D. Horizontal lines shall be level, and vertical lines shall be plumb.

E. Coordinate location of concealed supplemental blocking, backing, and additional anchoring reinforcement with items furnished under other Sections.

3.7 INSTALLATION – FRAMING (FURRING AND NON-LOADBEARING PARITIONS)

A. Partition framing and gypsum board shall extent to underside of structure, unless otherwise indicated.

B. Installation of framing shall be in accordance with ASTM C 754 and the CODE.

C. Provide slip-type deflection track at all head connections to underside of structure. Provide for deflection allowance of 1 1/2-inches (38 mm) minimum, unless otherwise indicated.

D. Align runner tracks to the partition layout at both floors and ceilings. Secure tracks to floor and overhead structure 16 inches (406 mm) on center, maximum. Provide fasteners at all corners and ends of runner tracks.

E. Full-length studs shall be provided to span the height between runner tracks. Spliced units shall not be allowed. Friction fit studs to runner tracks by positioning and rotating into place. Provide positive attachment to runner tracks for studs located at partition corners and intersections and adjacent to openings, using 3/8-inch (9.5 mm) self-drilling screws at both flanges and studs.

1. Space studs at 16 inches (406 mm) on center, unless otherwise indicated.

F. Provide additional studs to support corners at partition intersections and corners, and to support outside corners, terminations of partitions, and both sides of control joints. Provide any additional bracing and reinforcing members as recommended by the system Manufacturer to provide complete rigidity at partitions.

G. At openings and doorframes, install two full height studs at all jambs. Fasten the first stud at each jamb with two self-drilling screws to all frame joint anchors. Place second stud in tandem with and against first stud.

H. Above openings and heads of frames, a cut-to-length section of track shall be installed. Flanges shall overlap jamb studs and shall be securely attached to jamb studs.

I. Between frames and ceiling, install cut-to-length jack studs, extending from doorframe header track to ceiling track. Where control joint is called for at jamb line above frame, install jack stud approximately 1 inch (25 mm) from first jamb stud. At all other locations keep jack studs at least 6 inches (152 mm) from jambs to avoid gypsum board joints at jamb line.

J. Install reinforcing for applied items, such as supplementary framing, runners, furring, blocking, and bracing at openings and terminations in the WORK, and at locations required to support fixtures, accessories, equipment, services, heavy trim, furnishings, and similar WORK that cannot be adequately supported directly on gypsum board alone.

1. Attention is directed to electrical equipment, toilet partitions, lockers, and toilet and shower accessories requiring additional support. Coordinate these requirements with the respective trade sections for exact locations.

K. Tolerances: Provide framing such that tolerances are 1/16-inch (1.6 mm) maximum offset between planes of gypsum board faces and 1/8-inch (3.2 mm) in 8 feet (2.4 m) for plumb, level, warp, and bow, unless otherwise indicated.

3.8 INSTALLATION – GYPSUM BOARD GENERAL

A. Install gypsum board to minimize joints. When joints are necessary, butt tapered joints together; end joints shall be avoided and kept to a minimum.

1. Boards shall be brought into contact with each other but shall not be forced into place. Joints on opposite sides of a partition shall not occur on the same stud.

2. Provide expansion joints as shown, as recommended per applicable references, and as directed.

B. Where gypsum board abuts other materials, such as masonry walls, structural frame, and decking, the gypsum board shall be held back so as to form a joint, which shall be sealed with acoustical or fire rated sealant as required for the condition.

1. Isolate edges of gypsum board 1/2-inch (13 mm) from abutment with structure, particularly at slabs on grade. Provide trim and caulk with sealant.

C. Fasteners:

1. Gypsum board shall be screw-fastened to framing.

a. Screws shall be spaced not to exceed 12 inches (305 mm) on center except at vertical butting edges of the fire-rated partitions where they shall be 8 inches (203 mm) on center.

b. Space fasteners in accordance with applicable reference standards and Manufacturer's recommendations, except as otherwise indicated.

D. Single Layer Construction: Gypsum board shall be held in firm contact with framing member while fastenings are being driven. Fastening shall proceed from center portion of the gypsum board toward the edges and ends. Fasteners shall be set with heads slightly below the surface of the gypsum board in the dimple formed by the power screwdriver. Care shall be taken to avoid the breaking of the face paper of the gypsum board. Improperly driven screws shall be removed.

E. Metal Accessories:

1. Metal edge trim shall be provided whenever edge of gypsum board would otherwise be exposed or semi-exposed, at all discontinued edges, where abutting with another material, and where otherwise indicated or required.

2. Corner beads shall be provided at all exterior corners.

3. Metal accessories shall be set plumb, level, straight and true and shall be shimmed where necessary. The accessories shall be mitered at corners; exposed joints shall be accurately and tightly fitted. Sections shall be installed in lengths as long as practicable, and splices shall be held to a minimum.

4. Metal accessories shall be screw-fastened to framing members with screws spaced not more than 9 inches (229 mm) apart.

5. Where feasible, use the same fasteners to anchor metal accessories as required to fasten gypsum board to framing.

F. Upon completion, gypsum board shall form a smooth, firm flat plane free from ripples, waves, buckles, bumps, and projecting edges.

3.9 GYPSUM BOARD FINISHING

A. Gypsum board shall be taped, and all screw heads, penetrations, joints, end trim, corner beads, fastener, and other depressions shall be treated with joint and finishing compounds applied per applicable references and per Manufacturer's printed recommendations for three-coat WORK.

B. Finish gypsum WORK in accordance with ASTM C 840, to Level 4 of Gypsum Association GA-214, and the following:

1. Joint compound shall be mixed in accordance with Manufacturer's instructions. A uniform layer of compound shall be applied over the joint approximately 4 inches (102 mm) wide and filling the groove. The tape shall be centered over the joint and embedded into the compound leaving sufficient compound under tape to provide proper bond.

2. A second and third coat of joint compound or joint finishing compound shall be applied after each preceding coat has been allowed to thoroughly dry. Coats shall be spread over tape and the tapered portion of edge and feathered out at the edge.

3. All inside corners shall be coated with at least one coat of joint compound over perforated tape with the edges feathered out.

4. All screw head dimples shall receive at least three coats of compound.

5. Flanges of corner and casing beads shall be concealed by at least two coats of compound feathered out approximately 9 inches (229 mm) on one or both sides of the exposed metal as applicable.

6. Allow each application of compound to joints and fastener heads to dry, then sand as required.

7. Caution shall be used to avoid roughing of the gypsum board paper. All gypsum board and treated areas shall be left smooth and ready for painting.

8. Gypsum board shall be sanded smooth, dusted, and provided with a textured orange peel finish coat.

9. Joints and penetrations in gypsum board at non-visible locations, such as within attics or in ceiling plenums shall receive joint treatment, shall be taped, and joints shall be caulked with sealant. Additional treatment to comply with the required fire ratings shall be provided.

3.10 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Gypsum board shall be protected from damage from subsequent construction operations.

C. The CONTRACTOR shall make adjustments required until accepted.

D. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

E. When gypsum board WORK is completed, remove unused materials, containers, and equipment, and clean the Site of gypsum board debris.

- END OF SECTION -

SECTION 099100 - ARCHITECTURAL COATINGS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide Architectural Coatings and appurtenant Work, complete and in place, in accordance with the Contract Documents.

B. The CONTRACTOR shall paint surfaces not specifically included under the requirements of Section 099600 - Protective Coating, in accordance with the requirements of this Section and the Contract Documents.

C. Surfaces listed in the coating schedule of Section 099600 shall be deemed to be surfaces requiring coating under that Section, not this Section. In case of conflict between the provisions of the Protective Coating Section and the Architectural Coatings Section, the provisions of Section 099600 shall take precedence.

D. Materials not to be coated from systems in this Section include the following:

1. Products requiring factory applied finishes and or coatings, other than prime coat.

2. Surfaces whose coatings are for the specific purpose of protection from abrasion, wear and tear, or from corrosion, oxidation, decomposition, or other effects of exposure. Refer to Section 099600 – Protective Coatings.

3. Stainless steel, aluminum brass, bronze, and plated finished metals (not zinc or cadmium).

4. Finish hardware except prime-coated items, and fusible links, UL labels, nameplates, numbers, and identifying data.

5. Walking surfaces.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer’s specifications, technical data, installation methods, and maintenance instructions.

1. Manufacturer's data sheet for each product proposed, including statements on the suitability of the material for the intended use.

2. Technical and performance information that demonstrates compliance with the system performance and material requirements.

3. Paint manufacturer's instructions and recommendations on surface preparation and application.

4. Colors available for each product (where applicable).

5. Compatibility of shop and field applied coatings (where applicable).

6. Material Safety Data Sheet for each product proposed.

C. Warranty: Submit a copy of the warranty.

D. Certifications

1. Certification by the Architectural Coatings manufacturer that the Architectural Coatings provided are suitable for, and compatible with, the required installation.

2. Certification of manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, manufacturer's products, and contact information of the consultant firm of record, general contractor, and owner.

3. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor, and owner.

4. Certification by the manufacturer's field representative that surfaces have been prepared and the products have been applied in accordance with the manufacturer's recommendations.

E. Application Schedule : Furnish a detailed and complete application schedule indicating location and detail of installation.

F. Samples: When requested by the ENGINEER submit samples of the materials proposed. Samples shall be clearly marked to show the manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. Color samples and stain samples shall be submitted as required by the ENGINEER. Stain samples shall be provided on the same substrate as the stain will be applied in the final installation.

2. Samples of paint, finishes, and other coating materials shall be submitted on 8-1/2 inch by 11-inch sheet metal. Each sheet shall be completely coated over its entire surface with one protective coating material, type, and color.

3. Two sets of color samples to match each color selected by the ENGINEER from the manufacturer's standard color sheets. If custom mixed colors are indicated, the color samples shall be made using color formulations prepared to match the color samples furnished by the ENGINEER. The color formula shall be shown on the back of each color sample.

4. One 5 pound sample of each abrasive proposed to be used for surface preparation for submerged and severe service coating systems.

G. Upon completion of the project, the CONTRACTOR shall furnish one gallon or quart of each type and color of paint, depending on quantity used on the project.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility

1. Types or system of Architectural Coatings shall be provided by a single manufacturer, each.

B. Manufacturer Qualifications

1. Architectural Coatings manufacturer shall have a minimum of 10 years of manufacturing experience.

2. Architectural Coatings manufacturer shall have a minimum of 10 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications

1. Installer shall have a minimum of 5 years experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installer shall be trained, certified, and authorized by the manufacturer to install the manufacturer's product, when applicable.

3. Installers without these qualifications will not be accepted.

D. Manufacturer's Technical Field Representative: The CONTRACTOR shall arrange for a manufacturer's technical field representative to be on Site for at least 3 days, beginning at the start of surface preparation and continuing through application, to train the installers and to supervise the Work. The manufacturer's technical field representative shall observe as necessary to certify in writing that the completed Work has been performed according to the manufacturer's instructions.

E. Field Sample

1. Coordinate field sample with other field samples required in other Sections.

2. Prior to installation, erect sample wall panel mock-up on-site using materials and joint details required for final Work. Provide special features as directed.

3. Field sample shall not exhibit any deterioration of color or finish of the substrate, including but not limited to darkening, staining, streaking, and fading.

4. Apply material in accordance with the requirements in Part 3 – Execution, below.

5. Manufacturer's technical field representative shall be present to review technical aspects of the field sample installation.

6. Obtain the ENGINEER'S acceptance of qualities of field sample before installation. Modify and/or reconstruct field sample at the direction of ENGINEER until acceptance. Retain field sample during construction as a standard for judging

completed Work. Do not alter, move, or destroy field sample until directed by the ENGINEER.

7. Acceptance of field sample shall not relieve the CONTRACTOR from compliance with the Contract Documents.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Suitability: The CONTRACTOR shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the Site.

B. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the WORK. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

C. Containers: Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, and name of manufacturer, all of which shall be plainly legible at the time of use.

D. Colors**:** Colors and shades of colors of coatings shall be as indicated or selected by the ENGINEER. Each coat shall be of a slightly different shade to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the ENGINEER.

E. To the maximum extent practicable and, unless otherwise approved by the ENGINEER, each paint shall be factory-mixed to the specified color, gloss, and consistency required for application.

F. All mil thicknesses provided in this Section are to be confirmed and shall comply with Coating Manufacturer’s written recommendations.

G. Finish hardware shall be removed prior to painting and finishing and reinstalled upon completion.

H. In no case shall paint application exceed the paint manufacturer's published coverage rate based upon unthinned material. In the event that paint has been extended beyond the recommended coverage, or the "hide" produced is inadequate, as determined by the ENGINEER, the CONTRACTOR shall apply one or more additional coats as determined by the ENGINEER. The manufacturer's recommended amount of thinner shall not be exceeded. Unless otherwise approved, finish coat material shall be applied as taken from manufacturer's container.

I. Paint finishes shall be even, of uniform color, and free from cloudy or mottled appearance in surfaces and evident thinness of coatings.

J. Metal items in partitions and ceilings such as registers, grilles, and similar items shall be painted to match finish of room or area in which they occur, unless directed otherwise by the ENGINEER.

K. Painted doors opening into rooms or spaces having different finishes or colors shall have the edges finished as directed by the ENGINEER. Closet and storage room doors shall be finished on both sides to match the room into which they open.

L. Mechanical and Electrical Work**:** Mechanical and electrical products requiring painting shall conform to the requirements of Section 099600 – Protective Coatings, except for the following:

1. Areas behind grilles, baffles, ventilators, and louvers: exposed surfaces, not factory finished, visible from inside and outside of the building shall be painted with appropriate primers and one coat of black semi-gloss (low sheen) enamel paint far enough to conceal such areas and spaces when looking towards them from the floor and ground levels.

2. All conduit and piping shall be painted to match the adjacent substrate or equipment to which the are installed. Pipe identification shall be in accordance with Section 43 10 51 - Piping Identification.

2.2 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

2. Hand Tool Cleaning (SSPC SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC SP5): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

5. Commercial Blast Cleaning (SSPC SP6): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.

6. Brush-Off Blast Cleaning (SSPC SP7): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint.

7. Near-White Blast Cleaning (SSPC SP10): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.

8. Surface Preparation of Concrete (SSPC-SP13): Removal of protrusions, laitance and efflorescence, existing coatings, form-release agents, and surface contamination by detergent or steam cleaning, abrasive blasting, water jetting, or

impact or power tool methods as appropriate for the condition of the surface and the requirements of the coating system.

9. Ferrous Metal: Galvanized**.** Galvanized metal surfaces shall be cleaned to remove grease, oil, and other deleterious matter per SSPC-SP1. Non hydrocarbon based solvents, mildly acidic, should be used according to the manufacturer's directions for removal of oils greases. Hydrocarbon based solvents are not acceptable. Shop painted ferrous metal surfaces that show rusting when initially installed shall be touched up with a rust inhibitor. Rust inhibitor shall meet the requirements of MIL-M-10578B for Phosphoric Acid rust inhibitor, and shall be applied only after wire brushing to a sound surface, and then coated with a compatible universal primer.

10. Remove any sharp, protruding defects in the galvanized surface such as that commonly found on edges and holes with suitable tools. Remove all protruding defects that can lead to coating holidays

11. Remove deposits of zinc reaction by-products, such as wet storage stain, by hand and power tool cleaning as specified in SSPC SP 2 or 3.

12. Sweep-blast (brush-blast) galvanized surfaces in accordance with 5.4.1 of ASTM D6386 and the applicable portions of SSPC-SP7.

    a. The sweep-blast shall be relatively light (relative to sweep-blasting of steel) so as not remove excessive amounts of zinc from the galvanized surface.

    b. The sweep-blast shall remove zinc oxides, passivation layers or treatments, and other surface contaminants from the galvanizing as well as profile the surface

    c. The sweep-blast shall impart to the galvanized surface an anchor profile of 1.0 to 1.5 mils and the peak density should be sufficiently dense to provide a uniform appearance and so that none of the original galvanized surface remains unprofiled. Perform the sweep-blast in a manner that does not result in disbonding and flaking (leafing) of the galvanizing. To achieve the desired profile with minimal galvanizing loss and to mitigate damage to galvanized surface, reduce blast pressures (relative to abrasive blasting of steel), angle the blast (30 to 45 degrees to the surface), increase blast distances, and/or select suitable abrasive.

    d. Remove all abrasive, dust, and paint residue from galvanized steel surfaces. Control environmental conditions and apply primer after Inspector's examination, and before oxidation of the surface that could limit adhesion occurs. Only prepare enough surface area that can meet the surface preparation requirements and be coated in the same 8 - 10 hour shift.

    e. Pretreatment coatings of surfaces shall be in accordance with the printed recommendatiosn of the coating manufacturer.

B. Ferrous Metal: Ungalvanized

1. Surface salts shall be removed by washing with potable water and **Chlor*Rid**, followed by rinsing with potable water. Repeat the wash/rinse cycle until surface chloride salts are reduced to less than 7 micrograms per square centimeter.

2. The minimum abrasive blasting surface preparation shall be as indicated in the coating system schedules included at the end of this Section. Where there is a

conflict between these requirements and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.

3. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast-cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers, NACE Standard TM-01-70 - Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive and TM-01-75 - Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit.

4. Oil, grease, welding fluxes, and other surface contaminants shall be removed by solvent cleaning per SSPC SP1 - Solvent Cleaning prior to blast cleaning.

5. Sharp edges shall be rounded or chamfered, and burrs and surface defects and weld splatter shall be ground smooth prior to blast cleaning.

6. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular product and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag. Automated blasting systems shall not be used for surfaces that will be in submerged service. Metal shot or grit shall not be used for surfaces that will be in submerged service, even if subsequent abrasive blasting will use hard, sharp cutting crushed slag.

7. Abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least 50 percent grit.

8. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

9. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil and moisture separators that remove at least 95 percent of the contaminants.

10. Surfaces shall be cleaned of dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another approved method prior to painting.

11. Enclosed areas and other areas where dust settling is a problem shall be vacuum-cleaned and wiped with a tack cloth.

12. Damaged or defective coating shall be removed by the blast cleaning to meet the clean surface requirements before recoating.

13. If the required abrasive blast cleaning will damage adjacent WORK, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC SP2 or SSPC SP3 may be used.

14. Shop-applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP1 before the abrasive blast cleaning has been started.

15. Shop primed equipment shall be solvent-cleaned in the field before finish coats are applied.

C. Masonry and Concrete to be Painted: Surfaces of masonry and concrete to be painted shall be dry and free of dust, dirt, grease, oil, and other foreign matter such as loose or granular material. Holes, cracks, joints, and any surface defects shall be repaired and filled out flush and smooth with appropriate products, except where a priming coat may be recommended first by the manufacturer of the paint. Glaze and loose particles shall be removed by wire brushing. No evidence of curing compounds, release agents and the like will be acceptable.

1. Surface preparation shall not begin until at least 30 Days after the concrete or masonry has been placed.

2. Oil, grease, and form release and curing compounds shall be removed by detergent cleaning per SSPC SP1 before abrasive blast cleaning.

3. Concrete, cured in place concrete, previously coated concrete or concrete block, and deteriorated concrete surfaces to be coated shall be abrasive or shot blast cleaned per SSPC SP13/NACE 6 to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface. Reference ICRI 310.2 for acceptable "Concrete Surface Profile."

   a. Thin Film (0-15 mils): CSP 1-2

   b. Medium Film (15-40 mils): CSP 3-5

   c. Thick Film (40 mils – 1/8"): CSP 4-6

4. Concrete block surfaces, exposed, with no previously placed coatings shall have all loose mortar, surface contaminants, and any foreign materials which would inhibit the adhesion of applied coatings, removed by mechanical means or pressure wash cleaning. Surfaces shall be allowed to dry. Moisture content of the substrate shall not exceed manufacturer's specified requirements.

5. If acid etching is required by the coating application instructions, the treatment shall be made after abrasive blasting. After etching, rinse surfaces with water and test the pH. The pH shall be between neutral and 8. Acid etching shall only be used on horizontal surfaces where the specified coating system is 15 mils dft or less.

   a. Acid etching process shall conform to ASTM D4260.

   b. Acid etched surfaces shall be properly neutralized per ASTM D4262 prior to the application of specified thin film coating system.

6. Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.

7. Repair all surface irregularities including bugholes, fins, protrusions, cracks, deteriorated concrete using manufacturer's recommended repair materials.

8. Unless required for proper adhesion, surfaces shall be dry prior to coating. Refer to manufacturer acceptable levels of moisture. The presence of moisture shall be determined with a moisture detection device such as **Delmhorst Model DB,** or equal. Moisture content of the substrate shall not exceed manufacturer's specified moisture content for applied coatings.

D. Plastic, Fiberglass and Nonferrous Metals

1. Plastic and fiber glass surfaces shall be sanded or brush off blast cleaned prior to solvent cleaning with a chemical compatible with the coating system primer.

2. Non-ferrous metal surfaces shall be solvent-cleaned SSPC SP1 followed by sanding or brush-off blast cleaning SSPC SP7.

3. Surfaces shall be clean and dry prior to coating application.

E. Backpainting: Prior to installation, back surfaces of wood trim and finish that will be concealed after installation, including trims, exposed grounds, and paneling shall be painted. On painted and enameled WORK, the CONTRACTOR shall use the same primer as for exposed surfaces. Work to receive a natural finish shall be backpainted with one coat of spar varnish. Backpainting shall be omitted on casework and cabinets that are completely factory finished under other sections.

F. Surface Preparation of Ferrous Surfaces with Existing Coatings, Excluding Steel Reservoir Interiors:

1. General: Grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.

2. Abrasive Blast Cleaning: The CONTRACTOR shall provide the degree of cleaning indicated in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not indicated in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC SP6. Areas of tightly adhering coatings shall be cleaned to SSPC SP7, with the remaining thickness of existing coating not to exceed 3-mils.

3. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the CONTRACTOR shall apply intermediate coatings per the manufacturer's recommendation for the indicated coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.

4. Unknown Coatings**:** Coatings of unknown composition shall be completely removed prior to application of new coatings.

2.3 CONCRETE BLOCK MASONRY

A. **System 1 – Waterborne Cementitious Acrylic, Concrete Block Masonry**

1. Materials

Filler-Sealer Type	epoxy masonry sealer, for concrete and CMU, for wet and dry conditions
Primer	as recommended by manufacturer
VOC Content, g/L, max	250g/L
Finish Type	single component waterborne acrylic, industrial grade, high molecular weight
VOC Content, g/L, max	250g/L
Demonstrated suitable for	concrete under mild to moderate exposure conditions, splash but not immersion

2. Application and manufacturers

Surface Preparation	**Prime Coat** (Filler-Sealer)	**Finish Coat** (DFT = 2 - 5 mils per coat)	**Total System DFT**
SSPC SP13	Tnemec EnviroFill 130	Tnemec Tneme-Cryl Series 6	6-10 mils plus primer
	Carboline Sanitile 500	Carboline Carbocrylic 3359 DTM	
	Sherwin-Williams Kem-Cati Coat HS	Sherwin-Williams B66 Series DTM Acrylic Coating	
	Ameron Amerlock 400BF (masonry) and Nu-Klad 114A (concrete)	Ameron Amercoat 220	

B. **System 2– Acrylic Latex/Epoxy, Interior Concrete Block Masonry**

1. Materials

Filler-Sealer Type	Acrylic Latex Block Filler for filling surface voids in porous concrete and masonry

	block on interior, dry, above-grade masonry surfaces
Primer	as recommended by manufacturer
VOC Content, g/L, max	250g/L
Finish Type	Waterborne Epoxy, non-yellowing, stain-, abrasion-, chemical-, and moisture-resistant
VOC Content, g/L, max	250g/L
Demonstrated suitable for	Interior concrete block masonry

2. Application and manufacturers

Surface Preparation	**Prime Coat** (Filler-Sealer)	**Finish Coat** (DFT = 2 - 6 mils per coat)	**Total System DFT**
SSPC SP13, Surfaces must be clean, dry, and free of oil, grease and other contaminants	Tnemec Series 130	Tnemec Series 113	6-12 mils plus primer
	Carboline Sanitile 100	Carboline Sanitile 255	
	Sherwin-Williams B25 Series Preprite Block Filler	Sherwin-Williams B73 Series Waterbased Tile-Clad Epoxy	
	PPG/PMC Pitt Glaze 16-90	PPG/PMC Pitt Glaze 16-551	

2.4 METALS

A. **System 3 - Epoxy/Polyurethane**

1. Materials

Primer type	rust-inhibitive, 2 component epoxy
VOC Content, max	250g/L
Finish type	2 component aliphatic polyurethane
VOC Content	250 g/L, max
Demonstrated suitable for	ferrous surfaces, superior color and gloss retention, exceptional resistance to weathering, chemical fumes, and splash; Steel Doors and Frames, Exposed Steel Beams/Joists/Trusses, Exposed Secondary Framing members, Exposed Metal Deck, Steel Lintels, and Associated Connections.

2. Application and manufacturers

Surface Preparation	***Prime Coat***	***Finish Coat*** *(DFT=2-5 mils per coat)*	**Total System DFT**
SSPC SP 2, SP 3	Tnemec Hi-Build Epoxoline II Series L69	Tnemec Endura-Shield Series 1075	6 - 10 mils plus primer
	Carboline Carbomastic 94	Carboline Carbothane 133 MC	
	Sherwin-Williams B58 Series Macropoxy 646	Sherwin-Williams B65 Series Hi-Solids Polyurethane	
	PPG/PMC Amerlock 2/400GFK	PPG/PMC Amershield VOC	

B. **System 4 - Inorganic Zinc/Epoxy/Polyurethane**

1. Materials

Prime Coat	Inorganic zinc silicate, water-based, 2 component Zinc content in dry film 79% min
VOC content, max	100 g/L
Demonstrated suitable for	Ferrous metal, providing superior corrosion, chemical, and abrasion resistance, recommended for use as primer under epoxy
Intermediate Coat	2 component epoxy, high build, recommended by manufacturer for application over inorganic zinc primer
Demonstrated suitable for	Outstanding chemical, corrosion, and abrasion resistance
VOC content, max	100 g/L
Finish Coat	2 component aliphatic or acrylic polyurethane
Demonstrated suitable for	Superior color and gloss retention, resistance to chemical fumes, severe weathering, and abrasion
VOC content, max	250 g/L

2. Application and manufacturers

Surface preparation for primer	SSPC SP6
Anchor profile for primer	per manufacturer

Prime Coat (DFT = 2 - 4 mils per coat)	**Intermediate Coat** (DFT = 2 - 10 mils per coat)	**Finish Coat** (DFT = 2 - 5 mils per coat)	**Total System DFT**
Carboline Carbozinc 11WB	Carboline Carboguard 890 VOC	Carboline Carbothane 134 MC	6 - 19 mils (varies based on recommended coats)
Sherwin-Williams B69 Series Zinc Clad XI	Sherwin-Williams B58 Series Macropoxy 646	Sherwin-Williams B65 Series Hi-Solids Polyurethane	
PPG/PMC Dimetcote 21-5	PPG/PMC Amerlock 400VOC	PPG/PMC Amershield VOC	

2.5 ALUMINUM METAL ISOLATION

A. **System 6 – Epoxy, Aluminum Metal Isolation**

1. Material

Type	high build polyamide epoxy with chemical and abrasion resistance
Demonstrated suitable for	concrete and aluminum substrates, to isolate aluminum from contact with concrete and the resulting chemical degradation
VOC content, max	250g/L

2. Application and manufacturers

Surface Preparation	**Coating** (DFT = 2 - 10 mils per coat)
SSPC SP2, SP3	Tnemec L69 Hi-Build Polyamidoamine Epoxy
	Carboline Carboguard 890 VOC
	Sherwin-Williams B58 Series Macropoxy 646
	PPG/PMC AMERCOAT 351

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in manufacturer’s original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the manufacturer’s written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with manufacturer's written instructions.

D. A list of all batch numbers shall be furnished to the ENGINEER prior to the start of work.

E. Stored paints and liquids shall be kept covered, and precautions shall be taken for the prevention of fire. Empty containers and paint-soiled or oily rags shall be removed from the Site at the end of each day's work. Paint thinner shall not be stored in a room scheduled to receive resilient flooring.

3.2 APPLICATION SCHEDULE

A. The product shall be applied to areas indicated on the Finish Schedule.

B. The product shall also be applied elsewhere, where indicated on the Contract Drawings.

3.3 PROJECT CONDITIONS

A. Comply with manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding Work from damage that may result from operations under this Section.

C. Protect against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial.

D. No coating shall be applied in contradiction to manufacturer's written instructions.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the Work under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent Work.

1. Examine substrates, areas, and conditions where the product will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed the product

2. Surfaces to receive the product shall be dry, free of oil, dirt, dust and other contaminants and loose materials, and shall be in the proper condition as indicated by the manufacturer prior to the application of the surface applied water repellents materials.

a. Masonry, concrete, and cementitious products shall have been completely cured and the surface shall be dry and free from frost at the time of application.

3. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

4. Commencement of the installation shall indicate acceptance by the CONTRACTOR of the substrate, areas, and conditions.

3.5 SURFACE PREPARATION

A. Surface preparation shall be in compliance with the applicable references and with the manufacturer’s written instructions.

B. Coatings, including curing compounds, form release agents, and other substances shall be removed as recommended by the manufacturer.

C. Substrate shall be swept to remove all loose materials prior to beginning application.

3.6 PREPARATION

A. Sequence installation properly with the installation and protection of other Work, so that neither will be damaged by the installation of the other.

3.7 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, and with manufacturer’s written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. Surfaces shall receive complete coats and rates as recommended in writing by the manufacturer.

C. Paint shall not be applied in extreme heat, nor in dust or smoke laden air, nor in damp or humid weather.

D. Drying times shall be not less than called for in manufacturer's printed instructions.

E. Drop cloths shall be placed where required to protect floors and equipment from splatter and droppings.

F. The CONTRACTOR shall apply complete paint system required for exposed surfaces behind permanent cabinets, cases, counters, and similar work before such items are installed.

G. Unless otherwise indicated, paint materials shall be applied in strict accordance with the manufacturer's printed instructions. Spray painting is not allowed without specific approval in each case. Each coat shall be applied at proper consistency, and shall be free of brush or roller marks, sags, runs, or any other evidence of poor workmanship.

H. The splattering of paint on glass, hardware, tile, trim, and other surfaces not to be painted will not be accepted. Masking shall be applied as required.

I. The CONTRACTOR shall sand between all enamel coats.

3.8 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

3. The surfaces of materials adjoining the product shall be cleaned free of overspray and smears of the product or other soiling due to the product operations.

4. The CONTRACTOR shall carefully touch-up all abraded, stained, or otherwise disfigured painting work.

5. The CONTRACTOR shall maintain barricades and wet paint signs for duration of time needed.

B. Upon completion of the application, the product and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the Work, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the manufacturers written instructions.

C. The CONTRACTOR shall make adjustments required and retest until accepted by the ENGINEER.

D. The product shall be protected from damage from subsequent construction operations.

E. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER, at no additional cost to the OWNER.

1. Remove and replace defective Work, including the product that are warped, bowed, or otherwise unacceptable.

F. When the product Work is completed, remove unused materials, containers, and equipment, and clean the Site of surface applied water repellent debris.

3.9 COATING SYSTEM SCHEDULE

A. CONCRETE BLOCK MASONRY

	Item	Surface Prep.	System No.
CBM-1	New Concrete Masonry Units, Interior and/or Exterior in Mildly Corrosive or Wet (non submersion) Conditions; unless noted otherwise	Per paragraph 2.2	(1) Acrylic, Cementitious
CBM-2	New Interior Concrete Masonry Units to be painted; unless noted otherwise	Pressure-wash; remove dust, efflorescence, chalk, loose mortar, dirt, grease, oil, tar, and other foreign matter; ASTM D 4261. SSPC-SP13.	(2) Acrylic Latex/Epoxy

B. METALS

1. Pretreatment coatings, barrier coatings, or washes shall be applied as recommended by the coating manufacturer. All galvanized surfaces shall be coated**.**

	Item	Surface Prep.	System No.
MET-1	New Steel Doors and Frames, and All new Exposed Steel Beams/Joists/Trusses, Secondary Framing members, Metal Deck, Steel Lintels, and Associated Connections.	Solvent cleaning SSPC SP1 followed by brush-off grade blast cleaning SSPC SP7	(3) Epoxy/ Polyurethane (4) Inorganic Zinc Epoxy/ Polyurethane

C. MISCELLANEOUS ARCHITECTURAL SURFACES

1. Where isolated non-ferrous parts are associated with equipment or piping, the CONTRACTOR shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

	Item	**Surface Prep.**	**System No.**
MAS-1	All New Interior Gypsum Board	Per manufacturer's printed instructions	(5) Acrylic
MAS-2	Aluminum surfaces in contact with concrete, or with any other metal except galvanized ferrous metal.	Solvent cleaned SSPC SP1	(6) Epoxy, Aluminum Metal Isolation
MAS-3	New Interior Wood Surfaces to be Painted	Per manufacturer's printed instructions	(7) Latex/Acrylic
MAS-4	New Interior Wood Surfaces to be Stained	Per manufacturer's printed instructions	(8) Stain/Varnish
MAS-5	New Exterior Plaster Surfaces to be Field Painted	Per manufacturer's printed instructions	(9) Plaster

- END OF SECTION -

SECTION 099600 - PROTECTIVE COATING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide protective coatings, complete and in place, in accordance with the Contract Documents. Refer to Specification Section 99100 - Architectural Coatings for coating systems for the Pump Station Building for coatings of concrete, concrete block masonry, doors and frames, building components and the like. The coatings in this specification refer to the piping, piping supports and hangers, process equipment, electrical elquipment and consuits, and instrumentation only. Coordinate products and submittals between this Section and Section 99100.

B. Definitions

1. The term "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.

2. The term "DFT" means minimum dry film thickness, without any negative tolerance.

C. The following surfaces shall not be coated:

1. Stainless steel

2. Machined surfaces

3. Grease fittings

4. Glass

5. Equipment nameplates

D. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the Drawings are used to show or extend the limits of coating schedules, to show exceptions to the schedules, or to clarify or show details for application of the coating systems.

E. Where protective coatings are to be performed by a Subcontractor, the Subcontractor shall possess a valid state license as required for performance of the painting and coating WORK called for in this specification and shall provide 5 references which show that the Subcontractor has previous successful experience with the indicated or comparable coating systems. Include the name, address, and the telephone number for the owner of each installation for which the Subcontractor provided the protective coating.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Submittals shall include the following information and be submitted at least 30 Days prior to commencing protective coating WORK:

1. Materials List: Eight copies of a coating materials list showing the manufacturer and the product number, keyed to the coating systems herein. The list shall be submitted prior to or at the time of submitting samples.

2. Manufacturer's Information: For each coating system to be used, the following data:

   a. Manufacturer's data sheet for each product proposed, including statements on the suitability of the material for the intended use.

   b. Technical and performance information that demonstrates compliance with the system performance and material requirements.

   c. Paint manufacturer's instructions and recommendations on surface preparation and application.

   d. Colors available for each product (where applicable).

   e. Compatibility of shop and field applied coatings (where applicable).

   f. Material Safety Data Sheet for each product proposed.

C. Samples

1. Samples of paint, finishes, and other coating materials shall be submitted on 8-1/2 inch by 11-inch sheet metal. Each sheet shall be completely coated over its entire surface with one protective coating material, type, and color.

2. Two sets of color samples to match each color selected by the ENGINEER from the manufacturer's standard color sheets. If custom mixed colors are indicated, the color samples shall be made using color formulations prepared to match the color samples furnished by the ENGINEER. The color formula shall be shown on the back of each color sample.

1.3 SPECIAL CORRECTION OF DEFECTS REQUIREMENTS

A. Inspection: An inspection may be conducted during the eleventh month following completion of coating WORK. The CONTRACTOR and a representative of the coating material manufacturer shall attend this inspection. Defective WORK shall be repaired in accordance with these specifications and to the satisfaction of the OWNER. The OWNER may, by written notice to the CONTRACTOR, reschedule the inspection to another date within the one year correction period or may cancel the inspection altogether. The CONTRACTOR is not relieved of its responsibilities to correct defects, whether or not the inspection is conducted.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Suitability: The CONTRACTOR shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the Site.

B. Material Sources: Where manufacturers and product numbers are listed, it is to show the type and quality of coatings that are required. If a named product does not comply with VOC limits in effect at the time of Bid opening, that product will not be accepted, and the CONTRACTOR shall propose a substitution product of equal quality that does

comply. Proposed substitute materials will be considered as indicated below. Coating materials shall be materials that have a record of satisfactory performance in industrial plants, manufacturing facilities, and water and wastewater treatment plants.

C. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the WORK. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

D. Containers: Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, and name of manufacturer, all of which shall be plainly legible at the time of use.

E. Colors: Colors and shades of colors of coatings shall be as indicated or selected by the ENGINEER. Each coat shall be of a slightly different shade to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the ENGINEER.

F. Substitute or "Or-Equal" Products

1. To establish equality under Section 016000 - Products, Materials, Equipment and Substitutions, the CONTRACTOR shall furnish satisfactory documentation from the manufacturer of the proposed substitute or "or-equal" product that the material meets the indicated requirements and is equivalent or better in the following properties:
    a. Quality
    b. Durability
    c. Resistance to abrasion and physical damage
    d. Life expectancy
    e. Ability to recoat in future
    f. Solids content by volume
    g. Dry film thickness per coat
    h. Compatibility with other coatings
    i. Suitability for the intended service
    j. Resistance to chemical attack
    k. Temperature limitations during application and in service
    l. Type and quality of recommended undercoats and topcoats
    m. Ease of application
    n. Ease of repairing damaged areas
    o. Stability of colors

2. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. When requested, the CONTRACTOR shall

provide the ENGINEER with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements.

3. If a proposed substitution requires changes in the WORK, the CONTRACTOR shall bear such costs involved as part of the WORK.

2.2 INDUSTRIAL COATING SYSTEMS

A. System 4 - Epoxy/Polyurethane

1. Materials

Primer type	rust-inhibitive, 2 component epoxy
VOC Content, max	285 g/L
Finish type	2 component aliphatic polyurethane
VOC Content, max	300 g/L
Demonstrated suitable for	ferrous surfaces, superior color and gloss retention, exceptional resistance to weathering, chemical fumes, and splash

2. Application and manufacturers

Surface Preparation	**Prime Coat** (DFT = 3 - 5 mils)	**Finish Coat** (DFT = 3 - 4 mils)	**Total System DFT**
SSPC SP6	Ameron Amerlock 400/2	Ameron Amershield	6 - 9 mils
	Carboline Carboguard 893	Carboline Carbothane 134 HG (2 coats)	
	Tnemec Hi-Build Epoxoline II Series N69	Tnemec Endura-Shield Series 1075	

B. System 7 - Acrylic Latex

1. Material

Primer	Product, surface preparation, and DFT as recommended by manufacturer for the surface
Finish Type	Single component, water based acrylic latex, with fungicide
VOC Content, max	180 grams per gallon
Demonstrated suitable for	PVC piping, weather and mild chemical resistance, excellent color and gloss retention

2. Application and manufacturers

Surface Preparation	**Finish** (at least 2 coats required)	**Total System DFT**
SSPC SP 1, min	**PPG- Amercoat 220**	primer plus 6 mils
	Carboline Carbocrylic 3359	
	Tnemec Series 1028 Enduratone	
	Sherwin Williams Metalatex	
	Devoe Devcryl 530	

2.3 SUBMERGED AND SEVERE SERVICE COATING SYSTEMS

A. System 100 - Amine Cure Epoxy

1. Material

Type	high build, amine cure epoxy
VOC content, g/L max	220
Demonstrated suitable for	steel, long term immersion in water and wastewater, resistant to corrosion, chemical fumes, good color retention
Certification	NSF 61 if in contact with potable water

2. Application and manufacturers

Surface Preparation	Products (3 coats or more)	Total System DFT
SSPC SP10	Ameron Amercoat 395 FD	15 to 17 mils For non-submerged valves and other equipment, DFT = 10 to 12 mils
	Carboline Carboguard 891	
	Devoe Bar-Rust 233H	

B. System 106 - Fusion Bond Epoxy

1. Material

Type	100 percent solids fusion bond epoxy
Demonstrated suitable for	fluidized bed or electrostatic spray application, recommended for pumps, valves, pipe appurtenances, tanks, pipe hangers, flow meters, and hydrants
Certification requirement	NSF 61

2. Application in accordance with AWWA C213 and the following:

Surface Preparation	Product	Surface and DFT
SSPC SP10	3M Scotchkote 134 OR 206N	Valves 12-mils
		All others 16-mils

2.4 SPECIAL COATING SYSTEMS

A. System 205 - Polyethylene Encasement: Application of polyethylene encasement shall be in accordance with ANSI/AWWA C105.

PART 3 -- EXECUTION

3.1 MANUFACTURER'S SERVICES

A. The CONTRACTOR shall require the protective coating manufacturer to furnish a qualified technical representative to visit the Site for technical support as may be necessary to resolve field problems.

3.2 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on coating WORK.

B. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough surface preparation. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given so that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other precautionary measures.

C. Damage to other surfaces resulting from the WORK shall be cleaned, repaired, and refinished to original condition.

3.3 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for other procedures relative to coating shall be strictly observed.

B. Coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and Mixing: Coating materials shall be stored under the conditions recommended by the Product Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings from different manufacturers shall not be mixed together.

3.4 PREPARATION FOR COATING

A. General: Surfaces to receive protective coatings shall be prepared as indicated prior to application of coatings. The CONTRACTOR shall examine surfaces to be coated and shall correct surface defects before application of any coating material. Marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any field coating application. Surfaces to be coated shall be dry and free of visible dust.

B. Protection of Surfaces Not to be Coated: Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.

C. Hardware, lighting fixtures, switchplates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

D. Care shall be exercised not to damage adjacent WORK during blasting operations. Spraying shall be conducted under carefully controlled conditions. The CONTRACTOR shall be fully responsible for and shall promptly repair any and all damage to adjacent WORK or adjoining property occurring from blasting or coating operations.

E. Protection of Painted Surfaces: Cleaning and coating shall be coordinated so that dust and other contaminants from the preparation process will not fall on wet, newly-coated surfaces.

3.5 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

2. Hand Tool Cleaning (SSPC SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC SP5): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

5. Commercial Blast Cleaning (SSPC SP6): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.

6. Brush-Off Blast Cleaning (SSPC SP7): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint.

7. Near-White Blast Cleaning (SSPC SP10): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.

3.6 FERROUS METAL SURFACE PREPARATION (UNGALVANIZED)

A. Surface salts shall be removed by washing with potable water and Chlor*Rid, followed by rinsing with potable water. Repeat the wash/rinse cycle until surface chloride salts are reduced to less than 7 micrograms per square centimeter.

B. The minimum abrasive blasting surface preparation shall be as indicated in the coating system schedules included at the end of this Section. Where there is a conflict between these requirements and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.

C. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast-cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers, NACE Standard TM-01-70 - Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive and TM-01-75 - Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit.

D. Oil, grease, welding fluxes, and other surface contaminants shall be removed by solvent cleaning per SSPC SP1 - Solvent Cleaning prior to blast cleaning.

E. Sharp edges shall be rounded or chamfered, and burrs and surface defects and weld splatter shall be ground smooth prior to blast cleaning.

F. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular product and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag. Automated blasting systems shall not be used for surfaces that will be in submerged service. Metal shot or grit shall not be used for surfaces that will be in submerged service, even if subsequent abrasive blasting will use hard, sharp cutting crushed slag.

G. Abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least 50 percent grit.

H. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

I. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil and moisture separators that remove at least 95 percent of the contaminants.

J. Surfaces shall be cleaned of dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another approved method prior to painting.

K. Enclosed areas and other areas where dust settling is a problem shall be vacuum-cleaned and wiped with a tack cloth.

L. Damaged or defective coating shall be removed by the blast cleaning to meet the clean surface requirements before recoating.

M. If the required abrasive blast cleaning will damage adjacent WORK, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC SP2 or SSPC SP3 may be used.

N. Shop-applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP1 before the abrasive blast cleaning has been started.

O. Shop primed equipment shall be solvent-cleaned in the field before finish coats are applied.

3.7 FERROUS METAL SURFACE PREPARATION (GALVANIZED)

A. Galvanized ferrous metal shall be alkaline cleaned per SSPC SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system, followed by brush off blast cleaning per SSPC SP7.

B. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer.

C. SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS, EXCLUDING STEEL RESERVOIR INTERIORS

D. General: Grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.

E. Abrasive Blast Cleaning: The CONTRACTOR shall provide the degree of cleaning indicated in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not indicated in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC SP6. Areas of tightly adhering coatings shall be cleaned to SSPC SP7, with the remaining thickness of existing coating not to exceed 3-mils.

F. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the CONTRACTOR shall apply intermediate coatings per the manufacturer's recommendation for the indicated coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.

G. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.

H. Water Abrasive or Wet Abrasive Blast Cleaning: Where indicated or where Site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged or severe service coating systems unless indicated.

3.8 PLASTIC AND NONFERROUS METALS SURFACE PREPARATION

A. Plastic and fiber glass surfaces shall be sanded or brush off blast cleaned prior to solvent cleaning with a chemical compatible with the coating system primer.

B. Non-ferrous metal surfaces shall be solvent-cleaned SSPC SP1 followed by sanding or brush-off blast cleaning SSPC SP7.

C. Surfaces shall be clean and dry prior to coating application.

3.9 SHOP COATING REQUIREMENTS

A. Unless otherwise indicated, items of equipment or parts of equipment which are not submerged in service shall be shop-primed and then finish-coated in the field after installation with the indicated or selected color. The methods, materials, application equipment, and other details of shop painting shall comply with this Section. If the shop primer requires topcoating within a specific period of time, the equipment shall be finish-coated in the shop and then be touched up after installation.

B. Items of equipment or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have surface preparation and coating performed in the field.

C. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the indicated quality in the field. Such equipment shall be primed and finish-coated in the shop and touched up in the field with the identical material after installation. The CONTRACTOR shall require the manufacturer of each such piece of equipment to certify as part of its Shop Drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the Shop Drawings for the equipment.

D. For certain small pieces of equipment the manufacturer may have a standard coating system that is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the Shop Drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

E. Shop-painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before being topcoated, or less time if recommended by the coating manufacturer.

F. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturer's printed instructions.

G. The CONTRACTOR shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment Shop Drawings.

3.10 APPLICATION OF COATINGS

A. The application of protective coatings to steel substrates shall be in accordance with SSPC PA1 - Paint Application Specification No. 1.

B. Cleaned surfaces and each coat shall be inspected prior to applying each succeeding coat. The CONTRACTOR shall schedule such inspection with the ENGINEER in advance.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same day.

D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to occur. Use stripe painting with a brush in these areas.

F. Special attention shall be given to materials that will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Finish coats, including touch-up and damage repair coats shall be applied in a manner that will present a uniform texture and color matched appearance.

H. Coatings shall not be applied under the following conditions:

1. Temperatures exceeding the manufacturer's recommended maximum and minimum allowable.

2. Concrete surfaces will be in direct sunlight during application or within 3 hours after application.

3. Dust or smoke laden atmosphere.

4. Damp or humid weather.

5. Substrate or air temperature is less than 5 degrees F above the dewpoint.

6. Air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dewpoint within 8 hours after application of coating.

7. Wind conditions are not calm.

I. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychometric tables.

J. Unburied steel piping shall be abrasive blast cleaned and primed before installation.

K. Finish coats shall be applied after concrete, masonry, and equipment installation is complete, and the working areas are clean and dust free.

3.11 CURING OF COATINGS

A. The CONTRACTOR shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the most stringent, prior to placing the completed coating system into service.

B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.

3.12 IDENTIFICATION OF PIPING

A. Identification of piping shall be in accordance with Section 431051 - Piping Identification Systems.

B. Every valve or connection, where it may be possible for a worker to be exposed to a hazardous substance, shall be labeled per OSHA Occupational Safety and Health Standards 29CFR1910.1200.

3.13 SHOP AND FIELD INSPECTION AND TESTING

A. General: The CONTRACTOR shall give the ENGINEER a minimum of 3 Days advance notice of the start of any field surface preparation or coating application, and a minimum of 7 Days advance notice of the start of any surface preparation activity in the shop.

B. Such WORK shall be performed only in the presence of the ENGINEER, unless the ENGINEER has granted prior approval to perform such WORK in its absence.

C. Inspection by the ENGINEER, or the waiver of inspection of any particular portion of the WORK, shall not relieve the CONTRACTOR of its responsibility to perform the WORK in accordance with these Specifications.

D. Scaffolding shall be erected and moved to locations where requested by the ENGINEER to facilitate inspection. Additional illumination shall be furnished on areas to be inspected.

E. Inspection Devices: The CONTRACTOR shall furnish inspection devices in good working condition for the detection of holidays and measurement of dry film thicknesses of coatings. Dry-film thickness gauges shall be made available for the ENGINEER's use while coating is being done, until final acceptance of such coatings. The CONTRACTOR shall furnish the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the ENGINEER.

F. Holiday Testing: The CONTRACTOR shall test for continuity all coated ferrous surfaces inside a steel reservoir, other surfaces that will be submerged in water or other liquids, surfaces that are enclosed in a vapor space in such structures, and surfaces coated with any of the submerged and severe service coating systems. Areas that contain discontinuities shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then be retested.

1. Coatings with thickness exceeding 20-mils total DFT: Pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the required coating thickness.

2. Coatings with thickness of 20-mils or less total DFT: Tinker & Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75 volts. For thicknesses between 10- and 20-mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo or equal, shall be added to the water prior to wetting the detector sponge.

G. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC Paint Application Specification No. 2 using a magnetic type dry film thickness gauge such as Mikrotest Model FM, Elcometer Model 111/1EZ, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

H. Surface Preparation: Evaluation of blast cleaned surface preparation will be based upon comparison of the blasted surfaces with the standard samples available from NACE, using NACE standards TM-01-70 and TM-01-75.

I. Coating System Schedule, Ferrous Metal - Not Galvanized

	Item	**Surface Prep.**	**System No.**
FM-1	All surfaces indoors and outdoors, exposed or covered, except those included below.	Commercial blast cleaning SSPC SP6	(4) epoxy/ polyurethane
FM-3	Surfaces of equipment and ferrous surfaces submerged or intermittently submerged in potable water, utility water, and wastewater including all surfaces lower than 2 feet above high water level in hydraulic structures, and all surfaces inside enclosed hydraulic structures and vents (excluding shop-coated valves, couplings, pumps).	White metal blast cleaning SSPC SP5	(100) amine cure epoxy
FM-8	Where indicated, ferrous surfaces in water passages and submerged surfaces of all pumps which have discharge size of 4 inches or larger.	White metal blast cleaning SSPC SP5	(100) amine cure epoxy
FM-9	Ferrous surfaces of sleeve couplings.	Solvent cleaning SSPC SP1, followed by white metal blast cleaning SSPC-SP10	(106) fusion bond epoxy
FM-16	Surfaces of indoor equipment, not submerged	Commercial blast cleaning SSPC SP6	(4) epoxy/polyurethane
FM-19	Buried pipe couplings, valves, and flanged joints (where piping is ductile or cast iron, not tape-coated), including factory-coated surfaces.	As specified by reference specification	(205) polyethylene encasement

J. Coating System Schedule, Ferrous Metal - Galvanized: Pretreatment coatings, barrier coatings, or washes shall be applied as recommended by the coating manufacturer. All galvanized surfaces shall be coated except for the following items which shall be coated only if required by other Sections: (1) Floor gratings and frames, (2) Handrails, (3) Stair treads, (4) Chain link fencing and appurtenances.

	Item	**Surface Prep.**	**System No.**
FMG-1	All exposed surfaces indoors and outdoors, except those included below.	Solvent cleaning SSPC SP1	(4) epoxy/ polyurethane

K. **Coating System Schedule, Interior Surfaces of Welded Steel Tanks:** For steel tank exterior coating systems, see "Coating System Schedule, Ferrous Metal-Not Galvanized":

Product Stored	**Surface Prep.**	**System No.**
Water, potable water, utility water, Vaccum System Break tank	White metal blast cleaning SSPC SP5	(100) Amine-cured epoxy

3.14 COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBER GLASS

A. Where isolated non-ferrous parts are associated with equipment or piping, the CONTRACTOR shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

	Item	**Surface Prep.**	**System No.**
NFS-1	All exposed surfaces, indoors and outdoors, except those included below.	Solvent cleaned SSPC SP1	(4) epoxy/polyurethane
NFS-4	Polyvinyl chloride plastic piping, indoors and outdoors, or in structures, not submerged.	Solvent cleaned SSPC SP1	(7) acrylic latex

3.15 COATING SCHEDULE PROCESS MECHANICAL, ELECTRICAL AND INSTRUMENTATION

A. The design intent is to coat all work not specifically called out to be uncoated. The table below is a summary of coating requirements for process mechancial, electrcial and instrumentation work. Where work is not included in the schedule, provide the appropriate coating system from this section whether included below or not. Refer to Specification Section 99100 - Architectural Coatings for coating systems for the Pump Station Building for coatings of concrete, concrete block masonry, doors and frames, building components and the like.

Item	**System No.**
Buried ductile iron pipe and fittings	205
Buried polyethylene pipe	None
Exposed ductile iron pipe	FM-1
Stainess steel pipe, fittings and valves	None
Galvanized steel pipe supports	FMG-1
PVC pipe (inside)	Do not coat
PVC pipe (outside)	NFS-4
Vacuum tank	Manufacturer's prime and finish coating
Vacuum pumps	FM-16
Raw water pumps	FM-16
Sump pumps	Manufacturer's prime and finish coating

Item	System No.
Ferrous valves (vacuum prime valves, air release valves, plug valves, check valves, etc.), flange adapters and iron-body venturi meter	FM-16
Aluminum gantry crane	No coating
Hoists for mono-rail and gantry crane	Manufacturer's prime and finsh coating
Aluminum instrument stands	No coating
Galvanized steel wall sleeves (exposed portions, after installation)	FMG-1
Brass or stainless steel covers, grates, and equipment drain funnels for plumbing floor drains or cleanouts	No coating
Brass or bronze backflow preventers	No coating
Stainess steel wall hydrant covers	No coating
Stainless steel hose rack	No coating
Louvers	Refer to Section 99100
AC condensing units and air handler	Manufacturer's prime and finish coating
Themostats, dampers, exhaust fans	Manufacturer's prime and finish coating
Instruments	Factory prime and finished coating

Item	System No.
PVC conduit (outside)	NFS-4 (match adjacent surface color)
PCV conduit (inside)	Do not coat
Aluminum conduit	Do not coat
Ferrous electrical panels, MCC, transformers	Manufacturer's prime and finished coating
Lighting	Manufacturer's prime and finished coating

- END OF SECTION -

SECTION 101400 – BUILDING SIGNAGE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide building signage and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. Florida Accessibility Code.

C. Americans with Disabilities Act (ADA): ADA Accessibility Guidelines (ADAAG).

D. Building Code: Refer to the Drawings to determine which Building Code applies. The applicable Building Code, defined by the Drawings, is referred to herein as “the CODE.”

E. National Fire Protection Association (NFPA):

NFPA 704 Identification of the Hazards of Materials for Emergency Response

F. Occupational Safety and Health Administration (OSHA).

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Literature: Manufacturer’s specifications, technical data, installation methods, and maintenance instructions, and the following:

1. Manufacturer’s full range color charts, indicating custom color availability for color selection by the OWNER.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification by the building signage Manufacturer that the building signage provided is suitable for, and compatible with, the required installation.

2. Certification by the building signage Manufacturer that the building signage provided is suitable for, and compatible with, the substrates and surfaces indicated.

3. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated.

4. When requested by the ENGINEER, furnish other certifications as may be required to demonstrate compliance with the Contract Documents.

E. Shop Drawings: Complete Shop Drawings showing location and detail of installation.

1. Shop Drawings shall be drawn to sufficient scale and shall include dimensions, show elevations and details of construction of each building signage type, schedule of building signage, mounting details, location and installation requirements, thickness of materials, joints, provisions for expansion and contraction, connections, accessories, and trim.

F. Samples: The CONTRACTOR shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show gauges, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. Full-size sample of each typical building signage type.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Building signage shall be provided by a single Manufacturer, unless otherwise indicated.

B. Manufacturer Qualifications:

1. Building signage Manufacturer shall have a minimum of 10 years of building signage manufacturing experience.

2. Building signage Manufacturers shall have the ability to print signs in Spanish.

3. Manufacturers without these qualifications will not be accepted.

1.5 SPECIAL WARRANTY PROVISIONS

A. Furnish Manufacturer's 15-year written warranty to cover defects in materials, products, and manufacturing workmanship.

1. Warranty shall include coverage against chipping, fading, rusting, shattering, or peeling.

B. Warranties shall be non-prorated for the entire warranty period.

C. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Building signage shall be recommended by the Manufacturer for the installation indicated.

B. Building signage shall be suitable for, and compatible with, the required installation.

C. Building signage shall be suitable for, and compatible with, the substrates and surfaces indicated.

2.2 RESTRICTIVE/CAUTION SIGNS

A. Signs shall be 0.125 inch anodized aluminum plate, rounded corners, cast high intensity reflective vinyl background with 7 plus year durability, lettering to be cast vinyl Oracal 951 or equivalent with 7 plus year durability and surface to be sealed with a transparent vinyl laminate.

B. Signs shall be minimum 14 inches (356 mm) wide by 10 inches (254 mm) tall in rounded corners. Color of signs and letters shall be in accordance with OSHA standards. All other aspects of the Restrictive/Caution Signs shall be in accordance with OSHA standards. If OSHA standards do not apply, the color shall be red with white letters, 1-inch (25 mm) high.

C. Signs shall be mounted as scheduled, as recommended in writing by the Manufacturer, and as approved by the ENGINEER.

D. Sign sizes shall be adjusted to suit the number of letters in each sign with a 1 1/2-inch (38.1 mm) minimum border all around. Two lines are permitted. Left-hand justify the letters.

2.3 DEDICATION PLAQUE

A. Cast Bronze Plaque shall be Recognition Plaque PBF-3 by Architectural Bronze Aluminum Corporation, Deerfield, Illinois, or approved equal.

B. Plaque shall be 18 inches (458 mm) wide by 24-inches (610 mm) tall, and constructed of bronze (CDA922) 88-6-2-4 satin face with standard brown color background and edges, semi-gloss polyurethane finish.

C. Plaque background color shall be brown with a leatherette texture. Plaque shall incorporate the CITY logo as two-dimensional flat type. The following wording shall be included utilizing times new roman font:

Blue Sink Pump Station 201x
A project to help restore freshwater flow to the Lower Hillsborough River.
Cooperative funding received from the Southwest Florida Water Management District
Design Team: MWH, and Greeley and Hansen
Contractor: XXX

D. Plaque shall be wall mounted per Manufacturer standard. Plaque location shall be on the east Electrical Room wall below the glass block window.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer’s original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 LOCATIONS

A. Signage shall be installed at the locations indicated or as otherwise required by the CODE, Florida Accessibility Code, ADAAG, NFPA 704, and OSHA. Where a conflict occurs between the requirements of this Section and the references herein, the more stringent shall apply, as directed by the ENGINEER.

B. Where not indicated, signs shall be installed as directed by the ENGINEER.

C. Signs shall be mounted 60 inches (1520-millimeters) above the floor, unless otherwise indicated.

3.3 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where building signage will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed building signage.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of building signage and appurtenances. Coordinate delivery with other WORK to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR'S acceptance of the substrate, areas, and conditions.

3.5 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.6 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, with the requirements of the CODE, Florida Accessibility Code, NFPA 704, OSHA, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

C. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

D. Horizontal lines shall be level, and vertical lines shall be plumb.

E. The CONTRACTOR shall block and reinforce walls as required to support building signage, and appurtenances.

3.7 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, building signage and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer's written instructions.

C. Building signage shall be protected from damage from subsequent construction operations.

D. The CONTRACTOR shall make adjustments required until accepted.

E. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

F. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

G. When building signage WORK is completed, remove unused materials, containers, and equipment, and clean the Site of building signage debris.

3.8 RESTRICTIVE/CAUTION SIGN SCHEDULE

Quantity	Sign Wording	Location
3 English	DANGER Equipment may start without warning	• Two double faced signs hanging over Pump 1 North and Pump 2 South (two signs total), stainless steel chain. • One single faced sign mounted to wall adjacent to vacuum priming pumps.
3 English	CAUTION Non-Potable Water Do not drink	Wall mount at each hose bib.
1 English	CAUTION Floor Loading Capacity 150 pounds per square foot (14.4 kPa) 1,000 pounds (13.3kN) concentrated	
1 English	WARNING PUMP SUCTION PIPING	Pump Suction Piping sign per detail M-904 on Contract Drawings. Mount warning sign on two 4”x4” square by 8’ long precast concrete posts. Bury posts 3’ in ground.
2 English	WARNING RESTRICTED AREA	Restricted Area sign per detail M-902 on Contract Drawings. Mount on east and west fence gates.
1 English	IN CASE OF EMERGENCY DIAL 911 Tampa Water Department Contact Numbers Operations (813) 231-5258 Security (813) 231-1307	Mounted by front door number 100A.
1 English	CAUTION MAX ALLOWABLE LOAD ON CRANE 4000 LBS.	Overhead Crane Capacity sign per detail M-903 on Contract Drawings. Mounted near double door number 100A.

Quantity	Sign Wording	Location
1 English	CAUTION MAX ALLOWABLE LOAD ON CRANE 4000 LBS.	Gantry Crane Capacity sign similar to detail M-903 on Contract Drawings. Mount on gantry crane.
1 English	Raw Water Pump No. 1 North 'ORANGE'	Double faced hanging over pump with stainless steel chain.
1 English	Raw Water Pump No. 2 South 'BLUE'	Double faced hanging over pump with stainless steel chain.
1 English	TO SULPHUR SPRINGS TRANSMISSION MAIN	Mounted on wall where pipe exits Pump Station.
2 English	FROM BLUE SINK	Mounted on wall where pipes enter the Pump Station from Blue Sink.
1 English	Sump Pump No. 1 North	Mounted on wall above sump pump.
1 English	Sump Pump No. 2 South	Mounted on wall above sump pump.
1 English	Vacuum Pump No. 1 North	Mounted on wall above vacuum pump.
1 English	Vacuum Pump No. 2 South	Mounted on wall above vacuum pump.
2 English	Notice Authorized Personnel Only	One mounted on the outside of all exterior doors.

- END OF SECTION -

SECTION 104400 - FIRE EXTINGUISHERS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide fire extinguishers and appurtenant WORK, complete, in place, and operational in accordance with the Contract Documents.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. Building Code: Refer to the Drawings to determine which building code applies. The applicable building code, defined by the Drawings, is referenced herein as “the CODE”.

C. National Fire Protection Association publications (NFPA):

NFPA 10 Standard for Portable Fire Extinguishers

D. Underwriter’s Laboratories (UL)

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

1. Literature: Manufacturer’s specifications, technical data, installation methods, and maintenance instructions.

2. Certifications:

a. UL certification for each fire extinguisher unit provided.

b. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated.

3. When requested by the ENGINEER, furnish other certifications as may be required to show compliance with the Contract Documents.

4. Shop Drawings: Complete Shop Drawings showing location and detail of installation. Shop Drawings shall include mounting and bracket details.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Fire extinguishers shall be provided by a single Manufacturer.

B. Manufacturer Qualifications**:**

1. Fire extinguisher Manufacturer shall have a minimum of 20 years of fire extinguisher manufacturing experience.

2. Manufacturers without these qualifications will not be accepted.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Fire extinguishers, accessories, and installation shall comply with the CODE, NFPA 10, and with the Manufacturer's published recommendations and specifications.

2.2 FIRE EXTINGUISHERS:

A. Manufacturer, or Equal:

1. Subject to the requirements indicated, provide products from one of the Manufacturers listed below, or Equal.

a. **J.L Industries, Inc.**

b. **Larsen's Manufacturing Co**.

c. **General Fire Extinguisher Co.**

B. Description:

1. Fire extinguishers in every location, except in rooms or spaces containing electrical switchgear, motor control centers, variable frequency drives, generator rooms, etc., shall be 20 lb capacity, 20A:120BC (ABC), UL-rated, chemical multipurpose type.

2. Fire extinguishers in rooms or spaces containing electrical switchgear, motor control centers, variable frequency drives, generator rooms, etc., shall be 20 lb capacity 10 BC, UL-rated, carbon dioxide type.

3. Fire extinguishers shall be provided with severe duty corrosion resistant finish, red enamel steel cylinders.

4. Fire extinguishers shall be provided with mounting brackets, which support the bottom and sides of extinguishers, and are specially designed for the extinguisher, as recommended in writing by the Manufacturer.

PART 3 -- EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in Manufacturer's original, unopened packages, containers, or bundles with labels intact, which clearly identify contents.

B. Store materials carefully in accordance with the Manufacturer's written instructions, in an area that is protected from deleterious elements, and in a manner that will prevent damage to the products.

C. Handle materials in strict accordance with Manufacturer's written instructions.

3.2 LOCATIONS

A. The CONTRACTOR shall verify the fire extinguisher locations and mounting heights on the Contract Drawings with the Fire Marshall before installation. If locations on the

Drawings are not accepted by the Fire Marshal, install fire extinguishers where directed by the ENGINEER.

3.3 PROJECT CONDITIONS

A. Comply with Manufacturer's written instructions for environmental conditions before, during, and after installation.

B. Protect surrounding WORK from damage that may result from operations under this Section.

3.4 INSPECTION

A. The CONTRACTOR shall be totally responsible for the proper performance and completion of the WORK under this Section.

B. Systems and components shall be inspected before installation.

1. Damaged or defective items shall be rejected and marked as such and shall be removed from the Site.

2. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discoloration, or other surface imperfections on the finished units shall be rejected.

C. The CONTRACTOR shall verify dimensions, tolerances, and method of attachment with adjacent WORK.

1. Examine substrates, areas, and conditions where fire extinguishers and appurtenances will be installed for compliance with the requirements for installation, taking into account tolerances, and other conditions affecting performance of installed fire extinguishers and appurtenances.

a. Provide inserts, backing, blocking, anchoring devices, and reinforcements that must be built into other WORK for the installation of fire extinguishers and appurtenances. Coordinate delivery with other WORK to avoid delay.

2. Notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the WORK. Do not proceed with the WORK until unsatisfactory conditions have been corrected in an acceptable manner.

3. Commencement of the installation by the CONTRACTOR shall indicate CONTRACTOR's acceptance of the substrate, areas, and conditions.

3.5 PREPARATION

A. Sequence installation properly with the installation and protection of other WORK, so that neither will be damaged by the installation of the other.

3.6 INSTALLATION

A. Installation shall comply with the requirements of the Contract Documents, with applicable references, the requirements of the CODE, with NFPA 10, and with Manufacturer's written instructions. Where a conflict occurs among these requirements, the more stringent shall apply, as directed by the ENGINEER.

B. The CONTRACTOR shall block and reinforce walls as required to support the fire extinguishers and appurtenances.

C. The CONTRACTOR shall provide corrosion resistant fasteners, anchors, and shims required for a complete installation, and shall be secure, plumb, level, straight, and true to line, allowing for required movement, including expansion and contraction.

D. The CONTRACTOR shall provide separation of dissimilar materials to ensure no galvanic action occurs.

E. Horizontal lines shall be level, and vertical lines shall be plumb.

F. Secure mounting brackets and fire extinguishers to structure, square and plumb.

3.7 CLEANING, FINISHING, AND PROTECTION

A. Adhesive papers used for masking which become firmly bonded when exposed to heat and/or light shall not be used.

1. Remove masking film and temporary labels as soon as possible after installation. Films and labels left in place after installation shall be the responsibility of the CONTRACTOR.

2. Residue shall not be left on any surfaces.

B. Upon completion of the installation, fire extinguishers and appurtenances shall be cleaned of dirt and other foreign matter to the satisfaction of the ENGINEER.

1. Cleaning shall be performed again immediately prior to acceptance of the WORK, when directed by the ENGINEER.

2. Cleaning shall be performed in accordance with the Manufacturer’s written instructions.

C. Fire extinguishers shall be protected from damage from subsequent construction operations.

D. The CONTRACTOR shall make adjustments required until accepted.

E. The CONTRACTOR shall remove scratches and blemishes to the satisfaction of the ENGINEER.

F. Damaged or defective items shall be removed and replaced at the direction of the ENGINEER.

G. When fire extinguishers WORK is completed, remove unused materials, containers, and equipment, and clean the Site of fire extinguishers debris.

H. Fire extinguishers shall be inspected and certified within 30 days of Substantial Completion.

- END OF SECTION -

SECTION 260000 – ELECTRICAL WORK, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide the electrical WORK, complete and operable, as indicated in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all Sections in Division 26, except as otherwise indicated.

C. The WORK of this Section is required for operation of electrically-driven equipment provided under Specifications in other Divisions.

D. The CONTRACTOR'S attention is directed to the requirement for proper coordination of the WORK of this Section with the WORK of equipment Specifications, the WORK of instrumentation Sections, and the WORK of Section 260510 – Electric Motors.

E. Concrete, excavation, backfill, and steel reinforcement required for encasement, installation, or construction of the WORK of the various Sections of Division 26 is included as a part of the WORK under the respective Sections, including duct banks, manholes, handholes, equipment housekeeping pads, and light pole bases.

F. Equipment supports and foundations shall be in conformance with the requirements of Section 460100 – Equipment General Provisions.

1.2 REFERENCE STANDARDS

NEC (NFPA 70)	National Electrical Code
NETA	International Electrical Testing Association
NEMA 250	Enclosure for Electrical Equipment (1000 Volts Maximum)
ANSI / IEEE C37.20.7	Arc Flash
NFPA 70E	Electrical Safety in the Workplace

A. Electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL) or an independent testing laboratory acceptable to the local code enforcement agency having jurisdiction.

B. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards (29 CFR 1910 and 29 CFR 1926, as applicable), state building standards, and applicable local codes and regulations.

C. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.3 SIGNAGE AND MARKINGS

A. Identification

1. Provide danger, caution, and warning signs and equipment identification markings in accordance with applicable federal, state, OSHA, and NEC requirements.

B. Local Disconnect Switches

1. Legibly mark each local disconnect switch for motors and equipment in order to indicate its purpose, unless the purpose is indicated by the location and arrangement.

C. Warning Signs

1. 600 Volts Nominal, or Less

a. Mark entrances to rooms and other guarded locations that contain live parts with conspicuous signs prohibiting unqualified persons from entering.

2. Greater than 600 Volts

a. Buildings, rooms, or enclosures containing exposed live parts or exposed conductors operating at greater than 600 volts nominal shall be lockable.

b. Provide permanent and conspicuous warning signs reading as follows: DANGER – HIGH VOLTAGE – KEEP OUT.

3. Mark indoor electrical installations that are open to unqualified persons and contain metal-enclosed switchgear, unit substations, transformers, and other similar associated equipment over 600 volts nominal, with appropriate caution signs.

4. Outside Branch Circuits and Feeders over 600 Volts

a. Post warning signs in plain view where unauthorized persons might come in contact with live parts: WARNING – HIGH VOLTAGE – KEEP OUT.

D. Isolating Switches

1. Provide isolating switches not interlocked with an approved circuit-interrupting device with a sign warning against opening them under load.

1.4 PUBLIC UTILITIES REQUIREMENTS

A. Contact the serving utility and verify compliance with requirements before construction.

B. Coordinate schedules and payments for WORK by utilities.

C. Where conduits and conductors in the WORK are indicated to be larger, heavier schedule, or have greater protective coating than utility requirements, provide the larger size, heavier schedule, or greater protection.

D. Provide electrical service as indicated and as required by the serving utility.

E. Verify and provide service conduits, fittings, transformer pad, grounding devices, and service wires not provided by the serving utility.

F. Verify with the utility the exact location of each service point and type of service, and pay charges levied by the serving utilities as part of the WORK.

G. Network Cable Service

1. Provide broadband network service from the utility connection to the network panel within the Security Panel.

2. Provide cable modem, power supply, and network specific hardware for installation within the Security Panel to the utility connection point.

1.5 PERMITS AND INSPECTION

A. Obtain permits and pay inspection fees according to the General Conditions.

B. Pay connection, service, installation, and turn-on service charges required by the utility company.

1. Tampa Electric Utility

2. Brighthouse Networks (Cable and Network communications)

1.6 CONTRACTOR SUBMITTALS

A. General

1. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

2. Custom-prepare Shop Drawings.

3. Drawings or data indicating "optional" or "as required" equipment will not be accepted.

4. Cross out options not proposed or delete from the Shop Drawings.

B. Shop Drawings: Include the following:

1. Complete material lists stating manufacturer and brand name of each item or class of material.

2. Shop Drawings for grounding WORK not specifically indicated

3. Front, side, rear elevations, and top views with dimensional data

4. Location of conduit entrances and access plates

5. Component data

6. Connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers

7. Method of anchoring, seismic requirements, weight

8. Types of materials and finish

9. Nameplates

10. Temperature limitations, as applicable

11. Voltage requirement, phase, and current, as applicable

12. Front and rear access requirements

13. Test reports

14. Grounding requirements

C. Catalog Cuts

1. Submit catalog cuts or photocopies of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material.

2. Stamp the catalog data sheets in order to indicate the Project name, applicable Specifications Section and Paragraph, model number, and options.

D. Materials and Equipment Schedules

1. Within 30 Days of the commencement date in the Notice to Proceed, deliver to the ENGINEER a complete list of materials, equipment, apparatus, and fixtures that are proposed for use.

2. Include in the list the type, size, name of manufacturers, catalog number, and such other information as required to identify the item.

E. Technical Manuals

1. Submit complete information in accordance with the requirements of Section 013300 – Contractor Submittals.

2. As-Built Drawings

a. Prepare as-built drawings, showing invert and top elevations and routing of duct banks and concealed below-grade electrical installations, panels, and equipment.

b. Identify equipment and conduits using identification shown on drawings.

c. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 013300 – Contractor Submittals.

1.7 AREA DESIGNATIONS

A. General

1. Designations for raceway system enclosures shall comply with the requirements of Section 260533 – Electrical Raceway Systems.

2. Designations for electrical WORK specifically indicated in other Sections shall comply with the requirements of those Sections unless indicated otherwise.

3. Designations for other electrical WORK not included in the above Paragraphs shall be as follows:

AREA	NEMA ENCLOSURE CLASSIFICATION					
	1	3R	4X	9	12	Notes
Outside			x			316 stainless steel
Electrical Room					x	
Pump Room			X			316 stainless steel Damp location

4. Designations for electrical WORK not included in the above Paragraphs shall be 316 Stainless Steel, NEMA 4X.

B. Material Requirements

1. Construct NEMA 1, 3R, and 12 enclosures of steel, and prime and coat with ANSI 61 light grey paint.

1.8 TESTS

A. The CONTRACTOR shall be responsible for factory and field tests indicated in Division 26, as required by the ENGINEER, and as required by other authorities having jurisdiction.

B. Furnish necessary testing equipment.

C. Pay the costs of the tests, including replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of a faulty installation.

D. Reporting

1. Where test reporting is indicated, submit proof-of-design test reports for mass-produced equipment with the Shop Drawings.

2. Submit factory performance test reports for custom-manufactured equipment for approval prior to shipment.

3. Submit field test reports for review prior to Substantial Completion.

E. Remove and replace equipment or material that fails a test, or, if the ENGINEER approves, repair and retested for compliance.

F. Corrections to equipment or materials with a factory warranty shall be as recommended by the manufacturer and shall be performed in a manner that does not void the warranty.

1.9 CONSTRUCTION SEQUENCING

A. General

1. Schedule the WORK, subject to OWNER's approval, to minimize required shutdown time.

2. Submit a written sequencing request, including the sequence and duration of activities to be performed during plant shutdown.

3. Switching, safety tagging, and the like, as required for plant shutdown or to isolate equipment, shall be performed by the CONTRACTOR.

4. In no case shall the CONTRACTOR begin any WORK in, on, or adjacent to existing equipment without written authorization from the ENGINEER.

B. Existing Utilities

1. Exercise extreme caution when digging trenches to not damage existing underground utilities.

2. The cost of repairs of damages caused during construction shall be included as a part of the WORK.

C. Field Verifications

1. Visit the Site before submitting a Bid to become better acquainted with the WORK of this Contract.

2. The lack of knowledge will not be accepted as justification for extra compensation to perform the WORK.

3. The cost for the above verifications shall be included as part of the WORK.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Provide equipment and materials that are new and are the products of experienced and reputable manufacturers in the industry.

B. Provide equipment and materials listed by UL and bearing the UL label, where UL requirements apply.

C. Provide similar items in the WORK as products of the same manufacturer.

D. Provide equipment and materials of industrial grade standard of construction.

E. Where a NEMA enclosure type is indicated in a non-hazardous location, use that type of enclosure despite the fact that certain modifications such as cutouts for control devices may negate the NEMA rating.

F. On devices indicated to display dates, display the year as 4 digits.

G. Temperature Ratings of Equipment Terminations

1. Provide terminations and lugs rated for use with 75-degree C conductors.

2. Wire sizes in the Contract Documents are based on NEC ampacity tables using the 75-degree C ratings.

2.2 MOUNTING HARDWARE

A. Miscellaneous Hardware

1. Provide nuts, bolts, and washers constructed of stainless steel.

2. Provide threaded rods for trapeze supports constructed from continuous threaded stainless steel, 3/8-inch diameter minimum.

3. Struts

a. Construct struts for mounting of conduits and equipment of stainless steel or aluminum.

b. Where contact with concrete or dissimilar metals may cause galvanic corrosion, use suitable non-metallic or aluminum insulators in order to prevent such corrosion.

c. Do not use aluminum strut for free-standing support frames.

d. Strut Manufacturer, or Equal: **Unistrut; B-Line**

4. End Caps

a. Provide plastic protective end caps for all exposed strut ends.

b. End Caps Manufacturer, or Equal: **Unistrut, Model P2860**

5. Anchors

a. Provide stainless steel expansion anchors for attaching equipment to concrete walls, floors, and ceilings.

b. Wood plugs will not be accepted.

c. Anchor Manufacturer, or Equal: "Power-Bolt" or "Power-Stud" as manufactured by Power Fasteners, Inc.; similar by Star.

2.3 ELECTRICAL IDENTIFICATION

A. Nameplates

1. Fabricate nameplates from white-letter, black-face laminated plastic engraving stock, such as Formica Type ES-1 or equal.

2. Securely fasten each nameplate, using fasteners constructed of brass, cadmium-plated steel, or stainless steel, and screwed into inserts or tapped holes as required.

3. Provide engraved characters of the block style, with no characters smaller than 1/8 inch top to bottom.

B. Conductor and Equipment Identification

1. Provide imprinted plastic-coated cloth marking devices, such as manufactured by Brady, Thomas & Betts, or equal.

2. Alternatively, provide heat-shrunk plastic tubing, imprinted split-sleeve markers cemented in place.

2.4 PROTECTIVE MATTING

A. Provide full-width, high-voltage switchboard matting in front of indoor switchgear, service equipment, and motor control centers.

B. For 600-volt equipment, provide matting that is 1/4 inch thick and 42 inches wide .

C. Matting Manufacturer, or Equal

1. W.H.Salisbury and Company; Mats, Inc.; Rhino

PART 3 -- EXECUTION

3.1 GENERAL

A. Incidentals

1. Provide materials and incidentals required for a complete and operable system, even if not required explicitly by the Contract Documents.

2. Typical incidentals are terminal lugs not furnished with vendor-supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor-furnished equipment to connect with other equipment indicated in the Contract Documents.

B. Field Control of Location and Arrangement

1. The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items.

2. Exact locations shall be determined by the CONTRACTOR in the field, based on the physical size and arrangement of equipment, finished elevations, and other obstructions.

3. Follow the locations on the Drawings, however, as closely as possible.

4. Conduits

a. Where conduit development drawings or "home runs" are indicated, route the conduits in accordance with those requirements.

b. Provide exposed or encased routings as indicated, except conceal conduit in finished areas unless indicated otherwise.

c. Size conduits encased in a slab for conduit OD not to exceed 1/3 of the slab thickness, and lay out and space as to not impede concrete flow.

5. Placement

a. Install conduit and equipment in such a manner as to avoid obstructions, to preserve headroom, and to keep openings and passageways clear, including hoistways.

b. Locate luminaires, switches, convenience outlets, and similar items within finished rooms as indicated.

c. Where exact locations are not indicated, such locations will be determined by the ENGINEER.

d. If equipment is installed without instruction and must be moved, the cost of moving shall be included as part of the WORK.

e. Slightly adjust luminaire locations in order to avoid obstructions and to minimize shadows if required.

6. Circuits

a. Wherever conduits and wiring for lighting and receptacles are not indicated, it shall be the CONTRACTOR'S responsibility to provide lighting and receptacle-related conduits and wiring as required, based on the actual installed fixture layout and the circuit designations as indicated.

b. Provide No. 12 AWG minimum wiring, and 3/4-inch minimum conduits (exposed) and one-inch minimum conduits (encased).

c. Where circuits are combined in the same raceway, derate conductor ampacities in accordance with NEC requirements.

C. Workmanship

1. Install materials and equipment in strict accordance with the printed recommendations of the manufacturer, and using workers skilled in the WORK.

2. Coordinate installation in the field with other trades in order to avoid interferences.

D. Protection of Equipment and Materials

1. Fully protect materials and equipment against damage from any cause.

2. Cover materials and equipment, both in storage and during construction, in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint.

3. Keep moving parts clean and dry.

4. Replace or refinish damaged materials or equipment, including faceplates of panels and switchboard sections, as part of the WORK.

E. Provide incoming utility power equipment in conformance with the utility's requirements.

F. Provide power wiring in conduit for the HVAC equipment in accordance with the requirements as shown on the DRAWINGS.

G. Provide starters shall be in accordance with the requirements of Section 262900 – Low Voltage Motor Control Center for starters in MCC'S, and with Section 260515 – Local Control Stations and Miscellaneous Electrical Devices for starters not in MCC'S,

H. Provide control wiring operating at 120 volts and less as required by the DRAWINGS.

3.2 CORE DRILLING

A. Perform core drilling as required for the installation of raceways through concrete walls and floors.

B. Base the locations of floor penetrations, as may be required, on field conditions.

C. Verify exact core drilling locations based on equipment actually furnished as well as exact field placement.

D. To the extent possible, identify the existence and locations of encased raceways and other piping in existing walls and floors with the OWNER prior to any core drilling activities.

E. Repair damage to encased conduits, wiring, and piping as part of the WORK.

3.3 CONCRETE HOUSEKEEPING PADS

A. Provide concrete housekeeping pads for indoor floor-standing electrical equipment.

B. Extend housekeeping pads for equipment, including future units, 4 inches above the surrounding finished floor or grade, and 2 inches larger in both dimensions than the equipment, unless otherwise indicated.

C. Provide concrete housekeeping curbs for conduit stub-ups in indoor and outdoor locations that are not concealed by equipment enclosures.

D. Extend housekeeping curbs to 4 inches above the finished floor or grade.

3.4 EQUIPMENT ANCHORING

A. Floor-supported, wall, or ceiling-hung equipment and conductors shall be anchored in place by methods that will meet seismic requirements in the area where the Project is located.

B. Provide wall-mounted panels that weigh more than 500 pounds or that are within 18 inches of the floor with fabricated steel support pedestals.

C. If the supported equipment is a panel or cabinet enclosed within removable side plates, match supported equipment in physical appearance and dimensions.

D. Provide transformers hung from 4-inch stud walls and weighing more than 300 pounds with auxiliary floor supports.

E. Provide leveling channels anchored to the concrete pad for switchgear and pad-mounted transformer installations.

F. Manufacturer's Recommendations

1. Anchoring methods and leveling criteria in the printed recommendations of the equipment manufacturers are a part of the WORK of this Contract.

2. Submit such recommendations as Shop Drawings as indicated.

3.5 EQUIPMENT IDENTIFICATION

A. Provide nameplates for panelboards, control and instrumentation panels, starters, switches, and pushbutton stations.

B. In addition to nameplates, equip control devices with standard collar-type legend plates.

C. Identify control devices within enclosures as indicated and similar to the subparagraph above.

D. Provide suitable inscribed finish plates for toggle switches that control loads out of sight of switches and for multi-switch locations of more than 2 switches.

E. Use equipment names and tag numbers, where indicated, on nameplates.

F. Provide typewritten circuit directories for panelboards and directories, that accurately reflect the outlets and devices connected to each circuit.

G. Terminal Blocks

1. Label termination points on terminal blocks by identifiers on the blocks.

2. Provide identifiers that have been preprinted by the terminal manufacturer or custom-printed.

3. Hand-lettered markers will not be accepted.

H. Tag distribution equipment, stand-alone disconnects, starters, and VFDs with appropriate arc-flash labels.

3.6 CLEANING

A. Before final acceptance, thoroughly clean the electrical WORK of cement, plaster, and other materials.

B. Remove temporary tags, markers, stickers, and the like.

C. Remove oil and grease spots with a non-flammable cleaning solvent, by carefully wiping and scraping cracks and corners.

D. Apply touch-up paint to scratches on panels and cabinets.

E. Vacuum-clean electrical cabinets and enclosures.

F. Clean luminaires inside and out.

G. Dispose cleaning debris and refuse off-Site.

- END OF SECTION -

SECTION 260126 – ELECTRICAL TESTS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. This Section specifies the WORK necessary to test, commission, and demonstrate that the electrical work satisfies the criteria of these Specifications and functions as required by the Contract Documents.

B. The WORK of this Section includes furnishing the labor, equipment, and power required to support the testing indicated in other Divisions of these Specifications. Electrical testing indicated herein and functional testing of power and controls not tested under Division 40 - Instrumentation, shall be completed before commencement of the 7 Day test of Section 017500 - Equipment Testing and Plant Startup. This scope may require the CONTRACTOR to activate circuits, shutdown circuits, run equipment, make electrical measurements, replace blown fuses, and install temporary jumpers, etc.

C. The requirements of Section 260000 - Electrical Work, General, apply to the WORK of this Section.

D. Carry out tests indicated herein for individual items of materials and equipment in other Sections. Testing shall be done in accordance with the manufacturer's instructions, these Specifications, and applicable NETA Acceptance Testing Specifications, NEMA, ANSI, NFPA, and ASTM Standards.

1.2 REFERENCES

A. General

1. The publications listed below form a part of this specification to the extent referenced.

2. Where a date is given for reference standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of the Notice Inviting Bids shall be used.

B. American National Standards Institute (ANSI)

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE)

D. IEEE 400-2001, Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems

E. IEEE 576-2000, Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in Industrial and Commercial Applications

F. InterNational Electrical Testing Association (NETA)

G. NFPA 70, National Electrical Code (NEC)

1.3 SUBMITTALS

A. Submit in accordance with Section 013300 Submittals and Section 260000.

B. Submit complete system test procedures for review. Test procedures shall include but not be limited to:

1. Detailed procedures in sufficient detail to verify conformance with these Specifications and manufacturers recommendations.

2. Incorporation of the Test Record Sheets included at the end of this Section.

3. Detailed comprehensive testing schedule including:

a. Each major piece of electrical distribution equipment.

b. Each major electrical subsystem.

c. Duration of each test.

d. Milestone test completion date.

e. Ambient Conditions at time of test

f. Date of test results submittals following completion of the tests.

g. Names and qualifications of the individual(s) responsible for performing the testing.

C. Submit the completed test results to the Engineer following completion of the test for review. The results shall include a dedicated section with the “as-left” settings of all devices, relays, circuit breakers, etc.

D. Test results shall be submitted in one organized and indexed submittal

E. Test reports shall be based on NETA’s latest Acceptance Testing Specifications having a sign-off, pass/fail data filed for each line item covered by NETA’s Acceptance Testing Specifications latest edition.

1.4 COMMISSIONING

A. Commissioning shall not be attempted until all subsystems have been found to operate satisfactorily. Commissioning shall only be attempted as a function of normal plant operation in which plant process flows and levels are routine and equipment operates automatically in response to flow and level parameters or computer command, as applicable. Simulation of process parameters shall be considered only upon receipt of a written request by the CONTRACTOR.

B. Motor Current Tabulation

1. The motor current tabulation required by Section 260573– Protective Device Studies shall reflect the values occurring during commissioning.

2. Power meters, ammeters and kilowattmeters shall be recorded every half-hour during the commissioning.

3. Motors which have current/power measurement capabilities shall have this data recorded every 5 minutes while operating during commissioning, verified with reading from the AFDs.

4. Power monitored amperes, voltage, and kilowatts for each phase shall be recorded every 5 minutes during commissioning.

PART 2 -- TESTING & REPORTS

2.1 PRE-ENERGIZATION AND OPERATING TESTS

A. The complete electrical system shall be performance tested when first installed on-site. Each protective, switching, and control circuit shall be adjusted in accordance with the recommendations of the protective device study and tested by actual operation using current injection or equivalent methods as necessary to ensure that each and every such circuit operates correctly to the satisfaction of the authority having jurisdiction.

1. Instrument Transformers. All instrument transformers shall be tested to verify correct polarity and burden.

2. Protective Relays. Each protective relay shall be demonstrated to operate by injecting current or voltage, or both, at the associated instrument transformer output terminal and observing that the associated switching and signaling functions occur correctly and in proper time and sequence to accomplish the protective function intended.

3. Switching Circuits. Each switching circuit shall be observed to operate the associated equipment being switched.

4. Control and Signal Circuits. Each control or signal circuit shall be observed to perform its proper control function or produce a correct signal output.

5. Metering Circuits. All metering circuits shall be verified to operate correctly from voltage and current sources, similarly to protective relay circuits.

6. Acceptance Tests. Complete acceptance tests shall be performed, after the station installation is completed, on all assemblies, equipment, conductors, and control and protective systems, as applicable, to verify the integrity of all the systems.

7. Relays and Metering Utilizing Phase Differences. All relays and metering that use phase differences for operation shall be verified by measuring phase angles at the relay under actual load conditions after operation commences.

B. Test Report. A test report covering the results of the tests required in the Pre-Energization and Operating Tests shall be delivered to the authority having jurisdiction prior to energization. Acceptance Testing shall be in accordance with NETA ATS-2013 or latest edition, *Electrical Power Distribution Equipment and Systems*, published by the InterNational Electrical Testing Association.

2.2 TEST REQUIREMENTS

A. The following test requirements supplement test and acceptance criteria that may be stated elsewhere.

1. Lighting: Switching, include remote control, if present in system. Circuitry is in accordance with panel schedules. All interior and exterior lighting shall be checked for proper operation.

2. Power Instrumentation: Demonstrate that voltmeter and ammeter switches are functional. Demonstrate that kilowatt meters are within catalog accuracy as installed.

3. Visual and Mechanical Inspection

    1) Compare equipment nameplate data with drawings and specifications.

    2) Inspect physical and mechanical condition.

    3) Verify tightness of electrical connections.

    4) Inspect cover gasket, cover glass, condition of spiral spring, disk clearance, contacts, and case-shorting contacts, as applicable.

    5) Verify freedom of movement, end play, and alignment of rotating disk(s).

    b. Electrical Tests

    1) Verify accuracy of meters at all cardinal points.

    2) Calibrate watthour meters according to manufacturer's published data.

    3) Verify all instrument multipliers.

    4) Verify that current transformer and voltage transformer secondary circuits are intact.

4. Demonstrate mechanical and/or electrical interlocking by attempting to subvert the intended sequence.

5. Activate ground fault tripping by operating test features provided with ground current protective systems and by injecting a known and reasonable current in the ground current sensor circuit. In general, ground fault tripping should occur at a ground current equivalent to 20 percent of phase current. Current injection is not required of circuit 400 amperes or less.

6. Low Voltage Cables-600 volts Maximum

    a. Visual and Mechanical Inspection

    1) Compare cable data with drawings and specifications.

    2) Inspect exposed sections of cables for physical damage and correct connection in accordance with single-line diagram.

    3) Inspect bolted electrical connections for high resistance using one of the following methods:

        a) Use of low-resistance ohmmeter

        b) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS- 2013, Table 100.12.

        c) Perform thermographic survey in accordance with below Section Thermographic Survey.

4) Inspect compression-applied connectors for correct cable match and indentation.

5) Inspect for correct identification and arrangements.

6) Inspect cable jacket insulation and condition.

b. Electrical Tests

1) Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Test duration shall be one minute.

a) Motor feeders tested with motors disconnected and controller open.

b) Motor control circuits tested and verified for proper operation with control stations and overcurrent devices connected.

c) Panelboard feeders tested with feeder breaker open and panel-board connected. If a lighting transformer is associated with the panelboard, it shall be connected and the test made for both primary and secondary sides.

d) Conductors of main lighting feeders, including lighting panel with branch circuits open.

e) Prior to performing insulation resistance tests on cables, verify that they are not connected to a solid state device.

f) Equipment which may be damaged during this test shall be disconnected.

g) The Engineer shall be consulted if minimum insulation values cannot be obtained.

2) Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable.

3) Perform continuity test to insure correct cable connection.

c. Test Values – Visual and Mechanical

1) Compare bolted connection resistance to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Bolt-torque levels should be in accordance with NETA ATS-2013, Table 100.12 unless otherwise specified by the manufacturer.

3) Results of the thermographic survey shall be in accordance with the below Section Thermographic Survey.

d. Test Values – Electrical

1) Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Insulation-resistance values shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS-2013 Table 100.1. Values of insulation resistance less than this table or manufacturer's recommendations shall be investigated.

3) Cable shall exhibit continuity.

4) Deviations in resistance between parallel conductors shall be investigated.

7. Test ground interrupter (GFI) receptacles and Arc Fault Circuit Interrupter circuit breakers for proper operation by methods sanctioned by the receptacle and breaker manufacturer.

8. A functional test and check of electrical components is required prior to performing subsystem testing and commissioning. Compartments and equipment shall be cleaned as required by other provisions of these Specifications before commencement of functional testing. Functional testing shall comprise:

   a. Visual and physical check of cables, circuit breakers, transformers, and connections associated with each item of new and modified equipment.

   b. Verification that electrical equipment has been labeled with Arc Flash protection boundary and PPE levels, as required by Section 260573 – Protective Device Studies.

   c. Setting of protective relays in conformance with results of the Short Circuit Study required by Section 260573 - Protective Device Studies and testing of relays to assure that relays will trip at the current value and time required by the Study.

   d. Circuit Breakers

      1) Circuit breakers that have adjustable time or pick-up settings for ground current, instantaneous overcurrent, short-time overcurrent, or long-time overcurrent, shall be field-adjusted by a representative of the circuit breaker manufacturer.

      2) Time and pickup setting shall correspond to the recommendations of the Short Circuit Study.

      3) Setting shall be tabulated and proven for each circuit breaker in its installed position.

      4) Test results shall be certified by the person performing the tests and shall be submitted to the ENGINEER.

9. Complete ground testing of grounding electrodes per requirements below prior to operating the equipment.

B. Subsystem testing shall occur after the proper operation of alarm and status contacts has been demonstrated or otherwise accepted by the ENGINEER and after process control devices have been adjusted as accurately as possible. Alarm conditions shall be simulated for each alarm point, and alarm indicators shall be checked for proper operation. It is intended that the CONTRACTOR will adjust limit switches and level switches to their operating points prior to testing and will set pressure switches, flow switches, and timing relays as dictated by operating results.

C. Metering and indication lights for motors and other devices shall be tested for proper operation.

D. All control circuits such as motor, interlock and remote shall be tested for proper operation.

E. After initial settings have been completed, each subsystem shall be operated in the manual mode and it shall be demonstrated that operation is in compliance with the Contract Documents. Once the manual mode of operation has been proven, automatic operation shall be demonstrated to verify such items as proper start and stop sequence of pumps, proper operation of valves, proper speed control, etc.

F. Motor operated valves shall be tested after having been phased and tested for correct motor rotation and after travel and torque limit switches have been adjusted by a representative of the valve manufacturer. Tests shall verify status indication, proper valve travel, and correct command control from local and remote devices.

G. All lighting panels, circuits and fixtures; power panels, circuits and receptacles shall be tested for proper operation.

H. Provide ground resistance tests on the main grounding electrode or system in the presence of the ENGINEER and submit results

1. Visual and Mechanical Inspection

a. Verify ground system is in compliance with drawings and specifications.

2. Electrical Tests

a. Perform fall-of-potential test or alternative in accordance with IEEE Standard 81 on the main grounding electrode or system.

b. The earth resistance of each ground electrode shall be measured and recorded before electrodes are connected to the grounding loop.

c. Perform point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and/or derived neutral points.

3. Test Values

a. The resistance between the main grounding electrode and ground shall be no greater than five ohms for commercial or industrial systems and one ohm or less for generating or transmission station grounds unless otherwise specified by the owner.

b. Investigate point-to-point resistance values which exceed 0.5 ohm.

I. Subsystems shall be defined as individual and groups of pumps, conveyor systems, chemical feeders, air conditioning units, ventilation fans, air compressors, etc.

J. THERMOGRAPHIC SURVEY

1. Visual and Mechanical Inspection

a. Inspect physical, electrical, and mechanical condition.

b. Remove all necessary covers prior to thermographic inspection. Utilize appropriate caution, safety devices, and personal protective equipment.

2. Equipment to be inspected shall include all 120 volt and higher current-carrying devices including all switchgear, switchboards, distribution panels, cable and bus connections, motor control centers and starters, disconnect switches, and other

critical equipment. Testing of lighting luminaires, field instrumentation, SCADA & PLC's are not required.

3. Provide report including the following:
   a. Description of equipment to be tested.
   b. Discrepancies.
   c. Temperature difference between the area of concern and the reference area.
   d. Probable cause of temperature difference.
   e. Areas inspected. Identify inaccessible and/or unobservable areas and/or equipment.
   f. Identify load conditions at time of inspection.
   g. Provide photographs and/or thermograms of the deficient area.
   h. Recommended action.

4. Test Parameters
   a. Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1°C at 30°C.
   b. Equipment shall detect emitted radiation and convert detected radiation to visual signal.
   c. Thermographic surveys should be performed during periods of maximum possible loading but not less than 40 percent of rated load of the electrical equipment being inspected. Refer to ANSI/NFPA 70B-2010, Section 11-17 (Infrared Inspection).

5. Test Values
   a. Suggested actions based on temperature rise can be found in Table 100.18.

6. RE-INSPECTION
   a. All items that are reported deficient in the thermography reports section of the inspection report shall be re-inspected after repairs have been made.
   b. Original specification will apply to re-inspections.
   c. Submit re-inspection reports and indicate that repairs have fixed the anomaly or indicate any remaining anomalies.
   d. Perform a follow-up thermographic survey within 12 months of final acceptance by the owner.

2.3 TEST REPORTS

A. The test report shall include the following:

1. Summary of project.
2. Description of equipment tested.
3. Description of test.

4. Test data.

5. Analysis and recommendations.

B. Test data records shall include the following minimum requirements:

1. Identification of the testing organization.

2. Equipment identification.

3. Humidity, temperature, and other atmospheric conditions that may affect the results of the tests/calibrations.

4. Date of inspections, tests, maintenance, and/or calibrations.

5. Identification of the testing technician.

6. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.

7. Indication of expected results when calibrations are to be performed.

8. Indication of “as-found” and “as-left” results.

9. Sufficient spaces to allow all results and comments to be indicated.

C. The testing firm shall furnish a copy or copies of the complete report to the owner as required in the acceptance contract.

TABLE 100.18

THERMOGRAPHIC SURVEY
SUGGESTED ACTIONS BASED ON TEMPERATURE RISE

Temperature difference (ΔT) based on comparisons between similar components under similar loading.	Temperature difference (ΔT) based upon comparisons between component and ambient air temperatures.	Recommended Action
1ºC - 3ºC	1ºC - 10ºC	Possible deficiency; warrants investigation
4ºC - 15ºC	11ºC - 20ºC	Indicates probable deficiency; repair as time permits
- - - - - -	21ºC - 40ºC	Monitor until corrective measures can be accomplished
>15ºC	>40ºC	Major discrepancy; repair immediately

Temperature specifications vary depending on the exact type of equipment. Even in the same class of equipment (i.e., cables) there are various temperature ratings. Heating is generally related to the square of the current; therefore, the load current will have a major impact on ΔT. In the absence of consensus standards for ΔT, the values in this table will provide reasonable guidelines.

An alternative method of evaluation is the standards-based temperature rating system as discussed in Chapter 8.9.2, Conducting an IR Thermographic Inspection, *Electrical Power Systems Maintenance and Testing*, by Paul Gill, PE, 1998.

It is a necessary and valid requirement that the person performing the electrical inspection be thoroughly trained and experienced concerning the apparatus and systems being evaluated as well as knowledgeable of thermographic methodology

PART 3 -- TEST RECORD SHEETS

The test record sheets listed below shall be used to record testing of electrical equipment and of the electrical installation as required by these specifications. Sample copies of each sheet are attached.

Sheet No.	Title
1	Insulation Resistance (Power, Control Wire, and Cable) Test Record
2	Insulation Resistance (Instrument Wire and Cable) Test Record
3	DC High Potential (Medium Voltage Cable) Test Record
4	Ground Electrode Testing Test Record
5	Neutral Grounding Resistor Test Record
6	Bonding Resistance Readings (Nonelectrical Equipment/Structures) Test Record
7	Bonding Resistance Readings (Electrical Equipment) Test Record
8	Insulation Resistance (Transformer) Test Record
9	Insulation Resistance (Equipment) Test Record
10	Insulation Resistance (Rotating Equipment) Test Record
11	Equipment Absorption Ratio and Polarization Index Test Record
12	Record Feeder Breaker (480 V MCC) Test Record
13	Breaker/Contactor (480 V MCC) Test Record
14	460 V Motor Circuit (480 V MCC) Test Record
15	Medium Voltage Motor Circuit Test Record
16	Electric Motor Run-In Test Record
17	Thermographic Test Record

INSULATION RESISTANCE
(POWER, CONTROL WIRE, AND CABLE)
TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

AMBIENT TEMPERATURE: _____ ºC _____ ºF DATE: _____

NOTES: 1. Perform Insulation Resistance Test (megger) between each conductor and all other conductors and metallic sheath for cables with nonshielded conductors. Test between each conductor and shield for multiconductor cables with shielded conductors. Record lowest reading for each cable.

2. Use 1,000-V test set for cable rated 600 volts and 2,500-V test set for cable rated over 600 volts.

3. Readings will vary inversely with temperature and cable length. When the use of temperature correction factors is specified, attach a second sheet with computed values. Indicate on each sheet "measured" or "temperature corrected."

Panel No. Circuit No. Feeder No.	Wire Tagging	Cable Rated Voltage	Wire or Cable				Insulation Resistance (megohms) *	Initials
			Quantity	Size	From	To		

*Minimum acceptable values:

Cable Rated Voltage	Test Duration	Resistance for Cable Only	Cable/Wire Size or Amperage (megohms)	Resistance When Cable Connected to Equipment (ohms)

DISTRIBUTION:

CONTRACTOR/Date _____

INSULATION RESISTANCE
(INSTRUMENT WIRE AND CABLE)
TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

AMBIENT TEMPERATURE: _____ ºC _____ ºF DATE: _____

NOTES: 1. Record only the lowest value.

2. MP - Multi-pair cable. SP - Single pair cable.

3. Megger with instruments disconnected.

4. Use 250 volt (or lower voltage, when specified) range on DC test set.

5. Readings will vary with temperature and cable length.*

Cable Number or Instrument Number	Indicate MP or SP Type (2)	Conductor to Conduit (Single Pair Non-Shielded Cables) (megohms)	Conductor to Conductor (megohms) (1)	Shield to Conductor to Shield (megohms) (1)	Overall Shield to Shield (Multipair Cables Only) (megohms) (1)	Lead and Armor (Multipair Cables Only (megohms)	Shield to Conduit (Single Pair Cables Only) (megohms)	Initials

DISTRIBUTION:

CONTRACTOR/Date _____

GROUND ELECTRODE TESTING
TEST RECORD

TEST EQUIPMENT: _____ (Note 1) _____ (Note 2)

REFERENCE DRAWING: _____ _____

NOTES: 1. Record resistance-to-earth for each electrode with all other conductors disconnected. Resistance not to exceed 25 ohms for any single anode.

2. Check continuity from each electrode to any test bar or other electrode such that the complete ground loop is tested.

Rod Number	Resistance to Earth (ohms)	Ambient Temperature (ºC/ºF)	Weather	Taps (🗐)	Initials/Date

DISTRIBUTION:

CONTRACTOR/Date _____

NEUTRAL GROUNDING RESISTOR
TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

NOTES:
1. Use 1,000-volt test set for 600-volt equipment and below, 2,500-volt test set for equipment rated over 600 volts.
2. Resistor must be disconnected from ground and neutral during Insulation Resistance (megger) and DC Overpotential Tests.
3. Resistor must be disconnected from neutral during Cold Resistance Test.
4. Apply DC Overpotential Test between terminals and ground for the complete device. (The voltage applied between the terminals of each assembly and its grounded enclosure shall be twice the rated AC voltage plus 1000 V when rated 600 V or less, or 2.25 times the rated AC voltage plus 2000 V when rated over 600 V for 1 minute. This test is a Pass/Fail test based purely on withstand alone.
5. Inspect assembly for damage and missing parts.
6. Check to assure that the center tap ratio is correct, when CT is supplied with resistor.
7. Verify resistor reterminated.

Tag. No.	Cold Res. (ohms)	Insul. Res. (megohms)*	Overpot. (🗐)	CT Ratio Pri-Sec	Reterm (🗐)	Initials/Date

*Minimum acceptable values:

VOLTAGE CLASS	INSULATION RESISTANCE (megohms)

DISTRIBUTION:

CONTRACTOR/Date _____

BONDING RESISTANCE READINGS
(NONELECTRICAL EQUIPMENT/STRUCTURES)
TEST RECORD

TEST EQUIPMENT USED: _____ WEATHER: _____

NOTES: 1. Vessels, tanks, and structural steel bonded to the main grounding system, dedicated ground rod or foundation, as indicated on drawings listed below.

2. Measure resistance from ground wire tap (or anchor bolt) to tagged equipment frame or structural steel.

EQUIPMENT TAG NO. OR STRUCTURE	DRAWING	MEASURED RESISTANCE (ohms)	INITIALS/DATE

DISTRIBUTION:

CONTRACTOR/Date _____

BONDING RESISTANCE READINGS
(ELECTRICAL EQUIPMENT)
TEST RECORD

TEST EQUIPMENT USED: _____ WEATHER: _____

NOTES: 1. Electrical equipment bonded to the main grounding system or dedicated ground rod, as indicated on drawings listed below.

2. Measure resistance from ground wire tap to tagged equipment bus bars, tagged equipment enclosures, and any other points indicated on the drawings.

EQUIPMENT TAG NO. OR STRUCTURE	DRAWING	MEASURED RESISTANCE (ohms)	INITIALS/DATE

DISTRIBUTION:

CONTRACTOR/Date _____

INSULATION RESISTANCE (EQUIPMENT)
TEST RECORD

TEST EQUIPMENT: _____ SUBSTATION: _____

AMBIENT TEMPERATURE: _____ ºC _____ ºF DATE: _____

REFERENCE DRAWING: _____ REF. SEC.: _____

NOTES: 1. Use 1,000-V test set for equipment rated 600 volts and below, 2,500/5,000-V test set for equipment rated over 600 volts.

2. For equipment with solid state control circuits, consult manufacturer's literature for maximum test voltages.

Switchgear MCC (other)	INSULATION RESISTANCE (megohms) *						Test Voltage (kV)	Rated Voltage (kV)	Initials/ Date
	∅A to G	∅B to G	∅C to G	∅A to ∅B	∅B to ∅C	∅C to ∅A			

*Minimum acceptable values:

EQUIPMENT VOLTAGE CLASS (megohms)	RESISTANCE

TESTER'S INITIALS/DATE _____

DISTRIBUTION:

CONTRACTOR/Date _____

INSULATION RESISTANCE (ROTATING EQUIPMENT)
TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

AMBIENT TEMPERATURE: _____ ºC _____ ºF DATE: _____

EQUIP. TEMP., IF KNOWN: _____ ºC _____ ºF HOW KNOWN: _____

NOTES: 1. Use 1,000-V test set for equipment 600-volt and below, 2,500/5,000-V test set for equipment rated over 600 volts.

2. Test duration shall be 1 minute, note if otherwise: _____.

3. Isolate all motor leads from one another and from frame, test phase separately, wherever practical.

4. Document testing of low voltage and medium voltage equipment on separate sheets.

5. Readings will vary inversely with temperature. When the use of temperature correction factors is specified, attach second sheet with computed values. Indicate on each sheet "measured" or "temperature corrected."

Equipment Tag No.	INSULATION RESISTANCE (megohms) *						Rated Voltage	Equipment Initial/Date
	∅A to G	∅B to G	∅C to G	∅A to ∅B	∅B to ∅C	∅C to ∅A		

*Minimum acceptable values:

VOLTAGE CLASS	RESISTANCE (megohms)

DISTRIBUTION:

CONTRACTOR/Date _____

EQUIPMENT ABSORPTION RATIO
AND POLARIZATION INDEX
TEST RECORD

TEST EQUIPMENT: _____ TEST VOLTAGE: _____

AMBIENT TEMPERATURE: _____ ºC _____ ºF DATE: _____

EQUIP. TEMP., IF KNOWN: _____ ºC _____ ºF REL. HUMIDITY: _____

NOTES: 1. Perform test as indicated on Test Records for each individual equipment type. Reference the following sheets:

Transformers	8
Equipment	9
Motors and Generators	10

2. Absorption Ratio = $\frac{\text{1-Minute Resistance Value}}{\text{30-Second Resistance Value}}$

3. Polarization Index = $\frac{\text{10-Minute Resistance Value}}{\text{1-Minute Resistance Value}}$

OHMS TO GROUND 30-SECOND READING ∅A TO GROUND	OHMS TO GROUND 1-MINUTE READING ∅A TO GROUND	OHMS TO GROUND 10-MINUTE READING ∅A TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX
OHMS TO GROUND 30-SECOND READING ∅B TO GROUND	OHMS TO GROUND 1-MINUTE READING ∅B TO GROUND	OHMS TO GROUND 10-MINUTE READING ∅B TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX
OHMS TO GROUND 30-SECOND READING ∅C TO GROUND	OHMS TO GROUND 1-MINUTE READING ∅C TO GROUND	OHMS TO GROUND 10-MINUTE READING ∅C TO GROUND	DIELECTRIC ABSORPTION RATIO	POLARIZATION INDEX

TESTER'S INITIALS/DATE _____

DISTRIBUTION:

CONTRACTOR/Date _____

FEEDER BREAKER (480 V MCC)
TEST RECORD

EQUIPMENT DESIGNATION			
LOAD (kW/kVA)		VOLTAGE	F.L.A.
CIRCUIT BREAKER MFG.		RATING	SETTING
CONDUCTOR SIZE	POWER	GROUND	

1. Check nameplate data of breaker against approved vendor drawings. _____
2. Check breaker components for cleanliness. _____
3. Check mechanical function of breaker. _____
4. Check wiring for proper identification. _____
5. Check conduits/cables for tagging. _____
6. Check components for identification. _____
7. Check equipment for conformance of area classification. _____
8. Check installation for seals, breathers, and drains. _____
9. Verify power conductor continuity. _____
10. Check that power cable insulation resistance test (megger) is completed. _____

DISTRIBUTION:

CONTRACTOR/Date _____

BREAKER/CONTACTOR (480 V MCC)
TEST RECORD

EQUIPMENT DESIGNATION			
LOAD (kW/kVA)		VOLTAGE	F.L.A.
CIRCUIT BREAKER MFG.		RATING	SETTING
CONTACTOR MFG.		SIZE	
CONDUCTOR SIZE	POWER	CONTROL	GROUND

1. Check nameplate data of breaker, contactor fuses and relays against approved vendor drawings. _____
2. Check main and auxiliary contacts. _____
3. Check contactor/breaker components for cleanliness. _____
4. Check control fuses, CPT rating, and coil voltage. _____
5. Check mechanical function of contactor and breaker. _____
6. Check wiring for proper identification. _____
7. Check conduits/cables for tagging. _____
8. Check components for identification. _____
9. Check equipment for conformance to area classification. _____
10. Check installation for seals, breathers, and drains. _____
11. Verify continuity of all power and control leads. _____
12. Check that power and control cable Insulation Resistance Test (megger) is completed. _____
13. Complete functional operation check of the control circuit using contract drawings and approved vendor drawings. Close and open the contactor using all control devices. _____

DISTRIBUTION:

CONTRACTOR/Date _____

460 V MOTOR CIRCUIT (480 V MCC)
TEST RECORD

EQUIPMENT DESIGNATION			
MOTOR TAG NO.		VOLTAGE	F.L.A.
KW/HP		RPM	S.F.
CIRCUIT BREAKER MFG.		RATING	SETTING
STARTER MFG.		SIZE	O/L HTR. SIZE
C.T. RATIO		O/L RELAY SETTING	
CONDUCTOR SIZE	POWER	GROUND	

1. Check motor starter for cleanliness. _____

2. Check nameplate data and tagging of motor starter components for conformance to approved vendor drawings. _____

3. Check conduits and/or cables for correct tagging. _____

4. Check equipment and installation for conformance to area classification. _____

5. Check main and auxiliary contacts of breaker and contactors. _____

6. Manually check mechanical operation of breaker, contactor, O/L relay, and O/L reset device. _____

7. Check continuity of power and control cables. _____

8. Complete functional operation check of the motor control circuit using the contract drawings and approved vendor drawings. Close and open the starter using all control devices. _____

9. Verify proper operation of motor winding space heater unit. _____

DISTRIBUTION:

CONTRACTOR/Date _____

ELECTRIC MOTOR RUN-IN
TEST RECORD

TEST EQUIPMENT: _____ REFERENCE DRAWING: _____

NOTES: 1. Duration of tests to comply with specifications.

TEST	REMARKS	INITIALS/DATE
RESISTANCE: Bonding resistance measured from motor frame to main ground/earth system tap. _____ ohms		
VOLTAGE: Actual voltage measured at Motor Control Center. _____ volts		
ROTATION CHECK: Bump motor to verify rotation. Motor to be uncoupled.		
NO LOAD CURRENT: At beginning of test _____ amps At end of test _____ amps		
TEMPERATURE OF BEARING: Check bearing for high temperature: Before start: 15 minutes after start 30 minutes after start 1 hour after start 2 hours after start 3 hours after start		
VIBRATION: Make visual inspection during run-test. Record any unusual vibration in remarks column.		
NOISE: Record any unusual noise in remarks column.		

DISTRIBUTION:

CONTRACTOR/Date _____

THERMOGRAPHIC INSPECTION
TEST RECORD

EQUIPMENT: _____

THERMAL AND ELECTRICAL INFORMATION

THERMAL DATA (°F/°C) AND RISE				MANUAL READINGS			
A Phase	____/____	Reference	_____°F	A Phase	_____ A	A/ B Volts	_____V
B Phase	____/____	Temperature	_____° C	B Phase	_____ A	B/C Volts	_____V
C Phase	____/____	ΔT	_____°F	C Phase	_____ A	A/C Volts	_____V
Neutral	____/____	or Rise	_____° C	Neutral	_____ A	A/N Volts	_____V
ANOMALY TEMP(°F/°C)							
PROBLEM DESCRIPTION:							
RECOMMENDATION:							

ANOMALY PRIORITY

CRITICAL - IMMEDIATE ATTENTION SUGGESTED

SEVERE - PROBABLE FAILURE, PROMPT ACTION RECOMMENDED

INTERMEDIATE - MONITOR PROBLEM, SCHEDULE MAINTENANCE

MINOR - SCHEDULE ROUTINE MAINTENANCE AT NEXT OPPORTUNITY

DISTRIBUTION:

CONTRACTOR/Date _____

- END OF SECTION –

SECTION 260510 - ELECTRIC MOTORS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. General: The CONTRACTOR shall provide electric motors, accessories, and appurtenances complete and operable, in conformance to the Contract Documents.

B. The provisions of this Section apply to low voltage 3 phase, AC squirrel cage induction motors throughout the Contract Documents, except as indicated otherwise.

C. The CONTRACTOR shall assign to the equipment supplier the responsibility to select suitable electric motors for the equipment. The choice of motor manufacturer shall be subject to review by the ENGINEER. Such review will consider future availability of replacement parts and compatibility with driven equipment

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Complete motor data shall be submitted with the driven machinery Shop Drawings. Motor data shall include:

1. Machine name and specification number of driven machine
2. Motor manufacturer
3. Motor type or model and dimension drawing. Include motor weight.
4. Nominal horsepower
5. NEMA design
6. Enclosure
7. Frame size
8. Winding insulation class and temperature rise class
9. Voltage, phase, and frequency ratings
10. Service factor
11. Full load current at rated horsepower for application voltage
12. Full load speed
13. Guaranteed minimum full load efficiency. Also nominal efficiencies at 1/2 and 3/4 load.
14. Type of thermal protection or overtemperature protection, if included and required.
15. Wiring diagram for devices such as motor leak detection, temperature, or zero speed switches, as applicable
16. Bearing data. Include recommendation for lubricants of relubricatable type bearings.
17. If utilized with a variable frequency controller, verify motor is inverter duty type. Include minimum speed at which motor may be operated for the driven machinery.

18. Certificate of Compatibility: For each motor controlled by an adjustable frequency drive, furnish a certificate that the motors are compatible with the adjustable frequency drives and the equipment loads to be driven.
19. Certified standard commercial test reports for all motors 5 hp through 200 hp.
20. Power factor at 1/2, 3/4 and full load.
21. Recommended size for power factor correction capacitors to improve power factor to 0.95 percent lagging when operated at full load.
22. Operation and Maintenance manuals

C. If water cooling is required for motor thrust bearings, the Shop Drawing submittals shall indicate this requirement.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Electric motors driving identical machines shall be identical.

B. Maximum motor loading shall be equal to nameplate horsepower rating or less, exclusive of service factor and be verifiable from the submittal data of the driven machinery.

C. Motor Requirements: Unless otherwise specified, provide motors as follows:

1. Polyphase motors of the high energy efficiency and high power factor type.
2. Motor nameplate horsepower as specified for the driven equipment.
3. Motors that operate continuously over the entire load range of the driven equipment without loading motor in excess of nameplate rating and its specified temperature limit.
4. For motors rated ½ hp to 200 hp operating at 460 volts, 3-phase, 60-hertz, provide squirrel cage induction type.

D. Motor Capacity

1. The CONTRACTOR shall size motors for the larger of the following criteria:
   a. Size motors to continuously carry the maximum load that develops across the full range of driven equipment operation.
   b. Size motors for minimum size indicated
2. In every case, motor size shall be derated from nameplate values as follows:
   a. Ambient Temperature
      1) For ambient temperatures up to but not exceeding 40 degrees C, no derating is required.
      2) For ambient temperatures exceeding 40 degrees but less than 50 degrees C, derate nameplate HP ratings to 85 percent.

3. Increased circuit breaker, magnetic starter, and conductor and conduit capacities required for motors larger than the indicated sizes shall be provided as part of the WORK.

E. Exempt Motors: Motors for valve operators, submersible pumps, or motors which are an integral part of standard manufactured equipment, i.e., non-NEMA mounting, common shaft with driven element, or part of domestic or commercial use apparatus may be excepted from these requirements to the extent that such variation reflects a necessary condition of motor service or a requirement of the driven equipment.

2.2 DESIGN REQUIREMENTS

A. General: Electric motors shall comply with NEMA MG-1 - Motor and Generator. Motors used with adjustable frequency drives shall comply with NEMA MG-1, Part 31.

B. NEMA Design: Electric motors shall be NEMA Design B unless otherwise indicated. In no case shall starting torque or breakdown torque be less than the value in NEMA MG 1. Motors shall be suitable for the indicated starting method.

C. Motor Voltage Ratings: Low voltage motors shall have voltage ratings in accordance with the following, unless otherwise indicated:

1. Motors below 1/2 HP shall be rated 115 volts, single phase, 60 Hz. Dual voltage motors rated 115/230 volts, 115/208 volts, or 120-240 volts are acceptable, provided leads are brought out to the conduit box.

2. Motors 1/2 HP and larger shall be rated for 460 volts, 3 phase, 60 Hz. Dual voltage motors rated 230/460 volts or 208/230/460 volts are acceptable, provided every lead is brought out to the conduit box.

D. Insulation: Three phase motors shall be provided with Class F insulation, rated to operate at a maximum ambient temperature of 40 degrees C and at the altitudes where the motors will be installed and operated, without exceeding Class B temperature rise limits stated in NEMA MG 1-12.44. Single phase motors shall have Class F insulation with temperature rise not to exceed the insulation class. Motors to be operated from adjustable frequency drives shall be provided with insulation systems to withstand 1600 volt spikes, with dV/dt as defined in NEMA MG 1-31.

E. Motors 50 HP or smaller located in non-hazardous areas shall be totally enclosed, fan cooled (TEFC) with a Service Factor of 1.15 unless otherwise indicated.

F. Motors 50 HP and greater located in non-hazardous areas shall be TEFC, with a service factor of 1.15.

G. Motors larger than 50 HP installed outdoors or in unheated areas shall be provided with 120 volt AC space heaters, wired to a terminal strip in a low voltage motor junction box.

H. Premium Efficiency Motors

1. Motors with a nameplate rating of 1 HP and larger shall be premium efficient units. Motors shall be stamped with the efficiency on the nameplate with the caption "NEMA Nominal Efficiency" or "NEMA Nom. Eff." Such motors shall have efficiencies determined by the test as set forth in ANSI/IEEE 112 - Standard Test Procedure for Polyphase Induction Motors and Generators, Method B.

2. Efficiency: Nominal efficiency and minimum efficiency shall be defined in accordance with the following tables. Both efficiencies shall be included in the Shop Drawing submittal.

OPEN DRIP-PROOF (ODP)						
FULL-LOAD EFFICIENCIES OF NEMA PREMIUM EFFICIENCY MOTORS RATED 600 VOLTS OR LESS						
	2 POLE		**4 POLE**		**6 POLE**	
HP	**Nom. Effic.**	**Min. Effic.**	**Nom. Effic.**	**Min. Effic.**	**Nom. Effic.**	**Min. Effic.**
1	77.0	74.0	85.5	82.5	82.5	80.0
1.5	84.0	81.5	86.5	84.0	86.5	81.5
2	85.5	82.5	86.5	84.0	87.5	81.5
3	85.5	82.5	89.5	84.0	88.5	86.5
5	86.5	84.0	89.5	84.0	89.5	87.5
7.5	88.5	86.5	91.0	89.5	90.2	88.5
10	89.5	87.5	91.7	90.2	91.7	90.2
15	90.2	88.5	93.0	91.7	91.7	90.2
20	91.0	89.5	93.0	91.7	92.4	91.0
25	91.7	90.2	93.6	92.4	93.0	91.7
30	91.7	90.2	94.1	93.0	93.6	92.4
40	92.4	91.0	94.1	93.0	94.1	93.0
50	93.0	91.7	94.5	93.6	94.1	93.0
60	93.6	92.4	95.0	94.1	94.5	93.6
75	93.6	92.4	95.0	94.1	94.5	93.6
100	93.6	92.4	95.4	94.5	95.0	94.1
125	94.1	93.0	95.4	94.5	95.0	94.1
150	94.1	93.0	95.8	95.0	95.4	94.5
200	95.0	94.1	95.8	95.0	95.4	94.5
250	95.0	94.1	95.8	95.0	95.4	94.5
300	95.4	94.5	95.8	95.0	95.4	94.5
350	95.4	94.5	95.8	95.0	95.4	94.5
400	95.8	95.0	95.8	95.0	95.8	95.0
450	95.8	95.0	96.2	95.4	96.2	95.4
500	95.8	95.0	96.2	95.4	96.2	95.4

Source: NEMA MG1 - 2003, Table 12-12

TOTALLY ENCLOSED - FAN COOLED (TEFC)						
FULL-LOAD EFFICIENCIES OF NEMA PREMIUM EFFICIENCY MOTORS RATED 600 VOLTS OR LESS						
	2 POLE		4 POLE		6 POLE	
HP	Nom. Effic.	Min. Effic.	Nom. Effic.	Min. Effic.	Nom. Effic.	Min. Effic.
1	77.0	74.0	85.5	82.5	82.5	80.0
1.5	84.0	81.5	86.5	84.0	87.5	85.5
2	85.5	82.5	86.5	84.0	88.5	86.5
3	86.5	84.0	89.5	87.5	89.5	87.5
5	88.5	86.5	89.5	87.5	89.5	87.5
7.5	89.5	87.5	91.7	90.2	91.0	89.5
10	90.2	88.5	91.7	90.2	91.0	89.5
15	91.0	89.5	92.4	91.0	91.7	90.2
20	91.0	89.5	93.0	91.7	91.7	90.2
25	91.7	90.2	93.6	92.4	93.0	91.7
30	91.7	90.2	93.6	92.4	93.0	91.7
40	92.4	91.0	94.1	93.0	94.1	93.0
50	93.0	91.7	94.5	93.6	94.1	93.0
60	93.6	92.4	95.0	94.1	94.5	93.6
75	93.6	92.4	95.4	94.5	94.5	93.6
100	94.1	93.0	95.4	94.5	95.0	94.1
125	95.0	94.1	95.4	94.5	95.0	94.1
150	95.0	94.1	95.8	95.0	95.8	95.0
200	95.4	94.5	96.2	95.4	95.8	95.0
250	95.8	95.0	96.2	95.4	95.8	95.0
300	95.8	95.0	96.2	95.4	95.8	95.0
350	95.8	95.0	96.2	95.4	95.8	95.0
400	95.8	95.0	96.2	95.4	95.8	95.0
450	95.8	95.0	96.2	95.4	95.8	95.0
500	95.8	95.0	96.2	95.4	95.8	95.0

Source: NEMA MG1 - 2003, Table 12-12

I. Two speed motors shall be of the 2 winding type.

2.3 ACCESSORY REQUIREMENTS

A. General: Horizontal motors 3 HP and larger and every vertical motor shall have split-type cast metal conduit boxes. Motors smaller than 3 HP shall have the manufacturer's standard conduit boxes. Motors other than open drip-proof shall be gasketed.

B. Lifting Devices: Motors weighing 265 lb (120 Kg) or more shall have suitable lifting eyes for installation and removal.

C. Special Requirements: The CONTRACTOR shall refer to individual equipment specifications for special requirements such as motor winding thermal protection or multi-speed windings.

D. Grounding Lugs: Provide motor grounding lug suitable to terminate ground wire, sized as indicated.

E. Nameplate: Motors shall be fitted with permanent stainless steel nameplates indelibly stamped or engraved with NEMA Standard motor data, in conformance with NEMA MG-1-10.40.

F. Where motors are indicated by elementary schematics or specifications to have zero speed switches, the switches shall be factory mounted integral to the motors. Switches shall close contact when the motor is at zero speed.

G. Boxes:

1. General: Provide oversized conduit boxes on motors to facilitate conductor installation and auxiliary components as required.
    a. Provide separate boxes for motor power leads, accessory terminals and RTD leads.
    b. Provide motor conduit boxes with NEMA enclosure ratings compatible with motor enclosures.
    c. Provide additional space in the power terminal box for the mounting and wiring of the current transformers furnished under the motor protection system.

2.4 MOTOR THERMAL PROTECTION

Single Phase Motors: Single phase 120, 208, or 230 volt motors shall have integral thermal overload protection or shall be inherently current limited.

2.5 MOTOR BEARINGS

A. General: Bearings shall conform to Section 460100 - Equipment General Provisions, except as indicated herein.

B. Motors greater than 2 HP shall have bearings designed for 17,500 hours (belted) or 100,000 hours (coupled) L-10 life.

C. Fractional Horsepower: Motors with fractional horsepower through 2 HP shall be provided with lubricated-for-life ball bearings.

D. Horizontal Motors Over 2 HP: Motors larger than 2 HP shall be provided with relubricatable ball bearings. Lubrication shall be per manufacturer's recommendation for smooth operation and long life of the bearings.

E. Vertical Motors Over 2 HP: Vertical motors larger than 2 HP shall be provided with relubricatable ball, spherical, roller, or plate type thrust bearings. Lubrication shall be per manufacturer's recommendation for smooth operation and long life of the bearings.

F. Motor Grounding Shaft Protection:

1. Unless specifically noted otherwise, all horizontal drive motors, 1 HP to 99 HP driven by adjustable frequency drives shall be equipped with a conductive micro fiber shaft Grounding Ring (SGR), mounted on the “Drive End” (DE)/load side of the motor shaft.

2. All motors specified herein to have SGR, or SGR and insulated/ceramic grounding protection, including motors that are part of specialized hazardous and “Explosion Proof” or totally enclosed for their particular design for process equipment/pumps, shall be provided with the SGR rings and ceramic bearings as part of their manufactured design.

3. New motors shall have the bearing protection installed at the motor point of manufacturer, factory installed.

4. For motors driven by adjustable frequency drives type AEGIS bearing protection rings. Motor warranty shall include coverage against VFD induced damage or failure.

5. Manufactures Certificate of compatibility: Submit certificate of compatibility signed by both the motor manufacturer and the ground ring manufacturer. Indicate the ground ring is installed per manufacturer’s requirements without any detriment to proper motor operation.

2.6 MOTOR SPACE HEATERS

A. The 60 HP pump motors shall be fitted with motor space heaters.

2.7 MANUFACTURERS, OR EQUAL

A. U.S. Motors

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Motor installation shall be performed in accordance with the motor manufacturer's written recommendations and the written requirements of the manufacturer of the driven equipment.

B. Related electrical WORK involving connections, controls, switches, and disconnects shall be performed in accordance with the applicable sections of Division 26.

3.2 FACTORY TESTING

A. Motors rated 100 HP and larger shall be factory tested in conformance with IEEE 112, IEEE 43 - Recommended Practice for Testing Resistance of Rotating Machinery, and NEMA MG-2. Except where specific testing or witnessed shop tests are required by the specifications for driven equipment, factory test reports may be copies of routine test reports of electrically duplicate motors. Test report shall indicate test procedure and instrumentation used to measure and record data. Test report shall be certified by the motor manufacturer's test personnel and be submitted to the ENGINEER.

B. Standard Commercial Tests: Perform the following tests in accordance with NEMA standards.

1. No load running current and speed

2. Locked rotor current

3. Dielectric routine tests

4. Motor efficiency tests

5. Motor power factor tests

Additional Testing: Perform the following additional tests in accordance with NEMA standards:

6. Winding resistance

7. Bearing inspection

8. Power factor at full, ¾ and ½ load

3.3 FIELD TESTING

A. The CONTRACTOR shall perform the following field tests:

1. Inspect each motor installation for any deviation from rated voltage, phase, frequency, and improper installation.

2. Visually check for proper phase and ground connections. Verify that multi-voltage motors are connected for proper voltage.

3. Check space heaters for functional operation.

4. Test for proper rotation prior to connection to the driven equipment.

5. Visually check that motor overload heaters are properly sized and that MCP breaker settings are correct for the motor installed.

6. Test insulation (megger test) of new and re-used motors in accordance with NEMA MG-1. Test voltage shall be 1000 VAC plus twice the rated voltage of the motor.

- END OF SECTION -

SECTION 260515 – INDUSTRIAL CONTROL PANELS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide complete industrial control panels and/or local control stations as indicated herein or in other Sections of the Specifications. The stations shall be designed to provide the sequence of operation in Section 409100 – Process Control and Instrumentation Systems and the P&ID Drawings.

B. This section also specifies miscellaneous electrical devices used throughout this project. These devices are not limited to use within industrial control panels or local control stations.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Industrial control panels and/or local control stations shall comply with the requirements of NEC (including Article 409), NEMA, and UL 508A.

1.3 CONTRACTOR SUBMITTALS

A. Furnish Shop Drawings in accordance with Sections 013300 – Contractor Submittals and 260000 – Electrical Work, General.

1. Ladder diagrams and written descriptions explaining ladder diagram operation and system operation.

2. Include catalog cuts of control equipment including enclosures, overcurrent devices, relays, pilot devices, terminations, and wire troughs.

PART 2 -- PRODUCTS

2.1 GENERAL

A. The CONTRACTOR shall provide the equipment, panels and stations to satisfy the functional requirements in the relevant mechanical equipment and Instrumentation and Control specifications and the Electrical Schematics. Each panel and station shall be fabricated with UL labeled components. Equipment not specifically indicated as being WORK of other Sections shall be provided under this Section. All equipment, panels and stations shall be wired under this Section.

B. The controls shall be 120 V maximum. Where the electrical power supply is 240 V, single phase or 480 V, 3 phase, the station shall be provided with a fused control power transformer. Control conductors shall be provided in accordance with Section 260519 – Wire and Cabling.

C. Each panel and/or station shall be provided with identified terminal strips for the connection of external conductors. The CONTRACTOR shall provide sufficient terminal blocks to connect 25 percent additional conductors for future use. Termination points shall be identified in accordance with Shop Drawings. The panels and/or stations shall be the source of power for all 120 VAC solenoid valves interconnected with the panels

and/or stations. Equipment associated with the panels and/or stations shall be ready for service after connection of conductors to equipment, controls, panels and/or stations.

D. Wiring to door-mounted devices shall be extra flexible and anchored to doors using wire anchors cemented in place. Exposed terminals of door-mounted devices shall be guarded to prevent accidental personnel contact with energized terminals.

E. Enclosures

1. In electrical room, enclosures shall be NEMA 12 enclosures painted with ANSI 61 exterior and white interior.

2. In pump room, enclosures shall be NEMA 4X type 316 with brushed finish. Where possible, penetrations shall be made in such a manner to maintain the NEMA 4X rating. If this is not possible, the penetrations shall be made in such a manner to minimize entry of foreign materials and moisture into the enclosure, subject to approval by the ENGINEER. Fan kits if provided shall maintain the rating of the enclosure.

3. Enclosures shall be freestanding, pedestal-mounted, or equipment skid-mounted, as indicated. If mounting is not show, panels shall have mouting brackets for attachment to channel strut or suitable for wall mounting. Internal control components shall be mounted on a removable mounting pan. Mounting pan shall be finished white.

4. Panels that weigh over 100 pounds shipping weight shall have lifting rings.

5. Provide screened weep holes for draining condensation.

F. Disconnect Switches

1. Heavy duty, fusible, single throw switches shall be rated not less than 65 KA at 480 VAC.

2. Horsepower rated

3. UL listed

4. Padlockable in "Off" position and door interlock

5. Enclosure per area classification in Section 260000– Electrical Work, General.

6. 480 V, 3-phase, 3-pole (6-pole when used with 2-speed motor).

7. Auxiliary control contact as applicable and where indicated.

8. As manufactured by **G.E., Eaton Electrical, Square D,** or equal.

G. Identification of panel-mounted devices, conductors, and electrical components shall be in accordance with Section 260000 – Electrical Work, General.

H. Panel-mounted devices shall be mounted a minimum of 3-feet above finished floor elevation, but not higher than 6’-6” above finished floor, unless noted otherwise.

2.2 PANEL/STATION COMPONENTS

A. Pushbuttons, selector switches, and pilot lights shall be the heavy-duty, oil-tight type, sized to 30.5-mm. Miniature style devices are not acceptable. Devices shall be as manufactured by **General Electric, Eaton Electrical, Allen Bradley, Square D,** or equal.

1. Lens colors shall be red for "run," "open," or "on"; green for "stopped," "closed," or "off"; and amber for alarm.

2. Pilot lights shall be full voltage, push-to-test LED cluster type.

3. Provide hazardous location type pilot devices in classified locations.

B. Relays shall be 3 PDT with 10 amp contacts, plug-in type with indicating light, rectangular blades and provided with sockets for screw-type termination and hold-down clips. Relays shall be as manufactured by **Square D, Potter Brumfield,** or equal.

C. Elapsed time meters shall be non-resettable type, read to a maximum of 99999.9 hours and shall be as manufactured by **General Electric, Eaton Electrical,** or equal.

D. Magnetic starters shall be:

1. NEMA rated, Size 1 minimum. IEC or dual NEMA/IEC rated type are not acceptable.

2. FVNR type unless indicated otherwise.

3. Combination starters with magnetic only instantaneous trip circuit breakers such as **Eaton Electrical HMCP, General Electric Mag-Break,** or equal. Breakers shall be rated 65 KA minimum.

4. Control transformers shall be provided with primary and secondary fuses, 120 V maximum control voltage. VA rating of transformer shall be based on devices on the control schematic.

E. Terminal strips shall be provided for every panel and shall be the flanged fork or ring lug type suitable for No. 12 AWG stranded wire minimum. Provide 25 percent spare terminals in each panel.

F. Time delay relays shall be combination on delay and off delay (selectable) with adjustable timing ranges. Provide socket with screw terminal connections and retaining strap. Time delay relays shall be **Square D, ATC, Eaton Electrical,** or equal.

2.3 FACTORY TESTING

A. Each panel/station shall be factory assembled and tested for sequence of operation prior to delivery.

2.4 SPARE PARTS

A. Provide a minimum of 10 percent spare lamps (minimum 2) and one spare lens for each color pilot lamp in each panel.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Panels/stations shall be installed in accordance with in Section 260000 – Electrical Work, General and in accordance with the manufacturer's recommendations.

B. Panels/stations shall be protected at the site from loss, damage, and the effects of weather. Panels/stations shall be stored in an indoor, dry location. Heating shall be provided in areas subject to corrosion and humidity.

C. Panels/station interiors and exteriors shall be cleaned, and coatings shall be touched up to match original finish upon completion of the WORK.

D. Conduit, conductors, and terminations shall be installed in accordance with Section 260000 – Electrical Work, General.

E. Panels shall be provided with a laminated wiring diagram stored in a pocket inside the panel door.

F. Panels shall be provided with a minimum of 25% spare space on the backplane.

G. Components shall not be mounted on the interior sides, bottom or top of the enclosure.

H. Wireways shall be used to organize conductors. Wires shall be installed in separate wireways for each voltage, AC and DC, communication, etc.

I. Wire nuts will not be permitted.

J. A minimum of 6” free space shall be provided between the nearest component/wireway and the top/bottom/sides of the enclosure.

K. Control panels shall be supplied with corrosion protection capsules by Hoffman or equal.

3.2 FIELD TESTING

A. Each panel/station shall be tested again for functional operation in the field after the connection of external conductors and prior to equipment startup.

- END OF SECTION -

SECTION 260519 - WIRE AND CABLING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide wire and cable, complete and operable, in accordance with the Contract Documents.

B. In the event that motors provided are larger horsepower than the motors indicated, raceways, conductors, starters, overload elements, and branch circuit protectors shall be revised as necessary to control and protect the increased motor horsepower in accordance with Section 260510 – Electric Motors. Revisions are part of the WORK of this Section.

1.2 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall submit Shop Drawings in accordance with Sections 013300 – Contractor Submittals and 260000 – Electrical Work, General.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Conductors, include grounding conductors, shall be stranded copper. Aluminum conductor wire and cable will not be permitted. Insulation shall bear the UL label, the manufacturer's trademark, and identify the type, voltage, and conductor size. Conductors except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment such as motors and controllers shall conform to the requirements of Article 310 of the National Electrical Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.

2.2 LOW VOLTAGE WIRE AND CABLE

A. Power and Lighting Wire

1. Wire rated for 600 volts in duct or conduit for power and lighting circuits shall be Class B Type XHHW or XHHW-2 cross-linked polyethylene conforming to UL-44 - UL Standard for Thermoset-Insulated Wires and Cables. THHN/THWN wire shall not be permitted to be used for any power or control wiring in this project, except as specifically permitted within control panels per Section 40 95 13 – Control Panels. Where installed in cable tray the cables shall be rated for use in cable trays.

2. Conductors for feeders as defined in Article 100 of the NEC shall be sized to prevent a voltage drop exceeding 2 percent at the farthest outlet of power, heating, and lighting loads, or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.

3. Conductors for branch circuits as defined in Article 100 of the NEC shall be sized to prevent voltage drop exceeding 3 percent at the farthest connected load or combinations of such loads and where the maximum total voltage drop on both

feeders and branch circuits to the farthest connected load does not exceed 5 percent.

4. Wiring for 600 volt class power and lighting shall be as manufactured by **Okonite**, **General Cable**, **Southwire**, or equal.

B. Control Wire

1. Control wire in duct or conduit shall be the same type as power and lighting wire indicated above.

2. Control wiring shall be No.14 AWG.

3. Control wires inside panels and cabinets shall be machine tool grade type MTW, UL approved, rated for 90 degrees C at dry locations, and be as manufactured by **American, General Cable,** or equal.

4. Where installed in cable trays, the cables shall be rated for cable tray service.

C. Instrumentation Cable

1. Instrumentation cable shall be rated at 600 volts.

2. Individual conductors shall be No. 16 AWG stranded, tinned copper. Insulation shall be color coded pvc/nylon: black-white for 2 conductor cable and black-red-white for 3 conductor cable.

3. Instrumentation cables shall be composed of the individual conductors, an aluminum polyester foil shield, a No. 22 or larger AWG stranded tinned copper drain wire, and a PVC outer jacket with a thickness of 0.047-inches.

4. Single pair, No. 16 AWG, twisted, shielded cable shall be **Belden Part No. 3090A,** similar by **General Cable,** or equal.

5. Single triad, No. 16 AWG, twisted, shielded cable shall be **Belden Part No. 3091A,** similar by **General Cable,** or equal.

D. Tray Cable

1. Multi-conductor tray cable shall be rated 600 volts, listed by UL as Type TC cable per Article 336 of the NEC. The individual conductors shall be UL listed as Type XHHW or XHHW-2, with a sunlight-resistant PVC overall jacket.

2. Conductor sizes shall be the same as for power and lighting wire and control wire above.

3. Cables used in tray applications shall be rated for plenum service.

E. Category Cable

1. Cat 6, 23 AWG bonded pairs, industrial grade, cable tray rated, foil shielded, 600V rated

2. As manufactured by **Belden**

F. VFD Power Cable

1. VFD power cable shall be three (3) conductor, PVC jacketed, shielded type, tray cable (TC) rated 600 volts with ground conductor as indicated below. The individual conductors shall be UL listed as Type XHHW or XHHW-2, with XLPE insulation.

a. For conductors larger than #1, the cable shall include three (3) symmetrical ground conductors

b. For conductors #2 and smaller, cable shall include one (1) ground conductor.

2. VFD Cables shall be as manufactured by **Belden, Alpha**, **General Cable,** or equal.

2.3 CABLE SPLICES AND TERMINATIONS

A. Compression connectors shall be **Burndy Hi Lug, Thomas & Betts Sta-Kon,** or equal. Threaded connectors shall be split bolt type of high strength copper alloy. Pressure type, twist-on connectors (wire nuts) will not be acceptable.

B. Pre-insulated fork tongue lugs shall be **Thomas & Betts, Burndy,** or equal.

C. General purpose insulating tape shall be **Scotch No. 33, Plymouth Slip-knot,** or equal. High temperature tape shall be polyvinyl as manufactured by **Plymouth, 3M,** or equal.

D. Labels for coding 600 volt wiring shall be computer printable or pre-printed, self-laminating, self-sticking, as manufactured by **W.H. Brady, 3M,** or equal.

E. Splices are not permitted for this contract.

F. Category cable terminations shall be via Datatuff Industrial Ethernet Ruggedized RJ45 T568B Plug CAT6 Shielded by **Belden** or equal.

PART 3 -- EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall provide, terminate and test all power, control, and instrumentation conductors.

B. The CONTRACTOR shall, as a minimum, provide the number of control wires listed in the conduit schedule or on the Contract Drawings. Excess wires shall be treated as spares.

3.2 INSTALLATION

A. Conductors shall not be pulled into raceway until raceway has been cleared of moisture and debris.

B. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL approved.

C. Instrumentation wire shall not be run in the same raceway with power and AC control wiring except where specifically indicated.

D. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps, and shall be fanned out to terminals.

E. Single conductor cable in cable trays shall be No. 1/0 or larger and shall be of a type listed and marked for use in cable trays. Tray cable smaller than 1/0 shall be multi-conductor, with outer jacket.

3.3 SPLICES AND TERMINATIONS

A. General

1. Wire taps and splices shall be properly taped and insulated according to their respective classes.

2. Stranded conductors shall be terminated directly on equipment box lugs making sure that conductor strands are confined within lug. Use forked-tongue lugs where equipment box lugs have not been provided.

3. Excess control and instrumentation wires shall be long enough to terminate at any terminal block in the enclosure, be properly taped, be identified with origin, and be neatly coiled.

B. Control Wire and Cable

1. Control conductors shall be terminated only at the locations indicated and only on terminal strips or terminal lugs of vendor furnished equipment.

2. In motor control centers, and control panels, control wire and spare wire shall be terminated to terminal strips.

3. The CONTRACTOR shall provide as a minimum the number of control wires listed in the conduit schedule or as indicated in the Contract Documents. Excess wires shall be treated as spares.

C. Instrumentation Wire and Cable

1. Shielded instrumentation cables shall be grounded at one end only, preferably the receiving end on a 4 - 20 mA system.

D. Power Wire and Cable

1. Splices to motor leads in motor terminal boxes shall be Polaris style mechanically bolted, insulated connection.

2. Shielded power cable shall be terminated with pre-assembled stress cones in a manner approved by the cable and terminal manufacturer. The CONTRACTOR shall submit the proposed termination procedure as a Shop Drawing.

3. VFD shielded power cables shall have the shield grounded at all locations where it is exposed.

4. Connections shall be mechanically fastened or bolted.

3.4 CABLE IDENTIFICATION

A. General: Wire and cable shall be identified for proper control of circuits and equipment and to reduce maintenance effort. Identification shall be installed at every termination point.

B. Identification Numbers: The CONTRACTOR shall assign to each control and instrumentation wire and cable a unique identification number. Numbers shall be assigned to conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3 inches of conductor terminals. "Control Conductor" shall be defined as any conductor used for alarm, annunciator, or signal purposes.

1. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number shall form a part of the individual wire number. Individual control conductors and instrumentation cable shall be identified at pull points as described above. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.

2. 120/208-volt system feeder cables and branch circuit conductors shall be color coded as follows: Phase A - black, Phase B - red, Phase C - blue, and Neutral - white. The 120/240-volt system conductors shall be color coded as follows: Line 1 - Black, Line 2 - Red, and Neutral - White. The 480/277-volt system conductors shall be color coded as follows: Phase A - Brown, Phase B - Orange, Phase C - Yellow, and Neutral - Gray. Color coding tape shall be used where colored insulation is not available. Branch circuit switch shall be yellow. Insulated ground wire shall be green, and neutral shall be gray. Color coding and phasing shall be consistent throughout the Site, but bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs. Any phase changes necessary for proper rotation shall be made at the driven equipment and not in the local disconnect.

3. General purpose AC control cable shall be red. General purpose DC control cable shall be blue.

4. Spare cable shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.

5. Terminal strips shall be identified by computer printable, cloth, self-sticking marker strips attached under the terminal strip.

3.5 TESTING

A. Cable Assembly and Testing: Cable assembly and testing shall comply with applicable requirements of ICEA Publication No. S-95-658/NEMA WC70 - Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. Factory test results shall be submitted in accordance with Section 013300 – Contractor Submittals, prior to shipment of cable. The following field tests (in addition to the tests specified in Section 260126 – Electrical Tests) shall be the minimum requirements:

1. Power cable rated at 600 volts shall be tested for insulation resistance between phases and from each phase to a ground using a megohmeter.

2. Field testing shall be done after cable is installed in the raceways.

3. Field tests shall be performed by a certified test organization acceptable to the cable manufacturer. Test results shall be submitted to the ENGINEER for review and acceptance.

4. Cables failing the tests shall be replaced with a new cable or be repaired. Repair methods shall be as recommended by the cable manufacturer and shall be performed by persons certified by the industry.

B. Continuity Test: Control and instrumentation cable shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing cable in service.

- END OF SECTION -

SECTION 260526 – GROUNDING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide the electrical grounding system, complete and operable, as indicated in accordance with the Contract Documents.

B. The requirements of Section 260000 – Electrical Work, General apply to this Section.

C. Single Manufacturer

1. Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals and Section 260000 – Electrical Work, General.

B. Shop Drawings

1. Submit manufacturer's product information for connections, clamps, and grounding system components, showing compliance with the requirements of this Section.

C. Test Results

PART 2 -- PRODUCTS

2.1 GENERAL

A. Components of the grounding electrode system shall be manufactured in accordance with UL 467 - Standard for Safety Grounding and Bonding Equipment, and shall conform to the applicable requirements of National Electrical Code Article 250 and local codes.

2.2 GROUNDING SYSTEM

A. Grounding loop conductors shall be bare annealed copper conductors.

B. Conductors shall be No. 4/0 unless indicated otherwise.

C. Ground Rods

1. Unless indicated otherwise, provide ground rods minimum of 3/4 inch in diameter, 10 feet long, and with a uniform covering of electrolytic copper metallically bonded to a rigid steel core.

2. Provide corrosion-resistant copper-to-steel bond.

3. The rods shall conform to UL 467.

4. The rods shall be of the sectional type, joined by threaded copper alloy couplings.

5. Connections to Ground Rods shall be accessible.

D. Make buried and concrete-encased cable-to-cable and cable-to-ground rod connections using exothermic welds by **Cadweld, Thermoweld,** or equal.

E. Exposed Connectors

1. Exposed grounding connectors shall be of the compression type (connector-to-cable), constructed of high-copper alloy, and manufactured specifically for the particular grounding application.

2. The connectors shall be **FCI-Burndy, O.Z. Gedney**, or equal.

F. Use grounding clamps to bond each separately-derived system to the grounding electrode conductors.

G. Equipment Grounding Circuit Conductors

1. The conductors shall be green in color and the same type and insulation as the load circuit conductors.

2. The minimum size shall be as outlined in Table 250.122 of the National Electrical Code, unless indicated otherwise.

3. Metallic conduit systems shall have equipment grounding wires as well as being equipment grounding conductors themselves.

H. Grounding Materials Manufacturer, or Equal

1. **Copperweld**

2. **Thermoweld**

3. **FCI-Burndy**

PART 3 -- EXECUTION

3.1 GROUNDING

A. Provide a separate grounding conductor, securely grounded in each raceway independent of raceway material.

B. Provide a separate grounding conductor for each motor and connect at motor box.

C. Do not use bolts for securing the motor box to the frame or the cover for grounding connectors.

D. Sizes shall be as indicated on the Conduit Schedule and in accordance with NEC Article 250.

E. Route the conductors inside the raceway.

F. Provide a grounding-type bushing for secondary feeder conduits that originate from the secondary section of each MCC section, switchboard, or panelboard.

G. Individually bond the raceway to the ground bus in the secondary section.

H. Provide a green insulated wire as grounding jumper from the ground screw to a box grounding screw, and, for grounding type devices, to the equipment grounding conductor.

I. Provide a separate grounding conductor in each individual raceway for parallel feeders.

J. Interconnect the secondary switchgear MCC or panelboard neutral bus to the ground bus in the secondary switchgear compartment only at the service entrance point or after a transformer.

K. Provide the duct bank ground system as indicated, including trenching, splices, ground rods, and connections to equipment, fences, and structures.

L. Measure ground impedance in accordance with IEEE STD 81 after installation but before connecting the electrode to the remaining grounding system.

M. Low Voltage Grounded System (600V or less)

1. A low-voltage grounded system is defined as a system where the local power supply is a transformer, with the transformer secondary grounded.

2. Grounding system connections for a premises-wired system supplied by a grounded AC service shall be provided with a grounding electrode connector connected to the grounded service conductor at each service, in accordance with the NEC.

3. The grounded circuit conductor shall not be used for grounding non-current-carrying parts of equipment, raceways, and other enclosures except where specifically listed and permitted by the NEC.

N. Embedded Ground Connections

1. Underground and grounding connections embedded in concrete shall be UL-listed ground grid connectors.

2. The connection shall be made in accordance with the manufacturer's instructions.

3. Do not conceal or cover ground connections until the ENGINEER or an authorized representative has established that every grounding connection conforms to the requirements of the Contract Documents and has given the CONTRACTOR written confirmation.

O. Ground Ring

1. Furnish trenching and materials as necessary to install the ground ring as indicated.

2. The bonding conductor shall be in direct contact with the earth and of the indicated size.

3. Provide a minimum burial depth of 36 inches or as indicated on the Drawings, whichever is greater.

4. Re-compact disturbed soils to their original density in 6-inch lifts.

P. Duct Bank Ground

1. Embed a grounding conductor in every duct bank as indicated.

Q. Ground Rods

1. Provide ground rods at the indicated locations.

2. A single electrode that does not have resistance-to-ground of 5 ohms or less shall be augmented by additional electrodes to obtain this value.

3. Take the resistance-to-ground measurement during dry weather, a minimum of 48 hours after a rainfall.

4. Rods forming an individual ground array shall be equal in length.

R. Shield Grounding

1. Shielded instrumentation cable shall have its shield grounded at one end only unless the Shop Drawings indicate that the shield will be grounded at both ends.

2. The grounding point shall be at the control panel or at the receiving end of the signal carried by the cable.

3. The termination of the shield drain wire shall be on its own terminal screw.

4. Jumper together the terminal screws, using manufactured terminal block jumpers or a No. 14 green insulated conductor.

5. Connect the ground bus via a green No. 12 conductor to the main ground bus for the panel.

- END OF SECTION -

SECTION 260533 - ELECTRICAL RACEWAY SYSTEMS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide electrical raceway systems, complete and in place, as indicated in accordance with the Contract Documents.

B. In the event that individual equipment loads provided are larger than indicated in the Contract Documents, revise raceways, conductors, starters, overload elements, and branch circuit protectors as necessary in order to control and protect the increased connected load in conformance to NEC requirements as part of the WORK.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals, and Section 260000 – Electrical Work, General.

B. Shop Drawings

1. Submit complete catalog cuts of raceways, fittings, boxes, supports, and mounting hardware, marked where applicable to show proposed materials and finishes.

2. Submit dimensioned layout drawings of cable tray routings, including wall penetrations and elevations.

3. As-Built Drawings

a. Prepare dimensioned as-built drawings of encased concealed and exposed raceways, ducts, raceways, junction boxes, pull boxes, and electrical and instrumentation equipment.

b. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 013300 – Contractor Submittals.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Pull and junction boxes, fittings, and other indicated enclosures that are dedicated to the raceway system shall comply with the requirements of this Section.

2.2 CONDUIT

A. Rigid Aluminum (RAL) Conduits

1. Provide rigid aluminum conduit manufactured from 6063 alloy, temper T-1.

2. Provide rigid aluminum conduit manufactured in accordance with NEMA C80.5 – Electrical Rigid Aluminum Conduit, and UL-6A – Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel.

3. Manufacturer, or Equal
    a. **V.A.W. of America**
    b. **Alcoa**

B. Rigid Non-Metallic Conduit

1. Provide rigid non-metallic conduit manufactured from Schedule 40 PVC, as indicated, and sunlight-resistant.

2. Provide rigid non-metallic conduit manufactured in accordance with NEMA TC-2 - Electrical Plastic Tubing and Conduit, and UL-651 - Standard for Rigid Non-metallic Conduit.

3. Manufacturer, or Equal
    a. **Carlon**
    b. **Cantex**

C. Liquid-Tight Flexible Conduit

1. Provide liquid-tight flexible conduit constructed of a flexible non metallic core with a sunlight-resistant thermoplastic outer jacket.

2. Provide liquid-tight flexible conduit manufactured in accordance with the requirements of UL Liquid-Tight Flexible.

3. Manufacturer, or Equal
    a. **Anaconda, Sealtite**
    b. **Electriflex, Liquatite**

D. Electrical Metallic Tubing (EMT), Rigid Galvanized Steel (RGS), Flexiable Metallic Conduit, or Intermediate conduit (IMC) will not be accepted.

2.3 FITTINGS AND BOXES

A. General

1. For use with metallic and aluminum conduit, provide cast aluminum fittings of the threaded type with 5 full threads.

2. Fittings and Boxes
    a. Provide fittings and boxes with neoprene gaskets and non-magnetic stainless steel screws.
    b. Attach covers by means of holes tapped into the body of the fitting.
    c. Covers for fittings attached by means of clips or clamps will not be accepted.
    d. Boxes and box covers for metallic conduit shall be cast aluminum.

3. Provide boxes larger than standard cast of Type 304 or Type 316 stainless steel, NEMA 4X. Outdoor boxes shall be pad lockable.

4. Terminations
    a. In outdoor areas, terminate conduit in rain-tight hubs as manufactured by Myers, O.Z. Gedney, Appleton, or equal.
    b. In other than outdoor areas, provide sealed locknuts and bushings.

B. Cast Aluminum Fittings and Boxes

1. Provide cast aluminum boxes and fittings with less than 0.40 percent copper content, and use with aluminum conduit.

2. Manufacturer, or Equal
    a. **O.Z. Gedney**
    b. **Appleton**
    c. **Crouse-Hinds**

C. PVC Fittings and Boxes

1. For use with rigid non-metallic conduit, provide fittings manufactured of solvent-welded PVC.

2. Provide boxes manufactured of PVC or fiberglass reinforced polyester (FRP).

3. Manufacturer, or Equal
    a. **Carlon**
    b. **Crouse-Hinds**
    c. **Hoffman**

4. Provide welding solvent as required for the installation of non-metallic conduit and fittings.

D. Stainless Steel Boxes

1. Provide stainless steel boxes where indicated.

2. Provide NEMA 4X stainless steel boxes, constructed of Type 316 stainless steel.

3. Provide stainless steel of a minimum of 14-gauge thickness, with a brushed finish.

4. Door Hinges
    a. Provide doors with full-length stainless steel piano hinges.
    b. Non-hinged boxes will not be accepted.

5. Manufacturer, or Equal
    a. **Hoffman**
    b. **Rohn**
    c. **Hammond**

2.4 CABLE TRAYS

A. Provide cable tray systems composed of straight sections, curved transition sections, curved sections, fittings, and accessories as defined in the latest NEMA Standards publication VE-1 - Ventilated Cable Tray.

1. Provide cable trays and fittings shall constructed of aluminum.

2. Provide cable trays of the ladder type with 6-inch spacing ventilated trough type.

3. Provide tray sizes with a 4-inch minimum usable load depth, or as required. Trays shall have 25% spare capacity by fill and weight.

4. Provide loading capacities that meet the NEMA weight classification with a safety factor of 1.5.

5. Provide fire rated cable tray wall sleeves at all wall penetrations. Penetrations around cables shall be as manufactured by Roxtec

6. Manufacturer, or Equal

   a. **Husky**

   b. **B-Line**

   c. **T.J. Cope**

2.5 WIREWAY

A. General

1. Provide wireway of the lay-in type and NEMA-rated for the area in which it is to be installed in accordance with the requirements of Section 260000 – Electrical Work, General.

2. Separate power, control, signal and communications cables by grounded metallic dividers in wireways or run in separate wireways.

B. Fittings and Covers

1. Provide fittings and sections with non-magnetic stainless steel screws.

2. Attach covers by hinges and clamps to the bodies.

3. Covers attached by means of clips or screws will not be accepted.

4. Provide covers and bodies constructed of aluminum.

C. Grounding

1. Ground the aluminum wireway bodies.

2. Provide aluminum dividers with aluminum wireways, and ground by means of an individual grounding conductor.

3. Non-metallic dividers will not be accepted.

D. Terminations

1. In damp and outdoor areas, terminate grounding conduit in rain-tight “grounding” hubs as manufactured by Myers, O.Z. Gedney, or equal.

2. In other than outdoor areas, provide sealed grounding locknuts and bushings.

PART 3 -- EXECUTION

3.1 GENERAL

A. Run wiring in raceway unless indicated otherwise.

B. Install raceways between equipment as indicated.

C. Provide raceway systems that are electrically and mechanically complete before conductors are installed.

D. Provide housekeeping pads at all below ground to above ground/ above finished floor conduit penetrations.

E. Bends and Offsets

1. Provide bends and offsets that are smooth and symmetrical, and accomplished with tools designed for this purpose.

2. Provide factory elbows wherever possible.

3. No more than three 90 degree bends shall be allowed in any unbroken run of conduit.

F. Combined Raceways

1. Raceways other than those containing power conductors may be combined in strict accordance with the NEC and with prior written permission from the ENGINEER.

2. In general, combine only raceways containing the same type (control, signal, and the like) and voltage of conductors/cables, or dedicated conduits from one source to one device/equipment, in accordance with the NEC.

3. Permission from the ENGINEER shall not relieve the CONTRACTOR of responsibility to meet national, state and local requirements.

4. Do not combine wiring for redundant systems into single raceways.

   All security system related wiring shall be installed in separate conduits.

G. Routing

1. Where raceway routings are indicated, follow those routings to the extent possible.

2. Where raceways are indicated but routing is not indicated, such as home runs or on conduit developments and schedules, raceway routing shall be the

CONTRACTOR's choice and provided in strict accordance with the NEC as well as customary installation practice.

3. Provide the raceway encased, exposed, concealed, or under-floor as indicated, except conceal conduit in finished areas unless specifically indicated otherwise.

4. Adjust routings in order to avoid obstructions.

H. Coordination

1. Coordinate between trades prior to installing the raceways.

2. The lack of such coordination shall not be justification for extra compensation, and any costs for removal and re-installation to resolve conflicts shall be part of the Contract Price.

I. Support rod attachment for ceiling-hung trapeze and cable tray installations shall meet the seismic requirements in the area where the Project is located.

J. Support wireways in accordance with the manufacturer's recommendations for the seismic requirements indicated in Section 260000 – Electrical Work, General.

K. Provide cable tray anchoring that meets or exceeds the manufacturer's recommendations for the seismic zone indicated in Section 260000 – Electrical Work, General.

L. Install exposed raceways parallel or perpendicular to structural beams.

M. Expansion Fittings

1. Install expansion fittings with external bonding jumpers wherever exposed raceways cross building expansion joints.

2. Install expansion/deflection fittings where conduit movement is expected in more than one dimension, and where conduits transition out of structures in locations where differential settlement may occur.

3. Encased Expansion Fittings

a. Install encased expansion fittings wherever encased conduits cross building expansion joints.

b. Deflection type fittings shall not be required for encased conduits crossing an expansion joint within a single structure.

4. Provide expansion and expansion/deflection fittings constructed of the same material as the raceway to which they are installed.

N. Install expansion fittings with bonding jumpers wherever raceways cross building expansion joints.

O. Install exposed raceways at least 1/2 inch from walls or ceilings in damp location. In dry locations install exposed raceways at least 1/4 inch from the face of walls or ceilings by the use of clamp backs or struts.

P. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, provide a means of suitable insulation in order to prevent such corrosion.

3.2 CONDUIT

A. Provide exposed conduit manufactured of rigid aluminum except as follows and unless indicated otherwise:

1. For conduit containing only grounding system bonding conductors, provide Schedule 80 PVC conduit.

B. Power conduit encased in concrete or below grade shall be constructed of Schedule 40 PVC.

C. Concrete Encasement

1. Where PVC is stubbed up from a concrete encasement, provide an elbow as shown on drawings.

2. The conduit shall emerge from the concrete in a direction perpendicular to the surface whenever possible.

3. Do not encase conduit in the bottom floor slab below grade.

D. Size

1. Provide exposed conduit of 3/4-inch minimum trade size.

2. Provide encased conduit of one-inch minimum trade size.

E. Install supports at distances required by the NEC or as necessary to obtain rigid construction.

F. Concrete cover for conduit and fittings shall not be less than 1-1/2 inches for concrete exposed to earth or weather, or less than 3/4 inch for concrete not exposed to weather or in contact with the ground.

G. Penetrations

1. Provide conduit passing through walls or floors with plastic sleeves.

2. Perform core drilling in accordance with the requirements of Section 260000 – Electrical Work, General.

3. Conduits passing through a slab, wall, or beam shall not significantly impair the strength of the construction.

H. Conduits embedded within a slab, wall, or beam (other than those merely passing through) shall meet the following requirements:

1. Conduits with their fittings embedded within a column shall not displace greater than 4 percent of the gross area of cross section;

2. Conduits shall not be larger in outside dimension than 1/3 the overall thickness of the slab, wall, or beam in which it is embedded; and,

3. Conduits shall not be spaced closer than 3 outside diameters on centers.

I. Place the conduit such that cutting, bending, or displacing reinforcement from its proper location will not be required.

J. Coat threads with a conductive lubricant before assembly.

K. Joints

1. Provide joints that are tight, thoroughly grounded, secure, and free of obstructions in the pipe.

2. Adequately ream the conduit in order to prevent damage to the wires and cables inside.

3. Use strap-wrenches and vises to install the conduit, in order to prevent wrench marks on the conduit.

4. Replace conduit with wrench marks. Clean all conduit after installation.

L. Slope

1. Wherever possible, slope the conduit runs to drain at one or both ends of the run.

2. Wherever conduit enters a substructure below grade, slope the conduit in order to drain water away from the structure.

3. Take extreme care in order to avoid pockets or depressions in the conduit.

M. Installation of rigid steel conduit though a core-drilled hole in an exterior wall below-grade shall utilize a sealing device as manufactured by Link Seal, or equal.

N. Connections

1. Make connections to motors and other equipment subject to vibration by using liquid-tight flexible conduit not exceeding 3 feet in length. Use of flexible conduit to components not subject to vibration is not permitted.

2. Provide equipment subject to vibration that is normally provided with wiring leads with a cast junction box for the make-up of connections.

O. Empty Conduits

1. Tag empty conduits at both ends to indicate the final destination.

2. Where it is not possible to tag the conduit, identify the destination by means of a durable marking on an adjacent surface.

3. Install a pull-cord in each empty conduit in floors, panels, manholes, equipment, and the like.

4. Install a removable plug on empty conduits that terminate below grade, in vaults, manholes, handholes, and junction or pullboxes.

P. Identification of Conduits

1. Identify conduits at ends and at pulling points.

2. Identification shall be the unique conduit number assigned in the Contract Documents.

3. Other than 120 VAC panelboard circuits, if a conduit has not been assigned a unique number in the Contract Documents, assign a unique number following the numbering scheme used in the Contract Documents.

4. Assign a unique number to 120 VAC panelboard circuits, similar to the cable numbering scheme used in the Contract Documents.

5. Provide conduit identification by a stamped or engraved non-corroding metal tag attached to the conduit bushing.

6. Provide an engraved phenolic nameplate in accordance with the requirements of Section 26 00 00 – Electrical Work, General, or a computer printed self-adhesive label attached to the equipment or enclosure inside which the conduit terminates.

7. Markings with a pen or paint will not be accepted.

Q. Identification of Pullboxes and Junction Boxes

1. Identify pullboxes and junction boxes.

2. Identification shall be the unique conduit number assigned in the Contract Documents, or if not assigned a unique number the CONTRACTOR shall assign one following the numbering scheme used in the Contract Documents.

3. Provide box identification by a stamped or engraved non-corroding metal tag or an engraved phenolic nameplate, in accordance with the requirements of Section 260000 – Electrical Work, General, and attached to the box or enclosure.

4. Markings with a pen or paint will not be accepted.

R. Provide conduit for data cables in accordance with the equipment manufacturer’s recommendations, especially regarding separation from low- and medium-voltage power raceways.

3.3 CABLE TRAYS

A. Provide cable trays in strict accordance with the manufacturer's printed instructions.

B. Allowable cable fill areas shall meet NEC Article 392 - Cable Trays requirements.

C. Verify cable tray fills prior to installation based on cables and trays actually provided.

D. Maintain continuous grounding of cable trays including bonding jumpers in accordance with the requirements of NEC Article 392.

E. Install cable trays using hangers and supports on 6-foot centers, maximum.

F. Install cable trays to supported from walls where possible.

G. If support from the ceiling is the only alternative, use hangers and supports on 6-foot centers, maximum.

H. Installed cable trays shall have 25% spare capacity by fill and weight after project wires and cables are installed.

- END OF SECTION -

SECTION 260536 - WIRING DEVICES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide wiring devices, complete and operable, as indicated in accordance with the Contract Documents.

B. The requirements of Section 260000 – Electrical Work, General apply to this Section.

C. Single Manufacturer

1. Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.2 CONTRACTOR SUBMITTALS

A. Shop Drawings

1. Submit complete catalog cuts of switches, receptacles, enclosures, covers and appurtenances, marked to clearly identify the proposed materials.

2. Submit documentation showing that the proposed materials comply with the requirements of NEC and U.L.

3. Submit documentation of the manufacturer's qualifications.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Devices shall carry the U.L. label.

B. Color

1. General purpose duplex receptacles and toggle switch handles shall be white.

2. Special purpose receptacles shall have a body color as indicated.

3. Receptacles downstream of UPS shall be blue in color.

C. Receptacles and switches shall be of specification grade and shall conform to NEMA WD-1, Federal Specifications W-C-596E and W-S-896E, respectively.

2.2 LIGHTING SWITCHES

A. Local branch switches shall be of the toggle type, rated at 20 amperes, 120-277 VAC, and shall be **General Electric Cat. No. GE-5951-1** for single pole, **GE-5953-1** for 3 way and **GE-5954-1** for 4 way, similar types as manufactured by **Hubbell, Leviton,** or equal.

B. See Drawing E-6 “Electrical Lighting and Receptacle Plan” for special wiring device requirements related to occupancy sensors, timers and bypass switches. Wiring devices for such uses shall be manufactured by Leviton, Legrand or equal and be fully compatible with the fixtures they control.

2.3 GENERAL PURPOSE RECEPTACLES

A. Duplex receptacles that are rated at 125V, 20 amperes, shall be of the polarized 3-wire type for use with a 3-wire cord with grounded lead, and one designated stud shall be permanently grounded to the conduit system in accordance with NEMA 5-20R.

B. Dry Areas

1. Duplex 120V receptacles for dry areas shall be **G.E. 5362, Hubbell 5362,** or equal.

2. Single receptacles for dry areas shall be **G.E. 4102, Hubbell 6361,** or equal.

C. Damp/Wet Areas

1. Receptacles for damp/wet locations shall be weather-resistant-listed in accordance with NEC-2008, Article 406.8.

2. Duplex 120V receptacles for damp/wet areas shall be **Hubbell HBL5362IWR**, or equal.

D. GFCIs

1. Ground-fault circuit-interrupting receptacles (GFCIs) shall be installed at the indicated locations, all exterior receptacles, all receptacles inside the pump room, and as required by the NEC.

2. GFCIs shall be duplex receptacles, of specification grade, and tripping at 5 mA.

3. GFCI ratings shall be 125V, 20 amperes, NEMA WD-1, Configuration 5-20R, and capable of interrupting 5,000 amperes without damage.

4. GFCIs shall be weather resistant-listed in accordance with NEC-2008, Article 406.8.

5. Feed-through-type GFCIs serving standard receptacles will not be permitted.

6. GFCIs shall be **Hubbell GFR5362SGI** or similar as manufactured by **Bryant, Leviton,** or equal.

2.4 ENCLOSURES AND COVERS

A. Surface-mounted switches and receptacles shall be housed in FS- or FD-type weatherproof conduit fittings.

B. Switch and receptacle covers on surface-mounted boxes shall be constructed of die-cast copper-free aluminum.

C. In finished areas, switch and receptacle boxes shall be provided with "super stainless steel covers" as manufactured by **Harvey Hubbell, Arrow Hart, Bryant,** or equal.

D. In areas where cast boxes are used, switch and receptacle covers shall be **Crouse-Hinds Catalogue No. DS185 and WLRD-1, or Adalet No. WSL** and **WRD,** or equal.

E. Wet Locations

1. Receptacles in wet locations shall be provided with a hinged non-metallic cover/enclosure marked "Suitable for Wet Locations when in use" and "UL Listed." This enclosure shall be installed within an overall padlockable 316 stainless steel enclosure as indicated on the drawings.

2. Provide a gasket between the enclosure and the mounting surface, and between the hinged cover and mounting plate/base.

3. The cover shall be **TayMac Specification Grade**, or equal.

2.5 NAMEPLATES

A. Provide engraved nameplates or equivalent markings on the switch enclosures to indicate the ON and OFF positions of each switch. Provide engraved nameplates indicating panel and circuit numbers for all switches and receptacles. Provide engraved nameplates indicating the lights each switch controls.

B. ON and OFF for 3-way or 4-way switches will not be accepted.

C. Provide receptacles for special purposes with nameplates indicating their use.

D. Nameplates shall meet the requirements of Section 260000 – Electrical Work, General.

PART 3 -- EXECUTION

3.1 GENERAL

A. Perform WORK in accordance with the requirements of the NEC.

3.2 CONNECTION

A. Rigidly attach wiring devices in accordance with the NEC and as indicated, avoiding interference with other equipment. Wiring device terminations shall be via fork style crimped connectors by Thomas & Betts or approved equal.

B. Securely fasten nameplates using screws, bolts, or rivets centered under or on the device, unless otherwise indicated.

3.3 GROUNDING

A. Devices, including switches and receptacles, shall be grounded in accordance with NEC, Article 250, and Section 260526 – Grounding.

B. Switches and associated metal plates shall be grounded through the switch mounting yoke, outlet box, and raceway system.

C. Flush Receptacles

1. Flush receptacles and their metal plates shall be grounded through positive ground connections to the outlet box and grounding system.

2. Maintain the ground to each receptacle by a spring-loaded grounding contact to the mounting screw, or by a grounding jumper, each making a positive connection to the outlet box and grounding system at all times.

D. Receptacles served from an uninterruptible power supply shall be provided with an isolated grounding conductor from the serving power panelboard.

3.4 FIELD TESTING

A. Provide checkout, field, and functional testing of wiring devices in accordance with Section 260000 – Electrical Work, General.

B. Test each receptacle for polarity and ground integrity, using a standard receptacle tester.

- END OF SECTION -

SECTION 260543 - UNDERGROUND RACEWAY SYSTEMS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide underground raceway systems, complete and in place, as indicated in accordance with the Contract Documents.

B. Manholes, pullboxes, handholes, and fittings that are dedicated to the underground raceway system shall comply with the requirements of this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals, and Section 260000 – Electrical Work, General.

B. Shop Drawings

1. Submit complete catalog cuts of all raceways, fittings, pullboxes, handholes, and manholes, marked where applicable in order to show proposed materials and finishes.

C. As-Built Drawings

1. Prepare as-built drawings of encased concealed and exposed raceways, ducts, raceways, junction boxes, pull boxes, and electrical and instrumentation equipment.

2. Show routings, burial depths, manhole and handhole locations and sizes, and where applicable, connections to drainage systems.

3. Furnish the drawings to the ENGINEER in accordance with the requirements of Section 013300 – Contractor Submittals.

PART 2 -- PRODUCTS

2.1 MANHOLES, HANDHOLES, AND PULLBOXES

A. Frames and Covers

1. Provide traffic-type covers with an H-20 loading, except as otherwise indicated.

2. Identify manhole, handholes, and pullbox covers as "ELECTRIC", “CONTROL”, “INSTRUMENTATION”, or “COMMUNICATION” as applicable by providing raised letters cast into the covers. Conductors shall be separated in separate manholes, handholes, and pull boxes similar to the requirements in Section 260533.

3. Provide water-tight grey iron frames and covers with solid lids and inner lids, and with 28-inch clear openings.

4. Bolt the covers and lids to cast-in-place steel frames using corrosion-resistant hardware.

5. Factory-prime the frames.

6. Provide covers constructed of cast-iron, and provide pick holes.

7. Provide frames with a 1/2-inch drilled and tapped hole and lug in order to accommodate a No. 4/0 AWG bare stranded copper conductor connected to a ground rod and the ground conductor of power cables passing through the manhole.

8. Manhole frames and covers shall be **Neenah Foundry No. NF-1755GT18** or equal.

B. Equip manholes and pullboxes with pulling-in irons, opposite and below each ductway entrance.

C. Provide manholes and pullboxes with closed bottoms; open-bottom manholes and pullboxes will not be accepted.

D. Provide PVC ductbank conduits with end bells.

E. Brackets

1. Provide brackets in manholes as required for racking wiring through the manholes

2. Brackets: **Unistrut Cat. No. P2515** or equal

3. Concrete Inserts: 60-inch; **Unistrut Cat. NO. P3261** or equal

F. Precast Manholes and Pullboxes Manufacturer, or Equal

1. **Jensen Precast**

2. **Mack**

3. **Quikset**

4. **U.S. Precast**

G. Cast-Iron Covers Manufacturer, or Equal

1. **U.S. Foundry**

2.2 DUCTBANKS

A. Provide underground ducts constructed of Schedule 40 PVC.

B. Encase ducts in concrete with steel reinforcing bars.

C. Provide concrete with a 3,000-psi compressive strength conforming to the requirements of Section 033100 – Cast-in-Place Concrete.

D. Ductbanks

1. Ductbanks shall contain a No. 4/0 bare stranded copper ground wire.

2. The ground wire shall be continuous through the ductbank and terminate at power distribution equipment and the grounding grid.

E. Identification Tape

1. Provide continuous lengths of underground warning tapes located 12 inches above and parallel to the ductbanks.

2. Provide tape consisting of 6-inch wide polyethylene film, imprinted with "CAUTION - ELECTRIC UTILITIES BELOW."

3. Provide tape that contains a non-ferrous metal foil conductor sandwiched in the tape for detection purposes.

4. Tape Manufacturer, or Equal: **Brady**

PART 3 -- EXECUTION

3.1 GENERAL

A. Install underground raceways between manholes and pullboxes as indicated. No more than the equivalent of three 90 degree bends shall be present in any unbroken conduit run. No unbroken run shall exceed 300 feet in length. This length shall be reduced by 75 feet for each 90 degree elbow.

B. Raceway systems shall be electrically and mechanically complete before conductors are installed.

C. Provide bends and offsets that are smooth and symmetrical, and fabricated with tools designed for this purpose.

D. Concrete monuments shall be provided at each stubbed conduit location.

E. Use factory elbows wherever possible.

F. To the extent possible, follow the raceway routings as indicated on the Drawings.

G. Adjust the indicated routings as necessary in order to avoid obstructions.

H. Coordination with Other Trades

1. Coordinate with other trades prior to installation of raceways.

2. The lack of coordination shall not be justification for extra compensation.

3. Perform removal and re-installation to resolve conflicts as part of the WORK.

I. DUCTBANKS

1. Install ductbanks in accordance with the following criteria:

2. Assemble the duct using high-impact, non-metallic spacers and saddles in order to provide conduits with vertical and horizontal separation.

3. Set the plastic spacers every 5 feet.

4. Anchor the duct array every 5 feet in order to prevent movement during the placement of concrete.

5. Lay the duct on a grade line of at least 3 inches per 100 feet, sloping towards pullboxes or manholes and sloping away from buildings.

6. Install the duct and adjust the pullbox and manhole depths such that the top of the concrete envelope is a minimum of 30 inches below grade and a minimum of 30 inches below roadways.

7. Accomplish changes in direction of the duct envelope by more than 10 degrees horizontally or vertically by using bends with a minimum radius 24 times the duct diameter.

8. Stagger duct couplings a minimum of 6 inches.

9. Provide select backfill or sand for the bottom of the trench.

10. Cleaning

    a. Clean each bore of the completed ductbank by drawing through it a standard flexible mandrel, one foot long and 1/4 inch smaller than the nominal size of the duct.

    b. After passing the mandrel, draw through a wire brush and swab.

11. For spare raceways that are not indicated to contain conductors, provide a 1/8-inch polypropylene pull cord installed throughout the entire length of the raceway.

J. Grout duct entrances smooth, and terminate ducts with flush end bells.

K. Assemble sections of pre-fabricated manholes and pullboxes using waterproof mastic, and set on a 6-inch bed of gravel as recommended by the manufacturer or as required by field conditions.

L. Provide watertight ductbank penetrations through walls of manholes, pullboxes, and building walls below grade.

M. Terminate concrete-encased ductbanks at building foundations.

N. When duct enters the building on a concrete slab on grade, do not encase the duct but transition to rigid AL conduits on stub-ups.

O. Sealing

1. Where an underground conduit enters a structure through a concrete roof or a membrane-waterproofed wall or floor, provide a **Link-Seal** or equal sealing device.

2. Use the sealing device with rigid conduit.

3. Transition from PVC to rigid conduit prior to building entry.

- END OF SECTION -

SECTION 260573 – PROTECTIVE DEVICE STUDIES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall perform the indicated short circuit and protective device studies for the electrical power system in accordance with the Contract Documents.

B. The WORK of this Section shall include protection studies for motors with solid state overload and overcurrent protection devices.

C. It is the responsibility of the CONTRACTOR to obtain the information required from the electric utility and appropriate vendors.

1.2 QUALIFICATIONS

A. Short circuit studies, protective device evaluation studies, arc-flash hazard analysis studies, and protective device coordination studies shall be performed by a manufacturer who has been regularly engaged in short circuit and protective device coordination services for a period of at least 15 years.

B. The indicated studies shall be signed by the professional electrical engineer, registered in the State of Florida, responsible for the studies.

C. The studies shall utilize computer programs with proven reliability and accuracy for performing 3-phase fault-duty calculations.

1.3 CONTRACTOR SUBMITTALS

A. The indicated studies shall be submitted and approved by the ENGINEER prior to final approval of the distribution equipment Shop Drawings and release of equipment for manufacture.

B. An initial short circuit study shall be submitted and reviewed before the ENGINEER will approve the Shop Drawings for 480-volt distribution and motor control equipment.

C. Submit an initial protective device coordination study shall be submitted with 90 days after the approval of the initial short circuit study.

D. The short circuit, arc-flash hazard analysis, and protective device coordination studies shall be updated prior to Project Substantial Completion; utilize characteristics of as-installed equipment and materials.

E. The adequacy of the equipment "withstand" and interruption ratings shall be approved by the ENGINEER.

1.4 MANUFACTURERS' SERVICES

A. The low-voltage switchgear manufacturer shall furnish the services of a qualified field engineer and necessary tools and equipment in order to test, calibrate, and adjust the protective relays and circuit breaker trip devices as recommended in the power system coordination study.

B. The motor control center manufacturer shall furnish the services of a qualified field engineer to calibrate the MCPs as recommended in the power system study.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 GENERAL

A. The studies shall include development of single-line and impedance diagrams of the power system.

B. The diagrams shall identify components considered in the study and the ratings of power devices, including transformers, circuit breakers, relays, fuses, busses, and cables.

C. The resistances and reactances of cables shall be identified in the impedance diagram.

D. The studies shall contain written data from the electric utility company regarding maximum available short circuit current, voltage, and X/R ratio of the utility power system.

E. The studies shall include every protective device and feeder included within the WORK.

F. The first upstream overcurrent device outside the WORK shall be used as a fixed reference.

G. The studies shall include all portions of the electrical distribution system for normal and standby power sources down to and including the 480-volt distribution system.

3.2 SHORT CIRCUIT STUDY

A. The short circuit study shall be performed with the aid of a digital computer program, and shall be in accordance with the following Standards:

ANSI/IEEE 141	Recommended Practice for Electrical Power Distribution for Industrial Plants
ANSI/IEEE 242	Recommended Practice for Protection, and Coordination of Industrial, and Commercial Power Systems
ANSI/IEEE C 37.010	Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
ANSI/IEEE C 37.13	Low-Voltage AC Power Circuit Breakers Used in Enclosures

3.3 PROTECTIVE DEVICE EVALUATION STUDY

A. A protective device evaluation study shall be performed in order to determine the adequacy of circuit breakers, molded case switches, and fuses.

B. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the attention of the ENGINEER.

C. Do not utilize series-rated circuit breakers to meet short circuit requirements for this project.

D. Devices shall be fully rated to withstand available fault currents.

3.4 PROTECTIVE DEVICE EVALUATION STUDY

A. A protective device coordination study shall be performed in order to develop the necessary calculations to select power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low-voltage breaker trip characteristics and settings.

B. Any problem areas or inadequacies in the equipment due to prospective short-circuit currents shall be promptly brought to the ENGINEER's attention.

3.5 TIME/CURRENT COORDINATION CURVES

A. As a minimum, the time/current coordination curves for the power distribution system shall include the following items plotted on 5-cycle log-log graph paper:

1. time/current curves for each protective relay, circuit breaker, or fuse demonstrating graphically that the settings will provide protection and selectivity within industry standards

2. Each curve shall be identified, and tap and time dial settings shall be specified.

3. Provide individual curves for each feeder unless identical to others.

4. Selectivity

   a. Time/current curves for each device shall be positioned to provide the maximum selectivity to minimize system disturbances during fault clearing.

   b. Where selectivity cannot be achieved, the ENGINEER shall be notified as to the cause.

   c. Recommendations shall be included for alternate methods that would improve selectivity.

5. time/current curves and points for cable and equipment damage.

6. circuit interrupting device operating and interrupting times

7. Indicate maximum fault values on the graph.

8. sketch of bus and breaker arrangement

9. magnetizing inrush points of transformers

10. thermal limits of dry-type and liquid-insulated transformers (ANSI damage curve)

11. Every restriction of the ANSI and National Electrical Code shall be followed, and proper coordination intervals and separation of characteristics curves shall be maintained.

3.6 ARC FLASH STUDY

A. An arc flash study shall be performed with the aid of a digital computer program in order to determine the “Arc Flash Protection Boundary” and “Personal Protective Equipment” (PPE) levels for applicable electrical distribution equipment, stand-alone disconnects, starters, and VFDs in the power distribution system.

B. The arc flash study shall be performed in conjunction with short circuit calculations and protective device coordination.

C. The arc flash study shall be in accordance with the latest version of the following Standards:

NFPA 70E	Standard for Electrical Safety Requirements for Employee Workplaces
IEEE 1584	IEEE guide for performing Arc Flash Hazard Calculations
OSHA (29 CFR PART 1910)	Occupational Safety and Health Standards for General Industry
ANSI Z535.4	Product Safety Signs and Labels

D. The recommended values for the “Arc Flash Protection Boundary” and PPE levels, based on the arc flash study results, shall be tabulated in the study.

E. Labeling

1. The digital computer program shall provide the “Arc Flash Protection Boundary” and PPE values in a format that can be directly printed on to labels.

2. The CONTRACTOR shall provide these labels in accordance with Section 260000 – Electrical Work, General.

3.7 FINAL SUMMARY REPORT

A. Summarize the results of the indicated power system studies in a final report.

B. The report shall include the following items:

1. single-line diagram

2. impedance diagram

3. tabulation of all protective devices identified on the single line diagram

4. time/current coordination curves

5. specific recommendations, if any

6. test instrumentation, condition, and connections, as applicable, for each study

7. computerized fault current calculations

8. any suggested changes to the protection scheme or equipment selection that will result in improved system reliability and safety

9. recommendations to minimize the arc flash energy

C. The report shall include information concerning the computer program used for the study, as well as a general discussion of the procedure, items, and data considered in the preparation of the study.

D. Submit 8 bound copies of the report to the ENGINEER.

3.8 PROTECTIVE DEVICE TESTING, CALIBRATION, AND ADJUSTMENT

A. Test, calibrate, and adjust the protective relays and circuit breaker trip devices in accordance with the recommendations in the power system coordination study.

B. Calibrate the MCPs as in accordance with the recommendations in the power system study.

C. Adjustments shall be made prior to energizing any electrical equipment.

- END OF SECTION -

SECTION 262900 – LOW-VOLTAGE MOTOR CONTROL CENTERS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide motor control centers (MCCs), complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 260000 – Electrical Work, General, apply to the WORK of this Section.

C. In the event that provided motors are of greater horsepower than the indicated motors, revise the raceways, conductors, starters, overload elements, and branch circuit protectors as necessary in order to control and protect the increased motor horsepower in accordance with Section 260510 – Electric Motors.

D. Single Manufacturer

1. The MCCs shall be the end product of one manufacturer in order to standardize appearance, operation, maintenance, spare parts, and manufacturer's services.

2. This requirement, however, does not relieve the CONTRACTOR of overall responsibility for the WORK.

3. Motor Control Centers shall be Arc Resistant according to the requirements of ANSI / IEEE C37.20.7

E. Coordination

1. The equipment provided under this Section shall operate the electric motor driver with the driven equipment as indicated under other equipment Sections.

2. The MCC manufacturer shall be provided with the following information, at a minimum:

a. Section 460000 – Equipment General Provisions

b. Relevant Division 40, 46, and Division 23 Sections for each piece of equipment driven by the MCC

c. Section 260000 – Electrical Work, General

d. Section 260510 – Electric Motors

e. Section 260515 – Industrial Control Panels

f. Section 260126 – Electrical Tests

g. the Electrical Contract Drawings

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Sections 133000 and 260000 – Electrical Work, General.

B. Documentation stating the MCC passes IEEE C37.20.7 Testing for Type 2 accessibility (personnel are proctected while in front, at the side, or in the rear of the enclosure in the event of an arcing fault). During a 100 ms duration arcing fault doors and covers shall not open, parts shall not be ejected, holes in the exterior of the tested structure will not be created, untreated cotton test indicators must not ignite or be perforated and all grounding connections shall remain effective.

C. Furnish the following equipment information in the Shop Drawings:

1. NEMA rating and color of enclosure
2. horizontal and vertical bus ampacities, voltage rating, interrupting capacity, and materials of construction
3. ground bus size and material of construction
4. conduit entrance provisions
5. main incoming line entry provision (top or bottom)
6. control unit nameplate schedule
7. circuit breaker types, frames, and settings
8. starter NEMA sizes, auxiliary contact provisions, and coil voltage
9. relays, timers, pilot devices, control transformer VA and fuse sizes
10. MCC Ladder Diagrams
    a. Furnish custom elementary schematic ladder diagrams for each compartment.
    b. The ladder diagrams shall include remote devices.
    c. Submittals not meeting these requirements will not be reviewed further and will be returned to the CONTRACTOR.
11. short circuit rating of the complete assembly
12. replacement parts lists and operation and maintenance procedures
13. time-current curves for protective devices
14. RVSS and AFD Equipment Information
    a. name of starter and drive manufacturer
    b. type and complete model number
    c. assembly drawing and nomenclature, including enclosure dimensions, mounting and anchoring details, and internal layout
    d. detailed schematics, including external wiring connections
    e. maximum heat dissipation capacity in kW
    f. altitude de-rating information

15. System block diagram and interconnection diagrams, including communication protocol, cabling requirements, and any equipment required to connect to the SCADA PLC.

16. factory test data certifying compliance with requirements of similar equipment from the same manufacturer

D. Furnish an Owner's Manual, including:

1. manufacturer's two-year warranty
2. field test report
3. As Installed structure and schematic drawings

E. Furnish the Manufacturer's Service Representative's resume, including the following documentation:

1. copy of the proposed representative's Factory Training Certificate
2. number of years experience servicing the manufacturer’s MCCs and VFDs
3. a statement that the individual is authorized to inspect, test and perform field service and repairs

F. Spare Parts List

1. Furnish spare parts information for parts required by this Section as well any other spare parts recommended by the MCC manufacturer.

G. Startup and Testing Report

1. Within 15 days after completion of startup and testing, the CONTRACTOR shall submit a report for the MCC.
2. The report shall contain the following documentation:
   a. the device name, serial number, rating, and complete model number of each MCC
   b. a complete listing of all tests performed and the results of each test
   c. a complete listing of all circuit breaker and overload settings, fuse ratings, settings, setpoints and configuration information for VFDs and equipment or devices with adjustable settings
   d. documentation for training that was provided to the OWNER’s personnel, including topics covered, instructor's name and contact information, and a list of attendees

PART 2 -- PRODUCTS

2.1 GENERAL

A. The manufacturer of the low-voltage motor control center shall also manufacture at least the following:

1. molded case circuit breakers, up to and including 225 ampere frame size
2. disconnect switches
3. magnetic motor starters
4. control and timing relays rated at 600 volts AC
5. pushbuttons, lights and selector switches, including remote mounted control stations
6. meters, including ammeter, voltmeter, and solid-state metering devices

B. Single Manufacturer

1. Devices of the same type shall be products of the same manufacturer.
2. This requirement applies to control devices, custom-fabricated equipment, and insofar as practical to equipment manufactured on a production basis.

C. Lighting transformers and panelboards shall be in accordance with the requirements of Section 261216 – Panelboards and General Purpose Dry-Type Transformers.

D. Motor control centers shall conform to the standards for NEMA Class II, Type B diagrams and wiring.

2.2 DESIGN, CONSTRUCTION, AND MATERIAL REQUIREMENTS

A. The motor control centers shall be 600-volt class and suitable for operation on a 3-phase, 60-Hz system.

B. The system operating voltage and number of wires shall be as indicated.

C. Power

1. The motor control center shall receive power from three- single phase 277/480-volt transformers with a grounded neutral.
2. Power distribution from the MCC shall be 480-volt, 3-phase, 3-wire.
3. The MCC shall include provision for termination of an incoming neutral conductor in conformance to NEC requirements for service entrance.

D. Enclosure

1. The enclosure shall be of NEMA 12, gasketed12.
2. Compartment doors shall be interlocked with compartment circuit breakers, fitted with a maintenance override.
3. Latches for panelboard compartments shall have butterfly heads or another hand operable method that does not require tools to operate.
4. Top plate pressure relief system.

5. Arc containment latches that allow pressure relief while keeping doors from detaching during an arcing fault.

6. Bolted unit support pans.

7. Reinforced door hinges.

8. The MCC shall be designed as Arc Resistant and shall be tested, rated, and labeled in accordance with the requirements of IEEE C37.20.7-2007. MCC shall be rated for Arc Resistance Type 1 Accessibility.

Size and Arrangement

9. Motor control centers shall be configured as mechanical groupings of control center units, assembled into a lineup of control center sections.

10. Each control section shall be nominally 90 inches tall by a minimum of 20 inches deep.

11. MCCs shall be designed to not exceed the indicated spatial requirements, including spaces, spares, and future compartments.

12. MCCs shall be subject to rejection if they exceed the indicated lengths, where allotted space is critical.

13. Equipment within the MCC may be rearranged at the discretion of the manufacturer, providing that the MCC includes the spares, space, and future provisions as indicated, and that panelboards are either at the top of their sections or the bottoms are at least 36 inches above the housekeeping pad.

14. Switches and circuit breakers used as switches shall be located such that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, will not be more than 6 feet, 7 inches above the floor, including the height of the concrete pad, unless provided with a handle extension acceptable to the Authority Having Jurisdiction. The top of all displays (i.e. TVSS unit, power monitor, etc.) shall be less than 6 feet 7 inches above the floor including the height of the concrete pad.

E. Components

1. Busses

   a. Provide a continuous copper ground bus, full width of the motor control center line-up.

   b. Horizontal Busses

      1) The main horizontal bus shall be of tin-plated copper, and located within an isolated compartment.

      2) The bus shall be rated for 600 amperes minimum, but in no case less than the main lug or main breaker frame size.

   c. Vertical Busses

      1) The vertical bus in each section shall consist of a single tin-plated copper conductor per phase, with a current capacity of not less than 300 amps.

2) The vertical bus shall be completely isolated and insulated, and shall extend the full height of the section wherever possible.

d. Provide fully-rated continuous copper neutral bus through the control center, with lugs of appropriate capacity.

e. Power buses shall be braced to withstand 65,000 amperes, minimum.

2. Wireways

a. Provide a separate vertical wireway adjacent to each vertical unit, covered by a hinged door.

b. Each individual unit compartment shall be provided with a side barrier to permit pulling wire in the vertical wireway without disturbing adjacent unit components.

c. Full height (72-inch) compartments or sections are not required to have a separate wireway.

3. Power, control, and signal fuses shall have blown fuse indicators

4. Control wires shall be color coded in accordance with Section 26 05 19 – Wires and Cables.

F. Cabinets

1. Structural members shall be fabricated of not less than 12-gauge steel, and side and top panels and doors shall be fabricated of not less than 14-gauge steel.

2. Spaces designated as SPACE or BLANK shall include blank hinged doors and vertical bus bars.

3. Control units inside compartments shall be clearly identified with tags or stencil markings.

4. Identification

a. Each control unit, including spares, spaces and blanks, lights, and devices shall be identified by an engraved nameplate.

b. Identification shall include the indicated circuit number.

c. Each motor control center shall be fitted with the manufacturer's nameplate which shall include the NEMA Standard electric rating and other pertinent data, including manufacturer, sales order number, date of manufacture, and place of manufacture.

5. Fans, heat exchangers, transformers, capacitors, junction boxes, and other devices shall not be mounted on the outside of the motor control center enclosure.

6. Protective Coating

a. The finish for motor control center shall be light grey: ANSI 61 or 49.

b. The panels shall be coated with 2 coats of primer inside and out, and 2 coats of enamel finish.

c. External colors other than ANSI 61 or 49 will not be accepted.

G. Buss Surge Suppressors

1. Surge suppressers shall be designed to provide transient voltage protection for the MCC main power service compartment.

2. Surge suppressers shall comply with UL 845, UL 1449 2nd Edition and UL 1283, and shall be UL-labeled for such use.

3. Surge suppressors shall be installed with 12 inches or less of connecting cable from the bus to the surge suppressor electronics.

4. Surge suppressors shall be rated for 480-volt, 3-phase service at 250kA per phase.

5. Surge suppressors shall have a built-in diagnostic package with flashing trouble light, a display for the status of each phase, and a counter and display to indicate the number of surges that have caused the device to operate.

6. Surge suppressors shall be resettable.

7. Surge suppressors with sacrificial element shall be not be accepted.

8. Surge suppressors shall be **Cutler-Hammer Clipper CPS-250-480Y-S-C**, or equal.

2.3 MAIN AND FEEDER CIRCUIT BREAKERS (480 V)

A. Circuit breakers having a frame size of 150 amperes or less shall be molded-case type with thermal magnetic non-interchangeable, trip-free, sealed trip units.

B. Circuit breakers with a frame size of 225 amperes to 1,200 amperes shall be molded case with interchangeable thermal, and adjustable magnetic trip RMS sensing electronic trip elements with the following adjustments:

1. long-time setting (by changing the unit)

2. long-time delay

3. short-time setting

4. short-time delay

5. instantaneous setting

6. ground-fault setting

C. The interrupting capacity of the main and feeder branch circuit breakers shall be a minimum of 65,000 RMS symmetrical amperes.

D. Service disconnects rated 1000 amps or greater shall provide for ground fault protection of the equipment.

E. Circuit breaker disconnect operators shall be capable of accommodating 3 padlocks for locking in the OPEN position.

F. Circuit breaker auxiliary contacts shall be furnished where indicated.

2.4 MOTOR STARTERS

A. Motor starters shall be mounted in standard motor control center assemblies, arranged as indicated.

B. Components

1. Each motor starter unit shall consist of a combination magnetic contactor and short circuit protective device, mounted in a completely enclosed cubicle. Starter shall be rated according to the requirements of the MCC for bracing, fault, and arc.

2. The short circuit protective device shall be an instantaneous, magnetic only circuit breaker: **Cutler-Hammer Type HMCP, G.E. Mag-Break Motor Circuit Protector**, or equal.

3. Circuit breakers provided as part of a motor starter unit shall be capable of being padlocked in the OPEN position.

4. Resetting of thermal overload elements shall be possible with the unit door closed.

5. Provide 3-phase overload trip units to suit the full load current of the equipment installed, and the trip unit shall be adjusted as required for power factor correction capacitors.

C. Magnetic Starters

1. Magnetic starters shall have auxiliary contacts as indicated, including N-O and N-C contacts as indicated, plus one each spare N-O and N-C contact.

2. The combination motor starters shall be drawout-type for Size 5 and below.

3. The fixed-type unit assembly shall be constructed such that it can be easily removed from its panel after disconnecting the wires to the terminal block and withdrawing from the primary bus.

4. Removal of a unit assembly shall be possible without rear access and without disturbing any other unit in the motor control center.

D. Control Power Transformer

1. Each starter unit shall have its own control power transformer, with a 115-volt grounded secondary.

2. Provide one secondary fuse and 2 primary fuses.

3. Control power transformers shall be sized to accommodate the indicated control devices.

4. Local control devices shall be mounted independently of the cover door.

5. Starters shall have a local red RUN indicator, and a green OFF indicator to indicate the presence of control power when the motor is not energized.

6. Starters shall be provided with elapsed time meters, HAND-OFF-AUTO selector switches, and other devices as indicated.

7. Cubicle control wires shall be terminated at a pull-apart disconnecting terminal block located at the cubicle.

8. Transformers shall supply 150 VA in excess of loads within bucket, unless identified as larger on the drawings.

E. Identification

1. The motor control center manufacturer shall be responsible for identifying each control wire within each motor starter unit with wrap-around permanent plastic markers.

2. Each control wire shall be identified at both ends.

F. Full-Voltage Starters

1. Full-voltage motor starter units shall be NEMA Size 1 or larger.

2. Each combination starter shall be rated for a minimum 42,000 RMS symmetrical amperes.

G. NEMA Ratings

1. Motor starters shall be designed to NEMA ratings.

2. Starters designed to IEC ratings or with dual IEC/NEMA ratings will not be accepted, either as part of an MCC, as remote starters, or as part of an equipment package.

H. View Ports

1. Cabinets shall be fitted with infrared sightglasses sufficient to view the following
   a. Main breaker
   b. Feeder breaker
   c. Branch terminations

2.5 CONTROL DEVICES

A. Control devices shall be in accordance with the requirements of Section 260515 – Local Control Stations and Miscellaneous Electrical Devices.

B. Metering

1. Provide solid-state metering where indicated.

2. Include CTs and PTs of ratios as indicated or as recommended by the MCC manufacturer.

3. The CT leads shall terminate on shorting type terminal blocks, and the shorting bar shall be grounded to the MCC ground bus.

4. Solid-state metering shall be **G.E. "PQM", Cutler-Hammer "DP-4000," Square D "Power-Logic**," or equal.

5. Meters shall communicate with the station PLC using cat 6e Ethernet IP cables.

2.6 FACTORY TESTS

A. Provide the manufacturer's standard electrical and mechanical production tests and inspections for motor control centers and their components.

B. The tests shall include electrical continuity check, dielectric tests for each circuit, and inspection for proper functioning of components including controls, protective devices, metering, and alarm devices.

2.7 SPARE PARTS

A. The CONTRACTOR shall furnish the following for each MCC:

1. Unit Control Transformer: one of each size furnished in magnetic starters installed

2. Bezels: 3 of each color installed for pilot indicators

3. Panel Lamps: one dozen of each type (form, voltage and current rating) installed

4. Control Fuses: one dozen of each type (form, voltage and current rating) installed

5. Relays: one of each type and size installed

B. Spare parts shall be identified by MCC number, type, size, and manufacturer.

2.8 MCC MANUFACTURER, OR EQUAL

A. **Rockwell Automation /Allen Bradley Centerline 2100 with Arc Shield**

PART 3 -- EXECUTION

3.1 **GENERAL**

A. The CONTRACTOR shall install motor control centers in accordance with the manufacturer's published instructions.

B. Conduit installation shall be coordinated with the manufacturer's as-fabricated drawings such that conduit stub-ups are within the area allotted for conduit.

C. Conduit shall be stubbed up in the section that contains the devices to which conductors are terminated.

3.2 STORAGE AND HANDLING

A. If stored at the Site, motor control centers shall be stored in a clean, dry space.

B. Factory wrapping shall be maintained or an additional heavy plastic cover shall be provided to protect units from dirt, water, construction debris, and traffic.

C. The storage space shall be heated or the MCC space heaters shall be energized.

D. Motor control centers shall be handled carefully to avoid damage to motor control center components, enclosure, and finish.

E. Damage shall be repaired before installation.

3.3 MANUFACTURER'S SERVICES

A. General

1. An authorized Service Representative of the manufacturer shall be present at the Site for 3 Work Days in order to provide the services listed below.

2. For the purpose of this paragraph, a Work Day is defined as an 8-hour period, excluding travel time.

3. The service representative's resume shall be approved by the ENGINEER before training is scheduled.

Inspection, Startup, Field Adjustment

4. The Service Representative shall supervise the following items, and shall certify that the equipment and controls have been properly installed, aligned, and readied for operation:

a. installation of the equipment

b. inspection, checking, and adjusting of the equipment

c. startup and field testing for proper operation

d. performance of repairs to correct any discrepancies or problems revealed during startup and testing

e. performance of field adjustments to ensure that the equipment installation and operation comply with the indicated requirements

f. Preparation and submittal of a report covering startup and testing, including a listing of equipment settings and parameters at the end of startup and testing.

3.4 INSTALLATION

A. Motor control centers shall be installed on 4-inch concrete pads and in accordance with the requirements of Section 260000 – Electrical Work, General.

B. After leveling and shimming, the CONTRACTOR shall anchor motor control centers to the concrete pads, and shall grout such that no space exists between the pad and support beams.

C. The CONTRACTOR shall:

1. torque bus bar bolts to manufacturer's recommendations, and tighten sheet metal and structure assembly bolts;

2. adjust motor circuit protector (MCP) devices to the instantaneous trip setting position recommended for the actual horsepower and full load amps of the motor;

3. verify that overload devices are proper for equipment installed;

4. make necessary changes in overload devices as required for motors having power factor correcting capacitors;

5. touch up scratches after the equipment has been installed;

6. verify that nameplate, and other identification is accurate; and

7. provide high-voltage switchboard matting in front of the MCC, in accordance with the requirements of Section 260000 – Electrical Work, General.

8. Verify protective labels are properly installed and visable.

3.5 FIELD TESTS

A. Provide a visual and mechanical inspection after installation, as follows:

1. Inspect for physical damage, proper anchorage, and grounding.

2. Verify that the ratings of the thermal overload heaters match the motor full-load current nameplate data.

3. Check tightness of bolted connections.

B. Electrical Tests

1. Insulation Tests

a. Measure the insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute.

b. The test voltage and minimum acceptable resistance shall be in accordance with manufacturer's recommendations.

c. Measure the insulation resistance of each starter section phase-to-phase and phase-to-ground with the starter contacts closed and the protective device open.

d. The test voltage and minimum acceptable resistance shall be in accordance with the manufacturer's recommendations.

e. Measure the insulation resistance of each control circuit with respect to ground.

2. Verify the proper operation of control logic in each mode of control.

- END OF SECTION -

SECTION 262923 – ADJUSTABLE FREQUENCY DRIVE UNITS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. General

1. The CONTRACTOR shall provide Adjustable frequency drive (AFD) units, complete and operable, as indicated in accordance with the Contract Documents.

2. It is the intent of this Section to require complete, reliable, and fully tested adjustable frequency drive systems suitable for attended or unattended operation.

3. Where the term “adjustable frequency drive” is used it shall be applied as “adjustable frequency drive”.

B. The requirements of Section 260000 – Electrical Work, General, apply to the WORK of this Section.

C. Single Manufacturer

1. Like products shall be the end product of one manufacturer in order to standardize appearance, operation, maintenance, spare parts, and manufacturer's services.

2. This requirement, however, does not relieve the CONTRACTOR of overall responsibility for the WORK.

D. Coordination

1. Equipment provided under this Section shall operate the electric motor driver and the driven equipment as indicated under other equipment specification Sections.

2. The CONTRACTOR'S attention is specifically directed to the need for proper coordination of the WORK under this Section and the WORK under the equipment Section with the WORK under Section 262900 – Electric Motors.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals, except that Shop Drawing information for the drives shall be submitted as part of the information for the driven equipment.

B. Shop Drawings: Include the following information:

1. Equipment Information

a. name of drive manufacturer

b. type and model

c. assembly drawing and nomenclature

d. maximum heat dissipation capacity in kW

2. conduit entrance provisions

3. circuit breaker type, frames, and settings

4. information related to relays, timers, pilot devices, control transformer VA, and fuse sizes, including catalog cuts

5. wiring and connection diagrams

6. Ladder Diagram
    a. Submit the system schematic ladder diagram and interconnection diagrams.
    b. The schematic ladder diagram shall include remote devices.
    c. The ladder diagram shall incorporate the control logic on the corresponding elementary schematic as indicated.
    d. Submittals with drawings not meeting this requirement will not be reviewed further and will be returned to the CONTRACTOR stamped "REJECTED."

7. factory test data certifying compliance of similar equipment from the same manufacturer with requirements of this Section

C. The Technical Manual shall include the following documentation:

1. manufacturer's 2-year warranty

2. harmonic analysis report

3. field test report

4. programming procedure and program settings (configuration settings).

5. Operations and Maintenance Manual
    a. Detailed configuration
    b. Drawings
    c. Replacement parts list
    d. Service center
    e. Troubleshooting

D. Spare Parts List

1. Submit information for parts required by this Section plus any other spare parts recommended by the controller manufacturer.

E. Field Service

1. Submit field service and startup reports from AFD manufacturer service center for all service and startup visits to project equipment.

PART 2 -- PRODUCTS

2.1 GENERAL

A. The CONTRACTOR shall provide adjustable frequency drives as shown on the drawings.

2.2 EQUIPMENT

A. General

1. No components provided via this section shall be listed as Rockwell Automation / Allen Bradley “Silver Series” or discontinued products.

2. The power supply shall be an adjustable frequency inverter designed to convert incoming 3-phase, 480-volt, 60-Hertz power to a DC voltage and then to adjustable frequency AC by use of a 3-phase inverter.

3. Current-source inverters will not be accepted.

4. Inverters shall be sized to match the KVA and inrush characteristics of the motors actually provided.

5. The CONTRACTOR shall be responsible for matching the controller to the load (adjustable torque or constant torque) as well as the speed and current of the actual motor being controlled.

6. The CONTRACTOR shall provide "clean power" 18-pulse AFD's for AFDs that are operating motors greater than 50 HP.

B. Inverter

1. The inverter shall be of a voltage-source design, producing a pulse-width-modulated type output.

2. Six-step and current-source inverters will not be accepted.

3. Motors

a. AFD shall be cable of powering motors that shall meet the requirements of section 26 05 10 and the following.

b. Inverters shall be provided with 460-volt, 3-phase, 60-Hertz, squirrel-cage high-efficiency inverter duty induction motors.

c. Motors shall be capable of operating over the range of 50-100 percent of base speed without derating or requiring any motor modifications.

d. Motors enclosures shall be NEMA B, TEFC (1.15 SF).

4. Inverters shall be capable of delivering the nameplate horsepower exclusive of service factor without the need for mandatory thermostats or feedback tachometers.

5. The AFD shall vary both the AC voltage and frequency simultaneously in order to operate the motor at required speeds.

C. The minimum AFD inverter efficiency shall be 95 percent at 100 percent speed and load, and 85 percent efficiency at 50 percent speed and load.

D. Power Outage

1. The AFD shall shut down in an orderly manner when a power outage occurs on one or more phases.

2. Upon restoration of power and a START signal, the motor shall restart and run at the speed corresponding to the current process input signal.

E. The AFD shall be provided with the following features:

1. inrush current adjustment between 50 and 110 percent of motor full load current (factory set at 100 percent)

2. overload capability at 110 percent for 60 seconds for adjustable torque loads and 150 percent for constant torque loads.

3. adjustable acceleration and deceleration

4. input signal of 4 - 20 mA from process SCADA

5. output speed signal of 4 - 20 mA; Signals other than 4 - 20 mA will not be accepted.

6. Upon loss of input signal, the AFD shall operate at a preset speed.

7. a minimum of 2 selectable frequency jump points in order to avoid critical resonance frequency of the driven system.

8. additional devices and functions as indicated

9. Ethernet IP communications to transmit AFD data to/from a plant PLC-based control system. Provide data map of registers for AFD to allow transfer to and from AFD.

F. The AFD shall be provided with, as a minimum, the following protection features:

1. input line protection with metal oxide varistor (MOV) and RC network

2. protection against single phasing

3. instantaneous overcurrent protection

4. electronic overcurrent protection

5. ground fault protection

6. overtemperature protection for electronics

7. protection against internal faults

8. ability to start into rotating motor (forward rotation)

9. additional protection and control as indicated and as required by the motor and driven equipment

G. The AFD shall be designed and constructed to satisfactorily operate within the following service conditions.

1. Elevation
    a. elevation to 1000 feet
2. Ambient Temperature: 0 to 50 degrees C
3. Humidity: 0 to 95 percent, non-condensing
4. AC Line-Voltage Variation: plus 10 percent to minus 10 percent
5. AC Line-Frequency Variation: plus and minus 2 Hertz

H. Electrical equipment provided in addition to the adjustable frequency inverter for each drive shall include:

1. 2-1/2-percent (minimum) line reactor integral to the drive enclosure.
2. Di/DT filters fused 480-to-120-volt control transformer to provide system control power for the logic and pilot lamps.
3. Provide an input circuit breaker.

I. Inverter Signal Circuits

1. The inverter signal circuits shall be isolated from the power circuits and shall be designed to accept an isolated 4-20 mA signal in the automatic mode of operation.
2. The inverter shall follow the setting of a remote or local potentiometer control while in the manual mode.
3. Refer to the Schematic indicated on the Drawings for speed control and START/STOP methods. Ethernet IP communications to transmit AFD data to/from a plant PLC-based control system.
4. Access to set-up and protective adjustments shall be protected by key-lockout.
5. The following operator monitoring and control devices shall be provided on the face of the AFD enclosure as discrete devices:
    a. Rockwell Automation’s / Allen Bradley’s Human Interface Module to view and adjust drive parameters, alarm/fault codes, etc.
    b. HAND/OFF/AUTO selection switch.
    c. While in AUTO, the inverter shall operate from the remote Ethernet/IP input, where applicable, and while in HAND control shall operate from start and stop push buttons with a manually operated speed potentiometer; speed pot ratings shall be coordinated with the supplier of the Local Control Station.
    d. Analog speed indicator calibrated in percent speed.
    e. Start pushbutton
    f. Stop pushbutton
    g. E-Stop muchroom maintained contact pushbutton
    h. Amber inverter fault trip pilot light and output alarm contacts

i. trip reset pushbutton

j. Green pump primed indicator light

k. Blue AFD Ready indicator light

l. Red AFD Running indicator light

m. Red Motor Space Heater On indicator light

n. Green Discharge Valve Closed indicator light

o. Red Discharge Valve Open indicator light

p. Red Suction Vent Valve Open indicator light

q. Green Suction Vent Valve Closed indicator light

r. Amber LOR Relay Tripped indicator light

s. Amber Low Sink Level indicator light

t. White Control Power indicator light

u. Amber High Discharge Pressure indicator light

v. Power Monitor capable of displaying the electrical information shown on the I-Drawings equipped with Ethernet/IP communication ability.

w. Non-resettable analog run time meter.

x. Provide other controls and readouts normally furnished as standard equipment, or as otherwise indicated on the Elementary Schematics and P&IDs as indicated on the Drawings.

J. Properly identified screw type terminal boards shall be provided for interconnection to remote controls and instrumentation

K. Pilot devices, control relays, time delay relays, elapsed time meters, and indicators provided as a part of the AFD equipment package shall meet the applicable requirements of Section 260515 – Industrial Control Panels.

2.3 HARMONIC ANALYSIS FOR DRIVES

A. The CONTRACTOR shall perform a harmonic study of the facilities included in this Project.

B. The following assumptions shall be utilized for the harmonic analysis:

1. The distribution system is a "general" system as classified by IEEE 519 under low voltage systems.

2. Assume 90 percent of total station operating load is motor load and 10 percent is resistive.

3. Assume a 70 percent plant diversity factor (i.e., 70 percent of the total plant load is operating), with motors other than AFDs operating at 90 percent of their nameplate horsepower.

4. Report

a. Results of the harmonic analysis shall be submitted prior to AFD shipment.

b. Excessive harmonic distortion shall be specifically denoted.

c. Corrective measures shall be submitted for action by the ENGINEER.

2.4 SPARE PARTS

A. The CONTRACTOR shall furnish the spare parts listed below, suitably packaged and labeled with the corresponding equipment number.

B. Modified Parts

1. At any time prior to Substantial Completion, the CONTRACTOR shall notify the ENGINEER in writing about any manufacturer's modification of spare part numbers, interchangeabilities, or model changes.

2. If the ENGINEER determines that the modified parts no longer apply to the equipment provided, the CONTRACTOR shall furnish other applicable parts as part of the WORK.

C. The following spare parts shall be furnished:

1. Provide one set of spare power fuses of each form, voltage, and current rating.

2. Provide 10 spare control and power fuses of each type and rating.

3. Provide 10 panel lamps of each type (form, voltage, and current rating).

4. Provide two of each type of circuit board, as applicable:

a. control board

b. gate firing board

c. diagnostic system printed circuit board

d. input/output modules

e. communication module

f. power board

g. diode bridge

h. transistor module

5. Provide two of each size and type power diode and transistor.

6. Provide two complete sets of air filters.

7. Provide two cooling fans of each type installed.

8. Provide two relays of each type installed.

9. Provide one complete cell replacement

10. Provide one set of any special tools required for maintenance of the AFD units

11. Two of each printed circuit board not identified above utilized on the project. The intent is that two boards of each type used will be provided as spare for use by the Owner.

2.5 Manufacturers, or equal

A. **Allen-Bradley Powerflex, no substitutions.**

PART 3 -- EXECUTION

3.1 MANUFACTURER'S SERVICES

A. General

1. An authorized service representative of the manufacturer shall be present at the Site for 3 Days to furnish the services listed below.

2. For the purpose of this Paragraph, a Day is defined as an 8-hour period excluding travel time.

B. The authorized service representative shall supervise the following and shall certify that the equipment and controls have been properly installed, aligned, and readied for operation:

1. installation of the equipment

2. inspection, checking, and adjusting the equipment

3. startup and field testing for proper operation

4. performing field adjustments such that the equipment installation and operation comply with requirements

C. Instruction of OWNER's Personnel

1. The authorized representative shall instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with test equipment.

2. The instruction shall be specific to the AFD models provided.

3. Training shall be scheduled a minimum of 3 weeks in advance of the first session.

4. Training shall include individual sessions for 2 shifts of plant personnel.

5. Proposed training materials shall be submitted for review, and comments shall be incorporated.

6. Training materials shall remain with the trainees.

3.2 INSTALLATION

A. Conduit stub-ups for interconnected cables and remote cables shall be located and terminated in accordance with the drive manufacturer's recommendations.

B. Programming

1. The CONTRACTOR shall perform programming of drive parameters required for proper operation of the AFDs included in this project.

2. Submit records of programming data in the equipment Technical Manual, including setup and protective settings.

3.3 FIELD TESTING

A. Testing, checkout, and startup of the AFD equipment in the field shall be performed under the technical direction of the manufacturer's service engineer.

B. Under no circumstances shall any portion of the drive system be energized without authorization from the manufacturer's representative.

C. Verify proper operation of control logic in every mode of control.

D. Harmonic Analysis

1. The CONTRACTOR shall test the completed installation for actual harmonic distortion at electrical service entrance.

2. Harmonic analysis shall be performed in accordance with IEEE 519 - Harmonic Control and Reactive Compensation of Static Power Converters at unit full load using a harmonic analyzer by **Hewlett Packard**, or equal

3. Tests shall demonstrate that the harmonic voltage distortion at the 480 volt distribution bus of the panelboard, motor control center, or switchgear serving the AFD is limited to a magnitude of 5 percent of the fundamental, with the isolation transformer in the circuit as indicated and with the maximum number of drives, as permitted by the process, in operation and in conformance with the applicable requirements of IEEE-519.

4. Provide a report that shall include the following:

a. expected harmonic voltage (THD) through the 35th harmonic, calculated with isolation transformers

b. actual RMS value and measured percentage of the THD in the field

c. all test results

- END OF SECTION -

SECTION 264123 – LIGHTNING PROTECTION SYSTEM

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR, through a qualified Subcontractor, shall design and provide a lightning protection system, complete and operable, as indicated in accordance with the Contract Documents.

B. The lightning protection Subcontractor shall be certified by the Lightning Protection Institute (LPI), for both the design and the installation of the lightning protection system.

C. Master Label: Provide a master labeled lightning protection system in accordance with UL 96 and NFPA 780

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes

NFPA 780	Standard for the Installation of Lightning Protection Systems
NFPA 70	National Electric Code
UL 96A	Lightning Protection Components
LPI-175	Lightning Protection Institute Installation Code

1.3 CONTRACTOR SUBMITTALS

A. Furnish Shop Drawings in accordance with the requirements of Sections 013300 – Contractor Submittals and 260000 – Electrical Work, General.

1. Products: Furnish manufacturer’s catalog data for all materials.

2. Drawings

a. Furnish a scaled drawing of the facility and site plan showing the lightning protection system.

b. The drawing shall show, at a minimum:

1) the location of air terminals

2) the routing of conductors

3) connections to the electrical grounding system and ground rods

4) details of air terminal mounting and bonding to vents, chimneys, antennas, and other metallic structures

5) all connections and terminations

6) connection to the fence

3. Cross-reference the materials provided with the manufacturer’s catalog numbers and cuts.

4. Test Results

B. Submit copy of permanent master UL Master Label. Install Master Label beside door inside Electrical Room.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Products shall be UL-listed for use in lightning protection systems. Provide lightning protection system components that are designed, manufactured and tested in accordance with the latest UL 96 standard and meet the requirements of NFPA 780, Lightning Protection Institute (LPI) and NEC.

B. Products shall be Class I for structures not greater than 75 feet high and Class II for structures higher than 75 feet.

C. Standard of Quality: Label all materials used for the lightning protection system with UL factory inspection labels.

D. Air terminals for aluminum roofs or structures shall be of aluminum construction.

E. Air Terminals

1. Air terminals shall project a minimum of 10 inches above the objects protected, and shall be located at intervals not exceeding 20 feet along ridges and around the perimeter of flat roof or gently sloping roofs.

2. Flat or gently sloping roofs exceeding 50 feet in width shall be provided with additional air terminals at intervals not exceeding 50 feet on the flat or gently sloping area.

3. Locate air terminals within 24 inches of the roof edge and outside corners of the protected area.

4. Provide air terminals for metal stacks, flues, and mechanical equipment having a metal thickness of less than 3/16 inch and not within a zone of protection of an air terminal.

5. Equipment with a metal thickness 3/16 inch or greater shall be bonded in accordance with code requirements.

6. Air terminals shall be No. A71, 1/2-inch by 12-inch (or longer, as required), constructed of solid aluminum, and shall use air terminal bases of cast aluminum construction for aluminum roofs.

7. Air terminals shall be No. 71, 1/2-inch by 12-inch (or longer, as required), constructed of solid copper, and shall use air terminal bases of cast bronze construction for non-aluminum roofs.

F. Conductors

1. Structures Less than 75 Feet High

a. With Aluminum Roofs

1) Main size conductors on the roof shall be No. A28, Class I aluminum lightning conductor, consisting of 28 strands of 14 AWG aluminum wire weighing 115 lbs. per 1000 feet.

2) Secondary bonding conductors shall be No. A10, secondary bonding conductor, consisting of 10 strands of 14 AWG aluminum wire.

3) Down Conductors

a) Down conductors shall be No. 29, Class I copper lightning conductor.

b) Conceal down conductors in exterior wall construction.

c) Use bimetallic connectors for the transition from aluminum roof conductors to copper down conductors.

4) Provide buildings over 60 feet high with a conductor counterpoise cable constructed of 29/17 copper in conformance with NFPA code requirements.

b. With Non-Aluminum Roofs

1) Main size conductors on the roof shall be No. 29, Class I copper lightning conductor, consisting of 29 strands of 17 AWG copper wire weighing 190 lbs. per 1000 feet.

2) Secondary bonding conductors shall be No. 14, secondary bonding conductor, consisting of 14 strands of 17 AWG copper wire.

3) Down Conductors

a) Down conductors shall be No. 29, Class I copper lightning conductor.

b) Conceal down conductors in exterior wall construction.

4) Provide buildings over 60 feet high with a conductor counterpoise cable constructed of 29/17 copper in conformance with NFPA code requirements.

G. Miscellaneous Hardware

1. Provide miscellaneous hardware as may be required for the installation of the lightning protection system.

2. The hardware shall be compatible with the indicated air terminal and conductor materials.

3. Nuts, bolts, and other fasteners shall be constructed of stainless steel.

H. Corrosion Protection

1. Provide corrosion protection at the junctions of dissimilar metals and at locations where the components of the lighting protection system may be subjected to corrosion.

2. Use bimetallic connectors and fittings for splicing and bonding dissimilar metals.

3. Bimetallic connectors shall be located not less than 18 inches above grade.

4. Copper components within 24 inches of a chimney or vent emitting corrosive gases shall be protected by a hot-dipped lead coating or by another method as approved by the ENGINEER.

Grounding Materials

5. Ground rods and ground conductors shall conform to the requirements of Section 260526 – Grounding. Grounding rods shall be minimum ¾" diameter and 10' long, stainless steel.

6. Down conductors shall be connected to the ground rods using exothermic weld connections.

I. Structural Steel System

1. Structural steel may be substituted for down conductors.

2. The main steel columns shall be grounded an average maximum distance of 60 feet using Class II material.

3. Roof penetrations from steel to perimeter cables shall be at intervals not exceeding 100 feet in accordance with the requirements of UL 96A, LPI 175, and NFPA 780.

4. Use exothermic welds for steel connections.

PART 3 -- EXECUTION

3.1 GENERAL

A. The lightning protection system shall be installed in accordance with applicable code requirements by a Subcontractor certified in the following organizations:

1. NFPA

2. Lightning Protection Institute (LPI)

3. UL

B. Bends in conductors shall be gradual, utilizing a radius of 8-inches or greater and forming an angle of at least 90 degrees.

3.2 ROOF PENETRATIONS

A. Roof penetrations shall be made using a conduit sleeve passing through a pitch pocket.

B. The CONTRACTOR shall construct the pitch pockets in such a way as to maintain the roofing warranty in full force.

3.3 INTERCONNECTIONS OF METALS

A. Metal bodies within 6 feet of the conductor shall be bonded to the system with approved fittings and conductor.

B. Bonding of metallic objects and systems at roof levels and elsewhere on the structure shall be complete.

C. The primary bonds for metal bodies of conductance, which shall include the following items, shall be bonded with appropriate fittings and full-size conductor:

1. roof exhaust fans
2. HVAC units with related piping ductwork
3. exhaust vents and other roof piping systems
4. antenna masts for TV, radio, or microwave
5. decorative screens
6. roof ladders
7. metal plumbing stacks

D. Exterior architectural metal fascia, curtain walls, or mullions, which extend the full height of the structure, shall be bonded, if not inherently bonded through the building frame.

E. Metal Bodies of Conductance

1. Metal bodies of inductance located within 6 feet of a conductor or object with secondary bonds shall be bonded with secondary cable and fittings.

2. Typical of these are:
   a. roof flashings
   b. parapet coping
   c. gravel guards
   d. isolated metal building panels or siding
   e. roof drains and down spouts
   f. roof insulation vents
   g. other sizeable miscellaneous metal fabrications

3.4 INSPECTION AND ACCEPTANCE

A. The lightning protection system shall be inspected, tested, and certified according to UL 96/96A.

B. The CONTRACTOR shall retain the services of an independent inspector.

C. An LPI/UL Certificate of Inspection shall be furnished to the ENGINEER.

D. Test: Test the dry season resistance of the lightning protection system. Provide a system that does not to exceed five ohms at any point of test. Provide all test equipment as specified and required.

3.5 UL MASTER LABEL

A. UL Master Label: Upon completion of the installation of this system, furnish UL Master Label and deliver it to the OWNER and attach to the building in a location accepted by Owner and Engineer.

- END OF SECTION -

SECTION 265000 - LIGHTING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide luminaires and accessories, complete and operable, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes

NFPA 70	National Electrical Code
NEMA 250	Enclosures for Electrical Equipment (1,000 Volts Maximum)
International Building Code (IBC)	Earthquake Requirements
UL-595	Standard for Safety Marine-Type Electric Lighting Fixtures
UL-924	Standard for Safety Emergency Lighting and Power Equipment
ANSI C82.1	Specifications for Fluorescent Lamp Ballasts
UL 8750	Standards for LED fixtures

Standards of the Certified Ballast Manufacturer’s Association

1.3 CONTRACTOR SUBMITTALS

A. Furnish the following product information in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Furnish the following information:

1. Interior Luminaires
    a. catalog data sheets and photos
    b. luminaire finish and metal gauge
    c. lens material, pattern, and thickness
    d. candlepower distribution curves in 2 or more planes
    e. candlepower chart, 0 to 90 degrees
    f. lumen output chart
    g. average maximum brightness data in foot-lamberts
    h. coefficients of utilization for zonal cavity calculations
    i. mounting or suspension details

j. heat exchange and air handling data

2. Exterior Luminaires
   a. catalog data sheets and photos
   b. luminaire finish and metal gauge
   c. lens material, pattern, and thickness
   d. IES lighting classification and isolux diagram
   e. fastening details to wall or pole
   f. ballast type, location, and method of fastening
   g. for light poles: wind loading; complete dimensions; and finish

3. Lamps
   a. voltages
   b. colors
   c. approximate life (in hours)
   d. approximate initial lumens
   e. lumen maintenance curve
   f. lamp type and base
   g. LED light output, Power, efficiency, lifetime

4. Ballasts
   a. type
   b. wiring diagram
   c. nominal watts and input watts
   d. input voltage and power factor
   e. starting current, line current, and restrike current values
   f. sound rating
   g. temperature rating
   h. efficiency ratings
   i. low-temperature characteristics
   j. emergency ballasts rating and capacity data

PART 2 -- PRODUCTS

2.1 LUMINAIRES

A. General

1. Additional WORK requirements are indicated in the Luminaire Schedule on the Drawings.

B. Provide a feed-through type or separate junction box.

C. Provide 2-lamp ballasts when possible.

Tandem-wire luminaires for 3-lamp fluorescent luminaires.

D. Provide minimum 18 AWG wire leads.

E. Provide components that are accessible and replaceable without removing the luminaire from the ceiling.

F. Exterior Installations

1. Installations shall be UL-labeled as "Suitable for Wet Locations."

2. Provide removable and prewired ballasts.

3. When factory-installed photocells are provided, the entire assembly shall be UL-labeled.

G. Emergency Lighting

1. Power Pack
   a. self-contained
   b. 120 vac
   c. selectable input transformer
   d. 6 V sealed lead calcium battery
   e. indicator switch in accordance with the requirements of UL 924

2. lighted, push-to-test pushbutton and indicator

3. capability of providing full illumination for 1-1/2 hours in emergency mode

4. capability of full recharge in 24 hours, automatically initiated upon resumption of normal line voltage

5. capability of protecting against excess charging and discharging

6. twin halogen, sealed lighting heads

7. solid state charger

8. normal and emergency LED indicating lights

9. Provide a 3-wire power cord and plug set. Cord may be removed for installation.

10. mounting stand

11. time delay relays in order to maintain emergency lighting in areas illuminated by HID luminaires for 5 minutes after normal power has been restored.

12. Provide NEMA-rated enclosures in accordance with the area classifications in which they are installed.

H. Exit Signs

1. internally illuminated
2. universal mounting type
3. internal 6 V, maintenance free nickel-cadmium battery
4. battery charger
5. LED-type emergency and normal indicating lights
6. press-to-test button
7. directional arrows
8. red letters on a white panel

2.2 LAMPS

A. Fluorescent

1. Type: T-8, energy-efficient
2. Color: K-4100
3. Lengths: 48 inches
4. Rated Burning Life: 20,000 hours
5. Compact Fluorescent
   a. Type: double biax
   b. Color: K-4100
   c. Rated Burning Life: 10,000 hours.
6. Electronic Biax Lamps
   a. Type: double biax, with screw shell for replacement of incandescent lamps
   b. Color: K-2700 or higher
   c. Rated Burning Life: 10,000 hours

2.3 BALLASTS

A. General

1. UL-Listed, ETL-certified
2. high power factor, energy-efficient type
3. Ballasts shall meet luminaire requirements.

4. Ballasts shall conform to the State of Florida Energy Code and the local utility company's energy rebate program and total harmonic distortion (THD) limitations.

5. Provide exterior ballasts that produce reliable starting and produce the full output of the lamps when the ballasts and lamps are operating within an ambient temperature of 0 degrees F at 90 percent of normal line voltage.

B. Fluorescent

1. Type: electronic, high-frequency; full-output rapid start; for use with 265 mA T-8 lamps

2. Sound Rating: minimum 'A'; maximum allowable noise level of 30 decibels measured 2 feet from the luminaire.

3. Class: 'P'

4. Current Crest Factor: 1.7

5. Manufacturer, or Equal
   a. **Advance Mark V**
   b. **Valmont**
   c. **Osram/Sylvania**

C. LED

1. As shown on schedule

2.4 LIGHTING CONTROL

A. Per schedule provide outdoor luminaries with photocell

1. Provide Photocell with

2. Settings: ON at dusk; OFF at dawn

3. Provide a time delay feature in order to prevent false switching.

4. field-adjustable to control operating levels

PART 3 -- EXECUTION

3.1 LUMINAIRES

A. General

1. Install in accordance with the manufacturer's recommendations.

2. Provide necessary hangers, pendants, canopies, and other accessories.

3. Provide additional ceiling bracing, hanger supports, and other structural reinforcements to the building as required to safely mount the luminaire.

4. Install the luminaire plumb and level.

5. The mounting heights indicated for wall-mounted or pendant-mounted luminaires are from the bottom of the luminaire to finished floor or finished grade, whichever is applicable.

6. Install each luminaire outlet box with a stainless steel stud.

B. Pendant Mounting

1. Provide swivel-type hangers and canopies to match the luminaires, unless otherwise indicated.

2. Space single-stem hangers on continuous-row fluorescent luminaires 48 inches apart.

3. Provide twin-stem hangers on single luminaires.

C. Finished Areas

1. Install the luminaires symmetrically with tile pattern.

2. Locate with the centerline of tile or with centerline of the joint between adjacent tile runs.

3. Install recessed luminaires tight to the finished surface such that no spill light will show between the ceilings and the sealing rings.

4. When installing on combustible low-density cellulose fiberboard, provide spacers and mount luminaires 1-1/2 inches from ceiling surface, or use luminaires suitable for mounting on low-density ceilings.

5. Junction Boxes

   a. Flush and Recessed Luminaires: Locate a minimum of one foot from the luminaire.

   b. In concealed locations, install junction boxes to be accessible by the removal of the luminaire.

6. Wiring and Conduit

   a. Provide wiring of a suitable temperature rating as required by the luminaire.

   b. Provide flexible steel conduit.

7. Provide plaster frames when required by ceiling construction.

8. Independent Supports

   a. Provide each recessed fluorescent luminaire with 2 safety chains or 2 No. 12 soft-annealed galvanized steel wires of length needed to secure the luminaire to the building structure, independent of the ceiling structure.

b. Ensure that the tensile strength of chain or wire, and the method of fastening to the structure, is adequate to support the weight of the luminaire.

c. Fasten the chain or wire to each end of the luminaire.

D. Unfinished Areas

1. Locate the luminaires to avoid conflicts with other building systems and blockage of the luminaire light output.

2. Luminaire Suspension

a. Provide 3/8-inch threaded steel hanger rods.

b. Scissor-type hangers will not be accepted.

3. For attachments to steel beams, provide flanged beam clips and straight or angled hangers.

3.2 LAMPS

A. Within each luminaire, provide the number and type for which the luminaire is designed, unless otherwise indicated.

3.3 BALLASTS

A. Install in accordance with the manufacturer's recommendations.

B. Use ballast mounting holes to fasten the ballast securely within the luminaire.

C. Replace noisy or defective ballasts.

3.4 CLEAN-UP

A. Remove labels and other markings, except the UL listing mark.

B. Wipe the luminaires inside and out in order to remove construction dust.

C. Clean the luminaire plastic lenses with an antistatic cleaner only.

D. Touch up painted surfaces of the luminaires and the poles with matching paint provided by the manufacturer.

E. Replace defective lamps at the Date of Substantial Completion.

- END OF SECTION -

SECTION 311000 - SITE PREPARATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. In its initial move onto the Site, the CONTRACTOR shall protect existing fences, houses and associated improvements, streets, and utilities near construction areas from damage during the construction process and clear, grub, strip; and regrade certain areas, in accordance with the Contract Documents.

1.2 SITE INSPECTION

A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review the OWNER's property and right-of-way lines.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 SITE ACCESS

A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.

B. Utility Interference: Where existing utilities interfere with the WORK, notify the utility owner and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING, GRUBBING, AND STRIPPING

A. Construction areas shall be cleared of grass and weeds to at least a depth of 6-inches and cleared of structures, pavement, sidewalks, concrete or masonry debris, trees, logs, upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the WORK, create a hazard to safety, or impair the subsequent usefulness of the WORK, or obstruct its operation. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction.

B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove stumps, roots, buried logs, and other objectionable material. Underground structures, debris or waste shall be removed if found on the Site. Objectionable material from the clearing and grubbing process shall be removed from the Site and wasted in approved safe locations.

C. The entire area to be affected by construction shall be stripped as required for construction. The stripped materials shall be stockpiled and incorporated into landscaped areas or other non-structural embankments.

D. Unless otherwise indicated, native trees larger not scheduled on the Plans for removal shall not be removed without the ENGINEER's approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary for the CONTRACTOR's choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, as part of the WORK.

- END OF SECTION -

SECTION 312319 - DEWATERING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall dewater trench and structure excavations, in accordance with the Contract Documents. The CONTRACTOR shall secure all necessary permits to complete the requirements of this Section of the Specifications.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Prior to commencement of excavation, the CONTRACTOR shall submit a detailed plan and operation schedule for dewatering of excavations. The detailed plan shall include mitigation measures to prevent settlement of nearby structures and a contingency plan for restoring nearby structures if settlement is observed as a result of the CONTRACTOR’s dewatering operations. The CONTRACTOR may be required to demonstrate the system proposed and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times. The CONTRACTOR's dewatering plan is subject to review by the ENGINEER.

1.3 QUALITY CONTROL

A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.

C. All structures or facilities that are located within the radius of influence of the CONTRACTOR’s dewatering operation shall have reference points established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The CONTRACTOR shall survey, record and report the reference points on a daily basis, and submit the written log to the ENGINEER at the completion of construction. The ENGINEER shall be immediately notified should any sign of settlement is observed. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

D. The CONTRACTOR shall install monitoring wells adjacent to excavations and provide piezometers to verify groundwater levels are at least 12 inches below the excavation for the pipelines and at least 3 ft below the bottom of the excavation for the structures. The monitoring wells and piezometers shall be left in place until all below grade work is complete.

E. The CONTRACTOR shall provide calibrated sound level monitoring equipment capable of demonstrating compliance with noise regulations established by all applicable Rules and codes including those of the Environmental Protection Commission of Hillsborough County. This equipment shall be kept onsite in the event the OWNER receives noise complaints associated with dewatering equipment.

PART 2 -- PRODUCTS

2.1 EQUIPMENT

A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the Site such that the firm pumping capacity is equal to the capacity necessary to dewater the site per contract documents. Firm pumping capacity shall be the achievable capacity with the largest onsite pump out of service.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

A. The CONTRACTOR shall comply with all applicable Rules and codes related to noise pollution including those of the Environmental Protection Commission of Hillsborough County.

B. The CONTRACTOR shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Specified standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power or pump failures.

C. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements. In no event shall dewatering cease until backfill has reached existing grade and sufficient structural weight is in place to resist uplift pressures due to existing groundwater levels.

D. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped via float controlled sump pumps or drained by gravity from the excavation to maintain a bottom free from standing water.

E. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

F. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock.

G. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.

H. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

I. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

J. The CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the ENGINEER. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system. No visible turbidity shall be present in the discharged water.

K. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

L. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK and all costs thereof shall be included in the various contract prices in the Bid Forms, unless a separate bid item has been established for dewatering.

- END OF SECTION -

SECTION 313000 - EARTHWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall perform earthwork as indicated and required for construction of the WORK, complete and in place, in accordance with the Contract Documents. All testing shall be performed by a testing laboratory provided by the OWNER.

1.2 CONTRACTOR SUBMITTALS

A. Samples

1. The CONTRACTOR shall submit samples of materials proposed for the WORK in conformance with the requirements of Section 013300 – Contractor Submittals.

2. Sample sizes shall be as determined by the testing laboratory.

PART 2 -- PRODUCTS

2.1 FILL AND BACKFILL MATERIAL REQUIREMENTS

A. General

1. Fill, backfill, and embankment materials shall be selected or shall be processed and clean fine earth, rock, gravel, or sand, free from grass, roots, brush, other vegetation and organic matter.

2. Fill and backfill materials that are to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.

B. Suitable Materials

1. Materials not defined below as unsuitable will be considered as suitable materials and may be used in fills, backfilling, and embankment construction, subject to the indicated requirements.

2. If acceptable to the ENGINEER, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.

3. Mixing or blending of materials to obtain a suitable composite is the CONTRACTOR's option but is subject to the approval of the ENGINEER.

4. The CONTRACTOR shall submit certification to the ENGINEER that the chloride concentration in imported materials within the pipe zone does not exceed 100 ppm, when tested in accordance with the requirements of AASHTO T291-94 – Standard Method of Test for determining Water-Soluble Chloride Ion Content in Soil.

5. Suitable materials may be obtained from on-Site excavations, may be processed on-Site materials, or may be imported.

6. If imported materials are required by this Section or are required in order to meet the quantity requirements of the WORK, the CONTRACTOR shall provide the imported materials as part of the WORK.

7. Suitable materials are as tabulated below.

Soil Class	Soil Type[1]	Description of Material Classification	Acceptable Areas
Class I[2]	NA	Manufactured angular, granular material, 1/4- to 1-1/2-inches in size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Submittals shall be made for manufactured materials to indicate appropriateness to the project. Submittals shall include chemical and corrosivity analysis.	Embankment Bedding Embedment
Class II[3]	GW	Well-graded gravels and gravel-sand mixtures with little or no fines. 50 percent or more retained in the No. 4 sieve.	Bedding Embedment
	GP	Poorly graded gravels and gravel-sand mixtures with little or no fines. 50 percent or more retained on the No. 4 sieve. More than 95 percent retained in the No. 200 sieve.	Embankment Bedding Embedment
	SW	Well graded sands and gravelly sands with little or no fines. More than 50 percent passing the No. 4 sieve and more than 95 percent retained on the No. 200 sieve.	Embankment Bedding Embedment Trench Zone
	SP	Poorly graded sands and gravelly sands with little or no fines. More than 50 percent passing the No. 4 sieve and more than 95 percent retained on the No. 200 sieve.	Embankment Bedding Embedment Trench Zone
Class III[4]	GM	Silty gravels, gravelly-sand-silt mixtures. 50 percent or more retained on the No. 4 sieve. More than 88 percent retained on the No. 200 sieve.	Embankment Bedding Embedment Trench Zone
	GC	Clayey gravels, gravelly-sand-silt mixtures. 50 percent or more retained on the No. 4 sieve. More than 88 percent retained on the No. 200 sieve.	Embankment Bedding Embedment Trench Zone
	SM	Silty sands, sand-silt mixtures. More than 50 percent passing the No. 4 sieve. More than 88 percent retained on the No. 200 sieve.	Embankment Bedding Embedment Trench Zone
	SC	Clayey sands, sand-clay mixtures. More than 50 percent passing the No. 4 sieve. More than 88 percent retained on the No. 200 sieve.	Embankment Bedding Embedment Trench Zone

Soil Class	Soil Type[1]	Description of Material Classification	Acceptable Areas
Class IV	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50 percent or less. 50 percent or more passing the No. 200 sieve.	Embankment Trench Zone Trench Plug
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays. Liquid limit 50 percent or less. 50 percent or more passing the No. 200 sieve.	Embankment Trench Zone Trench Plug
	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50 percent. 50 percent or more passing the No. 200 sieve.	None – Material is unsuitable
	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50 percent. 50 percent or more passing the No. 200 sieve.	None – Material is unsuitable
Class V	OL	Organic silts and organic silty clays of low plasticity. Liquid limit of 50 percent or less. 50 percent or more passing the No. 200 sieve.	None – Material is unsuitable
	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50 percent. 50 percent or more passing the No. 200 sieve.	None – Material is unsuitable
	PT	Peat, muck, and other highly organic soils.	None – Material is unsuitable
VI	Pea Gravel	Crushed rock or gravel conforming to ASTM C33, Size No.8	Where Indicated
VII	Coarse Drainrock	Crushed rock or gravel conforming to ASTM C33 Size No.4	Excavations where dewatering is necessary to perform the WORK. Place filter fabric prior to placing Coarse Drainrock material.[5] Where Indicated
VIII	Graded Drainrock[6]	Crushed rock or gravel conforming to ASTM C33, Size No.57	Beneath hydraulic or water-retaining structures with and without underdrains. Where Indicated
IX	Aggregate Base	AASHTO M-147-65 (2000) Gradings A, B, or C, except that the material passing the No. 200 sieve shall be between 2 and 9 percent.	Beneath hydraulic or water-retaining structures without underdrains. Where Indicated

Soil Class	Soil Type[1]	Description of Material Classification	Acceptable Areas
X	Aggregate Subbase	AASHTO M-147-65 (2000) Gradings E or F.	Where Indicated
XI	Topsoil	Stockpiled topsoil material from the Site obtained by removing soil to a depth not exceeding 2 feet. Removal of topsoil shall be done after the area has been stripped of vegetation.	Where Indicated Final Backfill
XI	Cement-Treated or Lime-Treated Backfill	Any of the materials form Class I, II, III, or VIII or mixture thereof treated with a minimum of 5 percent by weight cement to obtain a 28 day compressive strength of not less than 400 psi.	Bedding Embedment Trench Zone Trench Plug Where Indicated

NOTES:

1. Refers to ASTM D 2487 classifications for Classes I, II, III, IV, and V.
2. Class I materials are not defined by ASTM D 2487.
3. In accordance with ASTM D 2487, less than 5 percent passes the No. 200 sieve.
4. In accordance with ASTM D 2487, more than 12 percent passing the No. 200 sieve. Soils with 5 to 12 percent passing the No. 200 sieve fall in borderline classification such as GP-GC. If borderline classifications are proposed, approval shall be subject to the CONTRACTOR demonstrating its ability to control moisture content and achieve the required compaction. If the borderline classification is predominately an unsuitable material, the composite material shall be considered unsuitable.
5, Filter fabric shall be **Mirafi 140 N, Mirafi 700X,** or equal.
6. The graded drainrock shall have a sand equivalent value not less than 75. The finish graded surface of the graded drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs. The CONTRACTOR shall use, at its option, one of the asphalt types listed below. If the surface remains tacky, sufficient sand shall be applied to absorb the excess asphalt.

	Type 1	Type 2	Type 3
Designation	SC-800	SC-250	RS-1
Spray Temperature, deg F	175-255	165-200	70-120
Coverage, gal/sq yd	0.50	0.50	0.50

Sources: Buried Pipe Design, Second Edition, by A.P. Moser; ASTM D2487-00; AASHTO M-147-65(2000).

8. A minimum of 2 feet of FDOT No. 57 stone wrapped in geo/filter fabric shall be placed beneath slabs and a minimum of 3 ft outside the footprint of slabs.

2.2 MATERIALS TESTING

A. Samples

1. Soils testing will be performed by an independent testing laboratory provided by the OWNER.

2. The ENGINEER may direct the CONTRACTOR to supply samples for testing of any material used in the WORK.

B. Particle size analysis of soils and aggregates will be performed using ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.

C. Determination of sand equivalent value will be performed using ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

D. Unified Soil Classification System

1. References in this Section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D 2487.

2. The CONTRACTOR shall be bound by applicable provisions of ASTM D 2487 in the interpretation of soil classifications.

2.3 IDENTIFICATION TAPE

A. Unless otherwise indicated, identification tape shall be placed above buried pipelines that are not comprised of magnetic components at least in part.

B. Identification tape shall be 6-inches wide, composed of polyethylene, and provided with an integral metallic wire. Color shall be blue (water), green (sewer), or red (electrical).

C. Tape shall be labeled with CAUTION – BURIED "XXXX", where "XXXX" indicates the type of buried utility present.

PART 3 -- EXECUTION

3.1 EXCAVATION AND BACKFILLING - GENERAL

A. General

1. The excavated subgrade (dewatered trench bottom) for pipes and associated structures shall be leveled, cut to grade, if necessary, and then compacted with a vibratory compactor. Careful observations shall be made during compaction to help identify any areas of soft yielding soils that may require over excavation and replacement. If unsuitable material such as organic or clayey soils is encountered at the bottom of the pipe or structure embedment depth, over excavate an additional 2 and 3 feet for the pipe and structure, respectively. The excavation shall then be backfilled to foundation grade with clean sands in controlled lifts not exceeding 6 inches and compacted to a density of at least 98 percent of the maximum density as determined by ASTM D-1557. Care shall be used when operating the compactor to

avoid transmission of vibrations to existing structures. The CONTRACTOR shall include the cost of over excavation and backfill as specified in his bid.

2. Prior to beginning compaction, soil moisture contents shall be controlled in order to facilitate proper compaction. Moisture content shall be within 2 percentage points of the optimum indicated by the modified Proctor test (ASTM D-1557).

3. Following satisfactory completion of the initial compaction on the excavation bottom, the construction areas may be brought up to finished subgrade levels. Fill shall consist of fine sand with less than 12% passing the No. 200 sieve, free of rubble, organics, clay, debris and other unsuitable material. Fill shall be tested and approved prior to acquisition and/or placement. Approved sand fill shall be placed in loose lifts not exceeding 6 inches in thickness and shall be compacted to a minimum of 98% of the maximum modified Proctor dry density (ASTM D-1557). Density tests to confirm compaction shall be performed in each fill lift before the next lift is placed.

4. If the excavation appears suitable as load bearing material, the soils shall be prepared for construction by compaction to a dry density of at least 95% of the modified Proctor maximum dry density (ASTM D-1557) for a depth of at least 1 foot below the compacted No. 57 stone wrapped in geo/filter fabric which will serve as a foundation base. If soft pockets are encountered in the bottom of the structure excavations, the unsuitable materials shall be removed and the proposed foundation elevation re-established by backfilling after the undesirable material has been removed. This backfilling may be done with a very lean concrete or with a well-compacted, suitable fill such as clean sand, gravel or crushed #57. If used, it should be compacted and the compaction confirmed by visual observation.

5. Minimum foundation embedment depths shall be 2 feet. A minimum of 2 feet of stone (FDOT No. 57) wrapped in geo/filter fabric shall be placed beneath the slab.

6. Existing sandy soils may be reused after removing all organic matter to build up the grade if required. Alternatively, durable crushed stone may be used below the groundwater and would not require compaction. The soil subgrade in the area of concrete mat support is often disturbed during foundation construction. The concrete slab subgrade shall be evaluated by a geotechnical engineer immediately prior to placing stone and beginning floor slab construction. If low consistency soils are encountered which cannot be adequately densified in place, such soils shall be removed and replaced with well-compacted structural fill material.

7. All footings shall be constructed in a “dry” fashion. All footing excavations shall be covered during rain. Surface run-off water shall be drained away from excavations and not allowed to pond.

8. Foundation bearing surface evaluations shall be performed and concrete placed as quickly as possible after the footings are excavated. Footing concrete shall be poured the same day footing excavations are made. If it is required that foundation excavations be left open for more than one day, they shall be protected by the placement of a thick (2-3 inches) mud made of lean concrete. Soils left exposed will soften and will required additional excavation.

9. All unsuitable materials encountered during construction such as clays, organic material and soils, debris, root and clay clods shall be removed and replaced with properly compacted clean sands.

10. All excavations shall be sloped no steeper than 3H:1V.

11. Prior to construction, the site shall be stripped of any surface vegetation along with the organic soil layer found at 0 to 2 feet below ground surface (bgs). The material shall be removed to a distance extending out at least 10 feet beyond the construction limits. Areas requiring at-grade structures or areas requiring fill shall be proof rolled with a heavily loaded dump truck to determine areas that may need additional removal of unsuitable bearing materials. In addition to stripping the site, the location of any existing underground utility lines within the construction area shall be established. Provisions shall then be made to relocate any interfering utility lines within the construction area to appropriate locations. In this regard, it shall be noted that if abandoned underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which subsequently may result in excessive settlement. Any underground utility pipes not removed and being greater than 4 inches in diameter shall be filled with “flowable” fill (lean concrete grout), while the ends of utility pipes less than 4 inches in diameter shall be plugged with concrete to prevent the inadvertent introduction of fluids into the construction area. All utility lines that are removed outside of the excavation limits shall be backfilled with acceptable fill material.

12. Organic soils and clayey soils shall be removed (if encountered) with 36 inches from the bottom of the pump station and electric room and replaced with properly compacted clean sands.

13. Except when specifically provided to the contrary, excavation shall include the removal of materials, including obstructions that would interfere with the proper execution and completion of the WORK.

14. The removal of such materials shall conform to the lines and grades indicated or ordered.

15. Unless otherwise indicated, the entire Site shall be stripped of vegetation and debris and shall be grubbed, and such material shall be removed from the Site prior to performing any excavation or placing any fill.

16. The CONTRACTOR shall furnish, place, and maintain supports and shoring that may be required for the sides of excavations.

17. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable state safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).

18. Surveys shall be performed prior to beginning WORK and upon completion by a surveyor licensed in the state where the Site is located.

19. Fill material placed adjacent to the walls and beneath structures and piping shall be placed in 6 to 8 inch loose lifts compacted using a static roller if near existing structures. Within small excavations such as in utility trenches, around manholes or within 5 feet of any of the structure walls, use smaller, hand or remote-guided equipment. Loose lift thickness shall be 4 inches when placed in this manner.

20. All structural fill shall be compacted to a dry density of at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557).

B. Removal and Exclusion of Water

1. The CONTRACTOR shall remove and exclude water, including stormwater, groundwater, irrigation water, and wastewater, from excavations.

2. Dewatering wells, wellpoints, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level at least 2 feet below the bottom of excavations before the excavation WORK begins at each location.

3. Water shall be removed and excluded until backfilling is complete and field soils testing has been completed.

3.2 OVER-EXCAVATION

A. Indicated

1. Where areas are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade indicated.

B. Not Indicated

1. When ordered to over-excavate areas deeper and/or wider than required by the Contract Documents, the CONTRACTOR shall over-excavate to the dimensions ordered and backfill to the indicated grade.

C. Neither Indicated nor Ordered

1. Any over-excavation carried below the grade that is neither ordered or nor indicated shall be backfilled and compacted to the required grade with the indicated material as part of the WORK.

3.3 EXCAVATION IN LAWN AREAS

A. Where excavation occurs in lawn areas, restoration shall be via solid sodding per Section 329300.

B. Excavated material may be placed on the lawn, provided that a drop cloth or other suitable method is employed to protect the lawn from damage, but the lawn shall not remain covered for more than 72 hours.

C. Immediately after completion of backfilling and testing of the pipeline, the excavated area shall be sodded per Section 329300.

3.4 EXCAVATION IN VICINITY OF TREES

A. Except where trees are indicated to be removed, trees shall be protected from injury during construction operations.

B. No tree roots larger than 2 inches in diameter shall be cut without the express permission of the ENGINEER.

C. Trees shall be supported during excavation by any means previously reviewed and accepted by the ENGINEER.

3.5 ROCK EXCAVATION

A. Rock excavation shall include removal and disposal of the following items:

1. boulders measuring 1/3 of a cubic yard or more in volume;

2. rock material in ledges, bedding deposits, and un-stratified masses that cannot be removed using conventional equipment as defined herein and which require systematic drilling and blasting for removal;

3. concrete or masonry structures that have been abandoned; and,

4. conglomerate deposits that are so firmly cemented that they possess the characteristics of solid rock and cannot be removed using conventional equipment as herein defined and require systematic drilling and blasting for removal.

B. Scope and Payment

Rock excavation shall be performed by the CONTRACTOR in accordance with a negotiated price.

C. Explosives and Blasting: Blasting will not be permitted.

3.6 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. Unless otherwise indicated, excess excavated material shall be the property of the CONTRACTOR.

B. The CONTRACTOR shall be responsible for the removal and disposal of excess excavated material.

C. Material shall be disposed of at an approved on-Site disposal area or off-Site at a location arranged by the CONTRACTOR in accordance with laws and regulations regarding the disposal of such material.

3.7 BACKFILL

A. General

1. Backfill shall not be dropped directly upon any structure or pipe.

2. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.

3. Backfill around water-retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

B. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall be placed after water is removed from the excavation and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.

C. Pre-Placement Conditions

1. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have any loose, sloughing, or caving soil and rock materials removed.

2. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

D. Layering

1. Backfill materials shall be placed and spread evenly in layers.

2. When compaction is achieved using mechanical equipment, the layers shall be evenly spread such that when compacted each layer shall not exceed 6 inches in thickness.

E. During spreading, each layer shall be thoroughly mixed as necessary in order to promote uniformity of material in each layer.

F. Moisture Content

1. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved.

2. Where the backfill material moisture content is too high to permit the indicated degree of compaction, the material shall be dried until the moisture content is satisfactory.

3.8 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION AND BACKFILL

A. Excavation Beneath Structures and Embankments

1. Except where indicated otherwise for a particular structure or where ordered by the ENGINEER, excavation shall be carried to an elevation 6 inches below the bottom of the footing or slab and brought back to grade with compacted materials acceptable for placement beneath structures.

2. The area where a fill or embankment is to be constructed shall be cleared of vegetation, roots, and foreign material.

3. Where indicated or ordered, areas beneath structures or fills shall be over-excavated.

4. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched.

5. When such over-excavation is indicated, both the over-excavation and the subsequent backfill to the required grade shall be performed by the CONTRACTOR.

6. After the required excavation or over-excavation for fills and embankments has been completed, the exposed surface shall be scarified to a depth of 6 inches,

brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

B. Excavation Beneath Paved Areas

1. Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to the paving thickness.

2. After the required excavation has been completed, the top 12 inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

3. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement.

4. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.

C. Notification of ENGINEER

1. The CONTRACTOR shall notify the ENGINEER at least 3 Days in advance of completion of any structure or roadway excavation and shall allow the ENGINEER a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

D. Compaction of Fill, Backfill, and Embankment Materials

1. Each layer of backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density.

2. Equipment that is consistently capable of achieving the required degree of compaction shall be used, and each layer shall be compacted over its entire area while the material is at the required moisture content.

3. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of obtaining the required density in 2 passes.

E. Heavy Equipment

1. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the vertical depth of the fill above undisturbed soil at that time.

2. Hand-operated power compaction equipment shall be used where the use of heavier equipment is impractical or restricted due to weight limitations.

F. Layering

1. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers.

2. Each layer shall be moistened and aerated as necessary.

3. Unless otherwise approved by the ENGINEER, no layer shall exceed 6 inches of compacted thickness.

4. The embankment and fill shall be compacted in conformance with Paragraph H, below.

G. Embankments and Fills

1. When an embankment or fill is to be constructed and compacted against hillsides or fill slopes steeper than 4:1, the slopes of the hillsides or fills shall be horizontally benched in order to key the embankment or fill to the underlying ground.

2. A minimum of 12 inches perpendicular to the slope of the hillside or fill shall be removed and re-compacted as the embankment or fill is brought up in layers.

3. Material thus cut shall be re-compacted along with the new material.

4. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

H. Compaction Requirements

1. The following compaction requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft^3) (2,700 kN-m/m^3) where the material is graded such that 10 percent or more passes a No. 4 sieve and in accordance with ASTM D 4253 - Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density, where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve:

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Embankments and fills not identified otherwise	90	55
Embankments and fills beneath paved areas or structures	95	70
Backfill beneath structures and hydraulic structures	95	70
Topsoil	80	NA
Aggregate base or subbase	95	NA

3.9 PIPELINE AND UTILITY TRENCH EXCAVATION AND BACKFILL

A. General

1. Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.

B. Trench Bottom

1. Except where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe.

2. Excavations for pipe bells and welding shall be made as required.

3. Where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding.

C. Open Trenches

1. The maximum amount of open trench permitted in any one location shall be 500 feet or the length necessary to accommodate the amount of pipe installed in a single Day, whichever is greater.

2. Trenches shall be fully backfilled at the end of each Day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each Day.

3. These requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure; in such cases, however, barricades and warning lights meeting appropriate safety requirements shall be provided and maintained.

D. Embankments, Fills and Structural Backfills

1. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

2. Upon completion of the embankment or structural backfill, a trench conforming to the appropriate detail may be excavated and the pipe may be installed.

E. Trench Shield

1. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield such that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls and causing sloughing or caving of the trench walls.

2. If the trench walls cave or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.

3. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally.

4. The CONTRACTOR shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

F. Placing and Spreading Of Backfill Materials

1. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of achieving the required density in 2 passes and that is acceptable to the ENGINEER.

2. Where such materials are used for pipe zone backfill, vibratory compaction shall be used at vertical intervals of the lesser of:

   a. one-half the diameter of the pipe; or

   b. 24 inches, measured in the uncompacted state.

3. In addition, these materials shall be subjected to vibratory compaction at the springline of the pipe and the top of the pipe zone backfill, regardless of whether that dimension is less than 24 inches or not.

4. Each layer of backfill material with greater than 10 percent passing the No. 4 sieve shall be compacted using mechanical compactors suitable for the WORK.

5. The material shall be placed and compacted under the haunch of the pipe and up each side evenly so as not to move the pipe during the placement of the backfill.

6. The material shall be placed in lifts that will not exceed 6 inches when compacted to the required density.

G. Mechanical Compaction

1. Backfill around and over pipelines that is mechanically compacted shall be compacted using light, hand-operated vibratory compactors and rollers that do not damage the pipe.

2. After completion of at least 2 feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.

H. Pipe And Utility Trench Backfill

1. Pipe Zone Backfill

   a. Definitions

      1) The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane below the bottom surface of the pipe and a plane at a point above the top surface of the pipe as indicated.

      2) The bedding is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe.

      3) The embedment is defined as that portion of the pipe zone backfill material between the bedding and a level line as indicated.

   b. Final Trim

      1) After compacting the bedding, the CONTRACTOR shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe.

2) Excavation for pipe bells and welding shall be made as required.

c. The pipe zone shall be backfilled with the indicated backfill material.

d. Pipe zone backfill materials shall be manually spread evenly around the pipe, maintaining the same height on both sides of the pipe such that when compacted the pipe zone backfill will provide uniform bearing and side support.

e. The CONTRACTOR shall exercise care in order to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations.

2. Trench Zone Backfil

a. After the pipe zone backfill has been placed, backfilling of the trench zone may proceed.

b. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade.

3. Final Backfill

a. Final backfill is defined as backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, backfill within 18 inches of the roadway subgrade.

I. Identification Tape

1. Install identification tape as indicated.

2. Terminate the tape in a precast concrete box either adjacent to or part of the valve box, manhole, vault, or other structure into which the non-metallic pipe enters or at the end of the non-metallic pipeline.

3. The termination box shall be covered with a cast iron lid.

4. The box shall be located at grade in paved areas or 6 inches above grade in unpaved areas.

J. Trench Shield

1. If a moveable trench shield is used during backfill operations, the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer.

2. The CONTRACTOR shall not displace the pipe or backfill while the shield is being moved.

K. Compaction Requirements

1. The following compaction test requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft^3) (2,700 kN-m/m^3) where the material is graded such that 10 percent or more passes a No. 4 sieve, and in accordance with ASTM D 4253

- Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve.

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Pipe embedment backfill for flexible pipe.	95	70
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	95	70
Pipe embedment backfill for steel yard piping	---	70
Pipe zone backfill portion above embedment for flexible pipe	95	70
Pipe embedment backfill for rigid pipe	90	55
Pipe zone backfill portion above embedment for rigid pipe.	95	70
Pipe bedding and over-excavated zones under bedding for rigid pipe.	95	70
Final backfill, beneath paved areas or structures.	98	70
Final backfill, not beneath paved areas or structures.	90	55
Trench zone backfill, beneath paved areas and structures, including trench plugs.	95	70
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	95	70

3.10 FIELD TESTING

A. General:

1. Field soils testing will be performed by a testing laboratory provided by the OWNER.

B. Density

1. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D 1557.

2. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254.

3. Field density in-place tests will be performed in accordance with ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth), or by such other means acceptable to the ENGINEER.

C. Remediation

1. In case the test of the fill or backfill shows non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to ensure compliance.

2. Subsequent testing to show compliance shall be by a testing laboratory provided by the OWNER.

D. CONTRACTOR's Responsibilities

1. The CONTRACTOR shall provide test trenches and excavations, including excavation, trench support and groundwater removal for the OWNER's field soils testing operations.

2. The trenches and excavations shall be provided at the locations and to the depths as required by the OWNER.

3. Lawn areas destroyed by test trenching and excavation shall be re-graded and re-landscaped per Section 329300.

- END OF SECTION -

SECTION 313526 - EROSION CONTROL BARRIER

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide erosion control barriers, complete and in place, in accordance with the Contract Documents

1.2 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with Section 013300 - Contractor Submittals.

B. Product Data: Manufacturer's catalog sheets on geotextile fabrics.

PART 2 -- PRODUCTS

2.1 FABRIC

A. Fabric may be woven or non-woven, made from polypropylene, polyethylene, or polyamid, and shall contain sufficient UV inhibitors so that it will last for 2 years in outdoor exposure.

B. Fabric shall have the following properties:

Parameter	Standard Method	Value
Grab tensile strength	ASTM D 4632	100 lb
Burst strength	ASTM D 3786	200 psi
Apparent opening size	ASTM D 4751	Between 200 and 70 sieve size

C. Fabric Manufacturer, or equal

1. **Mirafi**

2.2 POSTS

A. Posts shall be wood, at least 2-inches by 2-inches, at least 6-feet long.

2.3 FENCING

A. Temporary construction fencing shall be 2-inbch mesh galvanized fabric steel fence with green opaque fabric teid to the fencing.

2.4 FASTENERS

A. Fasteners to wood posts shall be steel, at least 1-1/2 inches long.

B. Fasteners to steel posts shall be galvanized clips.

PART 3 -- EXECUTION

3.1 PREPARATION

A. Provide erosion control barriers at the indicated locations and as required to prevent erosion and silt loss from the Site.

B. CONTRACTOR shall not commence clearing, grubbing, earthwork, or other activities which may cause erosion until barriers are in place.

3.2 INSTALLATION

A. Barrier systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Attach the galvanized temporary construction fencing to the posts that are spaced a maximum of 6 feet apart and embedded a minimum of 12 Inches.

C. Install posts for silt fencing at a slight angle toward the source of the anticipated runoff.

D. Trench in the toe of the filter fabric barrier with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow. Lay fabric along the edges of the trench. Backfill and compact.

E. Securely fasten the fabric materials to the woven wire fencing with tie wires.

F. Reinforced fabric barrier shall have a height of 18 inches.

G. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

3.3 MAINTENANCE

A. Regularly inspect and repair or replace damaged components of the barrier. Unless otherwise directed, maintain the erosion control system until final acceptance; then remove erosion and sediment control systems promptly.

B. Remove sediment deposits when silt reaches a depth of 6 inches or 1/2 the height of the barrier, whichever is less. Dispose of sediments on the Site, if a location is indicated on the Drawings, or at a site arranged by the CONTRACTOR which is not in or adjacent to a stream or floodplain.

- END OF SECTION -

SECTION 321115 - A.C. PAVEMENT AND BASE (FDOT)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide asphaltic concrete pavement, complete and in place, in accordance with the Contract Documents. All testing shall be performed by a testing laboratory provided by the OWNER.

1.2 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall submit, in writing, materials testing reports, job-mix formulas, notarized certificates of compliance signed by material producer and CONTRACTOR, certifying that each material item complies with, or exceeds, requirements, and other pertinent information satisfactory to the ENGINEER demonstrating that proposed materials and methods will comply with the provisions of this Section. Submittals shall be in accordance with Section 013300 - Contractor Submittals.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The phrase "DOT Specifications" shall refer to the most recent edition of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT Specifications, are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the CONTRACTOR as though reproduced herein in their entirety.

B. Commercial Standards

ASTM D 3515	Hot-Mixed Job Laid, Bituminous Paving Mixtures.

1.4 QUALITY CONTROL

A. Suitability Tests of Proposed Materials: Tests for conformance with the Specifications shall be performed prior to start of the WORK. Materials to be tested shall include aggregate base, coarse and fine aggregate for paving mixtures, mineral filler, and asphalt cement. The samples shall be identified to show the name of the material, aggregate source, name of the Supplier, contract number, and the segment of the WORK where the material represented by the sample is to be used. Results of all tests shall be submitted to the ENGINEER for approval.

B. All WORK within the right-of-way shall be constructed using materials and methods in accordance with the Drawings and DOT Specifications.

C. Apply prime and tack coats when ambient temperature is above 50 degrees, and when temperature has not been below 35 degrees for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

D. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees, and when base is dry. Base course may be placed when air temperature is above 30 degrees, and rising.

E. Test in place asphalt concrete course for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by OWNER's Representative and ENGINEER.

1. In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

a. Base Course: Not greater than 1/2-inch of required thickness.

b. Surface Course: Not greater than 1/4-inch of required thickness.

2. Test finished surface of each asphalt concrete course for smoothness, using 10-foot straight edge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

a. Base Course Surface: 1/4-inch.

b. Wearing Course Surface: 1/8-inch.

3. Check surface area at intervals as directed by the ENGINEER.

F. Finish grade shall be within +0.05 feet of the grades indicated.

1.5 TRAFFIC CONTROL

A. The CONTRACTOR shall provide and maintain access to and from all properties along the line of WORK. The CONTRACTOR shall also provide temporary by-passes and maintain them in a safe and usable condition whenever detouring of traffic to parallel routes cannot be done without hardship or excessive increases in travel by the public.

1.6 LOCATIONS, LAYOUT AND GRADES

A. Locate and layout paved areas and right-of-ways with reference to benchmarks, property lines or buildings according to the drawings and as accepted by the ENGINEER.

B. Determine locations of paved edges and right-of-way line from surveyor's permanent reference monuments and information on the Drawings.

C. Where permanent reference monuments are not available, obtain proper line locations from authorities having jurisdiction.

D. Establish and maintain required lines and elevations.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Lime Rock Base: Limerock base shall satisfy all requirements of Section 911, Limerock Material, of FDOT SSRBC, latest edition, except that testing requirements shall be in conformance with the requirements of the regulatory agency responsible for overseeing the roadway.

B. Prime Coat: The material used for the prime coat shall be cut-back Asphalt Grade RC70 conforming to Sections 300 and 916 of the DOT Specifications for prime to be used on limerock.

C. Tack Coat: The material used for the tack coat shall be Emulsified Asphalt Grade RS-2 conforming to Section 300 and 916 of the DOT Specifications.

D. Asphaltic Concrete: The materials and construction of the asphaltic concrete patch and surface courses shall be:

1. Superpave Asphaltic Concrete conforming to Section 334, FDOR SSRBC, latest edition.
2. All Type S Asphaltic Concretes conforming to Section 331, FDOR SSRBC, 2000 edition.

PART 3 -- EXECUTION

3.1 SUBGRADE

A. Preparation Of Subgrade

1. This WORK consists of bringing the bottom of excavations and top of embankments of the roadway between the outer limits of the shoulders or base course to a surface conforming to the grades, lines, and cross sections indicated. The subgrade shall be of uniform density ready to receive the rock base of the paving course.

2. In 115th Avenue, existing paving and base shall be removed and disposed within the limits of the right of way. Existing base material from the excavation may not be re-used as base material, but may be used as trench backfill unless it is determined by the ENGINEER to be unsuitable.

3. All soft and yielding material and other portions of the subgrade which will not compact readily shall be removed and replaced with suitable material and the entire subgrade brought to line and grade to provide a foundation of uniform compaction and supporting power.

4. Stumps, roots, and other deleterious organic matter encountered in the preparation of the subgrade shall be removed.

5. Material for fills shall consist of sand or other suitable material approved by the ENGINEER, free from stumps, roots, brushes, and other deleterious organic matter.

6. Where fill is more than one foot in depth, the backfill material above the ground water table shall be compacted on one 8-inch depth lift. Each individual layer of fill under the rock base shall have a density of 98 percent of the maximum density as determined by the AASHTO T-180 - Moisture-Density Relations of Soils Using a 4.5 kg (10 pound) Rammer and a 457-mm (18-inch) Drop, unless indicated otherwise. Each individual layer of fill under the shoulder area shall have a density of 98 percent of the maximum density as determined by AASHTO T-180, unless otherwise indicated.

7. The bottom of all excavated areas and the top of all fills where limerock base is to be constructed shall be thoroughly compacted by rolling. Water shall be used to

insure thorough compaction. The stability of the top 12-inch thickness of the subgrade immediately under the base, for the full base width plus one-foot on each side, shall be compacted to a density of 98 percent of the maximum dry density (minimum LBR 40).

8. Bring subgrade which has been properly filled and shaped to a firm unyielding surface, by rolling an entire area with an approved power roller weighing a minimum of 10 tons.
    a. Thoroughly compact area inaccessible to the roller with approved hand tamper.
    b. Apply water sufficiently to compact the subgrade where the subgrade is of a dry, sandy nature and cannot be rolled.

9. The subgrade shall be maintained free from ruts, depressions, or other irregularities until rock base material is spread.

10. Test subgrade for crown and elevation after preparation and immediately before base of paving course is laid.
    a. Remove or add material and compact to bring to a correct elevation and uniform bearing if the subgrade is found not to be at the required elevation at all points.
    b. Adjust the manhole rims, catch basin frames, and valve boxes where necessary to match proposed finish grade.

B. Subgrade Stabilization:

1. Roadway subgrades shall be stabilized to the minimum depth indicated to a Limerock Bearing Ratio (LBR) of not less than 40. Stabilizing shall be Type B as defined in Section 160 of the DOT Specifications. Stabilization may require the addition and thorough mixing in of crushed limerock, coarse limerock screenings, or any other stabilizing material acceptable to the ENGINEER. The stabilizing material shall be applied in such quantity that, after mixing and blending, the subgrade will have a LBR of not less than 40. Stabilizing material shall be mixed or blended in the subgrade material by plowing, scarifying, disking, harrowing, blading, and mixing with rotary tillers until the mixed materials are of uniform bearing value throughout the width and depth of the layer being processed.

2. At least 3 density determinations shall be made on each Days final compaction operations on each course, and the density determinations shall be made at more frequent intervals if deemed necessary by the ENGINEER.

3.2 LIMEROCK BASE

A. Preparation of Limerock Base

1. The limerock base shall be constructed in accordance with Section 200 of the DOT Specifications, to the thickness and width indicated.

2. After spreading of the base material is completed, the entire surface shall be scarified and shaped so as to produce the exact grade and cross section after compaction. For double course base, this scarifying shall extend a depth sufficient to penetrate slightly the surface of the first course. The maximum depth of each lift shall be 8-inches.

3. When the material does not have the proper moisture content to ensure the required density, wetting or drying shall be required. If the material is deficient in moisture, water will be added and uniformly mixed in by disking the base course to its full depth. If the material contains an excess of moisture, it shall be allowed to dry before being compacted. Wetting and drying operations shall involve manipulation of the entire width and depth of the base as a unit. As soon as proper conditions of moisture are attained, the material shall be compacted to an average density not less than 98 percent maximum density as determined in more than one course, the density shall be obtained in each lift of the base.

4. During final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density determination on the finished base.

5. Unless otherwise directed by the ENGINEER, the surface shall be "hard-planed" with a blade grader immediately prior to the application of the prime coat to remove the thin glaze or cemented surface and to allow free penetration of the prime material. The materials planed from the base shall be removed from the base area.

6. If cracks or checks appear in the base, either before or after priming, which in the opinion of the ENGINEER, would impair the structural efficiency of the base course, the CONTRACTOR shall remove such cracks or checks by re-scarifying, reshaping, adding base material where necessary and re-compacting, at no additional cost to the OWNER.

B. Construction Of Base Course

1. This WORK consists of construction of lime rock base course for the asphaltic concrete wearing surface. The base course shall be constructed on the prepared subgrade in an 8-inch thick limerock base constructed in two 4 inch lifts as indicated. Twelve-inch thick limerock base shall be constructed in two 6 inch lifts. The limerock base shall be a minimum LBR of 100.

2. Spreading Rock: The rock shall be transported to the points where it is to be used over rock previously placed, and dumped on the end of the preceding spread. It shall then be spread uniformly with hand tools, or mechanical equipment. In no case shall rock be dumped directly on the subgrade. No hauling shall be done over the subgrade.

3. Compacting Rock

   a. Following spreading, the rock shall be rolled with a three wheel roller weighing not less than 10 tons, water being added as required, until the entire depth of base is compacted into a dense unyielding mass.

   b. No greater area of rock base shall be placed during any one Day than that which can be rolled and compacted on the same Day.

4. Finishing Base

   a. After watering and rolling, the entire surface shall be thoroughly scarified to a depth not less than 4-inches and shaped to exact crown and cross section, rewatered and again thoroughly rolled. Rolling shall continue until the entire depth of base is bonded and compacted into a dense, unyielding mass, true to grade and cross section.

1) Any irregularities which may develop in the surface during such finishing shall be corrected by the removal or addition of rock as the case may be.

2) If at any time the subgrade material becomes churned up and mixed with the base rock, the CONTRACTOR shall dig out and remove the mixture, reshape and compact the subgrade and replace the materials removed with clean rock which shall be watered and rolled until satisfactorily compacted.

3) Where cracks or checks appear in the base either before or after priming, which in the opinion of the ENGINEER would impair the structural efficiency of the base course, the CONTRACTOR shall remove such cracks or checks by re-scarifying, reshaping, watering, rolling, and adding rock where necessary.

4) During final compacting operations, if grading of any areas is necessary to obtain the true grade and cross section, the compacting operations for such areas shall be completed prior to making the density tests on the finished base.

5. Inferior Rock: If in the opinion of the ENGINEER at any time during the progress of the work, rock of inferior quality is being delivered to the Site, a laboratory analysis of the rock shall be made. Should the results of such tests indicate that the rock does not conform to specifications, the CONTRACTOR shall, at its own expense, remove such inferior material from the area indicated, and deliver and spread satisfactory rock on said area.

6. Testing Surface: The finished surface of the rock base shall be true to the required cross section. Any irregularities in the grade greater than 1/4-inch, as determined by placing a 10-foot straight edge parallel with the centerline, shall be corrected by scarifying to a depth of 3-inches, removing or adding rock as may be required and again watering, rolling, and compacting the scarified area. In testing the surface for irregularities, the measurements under the straight edge will not be taken in small holes caused by individual pieces of rock having been pulled out by the road grader.

7. Thickness Determination: Thickness of the base shall be measured by intervals as required by the ENGINEER. Measurements shall be taken at various points on the cross section. The measurements shall be taken in holes through the base of not less than 3 inches in diameter. Where the base is more than 1/2-inch less than the required compacted thickness, the CONTRACTOR shall correct such areas by scarifying and adding rock. The affected areas shall then be watered, rolled and brought to a satisfactory state of completion, and be of required thickness and cross section.

8. Density: Density determinations shall be made by a testing company provided by the OWNER. An average required density shall be 98 percent of maximum density obtainable under AASHTO Method T-180. No section of base shall be accepted when more than 10 percent of tests fall below 98 percent of maximum density and in no case shall a density of less than 96 percent of maximum be accepted.

9. Testing: The CONTRACTOR shall coordinate with ENGINEER for testing. One test shall be made in accordance with AASHTO T-180 for each class of material in the subgrade and base. Testing will be provided by the OWNER.

a. In place density tests in accordance with AASHTO M-147 - Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Course, shall be made in the locations indicated. Two copies of the test reports will be sent directly to the ENGINEER for evaluation.

b. Any material that fails to meet these specifications shall be removed, replaced, and retested, all at the CONTRACTOR's expense.

c. Tests shall be taken at least every 1,000 square yards and taken at locations and lifts as directed by the ENGINEER.

3.3 PRIME COAT

A. Prime Coat Construction

1. The prime coat shall be applied at a rate of 0.15 gallons per square yard and the WORK shall be performed in accordance with Section 300 of the DOT Specifications.

2. Cleaning the prepared base

a. Before any bituminous material is applied, all loose material: dust, dirt, caked clay, and foreign matter which might prevent proper bond with the existing surface shall be moved to the shoulders, to the full width of the treatment, by means of revolving brooms or approved mechanical sweepers and by mechanical blowers of approved types, supplemented by hand sweeping. Dust and other loose materials not removed by mechanical means shall be removed with hand brooms. Particular care shall be taken to clean the outer edges of the strip to be treated in order to insure that the prime coat will adhere. Sweeping and blowing shall be continued until all the loose dust and dirt is removed from the surfaces.

b. Application of bituminous material shall be made during the same Day surface has been swept and as soon as practical thereafter.

3. Application for prime coat

a. The bituminous material shall be applied to the clean dry surface of the rock base at such temperature as will insure uniform distribution. The application shall be made by means of self propelled pressure distributor operating under a pressure not less than 20 pounds per square inch. Application of bituminous material shall be made on only 1/2 of the width of base at one time.

b. The primed base shall then be covered with a uniform layer of clean sand, and kept thoroughly and uniformly covered by additional sand or sweeping until it shows no signs of picking up under traffic. For a period of one week after priming, the CONTRACTOR shall again broom any area where insufficient cover sand or excess of bituminous material causes bleeding and, if necessary, spread additional sand on such area.

4. Prime coat finish: After prime has cured or sat and been sanded, the shoulder shall be shaped to conform to all grade lines and cross sections and the entire area shall be rolled and compacted with a rubber tired roller or a power roller before asphalt surface is laid on the finished base.

B. Tack Coat: A tack coat shall be applied to existing paved surfaces where new pavement is to be placed against existing. It shall also be placed against cold pavement joints,

concrete, and other surfaces which will come in contact with new asphalt. The tack coat shall be applied at a rate between 0.02 and 0. 10 gallons per square yard and the work performed in accordance with Section 300 of the DOT Specifications.

1. Before applying any bituminous material, all loose material: dust, dirt and foreign material, which might prevent proper bond with the existing surface, shall be removed for the full width of the application.

2. Application for tack coat

   a. The surface to receive the tack coat shall be clean and dry. The tack coat shall be clean and dry. The tack coat shall be applied with a pressure distributor except that on small jobs, if approved by the ENGINEER, the application may be made by other approved mechanical methods or by hand methods. The pressure distributor shall operate at a pressure not less than 20 psi and at a consistency such that it can be properly pumped and sprayed uniformly over the surface.

   b. The bituminous material shall be applied in a thin uniform layer. The rate of application shall be between 0.02 and 0.10 gallon per square yard. The tack coat shall be applied sufficiently in advance of the laying of the wearing surface to permit drying, but shall not be applied so far in advance that it might lose adhesiveness as a result of being covered with dust or other foreign material. The tack coat surface shall be kept free from traffic until the wearing surface is laid.

3.4 ASPHALTIC CONCRETE

A. Asphaltic Concrete Construction

1. The spreading, compacting and jointing the wearing surface shall be in accordance with Sections 330 and 331 of the DOT Specifications to the thickness indicated.

2. Cleaning and preparing base

   a. Prior to the laying of the asphaltic concrete, the base of pavement to be covered shall be cleaned of all loose deleterious material by the use of power brooms or blowers. A tack coat shall be applied on all pavement. The tack coat shall not be applied so far in advance of laying operations as to allow shifting and sand or weather conditions to nullify its effectiveness.

   b. After the surface has been thoroughly cleaned, holes shall be filled with asphaltic concrete, if necessary, and thoroughly compacted to conform to the existing surface and to form a smooth surface.

3. Placing Asphaltic Concrete: The asphaltic concrete surface course applied after the tack coat may be permitted a reasonable time for drying but not to an extent that the tack coat is allowed to lose its adhesiveness.

   a. Machine spreading: Upon arrival the mixture shall be dumped into the approved mechanical spreader and immediately spread and struck off to the full width required and to such appropriate loose depth for each successive course that when the WORK is completed the required weight of the mixture per square yard or the required thickness will be secured. An excessive amount of mixture shall be carried ahead of the screen at all times. Hand raking shall be done behind the machine as required.

b. Hand spreading: In limited areas where, on account of irregularities or unavoidable obstacles, the use of mechanical spreading and finishing equipment is impractical, the mixture may be spread by hand, when so authorized by the ENGINEER.

c. The mixture shall be laid only when the surface to be covered is dry and only when weather conditions are suitable.

d. Structures which will be in actual contact with asphaltic mixture, including the face or surface of curbs or gutters and the vertical faces of existing pavements, shall be painted with a uniform coating of asphalt material to provide a closely bonded, watertight joint.

e. Where necessary, due to the traffic requirements, the mixture shall be laid in strips in such manner as to provide for the passage of traffic.

f. Any mixtures caught in transit by a sudden rain may be laid at the CONTRACTOR's risk. In no case shall the mixture be laid while rain is falling or when there is water on the surface to be covered.

g. The depth of the layer being spread shall be gauged as directed, and where the thickness fails to average the required thickness, immediate steps shall be taken to correct the depth.

h. Before any rolling is started, the course surface shall be checked, any inequalities adjusted, and all drippings, fat sand accumulations from the screed and fat spots from any source shall be removed and replaced with satisfactory material.

i. Straight-edging and back-patching shall be done after initial completion has been obtained and while the material is still hot. Any irregularity greater than 1/4-inch either longitudinally or traversely shall be corrected at this time.

j. No skin patching shall be done. When a depression is to be corrected while the mixture is hot, the surface shall be well scarified before the addition of fresh mixture. If irregularities occur and are not corrected while the mixture is still hot, the irregularities shall be cut out the full depth of the layer and replaced with fresh mixture.

4. Compacting Mixture: After the spreading, the mixture shall be rolled when it has set sufficiently or come to the proper condition to be rolled, and when the rolling does not cause undue displacement or shoving.

a. The motion of the roller shall at all times be slow enough to avoid displacement and shall at once be corrected by the use of rakes and fresh mixture where required. The rolling shall include all transverse, longitudinal, and diagonal rolling, as may be necessary to obtain the maximum density.

b. The seal rolling with tandem steel rollers weighing from 5 to 8 tons shall follow as close behind the spreader as is possible without picking up or displacing or blistering the material.

c. Rolling with the self-propelled pneumatic-tired rollers shall follow as soon as possible and as close behind the seal rolling as the heat of the mixture will permit. The rolling shall be done while pavement temperature is between 175 and 240 degrees F, and to such an extent that the self-propelled traffic roller shall cover every area of the surface with at least 10 passes. Final rolling with tandem steel rollers shall be done after the rolling with self propelled pneumatic tired rollers is completed. This final rolling shall be done before the pavement

temperature is lower than 175 degrees F, and shall be continued until all roller marks or tire marks are eliminated.

d. Self-propelled pneumatic rollers shall be used for the rolling of patching and leveling courses. At the option of the CONTRACTOR, a steel-wheeled roller may be used to supplement the self-propelled pneumatic-tired rollers but not more than one steel-wheeled roller may be used in conjunction with the necessary number of self-propelled pneumatic-tired rollers. After final completion, the finished pavement shall at no point have a density less than 95 percent of the laboratory compacted density.

e. Rolling with the self-propelled pneumatic-tired roller shall proceed at a speed from 6 to 12 miles per hour and the rate of rolling shall not exceed 3,000 square yards per hour per roller. A sufficient number of self-propelled pneumatic-tired rollers shall be used so that the rolling of the surface for the required number of 10 passes within this maximum rolling rate shall not delay any other phase of the placing operation and not result in excessive cooling of the mixture before the rolling is complete. In the event that the rolling is not properly maintained to schedule as outlined above, the laying operation shall be discontinued until the rolling operations are sufficiently caught up.

f. In all places inaccessible to a roller, such as adjacent to curbs, headers, gutters, bridges, manholes, etc., the required compaction shall be secured with tamps. Depressions which develop before the completion of the rolling shall be remedied by loosening the mixture laid and adding new material to bring such depressions to a true surface.

g. Should any depressions remain after final compaction has been obtained, the mixture shall be removed sufficiently and new material added to form a true and even surface. High spots, high joints and honeycombs shall be adjusted as directed by the ENGINEER.

h. The mixture, after compaction, shall be of the thickness indicated. The surface, after compactions, at no place shall show an excess of asphalt and any area showing such excess or other defect, shall be cut out and replaced with fresh mixture and immediately compacted to conform with the surrounding area. Any mixture which becomes loose or broken or mixed with dirt in the wearing course shall be removed and replaced with fresh mixture which shall be immediately compacted to conform with surrounding areas.

i. Gasoline or oil from rollers shall not be allowed to deposit on the pavement and any pavement damaged by such deposits shall be removed and replaced as directed by the ENGINEER.

j. Any mixture remaining unbonded after rolling shall be removed and replaced.

B. Protection of Pavement: After the completion of the pavement, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently as approved by the ENGINEER.

3.5 PAVEMENT REPAIRS

A. All damage to pavement as a result of WORK under this Contract shall be repaired in a manner satisfactory to the ENGINEER and at no additional cost to the OWNER. The repair shall include the preparation of the subgrade, the placing and compacting of the limerock base, the priming of the base, and the placing and maintaining of the surface treatment, all as specified herein.

B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other acceptable method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

3.6 CLEAN UP

A. Remove debris and excess material immediately from Site.

B. Take down all barricades and temporary traffic markers, signals and signs only after all work included in this Section is finished and inspected, and only after so directed by the ENGINEER.

C. Leave project area clean, orderly, and free of any hazardous conditions.

- END OF SECTION -

SECTION 321723S - PAVEMENT MARKING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide pavement marking and striping, complete and in place, in accordance with the Contract Documents. For repair of existing pavement, pavement markings shall match the previous existing pavement markings. For new pavement or where new markings are required other than replacement of previously existing markings, follow the requirements U.S. Department of Transportation, Manual of Uniform Traffic Control Devices for Streets and Highways and the regulatory agency having jurisdiction over the roadway.

1.2 QUALITY ASSURANCE

A. Perform WORK in accordance with the requirements of local agencies.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Chlorinated Rubber-alkyd Type: Per Fed Spec. No. TT-P-115, Type III, or Code T-1, conforming to Section 971-12.2 of the Florida Department of Transportation Standard Specifications.

B. Paint shall be factory mixed, quick drying and non-bleeding type.

C. Color shall be as per D.O.T. requirements.

D. Striping, arrows, lane markers and stop bars shall be provided with paint containing reflective additive.

E. Thermoplastic Paint: Conform to the applicable Technical Specifications (Section 711) of the Florida Department of Transportation and City of Tampa Standards.

F. Reflective Pavement Markers: Install to match the pattern in place prior to start of construction or per FDOT standards and as shown on the drawings.

PART 3 -- EXECUTION

3.1 TRAFFIC AND LANE MARKINGS

A. Sweep dust and loose material from the sealed surface.

B. Apply paint striping as indicated with suitable mechanical equipment to produce uniform straight edges. Apply not less than 2 coats at manufacturer's recommended rates of application.

C. Protect pavement markings until completely dry in accordance with manufacturer's recommendations.

- END OF SECTION -

SECTION 323113 – CHAIN LINK FENCING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide chain link fencing and gates and appurtenant WORK, complete and operable, in accordance with the Contract Documents.

B. Single Manufacturer: Chain link fencing, gates, accessories, fittings, and fastenings shall be products of a single manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. General: Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings

1. Manufacturer's technical data, product specifications, standard details, certified product test results, installation instructions and general recommendations.

2. Scale layout of fencing, gates, and accessories. Drawings shall show fence height, post layout, including sizes and sections; post setting and bracing configuration, details of gates and corner construction, barbed wire support arms; and other accessories which may be necessary.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Dimensions indicated herein for roll-formed pipe and H-sections are outside dimensions, excluding coatings.

B. Fence fabric height shall be 8 feet unless otherwise indicated.

C. Fencing materials shall be hot-dip galvanized after fabrication.

D. Fencing shall be topped with 3 lines of barbed wire on single, 45 degree supporting arms sloped outward.

2.2 STEEL FABRIC

A. Fence fabric shall be No. 9 gauge steel wire, 2-inch mesh, with top selvages knuckled and bottom selvages twisted and barbed.

B. Fabric Finish: Fabric shall be galvanized in conformance with ASTM A 392 - Zinc-Coated Steel Chain Link Fence Fabric, Class II, with not less than 2.0 ounces zinc per square foot of coated surface.

2.3 FRAMING AND ACCESSORIES

A. Steel Framework, General: Unless otherwise indicated, framework components shall be fabricated of galvanized steel conforming to ASTM A 53 - Pipe, Steel, Black and Hot-

Dipped, Zinc-Coated Welded and Seamless, or ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products, with not less than 1.8 ounces zinc per square feet of coated surface.

1. Fittings and accessories shall be galvanized in accordance with ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware, with zinc weights per Table I of that standard, except that no coating shall be less than 1.8-ounce zinc per square foot of coated surface.

B. End, Corner and Pull Posts: Posts shall be one-piece without circumferential welds, 3-inch schedule 40 pipe, 5.79 pounds per linear foot.

C. Line Posts: Line posts shall be spaced no more than 10-feet on center and shall be 2-1/4 inch “H” column section, 4.1-pounds per linear foot, or schedule 40, 2-1/2 inch pipe, 3.65-pounds per linear foot.

D. Gate Posts: Gate posts shall be 4-inch schedule 40 pipe, 9.1-pounds per linear foot.

E. Top and Bottom Rails: Top and bottom railings shall be provided in manufacturer’s longest lengths, with expansion type couplings, approximately 6 inches long, for each joint. Fence design shall provide positive, secure attachment of top and bottom rails to each gate post, corner post, pull post and end post. Top and bottom rails and braces shall be 1-5/8 inch schedule 40 pipe, 2.27-pounds per linear foot, or 1-1/2 inch “H” column section, 2.00-pounds per linear foot.

F. Fabric Tie Wires: Fabric tie wires shall be No. 9 gauge galvanized steel wire of the same finish as the fabric. Aluminum ties shall not be used. Ties shall be spaced 14-inches apart on posts and 24-inches apart on rails.

G. Post Brace Assembly: Post brace assembly shall be manufacturer’s standard adjustable brace assembly provided at each end post, gate post and at both sides of each corner post and intermediate brace post. Material used for brace shall be same as top rail. Truss bracing between line posts shall be achieved with 0.375-inch diameter rod and adjustable tensioner.

H. Post Tops: Post tops shall be weather-tight closure caps, designed for containment of top rail and positive permanent attachment to post. One cap shall be provided for each post.

I. Stretcher Bars: Stretcher bars shall be one-piece lengths equal to the full height of the fabric, with minimum cross-section of 3/16-inch by 3-1/2 inch. One stretcher bar shall be provided for each gate and end post, and 2 for each corner and intermediate brace post.

J. Stretcher Bar Bands: Stretcher bar bands shall be one-piece fabrications designed to secure stretcher bars to end, corner, intermediate brace, and gate posts. Bands shall have a minimum cross-section of 1/8-inch by 3/4-inch. Stretcher bar bands shall be spaced no more than 15-inches on center.

K. Barbed Wire Supporting Arms: Supporting arms shall be manufacturer’s standard fabrication, of metal and finish to match fence framework, with provision for anchorage to each post and attachment of three rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap. Supporting arm shall be single 45-degree arm type and shall be capable of withstanding 250 pounds of downward pull at outermost end.

L. Barbed Wire: Barbed wire shall be 2-strand, No. 12-1/2 gauge zinc-coated steel or iron wire with four-point, 14-gauge barbs spaced no more than 5 inches apart.

2.4 GATES

A. Fabrication: Perimeter frames of gates shall be fabricated from same metal and finish as fence framework. Gate frames shall be assembled by welding or with fittings and rivets for rigid, secure connections. Welds shall be ground smooth. Gate frames and any ungalvanized hardware, shall be hot-dip galvanized after fabrication. Horizontal and vertical members shall be provided to ensure proper gate operation and attachment of fabric, hardware and shall be hot-dip galvanized after fabrication.

1. Fabric for gates shall match fence fabric, unless otherwise indicated. Fabric shall be installed with stretcher bars at all perimeter edges. Stretcher bars shall be attached to gate frame with stretcher bar bands spaced no more than 15 inches on center.

2. Each gate shall be diagonally cross-braced with a 3/8-inch diameter adjustable length truss rod to ensure frame rigidity without sag or twist.

3. Where barbed wire is indicated above gates, vertical members shall be extended and fabricated as required to receive barbed wire supporting arms.

B. Swing Gates: Perimeter frames of swing gates shall be constructed of the same pipe or “H” column members as the top rails and shall be fabricated by welding. Welds shall be ground smooth prior to hot-dip galvanizing.

1. Hardware and accessories shall be provided for each gate, galvanized in conformance with ASTM A 153, and in accordance with the following:

a. Hinges: Hinges shall be of size and material to suit gate size, non-lift-off type, offset to permit 180-degree gate opening. Three hinges shall be provided for each leaf 6-feet or more in height.

b. Latch: Latch shall be forked type or plunger-bar type, permitting operation from either side of the gate, with padlock eye as an integral part of the latch.

c. Keeper: Keeper shall be provided which automatically engages the gate leaf and holds it in the open position until it is manually released.

d. Double Gates: Gate stops shall be provided for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Locking device and padlock eyes shall be provided as an integral part of the latch, permitting both gate leaves to be locked with a single padlock.

C. Sliding Gates: Sliding gates shall be track guided type, engineered and designed specifically for the opening size and opening direction. Construction and coating shall be the same as for swing gates. The gate components shall be engineered for proper frame and bracing size, and shall be provided complete with all necessary overhead framing, supports, guides, stays, bracing, track foundations, hardware, heavy duty rollers with roller or ball bearings, and accessories as required. Hanger sheaves shall be heavy duty type with roller or ball bearings.

1. Sliding gates shall be engineered for a wind load of at least 25 lb/sq.ft. and maximum deflection of 1/160 of the full span with a 200 lb live load at the free end.

2.5 CABLE ARRESTORS

A. Cable arrestors shall be provided where shown on the plan. Cable arrestors shall be constructed of two lengths of galvanized 3/4-inch diameter steel wire rope, each connected to a buried concrete anchor block. The arrestor cables shall be arranged and attached to the fence 3 feet above grade up to and on the gate leaves. A cable eye shall be provided for each arrestor cable so that the ends of the two cables can be locked at each gate when the leaves are closed.

2.6 RELATED ITEMS

A. Concrete: Concrete shall be provided according to Section 033100 - Cast-In-Place Concrete.

B. Nuts, bolts and screws shall be steel, minimum size 3/8-inch diameter, hot-dip galvanized after fabrication.

2.7 MANUFACTURERS

A. Manufacturer's Qualifications: Chain link fencing and gates shall be products of a single manufacturer which has been successfully engaged in the production of such items for a period of at least 5 years.

B. Installer's Qualifications: Installation of the chain link fence shall be by the manufacturer or by a firm accepted and licensed by the manufacturer.

C. Manufacturers, or equal

1. American Fence Corp.

2. Anchor Fence, Inc.

3. United States Steel

PART 3 -- EXECUTION

3.1 INSPECTION

A. Prior to commencing installation, require Installer to inspect all areas and conditions within which WORK of this Section will be performed. Dimensions and clearances shall be verified. Final grading shall be completed and all earth, brush, or other obstructions which interfere with the proper alignment and construction of fencing shall be removed.

3.2 INSTALLATION

A. General: Unless otherwise indicated, all posts shall be set in concrete. Gate and related posts, corner posts, and other critical elements shall be provided with concrete foundations which are designed by an engineer to safely accommodate the loads to which they will be subjected.

B. Excavation: Holes for posts shall be drilled or hand excavated to the diameters and spacings indicated, in firm, undisturbed or compacted soil. Post foundations which are not designed by an engineer shall comply with the following:

1. Holes shall be excavated to a diameter not less than 12 inches or not less than 5 times the largest dimension of the item being anchored, whichever is larger.

2. Depth for holes shall be not less than 40 inches; excavated approximately 4 inches lower than the post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

C. Setting Posts: Line posts shall be spaced at not more than 10-foot intervals, measured from center to center of the posts, parallel to the ground slope. Posts shall be set plumb and shall be centered in holes, 4 inches above the bottom of the excavation, with posts extending not less than 36 inches below finish grade surface.

1. Corner posts shall be installed where changes in the fence lines equal or exceed 15 degrees, measured horizontally.

2. Each post shall be properly aligned vertically and its top aligned parallel to the ground slope. Posts shall be maintained in proper position during placement and finishing operations.

D. Concrete

1. Concrete for footings may be placed without forms, providing the ground is firm enough to permit excavation to neat line dimensions. Prior to placing concrete, the earth around the hole shall be thoroughly moistened.

2. Encasement concrete for footings shall be placed immediately after mixing in a manner such that there will be no concentration of the large aggregates. The concrete shall be consolidated by tamping or vibrating.

3. Concrete footings shall have a neat appearance and shall be extended 2 inches above grade and troweled to a crown to shed water.

4. A minimum of 7 days shall elapse after placing the concrete footings before the fence fabric or barbed wire is fastened to the posts.

E. Bracing: Bracing shall be provided at all ends, corners, gates, and intermediate brace posts. Corner posts and intermediate brace posts shall be braced in both directions. Horizontal brace rails shall be set midway between the top rail and the ground, running from the corner, end, intermediate brace or gate post to the first line post. Diagonal tension members shall connect tautly between posts below horizontal braces.

1. Braces shall be so installed that posts remain plumb when diagonal rod is under proper tension.

F. Intermediate Brace Posts: Where straight runs of fencing exceed 500 feet, intermediate brace posts shall be installed, spaced equally between ends or corners; with additional posts provided as required, such that the spacing between intermediate brace posts does not exceed 500 feet. Intermediate brace posts shall be equivalent in size to corner posts and shall be braced with horizontal brace rails and diagonal tension members in both directions.

G. Top Rails: Top rails shall be run continuously through post caps, bending to radius for curved runs. Expansion couplings shall be provided as recommended by the fencing manufacturer.

H. Center Rails: Center rails shall be provided where indicated. Rails shall be installed in one piece, between posts and flush with posts on fabric side, using special offset fittings where necessary.

I. Bottom Rails: Bottom rails shall be provided. Rails shall be installed in one piece, between posts and flush with posts, using special offset fittings where necessary. Bottom rails shall be installed on a straight grade between posts, with 2 inches maximum and 1/2 minimum space between finish grade and bottom selvage, unless otherwise indicated.

J. Fabric

1. Chain-link fabric shall be fastened on the secured side of the posts.

2. Fabric shall be stretched and securely fastened to posts. Between posts, top and bottom edges of the fabric shall be fastened to the top rail and bottom rail, respectively.

3. Fabric shall be stretched and anchored in such a manner that it remains in tension after the pulling force is released.

K. Tie Wires: Tie wire shall be bent to conform to the diameter of the pipe to which it is attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Ends of wire shall be bent back to minimize hazard to persons or clothing.

1. Fabric shall be tied to line posts with tie wires spaced at 12 inches on center.

2. Fabric shall be tied to rails and braces with tie wires spaced at 24 inches on center.

3. Fabric shall be tied to tension wires, with hog rings spaced 24 inches on center.

L. Stretcher Bars: Fabric shall be fastened to end, corner, intermediate brace, and gate posts with stretcher bars. Bars shall be threaded through or clamped to fabric at 4 inches on center and secured to posts with stretcher bar bands spaced no more than 14 inches on center.

M. Fasteners: Nuts for tension bands and hardware bolts shall be installed on the side of fence opposite the fabric side. Ends of bolts shall be peened or the threads scored to prevent removal of nuts.

N. Galvanized coating damaged during construction of the fencing shall be repaired by application of Galvo-Weld; Galvinox; or equal.

- END OF SECTION -

SECTION 329300 - LANDSCAPING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide landscaping and appurtenant work, complete and in place, in accordance with the Contract Documents. The requirements of this section shall apply to all landscaping work within the pumping station site boundary. The requirements for sodding included in this section apply to the right-of way green space of 115th Avenue and the pipeline corridor and disturbed work area from the west side of the proposed pumping station fence to the project western boundary at Ravine Road.

1.2 DEFINITIONS

A. The terms "plant material" or "plants" refer to all vegetation, whether trees, shrubs, ground cover, or herbaceous vegetation.

B. "Quality" refers to structure and form, as evidenced by density and number of canes and branches, compactness, symmetry, and general development without consideration of size or condition. All plant material furnished by the landscape contractor unless otherwise specified shall be Florida No. 1 or better and shall be installed as specified in grades and standards for nursery plants, State Plant Board of Florida. Plants shall be nursery grown.

C. "Specimen" means an exceptionally heavy, symmetrical, tightly-knit plant, so trained or favored in its development and appearance as to be outstanding, superior in form, number of branches, compactness, and symmetry.

D. "Size" is the factor controlled by dimensions representing height or spread, or both, without consideration of quality or conditions. For standard quality, a dimension is given for height or container size, or a dimension is given for height as well as container size.

E. "Height" is usually indicated with a tolerance. The smaller dimension is the minimum acceptable. The larger dimension represents the maximum permissible. The average dimension of all plants shall equal the average of the tolerance figures for each item.

F. "Condition" is the factor controlled by vitality and ability to survive and thrive and be comparable with normal plants of the same species and variety in the vicinity at the same season of the year. Plants shall be free from physical damage or adverse conditions that would prevent thriving. "Condition" also sometimes refers to state of growth, i.e., whether "dormant condition" or "growing condition" and this state shall be comparable to plants of similar species in the vicinity for leaves, formation of buds, and the like.

G. "Cane" means a primary stem which starts from the ground, or close to the ground, at a point not higher than 1/4 the height of the plant.

H. "Caliper" shall be measured 12 inches above the finish grade or ground, as a guide, or where the trunk appears to form the head of the tree.

I. "Foliage line" is maximum dimension in case of specimen plants. It measures from ground to lowest part of body of plant.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ASTM D 422	Method for Particle-Size Analysis of Soils
ANSI Z60.1	Nursery Stock
American Association of Nurserymen, Inc.	Rules and Grading Provisions

1.4 CONTRACTOR SUBMITTALS

A. General: Submittals shall be furnished in accordance with Section 013300 - Contractor Submittals.

B. Product Information

1. Manufacturer's product information on fertilizer, peat moss, mulch, sod, and tree paint.

2. Topsoil Analysis Report: A report certified by an analytical laboratory which shows results of analyzing representative samples of topsoil proposed for use. Approval of the report does not constitute final acceptance of the topsoil.

C. Certificate

1. Certificates shall accompany each delivery stating source, quantity, and type of material. All certificates shall be submitted at the time of delivery.

2. Certificates of inspection of plant material, as may be required by Federal, State, or other authorities having jurisdiction, which accompany the shipment, shall be submitted at delivery.

3. Landscaping Subcontractor guarantee to perform planting maintenance services during the one year correction of defects period.

1.5 QUALITY ASSURANCE

A. General: All plants shall be true to type or name as indicated in the Contract Documents and shall be tagged in accordance with the standard practice recommended by the State of Florida.

B. All plants shall comply with Federal and State laws requiring inspection for plant diseases and infestations.

C. Inspections will be made by the ENGINEER or its representative. The CONTRACTOR shall request inspection at least 24 hours in advance of the time inspection is required. Inspection is required on the following stages of the WORK:

1. During preliminary grading, soil preparation, and initial weeding.
2. When trees are spotted for planting, but before planting holes have been excavated.
3. When finish grading has been completed.

4. When all WORK except the maintenance period has been completed.
5. Final inspection at the completion of the maintenance period.

D. Plants shall be subject to inspection and approval or rejection by the ENGINEER at place of growth and upon delivery to the Site at any time before or during progress of the WORK based on:

1. Quantity, quality, size, and variety;
2. Ball and root condition; and
3. Latent defects and injuries resulting from handling, disease, and insects.

E. Plants approved at pre-planting inspection are subject to rejection during planting if found to be defective.

F. Rejected plants shall be identified as such in an obvious manner, shall be removed from the Site, and be replaced with acceptable plants.

G. Plants shall have been grown in nurseries that have been inspected by the governing authorities. Inspection of plant materials required by City, County, State, or Federal authorities shall be the responsibility of the CONTRACTOR, who shall have secured permits or certificates prior to delivery of plants to Site.

1.6 CLEANUP

A. Upon completion of all planting operations, the portion of the Site used for a work or storage area by the CONTRACTOR shall be cleaned of all debris, superfluous materials, and equipment. All such materials and equipment shall be entirely removed from the Site in accordance with Section 017700 - Project Closeout.

B. All walks or pavement shall be swept or washed clean upon completion of the WORK of this Section.

C. During the entire Contract period, plant containers that have been cut or removed from plant materials shall be removed from the Site daily.

1.7 MAINTENANCE OF LANDSCAPING PLANTING PRIOR TO ACCEPTANCE OF PROJECT

A. General: The CONTRACTOR shall be responsible for protecting, watering, and maintaining all planting and irrigation systems until final acceptance of all WORK under the Contract.

B. At time of acceptance of the complete project, the lawn shall be totally established with no bare spots, have been mowed a minimum of 4 times, and the grass shall be at least 1-1/4 to 2-inches in height.

C. Watering: Trees and shrubs shall be thoroughly soaked after planting and provided with additional water at intervals as necessary to provide for good health and growth of the planting.

D. Upon completion of lawn sodding, the entire area shall be soaked to saturation by a fine spray. The new planting shall be kept watered by the sprinkling system on the Site during dry weather or whenever necessary for proper establishment of the lawn. Care shall be taken to avoid excessive washing or puddling on the surface and any such

damage caused thereby shall be repaired. For the right of way of 115th Avenue and the pipeline corridor/work area from the west pump station fence to the project termination at Ravine Road, watering shall be accomplished by watering trucks or other portable watering on the following schedule:

Period	Watering Frequency
Week 1 - 2	Daily
Week 3 -4	Every Other Day
Week 5 - 7	Twice Weekly
Week 8 - On	As Needed

E. Protection: The CONTRACTOR shall provide adequate protection to all newly sodded areas including the installation of approved temporary fences to prevent trespassing and damage, as well as erosion control, until the end of the correction of defects period.

F. The CONTRACTOR shall replace any materials or equipment or which its employees or Subcontractors have damaged.

G. Partial utilization of the project shall not relieve the CONTRACTOR of any of the requirements contained in the Contract Documents.

H. Mowing of Lawn Areas: First mowing of lawn areas shall begin as soon as the grass has reached a height of 3 inches and subsequent mowing shall be at least once a week, or as often as necessary to maintain all lawn areas at a uniform height of 1-1/2 to 2-inches.

I. All lawns shall be fertilized every 3 weeks with 6 lb of 16-16-8 commercial fertilizer per 1000 sq ft for the first 7 weeks and be fertilized thereafter once each 5 months prior to acceptance.

J. Plants shall be maintained in a vigorous, thriving condition by watering, cultivating, weeding, pruning, spraying, and other operations necessary. No trees or shrubs will be accepted unless they are healthy and show satisfactory foliage conditions.

K. All planted areas shall be cultivated at least every 2 weeks and be raked smooth to present a neat appearance, and additional mulch shall be added where necessary.

L. Maintenance shall include, in addition to the foregoing, cleaning, edging, repairs to stakes, wire, and wrappings, the repair of erosion, and all other necessary work of maintenance. Sidewalks and other paved areas shall be kept clean while planting and maintenance are in progress.

M. Any existing sprinkler lines broken or disrupted shall be replaced to proper working order prior to work under this Contract and shall be acceptable to the OWNER.

1.8 FINAL INSPECTION AND GUARANTEE

A. Inspection of lawns and planting will be part of final inspection under the Contract.

B. Written notice requesting inspection shall be submitted to the ENGINEER at least 10 days prior to the anticipated inspection date.

C. Final acceptance prior to start of the guarantee period of the Contract will be on written approval by the ENGINEER, on the satisfactory completion of all WORK, including maintenance, but exclusive of the replacement of plant material.

D. Any delay in the completion of any item of work in the planting operation which extends the planting into more than one season shall extend the correction period in accordance with the date of completion given above.

E. The CONTRACTOR shall replace, as soon as weather conditions permit, all dead plants and all plants not in a vigorous, thriving condition which are noted at the end of the one-year correction period.

F. Plants used for replacement shall be of the same size and variety on the Plant List. Replacement plants shall be furnished, planted, staked, and mulched as indicated for new plants.

G. All WORK under this Section shall be left in good order to the satisfaction of the OWNER and the ENGINEER, and the CONTRACTOR shall, without additional expense to the OWNER, replace any trees, shrubs, etc., which develop defects or die during the one-year correction period.

1.9 MAINTENANCE AND GUARANTEE FOLLOWING ACCEPTANCE OF PROJECT

A. General: The CONTRACTOR shall be responsible for a period of one year after date of acceptance of the WORK of this Section, for maintaining all plantings, including all necessary plant or tree replacements, weeding, cultivating, fertilizing, pruning, controlling insects and diseases, re-guying, and performing all other operations incident thereto, as well as maintenance of the irrigation system in Section 338300 - Landscape Irrigation System. The CONTRACTOR shall obtain a written guarantee from the landscaping Subcontractor embodying the provisions of this paragraph.

B. The WORK covered by the maintenance and guarantee portions of this paragraph includes providing all replacements of plants, labor, materials, equipment, and supplies and in performing all operations in connection with maintenance and guarantees.

C. The inspection of lawn areas is independent of the final inspection and maintenance period. After the lawn has been accepted and has been mowed 4 or more times, the responsibility for mowing and irrigation will be turned over to the OWNER. However, the weeding, fertilizing, and controlling of diseases of the lawn areas shall remain the responsibility of the CONTRACTOR for the remainder of the one-year maintenance and correction period.

D. All plant materials shall be in a condition acceptable to the OWNER or its representative at the end of the maintenance guarantee period.

E. The OWNER will furnish all water required during the maintenance and correction period.

F. Maintenance: Watering and mowing of the lawn during the maintenance and correction period will be performed by the OWNER in accordance with written instructions which shall be furnished by the CONTRACTOR.

G. The CONTRACTOR shall request and the OWNER will make any changes or adjustments necessary to the automatic sprinkler system during the maintenance and correction period.

H. The CONTRACTOR shall replace any dead or diseased plants during the maintenance and correction period.

I. All lawn and planting areas shall be fertilized during the maintenance and correction period with 16-6-4 chemical fertilizer. Amount of fertilizer applied shall be per fertilizer's written instructions on bag. Fertilizers applied to planting areas shall be cultivated into the top 2 inches of topsoil.

J. The CONTRACTOR shall clean-up and remove unused or waste materials from the Site and leave the area in a neat condition satisfactory to the OWNER whenever it performs work during the maintenance period.

K. Final Inspection: The OWNER and CONTRACTOR shall make a final inspection at the end of the one-year correction period. Any plants and materials found defective at time of final inspection shall be replaced within a time agreed upon by both parties. If it is too late in the planting season for replanting, the replacements shall be made during the next planting season even though such planting may run beyond the maintenance and correction period.

PART 2 -- PRODUCTS

2.1 GENERAL

A. All landscaping materials for soil conditioning, weed abatement, or planting shall be first-grade, commercial quality and shall have certificates indicating the source of material, analysis, quantity, or weight attached to each sack or container or furnished with each delivery. Delivery certificates shall be given to the ENGINEER as each shipment of material is delivered. A list of the materials used, together with typical certificates of each material, shall be submitted to the ENGINEER prior to final acceptance.

2.2 TOPSOIL

A. Topsoil shall be obtained from naturally drained areas and shall be fertile, friable loam suitable for plant growth. Topsoil shall be subject to inspection and approval at the source of supply and upon delivery.

B. The topsoil shall be of uniform quality, free from subsoil, hard clods, hardpan, rocks, disintegrated debris, plants, roots, seeds, and any other materials that would be toxic or harmful to plant growth. Topsoil shall contain no noxious weeds or noxious weed seeds.

C. The topsoil shall contain at least 6 percent organic matter as determined by loss of weight after ignition of moisture-free samples in accordance with current methods of the Association of Official Agricultural Chemists.

D. The acidity of the topsoil shall result in soil pH between 5.5 and 7.5. The salinity level shall be less than 3 millimhos/cm.

E. Mechanical analysis shall be performed and shall conform to ASTM D 422.

2.3 FERTILIZER AND ADDITIVES

A. Fertilizer shall be furnished in bags or other standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon.

B. Chemical fertilizers shall be a free-flowing factory-mixed commercial fertilizer with percentages of nitrogen, phosphoric acid, and potash at 6-10-4. Fertilizers shall be uniform in composition, dry, and free flowing.

C. Animal fertilizer shall be well-rotted cattle manure, free from sawdust, shaving, or refuse of any kind, and shall contain not more than 25 percent straw by volume.

D. Tablets shall be 12 grams each 20-10-5 Agriform, Lesslie, or equal.

E. Lime shall be dolomite limestone containing not less than 85 percent of total carbonates. Limestone shall be ground to such fineness that 100 percent will pass a No. 200 sieve.

F. Agricultural gypsum shall be standard brand agricultural calcium sulfate intended for soil application and shall contain 19 percent combined sulfur.

2.4 MULCH

A. Mulching material shall be 3-inch pine bark mulch, free of sticks, stones, or other foreign materials.

2.5 PLANT MATERIALS

A. Plants shall meet requirements of the Contract Documents and shall be in accordance with the botanical names and applicable standards of quality, size, condition, and type. Plants shall be true to name, genera, species, and variety in accordance with reference publications.

B. Plant names are defined in "Standardized Plant Names" and "Bailey's Encyclopedia of Horticulture." When a name is not found in either reference, the accepted name used in the nursery trade shall apply.

C. Plants shall be marked for identification. Each bundle of plants and at least 25 percent of each species and variety of separate plants in any one shipment shall have legible labels securely attached before delivery to the Site.

D. Trees and shrubs shall be measured while their branches are in their normal position. Height and spread dimensions refer to the main body of the plant and not from branch or root tip to tip. No trees will be accepted with leaders cut or so damaged that cutting is necessary.

E. All plants shall be symmetrical and shall conform to the size, age, and condition on the Plant List. Exceptions are as follows:

1. Plants larger than indicated on the plant list may be used if approved by the ENGINEER, but approval of such plants shall not increase the Contract Price. If the use of larger plants is approved, the spread of roots or ball earth shall be increased in proportion to the size of the plant. Bare root plants furnished in size greater than indicated shall be balled and burlapped when required by the ENGINEER.

2. Where caliper or other dimensions of any plant materials are omitted from the Plant List, it shall be understood that such plant materials shall be normal stock for type listed.

F. Plants shall be of sound health, vigorous, and free from plant disease and shall be well branched, shall have full foliage when in leaf, and shall have a healthy well-developed normal root system.

G. Balled and burlapped (BB) plants shall have firm, natural balls of earth of diameter not less than that indicated and be of sufficient depth to include all the fibrous and feeding roots. No plant moved with a ball will be accepted if the ball is cracked or broken before or during plant operations, except on approval of the ENGINEER.

H. Roots or balls of all plants shall be adequately protected at all times from sun and drying winds.

I. Plants indicated to be in marked cans, pots, or other containers on the Plant List shall have been grown in the containers for a minimum of 6 months and a maximum of 2 years. Roots shall fill the containers but show no evidence of being or having been root bound.

J. Trees shall have straight trunks and all old abrasions and cuts shall be completely callused over. In no case shall trees be topped before delivery.

K. Plants shall have been transplanted or root-pruned at least once in the 2 years prior to delivery, but plants shall not be pruned immediately prior to delivery except as authorized by the ENGINEER.

2.6 SOD GRASS

A. Sod shall contain at least 85 percent permanent grass suitable to the climate in which it is to be placed free of weed and undesirable grasses, and shall be of good texture, free from obnoxious roots, stones and foreign materials. The sod shall be cut in 16-inch squares, 16-inch wide strips, 4-ft wide strips or 4-ft wide squares, uniformly 1-1/2 inches thick with clean cut edges.

B. The sod shall be nursery grown Bahia sod. It shall be uniformly cut approximately 3/4-inch or more thick and shall be well rooted, 2-year old growth of permanent and desirable grasses indigenous to this general location. The sod shall be practically free from weeds and undesirable grasses.

2.7 STAKING MATERIALS

A. Stakes for supporting trees shall be sound No. 2 pressure treated pine of uniform size not less than 2-inch by 2-inch or 2-1/2 inch minimum diameter wood posts of lengths on the staking details. All knots shall be solid.

B. Hose for covering wire shall be new or used black or green 2 ply fiber-bearing garden hose, not less than 1/2-inch inside diameter.

C. Wire for tree bracing and guying shall be double strand pliable No. 10 gauge galvanized steel wire or vinyl-coated steel wire.

D. Tree ties of other materials may be used with prior approval of ENGINEER.

2.8 MISCELLANEOUS MATERIALS

A. Wrapping material for trees, 2-inch diameter or larger, shall be 2 thicknesses of crinkled paper cemented together with bituminous material in strips 4-inch wide. Twine for tying shall be medium or coarse sisal yarn with a light impregnation of oil condensate from asphalt or tar.

PART 3 -- EXECUTION

3.1 GENERAL

A. The landscape work shall not be performed at any time when it may be subject to damage by climatic conditions.

B. The CONTRACTOR shall carefully scale or otherwise verify all dimensions in the Contract Documents. Dimensions and plant locations shall be coordinated with ENGINEER and final location shall be Site-oriented by the planter and ENGINEER. Any discrepancies or inconsistencies shall be brought to the attention of the ENGINEER.

C. In case of conflict between the Plant List totals and total plant count of the Contract Documents, the CONTRACTOR shall provide the higher number of plants.

D. Delivery of materials may begin only after samples and tests have been approved by the ENGINEER. Materials provided shall be not less quality than the approved sample.

E. Substitutions for the indicated plant materials may be considered pursuant to the Contract Documents.

F. The CONTRACTOR shall provide temporary fencing, barricades, covering, or other protections to preserve existing landscaping items indicated to remain and to protect the adjacent properties and other structures when they may be damaged by the landscape work.

G. The CONTRACTOR shall retain the services of a tree surgeon approved by the ENGINEER to repair damage to existing trees. Existing trees which are to be saved and which cannot be restored to full growth, as determined by tree surgeon, shall be removed and replaced with per City of Tampa landscape ordinance.

H. The CONTRACTOR shall remove and/or relocate landscape items such as trees, shrubs, grass, other vegetation, improvements, and obstructions as indicated.

I. Waste materials shall be removed and disposed of off the Site, unless otherwise indicated.

J. It shall be the responsibility of the CONTRACTOR to obtain information regarding utilities in the area of work and to prevent damage to the same. The CONTRACTOR shall protect the utilities as necessary.

K. Burning of combustible materials on the Site shall not be permitted.

L. The CONTRACTOR shall protect structures, sidewalks, pavements, and other facilities that are subject to damage during landscape work. Open excavations shall be provided with barricades and warning lights which conform to the requirements of governing

authorities and the State's OSHA safety requirements from dusk to dawn each day and when needed for safety.

M. Planting areas include all areas to be landscaped unless indicated otherwise.

3.2 SOIL PREPARATION

A. The landscape work shall not begin until all other trades have repaired all areas of settlement, erosion, rutting, etc., and the soils have been re-established, recompacted, and refinished to finish grades. The ENGINEER shall be notified of all areas that prevent the landscape work from being executed.

B. Areas requiring grading by the landscaper including adjacent transition areas shall be uniformly level or sloping between finish elevations to within 0.10-ft above or below required finish elevations.

C. The landscape work shall not proceed until after walks, curbs, pavings, edging, and irrigation systems are in place. WORK under the Contract shall be completed to a point where the landscape areas will not be disturbed. The subgrade shall be free of waste materials of all kinds.

D. During grading, waste materials in the planting areas such as weeds, rocks 2-inches and larger, building materials, rubble, wires, cans, glass, lumber, sticks, etc., shall be removed from the Site. Weeds shall be dug out by the roots.

E. Fertilizers, additives, seed, peat, etc. subject to moisture damage shall be kept dry in a weatherproof storage place.

F. After removal of waste materials, the planting area subgrade shall be scarified and pulverized to a depth of not less than 6 inches, and all surface irregularities below the cover of topsoil shall be removed.

G. Finish grading shall consist of:

1. Final contouring of the planting areas.
2. Placing 4 inches of topsoil over all areas to be planted unless indicated otherwise.
3. Placing all soil additives and fertilizers.
4. Tilling of planting areas.
5. After tilling, bringing areas to uniform grades by floating and/or hand raking.
6. Making minor adjustment of finish grades as directed by the ENGINEER.
7. Removing waste materials such as stones, roots, or other undesirable foreign material and raking, disking, dragging, and smoothing soil ready for planting.

H. Any unusual subsoil condition that will require special treatment shall be reported to the ENGINEER.

I. Topsoil shall be uniformly distributed over all areas where required. Subgrade and topsoil shall be damp and free from frost.

J. Surface drainage shall be provided as indicated by shaping the surfaces to facilitate the natural run-off of water. Low spots and pockets shall be filled with topsoil and graded to drain properly.

K. Finish grade of all planting areas shall be 1-1/2 inches below finish grade of adjacent pavement of any kind.

L. In all shrub planting areas, 1-1/2 inches of peat moss or soil-aid shall be raked into the top 3 inches of soil.

3.3 DELIVERY, STORAGE, AND HANDLING OF PLANT MATERIALS

A. No plants other than the required samples shall be dug or delivered to the Site until the required inspections have been made and the plant samples are approved.

B. Plants shall not be pruned prior to delivery except upon approval by the ENGINEER.

C. Plant material shall be planted on the day of delivery if possible. The CONTRACTOR shall protect the stock in a temporary nursery at the Site where it shall be protected from sun and drying winds and shall be shaded, kept moist, and protected with damp soil, moss, or other acceptable material. Plants shall be planted within 2 days after delivery.

D. All balled and burlapped plants which cannot be planted immediately after delivery shall be set on the ground and be well protected with soil, wet moss, or other acceptable material.

E. Plants shall not be picked up or moved by stem or branches, but shall be lifted and handled from the sides of the containers.

F. Plants shall be lifted and handled from the bottom of the ball or container. Plants with balls cracked or broken before or during planting operations will not be accepted and shall be immediately removed from the Site.

3.4 TREE AND PLANT LOCATIONS

A. The CONTRACTOR shall locate and stake all tree and shrub locations and have the locations approved by the ENGINEER before starting excavation for same. The plant locations shall be observed, and their locations shall be adjusted as directed by ENGINEER before final approval.

B. No trees shall be located closer than 72 inches to structures unless otherwise indicated. Ground covers and shrubs may be planted up to structures or curbs.

3.5 PLANT PITS

A. Plant pits, centered on location stakes, shall be excavated circular pits with vertical sides and flat or saucer shape bottom in accordance with the following sizes unless indicated otherwise:

1. Tree pits shall be at least twice the size of the root ball, and at least 8 inches below depth of ball or roots. A 3-inch layer of manure shall be worked thoroughly to a depth of 6 inches below the pit bottom.

2. Shrubs shall be planted in pits or holes of soil 24 inches deep below finished grade, or as much deeper as necessary to properly set the plant at finished grade with a minimum of 4 inches of planting soil under balls of all plants. Shrubs with balls shall be planted in pits that are at least 24 inches greater in diameter than the bottom of ball.

3.6 PREPARED BACKFILL

A. Tree and shrub pit backfilling soil shall consist of 3 parts topsoil, and 1 part peat or soil-aid by volume. Commercial fertilizer shall be sparingly mixed with the prepared topsoil, using 5 lb/cu yd or as required by manufacturer's printed recommendations.

B. Planting pit, bin, and trench filling and bedding soil shall consist of 4 parts by volume topsoil mixed with one part manure and 5 lb of commercial fertilizer per cubic yard.

C. Materials shall be thoroughly rotary-mixed on the Site before placement. Mixing of materials in pits, bins, trenches or beds will not be permitted.

D. Tree and shrub pits shall be provided with fertilizer tablets as follows:

1 per one-gallon can plant
3 per 5-gallon can plant
5 per 15-gallon can plant

3.7 ROCKS OR UNDERGROUND OBSTRUCTIONS

A. In the event that rock or underground obstructions are encountered in the excavation of plant pits, alternative locations will be selected by the ENGINEER. Moving of trees to alternative locations shall not entail additional costs to the OWNER.

3.8 SETTING PLANT MATERIALS

A. The soil shall not be worked when the moisture content is so great that excessive compaction will occur, nor when it is so dry that a dust will form in the air or that clods will not break readily. Water shall be applied if necessary to provide ideal moisture for filling and for planting.

B. Plants shall be set plumb and straight in center of pits, and at such a level that after settlement that the crown of the plant will be 2 inches above the finished grade.

C. Balled and burlapped trees shall have planting soil placed and compacted around base of ball to fill all voids. All burlap ropes or wires shall be removed from the sides and tops of balls.

D. Ground cover plants shall be evenly spaced, staggered in rows, and set at intervals indicated, so as to produce a uniform effect. Plants shall be watered immediately after planting operations have been completed.

E. Shrubs shall be pruned to remove damaged branches.

F. Planting soil around roots or balls shall be thoroughly compacted and watered. After planting, the soil in the shrub beds shall be cultivated between shrubs, raked smooth, and neatly outlined. Muddy soil shall not be used for backfilling. All broken or frayed roots shall be properly cut off.

G. Trees and shrubs on slopes steeper than 6 to 1 shall be provided with watering dams or berms at least 6 inches high and 8 inches wider than planting pit unless indicated otherwise.

H. Trees shall be thoroughly watered immediately after planting.

Remove all tags and labels when directed by ENGINEER.

I. Trees shall have trunks wrapped in acceptable tree wrap material from base up to and above at least the second scaffold branch.

3.9 STAKING

A. Staking of trees shall be done immediately after planting. Plants shall stand plumb after staking. Staking shall be as indicated.

B. No balled and burlapped specimen "tree-like" shrubs shall be staked.

C. Trees of 2-inch caliper and larger shall be guyed at points of branching with 3 wires spaced equally around and outside the perimeter of the ball. Guy wires shall be covered with rubber hose at the bark, protected by approved material at points of contact. Each guy shall be positioned below crotches and fastened to a 4-inch diameter by 18-inch wood deadman, 12 inches below grade. One turnbuckle shall be provided for each guy.

D. Trees less than 2-inch caliper shall be supported by 2 stakes placed diametrically opposite at perimeter line of ball and to sufficient depth to hold tree rigid. Stakes shall be driven vertically and not twisted or pulled. Trees shall be wired to each stake as indicated on staking details. Trees shall be protected with rubber hose over wires at points of contact. Evergreen trees shall be guyed.

3.10 PRUNING AND MULCHING

A. Each tree and shrub shall be pruned in accordance with standard horticultural practice to preserve the natural character of the plant in the manner fitting its use in the landscape design, as approved by the ENGINEER.

B. All dead wood or suckers and all broken or badly bruised branches shall be removed by thinning out and shortening branches. Deciduous bare-rooted plants shall have not less than 1/3 of their respective leaf surfaces removed. All cuts shall be made just above a healthy bud. Pruning shall be done with clean, sharp tools.

C. Cuts over 3/4-inch diameter shall be painted with an approved tree paint. Paint shall cover all exposed cambium as well as other living tissue. Paint shall be waterproof, adhesive, and elastic antiseptic; shall be free from kerosenes, coal tar, creosote, or other materials injurious to the life of the tree; and shall be approved before it is used.

D. Plants shall be mulched after planting and cultivating have been completed. A layer of mulch materials shall be spread on finished landscaping grade within all planting areas to a depth of 2 inches. The mulch around isolated plants shall be 6 inches greater in diameter than the planting hole. All shrub and ground cover beds shall be completely covered with the mulch.

E. All deciduous tree trunks shall be thoroughly sprayed with a methoxychlor or similar insecticide, and wrapped immediately after planting, with wrapping material overlapping 1-1/2 inches, wound from ground line to the second branch, and securely taped in at least 5 places, including the top, middle, and bottom.

3.11 SODDING

A. Grass sod shall be provided where indicated and shall be maintained.

B. The soil shall be prepared and fertilized before sodding. The CONTRACTOR shall prepare only enough ground that can be planted within 24 hours thereafter.

C. Soil preparation shall consist of the following:

1. Preparation of sub-grade grading shall be per the paragraphs entitled "General" and "Soil Preparation" above.

2. Finish grading shall be per the paragraph entitled "Soil Preparation" above. Topsoil required at areas to be sodded shall be 1-1/2 inches. The soil additives and fertilizer for finish grading shall consist of mulch at 5 cu yd/1000 sq ft and commercial fertilizer at 20 lb/1000 sq ft.

D. Sod shall be cut and laid on Site the same day.

E. The sod shall be placed over leveled, compacted, and prepared finish graded soil. The topsoil and sub-base shall be moist enough to resist shifting.

F. The surface on which the sod is to be laid should be firm and free from footprints or other depressions. A string or line of boards may be used as a guide for setting the first line of sod across the area. Sods of the next course shall be matched against the edge of this first line in such a way the joints between the individual sod pieces in the 2 courses do not coincide. Successive courses shall be matched against the last line laid, in the same manner. Sod joints shall be closely laid.

G. Sod on slopes should be staked down by driving a wooden peg through the sod. Wire stakes shall not be used for pegging sod.

H. Sod shall always be laid across slopes.

I. All new sod shall be rolled or firmly but lightly tamped with a suitable wooden or metal tamper, sufficiently to set or press sod into underlying soil.

J. After sodding has been completed, the sodded area shall be cleaned up and thoroughly moistened by sprinklers.

3.12 MISCELLANEOUS ITEMS

A. After all plants and sprinkler emitters are in place, and the existing sod in, and all mulch area has been removed to a depth of 4 inches, place filter fabric over the entire area to receive mulch.

B. Mulch shall be placed in all shrub areas where indicated, spread carefully and evenly to a minimum depth of 4 inches over planted areas.

- END OF SECTION -

SECTION 330516 - PRECAST CONCRETE MANHOLES AND VAULTS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide precast concrete manholes and vaults, complete and in place, in accordance with the Contract Documents.

1.2 SPECIFICATIONS, CODES AND STANDARDS

ASTM A 48	Gray Iron Castings
ASTM C 150	Portland Cement
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 478	Precast Reinforced Concrete Manhole Sections
ASTM C 890	Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
ASTM C 913	Standard Specification for Precast Concrete Water and Wastewater Structures
ASTM C 923	Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

1.3 CONTRACTOR SUBMITTALS

A. General: Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings

1. Show dimensions, locations, lifting inserts, reinforcement, and joints.

2. Structural design calculations for vaults, signed by a registered engineer in the State of Florida.

C. Manufacturer’s Certification for Vaults: Written certification that the vault complies with the requirements of this Section.

1.4 QUALITY ASSURANCE

A. Inspection: After installation, the CONTRACTOR shall demonstrate that manholes and vaults have been properly installed, level, with tight joints, at the correct elevations and orientations, and that the backfilling has been carried out in accordance with the Contract Documents.

PART 2 -- PRODUCTS

2.1 MANHOLES

A. The CONTRACTOR shall provide precast manhole sections and conical sections conforming to ASTM C 478, the requirements of this Section and the City of Tampa Department of Sanitary Sewers (DSS) requirements. Adjusting rings shall be standard items from the manufacturer of the manhole sections. Minimum wall thickness of rings shall be 4 inches if steel reinforced and 6 inches if not reinforced.

B. Axial length of sections shall be selected to provide the correct total height with the fewest joints.

C. Conical sections shall be designed to support cast iron frames and covers under an H-20 loading, unless indicated otherwise.

D. Where the manhole barrel diameter is greater than 48 inches, a flat slab-transition, either concentric or eccentric, shall be used to transition to 48-inch diameter riser sections. Underside of the transition shall be at least 7-feet above the top of the bench.

E. Design Criteria: Manhole walls, transitions, conical sections, and base shall be designed per ASTM C 478 for the depths indicated and the following:

1. AASHTO H-20 loading applied to the cover.
2. Unit weight of soil of 120 pcf located above all portions of the manhole.
3. Lateral soil pressure based on saturated soil producing 100 pcf acting on an empty manhole.
4. Internal fluid pressure based on unit weight of 63 pcf with manhole filled from invert to cover with no balancing external soil pressure.
5. Dead load of manhole sections fully supported by the base and transition.
6. Additional reinforcing steel in walls to transfer stresses at openings.
7. The minimum clear distance between the edges of any 2 wall penetrations shall be 12 inches or one-half of the diameter of the smaller penetration, whichever is greater.

F. Joints shall be sealed in accordance with DSS standards.

G. Concrete for base and channel formation shall be 4000 psi concrete conforming to Section 033100 - Cast-In-Place Concrete.

H. Barrel section to sewer pipe connections shall be sealed with resilient connectors complying with ASTM C 923. Mechanical devices shall be stainless steel.

I. Manhole Manufacturers, or Equal

1. Atlantic Concrete Products, Inc.
2. Hanson Concrete Products, Inc.
3. Hardwall Fabricators, Inc.

4. Teichert Precast

2.2 FRAMES AND COVERS

A. Castings: Castings for manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A 48, Class 30. Unless otherwise indicated, cast iron covers and frames shall be heavy traffic type, meeting DSS standards. Frame and cover shall be designed for H-20 traffic loading.

B. Castings Manufacturers, or Equal

1. Alhambra Foundry Co., Ltd.

2. Neenah Foundry Co.

3. Vulcan Foundry, Inc

2.3 VAULTS

A. The CONTRACTOR shall provide precast vaults designed for the indicated applications and of the sizes indicated.

B. The minimum structural member thickness for vaults shall be 5 inches. Cement shall be Type V portland cement as specified in ASTM C 150. The minimum 28-day concrete compressive strength shall be 4,000 psi. All reinforcing steel shall be embedded in the concrete with a minimum clear cover as recommended by ACI 318.

C. Design Loading: Vaults in areas subject to vehicular traffic shall be designed for H-20 traffic loading. Vaults in other areas shall be designed for a vertical live load of 300 psf. Lateral loads on vaults in all areas shall be calculated from:

$$L = 90\,h, \text{ plus surcharge of } 240 \text{ psf in areas of vehicular traffic}$$

Where L = loading in psf

h = depth of fill in feet

D. Where joints are designed in pre-cast concrete vaults, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint.

E. Where openings for access to the vault are required, the full clear space opening indicated shall be provided, without obstructions from brackets or supports. For large openings where brackets or supports are designed to protrude into the opening for support of required covers, such brackets or supports shall be designed to be easily removed and replaced with a minimum of effort and without cutting or welding.

F. Covers for access openings shall be provided. Frames for covers shall be fabricated from steel, galvanized after fabrication, and shall be integrally cast into the vault concrete sections. All covers shall be tight fitting to prevent the entrance of dirt and debris. Where edge seams are permitted, no gaps greater than 1/16-inch between

edges will be accepted. All covers, except round, heavy-weight, cast iron manhole covers, shall have securing mechanisms to hold the covers firmly in place against the effects of repetitious live loads such as pedestrian or vehicle traffic.

G. Where penetration of the pre-cast concrete vault are required for piping, conduit, or ducts, such penetrations shall be accommodated through pre-cast openings or thin-wall knock-out sections. All openings for penetrations shall be smooth and free of surface irregularities and without exposed steel reinforcing. Vaults need not be designed to resist thrust from piping passing through the vault.

H. Warning Signs

1. The entrance to every manhole and vault shall be fitted with a permanently affixed, plastic warning sign, located above and centered on the top step. Each sign shall be in accordance with Section 101400 - Signage

2. Sign Manufacturer, or Equal

a. W. H. Brady Company

b. Seton Nameplate Corporation

PART 3 -- EXECUTION

3.1 GENERAL

A. Pre-cast concrete sections shall be transported and handled with care in accordance with the manufacturer's written recommendations. Where lifting devices are provided in pre-cast sections, such lifting devices shall be used as intended. Where no lifting devices are provided, the CONTRACTOR shall follow the manufacturer's recommendations for lifting procedures to provide proper support during lifting.

B. Buried pre-cast concrete vaults shall be assembled and placed in excavations on properly compacted soil foundations as indicated. Pre-cast concrete vaults shall be set to grade and oriented to provide the required dimensions and clearances from pipes and other structures.

C. Prior to backfilling, all cracks and voids in pre-cast concrete vaults shall be filled with non-shrink grout or polyurethane sealant, or both. Around pipe and conduit penetrations, openings shall be sealed with polyurethane sealant. With the authorization of the ENGINEER, grout or a closed-cell flexible insulation may be used as filler material prior to placing a final bed of polyurethane sealant.

- END OF SECTION -

SECTION 332413 – MONITORING WELL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. General: The CONTRACTOR shall provide a monitoring well and appurtenant WORK, in accordance with the Contract Documents.

B. Scope of Work: The Work to be performed includes all equipment, materials, and manpower necessary to construct one monitoring well, to be completed in the Upper Floridan aquifer system. This monitoring well will be utilized to monitor water level in Blue Sink, via water level instrumentation provided under other sections of the Work. The design intent is to install casing from the surface to the top of the limerock and then provide 15 feet of open bore hole below the casing and top of rock. The elevations provided in this specification and shown on the plan detail shall be adjusted based on the actual top of rock elevation at the monitoring well location. The actual length of casing will be based on the depth of the 8-inch diameter borehole.In general, the 4-inch diameter monitoring well will be cased from the surface elevation of 30.0 (NGVD 1929) to approximately El. -4.0 (NGVD 1929 datum) 34 feet below land surface (bls) with an open borehole to approximately El. -19.00 (NGVD 1929 datum) 49 feet bls. Conform all materials and construction to applicable Southwest Florida Water Management District (SWFWMD) and Florida Department of Environmental Protection (FDEP) regulations for monitoring wells.

C. Well Location

1. The monitoring well is shown on Plan Sheet C-1, and is located on the City of Tampa pumping station site.

2. The CONTRACTOR shall be responsible for identifying and marking the monitoring well location prior to drilling.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc – Coated Welded and Seamless
ASTM A 252	Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM C 150	Portland Cement
AWS D1.1	Structural Welding Code - Steel
AWS D10.9	Standard Qualification of Welding Procedures and Welders of Piping and Tubing
AWWA A100	Standard for Water Wells
29 CFR 1910.120(e)	OSHA Health and Safety Standards
EPA 570	Manual of Water Well Construction Practices

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Submittals

1. All submittals must be approved prior to mobilization for well drilling activities.
2. Discharge and Settling Tanks: Specifications for tanks to be used during drilling and pumping development for the settling of sand and silt prior to discharge.
3. Noise Abatement: Describe the techniques to abate noise generated by construction operations.
3. Lost Circulation Plan: Discuss procedures to follow in case of loss of circulation during drilling operations.
4. Submittals for all materials, including surface casing, well casing, grout, drilling equipment, flow metering equipment and all other equipment or materials to be utilized in the Work.
5. Current qualification certificates for welders per AWS D10.9.

C. Submittals Prior To And During Construction

1. Drilling Log: A detailed daily drilling log of events during drilling, well construction, and well development, recorded on Daily Drilling Report forms for each drilling rig in operation. Failure to keep drilling logs up to date will be grounds for the OWNER to suspend drilling operations. No standby time will be paid.

2. The report forms shall include the following information:

a. Bit assembly and drill string.
b. Water losses, drilling fluid losses, additions of water or manufactured products to the drilling fluid, and the drilling depth at the time of the additions.
c. Footage drilled.
d. Formations encountered from surface to total depth, indicating the depth of each change in formation and including difficulties and unusual conditions met during drilling and cementing operations.
e. In addition, information relative to maintenance and repair time, details of repair, presence of CONTRACTOR and Subcontractor personnel.

3. The drilling log shall be available for inspection at the Site at all times. Legible forms suitable for photocopying shall be submitted a daily basis.

PART 2 -- PRODUCTS

2.1 CASING AND APPURTENANCES

A. Surface Casing: 12-inch diameter black steel with a minimum wall thickness of 0.375-inch. Conform surface casing to ASTM Standard A-252 Grade 2 or equal.

B. Well Casing: 4-inch diameter black steel with a wall thickness of 0.237-inch. Conform casing to ASTM Standard A53 Grade B ERW or equal, of new, first-quality material and free of defects. Provide casing NSF approved for use with potable water.

C. Casing Centralizers: Casing centralizers (used to center casing in the borehole or within an overlapping casing): 0.25-inch minimum thickness steel and of a size and shape such that, when attached to the casing, will effectively center the casing and assure sufficient space for a proper grout seal. Provide casing centralizers of the size, shape, and positioning of casing centralizers to not adversely affect placement of the casing or limit access of tremie pipes and other necessary tools in the annulus.

D. Water: Provide water for use during drilling operations from an approved source, contaminant-free, and of a quality that will not degrade the characteristics of drilling fluid or grout.

E. Above-Ground Completion/Well Heads: Wellheads shall be constructed as indicated on the Plan details.

2.2 SEALING MATERIAL

A. Cement: Cement used for grouting: Portland Cement, Class A (API) or C150, Type II (ASTM). Provide neat cement for grouting of the following materials and proportions: 1 sack (94 lbs.) of cement and 5.2 to 6.0 gallons of water.

PART 3 -- EXECUTION

3.1 PERMITS

A. At a minimum, the following requirements shall be satisfied prior to the start of any on-Site activities:

1. A firm licensed as a water well driller in the State of Florida shall be contracted to perform the WORK, and a copy of the driller's water well license shall be submitted.

2. Drilling and construction personnel shall meet the pertinent health and safety requirements in OSHA Standard 29 CFR1910.120(e) and copies of personnel training certificates shall be submitted.

3. The CONTRACTOR is responsible for obtaining necessary permits for the WORK, including a well construction permit from the Southwest Florida Water Management District (SWFWMD), except NPDES permit to discharge the well development and testing water, which will be obtained by the CONTRACTOR. The well drilling subcontractor and CONTRACTOR shall comply with the NPDES permit conditions.

3.2 DRILLING EQUIPMENT

A. Provide and use sufficient and capable personnel, equipment, and materials to construct the well by mud-rotary and reverse-air circulation drilling. Mobilize equipment and materials to the site in a timely manner. Provide all equipment in first-class working order and suitable for successfully completing, in a timely manner, the Work specified. Unless pre-approved by the ENGINEER, mud rotary drilling requires the use of above-ground mud containers (i.e., no mud-pit excavations).

3.3 CASING INSTALLATION

A. Butt-weld casing sections in such a manner to ensure their strength and straightness. Preform welding in accordance with AWS D1.1. Align and space centralizers around the

casing at 120 degree intervals to center it within the borehole. Place centralizers 5 feet from the bottom of the casing, 5 feet from the top of the casing, and at center of the casing. Install the casing as near to plumb as possible. If, in the opinion of the ENGINEER, there is reasonable doubt about the plumbness of the well, perform a plumbness test at the CONTRACTOR's expense. If the test results indicate that the well will not meet normal performance expectations of its intended use, repair or replace the well at the CONTRACTOR's expense.

3.4 GROUTING

A. Unless pre-approved by the ENGINEER, pump neat cement grout into the borehole or annular space from the bottom up by either: 1) the capped casing pressure tremie method for the initial stage of casing grouting or; 2) the annular space tremie method. Place the grout in separate stages with each stage consisting of a grout volume not exceeding 120 sacks of cement (mixed at the specified ratio) unless otherwise directed. After the grout for each stage has sufficiently hardened, determine the vertical rise of grout within the annular space by obtaining a hard tag with the tremie pipe and report the result to the ENGINEER. Upon completion of the final stage of grouting, do not disturb the well for at least 24 hours after the grout has thoroughly hardened.

3.5 DETAILED DESCRIPTION OF MONITORING WELL CONSTRUCTION AND TESTING

A. Location: Provide the services of a Florida Registered Land Surveyor to locate the monitoring well on the pump station site based on the location shown and described on the Plans. Notify the ENGINEER when the proposed well location is identified in the field and obtain the ENGINEER's approval prior to commencing any drilling activities.

B. Open Hole: Drill an 8-inch-diameter hole from land surface to an estimated depth of 34 feet bls (El. -4.0 NGVD 1929) Ream the hole to 16-inch diameter from land surface to a depth of 3 feet below the top of the uppermost vertically persistent stable stratum suitable for setting surface casing. Provide a minimum depth of 10 feet bls (El. 20.00 NGVD 1929) for the 16-inch diameter hole. Collect formation samples during drilling of the 8-inch-diameter hole. Note that the surface casing may be eliminated if field conditions allow construction without the surface casing.

C. Surface Casing and Installation: Insert and align into the borehole a sufficient length of 12-inch-diameter steel surface casing so that it extends from the bottom of the 16-inch diameter open hole to 6 inches above land surface. After installing the casing, grout it in place from the bottom of the casing to land surface. Do not resume drilling for at least 12 hours after the grout has thoroughly hardened from the placing of the final grout stage.

D. Well Casing and Installation: Furnish, insert, and align in the borehole an estimated 37 feet of 4-inch diameter steel well casing from 3 feet above land surface to 34 feet bls (El. -4.00 NGVD 1929). The design intent is to install casing from the surface to the top of the limerock and then provide 15 feet of open bore hole below the casing and top of rock. The elevations provided in this specification and shown on the plan detail shall be adjusted based on the actual top of rock elevation at the monitoring well location. The actual length of casing will be based on the depth of the 8-inch diameter borehole. Align and space centralizers around the casing at 120-degree intervals and weld to the casing at points 5 feet from the bottom and top of the casing, and in the center of the casing. Grout the well casing into the borehole from the bottom of the casing to land surface. Do

not disturb the well for 24 hours after the final grout stage is completed and the grout has hardened.

E. Open Hole and Development: Drill with a nominal 4-inch diameter bit from the bottom of the well casing to 15 feet below the bottom of the casing, estimated 49 feet bls (El. -19.00 NGVD 1929) using the reverse-air drilling method as soon as practicable. Collect drill cuttings and water samples during drilling. Develop the borehole by alternately pumping and surging with an approved air-lift pumping system until it yields water free of sediment and suspended solids as determined by the ENGINEER.

F. Above-Ground Completion: Extend the 4-inch diameter casing approximately 3.0 feet above land surface and finish with a flanged vented top, with accesories required for the level instrument per plan details. Provide a removable and lockable heavy-duty cover plate for the flanged casing top. Provide a concrete surface pad around the well casing as shown on the Plans.

3.6 WELL ABANDONMENT

A. In the event that the CONTRACTOR fails to drill the well or place casings to the depth specified or to such other depth as directed by the ENGINEER, or should terminate Work on the well because of loss of tools or for any other cause which is the responsibility of the CONTRACTOR, the CONTRACTOR shall, if directed by the ENGINEER, remove salvageable casings and equipment and abandon the hole in accordance with all laws and regulations. The CONTRACTOR shall then move to a new location approved by the ENGINEER and construct a replacement well. This Work shall be done at the CONTRACTOR's expense, employing the use of salvageable materials at the discretion of the ENGINEER.

3.7 SITE RESTORATION

A. Upon completion and preliminary acceptance of the well by the ENGINEER, remove all equipment, materials, and supplies from the work site. Remove all drill cuttings and debris from the site and dispose of these in accordance with applicable laws and regulations. Fill in and grade all holes, excavations, and ruts to restore elevations and grades which existed prior to commencement of the Work. Sod or seed areas covered with grass or plant cover prior to the Work as appropriate to restore the site to its previous condition. Final acceptance of the WORK will not be granted until site restoration is completed and approved by the ENGINEER.

3.8 DISPOSAL OF DEVELOPMENT WATER

A. General: The CONTRACTOR shall provide pipeline and facilities for discharging water from the well Site to the nearest permitted discharge point as per the NPDES General permit for stormwater discharge. The purge water shall be contained in a settling tank prior to being discharged to the nearest discharge point. The discharge point for the monitoring well is the existing FC-100 stormwater pond owned and operated by the City of Tampa Stormwater Division of the Public Works Department. The CONTRACTOR shall design the system so that no erosion results from the discharge. Actions necessary to conform to discharge requirements shall be performed by the CONTRACTOR as a part of the WORK.

- END OF SECTION -

SECTION 332420 – STAFF GAUGE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. General: The CONTRACTOR shall provide one staff gauge in Blue Sink, calibrated and set to NGVD 1929 elevation datum.

B. Scope of Work: The Work to be performed includes all equipment, materials, and manpower necessary to furnish and install one porcelain enameled iron gage on a treated wood pole in Blue Sink.

C. Gauge Location

1. The gauge location is shown on Plan Sheet C-1.

2. The CONTRACTOR shall be responsible for identifying and marking the gauge location.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Submittals

1. All submittals must be approved prior to furnishing the gauge.

2. Submittals for all materials, including gauge, fasteners, and all other equipment or materials to be utilized in the Work.

3. Signed and sealed document by a State of Florida licensed surveyor stating that the gauge has been accurately set to the specified vertical datum.

PART 2 -- PRODUCTS

2.1 LEVEL GAUGE AND APPURTENANCES

A. Rugged iron construction with procelain enamel finish to ensure easy reading. Finish shall resist rust and discoloration.

B. Provide standard USGS Style A gauge with 4-inch width, marked at every foot, tenth and 0.02 feet with total elevation. Furnish gauge in 2-1/3 foot increments. Provide sections to show elevations from 13.56 to 16.92 feet, 16.96 to 20.32 feet, 20.36 to 23.72 feet, and 23.76 to 27.12 feet.

C. Provide treated wood pole or post, minimum 8-inches diameter for mounting gauge sections. Use Type 316 stainless steel mounting hardware.

2.2 MANUFACTURER

A. Rickley Hydrological Company, 1700 Joyce Ave., Columbus, OH 43219 800-561-9677. Style A gauge.

PART 3 -- EXECUTION

3.1 POST INSTALLATION

A. Provide post of sufficent length to drive to firm foundation in bottom of sink. Set post vertical and true.

3.2 GAUGE INSTALLATION

A. Mount gauge sections facing east so that they may be easily read from the pumping station fenced area. Install gauge so the the elevations on the gauge are set to NGVD 1929 elevations. Mount sections on the wood post using Type 3165 stainless steel hardware.

- END OF SECTION -

SECTION 338300 - LANDSCAPE IRRIGATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall design and provide an automatic irrigation system, complete and operable, in accordance with the Contract Documents.

B. Minor items necessary for proper construction and functional operation of the system, even if not specifically described in the Contract Documents, shall be included as a part of the WORK of this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings

1. Shop Drawings of the complete irrigation system and irrigation structures. CONTRACTOR is responsible for the detailed design of the irrigation system in accordance with the requirements of the Contract Documents. The detailed design shall be submitted to the ENGINEER for approval prior to commencing WORK.

2. Complete list of irrigation materials and equipment, including manufacturer's name/address, specific trade names, catalog numbers, complete with illustrations and/or necessary descriptive literature. The proposed items shall be clearly marked or underlined.

3. Controller literature, specifications, installation wiring diagram, and circuit breaker information shall be submitted for review prior to ordering.

C. Record Drawings: Record drawings showing locations of all valves, pipe, heads, dimensions, controllers, control cables, and electrical wiring shall be submitted to the ENGINEER prior to final inspection.

1.3 QUALITY ASSURANCE

A. The CONTRACTOR shall give at least 72 hours notice to the ENGINEER for scheduling the following special inspections:

1. Layout of the system. Include ENGINEER and OWNER in this inspection.

2. Inspection of trenches, backfilling, and equipment.

3. Pressure tests.

4. Coverage adjustment.

5. Automatic operation.

B. Pressure Testing: Tests shall be performed in the presence of the ENGINEER.

1. After assembly and installation, water pipes, fittings, automatic equipment, and appurtenances shall be tested at a hydrostatic pressure of 150 psi at the lowest point of the system for not less than 60 minutes.

2. The first test shall be made in such a manner that all valves in the new water pipe sprinkler lines will be tested for watertight closure. Valves may be tested in groups or singly while subjected to 150 psi water pressure for a period of not less than 60 minutes.

3. The second test shall be made by forcing air from the pipes with water and capping or plugging pipe risers. After the pipe risers have been plugged or capped, line valves shall be fully opened and the pipelines subjected to the full static water pressure for a period of not less than 120 minutes. (Pressure pipelines 150 psi).

4. The third test requires that lateral lines be tested at 100 psi for 120 minutes.

5. The fourth test requires that all pressure lines be tested at 120 psi for 24 hours.

6. Water lines and valves which show evidence of leakage or fail to be watertight shall be repaired or replaced. After all repairs or replacements have been made, the above tests shall be performed again.

C. Coverage Adjustment: When the sprinkler system is completed, the CONTRACTOR, in the presence of the ENGINEER, shall demonstrate coverage of water onto the lawn and planting areas. The CONTRACTOR shall furnish all material and perform all WORK required to correct any inadequacies of coverage disclosed. The CONTRACTOR shall inform the ENGINEER of any deviation from the Drawings required due to wind, planting, soil, or Site conditions that bear on proper coverage.

1. Upon completion of each phase of the WORK, the CONTRACTOR shall check and adjust each sprinkler head to meet the Site requirements of the Contract Documents.

1.4 SCHEDULING AND COORDINATION

A. The CONTRACTOR shall be responsible for making arrangements for the coordination of its construction operations with those of all others on the Site. The CONTRACTOR shall permit others engaged in work on the Site to accomplish their work without undue interference or delay.

B. The CONTRACTOR shall be responsible for the scheduling and coordination of the electrical and water connections and the installation of the piping and equipment in a manner that will effect the earliest completion of the WORK in conformance with the construction progress schedules.

1.5 SPECIAL CORRECTION OF DEFECTS REQUIREMENTS

A. The CONTRACTOR shall repair any settling of backfilled trenches occurring during a one year period after final acceptance without expense to the OWNER including complete restoration of all damaged planting, paving, or other improvements of any kind.

B. When defective material or workmanship is discovered which will require repair or replacement, such repair or replacement shall be completed by the CONTRACTOR within 3 Days after written notification of such required repair is given by the OWNER.

However, if the CONTRACTOR fails to comply after notification is given, the OWNER will proceed to have the repairs made by others at the CONTRACTOR's expense.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Equipment Compatibility: Controller and automatic control valves shall be products of the same manufacturer and have similar operational and adjustment features.

2.2 PLASTIC PIPE AND FITTINGS

A. Pipe shall be continuously and permanently marked with the manufacturer's name, nominal pipe size, PVC type, pressure rating, and extrusion date. Pipe shall be as recommended for the intended application.

B. Lateral lines shall be PVC SDR 21, Class 200, NSF approved.

C. Piping upstream from remote control valves and quick coupling lines shall be PVC SDR 21, Schedule 40, NSF approved, Joints on PVC piping larger than 3 inches diameter shall be O-ring type flexible couplings and on size 3 inches and smaller shall be solvent welded.

D. Fittings shall be PVC Schedule 40, Type II, NSF, or Schedule 80 as indicated.

E. Swing joint ells shall be Schedule 80 PVC. Flexible riser shall be 1/2-inch in size.

F. Teflon thread tape sealant shall be 3/4-inch wide.

G. Emitter lines shall be **PEPCO, Rainbird tubing, or** equal.

2.3 VALVES

A. Main shut-off valves shall be ¼ turn brass ball valves per Section 433018.

B. Isolation valves for main lines shall be bronze ball valves per Section 433018.

C. Remote Control Valves: Remote control valves for the irrigation system shall conform to the following requirements:

1. Control valves shall be bronze valves, for 24 volt electrically-controlled solenoids, ac or dc operation. They shall be of heavy cast-bronze construction with cross or slotted type wheel for operation with key, and bleed fitting. Valves shall be operable electrically and manually.

2. Each remote control valve shall be housed in a valve box marked "IRRIGATION VALVE." The box shall be of adequate size and be set in clean gravel.

3. Control valves shall be by the same manufacturer as the controller.

D. Backflow Preventer: Provide a connection to the pumping station potable water service and provide a 2 inch ball valve and 2 inch reduced pressure zone type backflow preventer with wye strainer and ball isolation valves as shown on the Plan details.

2.4 AUTOMATIC CONTROLLER

A. Controllers shall be digital electrically-timed devices for automatically opening and closing remote control valves. Controllers and remote control valves shall be of the same manufacturer and have similar operational and adjustment features. Controllers shall be the most recent models of the manufacturer, still in normal production.

B. Controller(s) shall be single-phase, 115 volt AC operated and shall be provided with an On-Off switch and fuse assembly. Controller(s) shall be equipped with a transformer to reduce voltage to the 24 volt control valves.

C. Controllers shall have the following features:

1. The controller shall be of a hybrid type that combines electro-mechanical and microelectronic circuitry capable of fully automatic or manual operation.

2. The controller shall be housed in a wall-mountable, weather resistant plastic cabinet located inside electric room as shown on the drawings.

3. The controller shall have a fixed station capacity of four, six or eight stations.

4. The controller shall have a graphic based user interface.

5. The controllers shall have an LCD display that is capable of displaying each zone's irrigation scheduled watering days, start times, and run times in the same screen.

6. Station timing shall be from 0 minutes to 199 minutes.

7. The controller shave have independent zone-based scheduling allowing each valve to be scheduled independently.

8. The zone schedules shall have the capabilities of different start times, watering day cycles, and zone run times.

9. Each zone shall have up to six start times per day that are independent of each other.

10. The controller shall incorporate a rapid programming function which automatically copies the start times and watering days from Zone 1 to all remaining zones at the initial set up of the controller.

11. The controller shall have the capabilities of copying a previous zone to another for faster initial setup and more reliable programming.

12. The controller electrical specifications shall be 120 VAC± 10% at 60Hz. Output: 24 VAC 650mA.

13. Power back-ups: 2 x AAA batteries maintain time and date while nonvolatile memory maintains the programming. The controller shall be programmable under battery power.

14. The controller shall have a mechanism to indicate to the user when AC-power is not present when running on the batteries.

15. The controller shall have a 365-day calendar with leap year intelligence. The leap year intelligence allows the use of “Odd” or “Even” day watering schedule without changing the date on leap years.

16. Shall have four irrigation cycle modes for maximum flexibility and compliance to all major watering restrictions.

17. Custom 7-day calendar cycle

18. 1-14 day (Cyclic)

19. Odd cycle

20. Even cycle

21. Shall include non-volatile (100 year) program memory to maintain the irrigation schedule during a power outage or if unwanted schedule changes are made.

22. The controller shall have a seasonal adjust feature which adjust the run time for all zones from -90% to +100% in increments of 10%. Seasonal adjust shall effect all programs simultaneously.

23. The controller shall have a 12-hour AM/PM or 24 hour military (for 230VAC models) clock with a midnight day change over.

24. The controller shall have a weather sensor input with software override.

25. All stations shall have the capability of independently obeying or ignoring the weather sensor.

26. Shall include a diagnostic self-setting circuit breaker that identifies a valve or wire fault and continues to water operable stations.

27. The controller shall offer manual watering of all zones sequentially or one zone at a time.

28. When manual watering is activated; the unit shall ignore the status of the weather sensor (if connected) and re-enable the sensor when manual watering is completed.

29. The controller shall have default settings that allow the contractor to set his/her own default program.

D. Controls and controller shall be manufactured by Rainbird or Toro, or equal.

2.5 RAIN SENSOR

A. Provide an adjustable stainless steel sensing probe(s) to trigger rain shutoff of the irrigation system with as little as 1/8" of precipitation or when rainfall reaches or exceeds 1/2". Provide a rain collector pan that can be removed for cleaning for sensing where evaporation in the pan is faster than soil moisture to permit watering if required. Provide an electronic design that eliminates micro switches and water absorbing disks which may rust and/or wear out. Provide unit of UV resistant plastic construction suitable for outdoor exposed environment. Provide unit(s) compatible with controller to automatically interrupt watering cycle when rainfall exceeds pre-selected level with automatic return to normal watering.

2.6 SPRINKLER HEADS

A. Sprinkler heads shall conform to the standards indicated.

B. Rotor pop-up sprinklers shall be gear driven rotary heads. Rotation shall be accomplished by a sealed, oil packed gear assembly isolated from the water supply. The sprinkler housing shall be of high impact molded plastic with a 3/4-inch NPT connection. The sprinkler shall be capable of installation at grade level. Heads shall have adjustable arc increments. Provide Rainbird, Toro, Hunter, or equal.

C. Spray heads shall be pop-up design, full or part circle, fixed spray sprinklers designed for in-ground installation. The sprinkler shall have a riser screen filter to prevent entry of foreign material to the nozzle. All parts shall be removable through the top of the sprinkler case. Sprinkler shall have a stainless steel retraction spring. Provide Rainbird, Toro, Hunter, or equal.

D. Bubblers shall be a pressure compensating type with a “trickle” pattern or an “umbrella” pattern discharge. The bubbler assembly shall have a plastic inlet filter screen to protect the nozzle against clogging. Pressure compensating bubblers shall be of a permanently assembled design constructed of durable, UV resistant plastic with an integral rubber flow washer for regulating the flow rate at an operating pressure range. The bubbler shall have a 1/2" NPT inlet for connection to the piping system riser. Provide Rainbird, Toro, Hunter, or equal.

2.7 CONTROL WIRING

A. Control wiring shall be Standard UF Direct Burial Copper Wire, Type UF Bearing, UL approved for direct underground burial in National Electrical Code Class II circuits, AWG sizes.

B. Conductors shall be grade copper meeting ASTM B 3 - Soft or Annealed Copper Wire.

C. Splices shall be made with wire connectors, such as manufactured by Rainbird, Scotch Lock, or equal.

2.8 PVC SOLVENT CEMENT AND PRIMERS

A. Solvent cement shall be NSF approved and shall meet requirements of ASTM D 2564 - Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings.

B. Primer shall be NSF approved and shall be Weld-On, P-70 Industrial Polychemical Service, or equal.

2.9 WORM GEAR CLAMPS

A. Worm-gear clamps shall be stainless steel.

2.10 VALVE AND CONTROLLER BOXES

A. Boxes for valves and controllers shall be heavy duty fiber glass, PVC, or concrete and shall be complete with lid. Boxes shall be sized for equipment within box, depth of installation, and operation and maintenance space required. Lid shall be labeled “IRRIGATION.”

2.11 SPARE PARTS

A. Furnish the following:

1. Four control valve operating keys.

2. Two keys for locking automatic controller door.

PART 3 -- EXECUTION

3.1 EXISTING CONDITIONS

A. Prior to trenching, the CONTRACTOR shall locate all cables, conduits, sewers, septic tanks, and other such underground utilities, and shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed WORK, the CONTRACTOR shall promptly notify the ENGINEER.

B. The CONTRACTOR shall be responsible for coordinating its work with the operation of existing utilities and new utilities on the Project. The CONTRACTOR shall notify the ENGINEER or its representative when operating utilities require shut-off.

C. Any irrigation piping that is shown on the Plans is schematic and representative in nature. The CONTRACTOR is responsible for the complete design of the piping system, layout of irrigation zones, number and location of spray heads and bubbles, number and location of control valves, including all offset fittings, appurtenances and the like which may be required. The CONTRACTOR shall carefully investigate the structural and finished conditions affecting all its WORK, and plan accordingly, providing such fittings, etc., as may be required to meet such conditions. The WORK shall be installed in the most direct and workmanlike manner, so that conflicts between sprinkler systems, planting, structures, and piping, will be avoided.

D. The CONTRACTOR shall verify the water pressure available at the Site before installation of the system to make sure there is adequate pressure (minimum design pressure at the connection to the potable water service is estimated as 30 psig) to properly operate sprinkler heads and valves. If the pressure at Site or any other job condition will create problems that will prevent proper operation of the irrigation system, the ENGINEER shall be notified before commencement of any WORK. Minor additions and adjustments of heads, piping, and circuits shall be made at no additional cost to OWNER where it is necessary to make the irrigation system operate properly.

3.2 EXECUTION - GENERAL

A. Installation of the irrigation system shall be performed after the finish grading, but prior to landscaping.

B. Valves, fittings, heads, and piping shall be installed as required and all connections made to permit the irrigation system to function properly through its entire length.

C. Materials and equipment shall be installed in strict accordance with manufacturer's written instructions and recommendations and all local and state codes, laws, ordinances, and regulations.

D. Before proceeding with the installation of any section or unit of the irrigation system, the CONTRACTOR shall check and verify the correlation between ground measurements and Drawings and shall advise the ENGINEER of any discrepancies.

3.3 EXCAVATION

A. Trenches shall be dug as wide and as deep as necessary to properly install the irrigation lines. Width shall allow for proper tamping of backfill around the pipe.

B. Pipe trenches shall be straight or "snaked" slightly allowing for expansion and contraction of PVC pipe.

C. Subsoil shall be kept separate from topsoil, where possible.

D. Minimum cover depth shall be:

1. Supply pressure lines from water source to control valves: 24 inches unless otherwise indicated.

2. Lateral lines from control valves to sprinkler heads; 18-inches unless otherwise indicated. Lateral lines under paving, roadways, and driveways shall have 24 inches of cover and be located in Schedule 40 PVC sleeves.

3. Trenches for control wire only shall be 18 inches deep unless otherwise indicated. Control wires under concrete walks and slabs, paving, roadways, and driveways shall be installed in Schedule 40 PVC sleeves.

3.4 PIPING -GENERAL

A. Piping shall be laid out and installed in accordance with manufacturer's printed recommendations and industry standards. Substantial support shall be provided at all points, and pipes shall be snaked slightly allowing for expansion and contraction.

B. Minimum one-inch vertical clearance shall be between lines crossing at angles greater than 45 degrees.

C. Horizontal and vertical clearances between all lines shall be minimum 3 inches.

D. Swing or swivel joints shall provide a leak-resistant joint with freedom of movement.

E. Teflon thread sealant shall be used at threaded joints.

F. Pipe sleeves shall be provided under all paving and where necessary for passage under finish surface material, future replacement, and for protection of PVC piping and control wire. Pipe sleeves shall extend at least 12 inches beyond the edge of pavement.

3.5 PLASTIC PIPE

A. The plastic pipe sections shall be placed accurately to line and grade in the prepared trenches. The inside of all pipe shall be clean and free from foreign matter and shall be end-reamed to remove burrs and provide full inside diameter of the pipe end.

B. Pipe shall have a firm, uniform bearing for the entire length of each pipeline to prevent uneven settlement. Adjustments to grade shall be made by scraping away or filling in

with clean earth backfill material, well compacted under the body of the pipe. Wedging of pipe will not be permitted. The inside of pipe shall be clean and free from foreign materials before joints are assembled.

C. Open pipe ends where the WORK has been stopped shall be closed at the end of each day's construction work with a suitable temporary plug to prevent entrance of any foreign materials into the assembled pipeline.

D. Pressure pipe shall be defined as all piping lying "upstream" from remote control valves and quick-coupling lines.

E. O-Ring type flexible coupling pipe shall be used on pressure pipes larger than 3 inches diameter.

F. Three-inch and smaller mainlines and fittings of pressure piping shall be solvent-weld type.

G. Pressure piping 3 inches and larger shall be provided with portland cement concrete thrust blocks. Thrust blocks shall be constructed at the following places:

1. Where pipe changes direction at fittings.

2. Where pipe changes size.

3. Where line terminates.

4. Around gate valves (bottom half of valve in concrete; bolts exposed for change of top half).

H. Thrust blocks shall be constructed of 2000 psi concrete, as follows:

THRUST BLOCKS

Pipe Size	Minimum Square Feet of Bearing Area			
	Dead Ends, Tees, or Valves	90 Degree Bends	45 Degree Bends	22-1/2 Degree Bends or Less
3-inches	1.1	1.5	0.8	0.4
4-inches	2.0	2.7	1.5	0.7

I. The areas given in the table shall be measured in a plane perpendicular to the longitudinal axis of the pipe or to the longitudinal axis of the thrust developed. The thrust block bearing area shall be against undisturbed ground.

3.6 VALVES

A. Valves shall be the full size of the line in which they are installed, unless otherwise indicated.

B. Remote control valves shall be enclosed in valve boxes: up to 3 valves may be installed in one box if dimensions permit. Valves shall be adjusted so the most remote sprinkler heads operate at the pressure recommended by the head manufacturer and so a uniform distribution of water is applied by the sprinkler heads to the planting areas. A metal union shall be provided on the discharge side of the control valve.

C. Drain valves shall be installed at low points along the main. It shall be the CONTRACTOR's responsibility to see that the main drains properly.

3.7 SPRINKLER HEADS

A. Bubblers shall be on independent zones. Drip lines shall be on independent zones. Spray heads shall be on independent zones. Rotary heads shall be on independent zones.

B. Nozzles on sprinklers shall be tightened after installation. Sprinklers having an adjustment stem shall be adjusted on a lateral line for the proper radius diameter and/or flow rate.

C. Sprinkler heads shall be set perpendicular to finished grades and at finish ground level unless otherwise indicated.

D. Bubblers shall be coordinated with actual field placement of trees and shrubs as directed by the ENGINEER.

E. The sprinkler system shall be thoroughly flushed as so to remove all possible foreign matter prior to installation of the sprinkler heads.

F. The CONTRACTOR shall protect against re-entry of contaminated water into risers or piping. After flushing, the CONTRACTOR shall immediately install sprinkler heads or cap risers until sprinkler heads are installed.

3.8 CONTROLLERS

A. Controller location on the Drawings is essentially diagrammatic, and the actual installation shall be as specifically located by the ENGINEER.

B. Applicable codes shall be followed in providing a 115 volt electrical service to the controller.

C. The controller shall be wall-mounted inside the electric room at a height above grade so that all normal adjustments can be conveniently reached by the operator while in a standing position.

D. The CONTRACTOR shall properly ground the control boxes to copper ground rods driven into the ground.

E. The CONTRACTOR shall design and ENGINEER approve the timing, sequence, and period for the controller.

3.9 WIRING

A. Electrical equipment and wiring shall comply with applicable codes and shall be installed by those skilled and licensed in the trade.

B. The CONTRACTOR shall provide low voltage, 24 volt direct burial wires of not less than No. 14 AWG. Where sizes are not indicated, they shall be sized per wire manufacturer's sizing charts and specifications.

C. The CONTRACTOR shall provide all wiring, conduits, sleeves, and connection for the low voltage electrical system between controller and valves where indicated and necessary for a complete and operable irrigation system.

D. Wires shall be color coded as follows:

1. Control wires shall be red.

2. Ground (neutral) wire shall be white.

E. Splices shall be moisture proof using appropriate electrical connectors.

F. Wires shall be bundled together and wrapped with PVC tape at 5-foot intervals. They shall be buried in same trench as the pipe where possible.

G. An expansion curl shall be provided within 3-feet of each wire connection and at least every 100-ft of wire length on runs more than 100-feet in length. Expansion curls shall be formed by wrapping at least 5 turns of wire around a one-inch pipe or more in diameter, then withdrawing pipe.

H. Conduits and sleeves necessary for running wires under concrete, walks, and paving shall be provided before concrete, walks, and paving work is constructed. Changes in conduit and sleeve direction under paving shall be made with sweep ells.

I. Wire shall be continuous without splices except at control valves, and shall be routed in main line trench whenever possible.

3.10 PIPE TRENCH BACKFILL

A. Bottom of trenches shall be smooth and free of sharp rocks and other objects that may damage pipe.

B. Backfill material shall be free of rocks and other materials that may damage the piping.

C. The initial backfill shall be accomplished by carefully tamping selected material (from material excavated from the trench) under the pipe and between the pipe and the trench walls.

D. The pipes shall be filled with water and pressurized during backfilling operations if necessary, to prevent drainage into piping.

E. The backfill shall be carefully installed around and over the pipe to approximately 10 inches of the ground surface, then water shall be allowed to flow in the trench. After this puddling operation has been completed and allowed to stand for 24 hours, the balance of the materials shall be placed in the trench to the sub-grade line, leaving room for topsoil. The backfill shall be compacted carefully and thoroughly.

F. Couplings and fittings shall be left exposed until leakage tests have been completed, unless the ENGINEER orders otherwise.

G. Topsoil shall be installed prior to planting.

3.11 TESTING AND ADJUSTMENTS

A. The sprinkler heads shall be adjusted and balanced for optimum and uniform coverage without excessive fogging and overthrow on walks, paving, and structures. The height and elevations of risers and sprinkler heads shall be adjusted.

B. Following adjusting and balancing of the sprinkler heads, an operating test of the entire system shall be performed by the CONTRACTOR in the presence of the ENGINEER at normal operating pressures. The test will be considered as acceptable if the system operates in a satisfactory manner providing uniform coverage of irrigated areas for a one week period of automatic operation with no leaks.

3.12 INSTRUCTION

A. The CONTRACTOR shall, upon completion of the maintenance period of the irrigation system, instruct the OWNER and the OWNER's personnel as to the proper operation and maintenance of the system.

- END OF SECTION -

SECTION 339220 - DUCTILE IRON PIPING (AWWA C151, MODIFIED)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide ductile iron pipe and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

AWWA C104	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105	Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110	Ductile-Iron and Gray-Iron Fittings, 3 in through 48 in for Water
AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
AWWA C150	Thickness Design of Ductile-Iron Pipe
AWWA C151	Ductile-Iron Pipe, Centrifugally Cast for Water
AWWA C153	Ductile-Iron Compact Fittings for Water Service
AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances
ASTM C 150	Portland Cement

1.3 CONTRACTOR SUBMITTALS

A. Furnish Submittals in accordance with Section 013300 - Contractor Submittals and the following supplemental requirements:

B. Shop Drawings

1. Certified dimensional drawings of valves, fittings, and appurtenances.

2. For pipe 24 inches diameter and larger, line layout and marking diagrams which indicate the specific number of each fitting and the location and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at changes in grade or horizontal alignment; elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of restrained joints, or of concrete encasement.

C. Certifications: Certified affidavit of compliance for pipe and other products or materials furnished under this Section and as specified in the referenced standards and the following supplemental requirements:

1. Physical and chemical properties.

2. Hydrostatic test reports.

D. The CONTRACTOR shall be responsible for performing and paying for sampling and testing as necessary for the certifications.

1.4 QUALITY ASSURANCE

A. Tests: Except as modified herein, materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.

B. The CONTRACTOR shall perform said material tests as part of the WORK. The ENGINEER shall have the right to witness testing conducted by the CONTRACTOR; provided, that the CONTRACTOR's schedule is not delayed for the convenience of the ENGINEER.

C. In addition to those tests specifically required, the ENGINEER may request additional samples of any material including lining and coating samples for testing by the OWNER. The additional samples shall be furnished as a part of the WORK.

D. Inspection: Pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein. The CONTRACTOR shall notify the ENGINEER in writing of the manufacturing starting date not less than 14 Days prior to the start of any phase of the pipe manufacture.

E. During the manufacture of the pipe, the ENGINEER shall be given access to areas where manufacturing is in process and shall be permitted to make inspections necessary to confirm compliance with the Specifications.

PART 2 -- PRODUCTS

2.1 PIPE GENERAL

A. Mortar-lined and polyethylene-wrapped ductile iron pipe shall conform to AWWA C151, C104, and C105, subject to the supplemental requirements in this Section. The pipe shall be of the diameter and class indicated, shall be provided complete with rubber gaskets, specials, and fittings as required under the Contract Documents.

B. Markings: The CONTRACTOR shall legibly mark specials 24 inches diameter and larger in accordance with the laying schedule and marking diagram. Each fitting shall be marked at each end with top field centerline.

C. Handling and Storage: The pipe shall be handled as a minimum at the 1/3 points by use of wide slings, padded cradles, or other devices designed and constructed to prevent damage to the pipe coating/exterior. The use of chains, hooks, or other equipment that might injure the pipe coating/exterior will not be permitted. Stockpiled pipe shall be supported on padded skids, sand or earth berms free of rock exceeding 3 inches

diameter, sand bags, or suitable means so that the coating will not be damaged. The pipe shall not be rolled and shall be secured to prevent accidental rolling

D. Laying Lengths: Nominal pipe laying lengths shall be 20 feet.

E. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing, and roughness.

F. Closures and Correction Pieces: Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing on the Drawings. The locations of correction pieces and closure assemblies are indicated. Any change in location or number of said items shall only be as accepted by the ENGINEER.

2.2 SPECIALS AND FITTINGS

A. Fittings for ductile iron pipe shall conform to the requirements of AWWA C153 or AWWA C110 and shall have a minimum pressure rating of 250 psi. Ductile iron fittings larger than 48 inches shall conform to AWWA C153.

2.3 DESIGN OF PIPE

A. The pipe shall be designed, manufactured, tested, inspected, and marked according to AWWA C150 and C 151 except where modified by this Section.

B. Pipe Dimensions: The pipe shall be of the diameter and class indicated.

C. Fitting Dimensions: The fittings shall be of the diameter and class indicated.

D. Joint Design: Ductile iron pipe and fittings for buried pressure service shall be furnished with push on or manufacturer's restrained joints, unless otherwise indicated. Ductile iron pipe and fittings for buried gravity service shall be furnished with mechanical joints or push-on joints as required, unless otherwise indicated. Above ground ductile iron pipe and fittings joints shall be as indicated. Flanged joints shall be furnished where required.

1. Push On Joint Pipe:

a. Push-on joint pipe shall be supplied with all joint accessories. Accessories shall include gaskets and lubricant in sufficient quantity for the proper assembly of each joint. Gaskets for push-on joints shall be made of ethylene propylene diene monomer (EPDM) rubber. All plain ends shall be painted with a circular stripe on the pipe barrel to allow a visual means of checking proper assembly.

b. All push-on joints shall be in accordance with ANSI/AWWA C-111, latest revision.

c. Pressure Class: 4-inch to 16-inch diameter pipe shall be minimum Pressure Class 350. Pipe greater than 16-inch diameter shall be minimum Pressure Class 250.

2. Mechanical Joint Pipe:

a. Mechanical joint pipe shall be supplied with all joint accessories. Accessories shall include lubricant, gaskets, ductile iron glands, bolts, and nuts, all in sufficient quantity for the assembly of each joint. The bolts and nuts shall be

manufactured of high-strength, low-alloy steel such as "Corten", "Usalloy", or "Acipalloy". The follower gland shall be ductile iron. Gaskets for mechanical joints shall be made of ethylene propylene diene monomer (EPDM) rubber.

b. All mechanical joints shall be in accordance with ANSI/AWWA C-111, latest revision

c. Pressure Class: 4-inch to 16-inch diameter pipe shall be minimum Pressure Class 350. Pipe greater than 16-inch diameter shall be minimum Pressure Class 250.

3. Flexible Joint Pipe:

a. Flexible-joint pipe shall be push-on, ball-and-socket, freely deflecting, and restrained using a corrosion resistant locking device. Thickness class shall be as follows:

Pipe Diameter	Minimum Thickness Class
6	54
8	55
12	56
16	57

b. The joint shall be capable of a full 15 degree free deflection with no reduction in the waterway.

4. Manufacturer's Restrained Push On Joints:

a. Joints shall be push-on in accordance with ANSI/AWWA C-111/A21.11. Joints shall be secured by wedged locking shims or a follower gland which shoulder against a retaining ring permanently fastened to the spigot end of the pipe within the joint. Gaskets for manufactured restrained pipe joints shall be made of EPDM rubber.

b. Pressure Class: 4-inch to 16-inch diameter pipe shall be minimum Pressure Class 350. Pipe greater than 16-inch diameter shall be minimum Pressure Class 250.

5. Flanged Joint Pipe:

a. Flanged joints shall conform to AWWA C115. Where threaded flanges are provided, the pipe wall thickness under the cut threads shall not be less than the calculated net thickness required for the pressure class of the pipe. The flanged pipe shall be ductile iron domestically manufactured in accordance with ANSI/AWWA C-151/A21.51 and the National Association of Pipe Fabricators (NAPF) Product Standard 300, latest revisions, in nominal 18 or 20 foot laying length. The pipe shall be minimum Special Thickness Class 53 rated for a maximum working pressure of 250 psi, per ANSI/AWWA C-115/A21.15, latest revision.

b. All flanges shall be ductile iron and shall be manufactured and installed on the ductile iron pipe in accordance with ANSI/AWWA Standard C-115/A21.15, and the National Association of Pipe Fabricators (NAPF) Product Standard 300-01,

latest revisions. Bolt circle and bolt holes shall be drilled and faced to match American National Standards Institute (ANSI) B16.1, Class 125 Flanges. All necessary hex-head bolts and nuts, and full-faced gaskets for each joint size shall be furnished as a Flange Accessory Package. Bolts and nuts shall be high-strength, low-alloy steel such as "Corten", "Usalloy", or "AciPalloy". Gaskets shall be made from EPDM rubber. Provide Type 316 stainless steel nuts and bolts for buried flanged pipe or flanged pipe located in valve or meter vaults.

c. Plain ends of flange ductile iron pipe shall be slightly beveled for use in a push-on joint assembly. A circular stripe painted on the pipe barrel shall be provided as a visual means of checking proper assembly when used in a push-on joint.

d. All pipe interiors shall be lined with standard thickness cement mortar in accordance with ANSI/AWWA C-104/A21.4 latest revision. All pipe exterior surfaces shall be coated as specified in ANSI/AWWA C-151/A21.51, latest revision.

6. Manufacturers:

a. All ductile iron pipe, unless specified below, shall be by U.S Pipe, American Cast Iron Pipe Company, McWane Cast Iron Pipe Company, Griffin Pipe Products Company, or approved equal.

b. Flexible Joint pipe shall be American Ductile Iron “Flex-Lok Boltless Ball Joint Pipe", U.S. Pipe “USI FLEX Boltless Flexible Joint Pipe", Griffin Pipe Products “Snap-Lok River Crossing Pipe”, or approved equal.

c. Manufactured restrained joint pipe shall be American Ductile Iron "Flexring", US Pipe "TR-Flex", McWane Cast Iron Pipe Company "Super-Lock" (20-inch and 24-inch pipe) and "Thrust-Lock" (30" and 36" pipe), and Griffin Pipe Products "Snap-Lok", or approved equal.

d. All flanged ductile iron pipe shall be domestically manufactured by U.S. Pipe, American Cast Iron Pipe Company, McWane Cast Iron Pipe Company, or approved equal

e. All ductile iron pipe shall be domestically manufactured in the United States.

7. Joint Restraining Devices:

a. Flange Joint Restraint: Flange joint restraint fittings shall include all individually activated gripping wedges and gaskets. Flange joint restraint fittings shall attach to the plain end of a pipe by wedge screws to produce a flange which joins to an existing integral companion flange. Flange joint restraint fittings shall be constructed of ductile iron meeting ASTM A536 and manufactured in accordance with ANSI/AWWA C-110 and/or C-111, latest revision. All flanges shall have bolt circle and bolt holes which match a Class 125 flange and are compatible with ANSI/AWWA C-115/A21.15. Gasket shall be made of EPDM rubber.

b. Mechanical Joint Restraint: The wedge action follower glands shall be manufactured of ductile iron conforming to ASTM A536-80. The wedging lug and bolt shall be manufactured of ductile iron which has been heat-treated to a minimum hardness of 370 BHN.

c. Wedge action glands shall be dimensioned such that they can be used with standard mechanical joints and have tee-head bolts conforming to ANSI/AWWA C-111/A21.11 and ANSI/AWWA C-153/A21.53, latest revision.

d. Existing Pipe Restraint:

1) Split-restraint fittings for mechanical joints on existing pipe installations shall be manufactured in accordance with these technical specifications; however, split-restraint fittings shall be segmented to allow restraint of existing ductile iron mechanical joints meeting AWWA C111.

2) Split-restraint fittings for existing pipe bell-and-spigot joints shall consist of split restraint rings, one installed on the pipe barrel behind the bell. Restraint devices shall be ductile iron per ASTM A536, latest revision, min. Grade 60-42-12. Threaded rods shall be high strength low-alloy steel per AWWA C111, latest revision.

e. Coatings

1) Flange Adapters shall be provided with painted "shop coat", or approved equal.

2) Retainer glands shall be provided with a bituminous coat.

3) Existing pipe push-on joint restraint fittings shall be provided with a bituminous coat.

f. Quality Control and Testing

1) Pipe restrained with mechanical restraint devices specified shall be capable of withstanding the following pressures:

2) Push-on and Mechanical Joint Pipe 4-inches to 16-inches diameter: min. 350 psi

3) Push-on and Mechanical Joint Pipe -greater than 16-inches diameter: min. 250 psi

4) Flanged Joint Pipe -4-inches to 36-inches diameter: min. 250 psi

5) Burst pressure tests shall be performed as specified in ANSI/AWWA111/A21.11, latest revision.

6) Pipe restrained with retainer glands specified shall be capable of withstanding twice the rated pressure of the restraint device for five minutes with no leakage or movement

g. Manufacturer:

1) Ductile iron pipe flange joint restraint devices shall be approved, equal to, or better than EBAA Iron “Megaflange Series 2100” or “1000 EZ Flange”, or Ford Meter Box Company “Uni-flange Series 400-C”.

2) Wedge action restraint for ductile iron pipe mechanical joints shall be equal to or better than EBAA Iron “Megalug, Series 1100”, Sigma One-Lok Model SLD (4" to 36") or approved equal.

3) Split, wedge-action restraints devices for restraint of existing pipe and fitting joints shall be approved, equal to, or better than EBAA Iron “Megalug, Series 1100SD, or HD”, or approved equal.

E. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself, will provide watertight joints under all operating conditions when properly installed. The CONTRACTOR shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

2.4 CEMENT-MORTAR LINING

A. Cement-Mortar Lining for Shop Application: Except as otherwise provided herein, interior surfaces of ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with AWWA C104 and NSF 61. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found defective at the Site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

1. Cement: Cement for mortar lining shall conform to the requirements of AWWA C104; provided, that cement for mortar lining shall be Type II or V. Cement shall not originate from kilns that burn metal-rich hazardous waste fuel, nor shall a fly ash or pozzolan be used as a cement replacement.

B. The minimum lining thickness shall be as follows:

Nominal Pipe Diameter, inches	Minimum Lining Thickness, inches
3 - 12	1/16
14 - 24	3/32
30 - 64	1/8

C. Protection of Pipe Lining/Interior: Shop-applied cement mortar lining shall be given a seal coat of asphaltic material in conformance with AWWA C104.

2.5 EXTERIOR PROTECTION OF PIPE

A. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer conforming to the requirements of Section 099600 - Protective Coating.

B. Exterior Coating of Buried Piping: The exterior coating shall be an asphaltic coating approximately 1-mil thick in accordance with AWWA C-105.

C. Polyethylene Sleeve: Sleeves shall conform to the requirements of AWWA C105, Method A, tubular 8-mil thick linear low-density film. Color shall be blue. Provide encasement of domestic manufacture.

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE

A. The CONTRACTOR shall inspect each pipe and fitting prior to installation to insure that there are no damaged portions of the pipe. Pipe damaged prior to Substantial Completion shall be repaired or replaced by the CONTRACTOR.

B. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of pipes and fittings in the trench shall be closed during any interruption to the WORK.

C. Pipe Laying: The pipe shall be installed in accordance with AWWA C600.

D. Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

E. Each section of pipe 24 inches diameter and larger shall be laid in the order and position shown on the laying schedule. Each section shall be laid to the line and grade, within approximately one-inch plus or minus.

F. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the ENGINEER may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75 percent of the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of the finished joint.

G. Except for short runs that may be permitted by the ENGINEER, pipes shall be laid uphill on grades exceeding 10 percent. Pipe that is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement. Bends shall be properly installed as indicated.

H. Pipe and Specials Protection: The openings of pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

I. Pipe Cleanup: As pipe laying progresses, the CONTRACTOR shall keep the pipe interior free of debris. The CONTRACTOR shall completely clean the interior of the pipe of sand, dirt, mortar splatter, and any other debris following completion of pipe laying

and shall perform any necessary interior repairs prior to testing and disinfecting the completed pipeline.

3.2 RUBBER GASKETED JOINTS

A. Rubber Gasketed Joints: Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket shall be placed in the bell groove. The spigot end of the pipe and the inside surface of the gasket shall be carefully cleaned and lubricated. The lubricant shall be suitable for lubricating the parts of the joint for assembly and be a compound listed as in compliance with NSF Standard 61. The lubricant shall be nontoxic, shall not support the growth of bacteria, and shall have no deleterious effects on the gasket material. The lubricant shall not impart taste or odor to water in the pipe. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

3.3 POLYETHYLENE SLEEVE UNBONDED PROTECTION

A. Buried ductile iron pipe shall be polyethylene encased in accordance with the requirements of AWWA C105, Method A.

3.4 INSTALLATION OF PIPE APPURTENANCES

A. Protection of Appurtenances: Where pipe is encased in polyethylene sleeves, buried appurtenances shall be encased in polyethylene.

B. Installation of Valves: Valves shall be handled in a manner to prevent any injury or damage to any part of the valve. Joints shall be thoroughly cleaned and prepared prior to installation. The CONTRACTOR shall adjust stem packing and operate each valve prior to installation to insure proper operation.

C. Valves shall be installed so that the valve stems are plumb and in the location indicated.

- END OF SECTION -

SECTION 339534 – LARGE POLYETHYLENE PRESSURE PIPING (AWWA C906, MODIFIED)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide high density polyethylene (HDPE) pressure pipe, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 In Through 63 In, for Water Distribution and Transmission
ASTM D 3350	Polyethylene Plastics Pipe and Fittings Materials

1.3 CONTRACTOR SUBMITTALS

A. Furnish Shop Drawings of pipe, fittings, and appurtenances in accordance with Section 013300 - Contractor Submittals.

B. Certifications: Furnish a certified affidavit of compliance for pipe and other products or materials furnished under this Section meet all hydrostatic and acceptance tests as set forth in AWWA C906, latest editions, including:

1. Hydrostatic proof test reports.

2. Sustained pressure test reports.

3. Burst strength test reports.

C. Expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR as part of the WORK.

1.4 QUALITY ASSURANCE

A. Each manufacturer shall have an approved in-house QA/QC program for compliance to the testing specifications and requirements of AWWA C906 for both pipe and fittings.

B. Inspection: Pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards as supplemented by the requirements herein. The CONTRACTOR shall notify the ENGINEER in writing of the manufacturing start date not less than 14 calendar days prior to the start of any phase of manufacture.

C. During manufacture of the pipe, the ENGINEER shall be given access to areas where manufacturing is in process confirm compliance with the Specifications.

D. Tests: Except as modified herein, materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section and in the referenced standards, as applicable.

E. The CONTRACTOR shall perform said material tests in accordance with the requirements of the Contract Documents. The ENGINEER shall have the right to

witness testing conducted by the CONTRACTOR, provided that the CONTRACTOR's schedule will not be delayed for the convenience of the ENGINEER.

F. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the OWNER. The additional samples shall be furnished as part of the WORK.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Scope: The pipe shall have nominal sizes as shown on the Plans, meeting the specifications and requirements of AWWA C 906. Pipe shall be in ductile iron pipe sizes (DIPS).

B. Materials: Pipe and fittings shall be made of materials conforming to polyethylene code designation PE 3408, with a minimum cell classification of 334434C.

C. Pipe and Fittings: The pressure rating shall be 160 psi, DR 11.0. Laying lengths shall be 40-ft standard. Both pipe and fittings shall be listed as compliant with NSF Standard 61 and shall bear the "NSF-pw" logo or mark.

D. Joints: Pipe sections shall be joined by heat fusion.

E. Marking: Pipe and fittings shall be permanently blue coded to provide water main identification. When pipe is striped, stripes shall be blue, along the entire outside length of the pipe 90 or 120 degrees apart, and shall be made by co-extrusion or impregnation. Fully colored bleu pipe co-extruded from permanently pigmented HDPE is also acceptable. Pipe markings shall include nominal size, OD base (ie: 12-inch ductile iron pipe sizing, DIPS), standard material code designation, dimension ratio, pressure class, AWWA C906, material test category of pipe, manufacturer's test code, manufacturer's name, manufacturer's production code including day, month, and year extruded, manufacturer's plant and extrusion line, and NSF - pw logo.

PART 3 -- EXECUTION

3.1 GENERAL

A. Laying, jointing, and testing for defects and for leakage shall be performed in the presence of the ENGINEER and shall be subject to approval before acceptance. All material found to be defective will be rejected and the CONTRACTOR shall promptly remove such materials from the Site.

B. Installation shall conform to AWWA M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements or modifications herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.

3.2 HANDLING AND STORAGE

A. Handling: Pipe, fittings, and accessories shall be carefully inspected before and after installation and those found defective will be rejected. Pipe and fittings shall be free from fins and burrs. Before placing in position, clean pipe, fittings, and accessories, and

maintain them in a clean condition. Proper methods shall be used for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings, or any other material be dropped or dumped into trenches.

B. Storage: Pipe shall be stored, if possible, at the Site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to the pipe. Pipe shall be stored in such a way as to prevent sagging or bending, and it shall be protected from exposure to direct sunlight by covering with an opaque material that allows adequate air circulation above and around the pipe. Gaskets shall be stored in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

3.3 TRENCHING AND BACKFILL

A. Trench excavation and backfill shall conform to Section 313000 - Earthwork.

3.4 JOINING

A. Prior to installation of any pipe, the manufacturer shall provide training in the recommended butt fusion and saddle fusion procedures, testing procedures, and any other installation methods required by the WORK. Training shall include the CONTRACTOR's installation personnel, an OWNER's representative, the ENGINEER's representative, and any other personnel chosen by the OWNER. The CONTRACTOR shall record the names of trained personnel.

B. On every day that butt fusion joints are to be made, the first fusion of the day shall be a test. The test fusion shall be allowed to cool completely, then fusion test straps shall be cut out. Test strap length shall be 12 inches (min) or 30 times the wall thickness with the fused area in the center and width shall be 1-inch (min) or 1.5 times the wall thickness. The CONTRACTOR shall bend the test strap until the ends of the strap touch. If the test strap fails at the joint, the CONTRACTOR shall perform a new test to be cooled completely and bent as before. The CONTRACTOR shall not commence installation of pipe until a test fusion has passed the bent strap test.

3.5 INSTALLATION

A. Trench shall be graded in straight lines, taking care to avoid formation of any dips or low points. Pipe shall not be laid when the conditions of trench or weather are unsuitable. At the end of each day's work, open ends of pipe shall be closed temporarily with wood blocks or bulkheads.

B. Pipe shall be cut by means of saws, power driven abrasive wheels, pipe cutters, or other manufacturer recommended methods that will produce a clean, square cut.

C. Pipe shall be supported uniformly and firmly at its proper elevation. Wood support blocking will not be permitted. The full length of each section of pipe and fittings shall rest solidly on the soil, with recesses to accommodate joints and couplings. Anchors and supports shall be provided where necessary and where indicated for fastening WORK into place. Fittings shall be independently supported.

D. Short lengths of pipe shall be used in and out of each rigid joint or rigid structure. Piping that does not allow sufficient space for proper installation of jointing shall be replaced.

E. Joints shall be installed according to manufacturer's recommendations. Trenches shall be kept free of water until joints have been properly made. The maximum combined deflection at any coupling shall be in accordance with the manufacturer's recommendations.

3.6 FIELD TESTING

A. Field testing shall conform to the requirements of Section 017430 - Pressure Pipe Testing and Disinfection.

- END OF SECTION -

SECTION 339540 - SMALL POLY VINYL CHLORIDE NON-PRESSURE PIPING, RUBBER JOINTS (ASTM D 3034, MODIFIED)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide PVC solid wall nonpressure pipe and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

B. This Section covers pipe from 4- to 15-inches diameter nominal size.

1.2 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings: The CONTRACTOR shall submit Shop Drawings and laying diagrams of pipe, joints, bends, special fittings, and piping appurtenances. Refer to Plans and City of Tampa Department of Sanitary Sewers (DSS) techncial standards and details for submittal requirements in addition to those specified herein.

C. Certificates: The CONTRACTOR shall submit manufacturer's certificate that pipe conforms to these specifications.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and minimum pipe stiffness in psi.

B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

2.2 PIPE

A. Pipe shall conform to the requirements of ASTM D 3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, SDR 26. Material for PVC pipe shall conform to the requirements of ASTM D 1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds, for cell classification 12454-B or 12454-C as defined therein. The manufacturer shall test a sample from each batch according to ASTM D 2444 - Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

B. Joints shall conform to ASTM D 3212 - Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals. Elastomeric seals for compression type joints shall conform to the requirements of ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe or ASTM F 913 - Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

2.3 FITTINGS

A. Fittings shall conform to the requirements of ASTM D 3034. The ring groove and gasket ring shall be compatible with PVC pipe ends. The flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.

B. The stiffness of the fittings shall be not less than the stiffness of adjoining pipe.

2.4 BEDDING MATERIAL

A. Unless otherwise indicated, material used for pipe bedding shall conform to City of Tampa DSS standards and Section 313000 - Earthwork.

2.5 FLEXIBLE COUPLINGS

A. Flexible couplings shall be neoprene, full-circle, clamp-on type conforming to ASTM C 425 - Compression Joints for Vitrified Clay Pipe and Fittings and provided with 2 stainless steel band screw-clamps to secure the coupling tightly to entering and exiting pipes. Screw-clamp hardware shall be Type 304 or Type 316 stainless steel. Neoprene material shall be suitable for sewage service.

PART 3 -- EXECUTION

3.1 TRENCHING AND BACKFILL

A. Trench excavation and backfill shall conform to the requirements of City of Tampa DSS standards and Section 313000 - Earthwork and the Drawings.

3.2 LAYING PIPE

A. Pipe shall be installed in accordance with the requirements of ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications and as indicated. Pipe sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for jointings, the bedding for the pipe shall be checked for firmness and uniformity of slope.

B. Handling

1. Handling of the PVC pipe shall be done with implements, tools, and facilities as recommended by the pipe manufacturer to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.

2. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

3. Fittings shall be lowered into trench by means of rope, cable, chain, or other means without damage. Cable, rope, or other devices used for lowering fitting into trench, shall be attached around exterior of fitting for handling. Under no circumstances shall the cable, rope, or other device be attached through the fitting interior for handling or shall pipe or fittings be dropped or dumped into the trench.

C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, or any other method that may fracture the pipe or will produce ragged, uneven edges.

D. Foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. Openings in the pipeline shall be closed with watertight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.

E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the WORK shall be the CONTRACTOR's responsibility.

F. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of such utility structures. Unless otherwise indicated, protection of existing utility structures shall be the CONTRACTOR's responsibility.

3.3 FIELD JOINTING

A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.

B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. A thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall be then forced into the ring to complete the joint.

C. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.

D. Fittings shall be carefully connected to pipe, and joint shall be checked to insure a sound and proper joint.

E. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe that has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the ENGINEER, the trench conditions or weather are unsuitable.

3.4 TESTING

A. Testing shall comply with City of Tampa DSS standards.

- END OF SECTION -

SECTION 339550 - PVC PRESSURE PIPE, RUBBER JOINTS (AWWA C900, MODIFIED)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide polyvinyl chloride (PVC) pressure pipe, complete in place, as indicated in accordance with the Contract Documents. C900 PVC pressure pipe shall be used for the 4-inch PVC force main shown on the Plans.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

AWWA C104/A21.5	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings 3-in Through 48-in for Water and Other Liquids
AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances
AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4-in Through 12-in for Water Distribution
ASTM D 2584	Test Method for Ignition Loss of Cured Reinforced Resins

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Submit drawings of pipe, fittings, and appurtenances.

2. Furnish manufacturer's literature for metallic locating tape.

C. Certifications

1. All pipe shall meet or exceed all hydrostatic, performance and acceptance tests as set forth in AWWA C-900, latest revision. Prior to shipment of the pipe to the project site, the CONTRACTOR shall submit to the ENGINEER test reports and certifications as described below duly certified by the manufacturer's testing facility or an independent certified testing laboratory demonstrating full compliance with AWWA C-900. Certification from the supplier is not acceptable. An original plus four (4) copies of the following shall be submitted:

a. Name, address, and phone number of the pipe manufacturer and the location of the plant at which they will be manufactured.

b. Notarized certificates of conformance that each lot of pipe has been manufactured, sampled, and tested per AWWA C-900. The ENGINEER shall be provided in writing the means to cross-reference the markings with the certification and test reports (i.e. date of manufacturer, a lot number and shift number etc.) If this information is marked on the pipe in a code, the markings shall be decoded in writing.

D. Perform and pay for sampling and testing as necessary for the certifications.

1.4 QUALITY ASSURANCE

A. Inspection

1. Pipe shall be subject to inspection at the place of manufacture.

2. Notify the ENGINEER in writing of the manufacturing starting date, not less than 14 Days prior to the start of any phase of the pipe manufacture.

3. During the manufacture of the pipe, give the ENGINEER access to areas where manufacturing is in process, and permit the ENGINEER to make inspections as necessary to confirm compliance with the indicated requirements.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Provide PVC pressure pipe (4-inch through 12-inch) conforming to the applicable requirements of AWWA C900, and the requirements indicated in this Section.

2.2 MANUFACTURER

A. All C-900 PVC DR18 pipe shall be domestically manufactured and shall be equal to or better than Vasallo C-900, Diamond Plastics C-900, North American Pipe Corporation C-900, or JM C-900 PVC pipe.

2.3 PIPE

A. Pipe: PVC pipe, 4" through 8", shall be DR-18 pressure class 150 with ductile iron pipe equivalent ODs. The pipe shall be approved by the National Sanitation Foundation for use as a potable water main. The pipe color shall be blue (water) or green (wastewater) and the nominal laying length per pipe section shall be 20 ft.

B. Provide specials and fittings as indicated.

C. Joints: Joints shall be "push-on" and shall be made by joining pipe spigot end and integral wall-thickened bell end. All joints shall meet all requirements of ASTM Standard D3139. Each bell shall be an integral-wall section joint assembly using elastomeric-gasket seals. All gaskets shall meet all requirements for performance as specified by ASTM F-477. All integral joint gaskets shall be made of EDPM rubber.

D. Restraints: Joint restraint provided shall be with mechanical systems designed for:

1. Restraint of PVC pipe bell-and-spigots, such as the Uniflange 1350C, Uniflange 1390C, Megalug 1600, Sigma PV-Lok Series PVP, or approved equal.

2. Restraint of PVC pipe spigot-end to mechanical joint of fittings or valves, such as the Megalug 2000PV, Uniflange 1300C, Sigma One-Lok Models SLC or PVM, or approved equal.

3. Restraining devices shall meet or exceed all requirements of ASTM F1674 “Standard Test Method for Joint Restraint Products for Use with PVC Pipe”.

E. Joint Deflection

1. Deflection at the joint shall not exceed 1.5 degrees or the maximum deflection recommended by the manufacturer.

2. No deflection of the joint will be accepted for joints that are over-belled or not belled to the stop mark.

2.4 FITTINGS

A. Provide ductile iron fittings conforming to the requirements of Section 339220 - Ductile Iron Pipe. Ductile iron fittings for water mains shall be cement mortar lined. Ductile iron fittings for wastewater force mains shall be ceramic filled epoxy lined (Protecto401), 40 mils minimum, meeting City of Tampa Department of Sanitary Sewers (DSS) specifications.

B. Ductile iron pipe fittings for PVC pipe shall be mechanical joint.

PART 3 -- EXECUTION

3.1 GENERAL

A. Perform laying, jointing, and testing for defects and leakage in the presence of the ENGINEER, and obtain the ENGINEER's approval before acceptance.

B. Material found to have defects will be rejected, and the CONTRACTOR shall promptly remove such defective materials from the Site.

C. Installation shall conform to the requirements of AWWA M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements indicated herein. For force mains, install per details of the City of Tampa DSS for locating wire, valve installation and the like.

D. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.

3.2 HANDLING AND STORAGE

A. Handling

1. Carefully inspect pipe, fittings, and accessories before and after installation, and reject those found to be defective.

2. Pipe and fittings shall be free from fins and burrs.

3. Before being placed in position, clean the pipe, fittings, and accessories and maintain them in a clean condition.

4. Provide proper facilities for lowering sections of pipe into trenches.

5. Under no circumstances drop or dump pipe, fittings, or any other material into trenches.

B. Storage

1. Store pipe, if possible, at the Site in unit packages provided by the manufacturer.

2. Exercise caution to avoid compression damage or deformation to bell ends of the pipe.

3. Store pipe in such a way as to prevent sagging or bending, and protect pipe from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe.

4. Store gaskets in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

3.3 TRENCHING AND BACKFILL

A. Trench excavation and backfill shall conform to the requirements of City of Tampa Water Department, City of Tampa DSS and Section 313000 – Earthwork, as applicable.

3.4 INSTALLATION

A. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying.

B. Grade the pipe in straight lines, taking care to avoid the formation of any dips or low points.

C. Do not lay pipe when the conditions of trench or weather are unsuitable.

D. At the end of each day's WORK, temporarily close the open ends of pipe with bulkheads.

E. Supports

1. Support pipe at its proper elevation and grade, taking care to provide firm and uniform support.

2. Wood support blocking will not be accepted.

3. The full length of each section of pipe and fittings shall rest solidly on the pipe bed, with a recessed excavation in order to accommodate bells, joints, and couplings.

4. Provide anchors and supports where indicated and where necessary for fastening WORK into place.

5. Independently support fittings.

F. Use short lengths of pipe in and out of each rigid joint or rigid structure.

G. Replace piping that does not allow sufficient space for proper installation of jointing material with piping of proper dimensions.

H. Blocking or wedging between bells and spigots will not be accepted.

I. Install joints in accordance with the manufacturer's recommendations.

J. Keep trenches free of water until joints have been properly made.

K. The maximum combined deflection at couplings shall be in accordance with the manufacturer's recommendations.

L. Cutting

1. Cut the pipe by means of saws, power-driven abrasive wheels, or pipe cutters, which will produce a square cut.

2. Cuts by wedge-type roller cutters will not be accepted.

3. After cutting, bevel the end of the pipe using a beveling tool, portable type sander, or abrasive disc.

3.5 INSTALLATION OF COPPER WIRE

A. Provide polyvinyl chloride pipelines with tracer wire per City of Tampa Water Department Standard Details or City of Tampa Department of Sanitary Sewers, as applicable.

3.6 WATER SERVICE CONNECTIONS

A. Direct tapping will not be accepted.

B. All service taps on PVC mains shall require a service saddle, manufactured specifically for PVC pipe, equal to or better than Ford FS- or FC-202, or JCM 406. The cutting tool shall be a shell type for PVC pipe (hole) cutter with internal teeth or double slots and be designed to accommodate AWWA C-900 pipe (twist drill bits and auger bits shall be prohibited). The saddles used should provide full support around the circumference of the pipe and provide a bearing area of sufficient width along the axis of the pipe (2” minimum), ensuring that the pipe will not be distorted when the saddle is tightened.

3.7 FIELD TESTING AND DISINFECTION

A. Field testing and disinfection of water mains shall conform to the requirements of Section 017430 – Pressure Pipe Testing and Disinfection.

- END OF SECTION -

SECTION 408050 - PROCESS CONTROL SYSTEM COMMISSIONING

PART 1 -- GENERAL

1.1 SUMMARY

A. CONTRACTOR will provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all equipment and coordinate all activities necessary to perform check-out and start-up of the equipment.

B. CONTRACTOR will retain the services of the System Integrator to supervise and perform check-out and start-up of all Process Control System components. As part of these services, the services of an authorized manufacturer's representative to check the equipment installation and place the equipment in operation is required. The manufacturer's representative will be thoroughly knowledgeable about the installation, operation and maintenance of the equipment

C. Related work specified in other sections includes, but is not limited to, the following:

1. Section 013300 - Submittals
2. Section 260500 - Basic Electrical Materials and Methods
3. Section 409000 - Process Control System General Requirements
4. Section 409050 - Process Control Descriptions
5. Section 409100 - Process Control System Instruments
6. Section 409413 - Process Control Systems Computer and Network Hardware
7. Section 409443 - Programmable Logic Controller Systems
8. Section 409513 - Process Control System Panel Enclosure and Equipment
9. Section 409615 - Process Control System Input and Output list
10. Section 409800 - Process Control System Training
11. Section 409850 - Process Control System Factory Testing

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01.

B. Submit the following

1. Test Plan
2. Test Schedule
3. Testing Tools
4. Test results

1.3 SYSTEM CHECKOUT AND START-UP

A. CONTRACTOR will perform the following:

1. Check and approve the installation of all Process Control System components and all cable and wiring connections between the various system components.

2. Conduct a complete system checkout and adjustment, including checking each components functions, and testing of final process control system instrument, device, computer, and network functions. All problems encountered will be

promptly corrected to prevent any delays in start-up of the process control system network.

B. CONTRACTOR will provide all test equipment necessary to perform the testing during system checkout and start-up.

C. CONTRACTOR will be responsible for initial operation of the process control system and will make any required changes, adjustment or replacements necessary to the system to perform the intended functions.

D. CONTRACTOR will furnish ENGINEER an installation inspection report certifying that all equipment has been installed correctly and is operating properly. The report will be signed by authorized representatives of CONTRACTOR, System Integrator, and Supplier.

1.4 INTEGRATED SYSTEM FIELD TEST

A. Following the process control system, checkout and initial operation, CONTRACTOR, under the supervision of the Supplier/ENGINEER, will perform a complete system test to verify that all process control system instrumentation and controls equipment, network hardware, and software is operating properly as a fully integrated system, and that the intended network functions are fully implemented and operational.

B. Any defects or problems found during the test will be corrected by CONTRACTOR and then retested to demonstrate proper operation.

1.5 10-DAY TEST

A. The 10-Day Test is a period of time during which the control system will be utilized by the OWNER in day-to-day operations. The purpose of the process control system 10-day test is to test the control system stability and completeness over time. This test will occur in conjunction with all other systems included in the project.

B. Start the 10-Day Test upon written approval from the OWNER/ENGINEER.

C. 10-Day Test will continue until a time frame has been achieved wherein the system (both hardware and software) availability meets or exceeds 99.7 percent for 10 consecutive days and no system failures have occurred which result in starting the 10-Day Test over. During the 10-Day Test the system will be available to plant operating personnel for use in normal operation of the plant.

D. For the purpose of the 10-Day Test, the system will be defined as all new control system work installed under this Contract, as well as any modifications made to the existing control system.

E. The 10-Day Test will be terminated if one or more of the following occur. Following correction of the problem, a new 10 consecutive day 10-Day Test will begin.

1. Failure to repair a hardware or software problem, causing one or more processes halt execution, within 12 consecutive hours from the time of notification failure(s).

2. Recurrent hardware or software problems: If the same type of problem occurs three times or more.

3. The following conditions will constitute a system failure in determining the system availability based on the equation specified in Paragraph 1.5.G, below:

4. Loss of communications between devices on the process control system network.

5. Failure of one or more network device PLC processor, OIT.

6. Failures of any device impacting two or more process control system components simultaneously.

7. Failure of Power Supply: Where redundant power supplies are provided, failure of one power supply will not constitute a system failure provided the backup power supply operates properly and maintains power supply. Failure of the backup supply to operate properly and maintain supply power will constitute a system failure.

8. The system will be considered down if the system cannot generate the periodic reports, alarm log or event log. The report and logs need not appear on the printer originally selected for the report.

9. Downtime caused by primary utility power failure will not count as downtime.

10. Loss of any microprocessor will be considered downtime.

11. Loss of more than 5 percent of the total inputs or outputs will be considered downtime.

12. The accuracy and precision of 90 percent of the analog inputs and outputs must be within the limits specified, or the system will be considered down.

13. The time between notifying the CONTRACTOR of a system failure and the time it has been corrected and back on line.

14. Shutdown of the critical systems from a software fault will be considered downtime.

F. The system availability will be calculated based on the following equation:

$$A = \frac{TTO}{TTO + TTR} \times 100 \text{ percent}$$

where, A = system availability in percent

TTO = total time in operation
TTR = total time to repair

G. Time to repair will be the period between the time that CONTRACTOR is notified of a system failure and the time that the system has been restored to proper operation in terms of hours with an allowance for the following dead times which will not be counted as part of the time to repair period.

1. Actual travel time for service personnel to get to the Site up to four hours per incident from the time CONTRACTOR is notified of a system failure.

2. Time for receipt of replacement parts to the Site once identified up to 8 hours per incident. Work done on the system while waiting for delivery of replacement parts does not stop the failure clock.

3. Dead time will not be counted as part of the system available period. The dead time will be logged and the duration of the 10-Day Test extended for an amount of time equal to the total dead time. Dead time will be totalized.

H. All parts and maintenance materials required to repair the system prior to completion of the 10-Day Test will be supplied by CONTRACTOR, at no additional cost to OWNER. If parts are obtained from the Contract spare parts inventory, they will be immediately replaced.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 TRAINING

A. Provide training in accordance with the requirements contained in Section 018200 and detailed in Section 409800.

3.2 MANUFACTURER'S FIELD SERVICES AND TRAINING

A. Two (2) days of field services and training time will be included from each manufacturer listed. This time will be utilized at the discretion of the OWNER, before and during the 30-Day Test. Field services will be based on an eight (8) hour day, Monday through Friday, during the OWNER's normal working hours. All travel and living related costs are the responsibility of the CONTRACTOR.

B. The CONTRACTOR shall provide two identical four hour training sessions for OWNER staff to fully inform OWNER staff on the operation and maintenance of all installed features.

END OF SECTION

SECTION 409000 - PROCESS CONTROL SYSTEM GENERAL REQUIREMENTS

PART 1 -- GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing and installing process control systems (PCS) including all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate and place in operation a complete system as illustrated on drawings, and as specified in the following sections:

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Contractor Submittals
2. Section 260500 - Basic Electrical Material and Methods
3. Section 409050 - Process Control System Description
4. Section 409100 - Process Control System Instruments
5. Section 409443 - Programmable Logic Controller Systems
6. Section 409615 - Process Control System Input and Output List

1.2 SYSTEM SUPPLIERS

A. The CONTRACTOR will provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish, install, calibrate, test, start-up, and place in satisfactory operation a complete process control system. The CONTRACTOR will be responsible for all elements specified and furnished as part of this section and related sections.

1.3 REFERENCES

A. Section 014220 – References.

B. Codes and Standards referred to in this Section are:

1.	IEEE 802.3	10/100/1G Ethernet networks
2.	ISA-S5.4	Instrument Loop Diagrams.
3.	NFPA 70	National Electrical Code
4.	NFPA 79	Electrical Standard for Industrial Machinery
5.	UL	Underwriter’s Laboratory
6.	UL 508A	Industrial Control Panels
7.	NEMA	National Electrical Manufacturers Association
8.	IEEE 519	
9.	ANSI C37.90	
10.	FCC Part 15	
11.	NEMA ICS-1	

1.4 QUALITY ASSURANCE

A. General: Provide quality control, as specified in Section 014000 – Quality Control.

1.5 ABBREVIATIONS

A. EIA – Electronic Industries Association.

B. HMI – Human Machine Interface.

C. PC – Personal Computer.

D. PCS – Process Control Systems.

E. RIO – Remote Input/Output.

F. UPS – Uninterruptable Power Supply.

1.6 DEFINITIONS

A. Process Instrumentation and Control Equipment: Instrumentation and control and monitoring components such as field elements, panels, process control systems and associated electromechanical, electrical, and electronic accessories.

B. Process Instrumentation and Control System: Materials, equipment and work required to implement a complete and operating system of instrumentation and control equipment.

C. PLC (Programmable Logic Controller): System includes power supply, central processing unit (CPU), communication controller, interconnect cables, and input and output interface.

D. SCADA (Supervisory Control and Data Acquisition): Computer system that operates as primary operator interface to the entire PLC network, which includes process visualization and control, data collection and storage, alarm management, and process data link to other office productivity software.

E. OIT (Operator Interface Terminal): Graphical local operator interface terminal at a PLC enclosure or control panel.

F. OWS (Operator Workstation): PC based operator system, including hardware, operating system software, and operator interface HMI system software. This is generally referred to as the SCADA or HMI workstation.

1.7 SYSTEM DESCRIPTION

A. General Description of Work

1. The facility is a new Pumping Station, which will require a control system for monitoring and control of the process equipment, SCADA monitoring/ control/alarming on the remote network, data logging via a historian and automated report generation.

2. Provide PLC Panel and associated I/O’s and equipment to monitor and control systems such as, but not limited to as shown on drawings:

a. Raw Water Pumping
b. Vacuum Priming
c. Venting
d. Metering
e. Sump Pumps
f. Security
g. Power Monitoring
h. Building Monitoring (fire, flood, etc.)
i. Video Monitoring

B. Provide all materials and work necessary for complete and fully functional systems.

1. Coordinate work with all electrical, mechanical, and structural work furnished in this Contract.

2. Ensure proper interface between SCADA and PLC system and equipment furnished or modified as part of this contract.

3. Install, make final connections, adjust, test, start-up systems per manufacturer's instructions and recommendations.

4. Modify the Sulphur Springs Pump Station PLC programming, Hillsborough River Dam PLC programming, HMI programming, historian and automatic reporting programming/configuration as necessary to ensure accurate metering, monitoring and reporting results after connecting the Blue Sink Transmission Pipeline upstream of the venturi meter at the Hillsborough River Dam. The existing Sulphur Springs Pump Station automation programming (partially based on metering at the Hillsborough River Dam) shall also be modified to ensure calculated Sulphur Springs Pump Station setpoints are not affected by the addition of water from Blue Sink into the Sulphur Springs Transmission Main.

C. Design Requirements

1. General: Provide complete instrumentation and control system for the implementation of the New Pump Station as indicated herein and as shown on drawings.

D. Source Code Ownership

1. All ladder logic (along with source code) developed or installed by the CONTRACTOR will become property of the OWNER. This also applies to all installed logic for package control systems.

2. All HMI, OWS, and OIT applications (along w/ source code) developed or installed by the CONTRACTOR will become property of the OWNER. This applies to all for package control systems.

1.8 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01, Sections 013300 and 013250.

B. Action Submittals

1. Product Data: Submit manufacturer's official and published product data, specifications, and installation recommendations for each item. Submittals shall be both hard copy and electronic. Hard copy shall be bound, indexed, and tabbed. Electronic shall be in Adobe PDF format, bookmarked and tabbed with a file name specific and related to the submittal content.

2. Shop Drawings: Submit shop drawings as per Section 013300, and as required below. Include the following information in each submittal:

a. Instrument index, including tag number, description, location, and calibrated range for each instrument.

b. Individual instrument specification sheet, including manufacturer's name and complete catalog number. Electronically editable ISA data sheets, in compliance with ISA TR20 requirements.

c. Panel drawings with dimensions, layout and bill of materials.

d. Panel wiring diagrams, interconnection diagrams.

e. Loop diagrams.

f. Communication and digital networks diagrams

C. Include connections to Ethernet network, remote I/O and any local bus (for example Modbus, Profibus, Foundation Fieldbus, etc.) Identify cable, termination type, termination location, and drop lengths for each segment.

1. Format: Network schematic for each different type of network.

2. Input and Output drawings, containing, but not limited to, the following information:

a. Line numbers and instrument tag numbers

b. Individual component locations

c. Actual equipment wiring terminal designations, point to point wiring, and cable shield terminations

d. Wire type, size and identification number

e. Signal types (e.g., 120 Volt ac, 4-20 mAdc, pulse frequency, etc.)

f. Contact orientations (e.g., normally open, normally closed, etc.)

g. Equipment grounding requirements

h. Signal boosters, interposing relays, optical isolators, and shunt resistors.

i. Completely developed process screens for the HMI and OIT

D. Information Submittals

1. Test Reports: Submit all loop field calibration reports.

2. Field Testing: Provide the following:
    a. Test Results:
        1) Pass/fail status of all digital I/O.
        2) Results of analog I/O testing.
    b. Miscellaneous:
        1) Preventive maintenance schedule.
        2) Repair and field service Report Forms.
        3) Spares and Consumables Report.
3. Manufacturer's Instructions: Submit manufacturer published installation manuals and operations manuals for each instrument, device, or equipment.

E. Submittals for Closeout: Provide submittals as required below.

1. Project Record Documents: In addition to requirements described in Section 017000, provide the following:
    a. Program documentation: Provide paper copies of all software development and configuration including listing of all register and data tables.
    b. Include functional narrative description of the developed ladder logic to describe each control system. Ladder logic is to be annotated as specified in Section 409443 to include functional alphanumeric description of logic elements to assist OWNER in understanding the ladder logic for troubleshooting and future modification.
    c. Program copies: Provide two digital copies of fully configured systems. Digital copies will be in CD-ROM format, and include native (editable) copy and PDF version.
    d. Operator interface program copies: Provide hard copy printouts and digital copies of new or modified HMI and OIT screens and database listings. Digital copies will be in CD-ROM format, and include native (editable) copy and PDF version.
    e. Submit device tag and database cross reference listing.
2. Operation and Maintenance Data: Provide operation and maintenance manuals as specified in Division 1. Include the following information:
    a. Recommended spare parts list.
    b. Manufacturer approved repair and service centers list.
    c. Replacements part sources.
    d. Recommended maintenance procedures and frequencies.
    e. Manufacturer supplied manuals furnished with the equipment or system.
3. Warranty: Provide warranty certificate as described in, Section 017000.

1.9 REFERENCES

A. Regulatory Requirements

1. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes, applicable to construction and installation of electrical wiring, devices, material and equipment.

2. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation".

3. UL Labels: Provide control panel components, power supplies, controllers, relays, etc., which have been listed and labeled by Underwriter's Laboratories.

B. The purpose of Contract drawings and specifications is to convey information required for complete and functioning systems. System Supplier is responsible for all details necessary to properly install, adjust, configure and place in operation, intended systems. "Instrument Schedule" and "Input and Output Lists" if provided are for convenience; their accuracy is not guaranteed.

1.10 RESPONSIBILITY

A. System Supplier will provide application software programming as specified in Section 409050 - Process Control System Descriptions.

B. Interconnecting Wiring Diagram Drawings for the Process and Instrumentation Control System will be prepared by the respective System Supplier. Interconnecting wiring and terminations for the System will be provided by the electrical CONTRACTOR under Division 26, in accordance with the Interconnecting Wiring Diagram Drawings.

C. CONTRACTOR will immediately correct incomplete or deficient Work discovered during application software programming, downloading, testing, troubleshooting, and System startup. Interim modifications or patches will be used as required to maintain 24 hr x 7 day operation of the process.

D. System Suppliers will be responsible for configuration, coordination, and addressing of Ethernet networks for the devices specified herein and as shown on the Drawings. Where additions to existing plant networks are required, request the range of available addresses from the Owner and coordinate requirements.

E. Minimum Supplier Scope: Provide the following minimum scope of work:

1. For Process Control System control panels, components, and ancillaries specified under this section.

a. Coordinating to ensure that: The proper size, type and number of PCS related raceways and conductors are provided and installed.

b. Completing panel fabrication drawings.

c. Providing the specified submittals.

d. Providing panels, components and ancillaries.

e. Programming and configuration.

f. Providing instructions, details, and advice to and coordinating with, the CONTRACTOR to ensure proper installation.

g. Certifying correctness of installation.

h. Verifying final power and signal connections and labeling (lugging and connecting).

i. Adjusting and calibrating.

j. Starting up

k. Testing

l. Providing the required training.

2. For systems, components, and ancillaries not provided under this Section but that are directly connect to components provided under this Section.

a. Obtaining manufacturers' information regarding installation, interface, function and adjustment.

b. For operation and control, verifying that installations, interfacing signal terminations and adjustments have been completed in accordance with manufacture's recommendations.

c. Testing to demonstrate proper interface and operation with PLC.

1) Examples of items included in this category are:

(a) Raw Water Pumps

(b) Vacuum Prime System.

1.11 DELIVERY, STORAGE, AND HANDLING

A. General: Deliver, store, and handle all products and materials as specified in Section 016000.

B. Packing and Shipping

C. Acceptance at Site: Inspect all materials and equipment against approved shop drawings at time of delivery. Immediately return for replacement or repair any equipment or materials damaged or not meeting requirements of approved shop drawings.

D. Storage and Protection: Label all equipment and materials after they have been inspected. Store all equipment and materials in dry, covered, ventilated location. Protect from harm in accordance with manufacturer's recommendations.

1.12 PROJECT/SITE CONDITIONS

A. Environmental Requirements: Protect all equipment and instruments specified herein from moisture.

1.13 SEQUENCING AND SCHEDULING

A. Refer to Section 011400 for CONTRACTOR's scheduling requirements for applications software testing.

B. Prerequisite Activities and Lead Times: Do not start following key Project activities until prerequisite activities and lead times listed below have been completed and satisfied:

1. Shop Drawing Reviews by ENGINEER:

a. Prerequisite: ENGINEER acceptance of Schedule of Values and Progress Schedule.

2. Training

a. Prerequisite: Associated training plan Submittal approved.

b. Prerequiste: Offsite Training plan submittal approved

PART 2 PRODUCTS

2.1 SERVICE CONDITIONS

A. Standard Service Conditions: The following defines certain types of environments. Provide equipment for suitable continuous operation in these environments. Refer to Section 260500 - Basic Electrical Material and Methods for additional classifications:

1. Inside, Corrosive:

a. Temperature: Minus 20 degrees F to 104 degrees F.
b. Relative Humidity: 10 percent to 100 percent.
c. Corrosive Environment: Sodium Hypochlorite, waste vapors.
d. NEC Classification: Nonhazardous.

2. Outside:

a. Temperature: Minus 20 degrees F to 120 degrees F.
b. Relative Humidity: 10 percent to 100 percent, rain, freezing rain.
c. NEC Classification: Nonhazardous.

2.2 MONITORING AND CONTROL – GENERAL

A. Functional descriptions of the processes and equipment to be monitored and controlled by (or through) the Process Control System are specified in Section 409050.

B. Configure the PLC system to meet the functional requirements specified in Section 409443.

C. Complete the existing PLC configuration programming of the new processor, I/O modules, communication modules, network switches and the existing Citect SCADA computer workstations.

1. Make all register and I/O data available between the plant SCADA system and PLC system for display, logging and control purposes.

D. Monitoring and control requirements specified herein describe the additions and modifications to the PLC system.

E. Examine status of operating mode input from each equipment item/group. PLC control logic and outputs will only be activated if the equipment is in the proper operating mode (auto, computer or remote, as applicable). Computer Mode and Remote Mode inputs to the OWS and OIT generally refer to the same thing, i.e. that control is now handed off to the OWS and OIT.

F. In general, all OWS, OIT and PLC control discrete outputs for starting and stopping equipment are to be configured as maintained “Run” signal commands which are will be released during a power failure. This approach will be to have the equipment manually restarted following a power failure. Exceptions to this approach are noted in the respective control strategy descriptions.

2.3 TYPICAL MONITORING AND CONTROL STRATEGIES

A. Typical Setpoint Control Adjustment

1. Each operator adjustable timer and process variable setpoint must be provided with minimum and maximum limits.

2. Provide numerical fields for setpoint entry. Do not use sliders. Setpoint entries must be in direct engineering units.

3. Provide out of range warning messages if attempts are made to set setpoints less than the minimum limit, or greater than the maximum limit.

B. Equipment Runtime Totalizations

1. Configure OWS, OIT and PLC to accumulate runtime totals from the running status inputs for all equipment.

2. Display total runtime hours on each respective SCADA display screen where shown.

C. Control Strategy

1. Provide control system programming and operation as specified in Section 409443.

2. Develop HMI/ OWS screens, as listed below and as required by Section 409050.

a. Pump Controls
b. Packaged System Monitoring
c. Electrical Monitoring - breaker positions and power monitoring)

2.4 ALARM PROCEDURES

A. Provide alarm setpoint adjustment screens for process variable alarms.

1. Display alarm setpoints in direct engineering units.

2. Provide adjustable deadband (set and reset points) for each alarm setpoint.

2.5 DEVICE CONTROL

A. The control software will recognize several control modes. The modes of control reflect either field status of the equipment connected to the PLC/SCADA or operator commands. Switching between control modes, such as auto/manual or remote/local will be bumpless. Equipment status will be traced by the PLC/SCADA and will not change when modes are changed. The control modes are organized in a hierarchical manner as follows:

1. Local: A field operator controls the process equipment (system) from the – packaged panel. In effect this mode is always a Manual Mode.

2. Remote: The equipment is controlled remotely, either from an HMI or by the PLC/SCADA. Remote mode has two variations: Remote Panel or PLC/SCADA.

3. Remote Panel Manual: The equipment is controlled from the HMI either by manual pushbuttons or manipulation of screen.

4. Remote Panel Auto: The PLC controls the equipment automatically.

5. Remote: The equipment is controlled by the PLC.

2.6 GRAPHIC DISPLAY REQUIREMENTS

A. The displays will include at a minimum all the equipment shown in the Process Flow Diagram, P&IDs, and described in the control narratives. All equipment will be labeled as shown on the drawing or as listed in the I/O list. Follow color conventions and symbols and layout of existing application.

PART 3 EXECUTION

3.1 PLANNING MEETINGS

A. Conduct an 8 hr workshop with OWNER staff. The purpose of the workshop shall be to identify existing programming standards, programming “blocks”, graphic standards and similar to be implemented in the WORK. CONTRACTOR shall adhere to all identified standards while performing the WORK. Contractor shall lead workshop and provide proposed standards based on existing City of Tampa programming for discussion, review, and implementation. Standards shall be presented using hardware and software similar to those in this project.

B. Conduct a second 8 hr workshop with OWNER staff. The purpose of the workshop shall be to identify OWNER preferences with respect to control inputs, monitoring, layout, automation schemes, etc. CONTRACTOR shall implement identified OWNER preferences while performing the WORK. Contractor shall present automation using components to be provided for this project including software development and testing.

3.2 ERECTION, INSTALLATION AND APPLICATION

A. General

1. Install all instruments and equipment in strict compliance with manufacturer's instructions.

2. Mount all gages and indicators in upright position.

3. Provide sufficient space around equipment for maintenance and removal of equipment without removal of adjacent equipment.

4. Cover front panels, instruments, gages and indicators during construction for protection from dust, weld and paint splatter.

5. Mount all indicating instruments at eye level (5 feet).

6. Unless otherwise impractical, support instruments independent of process piping.

B. Installation Hardware

1. Provide stainless steel nuts and bolts.

2. Provide aluminum or stainless steel support channels.

3. Provide 1/4-inch thick minimum, clear anodized aluminum equipment mounting plates.

4. Provide gaskets to prevent galvanic reaction between dissimilar metal surfaces.

C. Equipment Identification and Instrument Tags

1. Install embossed stainless steel tags for each device as specified in Section 409100.

2. Provide an engraved laminated plastic plate at each wall-mounted instrument and panel, indicating panel and instrument function and tag and unique identifier as shown on drawings or schedules.

3. Engraved laminated tag colors: Provide black lettering on white background. Mount tags at eye level.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspection: Provide tests as required in Sections 014650 and 408050.

B. Inspection: Demonstrate that instruments, panels, programming equipment and network equipment:

1. Has not been damaged by transportation or installation,
2. Has been properly installed,
3. Has no mechanical defects,
4. Is in proper alignment, and
5. Has been properly connected.

6. Function recordings to system requirements.

C. Testing Process:

1. Test digital inputs and outputs by actual starting and stopping of equipment when possible, or with jumpers at field equipment terminals.

2. Conduct all tests in presence of plant personnel or ENGINEER.

D. Manufacturers Field Service: Provide manufacturer field service or authorized representative for calibration, initial setup, programming and commissioning of each instrument.

- END OF SECTION -

SECTION 409050 - PROCESS CONTROL SYSTEM DESCRIPTION

PART 1 --GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing and installing instrumentation and control systems including all work and materials necessary to perform control and monitoring functions as illustrated on drawings, and as specified in the following sections:

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Contractor Submittals
2. Section 260500 - Basic Electrical Material and Method
3. Section 408050 - Process Control System Commissioning
4. Section 409000 - Process Control System General Requirements
5. Section 409100 - Process Control Instruments
6. Section 409443 - Programmable Logic Controller Systems
7. Section 409513 - Process Control System Panel Enclosure and Equipment
8. Section 409615 - Process Control System Input and Output List

1.2 SYSTEM SUPPLIERS

A. The CONTRACTOR will provide all labor, materials, equipment, and incidentals as show, specified, and required to furnish, install, calibrate, test, start-up, and place in satisfactory operation a complete process control system.

1.3 SYSTEM DESCRIPTION

A. General Description of Work

1. Process control system to provide operation of the Blue Sink Pumping Station to provide fresh water flow to the base of the Hillsborough Dam.

B. The Control descriptions provide the functional requirements of the Control represented in the Contract Documents.

1. Descriptions will be provided as follows:
    a. Control system overview and general description.
    b. Equipment to be controlled.
    c. Major field mounted instruments (does not include local gauges).
    d. Manual control functions.
    e. Automatic control functions/interlocks.
    f. Major indications provided at local control panels.
    g. Remote indication and alarms.

C. The Control descriptions are not intended to be an inclusive listing of all elements and appurtenances required to execute loop functions, but are rather intended to supplement and complement the Drawings and other Specification Sections. The Control Descriptions will be the base document for the CONTRACTOR creation of the Control Strategies. Identification of required elements, documentation, and coordination between loops are to be developed during shop drawings. Finalizing and tuning of strategies, as required by process characteristics, are to be completed during startup.

1.4 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01.

B. Action Submittals

1. Product Data: Submit manufacturer's official and published product data, specifications, and installation recommendations for each item.

2. Shop Drawings: Submit shop drawings as per Section 013300, and as required below. Include the following information in each submittal:

a. Complete control descriptions/strategies developed from the Control Descriptions specified.

b. I/O List complete with Instrument Ranges and Alarm levels, setpoints.

c. Each permissive detailed.

d. Provide complete control description for all areas of control. Including sufficient detail for a complete understanding of each operator controllable set point, failure modes, flow balancing and level controls.

e. Submit complete control descriptions for all areas of control within control parameters as described within.

f. All screens for all control strategies will be completed and included in the submittal.

C. Contract Closeout Information Submittals: Provide submittals as required below.

1. Project Record Documents: In addition to requirements described in Division 01, Contract Closeout, provide the following:

a. Program documentation: Provide paper copies of all software development and configuration including listing of all register tables.

2. Operation and Maintenance Data: Provide operation and maintenance manuals as specified in Division 01. Include the following information:

a. Recommended spare parts list.

b. Manufacturer approved repair and service centers list.

c. Replacements part sources.

d. Recommended maintenance procedures and frequencies.

3. Warranty: Provide warranty certificate as described in Division 01.

1.5 QUALITY ASSURANCE

A. General: Provide Quality Assurance as specified in Division 01.

B. The purpose of contract drawings and specifications is to convey information required for complete and functioning systems. System Suppliers are responsible for all details necessary to properly install, adjust, and place in operation, intended systems. “Instrument Schedule” will be provided for convenience; their accuracy is not guaranteed.

C. Meetings

1. Schedule the following meetings:

a. Two (2) Process Control System Coordination Meetings of up to eight (8) hours and one (1) I&C Coordination Meeting of up to four (4) hours will be held to review Project activity, the submittal schedule, documentation requirements, and application software programming requirements for the Process Instrumentation and Control System. During the first coordination meeting (4 hours), the ENGINEER and OWNER will review the functional description for the System and respond to initial questions raised by the System Supplier as to design intent. The remaining two (2) meetings will be conducted to provide ENGINEER and OWNER review of programming effort and further clarification of design intent for the functional description of the System.

b. Process Control System Coordination Meetings will be held at David L. Tippin Water Treatment Facility (DLTWTF), North 30th Street, Tampa, FL. System Supplier’s designer specifically assigned to Project, CONTRACTOR, OWNER, and ENGINEER, will attend meeting.

c. When requested by CONTRACTOR, OWNER, and/or ENGINEER, System Supplier will attend Monthly Progress Meetings and Weekly Meetings specified. Attend at least 10 progress meetings during active construction and programming periods.

1.6 RESPONSIBILITY

A. System Suppliers will provide application software programming as specified herein.

1.7 APPLICATION SOFTWARE PROGRAMMING

A. The System Supplier will provide application software programming as specified in this and related Sections. System Supplier will download and test application software programming after successful completion of:

1. Process Control System Factory Testing, as specified in Section 409850,

2. Process Control System Commissioning as specified in Section 408050.

B. Training services, as specified in Section 017300 and 409800 - Training; and equipment testing and start-up, as specified in Section 016500 - Equipment Testing and Start-Up will not begin until System Supplier has successfully completed application software programming, downloading, and testing.

C. Refer to Section 011400 - Construction Limitations and Constraints, for specified construction limitations and constraints that affect completion of application software programming, downloading, and testing.

1.8 PROJECT/SITE CONDITIONS

A. The project is at the Blue Sink Pumping Station, and the equipment is subject to humidity, wastewater vapors, dust, noise, elevated and reduced temperatures.

1.9 SEQUENCING AND SCHEDULING

A. Refer to Section 011400.

1.10 ABBREVIATIONS

A. ANSI: American National Standards Institute

B. IEC: International Engineering Consortium

C. UL: Underwriters Laboratories

PART 2 --PRODUCTS (NOT USED)

PART 3 --EXECUTION.

3.1 RAW WATER PUMPING CONTROL STRATEGY

A. Control pumps from the station PLC, PLC-1, either locally by use of PanelView Plus mounted in face of enclosure, or remotely through a SCADA connection to the DLTWTF.

1. The pumps will be powered through the adjustable frequency drive (AFD), which shall receive the following commands from PLC-1:
    a. Run
    b. Speed
    c. Reset
    d. And others as shown on the P&ID and Control Schematics
2. Status and alarm conditions from devices associated with the pumps shall be routed through the AFD to the PLC, such as:
    a. Pump Primed
    b. Pump in PLC mode (auto)
    c. Running
    d. AFD Failure
    e. Pump Failure
    f. Pump Speed
    g. High discharge pressure
    h. Discharge valve opened

i. Discharge valve closed

j. And others as shown on the P&ID and Control Schematics

3. The speed of the AFD shall be paced based on the signal from the flow meter on the raw water discharge, to maintain flow setpoint.

B. Pump Station ON/OFF request will be made through operator entered request through the PLC/HMI/OIT. It is expected that the pump station will be run seasonally (dry season), for extended periods (5 - 6 months), with 24 hour operation.

C. When the pump station has been requested to be ON, the operation of Raw Water Pump 1 and Raw Water Pump 2 shall be controlled by the PLC through the AFD. Typically only one raw water pump shall be running at any given time. The Human Machine Interface (HMI) screen for the PLC will allow entry of a desired pump run time. The initial run time setting shall be 7 days, with the rotation of the pumps to occur during a convenient time chosen by operations staff. After the operator-entered run time has expired, the HMI and OIT shall alert the operator via an alarm that the pump operating time has expired. The HMI screen shall provide an operator option to "Switch Pumps" or "Ignore". If "Switch Pumps" is selected by the operator, the operating pump shall stop, the suction piping vent shall open to clear debris from the intake (at this point an adjustable hold time shall be programmed into the sequence-initial setting of 5 minutes, to allow removal of debris from the intake) and the available pump with the least total run time will have its suction piping vent valve closed and start. If "Ignore" is selected, the operating pump shall continue to operate. In the “ignore” scenario alarms shall be reissued at 4 hour intervals to remind operations staff to clear accumulated intake debris and manage run time between the two raw water pumps. The design intent is to rotate the operation of the pumps so that pump wear is evenly distributed, and to allow the water in the suction pipe of the operating pump to backflow through the suction pipe orifices to clear any debris from the suction pipe orifices, on a timed program.

D. A submersible level element, level transmitter and low level switch shall be provided in the monitoring well. The level transmitter in the monitoring well shall be calibrated to the SWFWMD staff gauge and new staff gage to provide continuous sink water elevation data (in NGVD 1929 datum) to the PLC, OIT, HMI and historian. The HMI shall provide an adjustable low water warning and an adjustable low water alarm. (Initial setting: Warning = El. 16.0 and Alarm = El. 15.5.) On alarm, any operating pump shall be stopped and the pump station ON/OFF status set to OFF, requiring operator intervention to reset to ON status. When the Blue Sink water level is above the “warning level” the pumped flow shall be controlled by the PLC at a constant 2 MGD setpoint with PID control. When the Blue Sink water level is between the “warning level” and the “alarm level” the PLC shall adjust the flow setpoint to prevent pump shutdowns associated with the 15.5 ft minimum pumping elevation. In this “warning condition” scenario if the Blue Sink water level decreases during an adjustable period of time (initial setting of 5 minutes) then the flow rate setpoint shall be reduced by an adjustable amount of flow. This is expected to reduce or eliminate the decline of Blue Sink water levels to a level when the low level cutoff (alarm condition -- 15.5 ft) is experienced. If the water level increases during the same adjustable period of time the flow rate setpoint shall be increased by an adjustable amount of flow. The initial flow change values during the “warning condition” shall be a 0.5 MGD reduction and a 0.05 MGD increase to capture the design intent of decreasing diversion rates (pump discharge flow) faster than increasing diversion rates during low water level conditions. In no event shall the pump speed be reduced to a point less than the minimum rating point described in the pump specification. If a pump is operating at the minimum rating point and the Blue Sink water

level is equal to or less than 15.5 ft the design intent is for the VFD to fault without consideration to the PLC flow setpoint. The VFD shall be configured to fault when the monitoring well float switch is opened for an adjustable period of time (initial setting of 30 seconds). At that time the pump shall ramp down and stop. Upon the PLC receiving a fault signal from the VFD the PLC shall issue an open command to the suction vent valve.

E. The HMI screens shall also provide an software enabled (HMI/OIT selector switch) adjustable "Reduced Flow" sink operating level. This adjustable level shall cause the target pump flow rate of 2 mgd (3 cfs) to be proportionally reduced between the "Reduced Flow" sink level and the "Alarm" sink level to an adjustable "Low Pumping" rate. This feature is to allow reduced flow operation of the pumping station at low sink levels. The AFD ramp down rate shall be field adjusted by the integrator to result in the slowest check valve closing as possible. Each raw water pump shall be provided a EMERGENCY STOP AND LOCK (E-STOP/L) pushbutton station with lockout adjacent to the pump and on the face of the AFD enclosure. The AFD for each pump shall have a HAND-OFF-AUTO selector switch, START-STOP pushbuttons, RESET pushbutton, E-STOP pushbutton and speed potentiometer (and other features as described in the AFD specification). When the HOA selector switch on the AFD is in AUTO mode (controlled by the PLC) the START-STOP pushbuttons, and speed potentiometer shall be inactive. When the HOA on the AFD is in HAND mode (control of the pump at the AFD) the pump shall be controlled by the AFD's START-STOP pushbuttons and potentiometer. The E-STOP at the AFD and at the pump shall stop the pump regardless of HOA switch status. The AFD shall stop immediately in lieu of "ramping down" upon activation of an E-Stop. The E-Stop pushbuttons shall be "maintained close" until the mushroom head is manually pulled out to cease the E-Stop scenario. The RESET pushbutton on the AFD shall reset the AFD. The design intent is to routinely operate the pumps from the station PLC/HMI in AUTO mode with occasional local operation for maintenance purposes in HAND mode. If the AFD HOA selector switch is in the "OFF" position the AFD shall not start.

F. When the AFD is in HAND mode, the pump shall operate based on the START/STOP pushbuttons and manual potentiometer irrespective of the primed status of the pump or other interlocks that are external to the AFD (less E-Stops). When the AFD is in AUTO (PLC CONTROL) mode, control logic provided in the PLC programming shall control operation of the pump. The pump shall not start in AFD AUTO mode unless the pump is primed, vent valve is closed, discharge valve is opened, and Blue Sink water level is above 15.5 ft,

G. When the AFD is running in AFD AUTO mode, the AFD shall fault if the suction vent valve closed limit switch opens, high discharge pressure switch closes, discharge open limit switch opens, Blue Sink minimum float switch opens, vacuum prime level switch opens. The AFD shall only fault when these conditions exist for an adjustable period of time to assure momentary events associated with this device do not cause a fault condition. If the AFD faults an alarm shall be displayed in the HMI and OIT indicating the fault and the specific cause of the fault.

H. In the event of a communication failure between the Blue Sink Pump Station PLC and the remainder of the PLC/SCADA network the Blue Sink Pump Station PLC shall control the station locally using the last known HMI inputs for a period of 4 hours. During communication interruptions all equipment protection features such as the low level cutoff switch shall remain operational. The intent is to maintain continuous pump station operation during times of short communication interruptions.

I. Modify the Sulphur Springs Pump Station PLC programming, Hillsborough River Dam PLC programming, HMI programming, historian and automatic reporting programming/configuration as necessary to ensure accurate metering, monitoring and reporting results after connecting the Blue Sink Transmission Pipeline upstream of the venturi meter at the Hillsborough River Dam. The existing Sulphur Springs Pump Station automation programming (partially based on metering at the Hillsborough River Dam) shall also be modified to ensure calculated Sulphur Springs Pump Station setpoints are not affected by the addition of water from Blue Sink into the Sulphur Springs Transmission Main.

J. The following devices shall be wired to the AFD:

1. Discharge Valve and Suction Vent Valve Limit Switches: The manually-operated pump discharge valve shall be equipped with an OPENED and CLOSED limit switch. The actuated suction vent valves shall be equipped with an OPENED and CLOSED limit switch. The valve status shall be displayed on the AFD and provided to the PLC. If the discharge valve is closed or the suction vent valve is opened and the AFD (while in “AUTO” mode) is called to run by PLC/SCADA, the AFD shall not run and a VALVE CLOSED (or OPEN as appropriate) alarm displayed on the HMI and OIT. The same actions (with modifications to the alarm language) shall occur for all of the conditions listed in Section F above

2. Pressure Switch: A pressure switch shall be provided on the pump discharge piping. The pressure switch shall have a range of 0 - 100 psig. The adjustable high pressure setting shall have an initial setting of 60 psi. The HIGH PRESSURE status shall be displayed on the AFD and provided to the PLC. If the high pressure switch is activated and the AFD is called on to run in either AUTO mode, the AFD shall not be allowed to run. The PLC HMI & OIT shall display an alarm condition in this circumstance and the pump shall be removed from service.

3. Vacuum Prime Valve Level Sensor: The vacuum prime valve with associated liquid level sensor provided as part of the vacuum prime system shall provide a signal to the AFD that shall indicate when prime has been achieved in the vacuum prime piping on the pump volute. PRIMED status shall be displayed on the AFD and retransmitted to the PLC for display on the HMI and OIT. PRIMED status shall be permissive for the raw water pump to start when the raw water pump is operating under PLC control. When in PLC control, if the vacuum prime valve level sensor loses prime when the pump is operating, the AFD/pump shall continue to operate for a timed delay adjustable on the PLC HMI to allow the prime to be re-established. If the prime is not re-established in the allowed time period, the condition shall be alarmed on the HMI, the pump stopped and removed from service rotation. When the raw water pump is being operated from the AFD in HAND mode (for maintenance purposes), the raw water pump may be started regardless of the primed status.

4. Space Heaters: Motors will have space heaters that energize when the AFD is not running, will not energize when the AFD is running.

K. If the pump station has an ON operation request, and there is no raw water pump available for operation (pump removed from service with alarm status or in AFD manual control), the PLC shall initiate a NO PUMP AVAILABLE alarm. On alarm, the pump station ON/OFF status shall be set to OFF, requiring operator intervention to reset to ON status.

L. The PLC shall monitor and record the flow rate measured by the station Venturi flow meter. The PLC shall vary the pump speed through the AFD to maintain a flow of 3 CFS (2 mgd; 1,346 gpm). If a pump is in AFD HAND mode for maintenance, the pump speed shall be set manually at the AFD by a manual potentiometer. If the flow meter signal fails or if flow is less than 100 gpm for longer than an adjustable period of time, pumps operating through the PLC control shall be stopped and the condition alarmed, or pumps called to be on shall not start and the condition alarmed.

M. The SCADA HMI shall have “HAND” and “AUTO” modes for the AFDs and Valves separate from the AFD/valve “HAND” and “AUTO” modes. When in SCADA “HAND” mode this equipment shall only operate upon specific operator entered commands via SCADA (i.e. an operator clicks on a valve to open or close it). When in SCADA “AUTO” mode this equipment shall operate automatically via PLC control without requiring specific operator commands via the SCADA HMI. The following signals shall be displayed on the PLC HMI:

1. PLC CONTROL mode: Indicate if the AFD control is through the PLC or in local manual control at the AFD.
2. Running: Indicate if the pump is running.
3. AFD Failure: Indicate if the AFD is in fault condition.
4. Pump Failure: Indicate if the pump is in fault condition.
5. Pump Speed: Indicate pump RPM.
6. High Discharge Pressure: Indicate high discharge pressure fault.
7. Discharge Valve Open/Closed Status: Indicate if pump discharge valve is open or closed.
8. Suction Vent Valve Open/Closed Status
9. Primed Status: Indicate if the raw water pump is primed.
10. Pumped flow
11. Sink Level, Sink Low Level
12. Communication Status (including on the OWNER’s existing PLC Health / Communication screens)
13. Sump level
14. Other elements as indicated on the drawings.
15. CONTRACTOR shall modify the existing Sulphur Springs Pump Station SCADA HMI screen to incorporate graphical representation of the Blue Sink Transmission Main and Blue Sink diversion rate.

3.2 VACUUM PRIMING SYSTEM CONTROL STRATEGY

A. The vacuum priming system shall be normally controlled from a control panel (Vacuum System Control Panel, VSCP) supplied by the vacuum priming system supplier. PLC-1, either locally, or remotely through a SCADA connection to the DLTWTF, shall monitor the status of the vendor-supplied control panel.

1. The VSCP-1 shall provide the following signals to PLC-1:
    a. Vacuum Pump running status of each pump
    b. Pump alarm status (run time) of each pump

c. High water in Break Tank alarm status

d. Vacuuming Priming system fail alarm status

e. Loss of seal water alarm (if applicable)

f. Primed status of the Vacuum Priming Valves (The primed status shall also be displayed on the VSCP directly from the Vacuum Priming Valves for status indication)

g. Other elements as indicated on the drawings.

2. OPEN/CLOSE commands the Vacuum Prime System Control solenoid Valves and of the Suction Pipe Vent Valves (SPV-BLV01, SPV-BLV02) shall be provided directly from PLC-1.

3. The VSCP shall include the following:

a. Motor starters for the vacuum pumps

b. HAND/OFF/AUTO selector switch for each vacuum pump,

c. PUMP ON indicating lights for each pump

d. PUMP 1/PUMP 2 lead selector switch

e. Break tank high water alarm indicating light

f. Elapsed Time Meter for each vacuum pump

g. Other elements as shown on the instrumentation and electrical drawings.

h. LOSS OF SEAL WATER alarm indicating light for each of the vacuum pumps (if applicable)

1) For vacuum pumps that require seal water, the seal water supply to each pump shall be equipped with a flow switch that is connected to the VSCP. The purpose of the flow switch is to indicate seal water availability to the vacuum pump. LOSS OF SEAL WATER shall be indicated on the VSCP, shall prevent the vacuum pump from starting, and be transmitted to the station PLC.

4. When the vacuum pump selector switch is in OFF, the vacuum pump will not run. When the vacuum pump selector switch is in HAND, the vacuum pump will run. This setting is intended for maintenance purposes.

5. When the vacuum pump selector switch is in AUTO, the vacuum pump shall be controlled from the VSCP, based on the following devices mounted on the vacuum tank:

a. Level switch

b. High pressure switch

c. Low pressure switch

d. Low-low pressure switch

e. Pressure indicating transmitter (The pressure of the vacuum tank shall be transmitted directly to PLC-1. When the pressure is above an adjustable setpoint for longer than an adjustable period of time the SCADA HMI and OIT shall display an alarm.)

f. Vacuum gage

6. When the level switch in the break tank is high, the indicating light on VSCP shall illuminate and the vacuum pumps shall not run unless the vacuum pump supplier warrants the provided vacuum pump system can continually ingest water without damage. The vacuum tank shall be equipped with a manual drain valve. Periodic maintenance is required to manually drain the vacuum tank of any accumulated water. A sight glass on each tank is provided for visual inspection of any water accumulation.

7. When vacuum tank High Pressure Switch goes high the VSCP shall indicate this condition to the PLC. If the PLC observes this condition for an adjustable period of time it shall send an alarm to the SCADA HMI and OIT.

8. When the vacuum tank High Pressure Switch goes high start the lead vacuum pump.

9. When the vacuum tank Low Pressure Switch goes high start the lag vacuum pump.

10. When the vacuum tank Low-Low Pressure Switch goes high stop all vacuum pumps.

11. The lead pump shall be selected via a manual selector switch on the vacuum system control panel enclosure face. Periodic maintenance is required to change the lead pump selection to ensure even vacuum pump run times.

12. The VSCP shall have run time meters for each vacuum pump. Each vacuum pump shall have an adjustable time delay relay in the VSCP that shall time operating time once the pump starts. If the pump run time exceeds the adjustable relay setting, the pump shall shut down, a "RUN TIME ALARM" indicating light illuminated and a RUN TIME ALARM signaled to the station PLC, SCADA HMI and OIT. The pump shall be removed from service until this condition is reset.

13. The Vacuum Prime System Control Valves are solenoid valves. The valve shall be controlled from the station PLC.

14. The Suction Pipe Vent Valves (SPV-BLV01, SPV-BLV02) are motor-actuated ball valves equipped (on the valve) with OPEN/STOP/CLOSE pushbuttons and OPEN/CLOSED indicating lights. The valve shall be controlled from the OPEN/STOP/CLOSE pushbuttons with over-ride from PLC-1. The indicator lights on the valve shall display the position of the valve.

15. Normal Operation of the Vacuum System is as follows:

    a. Both Vacuum Pump 1 and 2 HAND/OFF/AUTO selector switches on VSCP set in AUTO

    b. PUMP 1/PUMP 2 selector switch on VSCP set to either 1/2 or 2/1-selected pump shall be the lead pump.

    c. When raw water pumping is required, PLC-1 sends a command to close the Suction Pipe Vent Valve. When PLC-1 receives indication the Suction Pipe Vent Valve is CLOSED PLC-1 then sends an OPEN signal to the corresponding Vacuum System Control Valve. (Normal status of Vacuum System Control Valve is CLOSED.)

d. When the Vacuum System Control Valve is open the vacuum tank will provide the required vacuum to prime the raw water pump. If the Low Pressure Switch on the vacuum tank goes high, the VSCP starts the lead vacuum pump. If the High Pressure Switch on the vacuum tank goes high the VSCP starts the lag vacuum pump. The vacuum pump(s) shall run until the Low-Low Pressure Switch on the vacuum tank goes high, at which time all vacuum pumps will stop.

e. Once the Vacuum Priming Valve water level sensor indicates that raw water pump prime has been achieved, the station PLC will call for the Vacuum System Control Valve to close.

f. When a raw water pump is called OFF, the station PLC will ramp the pump down to a stopped state and then send an OPEN signal to the corresponding Suction Pipe Vent Valve. (status of Suction Pipe Vent Valve is OPEN while the corresponding raw water pump is not being requested to RUN by PLC-1.)

16. If the Vacuum Priming Valve sensor indicates that raw water pump priming has been lost while the Raw Water Pump is running PLC-1 shall open the vacuum prime system valve and start a timer in PLC-1. PLC-1 shall close the vacuum prime system valve immediately when the vacuum priming valve water level sensor indicates the Raw Water Pump has been reprimed. Should the vacuum priming valve water level sensor not indicate the raw water pump has been reprimed prior to the timer in PLC-1 timing out the vacuum prime system valve shall close and the raw water pump shall stop.

3.3 SUMP PUMP CONTROL STRATEGY

A. The sump pump system shall be normally controlled from a control panel (Sump Pump System Control Panel, SPCP) supplied by the sump pump supplier. PLC-1, SCADA HMI and the OIT shall monitor the status of the vendor-supplied control panel for pump run status and high sump water level.

1. The SPCP-1 shall provide the following signals to PLC-1:

a. Sump Pump running status of each pump (event)

b. Sump high level alarm

B. The sump pumping system shall consist of two submersible sump pumps (Sump Pump 1/North and 2/South), float switches installed in the sump, and the SPCP. The SPCP shall include the following:

1. Motor starters for the sump pumps.

2. ON/OFF/AUTO/ selector switch for each sump pump, and PUMP ON indicating lights for each pump.

3. HIGH WATER alarm indicating light and horn for the sump.

4. Contacts for remote monitoring of sump pump run status and sump high level by SCADA.

C. When the sump pump selector switch is in AUTO, the pump shall be controlled from the SPCP, based on signals from the corresponding float switch located in the sump.

D. When the sump pump selector switch is in ON, the sump pump shall run. The design intent is to routinely operate the sump pumps in AUTO, with operation controlled from the sump float switches. The ON mode is provided for maintenance purposes.

E. When either or both of the sump pumps are in AUTO mode, the sump pumps shall be activated from the sump float switches. Regular maintenance is required to swap the sump pumps between Sump Pump 1 and Sump Pump 2 to ensure equal run time (see Drawing E-5 for control schematic). The float switch operation shall be as follows (highest to lowest elevation in sump):

1. HIGH WATER ALARM: Alarm is activated if water elevation is at or higher than this float.

2. Sump Pump 1 Start: Sump Pump 1 shall start if water is at or higher than its corresponding float and operate until the sump water level is lower than Sump Pump 1's float. .

3. Sump Pump 2 Start: Sump Pump 2 shall start if water is at or higher than its corresponding float and operate until the sump water level is lower than Sump Pump 2's float.

3.4 MISCELLANEOUS DEVICES

A. The following are miscellaneous devices to be monitored by PLC-1:

1. Security Panel:

   a. Provide signal from security panel to PLC-1 & SCADA HMI for SECURITY ALARM in the event any of the door sensors or internal building motion detectors indicate an intrusion. Security system alarms related to perimeter intrusion (video analytics) shall sound in the DLTWTF Security Building (not SCADA HMI).

   b. Provide signal from security/network rack door to PLC-1 & SCADA HMI for DOOR AJAR ALARM to notify staff when security/network rack is open.

2. SCADA Panel:

   a. Provide two (2) signals from UPS to PLC-1 & SCADA HMI for UPS BATTERY FAIL ALARM and UPS INVERTER FAIL ALARM, respectively.

   b. Provide signal from SCADA panel to PLC-1 for DOOR AJAR ALARM to notify staff when SCADA panel is open.

   c. Provide two (2) signals (one from each PLC panel DC power supply) to PLC-1 and SCADA HMI indicating PLC Panel DC Power Supply 1 (and 2) Failure.

   d. Provide two (2) signals (one from each PLC chassis power supply to PLC-1 and SCADA HMI indicating PLC Chassis Power Supply 1 (and 2) Failure.

3. Electrical Room Temperature:

   a. A temperature element and temperature indicating transmitter shall be provided in the Electric Room and shall provide the Electric Room temperature to the station PLC. The PLC HMI shall provide an adjustable WARNING alarm and HIGH TEMPERATURE set point.

4. Flood Warning:

a. A float switch shall be provided in the Pump Room at elevation 30.50 feet. This float switch shall provide indication of Pump Room flooding to the PLC & SCADA HMI.

5. Smoke Detection:

a. Smoke detectors shall be provided in the Electrical Room and Pump room as shown on plans. Wire to PLC-1 for ALARMing to SCADA HMI.

6. Discharge Pressure:

a. The station discharge piping header shall have a pressure indicating transmitter that shall display pressure locally on the instrument and also provide pressure information to PLC-1. The pressure range for the transmitter shall be 0 - 100 psi.

7. Discharge Flow:

a. Provided a Venturi meter with an upper flow range of 3 mgd, to the station discharge piping. Venturi to be provided with a differential pressure sensor. A flow indicating transmitter shall display flow information locally and provide flow information to the station PLC.

b. The following alarms associated with the raw water pump operation shall be configured in the SCADA HMI:

1) VFD Fault (list reason in alarm)

c. Speed mismatch

d. Measure flow not within deadband of flow setpoint

e. Up to 10 other alarms identified by ENGINEER or OWNER during shop drawing submittal review, equipment coordination, or startup.

8. Power Meters:

a. Provide power meters in MCC-1 for main MCC breaker, Power meter monitoring to SCADA HMI shall indicate:

1) L1 thru L3 current

2) Average Current

3) L1 thru L3 real power

4) Total real power

5) L1 through L3 apparent power

6) Total apparent power

7) Frequency of last cycle

8) Voltage L1-N

9) Voltage L2-N

10) Voltage L3-N

11) Average L-N voltage

12) L1-L2 voltage

13) L2-L3 voltage

14) L3-L1 voltage

15) Average L-L voltage

16) L1 reactive power

17) L2 reactive power

18) L3 reactive power

19) Total reactive power

20) Provide a SCADA HMI alarm indicating utility power loss at Blue Sink Pump Station.

3.5 VIDEO MONITORING

A. The configuration of the Video system shall include, but is not limited to, establishing component names and network addresses with direction from the OWNER (network addresses for cameras and switches shall be assigned by the OWNER), establishing video transmission from the camera to the local network switch; video blanking, motion sensitivity and motion detection alarms, home position, and four preset locations per camera. The following features shall be implemented as a minimum:

1. Password protection
2. Motion detection
3. Motion area and sensitivity
4. Window blanking
5. Alarm / motion activation
6. Recording rate change / recording rate
7. Bandwidth throttling
8. Home position
9. Preset positions
10. Video loss detection
11. System alarming
12. Frame rate
13. Image quality

B. Monitoring Locations

1. The cameras have been located to monitor process locations as shown on the drawings. Each external camera will be installed within a protective dome, providing weather protection and additional security elements. The approximate field of view of each camera is identified in the bid documents, and the field of view for each camera shall be submitted by the CONTRACTOR and presented for review and approval by the OWNER and ENGINEER. The field of view shall be selected and approved during startup by the OWNER and ENGINEER. Sixty days after startup, the configuration of video monitoring components shall be reviewed by the CONTRACTOR with the OWNER for equipment adjustment by the CONTRACTOR based on operational performance and experience.

- END OF SECTION -

SECTION 409100 - PROCESS CONTROL SYSTEM INSTRUMENTS

PART 1 --GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for providing process control instrumentation systems (PCIS) in accordance with the contract documents.

B. Related work specified in other sections includes, but is not limited to, the following:

1. Section 013300 – Contractor Submittals
2. Section 260500 - Basic Electrical Material and Methods
3. Section 409000 - Process Control System General Requirements
4. Section 409050 - Process Control System Description
5. Section 409443 - Programmable Logic Controller Systems
6. Section 409615 - Process Control System Input and Output List

1.2 REFERENCES

A. International Society of Automation (ISA).

B. Underwriters Laboratories (UL): Applicable listings.

C. All electrical work will comply with the requirements of the National Electric Code (NEC) – Latest Revision.

1.3 RESPONSIBILITIES

A. The CONTRACTOR, through the use of a prequalified Instrumentation Supplier and qualified electrical and mechanical installers, shall be responsible to the OWNER for the implementation of the PCIS and the integration of the PCIS with other required instrumentation and control devices.

B. Due to the complexities associated with the interfacing of numerous control system devices, it is the intent of these specifications that the Instrumentation Supplier be responsible to the CONTRACTOR for the integration of the PCIS with existing devices and devices provided under other sections with the objective of providing a completely integrated control system free of signal incompatibilities.

C. As a minimum, the Instrumentation Supplier shall perform the following WORK:

1. Implementation of the PCIS
    a. Prepare hardware submittals
    b. Design, develop, and electronically draft loop drawings (interconnect wiring diagrams) and control panel designs
    c. Prepare the test plan, the training plan, and the spare parts submittals
    d. Procure hardware
    e. Fabricate panels
    f. Perform factory tests on panels
    g. Perform PCIS programming
    h. Perform bench calibration and verify calibration after installation

i. Oversee and certify installation

j. Oversee, document, and certify loop testing

k. Oversee, document, and certify system commissioning

l. Conduct the performance test

m. Prepare Technical Manuals

n. Conduct training classes

o. Prepare record drawings

2. Integration of the PCIS with instrumentation and control devices provided under other sections;

a. Develop requisite loop drawings and record loop drawings associated with equipment provided under other Divisions of these Specifications and OWNER-furnished and existing equipment.

b. Resolve signal, power, or functional incompatibilities between the PCIS and interfacing devices.

D. Certification of Intent

1. Each Bidder shall include with the Bid the following Certification from the selected Instrumentation Supplier:

a. The Certification shall be typed on the Instrumentation Supplier firm letterhead.

b. It shall be signed by an authorized representative of the Instrumentation Supplier's firm.

c. It shall include the following statements:

1) (Corporate name of Instrumentation Supplier) "Hereby certifies intent to assume and execute full responsibility to the CONTRACTOR to perform all tasks defined under Section 409100 - Paragraph 1.3.C.3 in full compliance with the requirements of the Contract Documents."

2) It is certified that the quotation to the CONTRACTOR includes full and complete compliance with the requirements of the Contract Documents without exception."

1.4 SUBMITTALS

A. General: Provide all submittals as specified in Division 01 plus:

1. Provide Shop Drawings as required below.

2. Complete and detailed system schematic drawings showing all components with the pneumatic and electrical point to point connections of each system (wiring and piping diagrams). Include a description of the operation of the system and equipment.

3. Instrumentation equipment specifications: Include manufacturer’s catalog information showing product data, outlines, dimensional drawings and instructions for installation, storage, handling, and protection. Duplicate equipment may be covered by one set of literature.

4. Updated Instrument Data Sheets showing actual manufacturer and devices selected, with all fields completed.

5. The submittal will be organized in a logical manner and have a schematic diagram for each system.

1.5 SUBMITTALS FOR CLOSEOUT

A. Instruction Manuals

1. Refer to Section 017000 - Contract Closeout.

2. Operation and maintenance information – complete descriptive literature/shop drawings for each piece of equipment, including a list and description of all parts of each piece of equipment and instructions for calibration, testing and maintenance requirements.

3. Project Record Documents: Revisions from the Approved shop drawings and previous submittals. This includes as built records such as instrument ranges and actual component/instrumentation locations, including sources of control power.

4. Revised or updated Instrument Data Sheets, P&IDs (IC series drawings), and process flow diagrams showing location of instrumentation and equipment including calibration data.

5. Submittals of Data sheets will be electronic and editable with file naming based on the device tag.

1.6 SYSTEM INTEGRATOR

A. A System Integrator shall be responsible for the implementation and integration of the Process Control and Instrumentation Systems (PCIS) in accordance with the Contract Documents. The System Integrator shall be experienced in the PCIS for raw water pump stations and have successfully completed three (3) PCIS projects within the last ten (10) years that demonstrate experience raw water pump stations with variable frequency drives, vacuum prime systems, pump control valves;

B. The CONTRACTOR shall submit the proposed System Integrator and the list of three (3) reference projects to the ENGINEER for review and approval. The following is a list of the pre-qualified System Integrators which are suitable for inclusion in the Contractor's bid:

1. Rocha Controls

C. Pre-qualification does not exempt the System Integrator or the CONTRACTOR from meeting the requirements of the Contract Documents.

1.7 SECURITY SYSTEM SUPPLIER

A. A Security System Supplier shall be responsible for the implementation and integration of the Security System in accordance with the Contract Documents. The System Supplier shall be experienced in the City of Tampa pump station facilities and have successfully completed three (3) similar security system projects within the last ten (10) years that demonstrate experience with access control, video monitoring, and network communication.

B. The CONTRACTOR shall submit the proposed Security System Supplier and the list of three (3) reference projects to the ENGINEER for review and approval. The following is a list of the pre-qualified Security System Suppliers suitable for inclusion in the Contractor's bid:

1. Site Secure

C. Pre-qualification does not exempt the Security System Supplier or the CONTRACTOR from meeting the requirements of the Contract Documents.

1.8 SPARE PARTS

A. Provide the following spare parts:

1. (1) Smoke Detector
2. (1) Float Switch
3. (2) Pressure Switches
4. (2) Position Switches
5. (1) Submersible Level Transmitter
6. (1) Pressure Transmitter

PART 2 -- PRODUCTS

2.1 GENERAL

A. Provide components to operate on 115 volt AC, single phase, 60 hertz electrical service unless otherwise specified.

B. Provide two-wire transmitter power supplies as required. Loop power supplies are to be installed in the PLC cabinets complete with a separate fuse and blown fuse indicator for each analog circuit.

C. Provide fuses or switches for equipment as recommended by the instrument manufacturer.

D. Provide contacts for control of motor operated or electrically operated equipment rated minimum 5 amps at 115 volts AC, 60 hertz. Provide contacts for low level analog signal switching of the gold bifurcated, cross bar type.

E. Provide 4-20 mA DC analog output signals from all process transmitters.

F. Where interposing relays are required to provide proper contact rating from devices interfacing to the PLCs, install the relays in the PLC cabinets. Refer to Section 409443.

G. Furnish all necessary accessories for installation, including mounting brackets, floor stands, hardware and like items. Mounting hardware shall meet the requirements of the area.

H. Provide tool kits and test equipment, as recommended by the manufacturer, necessary for assembling, calibrating and maintaining equipment.

I. Adverse Environmental Impact: No component of an instrumentation system shall contain liquid mercury.

2.2 PROCESS TAPS, SENSING LINES AND ACCESSORIES

A. Pressure Tap Sensing Lines and Accessories for Pressure Gages and Pressure Switches

1. For Process Sensing Taps in Ductile Iron, Steel and Stainless Steel Piping Systems:

a. Material and Fittings: Type 304 stainless steel pipe (ASTM A 312) and threaded fittings and adapters (ASTM A 403).

b. Sizes: 1/2-inch minimum for main sensing piping and 1/4-inch gage and switch connections.

c. Accessories:

1) For applications not requiring diaphragm seals, provide separate 1/4-inch Type 316 stainless steel threaded gauge cocks for each gauge and switch.

2) For applications requiring diaphragm seals, provide a separate 1/2-inch shutoff ball valve for the process side of the diaphragm seal for each gauge and switch.

2. For Process Sensing Taps in Copper and Thermoplastic Piping Systems:

a. Pipe Material and Fittings: Use same type of pipe material and fittings as that used in the process piping system.

b. Sizes: 1/2-inch minimum for main process sensing piping and 1/4-inch for gage and switch connections.

c. Pressure Rating: Equal to or greater than the applicable system test pressure as specified in the piping schedules on the contract drawings.

d. Accessories:

1) For copper piping system taps with or without seals, provide a separate 1/4-inch minimum threaded brass or bronze gage cock for each gage and switch.

2) For PVC and CPVC piping systems with or without diaphragm seals, provide a separate 1/2-inch threaded ball valve for process sensing line shutoff for each gage and switch. Ball valves are to be thermoplastic.

2.3 SIGNAL LINE TRANSIENT PROTECTION

A. All signal lines for solid state electronic equipment will be equipped with line voltage surge suppressors to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby equipment.

B. This will include, but is not be limited to digital inputs, analog inputs, analog outputs, flow transmitters and level transmitters. The signal line transient protection will be provided on any signal lines which are outside of the building structure housing the DCS control panel.

C. The signal line transient protection will include gas discharge tubes, varistors and suppressor diodes.

D. The unit will be Phoenix Contact terminal block type Plugtrab Model UFBK 2/2, UFBK 2-PE, UFBK2-PE/1, or approved equal.

E. Terminal block will be DIN rail type, mounted in the vertical position.

F. Provide lightning protection termination for all digital and analog signals, plus a minimum of 10 percent spares per panels.

G. Field instruments, for 24V DC analog signals

1. Manufacturers: Phoenix Contact PIPETRAB series.
2. Conduit Mounted: Protection circuit mounted ¾ inch (19 mm) stainless steel pipe nipple.
3. Provide surge protection for analog and digital I/O designed to withstand a 10kA test current of a (8/20) microseconds waveform according to IEC 1024 Application Guide A and ANSI/IEEE C62.41 Category C Area.
4. Surge protection will consist of a multistage hybrid circuit utilizing only diodes and gas discharge tubes but no Metal Oxide Varistors (MOVs).
5. Resistance: Less than 10 ohms of series resistance.
6. Surge protection will have a response time less than 1 microsecond.
7. Maximum Continuous Operating Voltage: Not to exceed 28V DC.
8. Cutoff Frequency: Less than 400kHz (for a 600 ohm system) to allow HART protocol and other superimposed smart digital signals to function.
9. Operating Temperature Range: Minus 40 to 65 degrees C, minimum.

2.4 VENTURI FLOW METER

A. General:

1. Function: Provide differential pressure signal proportional to the square of flow rate.
2. Type:
   a. Differential pressure producers.
   b. Ductile iron flanged line-size device.

B. Service:

1. Process Fluid: Water, unless otherwise noted.
2. Process Fluid Temperature: 40 to 120 degrees F, unless otherwise noted.
3. Process Pressure: 150 PSI

C. Design:

1. Provide modified venturi meter utilizing pure static pressure taps. Do not furnish flow tubes which sense pressure at locations where flow direction is changing, or flow tubes employing entire or partial pitot effects, amplifying the differential.
2. Throat length: at least 0.5 times throat diameter.
3. Outlet cone included angle: 10 14 degrees.

4. Material:
    a. Ductile iron construction, ASTM A- 536-65-45-12, with stainless steel throat liner.
    b. Stainless steel or bronze tap bushings.
    c. 150 pound ANSI flanged end connections.
5. Coat tube exterior with standard factory primer to be field coated same as pipeline. Coat meter interior (except throat liner and pressure tap bushings) with two-part epoxy approved by the National Sanitation Foundation for direct contact with potable water.
6. Meter coefficient independent of Beta ratio and line size and constant for pipe Reynolds number of 80,000 and greater.
7. No debris collecting cavities or annular chambers. Provide two sets of horizontal pressure taps at 180 degrees, stainless steel bushed, 3/4 inch NPT. Provide plugged vent and drain connections at 90 degrees from pressure taps. Provide each pressure tap with full port stainless steel ball valve
8. Static Tap
9. Provide a minimum differential of 100” on pressure reading.

D. Performance:
1. Process Flow Range: to match capacity of supplied pumps
2. Pressure Differential at Full Scale Flow: Approximately as noted.
3. Permanent Head Loss at Flow: Nominally not to exceed 10 percent of maximum pressure differential.
4. Accuracy (Excluding Secondary Instrument Inaccuracy): Plus or minus 0.750 percent of actual reading, uncalibrated, unless otherwise noted.

E. Supporting Calculations:
1. Pressure differential/flow/headloss calculations.
2. Flash/Cavitation calculations.
3. Submit certified flow versus differential curve and hydraulic data. Include flow calculations, coefficient values and tolerances, headloss, Beta ratio and proof that the coefficient is independent of Beta ratio and line size.

F. Features:
1. Provide pressure taps with bayonet style manual vent cleaners.
    a. To allow for in-place tap cleaning, each tap set shall be equipped with a manual cleanout rod.
    b. The rod shaft shall be machined Type 316 stainless steel designed to be permanently installed in the 0.75 inch taps.
    c. The cleanout rod body shall be stainless steel and the sealing fittings shall be stainless.
2. Provide meter with an inspection port and cover in the outlet cone.
    a. Location: Meter recovery section.

b. Cover: Type 316 stainless steel.

c. Fastening Hardware: Type 316 stainless steel.

d. Seal: gasket compatible with potable water.

3. Nameplate: Permanent stainless steel engraved with tag number, pipe inside diameter, throat inside diameter, flange size, pressure rating, and flow direction.

G. Certifications: Provide certified test results by an independent flow lab to substantiate the meter's accuracy over the specified range, the discharge coefficient and permanent pressure loss. The certified test shall be performed on the provided meter (the serial number of the meter used in the test shall match the serial number of the meter supplied.)

H. Manufacturer

1. **Primary Flow Signal; Model HVT-PS**.

2. **BIF**

3. Or approved equal.

2.5 LEVEL TRANSMITTERS – SUBMERSIBLE PRESSURE TYPE

A. Type: Measuring level by continuous measuring hydrostatic pressure via its sensing element, an ion implanted silicon semiconductor chip. Data is transmitted by an analog, 4 to 20 mA DC output signals.

B. Performance Requirements:

1. Accuracy: ±0.25 percent full scale.

2. Zero Offset: ±0.50 percent full scale.

3. Span: ±0.50 percent full scale.

4. Temperature Ranges: -40 to 150 degrees F.

C. Construction Features

1. Diaphragm: Type 316L stainless steel.

2. Housing: Type 316 stainless steel.

3. Cable shall be provided of required length and fully submersible construction. Electrical cable shall be relieved of strain with a stainless steel cable.

4. Power supply: 12 to 28 V DC with surge and lightning protection.

5. Electrical connection: Attached 3-wire, 20 gauge polyethylene shielded unspliced cable.

6. Panel mounted meter shall be factory calibrated for required range, shall accept 4 to 20 mA DC input, shall have 3-1/2 digit vacuum fluorescent display in feet of water, shall be NEMA 4X rated and have two programmable relay outputs for low level alarm and high level alarm.

D. Manufacturers: Provide products of one of the following:

1. **In-Situ, Inc.**

2. **Druck, Inc.**

3. **Ametek.**
4. **Or equal.**

2.6 TEMPERATURE SENSOR

A. Provide sensor with dual compartment housing. One compartment shall contain the electronics and the other shall contain all wiring terminals and receptacles.

B. Provide sensor with integral LCD that displays readings in five digit engineering units.

C. Performance requirements

1. Digital Accuracy: ±0.10 degrees C
2. Input: Two independently configured inputs; 2-wire RTD.
3. Output: 4-20 mA
4. Supply Voltage: 12.0 to 42.4 Vdc

D. Products and Manufacturers: Provide one of the following:

1. **Devar, Inc, Model d-RTTI**.
2. Or equal.

2.7 SMOKE DETECTOR

A. Provide photoelectric sensing smoke detector, 120VAC 60Hz power with battery back-up, Horn minimum 90dBA, with wire guard.

B. Provide smoke detector with dry alarm contacts:

1. One (1) form-A SPST
2. One (1) form-C SPDT

C. Operating temperature: 40º to 100º F.

D. Provide smoke detector rated for operation on SCADA system.

E. Provide a remote test station installed at FFE +5ft for each smoke detector.

F. Manufactures

1. **Sensaphone; Model FGD-0049-B**
2. Or approved equal.

2.8 PRESSURE AND DIFFERENTIAL PRESSURE TRANSMITTERS

A. Differential capacitance cell type. Two-wire, 4-20 mAdc output signal. Loop powered from 24 volts dc nominal. Output load impedance of at least 550 ohms.

B. Microprocessor based "smart" electronics. HART protocol compatible.

C. Accuracy: +\- 0.10 percent of calibrated span.

D. Span and zero continuously adjustable, either locally or via hand-held digital interface.

E. FM approved for installation in Class l, Division l hazardous areas.

F. NEMA 4 housing. Suitable for operation over ambient temperature range of 20 to 120 degrees F.

G. Ceramic or stainless steel wetted parts. Stainless steel bleed and drain fittings. All metal external parts.

H. Integral 4-digit LCD output indicator graduated 0-100 percent. Provide integral mounting bracket suitable for wall or pipestand mounting.

I. 1/2-inch NPT process connections.

J. Manufacturers: Provide products of one of the following:

1. **Endress and Hauser Cerebar/Deltabar S**
2. or equal.

2.9 LEVEL SWITCH – FLOAT TYPE

A. Type: Direct acting, pear shaped, eccentric weighted, displacement type liquid level sensor.

B. Construction Features

1. Float Body: Hollow hermetically sealed, rigidly molded of polypropylene containing mechanical switch and eccentric metal weight.
2. Mechanical Switch: SPDT switch rated 16 amps resistive at 120 VAC and five amps resistive at 30 VDC.
3. Weight: Weight to cause sensor to hang straight down from cable when not immersed and only allow float to pivot when immersed in liquid.
4. Electrical cable:
   a. Heavy duty, three conductor, flexible and submersible cable, sheathed in PVC and connected to float and switch with watertight seal.
   b. Length furnished to be sufficient to extend to junction box.
5. Float must be rated to meet the electrical hazard classification.

C. Products and Manufacturers – Provide one of the following:

1. **Flygt, Model ENM-10.**
2. **Rotofloat**
3. Or equal.

2.10 LEVEL SWITCH – MINI FLOAT TYPE

A. Type: Direct acting, vertically suspendable, displacement type liquid level sensor.

B. Construction Features

1. Float Body: Hollow hermetically sealed, rigidly molded of polypropylene containing mechanical switch and eccentric metal weight.

2. Mechanical Switch: SPDT switch rated 30 watts
3. Maximum float diameter 1.5”, vertical activation.
4. Float to cause sensor to hang straight when not immersed and float without pivot when liquid rises.
5. Electrical cable:
    a. Heavy duty, three conductor, flexible and submersible cable, sheathed in PVC and connected to float and switch with watertight seal.
    b. Length furnished to be sufficient to extend to junction box.
6. Float must be rated to meet the electrical hazard classification.

C. Products and Manufacturers – Provide one of the following:
1. Prosense FLS-VL series.

2.11 PRESSURE SWITCH

A. Type: Switch assembly with diaphragm/piston pressure sensor.

B. Function: Sense gauge or absolute pressure and open or close a contact when the pressure reaches the specified trip point.

C. Performance Requirements
1. Operating Range: As specified in the Instrument schedule or as required by process.
2. Setpoint: As specified in the Instrument schedule.
3. Setpoint Repeatability: ± 1 percent of range.
4. Output: Snap action switch, DPDT rated not less than ten amp resistive at 120 Vac and 1/2 amp resistive at 125 VDC.
5. Switch and Reset Action: Adjustable Deadband.
6. Adjustable Deadband Range and Setting: maximum full scale, minimum 10% of scale.
7. Ambient Temperature Limits: -4°F to 140°F.

D. Construction Features
1. Pressure Transducer Housing and Diaphragm Materials:
    a. Body and Process Connection Bolting: Type 316 stainless steel.
    b. Housing and Cover: Die cast low copper aluminum alloy finished with epoxy paint system; covers shall be threaded and seated on Buna-N O-rings; NEMA 4X rating.
    c. Process Wetted Parts: 316 stainless steel.
    d. Water Service with Copper Pipe: Brass housing with Buna-N diaphragm.
    e. Other Services: 316 stainless steel.
    f. Six inch diameter dial for display, white face, black scale.
    g. Compound gages shall be ranged for operation at mid-point.

2. Set and Reset Point Adjustments: Adjustable external adjusting nuts and pressure setting scales in psi.
3. Process Connection: 1/2-inch NPT.
4. Housing: Copper-free die cast aluminum, NEMA 4X.
5. External Mounting Lugs.
6. Electrical Connection: 3/4-inch NPT.
7. Diaphragm seal.

E. Products and Manufacturers: Provide one of the following:

1. Differential applications: United Electric Series 400 (non hazardous areas, series 120 for hazardous).
2. Gage Pressure : Ashcroft 1279; Ametek Solfrunt Series
3. Compound Gage : Dwyer Series 4000 (liquid service)

2.12 PTZ DOME CAMERA SYSTEMS

A. Each dome camera system shall be composed of a high-resolution 1.3 megapixel (minimum) digital IP color camera, environmental dome drive with pan, tilt, and zoom (PTZ) control, and state of the art electronics housed in a compact aluminum enclosure with a smoked acrylic dome. Enclosures for outside installations shall be equipped with suitable environmental protection including heaters and sun shroud.

B. Camera shall reflect the latest technology available at the time of bid for the IP megapixel camera specified below.

C. The high-resolution color camera shall meet or exceed the following design and performance specifications:

1. The color camera shall be a ¼-inch interline transfer imager meeting NTSC signal format specifications.
2. The image sensor shall have a pixel array of 1280(H) x 960(V), minimum.
3. 1/3” CCD sensor, 18X optical zoom.
4. The camera shall provide a minimum resolution of 540 TV lines horizontal.
5. The camera shall have automatic iris control and gain.
6. The camera shall provide for back light compensation via intelligent image management technology and shall automatically control the iris and be equipped with a manual override.
7. The camera/lens package shall provide for sensitivity as follows:
    a. 0.7 lux in color imaging mode.
    b. 0. 25 lux in black and white mode (mono).
8. The camera shall have a signal to nose ratio of >50 dB.
9. Power supplies for cameras shall be provided in a separate enclosure for mounting in panel or near cameras as required.
10. Built-in power line surge and lightning protection.

11. Electronic image stabilization.
12. Day/night compatibility (day = color, night = black and white). Autoswitchover from color imaging during the day to black and white imaging at night.
13. Video H.264.
14. Frame rate adjustable from 1 to 30 frames per second.
15. Two simultaneous video streams.
16. On board memory slot (SD style) with one 64 GB SD card for each camera.

D. The dome drive shall meet or exceed the following design and performance specifications:

1. Programmable camera settings with 256 presets with 20 character labels for each.
2. Seven alarm inputs and one auxiliary (Form C) relay output.
3. Proportional pan and tilt: continually decrease pan and tilt speeds in proportion to depth of zoom.
4. Variable pan speed: programmable from 1-40 degrees per second.
5. 360-degree continuous pan rotation.
6. IP, RS-422 “P” Series and “D” Series protocols.
7. For pole-mounted cameras, provide composite cable from camera equipment enclosure to camera housing at the top of the pole.
8. Built-in menu system for setup and camera functions.
9. “Auto-Flip” rotates dome 180 degrees at bottom of tilt travel.
10. The camera shall be remotely controllable via digital network such as RJ 45 Ethernet, RS 422 P and D series networks.

E. Product and Manufacturer: Provide one of the following:

1. Axis P33.

2.13 LEVEL SWITCH – BUILDING FLOOD FLOAT TYPE

A. Type: Direct acting, wall mounted, displacement type liquid level sensor.

B. Construction Features

1. Float Body: mechanical switch, 316 Stainless Steel.
2. Mechanical Switch: SP switch rated 100 VA
3. Float to cause sensor to hang straight when not immersed and float pivot when liquid rises.
4. Electrical cable:
    a. Length furnished to be sufficient to extend to junction box.
5. Float must be rated to meet the electrical hazard classification.

C. Products and Manufacturers – Provide the following:

1. GEMS sensors and Controls LS-1950.

PART 3 -- EXECUTION

3.1 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of analyzers, transmitters, probes and pressure switches with piping and equipment installers.

3.2 TRAINING

A. Perform training in accordance with the requirements contained in Section 409800 - Process Control System Training of these specifications and as specified in the Equipment Datasheets.

3.3 MANUFACTURER'S FIELD SERVICES

A. Secure the services of factory personnel for instrument start-up and calibration. Calibrate each instrument, including its complete instrument loop. Indication at remote receiving instruments, including any SCADA system operator interface screens, shall be equal to readings at local transmitter indicators.

B. Provide written loop-calibration report for each instrument loop, which shall include, but not limited to the following:

1. Date and time the final calibration was completed.
2. Weather conditions at the time the final calibration was performed.
3. Comparison of readings at the local transmitters with readings at the remote receiving instruments.
4. Verification of operation of all contact outputs, including those at the receiving instruments.
5. Description of method of calibration.
6. Provide a table showing calculated and measured values at 0%, 25%, 50%, 75%, and 100%.
7. Names and signatures of factory personnel performing calibration.
8. Names and signatures of Owner representative witnessing calibration process.

- END OF SECTION -

SECTION 409413 - PROCESS CONTROL SYSTEM COMPUTER AND NETWORK HARDWARE

PART 1 --GENERAL

1.1 SUMMARY

A. This Section includes requirements for providing computer and network equipment for a computer based SCADA (Supervisory Control and Data Acquisition) system, including software package as required. CONTRACTOR will provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and implement a fully functional Process Control System.

1. Work includes all software elements of the SCADA system specified. Provide a complete SCADA system including software configuration as part of the work. The hardware required for the Process Control System is shown on the Control System Configuration Diagram and is composed of the following types of major monitoring processing and control equipment units:

a. Ethernet Communication System.

b. PLCs including processors, chassis, I/O cards, communication cards, etc. as specified in related Sections

c. Operator Interface Terminals (OIT) for interfacing with PLCs

d. Human Machine Interface (HMI) computers for interfacing with PLCs

e. Network communication devices.

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Submittals
2. Section 408050 - Process Control System Commissioning
3. Section 409000 - Process Control System General Requirements
4. Section 409050 - Process Control System Descriptions
5. Section 409100 - Process Control System Instruments
6. Section 409443 - Programmable Logic Controller Systems
7. Section 409513 - Process Control System Panel Enclosure and Equipment
8. Section 409615 - Process Control System Input and Output List
9. Section 409800 - Process Control System Training
10. Section 409850 - Process Control System Testing

1.2 SYSTEM DESCRIPTION

1.3 SUBMITTALS

A. Submittals will be as required in Division 01 and Division 04.

1. Provide all documentation corresponding to SCADA software development and configuration.

2. Provide hard-copy printouts of all graphics screens.

3. Provide digital copy of the fully configured system or modifications submitted in CD-ROM format.

4. CONTRACTOR will submit fully documented electronic editable and paper copy of PLC, HMI, OIT programs, data tables, system addressing, and I/O Point lists to OWNER for their support of the system. These submittals will be provided before each factory test, each system acceptance, and updated at the end of the warranty period.

5. CONTRACTOR will submit requests for network address for each system and obtain these addresses from the OWNER.

6. CONTRACTOR will submit proof of software licenses demonstrating that the license is held by the OWNER for all licensed software.

7. CONTRACTOR will submit detailed project specific datasheets on hardware, software packaged by system, panel, and application.

8. Electronic (editable copy) of PLC code, HMI application program and OIT code.

9. CONTRACTOR will submit OEM software supplied by the manufacturer for each component, including operating system, application programs, diagnostic tools, etc.

10. CONTRACTOR will submit rack, communication card, and i/o card layouts with calculations for power supplies indicating power draw and heat release for each rack and power supply

1.4 QUALITY ASSURANCE

A. The SCADA system additions and modifications will be provided by a single systems-integrator who also supplies the process control hardware described in Section 409443.

B. The System manufacturer will demonstrate a minimum of five years experience providing Process Control Systems and be able to show evidence of at least five installations of equal or greater size to the one being specified.

1.5 WARRANTY

A. The warranty on the hardware and software will be three years, minimum.

1.6 MAINTENANCE

A. The System Integrator will provide recommended preventive maintenance tasks, schedules and instructions for hardware supplied. The PM documentation must be clear, applicable to hardware provided, concise and accurate.

1.7 TROUBLESHOOTING

A. The System Integrator will provide trouble-shooting procedures for hardware supplied. The procedures will be accurate, easy to understand and follow, current, and comprehensive in scope. If links to vendor website or technical support is necessary the vendor will provide up-to-date phone numbers and links.

PART 2 -- PRODUCTS

2.1 OPERATOR AND ENGINEERING WORKSTATIONS

A. General:

1. Operator and Engineering Workstations will be utilized as the human-machine interface (HMI), as shown. The functionality of the OIT will be replicated utilizing the HMI platform to provide control from the Operator workstations as shown. This Project will utilize a minimum of the quantity as shown and the mouse devices will be the primary operator input devices with keyboards as the supplementary input device. All stations will be functionally similar as to display arrangements, menu selections, command terminology, and data access methods.

2. All Workstations will be functionally interchangeable differing only in the software installed on each type. All Workstations will be capable of accessing both typical operator process control functions and Engineering configuration functions, through configurable software environments. Each Workstation's functional environment will be password protected for system security and user identification. Required number of Workstations will be provided as shown. System manufacturers that utilize separate Workstations for Operator and Engineering configuration functions will supply a configuration that allows the Engineering configuration functions to be performed at any and all Sites where operator interface is installed.

3. Because computer specifications change rapidly the CONTRACTOR will be responsible for providing reasonably current technology, even if those specifications are not addressed in this document. In no circumstances will the minimum requirements not be met. The specifications listed below are based on what is reasonably available at the time of the bidding process.

B. CONTRACTOR is responsible for coordinating workstation hardware and software with requirements as stated by the manufacturer of the HMI software.

2.2 OPERATOR INTERFACE TERMINALS

A. General:

1. Operator Interface Terminals (OIT’s) will be utilized as the interface to the PLC for a specific subsystem or particular process, as shown on the Contract Drawings. All stations will be functionally similar as to display arrangements, menu selections, command terminology, and data access methods.

2. All OIT’s of a given type will be functionally interchangeable differing only in the software installed on each type. All OIT’s will be capable of accessing typical operator process control functions. Each station's functional environment will be password protected for system security and user identification. Required number of OIT’s will be provided as shown.

B. OIT: The color OIT will meet the following requirements:

1. Display Screen Size: 15.0 inches, diagonally measured, backlighted.

2. Resolution: 1024 X 768 pixels, 24-bit color graphics.

3. Display and keypad type: Color TFT resistive touch screen and 22 key stainless steel domed membrane keypad.

4. Memory: 128 MB, minimum.

5. Storage Memory: 64 MB of flash memory on a removable compact Flash card to hold all required process application, alarm, help, form and recipe pages.

6. Supply Voltage: 120 VAC.

7. Communications: Ethernet.

8. Mounting: Unit will be mounted on the front face of panel, as indicated on the Drawings.

9. Provide 4 protective overlays for screen and keypads.

10. Manufacturer and Model:

    a. **Allen Bradley PanelView Plus,** No substitutions

2.3 NETWORKS

A. Ethernet:

1. Furnish and install a process Ethernet network. The network will be arranged such that future nodes can be added at any point(s) along the network without overloading the system or requiring re routing of the cable being installed under this Contract.

2. Topology will be as shown on the Drawings. Provide all hardware, including but not limited to, cabling, switches, connectors, convertors, patch panels, POE surge protection, power supplies, accessories and appurtenances to provide a fully functional Ethernet network. All network wiring and connections will be 100MBPs network category rated.

3. Where redundancy is shown or specified, Ethernet networks will be completely independent and isolated. Separate VLAN on the same physical equipment will not be acceptable unless shown on the drawings.

4. Rack mounted Ethernet network switches:

    a. Provide Ethernet Switches in sufficient quantity to allow connections for all nodes shown and specified and to provide 25% spare ports for future use with a minimum of 24 ports. Switches will be configurable using Cisco IOS.

    b. Manufacturer and Model: As shown on Drawings, no substitutions.

    c. Requirements for the Network components for the Security system are shown on the drawings.

B. Panel Mounted Ethernet switch (Rail Switch) as shown on Drawings shall be manufacturered by **Hirschmann Model RS-20**, no substitutions.

C. Provide configuration software to fully implement network monitoring and diagnostic functions for each type of network.

1. Rockwell software **Factory Talk View** or approved equal for OIT

2. **Citect HMI**

D. CONTRACTOR will identify necessary network addresses, masking, and required custom configuration requirements for each network. OWNER will assign these configuration requirements and CONTRACTOR will implement using addresses, etc furnished by the OWNER.

PART 3 -- EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

A. The complete monitoring and control system and associated input/output wiring will be used in an industrial water treatment facility environment where there will be high energy AC fields, DC control pulses, and varying ground potentials between the transducers or input contact locations and the system components. The system design will be adequate to provide proper protection against interferences from all such possible situations. Refer to Section 409000 for environmental conditions.

3.2 INSTALLATION

A. Process Control System

1. System Integrator will be responsible for furnishing all required hardware, software, and tools for configuring, testing, and troubleshooting the monitoring and control system

2. System Integrator will complete a full setup, including assigning node and network addresses, equipment identification, and document the setup on configuration sheets. The configuration sheets will clearly identify parameter settings, switch settings, software settings. These sheets will be submitted for record.

- END OF SECTION -

SECTION 409443 - PROGRAMMABLE LOGIC CONTROLLER SYSTEMS

PART 1 -- GENERAL

1.1 SUMMARY

A. Section includes requirements for furnishing, programming, configuring, and installing instrumentation and control systems including all work and materials necessary to perform control and monitoring functions as illustrated on drawings.

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Contractor Submittals
2. Section 408050 - Process Control System Commissioning
3. Section 409000 - Process Control System General Requirements
4. Section 409050 - Process Control System Descriptions
5. Section 409100 - Process Control System Instruments
6. Section 409413 - Process Control Systems Computer and Network Hardware
7. Section 409513 - Process Control System Panel Enclosure and Equipment
8. Section 409615 - Process Control System Input and Output List
9. Section 409800 - Process Control System Training
10. Section 409850 - Process Control System Testing

C. Programming and Software Configuration

1. All programming and software configuration for the PLC will be included as part of this Contract work.

2. All programming and software configuration of any package control system PLCs will be included as part of this Contract work

3. PLC configuration and programming will comply with the recommended practices published by the hardware manufacturer. Programming and configuration convention standards published by the OWNER will be followed.

D. Provide all submittal documents within 90 days of Notice to Proceed.

E. Work includes all elements of the systems specified. Provide all control hardware complete with power supplies, enclosures, accessories, and other appurtenances. Provide installation of new equipment, and testing necessary for the proper operation of the control system.

1.2 REFERENCES

A. Section 014000 - Quality Control: Requirements for references and standards.

B. Section 014220 – References: Requirements for references and standards.

C. American Society for Testing and Materials, (ASTM):

1. ASTM D999 - Standard Test Methods For Vibration Testing Of Shipping Containers.

D. Canadian Standards Organization, (CSA):

1. CSA Certification Class I, Division 2, Group A, B, C, D Hazardous or nonhazardous locations

2. CSA Standard C22.2 No. 142 for Isolation Voltages

E. Institute of Electrical and Electronics Engineers, (IEEE):

1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

2. IEEE Std. 472-1974/ANSI C37.90/90A-1974.

F. National Electrical Manufacturers Association, (NEMA):

1. NEMA ICS 1 - General Standards for Industrial Control and Systems.

2. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.

3. NEMA IA 2.2 - Programmable Controllers - Equipment Requirements and Tests.

4. NEMA IA 2.3 - Programmable Controllers - Programming Languages.

5. NEMA ICS 3 - Industrial Controls and Systems: Factory Built Assemblies.

6. NEMA ICS 6 - Industrial Controls and Systems: Enclosures.

G. International Electrotechnical Commission, (IEC):

1. IEC 60068-2.1 - Environmental Testing Part 2: Tests - Tests A: Cold

2. IEC 60068-2.2 - Basic Environmental Testing Procedures - Part 2: Tests - Tests B: Dry Heat.

3. IEC 60068-2.3 - Basic Environmental Testing Procedures Part 2: Tests - Test Ca: Damp Heat, Steady State.

4. IEC 60068-2.6 - Environmental Testing - Part 2: Tests - Test Fc: Vibration.

5. IEC 60068-2.27 - Basic Environmental Testing Procedures Part 2: Tests - Test: Shock.

6. IEC 61000-4.2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test.

7. IEC 61000-4.3 - Electromagnetic Compatibility (EMC) - Part 4-3: Testing and Measurement Techniques - Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.

8. IEC 61000-4.4 - Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques - Section 4: Electrical Fast Transient/Burst Immunity Test.

9. IEC 61000-4.5 - Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques - Section 5: Surge Immunity Test.

10. IEC 61000-4.6 - Electromagnetic Compatibility (EMC) - Part 4-6: Testing and Measurement Techniques - Immunity To Conducted Disturbances, Induced By Radio-Frequency Fields.

H. International Electrical Testing Association, (NETA):

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

I. National Fire Protection Association, (NFPA):

1. ANSI/NFPA 70 - National Electrical Code.

J. Underwriters Laboratories Inc., (UL): Applicable listings.

1. UL 50 - Enclosures for Electrical Equipment.

2. UL 508 - Industrial Control Equipment.

3. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings.

K. NSTA Project 1A.

L. CISPR 11 (EN 55011).

1.3 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01.

1. Submit data sheets and catalog literature on each type of equipment.

2. Submit programming and installation manuals for each type of equipment.

3. Spare parts List

B. Documentation:

1. Provide all documentation related to PLC software development and configuration.

2. Furnish all manuals, PLC logic documentation and application programmer’s notes.

3. Furnish listing of PLC register tables, including cross references.

4. Furnish hard copy printout of all PLC logic and PLC project documentation at project closeout.

C. Operation and Maintenance Manuals: Submit operation and maintenance manuals in accordance with General Conditions.

D. Submittals for Closeout: Provide submittals as required below.

1. Section 017000 - Contract Closeout: Closeout procedures.

2. As-Built Drawings: Accurately record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets. Include copy of manufacturer's certified drawings.

3. Operation and Maintenance Data:

   a. Submit bound copies of operating and programming instructions.

   b. Submit description of system operation, adjusting and testing required.

   c. Submit card replacement, adjustments, and preventative maintenance procedures and materials.

   d. Identify system maintenance requirements, servicing cycles, lubrication types required and local spare part sources.

4. System Documentation:

   a. System Abstract:

      1) Provide clear statement of task, define function of major hardware and software components.

      2) Design strategy used to implement solution.

      3) Statement of objectives.

   b. System Configuration: Pictorial drawing of hardware elements, show physical location of subsystems, designation of I/O rack address assignments, simplified connection.

   c. Include complete wiring diagrams inputs and outputs for each PLC module, show point address assignments. If field devices are not wired directly to I/O module show terminal block number.

   d. I/O Address Assignments: Identify each field device by address based on rack group and terminal, the type of I/O module, the device and the function the device performs in the field.

   e. Internal I/O Address Assignments: Identify used and unused addresses, show type and description.

   f. Register Assignments: Identify each available system register, weather used for user storage register or I/O register.

   g. Program coding printout showing each programmed instruction and associated address of each input and output.

   h. Reproducible stored program stored on compatible electronic media.

   i. Program coding for each PLC, in annotated ladder diagram form, include the following:

      1) Program titles.

2) Multiple subtitles.
3) Date and time the documentation was last produced.
4) Page numbering.
5) Extensive commentaries before and after each rung.
6) Contact or element description.
7) Address for each contact.
8) Pictorial representation of each instruction (coils, contacts, etc.)
9) Rung numbers.
10) Rungs where each contact is used.
11) All preset values of registers used.
12) Identification of all internals and real inputs and outputs.
13) Mapping of all I/O for porting over to SCADA.

1.4 SPARE PARTS

A. Provide the following spare parts:

1. One digital input module of each type utilized
2. One digital output module of each type utilized
3. One analog input module of each type utilized
4. One analog output module of each type utilized
5. One power supply assembly of each size utilized
6. One communication module of each type utilized
7. One dozen fuses of each size furnished
8. One dozen relays of each type utilized
9. One chassis of each size utilized
10. One processor of each type utilized

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. General

1. Provide PLC hardware in accordance with the following specifications. System Control is Allen Bradley ControlLogix hardware platform as specified and shown on drawings. Do not substitute.

B. ControlLogix PLC System:

1.	CPU:	Allen Bradley ControlLogix processor with 4-MB memory. Allen Bradley 1756-L73.
2.	Power Supply:	Allen Bradley 1756-PA72, 120 AC, 60 Hz input power, with 75W output.
3.	I/O Rack or Chassis:	Allen Bradley 1756-A(x) chassis having sufficient slots for installed modules plus 4 spare slots for future use. ,
4.	Discrete Input Module:	16-point, 24VDC, isolated high-density module. Allen Bradley 1756-IB16I.
5.	Discrete Output Module:	16-point, 24VDC, to be utilized in conjunction with interposing relays as specified in Section 40 95 13. Allen Bradley 1756-OB16I.
6.	Analog Input Module:	6-point, 16-bit resolution, 4-20 mA DC input module. Fully isolated inputs. Allen Bradley 1756-IF16.
7.	Analog Output Module:	6-point, 13-bit resolution, 4-20 mA DC isolated output module. Allen Bradley 1756-OF6VI.
8.	Chassis Slot Filler:	Filler module to occupy spare, unused slots. Allen Bradley 1756-N2.
9.	Ethernet Adapter:	Provide Ethernet bridge module with embedded switch technology for messaging between PLCs and remote I/O chassis modules. RJ-45 port. Allen Bradley 1756-ENBT.

C. Programming Software:

1. Provide the latest version of Windows® compatible RSLogix 5000 Software, Professional Edition, part no. 9324-RLD700NXENE, node locked for the PLC editor and RSLinx part no. 9355WABSNENE.

2. Programming software to be turned over to the OWNER at the completion of the project.

2.2 ENCLOSURES

A. Provide the PLC in the enclosures shown on the drawings and as specified in Section 40 95 13.

2.3 POWER SUPPLY

A. Manufacturer:

1. Allen-Bradley Model 1756-PA72.

B. Selection:

1. All power supplies will be redundant.

2. All redundant power supplies, for local and remote chassis, will be separately mounted.

3. Choose the power supplies to meet the current requirement based on the maximum draw of the modules plus 10 percent spare

4. The modules will include processors, all input / output modules, specialty modules and spare requirements.

5. The redundant power supplies will be designed to share the current required by the chassis. In the event of a failure of one redundant power supply, the remaining supply will accommodate the entire load of the chassis without disruption to the chassis activity.

C. Features:

1. Line Voltage Rating: 85 to 265 Volts ac, 47 to 63 Hz.

2. Switch to turn backplane power ON and OFF at the connected chassis.

3. Automatically shut down the Programmable Controller system whenever its output power is detected as exceeding 125 percent of its rated power.

4. Provide surge protection, isolation, and outage carry-over up to 2 cycles of the AC line.

5. Provide a failsafe fuse that is not accessible by the customer.

6. Provide a solid state relay connection to allow for failure annunciation when wired to an input module.

7. Provide a plastic barrier that separates the input power cable from the annunciator cable.

8. Diagnostic LED status indicators for Power and redundancy.

9. Accept number 14 AWG (single wire only) per terminal maximum.

2.4 CHASSIS

A. Manufacturer:

1. Allen-Bradley Model 1756-AX (where X represents number of slots).

B. Selection:

1. Provide panel mounted chassis as required for the project.

2. A maximum of two chassis configurations will be utilized on the project.

C. Features:

1. Panel Mount Chassis Size: 4, 7, 10, 13 or 17 slot as required to meet Project Requirements.

2. No tools will be required for insertion of modules.

PART 3 --EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Inputs and Outputs Isolation

1. Design PLC discrete inputs to monitor dry contact closures, sourced from the PLC enclosure.

2. Design PLC discrete outputs to energize terminal block style interposing relays as specified in Section 409513 - Process Control System Panel Enclosures.

B. Provide all communication cables necessary for complete working systems. Provide surge protection on all communication ports as necessary.

C. Interface with Other Products

1. Provide all special interface modules necessary for complete working systems. These will include all necessary cables and connectors as required.

D. Testing

1. Test all control function as described in Division 1, Section 408050 - Process Control System Commissioning, Section 409050 - Process Control System Descriptions, and Section 409850 - Process Control System Factory Testing.

END OF SECTION

SECTION 409513 - PROCESS CONTROL SYSTEM PANEL ENCLOSURES AND EQUIPMENT

PART 1 -- GENERAL

1.1 SUMMARY

A. Section includes technical requirements for fabrication, engineering, wiring and installation of instrument panels and enclosures and providing the panel mounted instruments and equipment. These include, but are not limited to the following:

1. Panel Construction
2. Panel Wiring
3. Panel Mounted Equipment

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Submittals
2. Section 260500 - Basic Electrical Material and Methods
3. Section 408050 - Process Control System Commissioning
4. Section 409000 - Process Control System General Requirements
5. Section 409050 - Process Control System Description
6. Section 409100 – Process Control System Instruments
7. Section 409413 - Process Control Systems Computer and Network Hardware
8. Section 409443 - Programmable Logic Controller Systems
9. Section 409615 - Process Control System Input and Output List
10. Section 409800 - Process Control System Training
11. Section 409850 - Process Control System Factory Testing

C. Panels provided by manufacturer as part of package control systems:

1. Certain control panels are furnished by manufacturers of equipment specified under other Sections as part of a package control system. In general, those panels will meet the requirements of this specification section.

1.2 SUBMITTALS

A. General: Provide submittals as specified in Division 01, and as required in Section 409000 – Process Control System General Requirements.

B. Pre-Construction Submittals

1. Product Data: Submit manufacturer’s official and published product data, specifications, and installation recommendations for each item. Product data will include terminal wiring details, and manufacturing data.
2. Shop Drawings: Include the following information:
   a. Bill of materials
   b. Front panel layout

c. Internal panel layout
d. Internal wiring diagrams, including wire type, size and identification number
e. PLC card layout and wiring
f. Terminal block layout
g. Nameplate lists
h. Color schedules
i. Elementary control diagrams
j. Equipment weights

3. Provide loop diagrams conforming to ISA-S5.4 “Instrument Loop Diagrams”.

C. Submittals for Closeout: Provide submittals as required below.
1. AS Built Drawings
2. Test Reports

1.3 QUALITY ASSURANCE

A. Comply with the applicable provision of the following codes and standards:
1. Underwriters Laboratory (UL)
a. UL50 Enclosures for Electrical Equipment
b. UL508 Industrial Control Equipment
c. UL870 Wireways Auxiliary Gutters and Associated Fittings
2. Electrical Testing Laboratory (ETL)
3. National Electrical Code (NEC)
4. National Fire Protection Association (NFPA) 79, Electrical Standard for Industrial Machinery
5. International Society of Automation (ISA)

B. All electrical materials and equipment will be new and bear the label of the Underwriters’ Laboratory (UL), Inc., Factory Mutual (FM) or equivalent where standards have been established and label service regularly applies.

C. All Process Control System Panels furnished as part of Division 40, including DCS/PLC control panels, will comply with the requirements of UL-508A, and NEC 409, Industrial Control Panels. Panels furnished under Section 260560, Electrical Requirements for Shop-Assembled Equipment will meet the requirements of that section.

D. Provide integrated process control systems. Assign complete responsibility for furnishing, coordination, assembly, and installation supervision of all equipment to one Systems Integrator regularly engaged in the manufacture, assembly and production of systems of type specified. Provide complete, satisfactory, and trouble-free operating installation.

E. Furnish like instruments from the same manufacturer. Minimize number of different manufacturers.

F. Furnish safety and regulatory labels required by NEC, NFPA, and UL.

PART 2 --PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Panels and enclosures will meet the NEMA requirements for the type specified.

B. Sizes shown are estimates. Furnish panels and enclosures amply sized to house all equipment, instruments, front panel mounted devices, power supplies, power distribution panels, wiring, tubing and other components installed within.

C. Panels located inside control or electrical room areas will be NEMA 12 rated unless specified otherwise and be constructed of Type 304 or 316 SST

D. Panels located in process areas or outdoors will be NEMA 4X unless specified otherwise and be constructed of Type 304 or 316 SST.

E. Provide lifting rings on panels in excess of 100 pounds.

F. Panels are to be sized by the integrator based on the equipment furnished. Minimum panel sizes are shown on the drawings. Panels may be increased in size only upon approval from the ENGINEER based on substantiated request. Provided panels shall have a minimum of 6” free space between the nearest backplane mounted components and the sides, top and bottom of the enclosure. Components may not be stacked from front to back, may not be installed on the top, bottom or sides of the enclosure. There shall be a minimum 25% unutilized area on the backplane for future expansion.

G. Panel Mounted Equipment

1. Unless otherwise specified, provide components to operate on 120 Volts AC single phase 60-Hertz power.
2. Provide redundant 24Vdc two-wire transmitter power supplies as required. Redundant power supplies shall be wired to automatically switch off of a failed power supply to the redundant power supply. SCADA monitoring of power supply status shall be provided.
3. Provide interposing relays surge protection devices and signal isolators to protect panel mounted equipment from electrical surges induced in field wiring.
4. Provide engraved laminated nameplates to identify each panel mounted component. The nameplates will have black lettering on white background. Lettering height will be 3/16-inch minimum.

H. Backup Power Supply

1. Design the PLC panel to accept two power feed circuits.
    a. Provide the service light with door contact switch and the duplex service receptacle with its own circuit breaker and power feed (from separate lighting panel circuit).
    b. Provide UPS supply receptacle with its own circuit breaker and power feed (from separate lighting panel circuit).
    c. The UPS shall be sized by the integrator to power all panel components and

19” rack mounted components in the Security/Network rack for a minimum of 15 minutes during a power outage.

d. The UPS status shall be monitored via SCADA.

e. Wiring, switching and controls (mechanical relay based) shall be provided to automatically switch the AC power supply to utility upon a UPS inverter failure

f. The UPS shall be DIN rail mounted or elevated off the enclosure floor via a stainless steel support.

g. All panels shall be solely top fed.

2. UPS Manufacturers:

a. Powerware

b. APC

c. MGE

2.2 PANEL CONSTRUCTION

A. NEMA 12 Panels

1. Fabricate enclosures using Type 316 stainless steel. Stainless steel will be free of pitting and surface blemishes.
2. Continuously weld all exterior seams and grind smooth.
3. Provide stiffening members for strength and stiffness as required.
4. Panel will be flat within 1/16-inch over a 24-inch by 24-inch area, or flat.
5. Use pan type construction for doors. Door widths will not exceed 36-inches.
6. Mount doors with full length heavy duty piano hinge with stainless steel pin.
7. Provide oil resistant gasket completely around each door or opening.
8. Provide handle-operated, oil-tight, key-lockable three point stainless steel latches.
9. Use stainless steel fasteners throughout.
10. Provide interior mounting panels and shelves constructed of minimum 12 gage steel.
11. Provide print pocket on door interior.
12. Provide enclosure mounting supports as required for floor, frame, or wall mount.
13. Provide all holes and cutouts for installation of conduit and equipment. Provide water tight conduit hubs. (Double locknuts are not acceptable.)
14. Completely clean all interior and exterior surfaces so they are free of dirt and corrosion.
15. Stainless Steel Panels:

a. Do not paint stainless steel enclosure exterior surface.

b. Cover, sides, top and bottom to have smooth #4 brushed finish.

16. Manufacturers:

a. Hoffman Enclosures Co., or equal

B. NEMA 4X Panels

1. Fabricate NEMA 4X enclosures from Type 316 stainless steel.
2. Provide non-corrodible metal hardware including hinge and cover clamps.
3. Do not paint stainless steel enclosure exterior surface.
4. Sandblast, roughen, or chemically etch stainless steel enclosures to reduce gloss, reflections and glare.
5. Provide conduit knock-outs prior to installation of equipment inside enclosure. Provide water tight conduit hubs. (Double locknuts are not acceptable.)
6. Provide door clamps on three sides of enclosure door. Clamps will be quarter-turn or similar tool-less means.
7. Rolled lip around three sides of door and along top of enclosure opening.
8. Hasp and staple for padlocking.
9. Provide a clear plastic, gasketed lockable hinged door to encompass all non-NEMA 4 front of panel instruments.
10. Manufacturers:
    a. Hoffman Enclosures, or equal

2.3 PANEL GROUNDING

A. Provide ground busbars, which will be directly wired and connected to facility grounding system.

B. Provide dc ground bus (for analog cable shield termination) bonded to chassis ground.

C. Provide nickel-plated copper busbars, with current rating of 100 amperes.

D. Provide each busbar with at least twenty (20) screw clamp terminal blocks, each capable of accepting #10 AWG conductors.

E. Provide ground lug on each door and connect lug to the ground bus within panel.

2.4 PANEL WIRING

A. Terminate all wiring, to and from field devices, at panel terminal blocks, not on equipment terminals.

B. Do not terminate more than two wires at the same terminal. Wiring splices and wire nuts will not be permitted within the enclosure.

C. Provide wire identification at each wire end. Utilize computer-generated, heat-shrink type wire markers.

D. Install all wiring in plastic wiring ducts, provided with snap-on covers. Size ducts to include at least 100% spare capacity. Restrain all wiring outside of ducts with plastic ties.

E. Group and wrap all wires passing a door hinge in protective wire harness. Provide abrasion protection for wire bundles passing through holes or across sheet metal edges.

F. Provide panel wiring of stranded copper with 600-volt rated thermoplastic insulation.
   1. Power wiring: No. 14 AWG minimum
   2. Control wiring: No. 18 AWG minimum
   3. Electronic signal wiring: No. 18 twisted shielded pair minimum
   4. Ethernet network wiring: Category 6e minimum
   5. Other serial communication cables: As recommended by equipment manufacturer.

G. Wire color convention will comply with NFPA 79, part 16:
   1. Line, load, and control conductors: black.
   2. Neutral: white.
   3. Equipment safety ground: green.
   4. AC control circuit: red
   5. DC control circuit: blue
   6. Foreign voltage control wire: yellow

H. Physically separate AC wiring from DC wiring.
   1. Where AC and DC wiring runs in parallel, provide at least 2 inch separation in separate wire ducts.
   2. Where AC and DC wiring cross, they will cross at 90°.
   3. The panel design shall maximize separation of AC and DC wire ducts.

I. Do not daisy-chain neutral wiring and grounding conductors at equipment terminals. Provide terminal blocks that accept jumper bridges.

2.5 TERMINAL BLOCKS

A. Provide terminal blocks for field wiring and equipment wiring terminations. Provide unique identification at each terminal block.
   1. Arrange terminal blocks in consecutively, based on standard alphanumeric order.
   2. Group terminal blocks based on voltage level and function.
   3. Color code foreign voltage terminal block identification to match wire insulation.

B. Provide at least 25% spare terminal blocks for each type used in each enclosure.

C. Provide high-density modular type terminal blocks suitable for mounting on standard DIN rails.
   1. Material: Nylon
   2. Termination type: tubular screw with serrated pressure plate.
   3. Current carrying parts (metal bodies): nickel or tin-plated copper.
   4. Ground terminal blocks will be dual color type: Green and Yellow.
   5. Maximum conductor size: No. 8 AWG stranded.
   6. Current rating: Up to 15 amperes at 250 volts AC.

7. Supply manufacturer jumper bridges, designed to fit on terminal blocks. Do not daisy-chain wiring.

D. Provide fused terminal blocks or DIN rail mounted circuit breakers for panel power distribution.

1. All digital I/O will be individually fused.
2. Provide disconnect lever and fuse-puller mechanism.
3. Provide illuminated indication to indicate status of load-side power.
4. Fuses will be standard 1/4" by 1-1/4", and sized to protect load.
5. Provide DIN Rail breakers with trip indication and mechanical reset.

E. Provide two-level type terminal blocks for PLC discrete input and outputs. Both levels will be of the feed through types.

F. Provide three-level type terminal blocks for analog signal wiring. Top and center terminations will be feed through types. Bottom termination will be grounded to isolated mounting railing, connected to the dc ground bus.

G. Manufacturers:

1. **Phoenix Contact**
2. **Allen Bradley**
3. **Weidmuller**
4. Substitutions: See Section 01 63 00

2.6 PANEL MOUNTED EQUIPMENT

A. Provide panel heaters, vapor type corrosion inhibitors and breather drains for condensation and corrosion control inside panel. Provide panel heaters of the forced air types, complete with thermostatic control.

1. Manufacturer: **Cortec VpCI-111, Hoffman,** or equal

B. Provide one (1) UPS supply receptacle, 120 VAC, 20A duplex type.

C. Provide one (1) “service receptacle”, 120 VAC, 20A duplex, GFCI grounding type receptacle.

D. Provide one (1) 120 VAC fluorescent light fixture with 40 watt lamp and protective plastic shield. The light fixture and lamp shall be the maximum available width that fits within the width of the provided enclosure.

E. Provide one (1) 120 VAC, 20A door operated switch.

F. Interposing Relays

1. Provide interposing relays to interface all PLC discrete outputs with field-mounted equipment.
2. Provide high density, DIN rail mounted type relays, with coils, contacts, and voltage ratings as required. Contacts will be rated 10 Amperes at 120 volts minimum. Relays will have LED indicator to indicate coil status.

3. Relays for control of motor starters larger than NEMA size 1 will be DPDT, rated 15 Amperes at 250 VAC.

G. Regulated Power Supplies

1. Provide regulated DC power supply as required for 2-wire analog loops. Size power supplies to include 100% spare capacity. Do not power more than three transmitter loops from the same power supply.
2. Power supplies will be as follows:
    a. Input power: 110 Volts AC, 60 Hz.
    b. Output power: 24 Volts DC at 200 mA or 500 mA
    c. Output regulation: <1%
    d. Operating temperature: 0 to 50° C
    e. DIN Rail mountable.
3. Manufacturers:
    a. Phoenix Contact
    b. Action Instruments
    c. Sola
    d. Puls
    e. Substitutions: See Section 01 63 00

H. Control Devices and Pilot Lights

1. General: Pushbuttons, selector switches, and indicating lights will be heavy-duty type, 30.5MM, oil-tight, watertight and corrosion resistant. Provide an engraved legend plate describing function at each device.
2. Contact block current rating: 10 amperes at 240 volts AC.
3. Pilot lights will be super-bright LED type with 120V lamps, color cap, and push-to-test feature. Provide flashing types where indicated.
4. Manufacturers:
    a. **Allen Bradley**
    b. **Eaton**
    c. **Square D**
    d. Substitutions: See Section 01 63 00

I. Signal Isolators

1. Provide 4-wire type for use as a signal isolator, converter and/or repeater.
2. Input Signal: 4-20 mA dc, field configurable for other signal ranges.
3. Input Impedance: No greater than 50 ohms.
4. Isolation: 1000-volt RMS output from input, power and ground; fully floating
5. Output Signal: 4-20 mA dc into 800 ohms minimum.
6. Accuracy: +/- 0.1% of span

7. Power Supply: 120-volt ac, 60 hertz or 24-volts dc
8. Enclosure: designed for high density DIN rail mount
9. Isolators are not scheduled.
    a. Provide isolators on all analog inputs to the PLC (unless the PLC is provided with isolated analog input modules).
    b. Provide as shown and as necessary to eliminate ground loop problems when connecting instruments to other instrument loops.
10. Manufacturers:
    a. Phoenix Contact
    b. Action Instruments
    c. Moore Industries
    d. Substitutions: See Section 01 63 00

J. Digital Panel Indicators

1. Type: Electronic, 3-1/2 Digit LED, 0.60-inch high display
2. Input Impedance: no greater than 250 ohms.
3. Power Source: 110-volt ac, 60 hertz
4. Input Signal: 4-20 mAdc
5. Input Dampening: Adjustable
6. Enclosure: 1/8 DIN, general purpose for indoor flush panel mount. Indicators for outdoor panels will have a NEMA 4X bezel rating or be mounted behind a weatherproof gasketed door assembly.
7. Accuracy: +/- 0.05 percent of span +/- 1 count
8. Decimal Point: Selectable via DIP switches or keypad.
9. Input Connections: Compression type screw terminals
10. Range Selection: DIP switches, multiturn potentiometers, or keypad.
11. Manufacturers:
    a. **Precision Digital**
    b. **Red Lion**
    c. Substitutions: See Section 01 63 00

2.7 SPACE HEATERS

A. Manufacturers:

1. **Hoffman Engineering Co.**
2. Substitutions: See Section 01 63 00

B. Space Heater to be supplied for operation on 120V, single phase, 60 hz

C. Provide an adjustable thermostat with each Space Heater

2.8 SOURCE QUALITY CONTROL

A. Tests and Inspection

1. Test each panel in conjunction with factory acceptance test as described in Section 409000 - Process Control System General Requirements.

PART 3 -- EXECUTION

3.1 PREPARATION

A. Sequence enclosure installation as follows:

1. Install enclosures and conduits, and pull field wiring into enclosures.
2. Seal all wire entries with non-setting silicon compound to prevent moisture from entering enclosure.
3. Cover enclosure installation thoroughly with heavy-duty plastic sheet to protect against moisture, paint splatter and dirt. Cover until 120-volt power is available, and enclosure is ready to be field tested.
4. Terminate field wiring on terminal blocks.
5. Energize panel heater and keep enclosure door closed when no work is being performed in enclosure. (Do not energize any other equipment prior to field wiring termination check.)
6. Check accuracy of field wiring termination. Thoroughly test for continuity.
7. Energize panel mounted equipment only after all wiring has been thoroughly checked and tested.
8. Energize panel heater to prevent condensation inside the panel.

3.2 ERECTION, INSTALLATION AND APPLICATION

A. Do not install control panels or enclosures directly against concrete walls. Provide stainless steel channels between wall and enclosure. Mount enclosure to stainless steel channels where shown on the drawings or provide floor mounted enclosures sitting on a concrete housekeeping pad.

B. Install enclosures and panels level and plumb. Touch up all nicks, scratches, etc. with materials recommended by enclosure manufacturer.

C. Vacuum and clean all panel interior surfaces prior to system commissioning.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspection

1. Demonstrate that each enclosure and each panel mounted equipment:
   a. Has not been damaged during transportation or installation.
   b. Has been properly installed.
   c. Has no mechanical defects.
   d. Is in proper alignment.

e. Has been properly wired and connected.

3.4 DEMONSTRATION

A. Test all control function as described in Division 1 and Section 409000 Process Control System General Requirements and Section 409850 Process Control System Factory Testing. In addition, perform the following:

1. Calibrate all process variable indications.
2. Adjust all alarm setpoints.
3. Tune all control function to achieve optimum and stable control.

END OF SECTION

SECTION 409615 - PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

PART 1 -- GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section describes the input/output (I/O) point list, modification of the OWNER's data historian and modification of the OWNER's automated reporting system. which follows this Section and requirements for configuring the control system database.

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Submittals
2. Section 408050 - Process Control System Commissioning
3. Section 409000 - Process Control System General Requirements
4. Section 409100 - Process Control System Instruments
5. Section 409443 - Programmable Logic Controller Systems
6. Section 409513 - Process Control System Panel Enclosure and Equipment
7. Section 409413 - Process Control Systems Computer and Network Hardware
8. Section 409800 - Process Control System Training
9. Section 409850 - Process Control System Factory Testing

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01, Sections 013300 and 013250.

1. For each I/O attribute listed in the I/O list that cannot be used exactly as listed, submit an explanation of the reason for the deviation and propose a method to modify the I/O list information. Do not proceed with any configuration until a method of resolving deviations is accepted by the ENGINEER.

2. Include the control system I/O database information in the PLC specific submittals for Programmable Logic Controller Systems Hardware.

3. CONTRACTOR will supplement and complete the information provided in the attached tables, including identification of all soft I/O for digital communication networks including Ethernet I/P, Modbus, and Ethernet. The Listing will include the node address, and addresses within the device. The addresses will be coordinated by the CONTRACTOR so that node and segment addresses are unique within the Process Control System.

B. Submittals for Closeout: Provide submittals as required below.

1. Section 017890 - Contract Closeout.
2. IO List

1.3 I/O POINT LIST DESCRIPTION

A. The I/O point list will contain the information necessary to configure the PLC I/O interface hardware and to indicate range conversion or signal functions.

B. “POINT TAG” is an alphanumeric character string. The point tag will follow the format example (----xxx----)-LIT-100-01

1. The next three alpha characters (LIT) is the ISA designator for process variables. For the purposes of this Contract:

A	Analytical
B	Rotation
C	Chlorine Residual/Gas
D	Dissolved
E	Voltage
F	Flow
G	Intrusion
H	Hydrogen Sulfide
I	Indicating
J	Power
K	Time
L	Level
M	Motor
N	pH
O	Oxygen
P	Pressure
Q	Virtual Data Point
R	Radiation
S	Speed
T	Transmitter
UV	Ultraviolet
V	Vibration
W	Torque
X	Low Explosive Level Gas
Y	Status
Z	Position

2. The three-digit number (100) identifies the loop or field device as shown on the drawings.

3. The two numbers are used when there are multiples of the same device.

C. “POINT DESCRIPTION” is an alphanumeric character string up to 40 positions in length. Points described as “SPARE” denote pre-wired I/O.

D. SIGNAL TYPE

1. AI Analog Input
2. AO Analog Output
3. DI Discrete Input
4. DO Discrete Output

E. RANGE – Indicate special range of operations.

F. LOCATION – Location of point origin.

G. COMMENTS – Comments, if required.

1. “MODBUS” is used to designate those I/O points that are transferred between the PLC via the digital communications link (PLC Gateway). Designation is made by listing "PLC" under the reference description.

2. “Hardwire FROM/ TO” is used to designate the origin or destination of the I/O point. If the I/O point is a digital or analog output, designate the destination piece of equipment or supplier’s local panel. If the I/O point is a digital or analog input, designate the origin piece of equipment or supplier’s local panel.

H. CONTROL PROCESSOR – Processor of Control.

I. I/O CARD ID – Identification of I/O Card.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 Data Historian

A. The CONTRACTOR shall purchase a GE Proficy Historian license expansion of sufficient additional points to accommodate all digital and analog I/O identified in the contract documents. No pre-existing OWNER historian license points shall be utilized by the CONTRACTOR.

B. The CONTRACTOR shall reconfigure the OWNER’s existing data historian to record all digital and analog I/O identified in the contract documents to the OWNER’s data historian.

3.2 Automated Reporting

A. The CONTRACTOR shall reconfigure the OWNER’s automated reporting system as follows:

1. LHR MFL Compliance Monthly Report (each day is a separate tab in the excel worksheet)—Add hourly Blue Sink flow contribution, daily Blue Sink average flow contribution and daily maximum Blue Sink flow contribution to the OWNER’s existing report.

2. Generate a new monthly report titled “Blue Sink Water Use Permit Compliance Report”. An excel spreadsheet shall automatically be generated monthly with a separate worksheet for each day in that month. Each worksheet shall display the average Blue Sink withdrawal in MGD and cfs along with the Blue Sink water level for each hour of the day. The hourly averages shall be based on samples every five minutes. A monthly summary worksheet shall be prepared displaying the daily

average Blue Sink pumping (MGD and cfs) for each day in the month and the average Blue Sink water level for each day in the month. The monthly summary worksheet shall also calculate and display the average Blue Sink pumping (MGD and cfs) for the most recent 12 month period (12 month rolling average) and the "peak month" flow from the most recent 12 month period.

3.3 I/O CONFIGURATION

A. Implement the control system database fields in a consistent manner by using the following procedures:

1. Use abbreviations and acronyms already established in the Contract Documents. In particular, use the information in the I/O Point List.

2. Use only abbreviation or acronym for a word or group of words, respectively.

3. Use the same subject and word order within data fields.

4. Use the same term (either phrase, description, word or acronym) to denote the same meaning. Do not use multiple terms for a single meaning.

5. Use the point names, descriptions, logic state descriptions, ranges and units of measurement exactly the same wherever the point is referenced.

6. Show point names and descriptions for all point references on documentation.

7. Maintain lists of acronyms and abbreviations used.

3.4 I/O HARDWARE CONFIGURATION

A. Partition the I/O among cards within an I/O enclosure to provide control loop integrity.

1. Put all inputs of the same I/O type associated with a device (e.g. pump, blower, clarifier or other piece of equipment) on the same card.

2. Put all inputs of the same I/O type for devices arranged in process trains (e.g. a pump, its inlet valve and its outlet valve, or a pump and its associated macerator) on the same card or adjacent cards if more than one card is required to accommodate the points.

3. Put all outputs of the same I/O type associated with a device or group of devices in a process train on the same card or adjacent cards if more than one card is required to accommodate the points.

4. Where the preceding requirements specified in this paragraph would cause more than 20 percent spare points on a card, points for a device or process train may be split between two consecutive cards.

5. Make unused terminals resulting from partitioning the I/O into pre-wired spares. Provide pre-wired spare points with all cabling and termination internal to the PLC as done for other I/O points.

3.5 POINT DATA FIELDS

A. I/O point data fields may be subject to review and modification by the ENGINEER during the Shop Drawing review phase. Incorporate changes directed by the ENGINEER completely into the entire system, at no additional cost to Owner, subject to the following limitations:

1. Limit the total number of modifications to 35 percent of the total number of I/O points.

2. Each unique change will count as one modification. For example, modifying the description, range, and engineering unit on an analog input count as three modifications.

3. Analog input alarm limit definition will not be counted as a modification.

3.6 INPUT/OUTPUT LIST

A. The Input/Output indicates all required I/O for the project, including all hardwired I/O as well as soft I/O to be communicated between processors and Ethernet and Modbus protocols.

B. The I/O list does not include all details that must be coordinated during project implementation, such as final node addresses and registers for all I/O. However, columns have been provided in the Project I/O list attached to facilitate inclusion of this information as the project installation progresses.

C. All Analog Points are required to have Trends created on the existing Historian.

D. For each PLC, or RIO panel, the CONTRACTOR will submit the required tag database submittals as described under Sections 409443 Programmable Logic Systems in both hardcopy and electronic form (Microsoft Excel).

E. Each submittal will include all information coordinated with equipment vendors and suppliers for the systems integration work including, but not limited to:

1. Alarm settings and class
2. Terminal block information
3. Power source
4. PLC or RIO terminal no.
5. Final PLC register location

F. Additionally, for soft I/O communicated over Ethernet and Modbus the submittal will include similar information coordinated with all equipment vendors and suppliers. For soft I/O include, but not be limited to:

1. Alarm settings and class
2. Communication segment tag
3. Node address on segment coordinated with all vendors and suppliers with equipment on that segment.
4. Final PLC register location.

-END OF SECTION -

SECTION 409800 - PROCESS CONTROL SYSTEM TRAINING

PART 1 -- GENERAL

1.1 REQUIREMENTS AND RESPONSIBILITIES

A. This section specifies the Monitoring and Control System Training requirements for the System as outlined in Section 409413 and for the operation and maintenance of the PLC system as outlined in Section 409443.

B. CONTRACTOR will provide all labor, materials, equipment and incidentals as shown, specified and required to perform and coordinate all required training at times acceptable to OWNER and ENGINEER.

C. CONTRACTOR will retain the services of the Supplier to provide operation and maintenance training for all Control System components and systems of the PROCESS CONTROL SYSTEM GENERAL REQUIREMENTS as specified herein, and identified in 409000.

D. For equipment not manufactured by the CONTRACTOR, the CONTRACTOR will provide for on-site training by an authorized representative of the equipment manufacturer. The manufacturer's representative will be fully knowledgeable in the operation and maintenance of the equipment and certified by the manufacturer as a trainer of that specific equipment.

E. CONTRACTOR will be responsible for all costs, including cost of travel, meals and lodging, if required, associated with onsite training at the OWNER’s facilities, and will provide all required materials, texts and required supplies.

F. The training courses will be scheduled to meet the working requirements for each shift, and training classes will be scheduled during day, evening, and midnight shifts.

G. The requirements of this specification supplement the requirements of Section 017300.

H. Related work specified in other sections includes, but is not limited to the following:
   1. Section 013300 - Submittals
   2. Section 260500 - Basic Electrical Material and Methods
   3. Section 408050 - Process Control System Commissioning
   4. Section 409000 - Process Control System General Requirements
   5. Section 409050 - Process Control System Description
   6. Section 409100 - Process Control System Instruments
   7. Section 409413 - Process Control Systems Computer and Network Hardware
   8. Section 409443 - Programmable Logic Controller Systems
   9. Section 409513 - Process Control System Panel Enclosure and Equipment
   10. Section 409615 - Process Control System Input and Output List
   11. Section 409800 - Process Control System Training
   12. Section 409850 - Process Control System Factory Testing

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01, Sections 013300 and 013250.

B. Within 180 days of the effective date of the Notice to Proceed, CONTRACTOR will submit his plan for training conforming to the requirements of 01 Instruction of Operations and Maintenance Personnel. Included in the plan will be course outlines for each control system and equipment, and coordinated schedules for training to be provided at the Control System Integrator's or Supplier's and OWNER'S facilities. Training will be scheduled to allow the OWNER, to receive the training in a timely manner in accordance with the project and equipment startup schedule.

C. CONTRACTOR will identify which systems are covered by each of the training courses, and identify common topics and specialty topics unique to a system or a course.

D. CONTRACTOR will submit Lesson Plans including course outline for each class for review.

E. CONTRACTOR will submit copies of training materials for each class for review a minimum of eight weeks before the scheduled class, and submit the final training materials two weeks before the scheduled class.

F. Submit instructor/trainer qualifications and experience records.

1.3 ON-SITE TRAINING

A. Primary Sensors/Transducers and Field Instruments:

1. Provide on-site operation and maintenance training by Control System Integrator or Supplier and the equipment manufacturer representatives prior to placing the equipment in continuous operation, conforming to the requirements of Section 017300 – Training. The services of equipment manufacturer's representatives will be provided for a minimum of eight hours for each type of instrument provided.

2. Training will accomplish the following:

a. Provide instruction covering use and operation of the equipment to perform the intended functions.

b. Provide instruction covering procedures for routine, preventive and troubleshooting maintenance including equipment calibration.

c. Explain procedures for placing the equipment in and out of operation and explain necessary actions and precautions to be taken regarding the overall plant monitoring and control system.

B. Software – PLC/HMI/OIT

1. Training course will accomplish the following:
   a. Provide all instructions necessary to operate and utilize all system components.
   b. Provide all instruction necessary to monitor and control the system processes from the designated control panel.
   c. Explain procedures for control of the system during scheduled or rescheduled shutdown and the subsequent start-up.
   d. Provide instructions for regular caretaking operations.
   e. Modification and development of graphics, logs and displays, alarm list

f. Training in operation of other software supplied with the system.
g. Different phases of the training may be grouped for presentation by different personnel.

C. Each instructor will be highly experienced in practical system applications similar to the specified installation, as well as in teaching the selected curriculum. Submit the resumes of those on the training staff, proposed for instructing the plant operating personnel, for review.

D. Procedures:

1. The training procedures will be the complete responsibility of the CONTRACTOR. Classes shall include formal classroom instruction in small classes (5 students maximum) as well as “in the field” setting. Trainees will be encouraged to freely ask questions during the instruction periods to understand the system.

2. Classes will be held at the OWNER facility using the actual equipment installed.

E. Materials:

1. Comprehensive text material will be provided to supplement classroom lectures and to provide material for self-study. The personnel who have attended training courses will be permitted to retain text materials for future reference.

F. CONTRACTOR will supply the following training for 7 OWNER personnel at the VENDOR Training facilities in Tampa, FL. Registration for training will be by the VENDOR voucher system for 28 days (7 personnel x 4 days of training each) use by the OWNER. Vouchers, when issued and delivered to the OWNER will have an expiration date no earlier than two calendar years from receipt. Vouchers are not to be delivered prior to 60 day test of equipment. The training will provide the OWNER staff with maintenance and troubleshooting knowledge for the following systems:

1. FactoryTalk View graphical software

a. Rockwell Automation Course Number CCV209 FactoryTalk View ME and PanelView PLUS Maintenance and Troubleshooting (2 Days).

b. Rockwell Automation Course Number CCV204 FactoryTalk View ME Programming.

G. CONTRACTOR will supply a single local license for the following Computer Based Training courses:

1. FactoryTalk View Machine Edition Bundle

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

A. Training

1. Provide training in accordance with the requirements contained in Section 017300 – Training, as detailed in this section.

- END OF SECTION -

SECTION 409850 - PROCESS CONTROL SYSTEM FACTORY TESTING

PART 1 -- GENERAL

1.1 SUMMARY

A. Section includes technical requirements for fabrication, engineering, wiring and factory testing of process control system panels and enclosures

B. Related work specified in other sections includes, but is not limited to the following:

1. Section 013300 - Submittals
2. Section 260500 - Basic Electrical Material and Methods
3. Section 408050 - Process Control System Commissioning
4. Section 409000 - Process Control System General Requirements
5. Section 409050 - Process Control System Description
6. Section 409100 - Process Control System Instruments
7. Section 409413 - Process Control Systems Computer and Network Hardware
8. Section 409443 - Programmable Logic Controller Systems
9. Section 409513 - Process Control System Panel Enclosure and Equipment
10. Section 409615 - Process Control System Input and Output List
11. Section 409800 - Process Control System Training

C. Panels provided by manufacturer as part of package control systems:

1. Certain control panels are furnished by manufacturers of equipment specified under other Sections as part of a packaged system. In general, those panels will be tested according to the requirements of the manufacturer and this specification section.

1.2 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Division 01.

B. Submit data on the following as required in Section 409000 Process Control System General Requirements.

1. Test Plan,
2. Test Schedule,
3. Testing Tools,
4. Test results.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 QUALITY CONTROL

A. Prior to System Factory Test

1. Approval of all shop drawings.
2. Verify receipt of programmed and tested PLC
3. Verify receipt of program and point mapping from system manufacturer.
4. Verify system manufacturer's test was completed.
5. Submittal and approval of control strategies.
6. Completion of control workshops, and associated follow through.

B. Tests and Inspection

1. Demonstrate for each enclosure and each panel mounted equipment:
   a. All installed equipment is terminated and securely mounted.
   b. All wiring is labeled.
   c. All equipment is labeled.
   d. All enclosures are labeled.
   e. Wiring diagram installed in cabinet.

3.2 DEMONSTRATION

A. Factory tests

1. Replicate and simulate the control system network to demonstrate network communication between panels and devices.

2. System programming is to be complete prior to each factory test.

B. Factory Tests: Perform the following tests:

1. In-Factory Inspection and PLC I/O Testing. (See Paragraph E & F)
2. Graphical Interface and Software Testing. (See Paragraph G)
3. Communication Failure Testing. (See Paragraph H)
4. Power Failure/System Restart Testing. (See Paragraph I)

C. Test Preparation

1. In-Factory Testing Aids and Equipment:
   a. Provide following documents.
      1) One copy of submittals applicable to equipment to be tested.
      2) One copy of Drawings and Specifications, with Addenda and Change Orders.

3) One master copy of test procedure.

4) Complete inventory of equipment to be tested including make, model, and serial number. Identify firmware revision.

b. Provide following support facilities.

1) Desk with keylock or lockable room with table for OWNER/ ENGINEER'S use.

2) Meeting room.

3) Reproduction facilities for copying test information.

2. Meet following criteria prior to start of test.

a. Complete submittals and resolve disputes, if any.

b. ENGINEER'S review of test procedure.

c. Include all processors, network interfaces, I/O cards and HMI computer in testing.

d. Set test date agreeable to each party.

3. Schedule:

a. Limit testing to 8 hours of testing to 10 hours maximum on location days.

b. Meet each morning to review day's test schedule.

c. Meet each evening to review day's test results and to review or revise next day's test schedule.

d. At end of test, meet to review list of deficiencies. ENGINEER will indicate those items which must be corrected prior to shipment.

e. Confirm in writing, locations, times and dates of test 2 weeks before tests.

D. In-Factory Inspection and I/O Testing

1. In-Factory inspection and testing will be performed at site of panel fabrication, and will be witnessed by ENGINEER and OWNER.

2. Process Control System PLC are required to pass in-factory inspection and testing prior to shipment to job site.

3. In-Factory Inspection.

a. In-Factory inspection will verify following in accordance with approved submittals:

1) Panel dimensions.

2) Equipment layout.

3) Wiring.

4) Wire and terminal identification.

b. Verify proper access to equipment for maintenance.

c. Verify proper access to field wire termination points.

d. Inspect for neatness of wiring and wire harness construction.

E. In-Factory Testing and Demonstration.

1. Test will demonstrate proper wiring and fabrication of Process Control System PLC.

a. Perform initial in-house hardware configuration to assure system is ready to demonstrate prior to OWNER and ENGINEER'S arrival.

b. After successful initial in-house hardware configuration, notify ENGINEER of test date at least one week in advance.

2. Install Designer-configured PLC programming software, furnished as part of the project, to permit following:

a. Diagnostic test of PLC processor to assure proper run mode operation.

b. Diagnostic test of remote I/O to assure proper operation.

c. Inspection of PLC data table to allow viewing of discrete input on/off status.

d. Inspection of PLC data table to view register contents when inputs are tested at 0, 4, 12, and 20 mAdc.

e. Forcing of all digital outputs.

f. Generation of 4, 12, and 20 mAdc signals for all analog outputs.

3. Test as follows:

a. Verify equipment and manuals against inventory lists.

b. Run hardware diagnostics.

c. Testing of all input and output (I/O) signals at terminal strip used for field terminations.

1) Test change of state for all discrete inputs.

2) Test analog inputs at 0, 4, 12, and 20 mAdc.

3) Manipulate PLC data table or use forces to test response of all discrete output signals.

4) Manipulate PLC data table to test response of all analog output signals at 4, 12, and 20 mAdc.

4. Correct any deficiencies discovered prior to shipment to job-site.

F. Graphical Interface and Software Testing

1. Test will demonstrate proper graphical programming for all screens associated with the project

a. Color Standards in accordance with Section 409000.

b. Navigation between equipment screens, overview screens, alarm screen.

G. Communication Failure Testing

1. Test will demonstrate communication failure alarm when a network connection is lost
    a. Each data highway will be disconnected
    b. Communication alarms and failure modes will be verified

H. Power Failure / System Restart Testing

1. Main power to system will be removed and then reconnected. System will re-boot and demonstrate start-up services and sequence for use by Operator

I. Testing of Connection to Packaged System

1. Test will demonstrate connection of packaged PLC into PCS system
2. Verify communication gateway from PLC.
3. Verify program and point mapping.

J. Documentation

1. Prepare in-factory inspection and testing sign-off document. Document will include following as a minimum.
    a. Project description and number.
    b. Company name for PLC SUPPLIER, OWNER, and ENGINEER.
    c. Section labeled “In-Factory Inspection”, with listing of items to be inspected as described above.
        1) For each item, include area for initials of PLC SUPPLIER’S, OWNER’S, and ENGINEER’S representative indicating passing of inspection.
        2) Include area for handwritten notes of any corrections required.

- END OF SECTION -

SECTION 431050 - PIPING, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide the piping systems indicated, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to piping sections in Divisions 33 and 43.

C. The mechanical Drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type.

D. The mechanical Drawings are not pipe construction or fabrication drawings.

E. Where pipe supports and spacing are indicated on the Drawings and are referenced to a Standard Detail, the CONTRACTOR shall use that Detail.

F. Where pipe supports are not indicated on the Drawings, it is the CONTRACTOR'S responsibility to develop the details necessary to design and construct mechanical piping systems to accommodate the specific equipment provided, and to provide spacers, adapters, and connectors for a complete and functional system.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 – Contractor Submittals.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Drawings: Layout drawings including necessary dimensions, details, pipe joints, fittings, specials, bolts and nuts, gaskets, valves, appurtenances, anchors, guides, and material lists. Fabrication drawings shall indicate spacers, adapters, connectors, fittings, and pipe supports to accommodate the equipment and valves in a complete and functional system.

2. Thermoplastic Pipe Joints: Submit solvent cement manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.

3. Gasket Material: Submit gasket manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.

4. Seals and Seating Materials: Submit elastomer material and manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.

5. Modular Seals for Pipe: Manufacturer's catalog sheet showing materials and installation procedures.

C. Samples

1. Performing and paying for sampling and testing as necessary for certifications are the CONTRACTOR'S responsibility.

D. Certifications

1. Necessary certificates, test reports, and affidavits of compliance shall be obtained by the CONTRACTOR.

2. A certification from the pipe fabricator that each pipe will be manufactured subject to the fabricator's or a recognized Quality Control Program. An outline of the program shall be submitted to the ENGINEER for review prior to the manufacture of any pipe.

1.3 MATERIAL DELIVERY, STORAGE, AND PROTECTION

A. Piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact.

B. Defective or damaged materials shall be replaced with new materials.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Extent of Work

1. Pipes, fittings, and appurtenances shall be provided in accordance with the requirements of the applicable Sections of Divisions 33 and 43 and as indicated.

2. Materials in contact with potable water shall be listed as compliant with NSF Standard 61.

B. Pipe Supports

1. Pipes shall be adequately supported, restrained, and anchored in accordance with Section 431052 – Pipe Supports, and as indicated.

C. Lining

1. Application, thickness, and curing of pipe lining shall be in accordance with the applicable Sections of Division 33, unless otherwise indicated.

D. Coating

1. Application, thickness, and curing of coating on buried pipe shall be in accordance with the applicable Sections of Division 33, unless otherwise indicated.

2. Pipes above ground or in structures shall be coated in accordance with Section 099600 – Protective Coating.

E. Pressure Rating

1. Piping systems shall be designed for the maximum expected pressure as defined in Section 017430 – Pressure Pipe Testing and Disinfection, or as indicated on the Piping Schedule, whichever is greater.

F. Inspection

1. Pipe shall be subject to inspection at the place of manufacture.

2. During the manufacture, the ENGINEER shall be given access to areas where manufacturing is in progress and shall be permitted to make inspections necessary to confirm compliance with requirements.

G. Tests

1. Except where otherwise indicated, materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards.

2. Welds shall be tested as indicated.

3. The CONTRACTOR shall be responsible for performing material tests.

H. Welding Requirements

1. Qualification of welding procedures used to fabricate pipe shall be in accordance with the provisions of AWS D1.1 - Structural Welding Code or the ASME Boiler and Pressure Vessel Code, Section 9, whichever is applicable.

2. Welding procedures shall be submitted for the ENGINEER's review.

I. Welder Qualifications

1. Welding shall be performed by skilled welders and welding operators who have adequate experience in the methods and materials to be used.

2. Welders shall be qualified under the provisions of AWS D1.1 or the ASME Boiler and Pressure Vessel Code, Section 9, whichever is applicable.

3. Machines and electrodes similar to those used in the WORK shall be used in qualification tests.

4. Qualification testing of welders and materials used during testing is part of the WORK.

2.2 PIPE FLANGES

A. General

B. Flanges shall be provided with flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise indicated.

C. Attachment of the flanges to the pipe shall conform to the applicable requirements of AWWA C207.

D. Flange faces shall be perpendicular to the axis of the adjoining pipe.

E. Flanges for miscellaneous small diameter pipes shall be in accordance with the standards indicated for these pipes.

F. Pressure Ratings

1. 150 psig or less: Flanges shall conform to either AWWA C207 - Steel Pipe Flanges for Waterworks Service--Sizes 4 In. Through 144 In., Class D, or ASME B16.5 - Pipe Flanges and Flanged Fittings, 150 lb. class.

2. 150 psig to 275 psig: Flanges shall conform to either AWWA C207 Class E or Class F, or ASME B16.5 150 lb. class.

3. 275 psig to 700 psig: Flanges shall conform to ASME B16.5, 300 lb. class.

4. Selection Based on Test Pressure

   a. Do not expose AWWA flanges to test pressures greater than 125 percent of rated capacity.

   b. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected.

G. Blind Flanges

1. Provide blind flanges in accordance with AWWA C207, or as indicated for miscellaneous small pipes.

2. Blind flanges for pipe sizes 12-inches and greater shall be provided with lifting eyes in the form of welded or screwed eye bolts.

H. Flange Coating

1. Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

I. Flange Bolts

1. Bolts and nuts shall conform to the requirements of Section 055000 – Miscellaneous Metalwork.

2. Use all-thread studs on valve flange connections where space restrictions preclude the use of regular bolts.

J. Insulating Flanges

1. Insulated flanges shall be provided with bolt holes 1/4-inch diameter greater than the bolt diameter.

K. Insulating Flange Sets

1. Insulating flange sets shall be furnished on all piping connections where two dissimilar metals are to be connected in order to prevent corrosion. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers, and a steel washer.

2. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2 inch or smaller and shall be made of acetal resin.

3. For bolt diameters larger than 1-1/2 inches, insulating sleeves and washers shall be 2-piece and shall be made of polyethylene or phenolic material.

4. Steel washers shall be in conformance with ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

5. Insulating gaskets shall be full-face.

L. Insulating Flange Manufacturer, or Equal

1. JM Red Devil, Type E

2. Maloney Pipeline Products Co.

3. PSI Products, Inc. (Garlock Pipeline Technologies)

M. Flange Gaskets

1. Gaskets for flanged joints used in general water and wastewater service shall be full-faced type, with material and thickness in accordance with AWWA C207, suitable for temperatures to 700 degrees F, a pH of one to 11, and pressures to 1000 psig. Provide EPDM gaskets for all pipelines carrying raw or potable water.

2. Blind flanges shall be provided with gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange.

3. Ring gaskets will not be accepted unless otherwise indicated.

4. Provide flange gaskets rated for the pressure service and test pressures by Garlock, John Crane, or equal.

5. Gaskets for flanges for PVC and CPVC piping used in general water and wastewater service shall be full-faced, 1/8-inch thick, and made of fluoroelastomers having a Type A durometer hardness of 50 to 70 when tested in accordance with ASTM D 2240. Gaskets for pipe sizes up to 24-inch and 150 psi shall be Garlock Style XP; Crane; or equal

6. When the mating flange has a raised face, provide a stainless steel flat ring gasket filler between the PVC flange and gasket and the adjacent flange.

7. Gaskets for flanged joints used in chemicals, air, oxygen, ozone gas, solvents, hydrocarbons, steam, chlorine and other fluids shall be made of materials compatible with the service, pressure, and temperature. Consult gasket Manufacturer for recommended gasket material.

2.3 THREADED INSULATING CONNECTIONS

A. General

1. Threaded insulating bushings, unions, or couplings, as appropriate, shall be furnished for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials

1. Threaded insulating connections shall be constructed of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.4 MECHANICAL-TYPE COUPLINGS (GROOVED OR BANDED PIPE)

A. General

1. Provide cast mechanical-type couplings where indicated, conforming to the requirements of AWWA C606 - Grooved and Shouldered Joints.

2. Bolts and nuts shall conform to the requirements of Section 055000 – Miscellaneous Metalwork.

3. Gaskets and elastomers for mechanical-type couplings shall be compatible with the piping service and fluid utilized, in accordance with the coupling manufacturer's recommendations.

4. The wall thickness of grooved piping shall conform to the coupling manufacturer's recommendations to suit the highest expected pressure.

5. In order to avoid excessive load on equipment caused by pipe movement due to steady state or transient pressure conditions, equipment connections with mechanical-type couplings shall be provided with rigid grooved couplings or flexible type coupling with harness in sizes where rigid type couplings are not available, unless thrust restraint is provided by other means.

6. Mechanical type couplings shall be bonded.

7. The CONTRACTOR shall have the coupling manufacturer's service representative verify the correct choice and application of couplings and gaskets, and the workmanship, to assure a correct installation.

8. In order to assure uniform and compatible piping components, grooved fittings, couplings, and valves shall be furnished by the same manufacturer as the coupling.

9. Grooving tools shall be from the same manufacturer as the grooved components.

B. Steel Pipe Couplings Manufacturer, or Equal

1. Victaulic Style 41 or 44 (banded, flexible)
2. Victaulic Style 77 (grooved, flexible or rigid)
3. Victaulic Style 07 or HP-70 (grooved, rigid)

C. Ductile Iron Pipe Couplings Manufacturer, or Equal

1. Victaulic Style 31 (flexible or rigid grooving)

Note: Ductile iron pipe couplings shall be provided with flush seal gaskets.

D. PVC Pipe Couplings Manufacturer, or Equal

1. Victaulic Style 775

Note: Couplings for PVC pipe shall be furnished with radius cut or standard roll grooved pipe ends.

2.5 SLEEVE-TYPE COUPLINGS

A. General

1. Provide sleeve-type couplings where indicated.

2. The CONTRACTOR will not be allowed to substitute a sleeve-split coupling, or any other type in lieu of sleeve coupling unless approved by the ENGINEER.

B. Construction

1. Sleeve couplings shall be in accordance with AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe.

2. Couplings shall be constructed of steel with steel bolts, without pipe stop.

3. Couplings shall be of sizes to fit the indicated pipe and fittings.

4. The middle ring shall be not less than 1/4-inch thick or at least the same wall thickness as the pipe to which the coupling is connected.

5. If the strength of the middle ring material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.

6. The coupling shall be either 5 or 7 inches long for sizes up to and including 30-inch and 10 inches long for sizes greater than 30-inch, for standard steel couplings, and 16 inches long for long-sleeve couplings.

7. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling.

8. The shape of the follower shall be of such design as to provide positive confinement of the gasket.

9. Bolts and nuts shall be in accordance with the requirements of Section 055000 – Miscellaneous Metalwork.

10. Buried sleeve-type couplings shall be epoxy-coated at the factory as indicated.

C. Pipe Preparation

1. Where indicated, prepare the ends of the pipe for flexible steel couplings.

2. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with an outside diameter not more than 1/64 inch smaller than the nominal outside diameter of the pipe.

3. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, in order to proof-test the weld to the strength of the parent metal.

4. The weld of the middle ring shall be subjected to air test for porosity.

D. Seals

1. Seal elastomer materials for sleeve-type couplings shall be selected to be compatible with the fluid service, pressure and temperature and composed of elastomeric-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions.

2. Where sleeve coupling adapters are used in water containing chloramine or other fluids which are not compatible with rubber materials, the gasket material shall be compatible with the piping service and fluid utilized.

E. Piping Connection to Equipment

1. Where piping connects to mechanical equipment such as pumps, compressors, and blowers, bring the piping to the equipment connection aligned and perpendicular to the axis of the flange or fitting for which the piping is to be connected.

2. The piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment.

3. The CONTRACTOR shall assign the responsibility to the equipment manufacturer to review the piping connection to the equipment and submit any modifications to the ENGINEER for review.

F. Insulating Sleeve Couplings

1. Where insulating couplings are required, both ends of the coupling shall be provided with a wedge-shaped gasket which assembles over a sleeve of an insulating compound material compatible with the fluid service in order to obtain insulation of coupling metal parts from the pipe.

G. Restrained Joints

1. Sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means.

2. Harnesses shall be designed by the pipe manufacturer in accordance with AWWA Manual M11, or as indicated.

3. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.

4. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation in order to prevent misalignment of the pump imparted by the thrust within the piping system.

H. Sleeve-Type Couplings Manufacturer, or Equal

1. Dresser, Style 38
2. Ford Meter Box Co., Inc., Style FC1 or FC3
3. Smith-Blair, Style 411

2.6 FLANGED COUPLING ADAPTERS

A. Provide flanged coupling adapters where indicated.

B. The CONTRACTOR will not be allowed to substitute any other type in lieu of flange coupling adapter unless approved by the ENGINEER.

C. The coupling shall be rated as indicated.

D. Construction

1. Flanged coupling adapter bodies shall be fabricated from steel, ASTM A 512 - Cold-Drawn Buttweld Carbon Steel Mechanical Tubing or A 513 - Electric-Resistance Welded Carbon and Alloy Steel Mechanical Tubing with steel bolts, without pipe stop.

2. Provide flanges in conformance with AWWA C207.

3. Couplings shall be of sizes to fit the indicated pipe and fittings.

4. The body shall be not less than 1/4 inch thick or at least the same wall thickness as the pipe to which the coupling is connected.

5. If the strength of the body material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.

6. The follower flange shall be fabricated from steel, ASTM A 576 - Steel Bars, Carbon, Hot Wrought, Special Quality or AISI C1012.

7. The shape of the follower shall be of such design as to provide positive confinement of the gasket.

8. Restraint

   a. For flanged coupling adapters installed in piping system rated for positive pressure, the coupling shall be restrained with harness bolts or tie rods.

   b. Other means of restraining the coupling such as set screws will not be accepted.

9. Bolts and nuts shall be in accordance with the requirements of Section 055000 – Miscellaneous Metalwork.

10. Buried couplings shall be epoxy-coated at the factory as indicated.

E. Seals

1. Seal elastomer materials for sleeve-type couplings shall be selected to be compatible with the fluid service, pressure and temperature. They shall be

composed of elastomeric-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions.

2. Where flanged coupling adapters are used in water containing chloramine or other fluids which are not compatible with rubber materials, the elastomeric seal material shall be compatible with the piping service and fluid utilized.

F. Piping Connections to Equipment

1. Where piping connects to mechanical equipment such as pumps, compressors, and blowers, bring the piping to the equipment connection aligned and perpendicular to the axis of the flange or fitting for which the piping is to be connected.

2. The piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment.

3. The CONTRACTOR shall assign the responsibility to the equipment manufacturer to review the piping connection to the equipment and submit any modifications to the ENGINEER for review.

G. Restrained Joints

1. Flange coupling adapters on pressure lines shall be harnessed unless thrust restraint is provided by other means.

2. Harnesses shall be designed by the pipe manufacturer in accordance with AWWA Manual M11, or as indicated.

3. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.

4. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation in order to prevent misalignment of the pump imparted by the thrust within the piping system.

H. Flanged Couplings Adapter Manufacturer, or Equal

1. **Smith-Blair, Model 975**

2. **JCM, Model 309**

2.7 FLEXIBLE CONNECTORS

A. Low-Temperature

1. Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment, and where indicated.

2. Flexible connectors for service temperatures up to 180 degrees F shall be flanged-reinforced neoprene or butyl spools, rated for a working pressure of 40 to 150 psig, or reinforced flanged duck and rubber, as best suited for the application.

3. Flexible connectors for service temperatures above 180 degrees F shall be flanged, braided stainless steel spools with inner, annular, corrugated stainless steel hose, rated for a minimum 150-psig working pressure, unless otherwise indicated.

4. The connectors shall be a minimum of 9 inches long and provided with face-to-face flanges, unless otherwise indicated.

5. The final material selection shall be approved by the manufacturer.

6. The CONTRACTOR shall submit Shop Drawings and calculations.

B. High-Temperature

1. Install flexible connectors in engine exhaust piping and where indicated.

2. Connectors shall be sufficient to compensate for thermal expansion and contraction and to isolate vibration between the engine and the exhaust piping system.

3. Connectors shall be stainless steel bellows-type, flanged, and rated for minimum 150 psig, 2000 degrees F.

2.8 EXPANSION JOINTS

A. Piping subject to expansion and contraction shall be provided with sufficient means to compensate for such movement without exertion of undue forces to equipment or structures, accomplished with expansion loops, bellow-type expansion joints, or sliding-type expansion joints.

B. Expansion joints shall be provided with flanged ends and constructed of stainless steel, Monel, rubber, or other materials best suited for each individual service.

C. Where bellows-type expansion joints are mounted near the suction nozzle of the pump, stainless steel internal liner shall be provided to minimize turbulence as the flow passes through the arches of the bellows.

D. Submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and anchors and guides, including information on materials, temperature, and pressure ratings.

2.9 PIPE THREADS

A. Pipe threads shall be in conformance with ASME B1.20.1 - Pipe Threads, General Purpose (inch), and be made up with Teflon tape unless otherwise indicated.

2.10 MODULAR MECHANICAL SEALS FOR PIPING PENETRATIONS

A. Where indicated and where required in order to prevent flow of water or air, the passages of piping through wall sleeves and cored openings shall be sealed with modular interlocking link mechanical closures.

B. Individual links shall be constructed of EPDM rubber, be suitable for temperatures between minus 40 and plus 250 degrees F, and be shaped to fill the annular space between the outside of the pipe and the inside of the wall sleeve or cored opening.

C. Assemble the links using Type 316 stainless steel bolts and nuts to form a continuous rubber belt around the pipe.

D. Pressure plates under each bolt and nut shall be fabricated of a corrosion-resistant composite material.

E. After the seal assembly is positioned in the sleeve, tighten the bolts against the pressure plates to expand the rubber links and form the watertight seal.

F. Sizing and installation of sleeves and assemblies shall be in accordance with the manufacturer's recommendations.

G. Modular Mechanical Seals Manufacturer, or Equal

1. **Thunderline Corporation, Link-Seal**

2.11 AIR AND GAS TRAPS

A. Air and gas pipes shall slope to low points and shall be provided with drip legs, shut-off valves, strainers, and traps.

B. Pipe the traps to the nearest drain.

C. Air and gas traps shall be not less than 150-lb iron body float-type, with a copper or stainless steel float.

D. Bracket, lever, and pins shall be constructed of stainless steel.

E. Drain traps shall be provided with threaded connections.

F. Air and Gas Traps Manufacturer, or Equal

1. **Armstrong International, Inc.**

2. **Spirax Sarco, Inc.**

PART 3 -- EXECUTION

3.1 GENERAL

A. Install piping, fittings, and appurtenances in accordance with the requirements of applicable Sections of Division 33 and Division 43.

B. Proprietary manufactured couplings shall be installed in accordance with the coupling manufacturer's recommendation.

C. Care shall be taken to insure that piping flanges, mechanical-type couplings, sleeve-type couplings, flexible connectors, and expansion joints are properly installed as follows:

1. Gasket surfaces shall be carefully cleaned and inspected prior to making up the connection.

2. Each gasket shall be centered properly on the contact surfaces.

3. Connections shall be installed to prevent inducing stress to the piping system or the equipment to which the piping is connected.

4. Contact surfaces for flanges, couplings, and piping ends shall be aligned parallel, concentric, and square to each axis at the piping connections.

5. Flange Bolts

   a. Flange bolts shall be initially hand-tightened with the piping connections properly aligned.

   b. Bolts shall be tightened with a torque wrench in a staggered sequence to the AISC-recommended torque for the bolt material.

6. Harness, Thrust Restraint, and Tie Rod Bolts

   a. Harness, thrust restraint, and tie rod bolts used for sleeve couplings, flange coupling adapters, or flexible joints shall be tightened gradually and equally at diametrically opposite sides until snug, in order to prevent misalignment and to insure that all studs carry equal loads.

   b. In order to prevent induced stress or misalignment, do not over-torque connections to adjoining pump or equipment.

7. Groove ends shall be clean and free from indentations, projections, and roll marks in the area from the pipe end to the groove.

8. After installation, joints shall meet the indicated leakage rate.

9. Flanges shall not be deformed nor cracked.

D. Lined Piping Systems

1. The lining manufacturer shall take full responsibility for the complete, final product and its application.

2. Pipe ends and joints of lined pipes at screwed flanges shall be epoxy-coated in order to assure continuous protection.

E. Core Drilling

1. Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction in order to avoid damage to embedded raceways and reinforcing bars.

F. Cleanup

1. After completion of the WORK, cuttings, joining and wrapping materials, and other scattered debris shall be removed from the Site.

2. The entire piping system shall be handed over in a clean and functional condition.

- END OF SECTION -

SECTION 431051 - PIPING IDENTIFICATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide identification for exposed piping and valves, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ANSI A13.1 Scheme for the Identification of Piping Systems

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings: A list of suggested wording for each valve tag, prior to fabrication.

C. Samples

1. One sample of each type of identification device.

2. Sample of each proposed color required by the pipe color schedule.

PART 2 -- PRODUCTS

2.1 IDENTIFICATION OF PIPING

A. Except as indicated below for very short pipe lengths, identify exposed piping larger than 2-inches nominal size for the pipe contents and direction of flow.

1. Marker Type

a. Snap Around: Vinyl or polyester sheet with UV- resistant ink, preshaped and sized to tightly curl around the pipe and remain in position.

b. Stencil: Lettering painted directly on surface of pipe inside color coded marker area.

2. Marker Area: Sized per pipe size according to ANSI A13.1; color from the table below.

3. Lettering: Sized per pipe size according to ANSI A13.1; color from the table below.

4. Arrows: at least 2 arrows at each marker area, showing direction of flow.

B. Pipe 2 inches and smaller shall be identified by plastic plates made from laminated 3 layer plastic with engraved black letters on white background.

C. Pipe identification shall be as manufactured by Brady, Seton, or equal.

2.2 EXISTING IDENTIFICATION SYSTEMS

A. In installations where existing piping identification systems have been established, the CONTRACTOR shall follow the existing system. Where existing identification systems are incomplete, utilize the existing system as far as practical and supplement with the indicated system.

2.3 IDENTIFICATION OF VALVES AND SHORT PIPE LENGTHS

A. Identifying devices for valves and the sections of pipe that are too short to be identified with markers and arrows shall be identified with embossed stainless steel metal tags.

B. Tags shall be designed to be firmly attached to the valves or short pipes or to the structure immediately adjacent to such valves or short pipes. Wording on the tags shall describe the exact function of each valve, e.g., "HWR-BALANCING," "CLS THROTTLING", "RAS-PUMP SHUT-OFF," etc., indicate the valve number per the P&ID, valve type, valve size, direction to close and number of turns to close, pipe size & type, etc.

PART 3 -- EXECUTION

3.1 GENERAL

A. Markers and identification tags shall be installed in accordance with the manufacturer's printed instructions, and shall be neat and uniform in appearance. Tags and markers shall be readily visible from all normal working locations.

3.2 VALVE TAGS

A. Valve tags shall be permanently attached to the valve or structure by means of 2 stainless steel bolts or with stainless steel “leader wire” with crimp style connections.

3.3 MARKER LOCATIONS

A. Each pipe shall be marked at:

1. Intervals of 20-feet in straight runs.

2. At least once in every room.

3. Within 2-feet of turns, elbows, and valves.

4. On the upstream side of tees, branches, and other distribution points.

5. On both sides of walls and floors through which the piping passes.

3.4 IDENTIFICATION COLORS

A. Conform to the following color codes.

Color Schedule				
Pipe Contents		**Pipe Color**	**Marker Color**	**Letter Color**
Abbreviation	**Identification**			
LSP	Landscape sprinkler system		black	white
PW	Potable water		blue	white
RW	Raw water		light green	white
SD	Sanitary drains and vents		green	white
SPD	Sump pump discharge		green	white
V	Vacuum		black	white

- END OF SECTION -

SECTION 431052 - PIPE SUPPORTS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide pipe supports, hangers, guides, and anchors, complete and in place, as indicated in accordance with the Contract Documents.

B. Where pipe support systems are not indicated on the Drawings, the CONTRACTOR shall design and provide the supports in accordance with this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Submit Shop Drawings which shall include the following information:
    a. drawings of pipe supports, hangers, anchors, and guides
    b. calculations for special supports and anchors, stamped and signed by a registered professional engineer in the State of Florida.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Code Compliance

1. Piping systems and pipe connections to equipment shall be properly anchored and supported in order to prevent undue deflection, vibration, and dislocation due to line pressures, pipe weight, fluid weight, liquid movement, thermal changes, vibration, probable forces applied during construction, and stresses on piping, equipment, and structures.

2. Supports and parts thereof shall conform to the requirements of ASME B31.1 - Power Piping, except as supplemented or modified in this Section.

3. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code or local administration requirements.

B. Structural Members

1. Wherever possible, pipes shall be supported from structural members.

2. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided by the CONTRACTOR.

3. Supplementary members shall be in accordance with the requirements of the Building Code and the American Institute of Steel Construction, and shall be as acceptable to the ENGINEER.

C. Pipe Hangers

1. Pipe hangers shall be capable of supporting the pipe in operation, allowing free expansion and contraction of the piping and preventing excessive stress on equipment.

2. Hangers shall have a means of vertical adjustment after erection.

3. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe.

4. Hangers subject to shock, or thrust imposed by the actuation of safety valves shall include hydraulic shock suppressors.

5. Hanger rods shall be subjected to vertical loading only.

D. Hangers Subject to Horizontal Movements

1. At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement.

2. Where horizontal pipe movement is greater than 1/2 inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the cold-to-hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

E. Spring-Type Hangers

1. Spring-type pipe hangers shall be provided for piping subject to vibration or vertical expansion and contraction, such as engine exhausts and similar piping.

2. Spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions encountered.

3. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate the compression of the spring.

4. Supports shall be capable of accommodating at least 4 times the maximum travel due to thermal expansion.

F. Thermal Expansion

1. Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or expansion joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely away from the anchored points.

2. Components shall be structurally suitable to withstand the imposed loads.

G. Heat Transmission

1. Supports, hangers, anchors, and guides shall be designed and insulated such that excessive heat will not be transmitted to the structure or to other equipment.

H. Riser Supports

1. Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

I. Freestanding Piping

1. Freestanding pipe connections to equipment such as chemical feeders and pumps shall be firmly attached to steel frames fabricated from angles, channels, or I-beams anchored to the structure.

2. Exterior, freestanding overhead piping shall be supported on fabricated pipe stands consisting of pipe columns anchored to concrete footings, or with horizontal, welded steel angles, and U-bolts or clamps securing the pipes.

J. Materials of Construction

1. Pipe support assemblies, including framing, hardware, and anchors, shall be of steel construction, galvanized after fabrication, unless otherwise indicated.

2. Submerged supports, as well as piping, conduits, and equipment in hydraulic structures within 24 inches of the water level, shall be supported with support assemblies, including framing, hardware, and anchors constructed of Type 316 stainless steel, unless otherwise indicated.

3. Piping in chemical and corrosive areas shall be supported with support assemblies, including framing, hardware, and anchors constructed of Type 316 stainless steel, unless otherwise indicated.

K. Point Loads

1. Meters, valves, heavy equipment, and other point loads on PVC, FRP, or other plastic pipes, shall be supported on both sides, according to manufacturer's recommendations, in order to avoid undue pipe stresses and failures.

2. In order to avoid point loads, the supports on PVC, FRP, or other plastic piping shall be equipped with extra wide pipe saddles or galvanized steel shields.

L. Concrete Anchors

1. Unless otherwise indicated, concrete anchors for pipe supports shall be according to the following table; consult the ENGINEER for any anchor applications not appearing on the table.

2. Anchor embedment shall be in accordance with the requirements of Section 055000 – Miscellaneous Metalwork.

Pipe Support Application	Type of Concrete Anchor
New Concrete	Use embedded concrete insert anchors on a grid pattern. Use Grinnell (Anvil International), Tolco, or equal.
Existing Concrete	Use non-shrink grouted anchors, metallic type expansion anchors, or epoxy anchors. Exceptions: Metallic type expansion anchors and epoxy anchors are not permitted for pipe supports subject to vibrating loads. Epoxy anchors are not permitted where the concrete temperature is in excess of 100 deg F or higher than the limiting temperature recommended by the manufacturer. Epoxy anchors are not accepted where anchors are subject to vibration or fire.
Vibratory Loads and High-Temperature Conditions	Use non-shrink grouted anchors

M. Noise Reduction

1. In order to reduce the transmission of noise in piping systems, copper tubes in buildings and structures shall be wrapped with a 2-inch wide strip of rubber fabric or similar suitable material at each pipe support, bracket, clip, or hanger.

2.2 SUPPORT SPACING

A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads.

B. Pipe support spacing shall not exceed the maximum indicated spans.

C. For temperatures other than ambient temperatures or those listed, and for other piping materials or wall thicknesses, the pipe support spacings shall be modified in accordance with the pipe manufacturer's recommendations.

D. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of loading effects.

E. Where support spacing is not indicated on the drawings, the Contractor shall use the spacing below.

F. Support Spacing for Schedule 40 and Schedule 80 and welded steel pipe

Nominal Pipe Diameter, In	Maximum Span, ft
1/2	6
3/4/and 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 and 10	19
12 and 14	23
16 and 18	25
20 and greater	30

G. Support Spacing for Ductile Iron Pipe

Nominal Pipe Diameter, In	Maximum Span, ft
All diameters	Two supports per pipe length or 10-feet (one of the 2 supports at a joint)

H. Support Spacing for Copper Tubing

Nominal Pipe Diameter, In	Maximum Span, ft
1/2 to 1-1/2	6
2 to 4	10
6 and greater	12

I. Support Spacing for Schedule 80 PVC/CPVC Pipe

Nominal Pipe Diameter, In	Maximum Span, ft
1/2	4
3/4	4.5
1	5
1-1/4	5.5
1-1/2	5.75
2	6.25
3	7.5
4	8.25
6	10
8	11

Nominal Pipe Diameter, In	Maximum Span, ft
10	12.25
12	13.25

J. Other Pipe Materials

1. Support spacing for pipe constructed of other materials shall be based on design temperature and in accordance with the pipe manufacturer's recommendations.

2.3 MANUFACTURED SUPPORTS

A. Stock Parts

1. Where not specifically indicated, designs that are generally accepted as exemplifying good engineering practice and using stock or production parts shall be utilized wherever possible.

2. Such parts shall be locally available, new, of best commercial quality, and designed and rated for the intended purpose.

B. Manufacturers, or Equal

1. Basic Engineers Inc.

2. Bergen-Paterson Pipesupport Corp.

3. Grinnell Corp. (Anvil International)

4. NPS Products, Inc.

5. Power Piping Company

6. Tolco Incorporated

2.4 COATING

A. Galvanizing

1. Unless otherwise indicated, fabricated pipe supports other than stainless steel or non-ferrous supports shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. Other Coatings

1. Other than stainless steel or non-ferrous supports, supports shall receive protective coatings in accordance with the requirements of Section 099600 – Protective Coating.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General

1. Pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed instructions and ASME B31.1 - Power Piping.

2. Concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

B. Appearance

1. Pipe supports and hangers shall be positioned in order to produce an orderly, neat piping system.

2. Hanger rods shall be vertical, without offsets.

3. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, and without interference with other WORK.

3.2 FABRICATION

A. Quality Control

1. Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available.

2. Fabricated supports shall be neat in appearance without sharp corners, burrs, or edges.

- END OF SECTION -

SECTION 431054 - STAINLESS STEEL PIPE (ASTM A 312, MODIFIED)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide stainless steel pipe and appurtenances, complete and in place, in accordance with the Contract Documents.

B. The requirements of Section 431050 - Piping, General apply to the WORK of this Section.

PART 2 -- PRODUCTS

2.1 PIPE MATERIAL

A. Unless otherwise indicated, stainless steel pipe shall be in accordance with ASTM A 312 - Seamless and Welded Austenitic Stainless Steel Pipe, Type 316, seamless, Schedule 40, with screwed fittings for sizes up to and including 2-1/2 inches and welded fittings or flanged fittings for sizes 3-inches and larger. Stainless steel pipe 12-inches in diameter and larger shall be in accordance with ASTM A 409 - Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service, or A 778 - Welded, Unannealed Austenitic Stainless Steel Tubular Products, Type 316, of the schedules indicated, with welded or flanged joints.

2.2 PIPE JOINTS

A. Stainless steel pipe for sizes 2-1/2 inches and smaller shall have screwed ends with NPT threads made up with Teflon tape. Stainless steel pipe 3-inches and larger and where indicated shall have welded joints with socket-welding fittings, butt-welding fittings, or socket welding flanges. Stainless steel flanges shall have stainless steel bolts and nuts. Where indicated, stainless steel pipe shall have grooved ends for shouldered couplings, except that no pipe with less than Schedule 40 wall thickness shall be grooved. Where indicated, stainless steel pipe shall have plain ends for sleeve-type couplings.

2.3 FITTINGS

A. Threaded Fittings: Forged stainless steel fittings conforming to ASME B 16.11 - Forged Fittings, Socket-Welding and Threaded, Type 316.

B. Socket-Welding Fittings: Forged stainless steel fittings conforming to ASME B 16.11, Type 316.

C. Butt-Welding Fittings: Wrought stainless steel butt-welding fittings conforming to ASTM A 403 - Wrought Austenitic Stainless Steel Piping Fittings, and ASME B 16.9 - Factory-Made Wrought Steel Butt-Welding Fittings, Type 316.

D. Grooved Fittings: Wrought stainless steel grooved fittings conforming to ASTM A 403 and ASME B 16.9, with grooving conforming to AWWA C606 - Grooved and Shouldered Joints, Type 316.

E. Flanged Fittings: Type 316 stainless steel flanged fittings and flanges conforming to ASME B 16.5 - Pipe Flanges and Flanged Fittings.

F. Pressure Class: Unless otherwise indicated, fittings shall be in accordance with the pressure classes called for in the Piping Schedule. Where not indicated, the fittings shall have the same pressure rating as the pipe.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: Stainless steel pipe shall be installed in a neat and workmanlike manner, properly aligned and cut from measurements taken at the Site to avoid interferences with structural members, architectural features, openings, and equipment. Exposed pipe shall afford maximum headroom and access to equipment, and where necessary piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points. Installation shall be free from defects.

B. Supports and Anchors: Piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 431052 - Pipe Supports. Where necessary to avoid stress on equipment or structural members, the pipe shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature differences.

C. Valves and Unions: Unless otherwise indicated, connections to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Unions shall be provided at threaded valves, equipment, devices requiring occasional removal or disconnection and at changes in piping direction (at bends, etc).

3.2 PIPE PREPARATION

A. Prior to installation, each pipe length shall be carefully inspected, be flushed clean of any debris or dust, and be straightened if not true. Ends of threaded pipes shall be reamed and filed smooth. Fittings shall be equally cleaned before assembly.

3.3 PIPE JOINTS

A. Threaded Joints: Pipe threads shall conform to ASME B 1.20.1 - Pipe Threads, General Purpose (inch), and shall be full and cleanly cut with sharp dies. Not more than 3 threads shall remain exposed after installation.

B. Welded Joints: Welded joints shall conform to the specifications and recommendations of ASME B 31.1 - Power Piping. Welding shall be done by skilled and qualified welders per Section 431050 - Piping, General.

1. Field welding shall be minimized to the greatest extent possible by use of couplings and prefabrication of pipe systems at the factory. Pipe butt welds may be performed at the Site, providing the butt welds are performed only with an inert gas shielded process and that other indicated welding requirements are followed rigidly.

2. Residue, oxide, and heat stain shall be removed from any type of field weld and the affected areas adjacent by the use of stainless steel wire brushes, followed by

cleaning with an agent such as Eutectic Company's Euclean or equal, followed by complete removal of the agent.

C. Grooved Joints: Grooves for grooved couplings and fittings shall be made with specially designed grooving tools to the manufacturer's recommendations and conforming to AWWA C606. Grooves shall be clean and sharp without flaws, and the pipe ends shall be accurately cut at 90 degrees to the pipe axis.

3.4 INSPECTION AND FIELD TESTING

A. Inspection: The finished installation shall be carefully inspected for proper supports, anchoring, interferences, and damage to pipe, fittings, and coating. Defects shall be repaired.

B. Field Testing: Prior to enclosure or burying, piping systems shall be pressure tested as required in the Piping Schedule, for a period of not less than one hour without exceeding the tolerances listed in the Piping Schedule. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure. The CONTRACTOR shall furnish test equipment, labor, materials, and devices as part of the WORK. For additional testing requirements refer to Section 017430 - Pressure Pipe Testing and Disinfection.

1. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. Fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.

2. Leaks shall be repaired, and the system shall be re-tested until no leaks are found.

- END OF SECTION -

SECTION 431061 - PVC PRESSURE PIPE (ASTM D 1785, MODIFIED)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide polyvinyl chloride (PVC) pressure pipe, complete and in place, in accordance with the Contract Documents.

B. The requirements of Section 431050 - Piping, General, apply to the WORK of this Section.

C. This Section includes PVC pressure pipe with solvent-welded, flanged, or screwed joints. PVC pipe with bell and spigot joints is included in Section 339550 - PVC Pressure Pipe, Rubber Joints.

PART 2 -- PRODUCTS

2.1 PIPE MATERIAL

A. PVC pipe shall be made from new rigid unplasticized polyvinyl chloride and shall be normal impact Type 1, Grade 1, class 12454, Schedule 80, listed as compliant with NSF Standard 61, unless otherwise indicated, in accordance with ASTM D 1785-Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

2.2 PIPE JOINTS

A. Pipe joints shall be solvent-welded type with solvent cement and primer as recommended by the pipe manufacturer for the fluid or chemical in the pipe.

B. Screwed joints that are necessary to match up to threaded valves or fittings shall be made up with appropriate thread sealant, either paste or tape. Threading the pipe itself will not be permitted.

C. Flanged joints shall be made with solvent-welded PVC flanges, drilled to ASME B 16.5 - Pipe Flanges and Flanged Fittings, Class 150, unless otherwise indicated. Gaskets shall be ANSI 150 lb. full face, 1/8-inch thick EPDM for water or wastewater service. Gasket material for chemicals shall be suitable for the chemical service.

2.3 UNIONS

A. PVC unions shall be HAYWARD. No substitutions.

2.4 FITTINGS

A. Solvent Welded and Threaded Fittings: Solvent-welded and threaded fittings shall be Schedule 80 PVC fittings in accordance with ASTM D 2467 - Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

B. Flanged Fittings: Flanged fittings shall be Schedule 80 fabricated PVC fittings with 150 lb. flanges to ASME B 16.5.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: PVC pipe shall be installed in a neat and workmanlike manner, properly aligned, and cut from measurements taken at the Site to avoid interferences with structural members, architectural features, openings, and equipment. Exposed pipe shall afford maximum headroom and access to equipment, and where necessary, piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points. It is recommended that the CONTRACTOR obtain the assistance of the pipe manufacturer's field representative to instruct the pipefitters in the correct installation and support of PVC piping.

B. Supports and Anchors: Piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 431052 - Pipe Supports. Where necessary to avoid stress on equipment or structural members, the pipe shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature changes.

C. Valves and Unions: Unless otherwise indicated, connections to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Unions shall be provided at threaded valves, equipment, changes in pipe direction and other devices requiring occasional removal or disconnection. Valves and flanges attached to PVC pipe shall be provided with adequate supports.

3.2 PIPE PREPARATION

A. Prior to installation, each pipe length shall be carefully inspected, flushed clean of any debris or dust, and be straightened, if not true. Ends of threaded pipes shall be reamed and filed smooth. Pipe fittings shall be equally cleaned before assembly.

3.3 PIPE JOINTS

A. Threaded Joints: Pipe threads shall conform to ASTM F 1498 - Taper Pipe Threads 60 Degrees for Thermoplastic Pipe and Fittings, and shall be full and cleanly cut with sharp dies or molded. Joints shall be made with Teflon tape or thread sealant.

B. Solvent-Welded Joints: Solvent-welded joints shall be made with fresh primer and solvent cement on clean, dry pipe ends. The primer and cement cans shall be kept closed at all times and the joints shall be made up at the recommended ambient temperatures, to the pipe or cement manufacturer's written recommendations. Pipe ends shall be inserted to the full depth of the socket.

C. Flange Joints: Flanged joints shall be made with gaskets and Type 316 stainless steel bolts and nuts. Care shall be taken not to over-torque the bolts, in accordance with the manufacturer's written recommendations.

3.4 INSPECTION AND FIELD TESTING

A. Inspection: Finished installations shall be carefully inspected for proper joints and sufficient supports, anchoring, interferences, and damage to pipe, fittings, and coating. Defective WORK shall be repaired.

B. Field Testing: The CONTRACTOR shall allow adequate time for the solvent cement joints to cure. Curing time shall be per the solvent cement manufacturer's recommendation. Prior to enclosure or burying, piping systems shall be pressure tested as required in the Piping Schedule, for a period of not less than one hour, without exceeding the tolerances listed in the Piping Schedule. Caution - Do not use air or gas for testing PVC pipe. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure. The CONTRACTOR shall furnish test equipment, labor, materials, and devices.

C. Leakage shall be determined by loss of pressure. Fixtures, devices, or other accessories that would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines shall be plugged or capped as appropriate during the testing procedures.

D. Leaks shall be repaired, and the pipng shall be re-tested until no leaks are found.

- END OF SECTION -

SECTION 431200 - BLOWERS, COMPRESSORS, AND VACUUM PUMPS, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide blowers, compressors, and vacuum pumps and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to blowers, compressors, and vacuum pumps, except where otherwise indicated.

C. The requirements of Section 460100 - Equipment General Provisions apply to the WORK of this Section.

D. The CONTRACTOR shall assign to a single manufacturer full responsibility for the furnishing and functional operation of the blower, compressor, or vacuum pump unit, including drives, drive motors, speed control equipment (where variable speed drives are required), and accessories. The designated single manufacturer, however, need not manufacture more than one part of the unit (blower, or motor and drive), but shall coordinate the design, assembly, testing, and erection of the unit.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys
ASME PTC 9	Performance Test Code - Displacement Compressors, Vacuum Pumps and Blowers
ASME PTC 10	Performance Test Code - Compressors and Exhausters
ASME B31.1	Power Piping
IEEE 112	Test Procedure for Polyphase Induction Motors and Generators
ASTM A 48	Gray Iron Castings.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings: Shop Drawings shall contain the following information:

1. Equipment name, identification number, and specification number.

2. Performance curve and data.

3. The CONTRACTOR shall require the manufacturer to indicate points on the H/Q curves, and the limits recommended for stable operation between which the blowers may be operated without surge and vibration. The stable operating range shall be as wide as possible based on actual tests, performed at the factory in accordance with the ASME PTC 9 and 10 test codes.

4. Equipment detailed description and specification.

5. Electrical data including control and wiring diagrams.

6. Assembly and installation drawings including shaft size, seal, coupling, anchor bolt plan, part nomenclature, material list, outline dimensions, and shipping weights.

7. Equipment drive and motor in accordance with Section 260510 - Electric Motors.

C. Certification: The CONTRACTOR shall obtain written certification from the designated single manufacturer, addressed to the OWNER, stating that the equipment will efficiently and thoroughly perform the required functions and that the designated single manufacturer accepts the CONTRACTOR's assignment of full responsibility for coordination of all equipment, including motors, variable speed drives, controls, and services required for proper installation and operation of the completely assembled and installed unit(s). The CONTRACTOR shall submit such certificates to the ENGINEER.

D. O & M Manuals: Prior to start-up, furnish complete operations and maintenance manuals in accordance with Section 017300 for each vacuum pump. Note that these operation and maintenance manuals shall include all components for the vacuum priming system, including the vacuum pumps. Printed instructions relating to proper maintenance, including lubrication, and parts lists indicating the various parts by name, number, and diagram where necessary, shall be furnished in duplicate with each unit or set of identical units in each station. A recommended spare parts list shall be included. Instructions for field procedures for erection, adjustments, inspection, and testing shall be provided prior to installation of each piece of equipment.

1.4 QUALITY ASSURANCE

A. Equipment Testing: The CONTRACTOR shall be responsible for the coordination of the following tests of each blower, compressor, and vacuum pump, drive, and motor:

1. General: Tests shall be performed in accordance with the ASME PTC 9 and 10 Performance Test Codes. Tests shall be performed on the actual assembled unit from surge condition to 25 percent above the required design capacity. Prototype model tests will not be acceptable. Equipment shall be tested, as defined herein.

2. Factory Tests of Blowers and Compressors: Blowers, compressors, and motors of sizes 10 to 125 hp (inclusive) shall be factory-tested in accordance with the above requirements. Seven sets of certified test data shall be submitted to the ENGINEER.

3. Factory Tests of Motors: Motors of size 10 hp and larger shall be assembled, tested, and certified at the factory and the working clearances checked to insure that parts are properly fitted. The tests shall be in accordance with IEEE 112 standards, including heat run and efficiency tests. Computations shall be recorded and 7 certified and dated copies of the test results shall be furnished to the ENGINEER.

4. Factory Witnessed Tests: Blowers and compressors, variable speed drives, and motors 150 hp and larger, shall be factory-tested as complete, assembled units, as indicated above, and witnessed by the ENGINEER. The CONTRACTOR shall give the ENGINEER a minimum of 2 weeks notification prior to the test. Costs for OWNER and ENGINEER representative expenses shall be borne by the CONTRACTOR and included in the Bid price. Such costs shall include travel and subsistence for 2 persons but shall exclude salaries. Test results in triplicate shall be submitted to the ENGINEER and no equipment shall be shipped until the test data have been approved by the ENGINEER.

5. Acceptance: In the event of failure of any blower or compressor to meet any of the above requirements or efficiencies, the CONTRACTOR shall make necessary modifications, repairs, or replacements to conform to the requirements of the Contract Documents and the equipment shall be re-tested at no additional compensation until found satisfactory.

B. Field Tests: Units shall be field tested after installation, in accordance with the Contract Documents, to demonstrate satisfactory operation, without causing excessive noise, vibration, and overheating of the bearings. The field testing shall be performed by the CONTRACTOR in the presence of a factory-trained, experienced field representative of the manufacturer, who shall supervise the following tasks and shall certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation:

1. Start-up, check, and operate the equipment over the entire speed range. The vibration shall be within acceptable limits.

2. Equipment performance shall be documented by obtaining concurrent readings, showing motor voltage, amperage, and discharge head. Each power lead to the motor shall be checked for proper current balance.

3. Bearing temperatures shall be determined by a contact-type thermometer. A running time of at least 20 minutes shall be maintained for this test.

4. Electrical and instrumentation testing shall conform to other applicable Sections of the Specifications.

5. The field testing will be witnessed by the ENGINEER. In the event any of the equipment fails to meet the above test requirements, it shall be modified and retested in accordance with the requirements of this Section. The CONTRACTOR shall then certify in writing that the equipment has been satisfactorily tested, and that final adjustments thereto have been made. Certification shall include date of final acceptance test, as well as a listing of persons present during tests, and resulting test data. The costs of work by factory-trained representatives shall be borne by the CONTRACTOR. The OWNER will pay for power costs. When available, the OWNER's operating personnel will provide assistance in the field testing.

1.5 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Erection and Startup Assistance: Service and instruction assistance by the manufacturer's service representative for each vacuum unit shall be provided by the CONTRACTOR during the following periods:

1. One day (minimum) during installation.

2. One day (minimum) during startup.

B. Instruction of OWNER's Personnel: The CONTRACTOR shall provide for the services of a factory service representative to instruct the OWNER's personnel in the operation and maintenance of the equipment.

1.6 GUARANTEES, WARRANTIES

A. After completion, the CONTRACTOR shall furnish to the OWNER the manufacturer's written guarantees, that the equipment will operate with the published efficiencies, heads, and flow ranges and meet these specifications. The CONTRACTOR shall also furnish the manufacturer's warranties as published in its literature.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Wherever it is required that a single designated manufacturer shall be responsible for the compatible and successful operation of the various components of any equipment, it shall be understood to mean that the CONTRACTOR shall provide only such equipment as the manufacturer will certify is compatible with its equipment and with the further understanding that this in no way constitutes a waiver of any requirements.

B. Manufactured items provided under this Section shall be new, current models, and the products of reputable companies specializing in the manufacture of such products, with previous experience in such manufacture. The CONTRACTOR shall, upon request of the ENGINEER, furnish the names of not less than 5 successful installations of its equipment of comparable nature to that offered under this Contract.

C. Where 2 or more units of the same type and/or size of equipment are required, such units shall be from the same manufacturer.

2.2 MATERIALS

A. Materials employed in the blower, compressor, and vacuum pump equipment shall be suitable for the intended application; material not indicated shall be high-grade, standard commercial quality, free from any defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements:

1. Cast iron casings shall be of close-grained gray cast iron, conforming to ASTM A 48, or equal.

2. Stainless steel shafts shall be of Type 400 Series. Miscellaneous stainless steel parts shall be Type 316.

3. Anchor bolts, nuts, and washers shall be Type 316 stainless steel.

2.3 APPURTENANCES

A. Nameplates: Each blower, compressor, vacuum pump, and motor shall be equipped with an embossed stainless steel nameplate indicating rated head and capacity, impeller size, speed, and manufacturer's name, serial, and model number. Nameplates for electric motors shall be in accordance with Section 260510 - Electric Motors.

B. Solenoid Valves: Solenoid valves shall be provided on the water or oil lubrication and cooling lines. Solenoid valve electrical rating shall be compatible with the motor control voltage and shall be provided complete with all necessary conduit and wiring installation from control panel to solenoid.

C. Gauges: Blowers, compressors, and vacuum pumps shall be equipped with pressure or vacuum gauges, respectively, installed in the discharge lines. Pressure gauges shall be located in a representative location, where not subject to shock or vibrations, in order to achieve true and accurate readings. Pressure gauges shall conform to Section 409100 - Process Control System Instruments. Where subject to shock or vibrations, the pressure gauges shall be wall-mounted or attached to galvanized channel floor stands and connected by means of flexible connectors.

D. Variable Speed Drives: Variable speed drives, drive motors, speed control equipment, and accessories shall be in accordance with Section 262923 - Variable Frequency Drive Units.

E. Controls shall be in accordance with Section 409050 - Process Control System Description.

F. Electric Motors: Electric motors shall comply with the requirements of Section 260510.

G. Flanges: Suction and discharge flanges shall conform to ANSI B16.1 or B16.5 dimensions.

H. Lubrication: Blowers, compressors, vacuum pumps, and motors shall be oil- or-grease-lubricated per individual specifications.

I. Control Panels shall be in accordance with DIV 26.

J. Drains: Cooling water drains and drains from variable speed drive equipment shall be piped to the nearest floor sink or drain with galvanized steel pipe or copper tube, properly supported with brackets.

2.4 TOOLS AND SPARE PARTS

A. Tools: Special tools necessary for maintenance and repair of the equipment and one pressure grease gun for each type of grease required for blowers, compressors, and motors shall be furnished as a part of the WORK hereunder; such tools shall be suitably stored in metal tool boxes, and identified with the equipment number by means of stainless steel or solid plastic name tags attached to the box.

B. Spare Parts: The CONTRACTOR shall furnish spare parts subject to wear, such as seals, packing, gaskets, nuts, bolts, washers, wear rings, etc., as well as a set of spare bearings, and one year's supply of filter elements. Furnish parts suitably packaged and labelled in a box as described above for tools.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: Blowers, compressors, and vacuum pump equipment shall be installed in accordance with the Shop Drawings and as indicated. General installation requirements shall be as indicated in Section 460100.

B. Alignment: Equipment shall be field tested to verify proper alignment and operation as indicated, and freedom from binding, scraping, excessive noise, overheating, vibration, shaft runout, or other defects. Drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure in position and neat in appearance.

C. Piping and Mounting: Piping shall be provided with sufficient expansion joints, guides, and anchors and be supported so as to preclude the possibility of exerting undue forces and moments on the equipment flanges. Suitable flexible connectors shall be provided to isolate the equipment from the piping system. Each unit shall be mounted on a flat and level concrete pad capable of supporting the dead weight of the unit, by means of restrained vibration isolators or resilient pads of suitable design.

D. Lubricants: The installation work shall include furnishing the necessary oil and grease for initial operation and for one year's operation.

E. Start-up and Commisioning: Perform in accordance with Section 0100001.

- END OF SECTION -

SECTION 431297 - VACUUM PRIMING SYSTEM

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide a vacuum priming system, complete and operable, in accordance with the Contract Documents. The vacuum priming system shall include:

1. Duplex diaphragm or turbine vacuum priming pumps.

2. Vacuum tank with manual drain valves, vacuum gauges, vacuum breaker valve, tank water level sight gauges, electronic water level sensor, high pressure switch, low pressure switch, low-low pressure switch, and pressure indicating transmitter. Provide tank with a dual vacuum chamber that will allow manual draining of accumulated water from one-half of the tank while the other half of the tank, and the vacuum priming system, remains in service.

3. Two Vacuum Priming Valves with water level sensors.

4. Two Vacuum Priming System Control Valves.

5. Two Suction Pipe Vent Valves.

6. Vacuum System Control Panel (VSCP).

7. All accessories necessary for complete installation,

B. The requirements of Section 431200 - Blowers, Compressors, and Vacuum Pumps, General, apply to the WORK of this Section.

C. The requirements of Section 433012 Valve and Gate Actuators apply to the WORK in this Section.

D. The supplier shall examine the site conditions, intended application, and operation of the vacuum priming system and recommend equipment that will best satisfy the indicated requirements.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 431200.

B. Provide operations and maintenance manuals for the entire system in accordance with Sections 431200 and 017300.

PART 2 -- PRODUCTS

2.1 SYSTEM

A. Provide all components of the system from a single supplier who regularly supplies systems of the type required, with at least 5 years of successful projects of similar scope and complexity. The supplier shall provide all components, less any field piping and wiring that may be required. All field devices, with the exception of the Suction

Pipe Vent Valves (SPV-BLVxx) and Vacuum Priming System Valves (VPS-BLVxx) shall be connected to the Vacuum System Control Panel for control. The Suction Pipe Vent Valves and actuators and Vacuum Priming System Valves and actuators shall be supplied as part of this scope of supply, but shall be powered and controlled from the Pump Station distribution panels and Station PLC SCADA.

B. System Suppliers, or Equal:

1. HFE
2. Lynn

2.2 VACUUM PUMPS

A. Design: Two required, Vacuum Pump 1 (North) and Vacuum Pump 2 (South). Either diaphragm or turbine type vacuum pumps are allowed.

1. Diaphragm Pump Option: Each pump shall be an air-cooled, single-stage unit, with belt-drive, and heavy duty electric motor mounted on a common base, with sliding base for the motor. The 5-hp motor shall be suitable for 460 volt, 3 phase, 60 Hz supply. The pump shall be rated at 50 cfm minimum at 1.5" Hg. Provide OSHA compliant belt guard. Mount pump and motor with base on concrete equipment pad. Provide exhaust muffler and sound enclosure to reduce noise to levels stated in Specification 460100 - Equipment General Provisions. Provide each pump with piping and accessories shown on the plans or as required, including a discharge check valve and manual shut off ball valve.

2. Turbine Pump Option: Each pump shall be a cast iron liquid ring vacuum pump close coupled to a 5 HP 460 volt, 3 phase, 60 Hz heavy duty electric motor. The pump shall be rated at 50 cfm minimum at 1.5" Hg. Mount pump/motor on concrete equipment pad. Provide each pump with piping and accessories shown on the plans or as required, including a discharge check valve and manual shut off ball valve. Provide exhaust muffler and sound enclosure to reduce noise to levels stated in Specification 460100 - Equipment General Provisions. For the turbine pump water supply, supply pump with manual ball shut off valves, wye strainer, solenoid valve, manual needle flow control valve and flow switch, as shown on the plans. Provide seal water to the turbine pump from the station potable water supply and pipe water from the seal to adjacent equipment drains.

B. Pump Manufacturers, or Equal:

1. Cornell
2. Nash

2.3 VACUUM TANK

A. Design: One 200 gallon (nominal) steel tank with minimum shell and head thickness of 3/16 inch with a corrosion allowance of 1/16 inch. Provide tank with interior partition to separate the tank into two pressure-rated halves, each capable of operating while the other half is out of service and at atmospheric pressure. Finish tank inside and out with manufacturer's primer and finished coatings for corrosion resistance. Provide tank capable of taking a perfect vacuum. Equip each tank half with water sight gauge with inlet and outlet ball shutoff valves, hand-hole for interior inspection of tank, tank drain with manual ball shutoff valve, stainless steel tank vacuum breaker valve and tank vacuum gauge with ball shutoff valve. Furnish upper half of tank additionally with tank

water level control switch. Provide tank connection(s) and/or pipe manifold on upper tank half for pressure indicating transmitter, high pressure switch, low pressure switch, and low-low pressure switch. Provide vacuum gauges meeting the requirements of Section 409100, Process Control System Instruments.

2.4 VACUUM PRIMING VALVES

A. Design: Two 2-inch vacuum priming valves, APCO 200P Priming Valve or equal by Valmatic, with Mercoid Model 123 level switch to provide water level control for the raw water pumps. Provide cast iron body valve with 2-inch connection. Provide stainless steel float and linkage of the internal mechanism. Provide corrosion resistant internal and external coating for the valve. Provide vacuum valve and switch as a single unit, with integral connecting piping and unions to allow disassembly. Provide each Mercoid switch with SPDT contacts rated minimum 5 amp at 120V. Provide strainer assembly with manual isolation ball valves and bypass piping between the vacuum priming valve and pump.

2.5 VACUUM SYSTEM CONTROL VALVES

A. Design: Two 1-inch stainless steel solenoid valves, supplied as part of the vacuum system. Solenoid valves shall operate on 120V AC single phase service for isolation of the Vacuum Priming Valve from the vacuum tank. Provide manual isolation valves and bypass piping to allow the solenoid valve to be manually bypassed.

2.6 SUCTION PIPE CONTROL VALVES

A. Design: Two 2-inch stainless steel ball valves with electric motor actuators operating on 120V AC single phase service for venting of the Raw Water Pump suction piping. Provide valve and actuator as specified in Section 433018 - Ball Valves and 433012 - Valve and Gate Actuators.

2.7 PRESSURE SWITCHES AND PRESSURE INDICATING TRANSMITTER

A. Design: Three pressure switches for control of the vacuum pumps. Provide a high pressure, low pressure, and low-low pressure switch. Provide one pressure indicating transmitter for continuous recording of the vacuum system pressure. Mount pressure switches on tank or alternately provide piped manifold connected to tank and mount devices to piping. Provide manual isolation ball valves for pressure switches and pressure indicating transmitter. Provide devices in accordance with Specification 409100 Process Control System Instruments.

2.8 VACUUM SYSTEM CONTROL PANEL AND CONTROL

A. Provide one Vacuum System Control Panel (VSCP) for control of the vacuum system. Wall mount panel as shown on the Plans. Control devices shall be pre-wired and terminated to field terminals in NEMA 4X junction boxes. Make field connections between control devices and VSCP. Provide interface monitoring and control, signals to the PLC-based SCADA as shown on the drawings and described in Specification 409100 - Process Control System Instruments. Provide control panel in accordance with the requirements of 409513 Process Control System Panel Enclosures and Equipment and other related instrumentation and electrical specifications.

2.9 MISCELLANEOUS ACCESSORIES

A. Design: Provide all vacuum system vacuum piping and tubing of Type 316 stainless steel per Specification 431054 Stainless Steel Pipe (ASTM A 312, Modified). Provide all ball valves, check valves, unions, strainers and the like installed in the vacuum piping of Type 316 stainless steel. Provide drain piping downstream of the vacuum tank manual valve of Type 316 stainless steel. Provide turbine vacuum pump water supply piping and turbine pump seal drain water of Schedule 80 solvent welded PVC.

2.10 SPARE PARTS

A. Furnish the following spare parts for the vacuum priming system:

1. One Vacuum Priming Valve with level sensor.

2. Two Vacuum System Control Valves (solenoid valves).

3. One Suction Pipe Vent Valve with electric motor actuator.

4. One turbine pump water supply solenoid valve (as applicable)

5. One turbine pump water supply flow switch (as applicable)

6. One vacuum pump.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. General: Equipment shall be installed in accordance with the Shop Drawings and as indicated.

B. General installation requirements shall be as indicated in Section 460100 - Equipment General Provisions.

3.2 SERVICES OF MANUFACTURER

A. Inspection, Startup, and Field Adjustment: In accordance with Section 432000 and Section 010001.

B. Instruction of OWNER'S Personnel: In accordance with Section 432000 and Section 010001.

C. For the purposes of this paragraph, a Day is defined as an 8 hour period, excluding

- END OF SECTION -

SECTION 432000 - PUMPS, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide pumps and pumping appurtenances, complete and operable, as indicated in accordance with the Contract Documents.

B. The provisions of this Section shall apply to pumps and pumping equipment throughout the Contract Documents, except where otherwise indicated.

C. The requirements of Section 460100 – Equipment General Provisions, apply to this Section.

D. Unit Responsibility

1. The pump manufacturer shall be made responsible for furnishing the WORK and for the coordination of design, assembly, testing, and installation of the WORK of each specific pump Section.

2. The CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each specific pump Section.

E. Single Manufacturer

1. Where 2 or more pump systems of the same type or size are required, provide pumps produced by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings

1. Submit pump name, identification number, and specification Section number.

2. Performance Information

a. Submit performance data curves showing head, capacity, horsepower demand, NPSH required, and pump efficiency over the entire operating range of the pump.

b. Require the equipment manufacturer to indicate separately the head, capacity, horsepower demand, overall efficiency, and minimum submergence required at the design flow conditions and the maximum and minimum flow conditions.

c. Submit performance curves at intervals of 100 RPM from minimum speed to maximum speed for each centrifugal pump equipped with a variable speed drive.

3. Operating Range

   a. Require the manufacturer to indicate the limits on the performance curves recommended for stable operation without surge, cavitation, or excessive vibration.

   b. Provide a stable operating range as wide as possible, based on actual hydraulic and mechanical tests.

4. Submit assembly and installation drawings, including shaft size, seal, coupling, bearings, anchor bolt plan, part nomenclature, material list, outline dimensions, and shipping weights.

5. Submit data, in accordance with the requirements of Section 260510 – Electric Motors, for the electric motor proposed for each pump.

6. Submit an elevation of the proposed local control panel, showing panel-mounted devices, details of enclosure type, a single-line diagram of power distribution, current draw of the panel, and a list of all terminals required to receive inputs or to transmit outputs from the local control panel.

7. Submit a wiring diagram of field connections, with identification of terminations between local control panels, junction terminal boxes, and equipment items.

8. Submit a complete electrical schematic diagram.

C. Technical Manual

1. Submit a Technical Manual containing the required information indicated in Section 013300 – Contractor Submittals and each specific pump Section.

D. Operations and Maintenance Manuals

1. Submit an Operation and Maintenance Manuals in accordance with Section 017300 for each specific pump.

E. Spare Parts List

1. Submit a spare parts list containing the required information indicated in Section 013300 – Contractor Submittals and each specific pump Section.

F. Factory Test Data

1. Submit signed, dated, and certified factory test data for each pump system which requires factory testing.

2. Submit these data before shipment of equipment.

G. Certifications

1. Submit the manufacturer's certification of proper installation.

2. Submit the CONTRACTOR's certification of satisfactory field testing.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Compliance with the requirements of the specific pump Sections may necessitate modifications to the manufacturer's standard equipment.

B. Performance Curves

1. Provide centrifugal pumps with a continuously rising curve or with the system operating range not crossing the pump curve at 2 different capacities or “dip region.”

2. Unless otherwise indicated, the required shaft horsepower for the entire pump assembly at any point on the performance curve shall not exceed the rated horsepower of the motor or engine or encroach on the service factor.

C. Compatibility

1. Provide entirely compatible components of each pump system provided under the specific pump Sections.

2. In each unit of pumping equipment, incorporate basic mechanisms, couplings, electric motors or engine drives, variable speed controls, necessary mountings, and appurtenances.

2.2 MATERIALS

A. Provide materials suitable for the intended application.

B. For materials not indicated, provide high-grade, standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended, and conforming to the following requirements:

1. Provide cast iron pump casings and bowls constructed of close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or equal.

2. Provide bronze pump impellers conforming to ASTM B 62 - Composition Bronze or Ounce Metal Castings, or B 584 - Copper Alloy Sand Castings for General Applications, where dezincification does not occur.

3. Provide pump shafts constructed of Type 416 or 316 stainless steel.

4. Miscellaneous stainless steel parts shall be of Type 316.

5. Provide anchor bolts, washers, and nuts of Type 316 stainless steel in accordance with the requirements of Section 055000 – Miscellaneous Metalwork.

C. Materials in contact with potable water shall be listed as compliant with NSF Standard 61.

2.3 PUMP COMPONENTS - GENERAL

A. Flanges and Bolts

B. Provide suction and discharge flanges conforming to ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 or ASME B16.5 - Pipe Flanges and Flanged Fittings dimensions.

C. Provide bolts shall be in accordance with the requirements of Section 055000 – Miscellaneous Metalwork.

D. Lubrication

1. Vertical pump shafts of clean water pumps shall be product water-lubricated, unless otherwise indicated.

2. Provide deep-well pumps and pumps with dry barrels with water- or oil-lubricated bearings and seals, and enclosed line shafts.

3. Pumps for sewage, sludge, and other process fluids shall be lubricated as indicated.

E. Hand holes

1. Provide hand holes on pump casings shaped to follow the contours of the casing in order to avoid any obstructions in the water passage.

F. Drains

1. Pipe gland seals, air valves, cooling water drains, and drains from variable speed drive equipment to the nearest floor sink or drain, using stainless steel pipe or tube that is properly supported with stainless steel brackets.

G. Grease Lubrication

1. For vertical propeller, mixed-flow, and turbine pumps, other than deep well pumps, of bowl sizes 10-inch and larger, provide a stainless steel tube attached to the column for grease lubrication of the bottom bearing.

H. Stuffing Boxes

1. Where stuffing boxes are indicated for the pump seal, provide stuffing boxes of the best quality, using the manufacturer's suggested materials best suited for the specific application.

2. For sewage, sludge, drainage, and liquids containing sediments, provide fresh-water-flushed seals, using lantern rings.

3. If fresh water is not available, the seal shall be flushed with product water cleaned by a solids separator as manufactured by John Crane Co., Lakos (Claude Laval Corp.), or equal.

4. Conventional Packing Gland Type Seal

a. Unless otherwise indicated, provide packing material of Teflon braiding, containing 50 percent ultrafine graphite impregnation in order to satisfy the requirements listed in the table below.

b. Acceptable ring materials are asbestos-free die-molded packing rings of braided graphite material free of PTFE, Chesterton 1400R or equal, for non-

potable water service, and braided PTFE material, Chesterton 1725 or equal, that is listed under NSF Standard 61 for potable water service.

c. Seal Requirements

Shaft speeds	up to 2500 fpm
Temperature	up to 500 deg F
pH range	0 - 14

5. Mechanical Seals (Conventional Non-Split-Type)

a. Provide mechanical seals of the fresh water-flushed-type, unless otherwise indicated in which case use product water cleaned by a solids separator as indicated above.

b. Provide mechanical seals as manufactured by the following, or equal:

Sewage, Sludge, Wastewater, or Raw Water Pumps	Double seals	John Crane Type 5620P, Flowserve Type ISCPP, Chesterton Type GDS or 255
Abrasives, Grit, or Lime Slurry Pumps	Double seals	John Crane Type 5620P (hard faces), Flowserve Type ISCPP or SLC (check with pump manufacturer), Chesterton Type GDS or 255
Chemicals or Corrosive Liquid Pumps	Single seals	John Crane Type 8-1 or 9, Flowserve Type ISCPX, or Chesterton Type UV, GSS, or 155
Water Pumps (hot and cold)	Single seals	John Crane Type 5610Q, Flowserve Type ISCPX, Chesterton Type UV, GSS, or 155

6. Mechanical Seals (Split-Type)

a. Provide split-type mechanical seals that are fresh water-flushed, unless otherwise indicated in which case use product water cleaned by a solids separator as indicated above.

b. Provide mechanical seals as manufactured by the following, or equal:

Sewage, Sludge, Wastewater, or Raw Water Pumps	Double seals	John Crane Type 3710, Flowserve Type PSS2, Chesterton Type 442
Abrasives, Grit, or Lime Slurry Pumps	Double seals	Split seals are not recommended.
Chemicals or Corrosive Liquid Pumps	Single seals	Split seals are not recommended because of leakage.
Water Pumps (Hot and cold)	Single seals	John Crane Type 3710, Flowserve Type PSS II, Chesterton Type 442

7. Where indicated, circulate a buffer fluid at a minimum 20 psi above discharge pressure, or as required by the manufacturer, in order to maintain reliable seal performance.

8. Equip mechanical seals with non-clogging, flexible–mounted seats with elastomer secondary seals.

9. Provide wetted metal parts constructed of Type 316 stainless steel, Alloy 20, or Hastelloy B or C, whichever has the best corrosion resistance to the pumped fluid.

10. Provide double-balanced dual cartridge seals in order to allow for seal integrity in case of flush water pressure reversal.

11. Provide springs in single and double seals, in the non-wetted end of the seal.

12. Deliver fresh water to the seals through appropriate size piping with plug valves, strainers, pressure regulators, electrically operated solenoid valves, and rotameters.

2.4 PUMP APPURTENANCES

A. Nameplates

1. Equip each pump with a stainless steel nameplate indicating serial number(s), rated head and flow, impeller size, pump speed, and manufacturer's name and model number.

B. Solenoid Valves

1. Require the pump manufacturer to provide solenoid valves on the water or oil lubrication lines and on cooling water lines.

2. Provide solenoid valve electrical ratings compatible with the motor control voltage.

C. Gauges

1. Except for sample pumps, sump pumps, and hot water circulating pumps, equip pumps with pressure gauges installed at the pump discharge lines.

2. Provide pump suction lines with compound gauges.

3. Located gauges in a representative location, where not subject to shock or vibrations, in order to achieve true and accurate readings.

4. Where subject to shock or vibrations, wall-mount the gauges or attach the gauges to stainless steel channel floor stands and connect by means of flexible connectors.

5. Provide pressure and compound gauges in accordance with the requirements of Section 409100 – Process Control System Instruments.

2.5 FACTORY TESTING

A. Conduct the following tests on each indicated pump system:

1. Motors

a. Test electric motors in accordance with the requirements of Section 260510 – Electric Motors.

b. Furnish test results to the pump manufacturer prior to the pump test.

2. Variable Frequency Drives

a. Test variable frequency drives in accordance with the requirements of Section 263940 – Medium Voltage Variable Speed Drives.

b. Furnish test results to the pump manufacturer prior to the pump test.

3. Factory Non-witnessed Test

a. Test centrifugal pump systems with drives 10 hp up to and including 125 hp at the pump factory in accordance with the American National Standard for Centrifugal Pump Tests (ANSI/HI 1.6) acceptance Level "1U" or the American National Standard for Vertical Pump Tests (ANSI/HI 2.6) as approved by ANSI and published by the Hydraulic Institute.

b. For sump pumps and sample pumps, acceptance shall be in accordance with Level "2" of ANSI/HI 1.6, unless otherwise indicated.

c. Perform tests using the complete pump system to be furnished, including the Project motor and variable speed drive if equipped with variable speed drive.

d. For pumps with motors smaller than 100 hp, the manufacturer's certified test motor will be accepted.

e. Testing of prototype models will not be accepted.

f. Conduct the following minimum tests and submit the test results:

1) Hydrostatic test;

2) Performance Test:

a) Conduct performance testing at maximum speed, obtain a minimum of 5 hydraulic test readings between shutoff head and 25 percent beyond the maximum indicated capacity, and record on data sheets as defined by the Hydraulic Institute standards;

b) For variable speed driven pumps, test each pump between maximum and minimum speed at 100-RPM increments;

c) Submit pump curves showing head, flow, bhp, and efficiency results;

3) Mechanical test;

4) NPSH

a) Perform a net positive suction head required test (NPSHr3) for the raw water pumps provided for this project.

g. Submit certification signed by a senior official of the pump manufacturer that the pump shaft horsepower demand did not exceed the rated motor horsepower of 1.0 service rating at any point on the curve.

h. Submit test results to the ENGINEER for review prior to delivery to the Site.

4. Acceptance

a. In the event of failure of any pump to meet any of the requirements, make necessary modifications, repairs, or replacements in order to conform to the requirements of the Contract Documents, and re-test the pump until found satisfactory.

PART 3 -- EXECUTION

3.1 MANUFACTURER'S SERVICES

A. Inspection, Startup, and Field Adjustment

1. Where required by the specific pump Section, furnish an authorized service representative of the manufacturer at the Site continuously to supervise the following items and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation:

a. installation of the equipment;

b. inspection, checking, and adjusting the equipment;

c. startup and field testing for proper operation; and

d. performance of field adjustments to ensure that the equipment installation and operation comply with the indicated requirements.

B. Instruction of OWNER's Personnel

1. Where required by the individual pump Section, furnish an authorized training representative of the manufacturer at the Site for the number of Days indicated in the specific pump Section, to instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment.

2. Furnish instruction specific to the model of equipment provided.

3. Qualifications
    a. Furnish a representative with at least 2 years experience in training.
    b. Submit a resume for the representative.
4. Schedule the training a minimum of 3 weeks in advance of the first session.
5. Lesson Plan Review
    a. Submit the proposed training material and a detailed outline of each lesson for review.
    b. Incorporate review comments into the material.
6. The trainees will keep the training materials.
7. The OWNER may videotape the training for later use with the OWNER's personnel.

3.2 INSTALLATION

A. General

1. Install pumping equipment in accordance with the manufacturer's written recommendations.

B. Alignment

1. Field-test the equipment in order to verify proper alignment and freedom from binding, scraping, shaft runout, or other defects.
2. Measure the pump drive shafts just prior to assembly in order to ensure correct alignment without forcing.
3. Ensure that the equipment is secure in position and neat in appearance.

C. Lubricants

1. Provide the necessary oil and grease for initial operation.

3.3 PROTECTIVE COATING

A. Coat materials and equipment in accordance with the requirements of Section 099600 – Protective Coating.

3.4 FIELD TESTS

A. Field-test each pump system after installation in order to demonstrate:

1. satisfactory operation without excessive noise and vibration;
2. no material loss caused by cavitation;
3. no overheating of bearings; and,
4. indicated head, flow, and efficiency at the design point.

B. Conduct the following field testing:

1. Startup, check, and operate the pump system over its entire speed range.

2. If the pump is driven by a variable speed drive, test the pump and motor at 100-RPM increments.

3. If the pump is driven at constant speed, test the pump and motor at the maximum RPM.

4. Unless otherwise indicated, vibration shall be within the amplitude limits recommended by the Hydraulic Institute standards at a minimum of 4 pumping conditions defined by the ENGINEER.

5. Obtain concurrent readings of motor voltage, amperage, pump suction head, and pump discharge head for at least 4 pumping conditions at each pump rotational speed, at 100-RPM increments if equipped with a variable speed drive or at maximum RPM if equipped with a constant speed drive.

6. Check each power lead to the motor for proper current balance.

7. Bearing Temperatures

   a. Determine bearing temperatures by a contact-type thermometer.

   b. Precede this test with a run time sufficient to stabilize bearing temperatures, unless an insufficient liquid volume is available to furnish such a run time.

8. Ensure that electrical and instrumentation tests conform to the requirements of the Section under which that equipment is specified.

C. Witnessing

1. Field testing will be witnessed by the ENGINEER.

2. Furnish 3 Days advance notice of field testing.

D. If the pumping system fails to meet the indicated requirements, modify or replace the pump and re-test as indicated above until it satisfies the indicated requirements.

E. Certification

1. After each pumping system has satisfied the requirements, certify in writing that it has been satisfactorily tested and that final adjustments have been performed.

2. Certification shall include the date of the field tests, a listing of persons present during the tests, and the test data.

F. The CONTRACTOR shall be responsible for costs of field tests, including related services of the manufacturer's representative, except for power and water, which the OWNER will bear.

G. If available, the OWNER'S operating personnel will provide assistance in field testing.

- END OF SECTION -

SECTION 432209 - HORIZONTAL NON-CLOG PUMPS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide two (2) horizontal non-clog raw water pumps and appurtenant WORK, complete and operable, in accordance with the Contract Documents. The pumps will operate with adjustable frequency drives and by primed with a vacuum priming system.

B. The requirements of Section 460100 - Equipment General Provisions apply to the WORK of this Section.

C. The requirements of Section 432000 - Pumps, General apply to this Section.

D. The Supplier shall examine the Site conditions, intended application, and operation of the pump system and recommend the pump which will best satisfy the indicated requirements.

E. Provide operations and maintenance manuals in accordance with Sections 432000 and 017300.

PART 2 -- PRODUCTS

2.1 GENERAL DESCRIPTION

A. Identification

Pump Names/Numbers	Raw Water Pump 1 (North) Raw Water Pump 2 (South)
Quantity	2
Location	Pump Room

B. **Operating Conditions:** The WORK of this Section shall be suitable for long term operation under the following conditions:

Duty	Continuous
Drive	Variable
Ambient environment	Indoors, Corrosive
Ambient temperature, degrees F	55 to 104
Ambient relative humidity, percent	- to 65
Fluid service	Raw Surface Water
Fluid temperature, degrees C	16 to 22
Fluid pH range	6.5 to 8

Fluid specific gravity	1.0
Pump Suction Elevation, ft (NGVD 1929)	32.71
Minimum Sink Water Surface Elevation, ft (NGVD 1929)	15.5
Maximum Sink Water Surface Elevation, ft (NGVD 1929)	23.5
Static Suction Lift Range, ft	9.21 to 17.21
Minimum size of spheres to pass, in. dia.	3

System Curves: The WORK of this Section shall be suitable for long term operation with the following system curves for the minimum, average and maximum system operating conditions of total dynamic head (TDH):

Flow GPM/CFS	Minimum System Curve TDH ft	Average System Curve TDH ft	Maximum System Curve TDH ft	NPSHA for Maximum System Curve ft
0	3.25	17.6	48.41	14.43
400	5.58	21.11	54.31	14.35
800	11.46	28.38	66.23	14.11
1200	21.04	39.44	84.03	13.74
1346/3	25.34	44.32	91.82	13.56
1400	27.13	46.31	95	13.5
1600	34.04	54.04	107.24	13.22
2000	50.28	72.02	135.73	12.57
2200	59.56	82.26	151.89	12.19

C. Performance Requirements

Rating Point at Full Speed, Full Flow	
Flow (cfs/gpm)	2/1,346
Total Dynamic Head (Feet)	101
Nominal Pump Speed (RPM)	1800
Frequency (Hz)	60
Nominal Brake Horsepower (HP)	44
Pump Efficiency (%)	79
Approximate Shutoff Head, feet	160
Maximum Net Positive Suction Head Required, (Feet)	10.5

Minimum Motor Horsepower (HP)	60
Secondary Rating Point at Full Speed	
Flow (gpm)	2250
Total Dynamic Head (Feet)	60
Nominal Pump Speed (RPM)	1800
Nominal Brake Horsepower (HP)	46
Frequency (Hz)	60
Pump Efficiency (%)	75
Rating Point at Reduced Speed 1, Full Flow	
Flow (cfs/gpm)	2/1,346
Total Dynamic Head (Feet)	44.3
Nominal Pump Speed (RPM)	1300
Pump Efficiency (%)	78
Approximate Shutoff Head, feet	81
Net Positive Suction Head Required, (Feet)	7.5
Minimum Motor Horsepower (HP)	60
Rating Point at Reduced Speed 2, Full Flow	
Flow (cfs/gpm)	2/1,346
Total Dynamic Head (Feet)	25.3
Nominal Pump Speed (RPM)	1100
Nominal Frequency (Hz)	37
Pump Efficiency (%)	78
Approximate Shutoff Head, feet	60
Net Positive Suction Head Required, (Feet)	7.5
Minimum Motor Horsepower (HP)	60

Rating Point at Reduced Speed 3, Half Flow	
Flow (mgd/gpm)	1/694
Total Dynamic Head (Feet)	60
Nominal Pump Speed (RPM)	1275
Nominal Frequency (Hz)	43
Pump Efficiency (%)	72.5
Approximate Shutoff Head, feet	82
Net Positive Suction Head Required, (Feet)	9
Minimum Motor Horsepower (HP)	60
Rating Point at Reduced Speed 4, Half Flow	
Flow (mgd/gpm)	1/694
Total Dynamic Head (Feet)	23
Nominal Pump Speed (RPM)	865
Nominal Frequency (Hz)	29
Pump Efficiency (%)	80
Approximate Shutoff Head, feet	38
Net Positive Suction Head Required, (Feet)	9
Minimum Motor Horsepower (HP)	60

D. Pump Dimensions

Min impeller diameter, in	11.75
Min pump shaft dia., in	2.5
Min suction flange size, in	6
Min discharge flange size, in	6
Suction flange rating, ANSI, psi	150
Discharge flange rating, ANSI, psi	150

2.2 PUMP REQUIREMENTS

A. **General:** Components shall be designed to safely withstand forces resulting from flow reversals up to 125 percent of maximum speed within the pump during shutdown caused by power failure.

B. **Construction:** Construction of horizontal non-clog pumps shall conform to the following requirements:

Casing and frame	Cast iron, with 2 to 3 percent nickel added, back pull-out design with large, contoured handhole and drain, foot-mounted. Minimum 1/2-inch taps for gauges
Impeller	Cast iron with 2 or 3 percent nickel added, non-clog design, enclosed, 2 or 3 vane type, statically and dynamically balanced
Wear rings (impeller and casing)	Type 420 stainless steel with Brinnell hardness of 350 at impeller and 450 at casing
Pump shaft	Heat treated, solid, high strength steel, AISI 1045 or 4140, of sufficient section to limit deflection of the impeller centerline to 6 mils when operating at continuous maximum load
Shaft sleeve	Type 316 stainless steel
Bearings	Double ball or roller and radial bearings, 100,000 hours L-10 life, at full load and max speed, to accept the full, maximum unbalanced thrust imposed on the pump
Coupling	4 piece heavy-duty adjustable spacer type with L-10 life of 100,000 hours, and guard
Seal	Mechanical seal: Option 1: Cornell Cycloseal single spring loaded seal, no external flush Option 2: Chesterton 442 split seal with enviroseal spiral track "N" , no external flush
Lubrication	Oil lubricated, with oil reservoir
Pump base	Cast iron or steel, with drain

C. **Drive:** Variable speed drive, close coupled, with horizontal, heavy-duty, high efficiency electric motor suitable for 460 volt, 3 phase, 60 Hz power supply, capable of accepting the total, unbalanced thrust imposed by the pump, in accordance with Section 260510 - Electric Motors. For variable speed drive see Section 262923 - Variable Frequency Drive Units.

2.3 PUMP CONTROLS

A. Pumps shall be controlled in accordance with Section 409050 - Process Control System Description.

2.4 SPARE PARTS

A. Furnish the following spare parts for each pump:

1. Two sets of bearings
2. Two shaft sleeves
3. Two sets of wear rings
4. Two mechanical seals
5. Two sets of all gaskets and O-rings

2.5 MANUFACTURERS OR EQUAL

A. Cornell Pump Company

PART 3 -- EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Inspection, Startup, and Field Adjustment: In accordance with Section 432000 and Section 010001.

B. Instruction of OWNER'S Personnel: In accordance with Section 010001.

- END OF SECTION -

SECTION 433000 - VALVES, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide valves, actuators, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.

B. The requirements of Section 460100 – Equipment General Provisions, apply to the WORK of this Section.

C. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated.

D. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls, as indicated.

E. Support

1. Where a valve is to be supported by means other than the piping to which it is attached, obtain from the valve manufacturer a design for its support and foundation that satisfies the criteria in Section 460100 – Equipment General Provisions.

2. Submit the support design, including drawings and calculations sealed by an engineer, with the Shop Drawings.

F. Unit Responsibility

1. The CONTRACTOR shall assign a single manufacturer to be responsible for the supply, coordination of design, assembly, testing, and furnishing of each valve; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each valve Section.

G. Single Manufacturer

1. Where 2 or more valves of the same type and size are required, the valves shall be furnished by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Furnish the following information on Shop Drawings:

1. valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number;

2. complete information on the valve actuator, hydraulic power units (HPU), pneumatic air supply system including size, manufacturer, model number, limit switches, and mounting;

3. cavitation limits for control valves;

4. assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems;

5. data in accordance with Section 260510 – Electric Motors, for electric motor-actuated valves;

6. complete wiring diagrams and control system schematics; and,

7. A valve-labeling schedule, listing the valves to be furnished with stainless steel tags, indicating in each case the valve location and the proposed wording for the label.

C. Furnish a technical manual containing the required information for each valve, as indicated.

D. Provide operations and maintenance manual for valves and actuators in accordance with Section 017300.

E. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.

F. Factory Test Data

1. Where indicated, submit signed, dated, and certified factory test data for each valve requiring certification, before shipping the valve.

2. Furnish a certification of quality and test results for factory-applied coatings.

G. Field Test Data

1. Submit signed, dated, and certified field test data for each valve.

PART 2 -- PRODUCTS

2.1 PRODUCTS

A. General

1. Provide valves of new and current manufacture.

2. Provide valves 6-inch and larger with actuators with position indicators.

3. Unless otherwise indicated, provide valve actuators in accordance with Section 433012 – Valve and Gate Actuators.

B. Protective Coating

1. Coat the exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 2-inch and larger in accordance with the requirements of Section 099600 – Protective Coating.

2. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.

3. Do not coat the machined flange faces of valves except where such flanges are not adjoining a mating flange as shown in the Contract Documents. Apply rust inhibitor coating on machined surfaces of the flange prior to shipment.

C. Valve Labeling

1. Except when such requirement is waived by the ENGINEER in writing, provide a label on shut-off valves and control valves except for hose bibbs.

2. Furnish a label composed of stainless steel, a minimum of 2 inches by 4 inches in size, as indicated in Section 431051 – Piping Identification Systems, and permanently attached to the valve or on the wall adjacent to the valve as directed by the ENGINEER.

D. Valve Testing

1. As a minimum, unless otherwise indicated or recommended by the reference standards, test valves 3 inches in diameter and smaller in accordance with the manufacturer's standard procedure.

2. Factory-test valves 4 inches in diameter and larger as follows:

a. Hydrostatic Testing

1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.

2) Metallic valves rating pressures shall be based at 100 degrees F.

3) Plastic valves rating pressures shall be based at 73 degrees F, or at a higher temperature according to material type.

4) During the hydrostatic test, there shall be no visible leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.

5) Allow test duration of at least 10 minutes, in order to allow visual examination for leakage.

b. Seat Testing

1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.

2) Provide test duration of at least 10 minutes, in order to allow visual examination for leakage.

3) The leakage rate shall be the more stringent of the following:

a) As recommended by the reference standard for that type of valve; or

b) Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves, and drop-tight for resilient seated valves.

c. Performance Testing

1) Shop-operate the valves from the fully-closed to the fully-open position, and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

E. Certification

1. Prior to shipment of valves with sizes larger than 12 inches in diameter, submit certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

F. Valve Markings

1. Permanently mark valve bodies in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.2 MATERIALS

A. General

1. Provide materials suitable for the intended application.

2. Provide materials in contact with potable water listed as compliant with NSF Standard 61.

3. Ensure that materials not indicated are of high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended.

4. Unless otherwise indicated, provide valve and actuator bodies conforming to the following requirements:

a. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings

b. Ductile Iron: ASTM A 536 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures

c. Steel: ASTM A 216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service

d. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications. Bronze materials in contact with potable water service shall be free of lead content meeting the Lead Reduction Act.

e. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel

f. PVC: Polyvinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454

g. CPVC: Chlorinated Poly Vinyl Chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447

h. NSF Standard 61: Materials shall be listed for use in contact with potable water.

i. Elastomeric materials used for seat, seals and O-rings shall be compatible with temperature, pressures and fluid or gas service.

1) Elastomeric materials for water with chloramines shall be Teflon or Viton-A.

2.3 VALVE CONSTRUCTION

A. Bodies

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.

2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.

3. Perform welds on welded bodies by certified welders and ground welds smooth.

4. Provide valve ends as indicated, and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections

1. Unless otherwise indicated, valves 2-1/2 inches in diameter and smaller may be provided with threaded end connections.

2. Provide valves 3 inches in diameter and larger with flanged end connections.

3. Flanges, bolts and gaskets shall be as specified in Section 431050 - Piping, General.

C. Bonnets

1. Connect valve bonnets to the body by clamping, screwing, or flanging.

2. Provide bonnets of the same material, temperature, and pressure rating as the body.

3. Make provisions for the stem seal with the necessary glands, packing nuts, and Yokes.

D. Stems

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercially-available material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal. Bronze materials in contact with potable water shall be NSF 61 approved and free of lead. Elastomeric materials shall be compatible with fluid service.

2. Bronze valve stems shall conform to ASTM B 584, except that zinc content shall not exceed 16 percent.

E. Stem Guides

1. Provide stem guides spaced with an L/R ratio not to exceed 200:1. Submit calculations for L/R ratios and guide spacing to the ENGINEER for review.

2. Stem guides shall have slotted holes and shall be adjustable in two directions.

3. Construct submerged stem guides from Type 304 stainless steel.

F. Internal Parts

1. Provide internal parts and valve trim as indicated for each individual valve.

2. Where not indicated, construct valve trim from Type 316 stainless steel or other material best-suited for the intended service.

G. Nuts and Bolts

1. Unless otherwise indicated, provide nuts and bolts on valve flanges and supports in accordance with the requirements of Section 055000 – Miscellaneous Metalwork and Section 431050 – Piping, General.

2.4 Torque Tubes

A. Submerged or buried valves with a remote gearbox and actuator shall be supplied with a torque tube to transfer torque from the actuator to the valve. Torque tubes shall be directly connected to the valve and the floor stand and gear actuator. Each torque tube and floor stand shall be sized to operate under the maximum service conditions for the valve. Unless otherwise indicated, torque tubes shall be made of schedule 40, steel pipe with epoxy coating suitable for the fluid service. Each submerged valve, torque tube, floor stand and actuator shall be pre-assembled and “matched marked” in the manufacturer’s shop to ensure proper fit when assembled in field.

2.5 Extension Shaft Stem

A. Valves mounted in dry areas with gearbox attached to the valve and with remote actuator shall be supplied with an extension shaft stem with universal joint attached to the gear and actuator. All components shall be sized to operate under the maximum service conditions for the valve. Unless otherwise indicated, shaft stem and universal joints shall be made of carbon steel with epoxy coating suitable for the fluid service. Each valve, shaft stem, floor stand and actuator shall be pre-assembled and “matched marked” in the manufacturer’s shop to ensure proper fit when assembled in field.

2.6 VALVE ACTUATORS

A. Valve actuators shall be as indicated and as specified in Section 433012 – Valve and Gate Actuators

2.7 VALVE ACCESSORIES

A. Provide valves complete with the accessories required to provide a functional system.

2.8 SPARE PARTS

A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.

B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.

C. Spare parts are intended for use by the OWNER, after expiration of the correction of defects period.

2.9 MANUFACTURERS

A. Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the indicated valves.

PART 3 -- EXECUTION

3.1 VALVE INSTALLATION AND TRIAL OPERATION

A. General

1. Install valves, actuating units, stem extensions, valve boxes, and accessories in accordance with the manufacturer's written instructions and as indicated.

2. Adequately brace gates in order to prevent warpage and bending under the intended use.

3. Firmly support valves in order to avoid undue stresses on the pipe.

B. Access

1. Install valves in a manner to provide easy access for actuation, removal, and maintenance, and to avoid interference between valve actuators and structural members, handrails, and other equipment.

C. Valve Accessories

1. Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items such that systems are compatible and operating properly.

2. Clearly note the relationship between interrelated items on Shop Drawing submittals.

D. Trial Operation

1. After installation, schedule trial operation witnessed by the ENGINEER and the OWNER representative.

2. All valves shall be cleaned thoroughly of all foreign materials and final adjustments made. The valves shall then be operated through one complete cycle from a fully closed position to a fully open position and back to a fully closed position to verify that the assembly is functional.

3. For control valves that operate in multiple operating scenarios, the CONTRACTOR shall simulate all operational scenarios including the hydraulic power units, pilot control system or pneumatic air supply system to demonstrate compliance to the specifications.

4. A field leakage test meeting the maximum allowable specified requirement shall be conducted.

5. Test certificate shall be signed by the valve manufacturer and the CONTRACTOR and shall be submitted to the ENGINEER.

- END OF SECTION -

SECTION 433012 - VALVE AND GATE ACTUATORS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. Provide valve actuators and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.

B. The provisions of this Section apply to valves and gates except where otherwise indicated in the Contract Documents.

C. Unit Responsibility

1. Make the valve manufacturer responsible for the coordination of design, assembly, testing, and installation of actuators on the valves; however, the CONTRACTOR shall be responsible to the OWNER for compliance of the valves, and actuators with the Contract Documents.

D. Where 2 or more valve or gate actuators of the same type or size are required, the actuators shall be produced by the same manufacturer.

E. The requirements of Section 260515 – Industrial Control Panels apply to the WORK of this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals and Section 433000 – Valves, General.

B. Submit Shop Drawing information for actuators with the valve submittals as a complete package.

C. Submit calculations showing dynamic seating and unseating torques versus the output torque of the actuator.

D. Provide operations and maintenance manuals in accordance with Section 017300.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Unless otherwise indicated, provide shut-off and throttling valves and externally actuated valves with manual or power actuators.

B. Provide actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, hand wheels, levers, chains, and extensions, as applicable.

C. Provide actuators with torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater, and capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.

D. Actuator torque ratings for butterfly valves shall be determined in accordance with AWWA C504 - Rubber-Seated Butterfly Valves.

E. Identify wires of motor-driven actuators by unique numbers.

F. Manufacturers

1. Where indicated, certain valves may be provided with actuators manufactured by the valve or gate manufacturer.

2. Where actuators are furnished by different manufacturers, coordinate the selection to result in the fewest number of manufacturers possible.

G. Materials

1. Provide actuators of current models, of the best commercial quality materials, and liberally sized for the required torque.

2. Provide materials suitable for the environment in which the valve is to be installed.

H. Actuator Mounting and Position Indicators

1. Securely mount actuators by means of brackets or hardware specially designed and sized for this purpose and of ample strength.

2. Cast the word "OPEN" on each valve or actuator, with an arrow indicating the direction to open in the counter-clockwise direction.

3. Equip gear and power actuators with position indicators.

4. Where possible, locate manual actuators between 48 and 60 inches above the floor or the permanent working platform.

I. Standards

1. Unless otherwise indicated and where applicable, provide actuators in accordance with AWWA C 540 - Power-Actuating Devices for Valves and Sluice Gates.

J. Functionality

1. Coordinate electric, pneumatic, and hydraulic actuators with the power requirements of Division 26 – Electrical, and instrumentation equipment as indicated in Section 409100 – Process Control and Instrumentation Systems.

K. Provide fasteners in accordance with the requirements of Section 055000 – Miscellaneous Metalwork.

L. Provide coatings in accordance with the requirements of Section 099600 – Protective Coating.

2.2 MANUAL ACTUATORS

A. General

1. Unless otherwise indicated, provide valves with manual actuators.

2. Provide valves in sizes up to and including 4 inches with direct-acting lever or hand wheel actuators of the manufacturer's best standard design.

3. Provide valves larger than 4-inch with gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the hand wheel.

4. Provide buried and submerged gear-assisted valves for pressures higher than 250 psig, valves 30 inches in diameter and larger, and where indicated, with worm gear actuators, hermetically-sealed water-tight and grease-packed.

5. Valves 6-inch to 24-inch diameter may be provided with traveling-nut actuators, worm gear actuators, spur or bevel gear actuators, as appropriate for each valve.

B. Buried Valves

1. Unless otherwise indicated, provide buried valves with extension stems to grade, with square nuts or floor stands, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys.

2. Where indicated, provide buried valves in cast-iron, concrete, or similar valve boxes with covers of ample size in order to allow operation of the valve actuators.

3. Permanently label the valve box covers as required by the local Utility Company or the ENGINEER.

4. Provide wrench-nuts in compliance with AWWA C 500 - Metal-Seated Gate Valves for Water Supply Service.

C. Chain Actuator

1. Provide manually-activated valves with the stem located more than 7 feet above the floor or operating level with chain drives consisting of sprocket-rim chain wheels, chain guides, and operating chains supplied by the valve manufacturer.

2. Construct the wheel and guide from ductile iron, cast iron, or steel.

3. Chains

   a. Fabricate the chain from hot-dip galvanized steel or stainless steel, and extend to 5 feet, 6 inches above the operating floor level.

   b. Provide an extra strong valve stem on chain-actuated valves in order to allow for the extra weight and chain pull.

   c. Provide hooks for chain storage where chains interfere with pedestrian traffic.

D. Floor Boxes

1. Provide hot-dipped galvanized cast iron or steel floor boxes and covers to fit the slab thickness, for operating nuts in or below concrete slabs.

2. For operating nuts in the concrete slab, provide a bronze-bushed cover.

E. Tee Wrenches

1. Furnish buried valves with floor boxes with 2 operating keys or one key per 10 valves, whichever is greater.

2. Size the tee wrenches such that the tee handle will be 2 to 4 feet above ground, and to fit the operating nuts.

F. Manual Worm Gear Actuator

1. Provide an actuator consisting of a single- or double-reduction gear unit contained in a weatherproof cast iron or steel body with cover, and a minimum 12-inch diameter handwheel.

2. Provide the actuator to be capable of a 90-degree rotation, and equip the actuator with travel stops capable of limiting the valve opening and closing.

3. Provide the actuator with spur or helical gears and worm gearing.

4. Provide a self-locking gear ratio in order to prevent "back-driving."

5. Construct the spur or helical gears of hardened alloy steel, and the worm gear of alloy bronze.

6. Construct the worm gear shaft and the hand wheel shaft from 17-4 PH or similar stainless steel.

7. Accurately cut gearing with hobbing machines.

8. Use ball or roller bearings throughout.

9. Provide the output shaft end with a spline in order to allow adjustable alignment.

10. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator.

11. Design gearing for a 100 percent overload.

12. The entire gear assembly shall be sealed weatherproof.

G. Design and rate buried gear actuators for buried service, provide with a stainless steel input shaft, and double-seal on shaft and top cap.

H. Traveling-Nut Actuator

1. Provide the actuator with a traveling-nut and screw (Scotch yoke), contained in a weatherproof cast iron or steel housing with a spur gear and a minimum 12-inch diameter hand wheel.

2. The screw shall run in 2 end bearings, and provide a self-locking actuator in order to maintain the valve position under any flow condition.

3. Construct the screw and gear from hardened alloy steel or stainless steel, and the construct the nut and bushings from alloy bronze.

4. The bearings and gear shall be grease-lubricated by means of nipples.

5. Design gearing for a 100 percent overload.

I. 120 V Quarter-Turn and Multi-Turn Electric Valve Operators (6-Inches and Smaller)

1. Provide 120-volt, single-phase, motor-operated valve operators suitable for use with quarter-turn ball valves, multi-turn diaphragm valves, and multi-turn globe valves.

2. Provide operators with the following characteristics and features:

   a. reversing capacitor-start motor rated for operation on 120 VAC, 60 Hz, single-phase;

   b. output torque as required for valve application and pressure differential;

   c. integral motor overload protection, with auto-reset;

   d. permanently-lubricated gear train;

   e. OPEN/CLOSE Control

      1) For OPEN/CLOSE control, provide 4 single-pole, double-throw cam-actuated limit switches (2 OPEN, 2 CLOSED);

      2) Use one set of limit switches for both motor control and local indication;

      3) Make the other set available for connection to remote monitoring;

      4) Provide adjustable limit switch contacts rated for not less than 5 amps at 120 VAC;

   f. Local Control Station: OPEN/CLOSE

      1) corrosion-resistant, NEMA 4X, for mounting near valve actuator;

      2) Provide 3-position selector switch for LOCAL/OFF/REMOTE selection and 2 pushbuttons, OPEN and CLOSE;

      3) Provide OPEN and CLOSE indicating lights operating at 120 VAC for connection to valve control limit switches;

      4) Local Control Station components and construction shall be as specified in DIV 26 and 40.

   g. Modulating Control

      1) For modulating control, provide an electronic positioner and feedback potentiometer;

      2) The positioner shall use a 4 to 20 ma signal to adjust the valve opening;

      3) Feedback potentiometer shall be 0 to 1000 ohms;

   h. Local Control Station Modulating

      1) corrosion resistant, NEMA 4X, for mounting near valve actuator;

      2) Provide 2-position selector switch for LOCAL/REMOTE selection, one OPEN and one CLOSE push button, a resistance-to-current converter with 4 to 20 ma output, and a zero to 100 percent electronic valve position indicator; and,

i. Disconnect Switch

1) Provide a lockable local power disconnect switch, NEMA 4X, for disconnecting the 120 VAC power to the valve; and,

2) Install the disconnect in the field adjacent to the valve actuator and in accordance with the requirements of NPFA 70.

3. Refer to the Drawings for the control diagram wiring interface.

4. Two-wire control systems are not required for this actuator.

5. 120 V Quarter-Turn and Multi-Turn Electric Valve Operators (6-Inches and Smaller) Manufacturer

a. FLOWSERVE Worcester Control Series 75 Electric Actuator, no substitutions.

PART 3 -- EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Field Adjustments

1. The adjustment of actuator controls and limit switches in the field for the required function shall be performed by field representatives of the manufacturers of valves or gates with pneumatic, hydraulic, or electric actuators.

3.2 INSTALLATION

A. Install valve and gate actuators and accessories in accordance with the requirements of Section 433000 – Valves, General.

B. Locate the actuators to be readily accessible for operation and maintenance without obstructing walkways.

C. Do not mount actuators where shock or vibrations will impair their operation, and do not attach the support systems to handrails, process piping, or mechanical equipment.

- END OF SECTION -

SECTION 433016 - CHECK VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide check valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 433000 - Valves, General apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 433000.

PART 2 -- PRODUCTS

2.1 SWING CHECK VALVES (2-1/2 INCHES AND SMALLER)

A. General: Swing check valves for steam, water, oil, or gas in sizes 2-1/2 inches and smaller shall be suitable for a steam pressure of 150 psi and a cold water pressure of 300 psi. Units shall have screwed ends unless otherwise indicated, and screwed caps.

B. Body: The valve body and cap shall be of bronze conforming to ASTM B 763 - Copper Alloy Sand Castings for Valve Application, or ASTM B 584 with threaded ends conforming to ASME B1.20.1 - Pipe Threads, General Purpose (inch).

C. Disc: Valves for steam service shall have bronze or brass discs conforming to ASTM B 16 - Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines, and for cold water, oil, and gas service replaceable composition discs.

D. Hinge Pin: The hinge pins shall be of bronze or stainless steel.

E. Manufacturers, or Equal

1. Crane Company

2. Milwaukee Valve Company

3. Stockham Valves and Fittings

4. Wm. Powell Company

2.2 DOUBLE-LEAF CHECK VALVES

A. General: Double-leaf check valves for air and gas service and where indicated, shall be of the wafer-type designed to fit between ANSI B16.1 flanges for 125 lb rating. The check valve leaves shall be spring-loaded. Flow from one direction shall cause the valve to open, and upon valve shutoff, the spring shall shut the valve leaves before reverse flow starts, acting at a point of zero velocity, for non-slam closure. The spring-tension of each valve shall be designed for the individual operating condition. For check valves installed in discharge piping of multi-stage blowers, the spring tension and seat material

shall be suitable for the pressure, temperature, and air or gas service per the blower manufacturer recommendations.

B. Body: The valve body shall be of cast iron conforming to ASTM A 126 with integrally-cast seat, rated for minimum 150 lb working pressure at up to 250 degrees F.

C. Leaves: The leaves shall be of bronze, aluminum bronze, or ductile iron, revolving on stainless steel or monel hinge pins with retainers.

D. Seat: The valves shall have resilient seats for bubble-tight shut-off, suitable for temperatures up to 250 degrees F without sticking. The seats shall be Buna-N, Viton, or other suitable material for the intended purpose. The seat rings shall be firmly attached to a shoulder cast in the body or to the disc by compression-molding or similar acceptable method.

E. Springs: The springs shall be of Type 316 stainless steel or Inconel, as best suited for the service condition.

F. Manufacturers, or Equal

1. APCO (Valve and Primer Corporation)
2. Proquip International
3. VAL-MATIC (Valve and Manufacturing Corporation)

2.3 RUBBER FLAPPER SWING CHECK VALVES

A. General: Rubber flapper swing check valves for water, sewage, sludge, and abrasives shall have full pipe size flow areas, one moving part only, and body seats at 45 degrees to permit horizontal and vertical up-flow. Valves shall be designed for a minimum water-working pressure of 150 psi, with a flanged cover plate holding down the rubber flapper. The valves shall be of the non-clog design.

B. Body: The valve body and cover shall be of cast iron conforming to ASTM A 126 with flanged ends conforming to ASME B 16.1. There shall be a threaded tapping in the bottom of the body for insertion of a back-flow device, and provision for mounting of a signal switch.

C. Disc: The valve disc or flapper shall be of Buna-N or other best-suited elastomer one-piece construction, precision molded, with integral O-ring type sealing surface, steel and nylon or fabric reinforced, with non-slam closing action through a 35 degree disc stroke, for bubble-tight shut off at high and low pressures.

D. Manufacturers, or Equal

1. APCO (Valve and Primer Corporation)

2. VAL-MATIC (Valve and Manufacturing Corporation)

2.4 PLASTIC BALL CHECK VALVES

A. General: Plastic ball check valves for corrosive fluids, in sizes up to 4-inches, shall be used for vertical up-flow conditions only, unless the valves are provided with spring actions.

B. Construction: The valve bodies and balls shall be of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polyvinylidene fluoride (PVDF), or polypropylene (PP) construction, as best suited for each individual service condition. They shall have unions with socket connections or flanged ends conforming to ASME B16.5 - Pipe Flanges and Flanged Fittings, class 150. Seals shall have Viton O-rings, and valve design shall minimize possibility of the balls sticking or chattering. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F.

C. Manufacturers, or Equal

1. ASAHI-AMERICA

2. George Fischer, Inc.

3. NIBCO Inc. (Chemtrol Division)

4. Spears Mfg. Co. (PVC, CPVC, AND PP only)

PART 3 -- EXECUTION

3.1 GENERAL

A. Valves shall be installed in accordance with provisions of Section 433000 - Valves, General.

- END OF SECTION -

SECTION 433018 - BALL VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide ball valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 433000 - Valves, General apply to this Section.

C. The requirements of Section 433012 - Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 433000 - Valves, General.

PART 2 -- PRODUCTS

2.1 STAINLESS STEEL METAL BALL VALVES (2-INCHES AND SMALLER)

A. General: Provide either manual level ball valves or actuator ready ball valves as required. Where indicated, metal ball valves in sizes up to 2 inches shall have actuators in accordance with Section 433012 - Valve and Gate Actuators.

B. Body**:** Ball valves up to and including 2 inches in size shall have two piece bodies, full port, ASTM A351/A351M GR CF8M stainless steel body and end piece, NPT threaded ends, ASTM A276 Type 316 stainless steel ball, reinforced PTFE seats, seals and packing, adjustable packing gland, blowout proof stainless steel stem, stainless steel lever operator with vinyl grip (manual operation), actuator pad (actuated valves), rated 1000 psi CWP, vacuum service to 29" mercury, complying with MSS SP-110.

C. Manufacturers, or Equal

1. **Conbraco Industries, Inc. (Apollo); 76F-100 Series**
2. **Nibco**

2.2 BRONZE METAL BALL VALVES (2-INCHES AND SMALLER)

A. General: Provide either manual level ball valves or actuator ready ball valves as required. Where indicated, metal ball valves in sizes up to 2-inches shall have actuators in accordance with Section 433012 - Valve and Gate Actuators.

B. Body: Ball valves up to and including 2 inches in size shall have two piece bodies, full port, NPT threaded ends, bronze body and end piece, Type 316 stainless steel ball and stem, vented ball, reinforced PTFE seats and seals, adjustable packing nut, blowout proof stem, zinc-coated steel lever operator with vinyl grip (manual actuation), actuator pad (actuated valves), rated 600 psi WOG, 150 pound SWP, vacuum service to 29" mercury, complying with MSS SP-110.

C. Manufacturers, or Equal

1. **Conbraco Industries, Inc. (Apollo); 77-140 Series**

2. **Nibco**

2.3 PLASTIC BALL VALVES

A. General: Plastic ball valves for corrosive fluids shall be made of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polypropylene (PP), or polyvinylidene fluoride (PVDF), as recommended by the manufacturer for the specific application. Valves shall have manual actuators in accordance with Section 433012 - Valve and Gate Actuators, unless otherwise indicated.

B. Construction**:** Rated 150 psi at 100 degrees F, 80 psi at 140 degrees, with ASTM D1784, Type IV, Grade 1 chlorinated polyvinyl chloride (CPVC) body, ball, and stem, end entry, double union design, with solvent-weld socket ends or single union ball with flanged ends drilled to ASME B16.1, replaceable Teflon seat, Viton or Teflon O ring stem seals, to block flow in both directions.

C. Manufacturers, or Equal

1. **ASAHI-America**

2. **George Fischer, Inc.**

3. **NIBCO Inc., (Chemtrol)**

4. **Plast-O-Matic Valves, Inc.**

5. **Spears Mfg. Co.**

6. **Watts Regulator**

PART 3 -- EXECUTION

3.1 GENERAL

A. Valves shall be installed in accordance with Section 433000. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

- END OF SECTION -

SECTION 433024 - PLUG VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide plug valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 433000 - Valves, General apply to this Section.

C. The requirements of Section 433012 - Valve and Gate Actuators apply to this Section.

D. Plug valves shall have undergone a proof-of-design test to demonstrate that the valve components operate at the service flow, pressure, temperature, and fluid conditions, free from binding, excessive noise, and premature failures. Proof-of-design test results shall be available to the ENGINEER on request. The proof-of-design test shall be conducted in accordance with the applicable provisions of AWWA C504.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 433000.

PART 2 -- PRODUCTS

2.1 ECCENTRIC PLUG VALVES (1/2-inch to 72-inches)

A. Construction: Eccentric plug valves shall be of the non-lubricated, eccentric plug design with cast iron bodies conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with ANSI 125 lb. flanged ends for valves 3 inches and larger, and screwed or flanged ends for smaller sizes. The plugs and shafts shall be of cast iron or ductile iron conforming to ASTM A 536 - Ductile Iron Castings, and the plugs shall be lined with a resilient coating, best suited for the specific service. The body shall be lined with a suitable elastomer, where required for a special service, or it shall be epoxy-lined in accordance with Section 099600 - Protective Coating. The seats shall be of nickel or stainless steel welded to the body. Top and bottom shaft bearings shall be of permanently lubricated stainless steel or Teflon coated stainless steel. Grit seals of Teflon, Nylatron, or similar suitable material shall be at the top and bottom plug journals. Valves up to and including 20 inches in size shall have an unobstructed port area of not less than 80 percent of full pipe area, and not less than 70 percent for larger valves. Eccentric plug valves shall have a pressure rating of not less than 150 psi WOG, for bubble-tight shut-off in the standard flow direction, and 25 psi WOG in the reverse flow direction. When equipped with worm gear actuator, the pressure rating shall be 150 psi WOG in both directions. The stem seal shall consist of field adjustable packing, replaceable without removal of the actuator, or of self-adjusting U-cup packing.

B. Actuators: Unless otherwise indicated, eccentric plug valves 3 inches and smaller shall have operating levers; larger valves shall have worm-gear actuators. Valve actuators shall be in accordance with Section 433012.

C. Manufacturers, or Equal

1. DeZurik Corporation

2. Clow Valve Company

3. Pratt Valve

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Plug valves shall be installed in strict accordance with the manufacturer's published recommendations and the applicable provisions of Section 433000.

B. Eccentric Plug Valves: Unless otherwise directed, the following rules shall be observed for the installation of eccentric plug valves on sewage, sludge, or other liquid systems containing solids, silt, or fine sand:

1. The valves shall be positioned with the stem in the horizontal direction.

2. In horizontal pipelines, the plug shall swing upwards when opening, to permit flushing out of solids.

3. The orientation of the valve shall prevent the valve body from filling up with solids when closed; however, where the pressure differential through the valve exceeds 25 psi, the higher pressure for valves without worm gear, electric, or air operators shall be through the valve to force the plug against the seat.

4. Valves which may be closed for extended periods (stand-by, bypass, or drain lines) and valves with reversed flow (higher pressure on downstream side, forcing the plug away from its seat), shall be equipped with worm gear operators for the full range of sizes.

5. For special applications or when in doubt, consult with the manufacturer prior to installation.

- END OF SECTION -

SECTION 433052 - MISCELLANEOUS VALVES

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide miscellaneous valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 433000 - Valves, General, apply to this Section.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 433000.

PART 2 -- PRODUCTS

2.1 AIR-VACUUM AND AIR-RELEASE VALVES

A. Air and Vacuum Valves: Air and vacuum valves shall be capable of venting large quantities of air while pipelines are being filled, and allowing air to re-enter while pipelines are being drained. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.

B. Air-Release Valves: Air-release valves shall vent accumulating air while system is in service under pressure and be of the size indicated. Valves shall meet the same general requirements as indicated for air and vacuum valves except that the vacuum feature will not be required. Valves shall be designed for a minimum water-working pressure of 150 psi, unless otherwise indicated. Air release valves for clean water applications with operating pressures of 150 psi or less shall be Apco/Valve and Primer "No. 200", GA Industries "Figure 920m", Multiplex "Crispin Type PL", ARI “No. S-050”, or Val-Matic "No. 38". Air release valves for working pressures below 20 psi shall be provided with soft seats.

C. Combination Air Valves: Combination air valves shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively. Valves shall have the same general requirements as indicated for air and vacuum valves. Two inch and smaller combination air valves for clean water applications shall be of the integral type with a valve assembly which functions as both an air and vacuum valve and an air release valve. The valves shall be Apco/Valve and Primer “Single Body Combination Air Valves”, Multiplex “Crispin Universal Air Release Valves”, ARI “No. D-040”, or Val-Matic “Combination Air Valves”. Three inch and larger combination air valves for clean water service shall consist of an air and vacuum valve with an externally mounted air release valve. The valves shall be Apco/Valve and Primer "Single Body Combination Air Valves" for 3 inch and “Custom Combination Air Valves” for 4 inch and larger, GA Industries "Figure 950 Kinetic Custom Combination Air Valves", Multiplex "Crispin Dual Air Valves", ARI “No. D-060-HF”, or Val-Matic "Dual Body Combination Air Valves". Unless otherwise specified or indicated

on the DRAWINGS, all combination valves shall be provided with surge check discs on the valve inlet to restrict the exhaust air flow rate.

D. Sewage Air Release Valves: Sewage air release valves shall vent accumulating gases during system operation. Valves shall have long float stems and bodies to minimize clogging. The same general requirements shall apply as indicated for air and vacuum valves. Each sewage air release valve shall be furnished with the following backwash accessories, fully assembled on the valve:

1. Inlet shut-off valve.
2. Blow-off valve.
3. Clear water inlet valve.
4. Rubber supply hose.
5. Quick disconnect couplings.

E. Manufacturers, or Equal

1. APCO (Valve and Primer Corporation)
2. Crispin - Multiplex Manufacturing Company
3. GA Industries
4. Val-Matic (Valve and Manufacturing Corporation)

2.2 BACKFLOW PREVENTER VALVES

A. General

1. Provide backflow preventers that work on the reduced pressure principle.
2. Provide drain lines with air gaps.
3. The backflow preventer valves shall be in accordance with AWWA C511 – Reduced-Pressure Principle Backflow Prevention Assembly.

B. Construction

1. The preventers shall consist of 2 spring-loaded check valves, an automatic differential pressure relief valve, drain valves, and shut-off valves.
2. The body material shall be bronze or cast iron, for a working pressure of not less than 150 psig, with bronze or stainless steel trim.

C. Maintenance Access

1. Provide separate access covers for the check valves and the relief valve.
2. Provide top-entry access to check valve components.

D. Manufacturers, or Equal

1. Cla-Val Company
2. Febco (CMB Industries)
3. Watts, ACV

4. Wilkins Regulator Division (Zurn Industries)

2.3 CORPORATION STOPS

A. Unless otherwise indicated, corporation stops shall be made of solid brass for key operation, with screwed ends with corporation thread or iron pipe thread, as required.

B. Manufacturer, or Equal

1. Ford Meter Box Company, Inc.
2. James Jones Company (Watts, ACV)
3. Mueller Company

2.4 SOLENOID VALVES

A. Solenoid valves shall be of the size, type, and class indicated and shall be designed for not less than 150 psi water-working pressure. Valves for water, air, or gas service shall have brass or bronze body with screwed ends, stainless steel trim and spring, Teflon or other resilient seals with material best suited for the temperature and fluid handled. Unless otherwise indicated, for chemicals and corrosive fluids, solenoid valves with PVC, CPVC, polypropylene (PP), polyvinylidene fluoride (PVDF), or Teflon materials of construction, suitable for the specific application shall be provided. Enclosures shall be NEMA rated in accordance with the area designations of Section 260000 - Electrical Work, General. Coil ratings shall be for continuous duty. For electrical characteristics see the electrical Drawings or Specifications.

B. Manufacturers, or Equal

1. For general duty

a. Automatic Switch Co. (ASCO), Model RED HAT
b. Skinner Valve (Parker Hannifin Corporation)
c. Magnatrol Valve Corporation
d. J. D. Gould Co.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Backflow preventers shall be installed in potable water lines where required by applicable codes or regulations, wherever there is any danger of contamination, and where indicated.

B. Valves shall be installed in accordance with the manufacturer's printed recommendations, and with Section 433052.

C. Backflow preventers, as well as air and vacuum release valves, shall have piped outlets to the nearest acceptable drain, firmly-supported, and installed in such a way as to avoid splashing and wetting of floors and obstruction of traffic.

- END OF SECTION -

SECTION 435200 – HOISTS AND CRANES, GENERAL

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide the hoisting equipment, ancillary steel, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.

B. The requirements of this Section apply to all hoists and cranes unless indicated otherwise.

1.2 REFERENCE SPECIFICATIONS CODES, AND STANDARDS

A. Commercial Standards

AISC	Specifications for the Design, Fabrication, and Erection of Structural Steel for Building
AGMA	American Gear Manufacturer’s Association
ANSI B30.11	Overhead and Gantry Cranes
ANSI MH 27.1	Underhung Crane and Monorail Systems
ASTM A 36	Carbon Structural Steel
CMAA	A division of Material Handling Industry of America
NEMA	National Electrical Manufacturer’s Association
OSHA	29 CFR 1926.550 – Cranes and derricks

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 013300 – Contractor Submittals.

B. Shop Drawings shall include electrical requirements, weights, wheel loads, dimensions, and required clearances.

C. Operation and Maintenance Manuals

1. Submit complete operating and maintenance manuals of the hoist and crane systems in accordance with Section 017300.

1.4 QUALITY ASSURANCE

A. Inspection and Testing Requirements

1. After installation, the CONTRACTOR shall inspect and test hoists and crane systems in the presence of the manufacturer's service representative, for proper operation and conformance to the indicated requirements.

B. Acceptance Criteria and Tolerances

1. The ENGINEER reserves the right to reject any equipment not conforming to the tolerances, deflections, and lateral stiffness as indicated.

1.5 MANUFACTURER'S SERVICES

A. The CONTRACTOR shall arrange for the hoist or crane manufacturer to furnish the services of a trained, qualified representative for at least one day after the units are installed, for the purpose of inspecting the installation and instructing the OWNER's operating personnel.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Equipment of similar design shall be from a single manufacturer.

B. The capacity of each hoist and trolley shall be permanently marked in a conspicuous manner on the equipment.

C. Hooks shall be of the safety type with a latch.

D. The CONTRACTOR shall verify dimensions and clearances in the field prior to installation and shall be responsible for the proper fitting and operation of the equipment.

E. All hoists and trolleys shown on the Drawings shall be manually chain driven. The HAND chain shall extend to 4 ft above the finished floor.

F. Manufacturers, or Equal

1. ACCO Babcock, Inc.
2. American Monorail
3. Cleveland Tramrail
4. Thern, Inc.

2.2 BASIC MATERIALS

A. Materials shall be new and of the best commercial grade.

B. Where materials are not indicated, the CONTRACTOR shall have the manufacturer use the most suitable selection for the given application and environment.

2.3 PLANT FABRICATED ITEMS

A. Fabrication, assembly, and welding shall be performed by factory-trained specialists and certified welders.

2.4 TOOLS AND SPARE PARTS

A. Tools

1. The CONTRACTOR shall furnish one complete set of special wrenches or other special tools necessary for the assembly, adjustment, and dismantling of the equipment.

2. The tools shall be of best quality and furnished in labeled toolboxes of suitable design.

B. Spare Parts

1. Furnish spare parts as required by the hoist or crane Section.

2. The parts shall be properly labeled and identified with the name and number of the equipment to which they belong.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Hoist and crane equipment shall be installed in strict accordance with the manufacturer's printed instructions.

B. Workmanship shall be in accordance with the referenced standards and codes.

C. Care shall be taken that the structural integrity of beams, columns, walls, floors, and roofs will be maintained at all times.

3.2 FIELD TESTING

A. After completion of the WORK, the CONTRACTOR shall test hoist and crane equipment in the presence of the manufacturer's field representative, who shall certify in writing that the equipment meets applicable standards and specifications.

- END OF SECTION -

SECTION 435201 – MONORAIL SYSTEM

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide a manual monorail system complete and operable, in accordance with the Contract Documents.

B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:

1. Section 099600 - Protective Coating
2. Section 435200 - Hoists and Cranes, General

1.2 REFERENCES

A. Codes and standards referred to in this Section are:

1. ANSI B30.11, B30.16, B30.17, B30.2
2. ANSI/ASME HST-4M
3. CMAA Spec Nos. 70 and 74
4. NACM No. 6001
5. OSHA 1910.179

1.3 SYSTEM DESCRIPTION

A. Type and Capacity: Provide One (1) 2-ton monorail trolley hoist with manually-operated geared trolley and manually operated chain hoist, located in the Pump Room.

B. Performance requirements: Provide equipment meeting the following performance requirements:

Items	
Capacity – tons	2
Nominal Elev. of monorail girder (Bottom of Monorail Girder)	45.67
Elev. of highest point of equipment - not higher than	42.00
Elev. of hook in highest position - not lower than	43.50
Elev. of hook in lowest position - not higher than	32.50
Elev. of trolley and hoist operating chain bottom – not higher than 34.0 ft	30.00
Elev. of operating floor	
Size of monorail girder	S12x31.8**
Distance centerline to end of trolley hoist - maximum (parallel to monorail)	12 inches
Max. pull on hoist operating chain to lift capacity load (lbs.)	40
Max. pull on trolley operating chain to move capacity load (lbs)	40

** Sized by monorail supplier

1.4 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Section 013300 - Contractor Submittals.

B. Product Data and Information: Submit catalog data and information for each unit.

C. Shop Drawings: Submit shop drawings signed and sealed by a professional engineer licensed in the State of Florida, including arrangement and erection drawings of the equipment and templates.

1. Manufacturer's certified performance and material records.

2. Manufacturer's certified copies of Field Test Reports.

D. Operation and Maintenance Manuals: Submit operation and maintenance manuals for the monorail system hoisting equipment in accordance with Section 017300.

1.5 QUALITY ASSURANCE

A. Qualifications: Provide hoisting equipment of complete assembled units of standard manufacture made by a company which has had equipment of equivalent capacity and design giving satisfactory service in similar installations, and which can furnish replacement parts which are completely interchangeable within the original hoist assembly.

B. Regulatory Requirements: Provide hoisting equipment meeting the requirements of the following specifications except as modified:

1. ANSI Safety Standards: B30.2, B30.11, B30.16, and B30.17

2. OSHA 1910.179, for Overhead and Gantry Cranes

1.6 SPARE PARTS

A. Furnish the following spare parts:

1. One set of trolley truck bearing assemblies.

2. One year supply of lubricants.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers are listed below. Other manufcaturers of equivalent products may be submitted.

1. ACI Hoist

2. Acco Central Material Handling Centers (Monorails)

3. Dresser-Shaw Box

4. C. M. Hoist & Whiting Corp.

5. P&H Harnischfeger

6. Conco Crane Division

7. Cleveland Tramrail Division

8. Cleveland Crane & Eng.

9. Robbins & Meyers, Inc., Hoist and Crane Div.

2.2 MATERIALS

A. General: Design monorail structures in accordance with AISC Standards. Design all load bearing parts with a safety factor of at least five at rated capacity loads, based on the ultimate strength of the materials used. Arrange the equipment to operate within the space shown with adequate clearances, with minimum clearance to the nearest obstruction not less than 3 inches vertical and 2 inches horizontal.

1. Arrange all working parts for convenient inspection, lubrication, adjustment, repair, or replacement. Assemble paint, test, and adjust the equipment, in the shop as far as practicable before shipment.

2. Design the hoist with an overload limit device to prevent damage to the equipment or structure if loads in excess of the specified capacity of the hoist are applied

3. Provide all hoisting equipment components designed for outside service suitable for operation at a range of temperature 55 degrees F to +104 degrees F, and subject to moderate dust and corrosion conditions.

B. Monorail Trolley With Chain Hoist: Manufacture each trolley for a chain hoist of the manual geared operated type with standard or low headroom hoist as required by the headroom availability. Fabricate the trolley frame of welded rolled steel or cast steel construction or a combination of both.

1. Wheels: Design trolley wheels to operate on the bottom flange of the monorail beam. Manufacture wheels of rolled, forged or cast steel with tapered hardened treads, designed to carry the maximum wheel load under normal conditions. Machine the wheels to matched diameters with treads to match the rolling surface of the lower flange of the monorail beam.

2. Appurtenances: Provide chain guides, guards and chain storage container. Reeve the hoist for true vertical lift, and equip the hoist with overload cutoff to prevent lifting loads over rated capacity.

3. Drive: Drive the chain hoist through gear trains and with all operating parts totally enclosed. Provide all gears carried on anti-friction bearings and operate in an oil bath, or with grease lubrication.

4. Army Type Low Headroom Chain Hoist: Manufacture the monorail trolley chain hoist of the geared, army, low headroom, chain type with manually operated geared trolley and manually operated geared hoist. Fabricate the hoist of the manually operated, high speed, planetary spur geared, ball or roller bearing type with a Weston type multiple disc brake built into the mechanism. Provide chain guides, guards and a chain container for excess tail chain, designed so the chain will not kink or twist. Reeve the hoist for true vertical lift and with all operating parts enclosed or shielded. Carry all gearing on permanently lubricated anti-friction

bearings. Arrange the gear train to run in an oil or grease bath. Provide the hoist with an overload cutoff to prevent lifting loads over rated capacity.

C. Hoisting Chain - (Load Chain): Provide hoisting or load chain of welded link type, accurately pitched to pass smoothly over all load sprockets without binding. Manufacture chain of steel. Use welded link chain meeting the requirements of the National Association of Chain Manufacturers (NACM) Grade 28 or single loop weldless chain meeting the requirements of NACM No. 6001. Coat chain by hot dip galvanizing meeting the requirements of Division 5. Remove excess metal at welded chain joints for proper fit into the chainwheel pockets. Remove burrs and sharp edges. Use chain that is suitable for bare hand operation.

1. Proof Test: Provide load chains which have been proof tested by the chain or hoist manufacturer with a load equivalent to at least one and one half times the hoist's rated load divided by the number of chain parts supporting the load.

D. Operating Wheels and Chains: Equip operating wheels with swinging chain guides to permit rapid handling of the operating chain without gagging the wheel and permit a reasonable side pull on the chain. Provide operating chains which hang approximately 3 feet above the operating floor. Provide hooks on which to hang the operating chains when not in use.

1. Electroplating: Coat the operating wheels, guides and chain by electroplating with zinc.

E. Bearings: Provide all bearings of the ball or roller type, conforming to the standards of the Anti-friction Bearing Manufacturers Association. Provide bearing housings that are split or designed to permit easy removal of the shafts. Prelubricate and seal all bearings for life.

1. Design all bearings in the crane wheels, drive shaft bearings and gear reduction shaft bearings for a minimum B10 bearing life of 5,000 hours.

F. Hoisting Blocks: Provide hoisting blocks of enclosed steel construction with forged steel hooks with spring operated safety latches supported on ball or roller bearings. Design hooks to rotate freely 360 degrees on the bearing support.

G. Gears: Design all gearing to meet the requirements of Section 4.2 of CMMA Specification No. 74 and AGMA Standards, and of helical or spur type constructed of heat treated steel. Provide worm gears of bronze and with precision machined cut teeth. Provide all pinions of heat treated alloy steel. Enclose or guard gearing and provide either oil bath or splash lubrication.

1. Design the gear reducer or gear motor specifically for crane service with minimum classification of Moderate Shock service and with minimum service factor of 1.0.

H. Brakes: Equip each hand operated hoist with a Weston or multiple disc type mechanical brake which will automatically hold the load indefinitely in any position and permit it to be lowered without acceleration under full control when the chain is pulled in the lowering direction.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

A. Install all trolley-monorail systems in accordance with the manufacturer's recommendations and approved shop drawings and as specified in Division 1.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Furnish the services of a qualified representative of the manufacturer to provide instruction on the proper installation of the equipment, inspect the completed installation, make any necessary adjustments, participate in the startup of the equipment, participate in the field testing of the equipment and place it in initial trouble free operation.

B. Tests: After installation of the trolley-monorail systems and all appurtenances, subject the units to a field running test, as specified in Division 1, under actual operating conditions. Test all trolley-monorails in accordance with ANSI B30.16. Operate each hoist through a complete lift and lowering cycle and through complete travel of the trolley to determine that the equipment will perform the function of hoisting, braking and traveling quietly, smoothly and safely without failure of any parts. Test the hoisting equipment to as near capacity as possible with available loading facilities such as material or equipment which is readily available within the area served that can be used for producing the loads. Promptly correct defects in the equipment indicated by the tests.

3.3 CLEANING AND PAINTING

A. Paint the trolley-monorails meeting the requirements of Section 099600, using colors conforming to applicable safety laws and codes. Paint the trolley beams in accordance with the Structural Steel (Interior) class of work. Paint the motors, hoists, trolleys and blocks in accordance with the Equipment (Interior) class of work. Do not paint hand chains and hoist wire ropes, but plate chains, as specified.

- END OF SECTION -

SECTION 435209 - GANTRY CRANE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide a portable aluminum gantry crane with geared manual trolley and chain hoist, complete and operable, in accordance with the Contract Documents.

B. Related Work Specified in Other Sections Includes, But is Not Limited to, the Following:

1. Section 099600 - Protective Coating

2. Section 435200 - Hoists and Cranes, General

1.2 REFERENCES

A. Codes and standards referred to in this Section are:

1. ANSI B30.11, B30.16, B30.17, B30.2

2. ANSI/ASME HST-4M

3. CMAA Spec Nos. 70 and 74

4. NACM No. 6001

5. OSHA 1910.179

1.3 SYSTEM DESCRIPTION

A. Type and Capacity: Provide one (1) 2-ton portable aluminum gantry crane with manually-operated geared trolley and manually operated chain hoist, located in the Pump Room.

B. Performance Requirements: Provide equipment meeting the following performance requirements:

Items	
Capacity – tons	2
Nominal Height of Hoist Girder, feet above floor	12
Height of highest point of equipment - not higher than, feet above floor	9
Height of hook in highest position - not lower than, feet above floor	9’-8”
Height of hook in lowest position - not higher than, feet above floor	2
Size of monorail girder, inches	10
Max. pull on hoist operating chain to lift capacity load (lbs.)	40

Items	
Max. pull on trolley operating chain to move capacity load (lbs)	40
Overall Span of Crane, feet	10
Span Between Wheel Centers, feet	9.25
Clear Span of Crane, feet	8'-10"
Height of Crane Beam, max., feet	12.17
Height of Crane Beam, min., feet	9.67
Tread Width of Crane, feet	4.25
Caster Diameter, inches	6
** Sized by gantry crane supplier	

1.4 SUBMITTALS

A. General: Provide all submittals, including the following, as specified in Section 013300 - Contractor Submittals.

B. Product Data and Information: Submit catalog data and information for each unit.

C. Shop Drawings: Submit shop drawings signed and sealed by a Professional Engineer licensed in the State of Florida, including arrangement and erection drawings of the equipment and templates.

1. Manufacturer's certified performance and material records.

2. Manufacturer's certified copies of Field Test Reports.

D. Operation and Maintenance Manuals: Submit operation and maintenance manuals for the gantry crane and hoisting equipment in accordance with Section 017300.

1.5 QUALITY ASSURANCE

A. Qualifications: Provide hoisting equipment of complete assembled units of standard manufacture made by a company which has had equipment of equivalent capacity and design giving satisfactory service in similar installations, and which can furnish replacement parts which are completely interchangeable within the original hoist assembly.

B. Regulatory Requirements: Provide hoisting equipment meeting the requirements of the following specifications except as modified:

1. ANSI Safety Standards: B30.2, B30.11, B30.16, and B30.17

2. OSHA 1910.179, for Overhead and Gantry Cranes

1.6 SPARE PARTS

A. Furnish the following spare parts:

1. One set of trolley truck bearing assemblies.

2. One year supply of lubricants.

PART 2 -- PRODUCTS

2.1 PORTABLE GANTRY CRANE

A. Construction: The gantry shall have fixed span, adjustable height, and tread. The beam assembly shall be of aluminum I-beam, supported with self-alignment A-frame with fully braced aluminum legs and caster wheels.

B. A safety cable or other bracing shall be provided to prevent over-spread while being adjusted. The casters shall have a swivel lock to secure the casters in any of the four positions or permit free swiveling. The legs shall be provided with spring loaded height position bolts which engage automatically to minimize aligning of bolts with holes.

C. Hoist: The hoist shall be a heavy duty, low headroom, hand chain hoist. It shall be a high speed, spur gear, aluminum alloy unit, equipped with load limiters for automatic overload protection, with fully enclosed brake and safety hook. The hand chain shall reach to 4-ft above floor when the hoist is attached to the trolley.

D. Trolley: The hoist shall be suspended from a geared hand chain trolley of the same capacity as the hoist. The trolley shall have steel side plates, a strong, forged yoke, and 4 wheels to fit the I-beam. The hand chain shall reach to 4-feet above floor at maximum crane height.

E. Manufacturers, or Equal

1. Spanco, Inc.

PART 3 -- EXECUTION

3.1 ERECTION

A. The CONTRACTOR shall install the gantry crane in strict accordance with the manufacturer's written recommendations.

- END OF SECTION -

SECTION 460100 - EQUIPMENT GENERAL PROVISIONS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide equipment and appurtenant WORK, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to equipment throughout the Contract except where otherwise indicated.

C. Equipment Arrangement: Unless specifically indicated otherwise, the arrangement of equipment indicated is based upon information available at the time of design and is not intended to show exact dimensions particular to a specific manufacturer. Some aspects of the Drawings are diagrammatic and some features of the illustrated equipment arrangement may require revision to meet the actual equipment requirements. Structural supports, foundations, piping and valve connections, and electrical and instrumentation connections indicated may have to be altered to accommodate the equipment provided. No additional payment will be made for such revisions and alterations. Substantiating calculations and drawings shall be submitted prior to beginning the installation of equipment.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Equipment shall be in accordance with the following standards, as applicable and as indicated in each equipment specification:

1. American Society for Testing and Materials (ASTM).

2. American National Standards Institute (ANSI).

3. American Society of Mechanical Engineers (ASME).

4. American Water Works Association (AWWA).

5. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).

6. American Welding Society (AWS).

7. National Fire Protection Association (NFPA).

8. Federal Specifications (FS).

9. National Electrical Manufacturers Association (NEMA).

10. Manufacturer's published recommendations and specifications.

11. General Industry Safety Orders (OSHA).

B. The following standards are referenced in this Section:

ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
ASME B16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy and other Special Alloys
ASME B46.1	Surface Texture
ANSI S12.6	Method for the Measurement of the Real-Ear Attenuation of Hearing Protectors
ASME B1.20.1	General Purpose Pipe Threads (Inch)
ASME B31.1	Power Piping
AWWA C206	Field Welding of Steel Water Pipe
AWWA C207	Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In. (100 mm through 3,600 mm)
AWWA D100	Welded Steel Tanks for Water Storage
ASTM A 48	Gray Iron Castings
ASTM A 108	Steel Bars, Carbon, Cold-Finished, Standard Quality

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.

B. Shop Drawings: Furnish complete drawings and technical information for equipment, piping, valves, and controls. Where indicated or required by the ENGINEER, Shop Drawings shall include clear, concise calculations showing equipment anchorage forces and the capacities of the anchorage elements proposed by the CONTRACTOR.

C. Spare Parts List: The CONTRACTOR shall obtain from the manufacturer and submit at the same time as Shop Drawings a list of suggested spare parts for each piece of equipment. CONTRACTOR shall also furnish the name, address, and telephone number of the nearest distributor for each piece of equipment.

1.4 QUALITY ASSURANCE

A. Costs: Responsibility shall be the CONTRACTOR'S for performing and paying the costs of inspection, startup, testing, adjustment, and instruction services performed by factory representatives. The OWNER will pay for costs of power and water. If available, the OWNER'S operating personnel will provide assistance in the field testing.

B. Inspection: The CONTRACTOR shall inform the local authorities, such as building and plumbing inspectors, fire marshal, OSHA inspectors, and others, to witness required tests for piping, plumbing, fire protection systems, pressure vessels, safety systems, and related items to obtain required permits and certificates, and shall pay inspection fees.

C. Quality and Tolerances: Tolerances and clearances shall be as shown on the Shop Drawings and shall be closely adhered to.

1. Machine WORK shall be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without milled ends and which are to be framed to other steel parts of the structure may have a variation in the detailed length of not greater than 1/16-inch for members 30-feet or less in length, and not greater than 1/8-inch for members over 30-feet in length.

2. Castings shall be homogeneous and free from non-metallic inclusions and defects. Surfaces of castings which are not machined shall be cleaned to remove foundry irregularities. Casting defects not exceeding 12.5 percent of the total thickness and where defects will not affect the strength and serviceability of the casting may be repaired by approved welding procedures. The ENGINEER shall be notified of larger defects. No repair welding of such defects shall be carried out without the ENGINEER'S written approval. If the removal of metal for repair reduces the stress resisting cross-section of the casting by more than 25 percent or to such an extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then the casting may be rejected. Costs of casting new material shall be the CONTRACTOR'S responsibility as part of the WORK.

3. Materials shall meet the physical and mechanical properties in accordance with the reference standards.

D. Machine Finish: The type of finish shall be the most suitable for the application and shall be shown in micro-inches in accordance with ANSI B46.1. The following finishes shall be used:

1. Surface roughness not greater than 63 micro-inches shall be required for surfaces in sliding contact.

2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.

3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.

4. Contact surfaces of shafts and stems which pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.

E. Manufacturer's Experience: Equipment manufacturer shall have a record of at least 5 years of successful, trouble-free operation in similar applications and size equal or larger than the equipment in this Contract.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Noise Level: When in operation, no single piece of equipment shall exceed 85 dBA.

B. High Noise Level Location: The CONTRACTOR shall provide one personal hearing protection station at each high noise level location. Locations are defined as follows:

1. Outdoor Location: Any single equipment item or any group of equipment items that produce noise exceeding OSHA noise level requirements for a 2 hour exposure. Where such equipment is separated by a distance of more than 20 feet, measured between edges of footings, each group of equipment shall be provided with a separate hearing protection station.

2. Indoor Location

   a. Any single equipment item or any group of equipment items located within a single room not normally occupied, that produces noise exceeding OSHA noise level requirements for a 2 hour exposure.

   b. Any single equipment item or any group of equipment items located within a single room normally occupied by workers, which produces noise exceeding OSHA noise level requirements for an 8 hour exposure.

C. Personal Hearing Protection: The CONTRACTOR shall furnish 3 pairs of high attenuation hearing protectors in the original unopened packaging. The ear protectors shall be capable of meeting the requirements of ANSI S12.6 and shall produce a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, provided at an approved location near the noise producing equipment. In addition, the CONTRACTOR shall provide a industrial dispenser of disposable ear plugs and locate as required by the OWNER.

D. Drive Trains and Service Factors: Service factors shall be applied in the selection or design of mechanical power transmission components. Components of drive train assemblies between the prime mover and the driven equipment shall be designed and rated to deliver the maximum peak or starting torque, speed, and horsepower. All of the applicable service factors shall be considered, such as mechanical (type of prime mover), load class, start frequency, ventilation, ambient temperature, and fan factors. Drive train components include couplings, shafts, gears and gear drives, drive chains, sprockets, and V-belt drives. Unless otherwise indicated, the following load classifications shall apply in determining service factors:

Type of Equipment	Service Factor	Load Classification
Centrifugal Fans	1.0	Uniform
Reciprocating Air Compressors or Vacuum Pumps		
multi-cylinder	2.0	Heavy Shock
single-cylinder	2.0	Heavy Shock
Pumps		
centrifugal or rotary	1.0	Uniform
reciprocating	1.8	Moderate Shock
progressing cavity	1.0	Uniform
Cranes or Hoists	1.25	Moderate Shock

E. Mechanical Service Factors

	Mechanical Service Factors	
	Electric Motor	**Internal Combustion Engine**
Uniform	1.25	1.50
Moderate Shock	1.50	1.75
Heavy Shock	2.00	2.25

F. For thermal rating adjustments such as start frequency, ambient temperature, and hourly duty cycle factor, ventilation factor, and fan factor, refer to gear manufacturer sizing information.

G. For service factors of electric motors, see Section 260510 - Electric Motors.

H. Where load classifications are not indicated, service factors shall be for standard load classifications and for flexible couplings.

I. Welding: Unless otherwise indicated, welding shall conform to the following:

1. Latest revision of AWWA D100.

2. Latest revision of AWWA C206.

3. Composite fabricated steel assemblies that are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds to prevent entrance of air or moisture.

4. Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards.

5. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. Sharp corners of material that are to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

J. Protective Coating: Equipment shall be painted or coated in accordance with Section 099600 - Protective Coating, unless otherwise indicated. Non-ferrous metal and corrosion-resisting steel surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.

K. Potable water contact: Materials immersed in or exposed to potable water shall be listed as compliant with NSF Standard 61.

L. Protection of Equipment: Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather-tight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers should be avoided to prevent accumulation of condensate in gears and bearings. In addition, motor space heaters shall be energized and shafts shall be rotated. Equipment delivered to the Site with rust or corroded parts shall be rejected. If equipment develops defects during storage, it shall be disassembled, cleaned, and recoated to restore it to original condition.

M. Identification of Equipment Items

1. At the time of shipping, each item of equipment shall have a legible identifying mark corresponding to the equipment number in the Contract Documents for the particular item.

2. After installation, each item of equipment shall be given permanent identification.

a. Pumps, compressors, blowers and fans shall receive stainless steel plate nametags in accordance with Section 101400.

N. Vibration Isolators: Air compressors, blowers, engines, inline fans shall be provided with restrained spring-type vibration isolators or pads per manufacturer's written recommendations. Vibration isolations shall be provided with seismic restraint.

O. Shop Fabrication: Shop fabrication shall be performed in accordance with the Contract Documents and the Shop Drawings.

P. Controls: Equipment and system controls shall be in accordance with Division 40 - Instrumentation.

2.2 EQUIPMENT SUPPORTS AND FOUNDATIONS

A. Equipment Supports: Unless otherwise indicated, equipment supports, anchors, and restrainers shall be adequately designed for static, dynamic, and wind loads as applicable.

1. Wall-mounted equipment weighing more than 250 pounds or which is within 18-inches above the floor shall be provided with fabricated steel supports. Pedestals shall be of welded steel. If the supported equipment is a panel or cabinet or is enclosed with removable sides, the pedestal shall match the supported equipment in appearance and dimensions.

2. Wind requirements: Exterior freestanding equipment shall be anchored in place by methods that satisfy the building code. Calculations shall be performed and signed and stamped, analyzing lateral and overturning forces and shall include a factor of safety against overturning equal to 1.5. Calculations shall include the distribution of forces imposed on the supporting structure and anchors, verifying that each anchor can develop the required resistance forces.

B. Anchors: Anchor bolts shall be in accordance with Section 055000 - Miscellaneous Metalwork. CONTRACTOR shall determine the size, type, capacity, location, and other placement requirements of anchorage elements. Anchoring methods and leveling criteria in the manufacturer's literature shall be followed. Submit methods and criteria with the Shop Drawings.

C. Equipment Foundations: Mechanical equipment, tanks, control cabinets, enclosures, and related equipment shall be mounted on minimum 3.5-inch high concrete bases, unless otherwise indicated. Equipment foundations are indicated on Drawings. The CONTRACTOR through the equipment manufacturer shall verify the size and weight of equipment foundation to insure compatibility with equipment.

2.3 COUPLINGS

A. Mechanical couplings shall be provided between the driver and the driven equipment. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end float, and to cushion shock loads. Unless otherwise indicated or recommended by the equipment manufacturer, coupling type shall be furnished with the respective equipment as follows:

Equipment Type	Coupling Type
Horizontal and end suction pumps	Gear or flexible spring
Air compressors or vacuum pumps	Gear or flexible disc pack

B. Each coupling size shall be determined based on the rated horsepower of the motor, speed of the shaft, and the load classification service factor. The CONTRACTOR shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.

C. Differential Settlement: Where differential settlement between the driver and the driven equipment may occur, 2 sets of universal type couplings shall be provided.

D. Taper-Lock or equal bushings may be used to provide for easy installation and removal of shafts of various diameters.

2.4 SHAFTING

A. General: Shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut in line. Shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the diameter of the shaft. Shafts shall rotate in the end bearings and shall be turned and polished, straight, and true.

B. Design Criteria: Shafts shall be designed to carry the steady state and transient loads suitable for unlimited number of load applications, in accordance with ASME B106.1M - Design of Transmission Shafting. Where shafts are subjected to fatigue stresses, such as frequent start and stop cycles, the mean stress shall be determined by using the modified Goodman Diagram. The maximum torsional stress shall not exceed the endurance limit of the shaft after application of the factor of safety of 2 in the endurance

limit and the stress concentration factor of the fillets in the shaft and keyway. Stress concentration factor shall be in accordance with ASME Standard B17.1 - Keys and Keyseats.

C. Materials: Shafting materials shall be appropriate for the type of service and torque transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as indicated unless furnished as part of an equipment assembly.

1. Low carbon cold-rolled steel shafting shall conform to ASTM A 108, Grade 1018.

2. Medium carbon cold-rolled shafting shall conform to ASTM A 108, Grade 1045.

3. Other grades of carbon steel alloys shall be suitable for service and load.

4. Corrosion-resistant shafting shall be stainless steel or Monel, whichever is most suitable for the intended service.

D. Differential Settlement: Where differential settlement between the driver and the driven equipment may occur, a shaft of sufficient length with 2 sets of universal type couplings shall be provided.

2.5 GEARS AND GEAR DRIVES

A. Unless otherwise indicated, gears shall be of the spur, helical, or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a service factor suitable for load class, mechanical service and thermal rating adjustment, a minimum L-10 bearing life of 60,000 hours, and a minimum efficiency of 94 percent. Peak torque, starting torque, and shaft overhung load shall be checked when selecting the gear reducer. Worm gears shall not be used unless specifically approved by the ENGINEER.

B. Gear speed reducers or increasers shall be of the enclosed type, oil- or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train. An oil level sight glass and an oil flow indicator shall be provided, located for easy reading.

C. Gears and gear drives that are part of an equipment assembly shall be shipped fully assembled for field installation.

D. Material selections shall be left to the discretion of the manufacturer, provided the above AGMA values are met. Input and output shafts shall be adequately designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall have 2 positive seals to prevent oil leakage.

E. Oil level and drain locations shall be easily accessible. Oil coolers or heat exchangers with required appurtenances shall be provided when necessary.

F. Where gear drive input or output shafts from one manufacturer connect to couplings or sprockets from a different manufacturer, the CONTRACTOR shall have the gear drive manufacturer furnish a matching key taped to the shaft for shipment.

2.6 V-BELT DRIVES

A. V-belts and sheaves shall be of the best commercial grade and shall conform to ASME, MPTA, and RMA Standards.

B. Unless otherwise indicated, sheaves shall be machined from the finest quality gray cast iron.

C. Sheaves shall be statically balanced. In some applications where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 fpm may be required to be of special materials and construction.

D. To facilitate installation and disassembly, sheaves shall be provided complete with Taper-Lock or QD bushings as required.

E. Finish bored sheaves shall be complete with keyseat and set screws.

F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.7 DRIVE GUARDS

A. Power transmission trains, prime movers, machines, shaft extensions, and moving machine parts shall be guarded to conform with the OSHA Safety and Health Standards (29CFR1910). The guards shall be constructed of minimum 10-gauge expanded, flattened steel with smooth edges and corners, galvanized after fabrication, and securely fastened. Where required for lubrication or maintenance, guards shall have hinged and latched access doors.

2.8 BEARINGS

A. General: Bearings shall conform to the standards of the American Bearing Manufacturers Association, Inc. (ABMA).

B. To assure satisfactory bearing application, fitting practice, mounting, lubrication, sealing, static rating, housing strength, and lubrication shall be considered in bearing selection.

C. Re-lubricatable type bearings shall be equipped with a hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.

D. Lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.

E. Anti-Friction Type Bearing Life: Except where otherwise indicated, bearings shall have a minimum L-10 life expectancy of 5 years or 20,000 hours, whichever occurs first. Where so indicated, bearings shall have a minimum rated L-10 life expectancy corresponding to the type of service, as follows:

Type of Service	Design Life, years	L-10 Design Life, hours
	(whichever comes first)	
8-hour shift	10	20,000
16-hour shift	10	40,000
Continuous	10	60,000

F. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as indicated or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.

G. Sleeve Type Bearings: Sleeve-type bearings shall have a cast iron or ductile iron housing and Babbitt or bronze liner. Bearing housing shall be bolted and doweled to the lower casing half. These housings shall be provided with cast iron caps bolted in place and the bearing end caps shall be bored to receive the bearing shells. Sleeve bearings shall be designed on the basis of the maximum allowable load permitted by the bearing manufacturer. If the sleeve bearing is connected to an equipment shaft with a coupling, the coupling transmitted thrust will be assumed to be the maximum motor or equipment thrust. Lubricant, lubrication system, and cooling system shall be as recommended by the bearing manufacturer.

H. Plate Thrust Bearings: Thrust bearings shall be the Kingsbury Type, designed and manufactured to maintain the shaft in the fixed axial position without undue heating or the necessity of adjustment or attention. Bearings shall be oil lubricated to suit the manufacturer's standard method of lubrication for the specific bearing. If bearing cooling is required, manufacturer shall provide necessary piping, filters, and valves.

2.9 PIPING CONNECTIONS

A. Pipe Hangers, Supports, and Guides: Pipe connections to equipment shall be supported, anchored, and guided to avoid stresses and loads on equipment flanges and equipment. Supports and hangers shall be in accordance with Section 431052 - Pipe Supports.

B. Flanges and Pipe Threads: Flanges on equipment and appurtenances shall conform to ASME B16.1, Class 125, or B16.5, Class 150, unless otherwise indicated. Pipe threads shall be in accordance with ASME B1.20.1 and Section 431050 - Piping, General.

C. Flexible Connectors: Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment and in piping systems in accordance with the requirements of Section 431050. Flexible connectors shall be harnessed or otherwise anchored to prevent separation of the pipe where required by the installation.

D. Insulating Connections: Insulating bushings, unions, couplings, or flanges, as appropriate, shall be used in accordance with the requirements of the Section 431000.

2.10 GASKETS AND PACKINGS

A. Gaskets shall be in accordance with Section 431000.

B. Packing around valve stems and reciprocating shafts shall be of compressible material, compatible with the fluid being used. Chevron-type "V" packing shall be Garlock No. 432, John Crane Everseal, or equal.

C. Packing around rotating shafts (other than valve stems) shall be "O" rings, stuffing boxes, or mechanical seals, as recommended by the manufacturer and approved by the ENGINEER, in accordance with Section 432000 - Pumps, General.

2.11 NAMEPLATES

A. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.12 TOOLS AND SPARE PARTS

A. Tools: The CONTRACTOR shall furnish one complete set of special wrenches and other special tools necessary for the assembly, adjustment, and dismantling of the equipment. Tools shall be of best quality hardened steel forgings with bright finish. Wrench heads shall have work faces dressed to fit nuts. Tools shall be suitable for professional work and manufactured by Snap On, Crescent, Stanley**,** or equal. The set of tools shall be neatly mounted in a labeled toolbox of suitable design provided with a hinged cover.

B. Spare parts shall be furnished as indicated in the individual equipment sections. Spare parts shall be suitably packaged in a metal box and labeled with equipment numbers by means of stainless steel or solid plastic nametags attached to the box.

2.13 EQUIPMENT LUBRICANTS

A. The CONTRACTOR shall provide lubricants for equipment during shipping, storage, and prior to testing, in accordance with the manufacturer’s recommendations. Lubricants that could come in contact with potable water shall be food grade lubricants. After successful initial testing, final testing, and satisfactory completion startup testing per Section 017500 - Equipment Testing and Plant Startup, the CONTRACTOR shall conduct one complete lubricant change on all equipment. In addition, the CONTRACTOR shall be responsible for the proper disposal of used lubricants. The OWNER will then be responsible for subsequent lubricant changes

PART 3 -- EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Inspection, Startup, and Field Adjustment: Where required by individual sections, an authorized, experienced, and competent service representative of the manufacturer shall visit the Site for the number of Days indicated in those sections to witness or perform the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Installation of equipment

2. Inspection, checking, and adjusting the equipment and approving its installation

3. Startup and field testing for proper operation, efficiency, and capacity

4. Performing field adjustments during the test period to ensure that the equipment installation and operation comply with requirements

B. Instruction of the OWNER'S Personnel

1. Where required by the individual equipment sections, an authorized training representative of the manufacturer shall visit the Site for the number of Days indicated in those sections to instruct the OWNER'S personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.

2. The representative shall have at least 2 years experience in training. A resume of the representative shall be submitted.

3. Training shall be scheduled 3 weeks in advance of the scheduled session.

4. Proposed training material and a detailed outline of each lesson shall be submitted for review. Review comments from the ENGINEER shall be incorporated into the material.

5. The training materials shall remain with the trainees after the session.

6. The OWNER may videotape the training for later use by the OWNER'S personnel.

3.2 INSTALLATION

A. General: Equipment shall be installed in accordance with the manufacturer's written recommendations.

B. Alignment: Equipment shall be field tested to verify proper alignment.

3.3 PACKAGED EQUIPMENT

A. When any system is furnished as pre-packaged equipment, the CONTRACTOR shall coordinate space and structural requirements, clearances, utility connections, signals, and outputs with Subcontractors to avoid later change orders.

B. If the packaged system has any additional features (as safety interlocks, etc.) other than required by the Contract Documents, the CONTRACTOR shall coordinate such features with the ENGINEER and provide material and labor necessary for a complete installation as required by the manufacturer.

3.4 FIELD ASSEMBLY

A. Studs, cap screws, bolt and nuts used in field assembly shall be coated with Never Seize compound or equal.

3.5 WELDING

A. Welds shall be cleaned of weld-slag, splatter, etc. to provide a smooth surface.

3.6 FIELD TESTS

A. Where indicated by the individual equipment sections, equipment shall be field tested after installation to demonstrate satisfactory operation without excessive noise, vibration, or overheating of bearings or motor.

B. The following field testing shall be conducted:

1. Start equipment, check, and operate the equipment over its entire operating range. Vibration level shall be within the amplitude limits as indicated or as recommended by the reference applicable standards.

2. Obtain concurrent readings of motor voltage, amperage, capacity, vibration, and bearing temperatures.

3. Operate equipment indicated in Section 017500.

C. The ENGINEER shall witness field-testing. The CONTRACTOR shall notify the ENGINEER of the test schedule 3 Days in advance.

D. In the event that any equipment fails to meet the test requirements, the equipment shall be modified and retested until it satisfies the requirement.

- END OF SECTION -

INDEX

UTILITY PERMIT

PERMIT NO.: 2014-H-796-111	**SECTION NO.:** 10020000	**STATE ROAD** 685	**COUNTY** HILLSBOROUGH
FDOT construction is proposed or underway.	☐ Yes	☒ No	**Financial Project ID:**
Is this work related to an approved Utility Work Schedule?	☐ Yes	☒ No	**If yes, Document Number:**
PERMITTEE:	City of Tampa Water Department		
ADDRESS:	306 E. Jackson Street, 5E	**TELEPHONE NUMBER:** (813) 274-8121	
CITY/STATE/ZIP:	Tampa, FL 33602		

The above PERMITTEE requests permission from the State of Florida Department of Transportation, hereinafter called the FDOT, to construct, operate and maintain the following: Install 560' (78' within FDOT R/W) of 2" HDPE water service line within 68' of existing 16" CIP, used as casing. 10' of the ... (see cont. page)

FROM: MP #7.237	**TO**: MP # 7.275

Submitted for the PERMITTEE by: Name and Company (Typed or Printed Legibly)	Contact Information Address/Telephone/E-Mail (if applicable)	Signature	Date
Michael McClurg	1715 N. Westshore Blvd. Tampa, FL 33607	Michael McClurg (sig)	07/07/2014

1. The Permittee declares that prior to filing this application, the location of all existing utilities that it owns or has an interest in, both aerial and underground, are accurately shown on the plans and a letter of notification was mailed on 07/01/2014 to the following utilities known to be involved or potentially impacted in the area of the proposed installation:
   All Utilities.
2. The local Maintenance or Resident Engineer, hereafter referred to as the FDOT Engineer, shall be notified a minimum of forty eight (48) hours in advance prior to starting work and again immediately upon completion of work. The FDOT's Engineer is James Meyer, located at 2820 Leslie Road, MS 7-1250 Tampa, FL 33619, Telephone Number (813) 612-3210.
   The Permittee's employee responsible for MOT is _____, Telephone Number _____ (This name may be provided at the time of the forty eight (48) hour advance-notice prior to starting work).
3. All work, materials, and equipment shall be subject to inspection and approval by the FDOT Engineer.
4. All plans and installations shall conform to the requirements of the FDOT's UAM in effect as of the date this permit is approved by FDOT, and shall be made a part of this permit. This provision shall not limit the authority of the FDOT under Paragraph 8 of this Permit.
5. This Permittee shall commence actual construction in good faith within 60 days after issuance of permit, and shall be completed within 180 days after the permitted work has begun. If the beginning date is more than sixty (60) days from the date of permit approval, the Permittee must review the permit with the FDOT Engineer to make sure no changes have occurred to the Transportation Facility that would affect the permitted construction.
6. The construction and maintenance of such utility shall not interfere with the property and rights of a prior Permittee.
7. It is expressly stipulated that this permit is a license for permissive use only and that the placing of utilities upon public property pursuant to this permit shall not operate to create or vest any property right in said holder, except as provided in executed subordination and Railroad Utility Agreements.
8. Pursuant to Section 337.403, Florida Statutes, any utility placed upon, under, over, or along any public road or publicly owned rail corridor that is found by FDOT to be unreasonably interfering in any way with the convenient, safe, or continuous use, or maintenance, improvement, extension, or expansion, of such public road or publicly owned rail corridor shall, upon thirty (30) days written notice to the utility or its agent by FDOT, be removed or relocated by such utility at its own expense except as provided in Section 337.403(1), Florida Statutes, and except for reimbursement rights set forth in previously executed subordination and Railroad Utility Agreements, and shall apply to all successors and assigns for the permitted facility.
9. It is agreed that in the event the relocation of said utilities are scheduled to be done simultaneously with the FDOT's construction work, the Permittee will coordinate with the FDOT before proceeding and shall cooperate with the FDOT's contractor to arrange the sequence of work so as not to delay the work of the FDOT's contractor, defend any legal claims of the FDOT's contractor due to delays caused by the Permittee's failure to comply with the approved schedule, and shall comply with all provisions of the law and the FDOT's current UAM. The Permittee shall not be responsible for delay beyond its control.
10. In the case of non-compliance with the FDOT's requirements in effect as of the date this permit is approved, this permit is void and the facility will have to be brought into compliance or removed from the R/W at no cost to the FDOT, except for reimbursement rights set forth in previously executed subordination and Railroad Utility Agreements. This provision shall not limit the authority of the FDOT under Paragraph 8 of this Permit.
11. It is understood and agreed that the rights and privileges herein set out are granted only to the extent of the State's right, title and interest in the land to be entered upon and used by the Permittee, and the Permittee will, at all times, and to the extent permitted by law, assume all risk of and indemnify, defend, and save harmless the State of Florida and the FDOT from and against any and all loss, damage, cost or expense arising in any manner on account of the exercise or attempted exercises by said Permittee of the aforesaid rights and privileges.
12. During construction, all safety regulations of the FDOT shall be observed and the Permittee must take measures, including placing and the display of safety devices that may be necessary in order to safely conduct the public through the project area in accordance with the Federal MUTCD, as amended by the UAM.
13. Should the Permittee be desirous of keeping its utilities in place and out of service, the Permittee, by execution of this permit acknowledges its present and continuing ownership of its utilities located between MP #7.237 and MP # 7.275 within the FDOT's R/W as set forth above. Whenever the Permittee removes its facilities, it shall be at the Permittee's sole cost and expense. The Permittee, at its sole expense, shall promptly remove said out of service utilities whenever the FDOT determines said removal is in the public interest.
14. In the event contaminated soil is encountered by the Permittee or anyone within the permitted construction limits, the Permittee shall immediately cease work and notify the FDOT. The FDOT shall notify the Permitee of any suspension or revocation of the permit to allow contamination assessment and remediation. Said suspension or revocation shall remain in effect until otherwise notified by FDOT
15. For any excavation, construction, maintenance, or support activities performed by or on behalf of the FDOT, within its R/W, the Permittee may be required by the FDOT or its agents to perform the following activities with respect to a Permittee's facilities: physically expose or direct exposure of underground facilities, provide any necessary support to facilities and/or cover, de-energize or alter aerial facilities as deemed necessary for protection and safety.

UTILITY PERMIT

16. Pursuant to Section 337.401(2), Florida Statutes, the permit shall require the permit holder to be responsible for damage resulting from the issuance of the permit. The FDOT may initiate injunctive proceedings as provided in s.120.69 to enforce provisions of this subsection or any rule or order issued or entered into pursuant thereto.
17. Pursuant to Section 337.402, Florida Statutes, when any public road or publicly owned rail corridor is damaged or impaired in any way because of the installation, inspection, or repair of a utility located on such road or publicly owned rail corridor, the owner of the utility shall, at his or her own expense, restore the road or publicly owned rail corridor to its original condition before such damage. If the owner fails to make such restoration, the authority is authorized to do so and charge the cost thereof against the owner under the provisions of s.337.404.
18. The Permittee shall comply with all provisions of Chapter 556, Florida Statutes, Underground Facilities Damage Prevention and Safety Act.
19. Special FDOT instructions: _____

Permit must be activated and a pre construction meeting must be held for this project before beginning work in FDOT ROW 813-612-3200

It is understood and agreed that commencement by the Permittee is acknowledgment and acceptance of the binding nature of all the above listed permit conditions and special instructions.

20. By receipt of this permit, the Permittee acknowledges responsibility to comply with Section 119.07, Florida Statutes.
21. By the below signature, the Permittee hereby represents that no change to the FDOT's standard Utility Permit form, as incorporated by reference into Rule 14-46.001, for this Utility Permit has been made which has not been previously called to the attention of the FDOT (and signified to by checking the appropriate box below) by a separate attached written document showing all changes and the written and dated approval of the FDOT Engineer. Are there attachments reflecting change/s to the standard form? ☒NO ☐ YES If Yes, _____ pages are attached.

PERMITTEE	City of Tampa Water Department	**SIGNATURE**	See Attached Application Form	**DATE:**	07/07/2014
	Name & Title of Authorized Permittee or Agent (Typed or Printed Legibly)				
APPROVED BY:	James Meyer (sig)			**ISSUE DATE:**	07/14/2014
	District Maintenance Engineer or Designee				

UTILITY PERMIT FINAL INSPECTION CERTIFICATION

DATE:	
DATE WORK STARTED:	
DATE WORK COMPLETED:	
INSPECTED BY:	
(Permittee or Agent)	
CHANGE APPROVED BY: N/A	**DATE:**
District Maintenance Engineer or Designee	

I the undersigned Permittee do hereby CERTIFY that the utility construction approved by the above numbered permit was inspected and installed in accordance with the approved plans made a part of this permit and in accordance with the FDOT's current UAM. All plan changes have been approved by the FDOT's Engineer and are attached to this permit. I also certify that the work area has been left in as good or better condition than when the work was begun.

PERMITTEE: City of Tampa Water Department	**SIGNATURE:** See Attached Application Form	**DATE:**
Name & Title of Authorized Permittee or Agent (Typed or Printed Legibly)		

CC: District Permit Office
Permittee

APPROVED
2014-H-796-111
James Meyer
7/14/2014

UTILITY PERMIT

PERMIT NO.: 2014-H-796-111

Financial Project ID:

COUNTY:

SECTION NO.:

STATE ROAD:

Preferred Contact	Address	Telephone	E-Mail

The above PERMITTEE requests permission from the State of Florida Department of Transportation, hereinafter called the FDOT, to construct, operate and maintain the following (continued):

Install 560' (78' within FDOT R/W) of 2" HDPE water service line within 68' of existing 16" CIP, used as casing. 10' of the service line will be installed with open cut near the connection point. The project also consists of construction of 48' of 8" PVC sanitart sewer (32' within FDOT R/W) with open cut trench untill the connection point at existing manhole in the center of Fl. Ave.

Location from/to:

Utilities notified (continuation of provision 1):

Ownership of utilities located at (continuation of provision 13):

MP #7.237 MP # 7.275

Supporting documents attached:

#4524.pdf

RULE 14-46

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

UTILITY PERMIT

710-010-85
UTILITIES
OGC – 08/10

PERMIT NO.:	SECTION NO.: 10 020 000	STATE ROAD 685	COUNTY Hillsborough
FDOT construction is proposed or underway.	☐ Yes	☒ No	Financial Project ID:
Is this work related to an approved Utility Work Schedule?	☐ Yes	☒ No	If yes, Document Number:

PERMITTEE:	City of Tampa Water Department
ADDRESS:	306 E. Jackson St. - 5E
CITY/STATE/ZIP:	Tampa, Florida 33602
TELEPHONE NUMBER:	(813) 274 - 8121

The above PERMITTEE requests permission from the State of Florida Department of Transportation, hereinafter called the FDOT, to construct, operate and maintain the following: 560 LF (78 LF within FDOT R/W) of 2" HDPE Water Service Line within 68 LF of existing 16" CIP pipe, used as casing. 10 LF of the 2" service line will be installed with open cut near the connection point. The Project also consists of construction of 48 LF of 8" PVC sanitary sewer (32 LF within FDOT R/W) with open cut trench until the connection point at existing manhole in the center of Florida Ave.

FROM: Plan Station 20+00 MP# 7.237 **TO:** Plan Station 20+77 MP# 7.275

Submitted for the PERMITTEE by: Name and Company (Typed or Printed Legibly)	Contact Information Address/Telephone/E-Mail (if applicable)	Signature	Date
Charles M. Pekkala, P.E.	1715 N. Westshore Blvd. Suite 464, Tampa FL 33607/ 813-873-3666/ mpekkala@greeley-hansen.com	BB	6/10/14

MAYOR Bob Buckhorn (See Permittee above) Bob Buckhorn

1. The Permittee declares that prior to filing this application, the location of all existing utilities that it owns or has an interest in, both aerial and underground, are accurately shown on the plans and a letter of notification was mailed on July 1, 2013 to the following utilities known to be involved or potentially impacted in the area of the proposed installation:
   Utility Matrix and copies of letters are attached under Exhibit 1.
2. The local Maintenance or Resident Engineer, hereafter referred to as the FDOT Engineer, shall be notified a minimum of forty eight (48) hours in advance prior to starting work and again immediately upon completion of work. The FDOT's Engineer is Harvey Hunt located at 2820 Leslie Road Tampa, FL 33619, Telephone Number 813-[illegible] 612-3200
   The Permittee's employee responsible for MOT is Low Responsible Bidder Provide @ 48hr Notice/Pre Con., Telephone Number to be determine (This name may be provided at the time of the forty eight (48) hour advance notice prior to starting work).
3. All work, materials, and equipment shall be subject to inspection and approval by the FDOT Engineer.
4. All plans and installations shall conform to the requirements of the FDOT's UAM in effect as of the date this permit is approved by FDOT, and shall be made a part of this permit. This provision shall not limit the authority of the FDOT under Paragraph 8 of this Permit.
5. This Permittee shall commence actual construction in good faith within ~~120~~ 60 m.m. days after issuance of permit, and shall be completed within 180 days after the permitted work has begun. If the beginning date is more than sixty (60) days from the date of permit approval, the Permittee must review the permit with the FDOT Engineer to make sure no changes have occurred to the Transportation Facility that would affect the permitted construction.
6. The construction and maintenance of such utility shall not interfere with the property and rights of a prior Permittee.
7. It is expressly stipulated that this permit is a license for permissive use only and that the placing of utilities upon public property pursuant to this permit shall not operate to create or vest any property right in said holder, except as provided in executed subordination and Railroad Utility Agreements.
8. Pursuant to Section 337.403, Florida Statutes, any utility placed upon, under, over, or along any public road or publicly owned rail corridor that is found by FDOT to be unreasonably interfering in any way with the convenient, safe, or continuous use, or maintenance, improvement, extension, or expansion, of such public road or publicly owned rail corridor shall, upon thirty (30) days written notice to the utility or its agent by FDOT, be removed or relocated by such utility at its own expense except as provided in Section 337.403(1), Florida Statutes, and except for reimbursement rights set forth in previously executed subordination and Railroad Utility Agreements, and shall apply to all successors and assigns for the permitted facility.
9. It is agreed that in the event the relocation of said utilities are scheduled to be done simultaneously with the FDOT's construction work, the Permittee will coordinate with the FDOT before proceeding and shall cooperate with the FDOT's contractor to arrange the sequence of work so as not to delay the work of the FDOT's contractor, defend any legal claims of the FDOT's contractor due to delays caused by the Permittee's failure to comply with the approved schedule, and shall comply with all provisions of the law and the FDOT's current UAM. The Permittee shall not be responsible for delay beyond its control.
10. In the case of non-compliance with the FDOT's requirements in effect as of the date this permit is approved, this permit is void and the facility will have to be brought into compliance or removed from the R/W at no cost to the FDOT, except for reimbursement rights set forth in previously executed subordination and Railroad Utility Agreements. This provision shall not limit the authority of the FDOT under Paragraph 8 of this Permit.
11. It is understood and agreed that the rights and privileges herein set out are granted only to the extent of the State's right, title and interest in the land to be entered upon and used by the Permittee, and the Permittee will, at all times, and to the extent permitted by law, assume all risk of and indemnify, defend, and save harmless the State of Florida and the FDOT from and against any and all loss, damage, cost or expense arising in any manner on account of the exercise or attempted exercises by said Permittee of the aforesaid rights and privileges.
12. During construction, all safety regulations of the FDOT shall be observed and the Permittee must take measures, including placing and the display of safety devices that may be necessary in order to safely conduct the public through the project area in accordance with the Federal MUTCD, as amended by the UAM.
13. Should the Permittee be desirous of keeping its utilities in place and out of service, the Permittee, by execution of this permit acknowledges its present and continuing ownership of its utilities located between N/A and _____ within the FDOT's R/W as set forth above. Whenever the Permittee removes its facilities, it shall be at the Permittee's sole cost and expense. The Permittee, at its sole expense, shall promptly remove said out of service utilities whenever the FDOT determines said removal is in the public interest
14. In the event contaminated soil is encountered by the Permittee or anyone within the permitted construction limits, the Permittee shall immediately cease work and notify the FDOT. The FDOT shall notify the Permitee of any suspension or revocation of the permit to allow contamination assessment and remediation. Said suspension or revocation shall remain in effect until otherwise notified by FDOT
15. For any excavation, construction, maintenance, or support activities performed by or on behalf of the FDOT, within its R/W, the Permittee may be required by

#4524

UTILITY PERMIT

the FDOT or its agents to perform the following activities with respect to a Permittee's facilities: physically expose or direct exposure of underground facilities, provide any necessary support to facilities and/or cover, de-energize or alter aerial facilities as deemed necessary for protection and safety.

16. Pursuant to Section 337.401(2), Florida Statutes, the permit shall require the permit holder to be responsible for damage resulting from the issuance of the permit. The FDOT may initiate injunctive proceedings as provided in s.120.69 to enforce provisions of this subsection or any rule or order issued or entered into pursuant thereto.
17. Pursuant to Section 337.402, Florida Statutes, when any public road or publicly owned rail corridor is damaged or impaired in any way because of the installation, inspection, or repair of a utility located on such road or publicly owned rail corridor, the owner of the utility shall, at his or her own expense, restore the road or publicly owned rail corridor to its original condition before such damage. If the owner fails to make such restoration, the authority is authorized to do so and charge the cost thereof against the owner under the provisions of s.337.404.
18. The Permittee shall comply with all provisions of Chapter 556, Florida Statutes, Underground Facilities Damage Prevention and Safety Act.
19. Special FDOT instructions: Following Standard FDOT Design Indices will be used during construction: 613 (Multilane, work within travel way median or outside lane) and 614 (Multilane, work within travel way, center lane).

It is understood and agreed that commencement by the Permittee is acknowledgment and acceptance of the binding nature of all the above listed permit conditions and special instructions.

20. By receipt of this permit, the Permittee acknowledges responsibility to comply with Section 119.07, Florida Statutes.
21. By the below signature, the Permittee hereby represents that no change to the FDOT's standard Utility Permit form, as incorporated by reference into Rule 14-46.001, for this Utility Permit has been made which has not been previously called to the attention of the FDOT (and signified to by checking the appropriate box below) by a separate attached written document showing all changes and the written and dated approval of the FDOT Engineer. Are there attachments reflecting change/s to the standard form? ☒NO ☐ YES If Yes, ____ pages are attached.

PERMITTEE	Janice Davis, P.E. Chief Design Engineer	**SIGNATURE**	Janice Davis	**DATE:**	6/10/14
	Name & Title of Authorized Permittee or Agent (Typed or Printed Legibly)				
APPROVED BY:				**ISSUE DATE:**	
	District Maintenance Engineer or Designee				

UTILITY PERMIT FINAL INSPECTION CERTIFICATION

DATE:	
DATE WORK STARTED:	
DATE WORK COMPLETED:	
INSPECTED BY:	
(Permittee or Agent)	
CHANGE APPROVED BY:	**DATE:**
District Maintenance Engineer or Designee	

I the undersigned Permittee do hereby CERTIFY that the utility construction approved by the above numbered permit was inspected and installed in accordance with the approved plans made a part of this permit and in accordance with the FDOT's current UAM. All plan changes have been approved by the FDOT's Engineer and are attached to this permit. I also certify that the work area has been left in as good or better condition than when the work was begun.

PERMITTEE:	**SIGNATURE:**	**DATE:**
Name & Title of Authorized Permittee or Agent (Typed or Printed Legibly)		

CC: District Permit Office
Permittee

DATA FOR D.O.T. PERMIT APPLICATION

A DEPARTMENT OF TRANSPORTATION PERMIT IS REQUIRED BEFORE ANY FACILITY IS INSTALLED ON THE RIGHT OF WAY, WHETHER IT IS FOR AERIAL OR UNDERGROUND INSTALLATIONS, EXCEPT UNDER THE FOLLOWING CONDITIONS:

1. A NEW POLE TO BE PLACED WITHIN AN EXISTING PERMITTED POLE LINE.
2. SERVICE DROPS OR SPAN GUYS EMANATING FROM AND/OR ATTACHED TO POLES PROPERLY COVERED BY AN EXISTING PERMIT WHICH DO NOT CROSS ANY ROADWAY
3. AN UNDERGROUND SERVICE CONNECTION PROVIDED THAT IT DOES NOT CROSS THE ROADWAY, AND TRENCHING IS AT RIGHT ANGLE AWAY FROM THE ROADWAY. NOTICE WILL BE GIVEN TO THE AFFECTED MAINTENANCE ENGINEER PRIOR TO CONSTRUCTION IN ALL INSTANCES.
4. TEMPORARY RELOCATION AS DIRECTED BY THE D.O.T. RESIDENT ENGINEER DURING THE HIGHWAY CONSTRUCTION PROJECT. THIS WILL ALSO INCLUDE NEW LOCATIONS AS NEEDED FOR TEMPORARY UTILITY SERVICE FOR CONSTRUCTION PROJECTS.

PERMITTEE: City of Tampa Water Department
COMPANY ENGINEER: Janice R Davis PHONE: 274-7096

1. S.R. # 685, S.R. SECTION 750 feet south of Fowler Ave.
LOCAL NAME OF ROAD OR STREET Florida Avenue

2. PROPOSED: 2" water main and 8" sewer TO ~~PARALLEL~~, CROSS ~~OR BOTH~~ IN R/W OF STATE ROAD WITHIN CITY LIMITS OF Tampa OR BETWEEN CITIES OF N/A AND N/A IN THE COUNTY OF Hillsborough.

3. SUBMIT A PLAN AND PROFILE VIEW OF PROPOSED CONSTRUCTION. See Exhibit 4 - Plan and Profile Sheets

4. PROPOSED UTILITY TO BE IN R/W FOR DISTANCE OF 78 FT., STARTING AT Intersection of Florida Ave and 115th Ave. (GIVE LOCATION, SUCH AS: NAME OF CROSSROADS, OR NUMBER OF FEET FROM SUCH LOCATION).

5. PROPOSED UTILITY TO BE ___ FT. N, S, E, W, OF C/L OF PAVEMENT. Water and sewer line perpendicular to SR 685 pavement (30' east to centerline to 54' west of centerline)

6. DISTANCE FROM PROPOSED UTILITY TO THE EDGE OF PAVEMENT ___FT. Utility located in pavement

7. DISTANCE FROM PROPOSED UTILITY TO THE R/W LINE __ FT. Utilities perpendicular to RW line

8. WIDTH OF R/W ON EACH SIDE OF C/L OF PAVEMENT 48' FT ~~N, S, E,~~ W, AND 40' FT ~~N, S,~~ E, ~~W.~~

9. WIDTH OF MEDIAN (TYPICAL, IF APPLICABLE) N/A.

10. WIDTH OF PAVEMENT 70 FT.

11. DISTANCE FROM CURB OR EDGE OF PAVEMENT TO SIDEWALK zero FT.

12. WIDTH OF SIDEWALK 6 FT.

13. DISTANCE FROM EXISTING UTILITY TO C/L OF PAVEMENT _____ FT. Utilities perpendicular to pavement centerline

14. WILL EXISTING UTILITY BE REMOVED? N/A. IF SO, WHAT AND HOW MUCH?

15. SUBMIT ALL OTHER UTILITIES ON CROSS-SECTION MAPS. MAKE SEPARATE CROSS-SECTION DETAIL FOR EACH CHANGE IN LOCATION, AND REPEAT ITEMS 5 AND 10. See Exhibit 4 - Plan and Profile Sheets

16. WILL ANY HIGHWAY PAVEMENT BE CUT? Yes, OR WILL PIPE BE DRIVEN UNDER PAVEMENT? ___.

17. INDICATE APPROXIMATE LOCATION, DEPTHS AND SIZES OF ALL UTILITIES WITHIN R/W LIMITS, AND SUBMIT NAME OF OWNERS AND CITY OR TOWN FROM WHICH THEY ARE OPERATED.

Southwest Florida Water Management District
2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
On the Internet at: WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

October 02, 2013

City of Tampa Water Department
Attn: Brad Baird, P.E.
306 East Jackson Street
Tampa, FL 33602

Subject: **Notice of Intended Agency Action**
ERP General Construction Modification

Project Name:	City of Tampa Blue Sink MFL PS Project
App ID/Permit No:	681844 / 44003359.002
County:	HILLSBOROUGH
Sec/Twp/Rge:	S13/T28S/R18E

Dear Permittee(s):

Your Environmental Resource Permit has been approved contingent upon no objection to the District's action being received by the District within the time frames described in the enclosed Notice of Rights.

Approved construction plans are part of the permit, and construction must be in accordance with these plans. These drawings are available for viewing or downloading through the District's Application and Permit Search Tools located at www.WaterMatters.org/permits.

The District's action in this matter only becomes closed to future legal challenges from members of the public if such persons have been properly notified of the District's action and no person objects to the District's action within the prescribed period of time following the notification. The District does not publish notices of intended agency action. If you wish to limit the time within which a person who does not receive actual written notice from the District may request an administrative hearing regarding this action, you are strongly encouraged to publish, at your own expense, a notice of intended agency action in the legal advertisement section of a newspaper of general circulation in the county or counties where the activity will occur. Publishing notice of intended agency action will close the window for filing a petition for hearing. Legal requirements and instructions for publishing notice of intended agency action, as well as a noticing form that can be used is available from the District's website at www.WaterMatters.org/permits/noticing. If you publish notice of intended agency action, a copy of the affidavit of publishing provided by the newspaper should be sent to the District's Tampa Service Office, for retention in the File of Record for this agency action.

If you have questions, please contact Jack Moore, at the Tampa Service Office, extension 2041. For assistance with environmental concerns, please contact Patty Frantz, extension 2054.

Sincerely,

Michelle K. Hopkins, P.E.
Bureau Chief
Environmental Resource Permit Bureau
Regulation Division

Enclosures: Approved Permit w/Conditions Attached
Statement of Completion
Notice of Authorization to Commence Construction
Notice of Rights
cc: U. S. Army Corps of Engineers
Kenneth Broome, P.E., MWH Americas, Inc.

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
GENERAL CONSTRUCTION MODIFICATION
PERMIT NO. 44003359.002

EXPIRATION DATE: October 02, 2018 **PERMIT ISSUE DATE:** October 02, 2013

This permit is issued under the provisions of Chapter 373, Florida Statutes, (F.S.), and the Rules contained in Chapters 40D-4 and 40D-40, Florida Administrative Code, (F.A.C.). The permit authorizes the Permittee to proceed with the construction of a surface water management system in accordance with the information outlined herein and shown by the application, approved drawings, plans, specifications, and other documents, attached hereto and kept on file at the Southwest Florida Water Management District (District). Unless otherwise stated by permit specific condition, permit issuance constitutes certification of compliance with state water quality standards under Section 401 of the Clean Water Act, 33 U.S.C. 1341. All construction, operation and maintenance of the surface water management system authorized by this permit shall occur in compliance with Florida Statutes and Administrative Code and the conditions of this permit.

PROJECT NAME:	City of Tampa Blue Sink MFL PS Project
GRANTED TO:	City of Tampa Water Department Attn: Brad Baird, P.E. 306 East Jackson Street Tampa, FL 33602
OTHER PERMITTEES:	N/A

ABSTRACT: This permit modifies existing Permit No. 40003359.000 and will authorize the construction of a new pump station to divert water from the Blue Sink to the base of the Hillsborough River dam to meet the adopted Minimum Flows and Levels (MFL) requirements for the lower Hillsborough River. The proposed project will include the demolition of an existing pump station and pavement, the construction of a new pump station and vehicular access facilities, the pump station intake pipes, and approximately 500 lineal feet of 16-inch diameter discharge pipe. Since there will be no increase in impervious area over the existing condition, no adverse water quality or quantity impacts are anticipated. Information regarding the surface water management system, 100-year floodplain, wetlands and;or surface waters is stated below and on the permitted construction drawings for the project.

OP. & MAIN. ENTITY:	City of Tampa Water Department
OTHER OP. & MAIN. ENTITY:	N/A
COUNTY:	HILLSBOROUGH
SEC/TWP/RGE:	S13/T28S/R18E
TOTAL ACRES OWNED OR UNDER CONTROL:	29.00
PROJECT SIZE:	1.00 Acres
LAND USE:	Government
DATE APPLICATION FILED:	July 10, 2013
AMENDED DATE:	N/A

I. Water Quantity/Quality

Water Quantity/Quality Comments:

The construction of the new pump station will maintain existing drainage patterns and will not add any additional impervious area at the existing site. The total impervious and semi-impervious area to be constructed with the new pump station total approximately 4,100 square feet. Water quality treatment and quantity attenuation are not required.

A mixing zone is not required.

A variance is not required.

II. 100-Year Floodplain

Encroachment (Acre-Feet of fill)	Compensation (Acre-Feet of excavation)	Compensation Type	Encroachment Result* (feet)
0.00	0.00	No Encroachment	N/A

*Depth of change in flood stage (level) over existing receiving water stage resulting from floodplain encroachment caused by a project that claims Minimal Impact type of compensation.

III. Environmental Considerations

Wetland/Other Surface Water Information

Wetland/Other Surface Water Name	Total Acres	Not Impacted Acres	Permanent Impacts		Temporary Impacts	
			Acres	Functional Loss*	Acres	Functional Loss*
Blue Sink	0.31	0.29	0.01	0.00	0.01	0.00
Total:	**0.31**	**0.29**	**0.01**	**0.00**	**0.01**	**0.00**

*** For impacts that do not require mitigation, their functional loss is not included.**

Wetland/Other Surface Water Comments:

There is 0.31 acre of wetlands and surface waters of Blue Sink (FLUCCS 550) within the project area. The construction to install the floating intake structures over the open water area of Blue sink and a pipeline crossing the sink will cause a temporary surface water impact of 0.01 acre and 0.01 acre of permanent wetland/surface water impacts. Permanent impacts to the wetlands/surface water features were evaluated using the Uniform Mitigation Assessment Method (UMAM) as required pursuant to Chapter 62-345, F.A.C. The results of the UMAM analysis indicate a net functional loss of 0.00 units due to the wetland impacts proposed and were, thus, deemed de minimis pursuant to Section 3.2.2 of the Basis of Review.

Mitigation Information

Mitigation Comments:

Wetland mitigation will not be required for permanent filling/dredging impacts to 0.01 acre of wetlands pursuant to Section 3.2.2. of the Basis of Review. Under this Section, wetland mitigation is not required for impacts that have been determined to be de minimis to fish, wildlife and listed species.

Specific Conditions

1. If the ownership of the project area covered by the subject permit is divided, with someone other than the Permittee becoming the owner of part of the project area, this permit shall terminate, pursuant to Rule 40D-1.6105, F.A.C. In such situations, each land owner shall obtain a permit (which may be a modification of this permit) for the land owned by that person. This condition shall not apply to the division and sale of lots or units in residential subdivisions or condominiums.

2. Unless specified otherwise herein, two copies of all information and reports required by this permit shall be submitted to the Regulation Department at the District Service Office that services this permit. The permit number, title of report or information and event (for recurring report or information submittal) shall be identified on all information and reports submitted.

3. The Permittee shall retain the design engineer, or other professional engineer registered in Florida, to conduct on-site observations of construction and assist with the as-built certification requirements of this project. The Permittee shall inform the District in writing of the name, address and phone number of the professional engineer so employed. This information shall be submitted prior to construction.

4. Within 30 days after completion of construction of the permitted activity, the Permittee shall submit to the Regulation Department at the District Service Office that services this permit a written statement of completion and certification by a registered professional engineer or other appropriate individual as authorized by law, utilizing the required Statement of Completion and Request for Transfer to Operation Entity form identified in Chapter 40D-1, F.A.C., and signed, dated, and sealed as-built drawings. The as-built drawings shall identify any deviations from the approved construction drawings.

5. The District reserves the right, upon prior notice to the Permittee, to conduct on-site research to assess the pollutant removal efficiency of the surface water management system. The Permittee may be required to cooperate in this regard by allowing on-site access by District representatives, by allowing the installation and operation of testing and monitoring equipment, and by allowing other assistance measures as needed on site.

6. Wetland buffers shall remain in an undisturbed condition except for approved drainage facility construction/maintenance.

7. The following boundaries, as shown on the approved construction drawings, shall be clearly delineated on the site prior to initial clearing or grading activities:

   wetland and surface water areas

   wetland buffers

   limits of approved wetland impacts

   The delineation shall endure throughout the construction period and be readily discernible to construction and District personnel.

8. All Wetland boundaries shown on the approved construction drawings shall be binding upon the Permittee and the District.

9. This modification, Construction Permit No. 44003359.002, amends the previously issued Construction Permit No. 40003359.000, and adds conditions. All other original permit conditions remain in effect.

10. The Permittee shall notify the District of any sinkhole development in the surface water management system within 48 hours of discovery and must submit a detailed sinkhole evaluation and repair plan for approval by the District within 30 days of discovery.

11. The District, upon prior notice to the Permittee, may conduct on-site inspections to assess the effectiveness of the erosion control barriers and other measures employed to prevent violations of state water quality standards and avoid downstream impacts. Such barriers or other measures should control discharges, erosion, and sediment transport during construction and thereafter. The District will also determine any potential environmental problems that may develop as a result of leaving or removing the barriers and other measures during construction or after construction of the project has been completed. The Permittee must provide any remedial measures that are needed.

12. This permit is issued based upon the design prepared by the Permittee's consultant. If at any time it is determined by the District that the Conditions for Issuance of Permits in Rules 40D-4.301 and 40D-4.302, F.A.C., have not been met, upon written notice by the District, the Permittee shall obtain a permit modification and perform any construction necessary thereunder to correct any deficiencies in the system design or construction to meet District rule criteria. The Permittee is advised that the correction of deficiencies may require re-construction of the surface water management system.

13. The Permitted Plan Set for this project includes:
the set received by the District on August 27, 2013.

GENERAL CONDITIONS

1. The general conditions attached hereto as Exhibit "A" are hereby incorporated into this permit by reference and the Permittee shall comply with them.

Michelle K. Hopkins, P.E.

Authorized Signature

EXHIBIT A

GENERAL CONDITIONS:

1. All activities shall be implemented as set forth in the plans, specifications and performance criteria as approved by this permit. Any deviation from the permitted activity and the conditions for undertaking that activity shall constitute a violation of this permit.

2. This permit or a copy thereof, complete with all conditions, attachments, exhibits, and modifications, shall be kept at the work site of the permitted activity. The complete permit shall be available for review at the work site upon request by District staff. The permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.

3. For general permits authorizing incidental site activities, the following limiting general conditions shall also apply:

   a. If the decision to issue the associated individual permit is not final within 90 days of issuance of the incidental site activities permit, the site must be restored by the permittee within 90 days after notification by the District. Restoration must be completed by re-contouring the disturbed site to previous grades and slopes re-establishing and maintaining suitable vegetation and erosion control to provide stabilized hydraulic conditions. The period for completing restoration may be extended if requested by the permittee and determined by the District to be warranted due to adverse weather conditions or other good cause. In addition, the permittee shall institute stabilization measures for erosion and sediment control as soon as practicable, but in no case more than 7 days after notification by the District.

   b. The incidental site activities are commenced at the permittee's own risk. The Governing Board will not consider the monetary costs associated with the incidental site activities or any potential restoration costs in making its decision to approve or deny the individual environmental resource permit application. Issuance of this permit shall not in any way be construed as commitment to issue the associated individual environmental resource permit.

4. Activities approved by this permit shall be conducted in a manner which does not cause violations of state water quality standards. The permittee shall implement best management practices for erosion and a pollution control to prevent violation of state water quality standards. Temporary erosion control shall be implemented prior to and during construction, and permanent control measures shall be completed within 7 days of any construction activity. Turbidity barriers shall be installed and maintained at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the permitted work. Turbidity barriers shall remain in place 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.

5. Water quality data for the water discharged from the permittee's property or into the surface waters of the state shall be submitted to the District as required by the permit. Analyses shall be performed according to procedures outlined in the current edition of Standard Methods for the Examination of Water and Wastewater by the American Public Health Association or Methods for Chemical Analyses of Water and Wastes by the U.S. Environmental Protection Agency. If water quality data are required, the permittee shall provide data as required on volumes of water discharged, including total volume discharged during the days of sampling and total monthly volume discharged from the property or into surface waters of the state.

6. District staff must be notified in advance of any proposed construction dewatering. If the dewatering activity is likely to result in offsite discharge or sediment transport into wetlands or surface waters, a written dewatering plan must either have been submitted and approved with the permit application or submitted to the District as a permit prior to the dewatering event as a permit modification. A water use permit may be required prior to any use exceeding the thresholds in Chapter 40D-2, F.A.C.

7. Stabilization measures shall be initiated for erosion and sediment control on disturbed areas as soon as

practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.

8. Off-site discharges during construction and development shall be made only through the facilities authorized by this permit. Water discharged from the project shall be through structures having a mechanism suitable for regulating upstream stages. Stages may be subject to operating schedules satisfactory to the District.

9. The permittee shall complete construction of all aspects of the surface water management system, including wetland compensation (grading, mulching, planting), water quality treatment features, and discharge control facilities prior to beneficial occupancy or use of the development being served by this system.

10. The following shall be properly abandoned and/or removed in accordance with the applicable regulations:

    a. Any existing wells in the path of construction shall be properly plugged and abandoned by a licensed well contractor.

    b. Any existing septic tanks on site shall be abandoned at the beginning of construction.

    c. Any existing fuel storage tanks and fuel pumps shall be removed at the beginning of construction.

11. All surface water management systems shall be operated to conserve water in order to maintain environmental quality and resource protection; to increase the efficiency of transport, application and use; to decrease waste; to minimize unnatural runoff from the property and to minimize dewatering of offsite property.

12. At least 48 hours prior to commencement of activity authorized by this permit, the permittee shall submit to the District a written notification of commencement indicating the actual start date and the expected completion date.

13. Each phase or independent portion of the permitted system must be completed in accordance with the permitted plans and permit conditions prior to the occupation of the site or operation of site infrastructure located within the area served by that portion or phase of the system. Each phase or independent portion of the system must be completed in accordance with the permitted plans and permit conditions prior to transfer of responsibility for operation and maintenance of that phase or portion of the system to a local government or other responsible entity.

14. Within 30 days after completion of construction of the permitted activity, the permittee shall submit a written statement of completion and certification by a registered professional engineer or other appropriate individual as authorized by law, utilizing the required Statement of Completion and Request for Transfer to Operation Entity form identified in Chapter 40D-1, F.A.C. Additionally, if deviation from the approved drawings are discovered during the certification process the certification must be accompanied by a copy of the approved permit drawings with deviations noted.

15. This permit is valid only for the specific processes, operations and designs indicated on the approved drawings or exhibits submitted in support of the permit application. Any substantial deviation from the approved drawings, exhibits, specifications or permit conditions, including construction within the total land area but outside the approved project area(s), may constitute grounds for revocation or enforcement action by the District, unless a modification has been applied for and approved. Examples of substantial deviations include excavation of ponds, ditches or sump areas deeper than shown on the approved plans.

16. The operation phase of this permit shall not become effective until the permittee has complied with the requirements of the conditions herein, the District determines the system to be in compliance with the permitted plans, and the entity approved by the District accepts responsibility for operation and maintenance of the system. The permit may not be transferred to the operation and maintenance entity approved by the District until the operation phase of the permit becomes effective. Following inspection and approval of the permitted system by the District, the permittee shall request transfer of the permit to the responsible operation and maintenance entity approved by the District, if different from the permittee. Until a transfer is approved by the District, the permittee shall be liable for compliance with the terms of the permit.

17. Should any other regulatory agency require changes to the permitted system, the District shall be notified of the changes prior to implementation so that a determination can be made whether a permit modification is required.

18. This permit does not eliminate the necessity to obtain any required federal, state, local and special District authorizations including a determination of the proposed activities' compliance with the applicable comprehensive plan prior to the start of any activity approved by this permit.

19. This 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 permit and Chapter 40D-4 or Chapter 40D-40, F.A.C.

20. The permittee shall hold and save the District harmless from any and all damages, claims, or liabilities which may arise by reason of the activities authorized by the permit or any use of the permitted system.

21. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered binding unless a specific condition of this permit or a formal determination under section 373.421(2), F.S., provides otherwise.

22. The permittee shall notify the District in writing within 30 days of any sale, conveyance, or other transfer of ownership or control of the permitted system or the real property at which the permitted system is located. All transfers of ownership or transfers of a permit are subject to the requirements of Rule 40D-4.351, F.A.C. The permittee transferring the permit shall remain liable for any corrective actions that may be required as a result of any permit violations prior to such sale, conveyance or other transfer.

23. Upon reasonable notice to the permittee, District authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with District rules, regulations and conditions of the permits.

24. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the District and the Florida Department of State, Division of Historical Resources.

25. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

SOUTHWEST FLORIDA
WATER MANAGEMENT DISTRICT

NOTICE OF
AUTHORIZATION
TO COMMENCE CONSTRUCTION

City of Tampa Blue Sink MFL PS Project
PROJECT NAME

Government
PROJECT TYPE

HILLSBOROUGH
COUNTY

S13/T28S/R18E
SEC(S)/TWP(S)/RGE(S)

City of Tampa Water Department
PERMITTEE

APPLICATION ID/PERMIT NO: 681844 / 44003359.002

DATE ISSUED: October 02, 2013

Michelle K. Hopkins, P.E.
Issuing Authority

THIS NOTICE SHOULD BE CONSPICUOUSLY DISPLAYED AT THE SITE OF THE WORK

Notice of Rights

ADMINISTRATIVE HEARING

1. You or any person whose substantial interests are or may be affected by the District's intended or proposed action may request an administrative hearing on that action by filing a written petition in accordance with Sections 120.569 and 120.57, Florida Statutes (F.S.), Uniform Rules of Procedure Chapter 28-106, Florida Administrative Code (F.A.C.) and District Rule 40D-1.1010, F.A.C. Unless otherwise provided by law, a petition for administrative hearing must be filed with (received by) the District within 21 days of receipt of written notice of agency action. "Written notice" means either actual written notice, or newspaper publication of notice, that the District has taken or intends to take agency action. "Receipt of written notice" is deemed to be the fifth day after the date on which actual notice is deposited in the United States mail, if notice is mailed to you, or the date that actual notice is issued, if sent to you by electronic mail or delivered to you, or the date that notice is published in a newspaper, for those persons to whom the District does not provide actual notice.

2. Pursuant to Subsection 373.427(2)(c), F.S., for notices of intended or proposed agency action on a consolidated application for an environmental resource permit and use of sovereignty submerged lands concurrently reviewed by the District, a petition for administrative hearing must be filed with (received by) the District within 14 days of receipt of written notice.

3. Pursuant to Rule 62-532.430, F.A.C., for notices of intent to deny a well construction permit, a petition for administrative hearing must be filed with (received by) the District within 30 days of receipt of written notice of intent to deny.

4. Any person who receives written notice of an agency decision and who fails to file a written request for a hearing within 21 days of receipt or other period as required by law waives the right to request a hearing on such matters.

5. Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding District intended or proposed action is not available prior to the filing of a petition for hearing.

6. A request or petition for administrative hearing must comply with the requirements set forth in Chapter 28.106, F.A.C. A request or petition for a hearing must: (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's intended action or proposed action, (2) state all material facts disputed by the person requesting the hearing or state that there are no material facts in dispute, and (3) otherwise comply with Rules 28-106.201 and 28-106.301, F.A.C. Chapter 28-106, F.A.C. can be viewed at www.flrules.org or at the District's website at www.WaterMatters.org/permits/rules.

7. A petition for administrative hearing is deemed filed upon receipt of the complete petition by the District Agency Clerk at the District's Tampa Service Office during normal business hours, which are 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding District holidays. Filings with the District Agency Clerk may be made by mail, hand-delivery or facsimile transfer (fax). The District does not accept petitions for administrative hearing by electronic mail. Mailed filings must be addressed to, and hand-delivered filings must be delivered to, the Agency Clerk, Southwest Florida Water Management District, 7601 Highway 301 North,Tampa,FL 33637-6759. Faxed filings must be transmitted to the District Agency Clerk at (813) 987-6746. Any petition not received during normal business hours shall be filed as of 8:00 a.m. on the next business day. The District's acceptance of faxed petitions for filing is subject to certain conditions set forth in the District's Statement of Agency Organization and Operation, available for viewing at www.WaterMatters.org/about.

JUDICIAL REVIEW

1. Pursuant to Sections 120.60(3) and 120.68, F.S., a party who is adversely affected by District action may seek judicial review of the District's action. Judicial review shall be sought in the Fifth District Court of Appeal or in the appellate district where a party resides or as otherwise provided by law.

2. All proceedings shall be instituted by filing an original notice of appeal with the District Agency Clerk within 30 days after the rendition of the order being appealed, and a copy of the notice of appeal, accompanied by any filing fees prescribed by law, with the clerk of the court, in accordance with Rules 9.110 and 9.190 of the Florida Rules of Appellate Procedure (Fla. R. App. P.). Pursuant to Fla. R. App. P. 9.020(h), an order is rendered when a signed written order is filed with the clerk of the lower tribunal.

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at *WaterMatters.org*

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

December 17, 2013

City of Tampa
Attn: Brad L. Baird
306 East Jackson Street, 5E
Tampa, FL 33602

Subject: Final Agency Action Transmittal Letter
Individual Water Use Permit No. 20 020382.000

Dear Permittee:

This Water Use Permit was approved by the District Governing Board subject to all terms and conditions set forth in the Permit.

Please be advised that the Governing Board has formulated a water shortage plan referenced in a Standard Water Use Permit Condition (Exhibit A) of your permit, and will implement such a plan during periods of water shortage. You will be notified during a declared water shortage of any change in the conditions of your Permit or any suspension of your Permit, or of any restriction on your use of water for the duration of any declared water shortage. Please further note that water conservation is a condition of your Permit and should be practiced at all times.

The well tags for your withdrawals will be applied by a District representative. If you have any questions or concerns regarding your tags, please contact Billy Permenter at extension 2064, in the Tampa Service Office. If you have any questions or concerns regarding your permit or any other information, please contact the Tampa Service Office and ask to speak to someone in the Water Use Permit Bureau.

Sincerely,

Darrin Herbst, P.G. Electronically Signed

Darrin Herbst, P.G.
Bureau Chief
Water Use Permit Bureau
Regulation Division

Enclosures: Approved Permit
cc: File of Record
Kenneth J. Broome
Brian Pickard
Ron Hines
Robert Lowe
James Wilson
Ellen O. Wilson
Ken Weber
Benjamin Ochshorn

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
WATER USE PERMIT
INDIVIDUAL
PERMIT NO. 20 020382.000

PERMIT ISSUE DATE: **December 17, 2013** **EXPIRATION DATE:** **December 17, 2037**

The Permittee is responsible for submitting an application to renew this permit no sooner than one year prior to the expiration date, and no later than the end of the last business day before the expiration date, whether or not the Permittee receives prior notification by mail. Failure to submit a renewal application prior to the expiration date and continuing to withdraw water after the expiration date is a violation of Chapter 373, Florida Statutes, and Chapter 40D-2, Florida Administrative Code, and may result in a monetary penalty and/or loss of the right to use the water. Issuance of a renewal of this permit is contingent upon District approval.

TYPE OF APPLICATION: New

GRANTED TO: City of Tampa
Attn: Brad L. Baird
306 East Jackson St 5E
Tampa, FL 33602

PROJECT NAME: Blue Sink MFL Pump Station

WATER USE CAUTION AREA(S): Northern Tampa Bay

COUNTY: Hillsborough

TOTAL QUANTITIES AUTHORIZED UNDER THIS PERMIT (in gallons per day)

ANNUAL AVERAGE	1,742,700 gpd
PEAK MONTH[1]	2,000,000 gpd

[1]Peak Month: Average daily use during the highest water use month.

ABSTRACT:

This is a new water use permit which authorizes the withdrawal of an annual average quantity of 1,742,700 gallons per day (gpd) from the Blue Sink. The authorized quantities are necessary to assist in meeting the minimum flow of the lower Hillsborough River below the dam established in Rule 40D-8.041(1)(b), F.A.C. and in accordance with Rule 40D-80.073(8), F.A.C., the Comprehensive Environmental Resources Recovery Plan for the Northern Tampa Bay Water Use Caution Area, and the Hillsborough River Strategy.

Special conditions include those that require the Permittee to install and maintain flow meters, record and report meter readings monthly, cap withdrawals that are not in use, submit annual water use reports, investigate well and water quality complaints, and comply with the Comprehensive Environmental Resources Recovery Plan for the Northern Tampa Bay Water Use Caution Area.

WATER USE TABLE (in gpd)

USE	ANNUAL AVERAGE	PEAK MONTH
Recreation/Aesthetic	1,742,700	2,000,000

USE TYPE

Augmentation For Environmental

WITHDRAWAL POINT QUANTITY TABLE

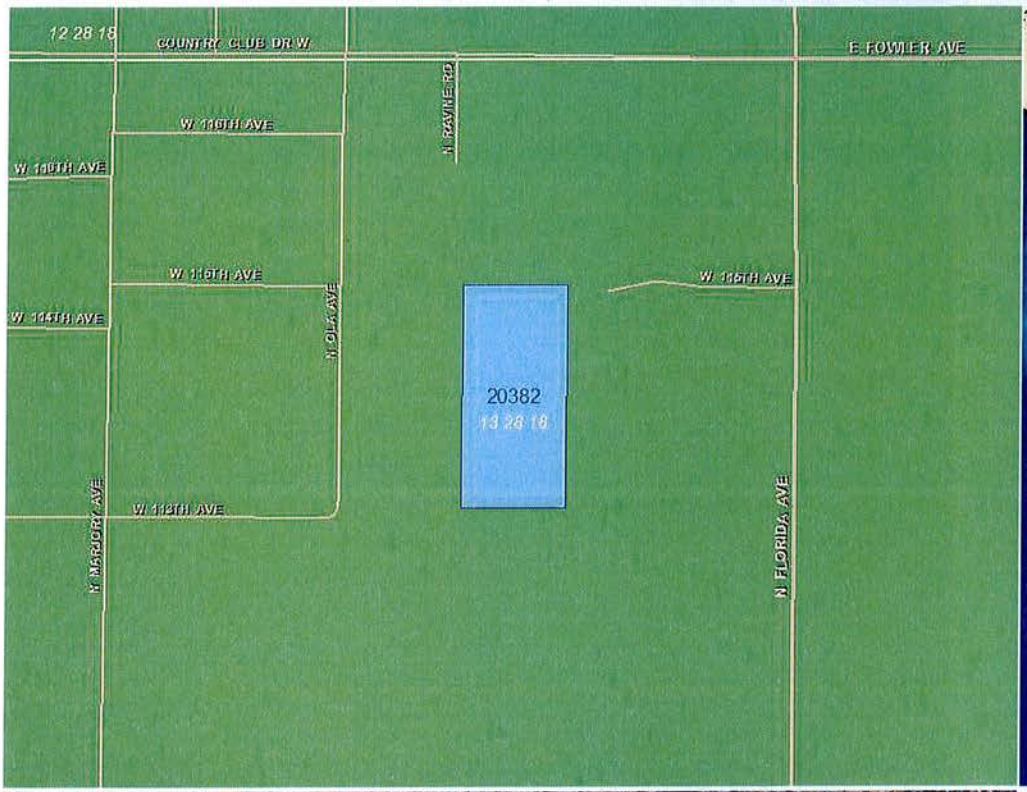
Water use from these withdrawal points are restricted to the quantities given below:

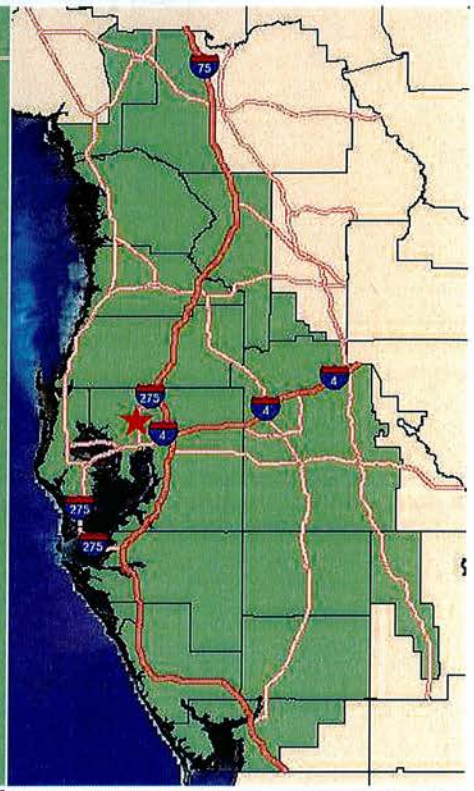
I.D. NO. PERMITTEE/ DISTRICT	DIAM (in.)	DEPTH TTL./CSD.FT. (feet bls)	USE DESCRIPTION	AVERAGE (gpd)	PEAK MONTH (gpd)
1 / 1	16	N/A / N/A	Augmentation	1,742,700	2,000,000

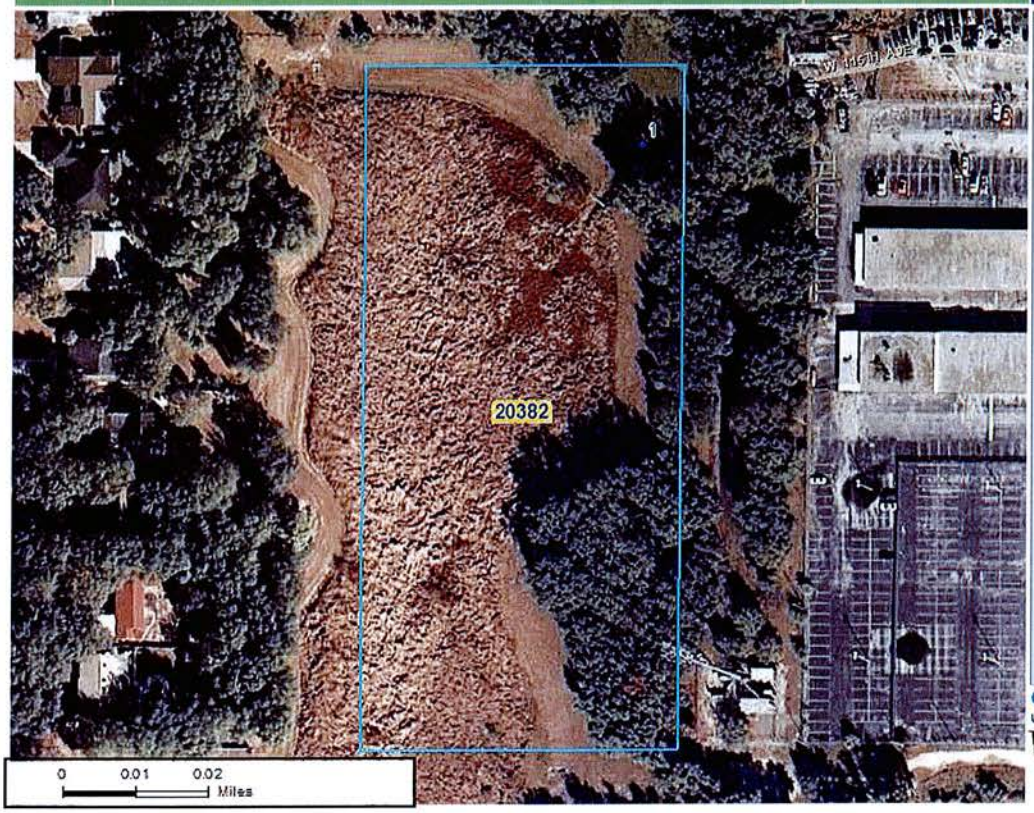
WITHDRAWAL POINT LOCATION TABLE

DISTRICT I.D. NO.	LATITUDE/LONGITUDE
1	28° 03' 09.42"/82° 27' 41.65"

Location Map
City of Tampa / Attn: Brad L. Baird
WUP No. 20 020382.000







Legend

- DIDs
- WUP Boundary
- 2011 Natural Color Imagery

HILLSBOROUGH COUNTY

N
W E
S

Southwest Florida
Water Management District

STANDARD CONDITIONS:

The Permittee shall comply with the Standard Conditions attached hereto, incorporated herein by reference as Exhibit A and made a part hereof.

SPECIAL CONDITIONS:

1. All reports and data required by conditions of the permit shall be submitted to the District according to the due dates contained in the specific condition. If the condition specifies that a District-supplied form is to be used, the Permittee should use that form in order for their submission to be acknowledged in a timely manner. The only alternative to this requirement is to use the District Permit Information Center (www.swfwmd.state.fl.us/permits/epermitting/) to submit data, plans or reports online. There are instructions at the District website on how to register to set up an account to do so. If the report or data is received on or before the tenth day of the month following data collection, it shall be deemed as a timely submittal.

   All mailed reports and data are to be sent to:

   Southwest Florida Water Management District
   Tampa Service Office, Water Use Permit Bureau
   7601 U.S. Hwy. 301 North
   Tampa, Florida 33637-6759

   Submission of plans and reports: Unless submitted online or otherwise indicated in the special condition, the original and two copies of each plan and report, such as conservation plans, environmental analyses, aquifer test results, per capita annual reports, etc. are required.

   Submission of data: Unless otherwise indicated in the special condition, an original (no copies) is required for data submittals such as crop report forms, meter readings and/or pumpage, rainfall, water level, evapotranspiration, or water quality data.
   (499)

2. The Permittee shall comply with authorized quantities. If the authorized quantities are exceeded, upon request by the District, the Permittee shall submit a report that includes reasons why the authorized quantities were exceeded, measures taken to attempt to meet the authorized quantities, and a plan to bring the permit into compliance. The District will evaluate information submitted by Permittees who exceed their authorized quantities to determine whether the lack of achievement is permissible. The report is subject to approval by the District; however, justification for exceeding the authorized withdrawal quantity does not constitute a waiver of the District's authority to enforce the terms and conditions of the permit.(651)

3. The City may utilize the withdrawal from the Blue Sink only for augmentation of the Lower Hillsborough River and only when flow at the base of the dam is below the established minimum flows as defined in Rule 40D-8.041(1)(b), F.A.C.(990)

4. The Permittee shall investigate well complaints related to the withdrawals within 2,000 feet of the Blue Sink withdrawal (District ID No. 1, Permittee ID No. 1). The permittee shall adhere to the following process for handling water resource, surface or groundwater withdrawal point impact, dewatering complaints, or discharge/seepage of water from their property:
   1. Within 24 hours of a complaint received by the Permittee related to their withdrawal or use of water or dewatering activity, the Permittee shall notify the District, perform a preliminary investigation to determine whether the Permittee's pumpage, dewatering activity, or discharge/seepage from their property may have caused the problem.
   2. If this preliminary assessment indicates that the Permittee may be responsible for a water supply impact which represents a public health and safety problem, the Permittee shall, within 48 hours of complaint receipt, supply the complainant with any water necessary for health and safety purposes, such as drinking water.
   3. If the resulting investigation determines that the Permittee was not responsible for the well problem, the Permittee shall document the reasons for this determination.
   4. If the detailed investigation confirms that the complainant's problem was caused by the Permittee's pumpage, dewatering, or discharge or water impoundment activities:

A. The Permittee shall restore essential domestic water supply witin 15 days and fully correct the complainant's problem within 30 days of complaint receipt, unless an extension is granted by the District.

B. Impacts to wells: Full correction shall be restoration of the complainant's well to pre-impact condition or better, including the aspects of pressure levels, discharge quantity, and water quality. This detailed investigation shall include, but not be limited to, an analysis of water levels and pumpage impacts at the time of the complainant's problem, well and pump characteristics including depths, capacity, pump curves, and irrigation system requirements.

5. The Permittee shall file a report of the complaint, the findings of facts, appropriate technical data, and any mitigating action taken or to be taken by the Permittee, to the Water Use Permit Bureau Chief, for review and approval within 20 days of the receipt of any complaint. The report shall include:

A. The name and address of each complainant;

B. The date and nature of the complaint;

C. A summary of the Permittee's investigation;

D. A summary of the Permittee's determination, including details of any mitigation activities; and

E. Cost of mitigation activity for each complaint.

6. A copy of the report shall be sent to the complainant within 20 days of complaint receipt. (994)

5. The following proposed withdrawal point shall be metered prior to any withdrawal: District ID No. 1, Permittee ID No. 1. Meter reading and reporting, as well as meter accuracy checks every five years shall be in accordance with instructions in Exhibit B, Metering Instructions, attached to and made part of this permit. The Permittee may elect to use the District approved alternative meter accuracy methodology dated October 22, 2013.(730)

6. The District will continue to collect water level elevation readings at the staff gauge in Blue Sink. Should the District discontinue the monitoring of this data point (District Site ID No. 670721), the City shall maintain the water level recording and reporting on a bi-monthly basis (twice a month) within 90 days of written notification from the District.(992)

7. The Permittee shall investigate withdrawal-related water resource complaints, including surface water and groundwater quality complaints, levels or flow complaints associated with surface water bodies, and impacts related to existing offsite land uses within 1,350 feet of the Blue Sink withdrawal (District ID No. 1, Permittee ID No. 1).
The permittee shall adhere to the following process for handling water resource, surface or groundwater withdrawal point impact, dewatering complaints, or discharge/seepage of water from their property:

1. Within 24 hours of a complaint received by the Permittee related to their withdrawal or use of water or dewatering activity, the Permittee shall notify the District, perform a preliminary investigation to determine whether the Permittee's pumpage, dewatering activity, or discharge/seepage from their property may have caused the problem.

2. If this preliminary assessment indicates that the Permittee may be responsible for a water supply impact which represents a public health and safety problem, the Permittee shall, within 48 hours of complaint receipt, supply the complainant with any water necessary for health and safety purposes, such as drinking water.

3. If the resulting investigation determines that the Permittee was not responsible for the well problem, the Permittee shall document the reasons for this determination.

4. If the detailed investigation confirms that the complainant's problem was caused by the Permittee's pumpage, dewatering, or discharge or water impoundment activities:

A. The Permittee shall restore essential domestic water supply witin 15 days and fully correct the complainant's problem within 30 days of complaint receipt, unless an extension is granted by the District.

B. Impacts to wells: Full correction shall be restoration of the complainant's well to pre-impact condition or better, including the aspects of pressure levels, discharge quantity, and water quality. This detailed investigation shall include, but not be limited to, an analysis of water levels and pumpage impacts at the time of the complainant's problem, well and pump characteristics including depths, capacity, pump curves, and irrigation system requirements.

5. The Permittee shall file a report of the complaint, the findings of facts, appropriate technical data, and any mitigating action taken or to be taken by the Permittee, to the Water Use Permit Bureau Chief, for review and approval within 20 days of the receipt of any complaint. The report shall include:

A. The name and address of each complainant;

B. The date and nature of the complaint;
C. A summary of the Permittee's investigation;
D. A summary of the Permittee's determination, including details of any mitigation activities; and
E. Cost of mitigation activity for each complaint.

6. A copy of the report shall be sent to the complainant within 20 days of complaint receipt.
(995)

8. This Permit authorizes withdrawals necessary for the environmental benefit of the lower Hillsborough River below the dam to assist in meeting the established minimum flow in Rule 40D-8.041(1)(b), F.A.C. as required by Rule 40D-80.073(8), F.A.C., the Comprehensive Environmental Resources Recovery Plan for the Northern Tampa Bay Water Use Caution Area, and the Hillsborough River Strategy. The Governing Board may amend the recovery strategy and minimum flow at any time. Therefore, this Permit is subject to modification to comply with new rules regarding the amended recovery strategy or minimum flow for the lower Hillsborough River.(993)

9. The Permittee shall submit a compliance report by December 31, 2020 and every 10 years thereafter to the Water Use Permit Bureau in the Tampa Service Office. The report shall include a data summary section of the Blue Sink staff gauge readings and meter data from Blue Sink over the previous 10 year period and also include an interpretive section which provides the Permittee's analysis and interpretation of the staff gauge readings and meter data as it relates to the necessity in meeting the established minimum flow in Rule 40D-8.041(1(b), F.A.C. and as required by Rule 40D-80.073(8), F.A.C., the Comprehensive Environmental Resources Recovery Plan for the Northern Tampa Bay Water Use Caution Area, and the Hillsborough River Strategy.(100)

40D-2
Exhibit A

WATER USE PERMIT STANDARD CONDITIONS

1. The Permittee shall provide access to an authorized District representative to enter the property at any reasonable time to inspect the facility and make environmental or hydrologic assessments. The Permittee shall either accompany District staff onto the property or make provision for access onto the property.

2. When necessary to analyze impacts to the water resource or existing users, the District shall require the Permittee to install flow metering or other measuring devices to record withdrawal quantities and submit the data to the District.

3. The District shall collect water samples from any withdrawal point listed in the permit or shall require the permittee to submit water samples when the District determines there is a potential for adverse impacts to water quality.

4. A District identification tag shall be prominently displayed at each withdrawal point that is required by the District to be metered or for which withdrawal quantities are required to be reported to the District, by permanently affixing the tag to the withdrawal facility.

5. The Permittee shall mitigate to the satisfaction of the District any adverse impact to environmental features or off-site land uses as a result of withdrawals. When adverse impacts occur or are imminent, the District shall require the Permittee to mitigate the impacts. Adverse impacts include the following:

   A. Significant reduction in levels or flows in water bodies such as lakes, impoundments, wetlands, springs, streams or other watercourses; or
   B. Damage to crops and other vegetation causing financial harm to the owner; and
   C. Damage to the habitat of endangered or threatened species.

6. The Permittee shall mitigate, to the satisfaction of the District, any adverse impact to existing legal uses caused by withdrawals. When adverse impacts occur or are imminent, the District shall require the Permittee to mitigate the impacts. Adverse impacts include the following:

   A. A reduction in water levels which impairs the ability of a well to produce water;
   B. Significant reduction in levels or flows in water bodies such as lakes, impoundments, wetlands, springs, streams or other watercourses; or
   C. Significant inducement of natural or manmade contaminants into a water supply or into a usable portion of an aquifer or water body.

7. Notwithstanding the provisions of Rule 40D-1.6105, F.A.C., persons who wish to continue the water use permitted herein and who have acquired ownership or legal control of permitted water withdrawal facilities or the land on which the facilities are located must apply to transfer the permit to themselves within 45 days of acquiring ownership or legal control of the water withdrawal facilities or the land.

8. If any of the statements in the application and in the supporting data are found to be untrue and inaccurate, or if the Permittee fails to comply with all of the provisions of Chapter 373, Florida Statutes (F.S.), Chapter 40D, Florida Administrative Code (F.A.C.), or the conditions set forth herein, the Governing Board shall revoke this permit in accordance with Rule 40D-2.341, F.A.C., following notice and hearing.

9. Issuance of this permit does not exempt the Permittee from any other District permitting requirements.

10. The Permittee shall cease or reduce surface water withdrawal as directed by the District if water levels in lakes fall below the applicable minimum water level established in Chapter 40D-8, F.A.C., or rates of flow in streams fall below the minimum levels established in Chapter 40D-8, F.A.C.

11. The Permittee shall cease or reduce withdrawal as directed by the District if water levels in aquifers fall below the minimum levels established by the Governing Board.

12. The Permittee shall not deviate from any of the terms or conditions of this permit without written approval by the District.

13. The Permittee shall practice water conservation to increase the efficiency of transport, application, and use, as well as to decrease waste and to minimize runoff from the property. At such time as the Governing Board adopts specific conservation requirements for the Permittee's water use classification, this permit shall be subject to those requirements upon notice and after a reasonable period for compliance.

14. The District may establish special regulations for Water-Use Caution Areas. At such time as the Governing Board adopts such provisions, this permit shall be subject to them upon notice and after a reasonable period for compliance.

15. In the event the District declares that a Water Shortage exists pursuant to Chapter 40D-21, F.A.C., the District shall alter, modify, or declare inactive all or parts of this permit as necessary to address the water shortage.

16. This permit is issued based on information provided by the Permittee demonstrating that the use of water is reasonable and beneficial, consistent with the public interest, and will not interfere with any existing legal use of water. If, during the term of the permit, it is determined by the District that the use is not reasonable and beneficial, in the public interest, or does impact an existing legal use of water, the Governing Board shall modify this permit or shall revoke this permit following notice and hearing.

17. All permits issued pursuant to these Rules are contingent upon continued ownership or legal control of all property on which pumps, wells, diversions or other water withdrawal facilities are located.

Exhibit B
Instructions

METERING INSTRUCTIONS

The Permittee shall meter withdrawals from surface waters and/or the ground water resources, and meter readings from each withdrawal facility shall be recorded on a monthly basis within the last week of the month. The meter reading(s) shall be reported to the Water Use Permit Bureau on or before the tenth day of the following month .The Permittee shall submit meter readings online using the Permit Information Center at www.swfwmd.state.fl.us/permits/epermitting/ or on District supplied scanning forms unless another arrangement for submission of this data has been approved by the District. Submission of such data by any other unauthorized form or mechanism may result in loss of data and subsequent delinquency notifications. Call the Water Use Permit Bureau in Tampa at (813) 985-7481 if difficulty is encountered.

The meters shall adhere to the following descriptions and shall be installed or maintained as follows:

1. The meter(s) shall be non-resettable, totalizing flow meter(s) that have a totalizer of sufficient magnitude to retain total gallon data for a minimum of the three highest consecutive months permitted quantities. If other measuring device(s) are proposed, prior to installation, approval shall be obtained in writing from the Water Use Permit Bureau Chief.
2. The Permittee shall report non-use on all metered standby withdrawal facilities on the scanning form or approved alternative reporting method.
3. If a metered withdrawal facility is not used during any given month, the meter report shall be submitted to the District indicating the same meter reading as was submitted the previous month.
4. The flow meter(s) or other approved device(s) shall have and maintain an accuracy within five percent of the actual flow as installed.
5. Meter accuracy testing requirements:
   A. For newly metered withdrawal points, the flow meter installation shall be designed for inline field access for meter accuracy testing.
   B. The meter shall be tested for accuracy on-site, as installed according to the Flow Meter Accuracy Test Instructions in this Exhibit B, every five years in the assigned month for the county, beginning from the date of its installation for new meters or from the date of initial issuance of this permit containing the metering condition with an accuracy test requirement for existing meters.
   C. The testing frequency will be decreased if the Permittee demonstrates to the satisfaction of the District that a longer period of time for testing is warranted.
   D. The test will be accepted by the District only if performed by a person knowledgeable in the testing equipment used.
   E. If the actual flow is found to be greater than 5% different from the measured flow, within 30 days, the Permittee shall have the meter re-calibrated, repaired, or replaced, whichever is necessary. Documentation of the test and a certificate of re-calibration, if applicable, shall be submitted within 30 days of each test or re-calibration.
6. The meter shall be installed according to the manufacturer's instructions for achieving accurate flow to the specifications above, or it shall be installed in a straight length of pipe where there is at least an upstream length equal to ten (10) times the outside pipe diameter and a downstream length equal to two (2) times the outside pipe diameter. Where there is not at least a length of ten diameters upstream available, flow straightening vanes shall be used in the upstream line.
7. Broken or malfunctioning meter:

   A. If the meter or other flow measuring device malfunctions or breaks, the Permittee shall notify the District within 15 days of discovering the malfunction or breakage.
   B. The meter must be replaced with a repaired or new meter, subject to the same specifications given above, within 30 days of the discovery.
   C. If the meter is removed from the withdrawal point for any other reason, it shall be replaced with another meter having the same specifications given above, or the meter shall be reinstalled within 30 days of its removal from the withdrawal. In either event, a fully functioning meter shall not be off the withdrawal point for more than 60 consecutive days.

8. While the meter is not functioning correctly, the Permittee shall keep track of the total amount of time the withdrawal point was used for each month and multiply those minutes times the pump capacity (in gallons per minute) for total gallons. The estimate of the number of gallons used each month during that period shall be submitted on District scanning forms and noted as estimated per instructions on the form. If the data is submitted by another approved method, the fact that it is estimated must be indicated. The reason for the necessity to estimate pumpage shall be reported with the estimate.
9. In the event a new meter is installed to replace a broken meter, it and its installation shall meet the specifications of this condition. The permittee shall notify the District of the replacement with the first submittal of meter readings from the new meter.

FLOW METER ACCURACY TEST INSTRUCTIONS

1. **Accuracy Test Due Date** - The Permittee is to schedule their accuracy test according to the following schedule:

   A. For existing metered withdrawal points, add five years to the previous test year, and make the test in the month assigned to your county.
   B. For withdrawal points for which metering is added for the first time, the test is to be scheduled five years from the issue year in the month assigned to your county.
   C. For proposed withdrawal points, the test date is five years from the completion date of the withdrawal point in the month assigned to your county.
   D. For the Permittee's convenience, if there are multiple due-years for meter accuracy testing because of the timing of the installation and/or previous accuracy tests of meters, the Permittee can submit a request in writing to the Water Use Permit Bureau Chief for one specific year to be assigned as the due date year for meter testing. Permittees with many meters to test may also request the tests to be grouped into one year or spread out evenly over two to three years.
   E. The months for accuracy testing of meters are assigned by county. The Permittee is requested but not required to have their testing done in the month assigned to their county. This is to have sufficient District staff available for assistance.

January	Hillsborough
February	Manatee, Pasco
March	Polk (for odd numbered permits)*
April	Polk (for even numbered permits)*
May	Highlands
June	Hardee, Charlotte
July	None or Special Request
August	None or Special Request
September	Desoto, Sarasota
October	Citrus, Levy, Lake
November	Hernando, Sumter, Marion
December	Pinellas

   * The permittee may request their multiple permits be tested in the same month.

2. **Accuracy Test Requirements**: The Permittee shall test the accuracy of flow meters on permitted withdrawal points as follows:

   A. The equipment water temperature shall be set to 72 degrees Fahrenheit for ground water, and to the measured water temperature for other water sources.
   B. A minimum of two separate timed tests shall be performed for each meter. Each timed test shall consist of measuring flow using the test meter and the installed meter for a minimum of four minutes duration. If the two tests do not yield consistent results, additional tests shall be performed for a minimum of eight minutes or longer per test until consistent results are obtained.
   C. If the installed meter has a rate of flow, or large multiplier that does not allow for consistent results to be obtained with four- or eight-minute tests, the duration of the test shall be increased as necessary to obtain accurate and consistent results with respect to the type of flow meter installed.
   D. The results of two consistent tests shall be averaged, and the result will be considered the test result for the meter being tested. This result shall be expressed as a plus or minus percent (rounded to the nearest one-tenth percent) accuracy of the installed meter relative to the test meter. The percent accuracy indicates the deviation (if any), of the meter being tested from the test meter.

3. **Accuracy Test Report:** The Permittees shall demonstrate that the results of the meter test(s) are accurate by submitting the following information within 30 days of the test:

   A. A completed Flow Meter Accuracy Verification Form, Form LEG-R.014.00 (07/08) for each flow meter tested. This form can be obtained from the District's website (www.watermatters.org) under "ePermitting and Rules" for Water Use Permits.

   B. A printout of data that was input into the test equipment, if the test equipment is capable of creating such a printout;

   C. A statement attesting that the manufacturer of the test equipment, or an entity approved or authorized by the manufacturer, has trained the operator to use the specific model test equipment used for testing;

   D. The date of the test equipment's most recent calibration that demonstrates that it was calibrated within the previous twelve months, and the test lab's National Institute of Standards and Testing (N.I.S.T.) traceability reference number.

   E. A diagram showing the precise location on the pipe where the testing equipment was mounted shall be supplied with the form. This diagram shall also show the pump, installed meter, the configuration (with all valves, tees, elbows, and any other possible flow disturbing devices) that exists between the pump and the test location clearly noted with measurements. If flow straightening vanes are utilized, their location(s) shall also be included in the diagram.

   F. A picture of the test location, including the pump, installed flow meter, and the measuring device, or for sites where the picture does not include all of the items listed above, a picture of the test site with a notation of distances to these items. with a notation of distances to these items.

Darrin Herbst, P.G. Electronically Signed
Authorized Signature
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

This permit, issued under the provision of Chapter 373, Florida Statues and Florida Administrative Code 40D-2, authorizes the Permittee to withdraw the quantities outlined above, and may require various activities to be performed by the Permittee as described in the permit, including the Special Conditions. The permit does not convey to the Permittee any property rights or privileges other than those specified herein, nor relieve the Permittee from complying with any applicable local government, state, or federal law, rule, or ordinance.

Notice of Rights

ADMINISTRATIVE HEARING

1. You or any person whose substantial interests are or may be affected by the District's intended or proposed action may request an administrative hearing on that action by filing a written petition in accordance with Sections 120.569 and 120.57, Florida Statutes (F.S.), Uniform Rules of Procedure Chapter 28-106, Florida Administrative Code (F.A.C.) and District Rule 40D-1.1010, F.A.C. Unless otherwise provided by law, a petition for administrative hearing must be filed with (received by) the District within 21 days of receipt of written notice of agency action. "Written notice" means either actual written notice, or newspaper publication of notice, that the District has taken or intends to take agency action. "Receipt of written notice" is deemed to be the fifth day after the date on which actual notice is deposited in the United States mail, if notice is mailed to you, or the date that actual notice is issued, if sent to you by electronic mail or delivered to you, or the date that notice is published in a newspaper, for those persons to whom the District does not provide actual notice.

2. Pursuant to Subsection 373.427(2)(c), F.S., for notices of intended or proposed agency action on a consolidated application for an environmental resource permit and use of sovereignty submerged lands concurrently reviewed by the District, a petition for administrative hearing must be filed with (received by) the District within 14 days of receipt of written notice.

3. Pursuant to Rule 62-532.430, F.A.C., for notices of intent to deny a well construction permit, a petition for administrative hearing must be filed with (received by) the District within 30 days of receipt of written notice of intent to deny.

4. Any person who receives written notice of an agency decision and who fails to file a written request for a hearing within 21 days of receipt or other period as required by law waives the right to request a hearing on such matters.

5. Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding District intended or proposed action is not available prior to the filing of a petition for hearing.

6. A request or petition for administrative hearing must comply with the requirements set forth in Chapter 28.106, F.A.C. A request or petition for a hearing must: (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's intended action or proposed action, (2) state all material facts disputed by the person requesting the hearing or state that there are no material facts in dispute, and (3) otherwise comply with Rules 28-106.201 and 28-106.301, F.A.C. Chapter 28-106, F.A.C. can be viewed at www.flrules.org or at the District's website at www.WaterMatters.org/permits/rules.

7. A petition for administrative hearing is deemed filed upon receipt of the complete petition by the District Agency Clerk at the District's Tampa Service Office during normal business hours, which are 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding District holidays. Filings with the District Agency Clerk may be made by mail, hand-delivery or facsimile transfer (fax). The District does not accept petitions for administrative hearing by electronic mail. Mailed filings must be addressed to, and hand-delivered filings must be delivered to, the Agency Clerk, Southwest Florida Water Management District, 7601 Highway 301 North, Tampa, FL 33637-6759. Faxed filings must be transmitted to the District Agency Clerk at (813) 987-6746. Any petition not received during normal business hours shall be filed as of 8:00 a.m. on the next business day. The District's acceptance of faxed petitions for filing is subject to certain conditions set forth in the District's Statement of Agency Organization and Operation, available for viewing at www.WaterMatters.org/about.

UDICIAL REVIEW

1. Pursuant to Sections 120.60(3) and 120.68, F.S., a party who is adversely affected by District action may seek judicial review of the District's action. Judicial review shall be sought in the Fifth District Court of Appeal or in the appellate district where a party resides or as otherwise provided by law.

2. All proceedings shall be instituted by filing an original notice of appeal with the District Agency Clerk within 30 days after the rendition of the order being appealed, and a copy of the notice of appeal, accompanied by any filing fees prescribed by law, with the clerk of the court, in accordance with Rules 9.110 and 9.190 of the Florida Rules of Appellate Procedure (Fla. R. App. P.). Pursuant to Fla. R. App. P. 9.020(h), an order is rendered when a signed written order is filed with the clerk of the lower tribunal.

October 15, 2013

Mr. Brad L. Baird
City of Tampa
306 E. Jackson St.
Tampa, FL 33602

SUBJECT: **AMENDED MISCELLANEOUS ACTIVITIES IN WETLANDS AUTHORIZATION**
REVIEW OF MISCELLANEOUS ACTIVITIES IN WETLANDS APPLICATION FOR THE COT BLUE SINK MFL PUMP STATION PROJECT / EPC REVIEW #55828 / APPLICATION RECEIVED JULY 17, 2013 / STR 13-28S-18E

Dear Mr. Baird:

Wetlands Management Division staff of the Environmental Protection Commission (EPC) of Hillsborough County has completed its review of the above referenced plans to install a floating intake structure and submerged discharge line in Blue Sink. The EPC Executive Director has amended the previously issued agency action on this matter dated September 4, 2013 and this document replaces and supersedes that document. **EPC staff authorizes the proposed activities as identified in the application, pursuant to Section 1-11.10, Rules of the EPC, subject to the following conditions:**

1. All temporary wetland and other surface water impact areas must be returned to pre-existing grade following construction and be allowed to revegetate.

2. No development, as defined in EPC Wetland Rule Section 1-11.02, in wetlands or other surface waters is authorized outside of the proposed project area, as attached hereto as Exhibit "A."

3. During all construction work, appropriate erosion control devices must be installed along the perimeter of the project area and must remain in place until the work has ceased and the ground surface has stabilized.

4. All efforts must be undertaken to prevent any erosion or turbid water from being discharged into wetlands and/or waters of the County. Turbid discharges that exceed 29 NTU's (Nephelometric Turbidity Units) above background levels are a violation pursuant

to Chapter 1-5, the EPC Water Quality Rule. The erosion or discharge of sediments into wetlands is a violation of Chapter 1-11, the EPC Wetland Rule. Silt screens or other EPC approved methods or erosion/turbidity controls are required. It is the responsibility of the owner/developer to insure the installation of adequate erosion control barriers prior to the commencement of any site work. These erosion control devices must be maintained in good condition throughout the construction phase and until all loose soils have stabilized. It is strongly recommended that all erosion control devices be regularly inspected during construction and modified if conditions warrant.

5. This authorization or a copy must be present on site during the time of construction.

INFORMATIONAL COMMENTS

The following are included for informational purposes only and are not included as conditions upon this authorization.

- Any unauthorized impacts to offsite wetlands or other surface waters constituting development under EPC Wetland Rule Section 1-11.02 resulting from the installation or operation of the subject structure may constitute violations of the EPC Wetland Rule Chapter 1-11.

- Any activities not authorized by this permit which cause offsite adverse impacts, including flooding, or otherwise adversely affect the hydrology of other wetlands or other surface waters may constitute a violation of the EPC Wetland Rule Chapter 1-11.

- It is the responsibility of the applicant to ensure that all operators of equipment, or others performing the construction work, know the scope of the project, are provided a copy of this letter of authorization and understand the specific conditions of EPC approval contained therein. The operator must be in possession of this letter of authorization at all times during performance of the work. All questions pertaining to this authorization shall be addressed to the EPC (627-2600, extension 1249) and should be resolved prior to the commencement of the work.

- Any activity interfering with the integrity of a wetland or other surface water, such as clearing, excavating, draining or filling, without the written authorization from the Executive Director of the EPC or his authorized agent, pursuant to Section 1-11.07, Rules of the EPC, may be a violation of Section 17 of the Environmental Protection Act of Hillsborough County, Chapter 84-446, and Chapter 1-11, Rules of the EPC.

"Miscellaneous Activities Within Wetland Area" Notification:

Be advised, the applicant is encouraged to publish, at their own expense, notice of this authorization (binding letter) in the legal advertisements section of a newspaper of general circulation. Publication will extinguish third party rights to challenge the permit 20 days after the date of publication, unless

a party specifically asked for a copy of the notice prior to issuance of the agency action. Choosing not to publish notice of this permit will allow third party challenges to remain open. If you choose to publish the proposed agency action, it should be published in substantially the following format:

Environmental Protection Commission
Notice of Proposed Agency Action

The EPC gives notice of its intent to approve miscellaneous activities within wetlands in reference to [*a brief description and location of the subject matter or activity covered by the action, and the name and address of any person to whom action is directed*]. Complete copies of the miscellaneous activity file are available for public inspection during normal business hours 9:00 a.m. to 5:00 p.m., Monday through Friday at the EPC Wetland Division office, 3629 Queen Palm Drive, Tampa, Florida 33619. Any person whose interests protected by Chapter 84-446, Laws of Florida, are adversely affected by this action has the right to appeal this approval. Written Notice of Appeal must be received by the Chairperson of the EPC, at 601 East Kennedy Blvd., Tampa, Florida 33602, within **twenty (20) days** of receipt of this notice and must state specifically what part of the action or decision is appealed and must specifically set forth the reasons for your objection. A copy of the Notice of Appeal must also be sent to the EPC's Legal Department, Environmental Protection Commission of Hillsborough County, 3629 Queen Palm Drive, Tampa, Florida 33619, facsimile (813) 627-2602.

If you have any questions or need further assistance, please contact Chris Cooley at 813-627-2600 extension 1249.

Sincerely,

Scott Emery, Ph.D.
Division Director
Wetlands Management Division
Environmental Protection Commission
of Hillsborough County

cc: brad.baird@tampagov.net
Kenneth.j.broome@mwhglobal.com
nick.nichols@prodigy.net

NOTICE OF RIGHTS

Pursuant to Section 9 of the Hillsborough County Environmental Protection Act, Chapter 84-446, as amended, Laws of Florida, (EPC Act) and Rule 1-2.30, Rules of the Environmental Protection Commission of Hillsborough County (EPC), any person whose interests are protected by Chapter 84-446, Laws of Florida

and who is adversely affected or otherwise aggrieved by this action has the right to appeal this action. **Written Notice of Appeal for a Section 9 Administrative Hearing must be received by the Chairperson of the EPC, at 601 East Kennedy Blvd., Tampa, Florida 33602, within twenty (20) days of receipt of this notice** and pursuant to Section 1-2.30(c), Rules of the EPC, must include the following information:

(1) The name, address, and telephone number of the Appellant; the name, address, and telephone number of the Appellant's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the Appellant will be aggrieved or how his or her interests will be adversely affected by the Executive Director's decision;
(2) A statement of when and how the Appellant received notice of the agency decision;
(3) A statement of all disputed issues of material fact. If there are none, the Notice of Appeal must so indicate;
(4) The specific facts the Appellant contends warrant reversal or modification of the Executive Director's proposed action;
(5) A statement of the specific laws or rules the Appellant contends require reversal or modification of the Executive Director's proposed action; and
(6) A statement of the relief sought by the Appellant, stating precisely the action Appellant wishes the Commission to take with respect to the Executive Director's proposed action or decision.

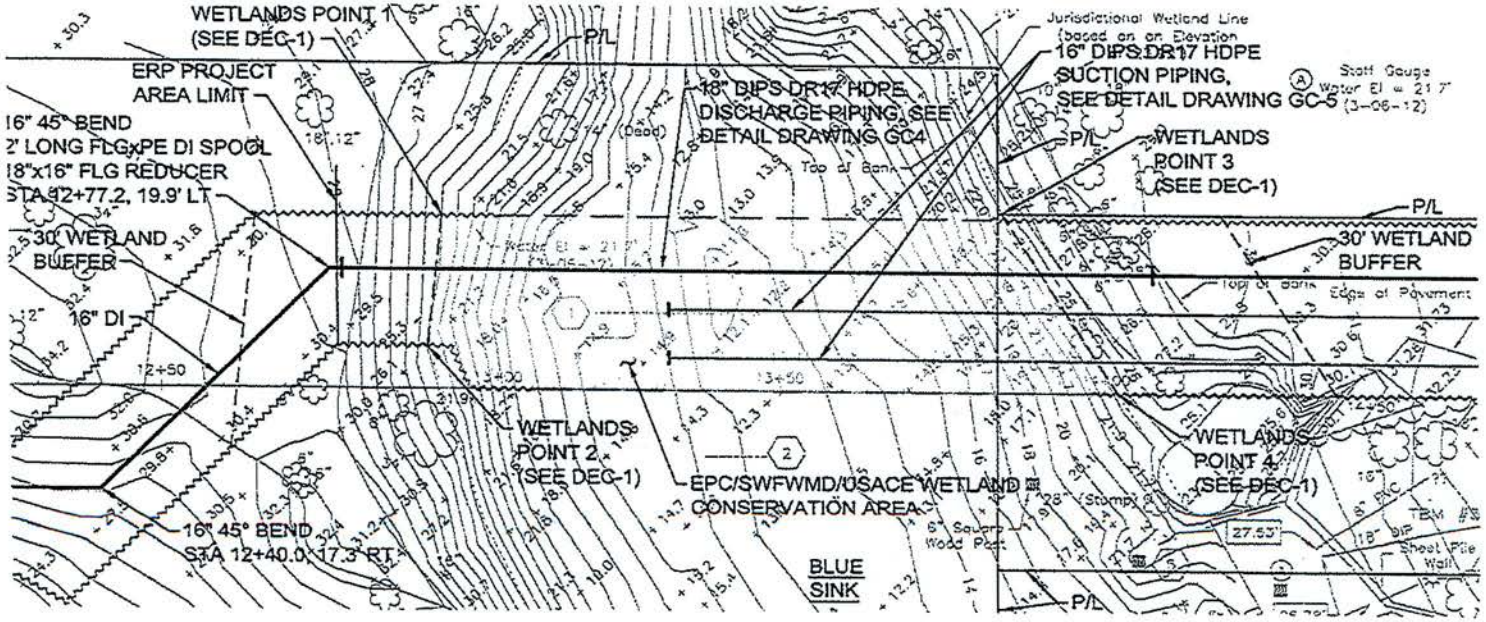
A copy of the Notice of Appeal for a Section 9 Administrative Hearing must also be sent to the EPC's Legal Department, Environmental Protection Commission of Hillsborough County, 3629 Queen Palm Dr., Tampa, Florida 33619, facsimile (813) 627-2602, phone (813) 627-2600. Pursuant to Section 1-2.31, Rules of the EPC, you may request additional time to file a Notice of Appeal by filing a **Request for Extension of Time to file a Notice of Appeal.** The Request for Extension of Time must be sent to and received by the EPC Legal Department at the address above within twenty (20) days of receipt of this notice.

This Order is final unless the party timely files, pursuant to Chapter 1-2, Part IV, Rules of the EPC, a Notice of Appeal or files a Request for Extension of Time to file a Notice of Appeal for a formal hearing. Pursuant to Section 1-2.31(e), Rules of the EPC, failure to request an administrative hearing by filing a Notice of Appeal within 20 days after receipt of this Order shall constitute a waiver of one's right to have an appeal heard, and this unappealed Order shall automatically become a final and enforceable Order of the Commission.

Upon receipt of a sufficient Notice of Appeal for a Section 9 Administrative Hearing an independent hearing officer will be assigned. The hearing officer will schedule the appeal hearing at the earliest reasonable date. Following an evidentiary hearing, the hearing officer will render his/her decision as a recommendation before the EPC board. Pursuant to Section 1-2.35, Rules of the EPC, the EPC board will take final agency action on the findings of fact and conclusions of law of the hearing officer. A written decision will be provided by the EPC board, which affirms, reverses or modifies the hearing officer's decision. Should this final administrative decision still not be in your favor, you may seek review in accordance with Section 9 of the Hillsborough County Environmental Protection Act, Chapter 84-446, as amended, Laws of Florida, and the Administrative Procedure Act, Chapter 120, part II, Florida Statutes, 1961 by filing an appeal under rule 9.110 of the Florida Rules of Appellate Procedure, with the clerk of the Environmental Protection Commission, EPC Legal Department, 3629 Queen Palm Dr., Tampa, FL 33619, and filing a notice of appeal accompanied by the applicable filing fee with the Second District Court of Appeal within 30 days from the date of the final administrative decision becoming an order of the Commission.

Copies of EPC rules referenced in this Order may be examined at any EPC office, may be found on the internet site for the agency at http://www.epchc.org or may be obtained by written request to the EPC Legal Department at 3629 Queen Palm Dr., Tampa, FL 33619.
Development as define

EXHIBIT "A"



City of Tampa Project Area
Miscellaneous Activities in Wetlands
Permit Application

CITY OF TAMPA WATER DEPARTMENT
City Hall Plaza, 5E
Tampa, Florida 33602
Phone (813) 274-8121
Fax (813) 274-7435

LETTER OF TRANSMITTAL:

TO: Greeley and Hansen
1715 N. Westshore Blvd.
Suite 464
Tampa, FL 33607

DATE: June 10, 2014 | WORK ORDER NO.: 8019

ATTENTION: Mike Pekkala, P.E.

RE: *Blue Sink MFL Pump Station*
Application for Water Services

WE ARE SENDING YOU ATTACHED, the following items:

- ☐ Original (Tracings)
- ☐ Sepia Transparencies
- ☐ Photostats
- ☐ Black and White Prints
- ☐ Blue Line Prints
- ☐ Shop Drawings
- ☐ Specifications
- ☐ Photographs
- ☐ Letter
- ☐ Samples
- ☐ Estimates
- ☐ Report(s)
- ☐ Map(s)
- ☐ Agreements
- ☒ Other: See enclosure log

PREPARED BY: _____ APPROVED: _____

THESE ARE FORWARDED:

- ☐ As Requested
- ☐ For Approval
- ☐ For Correction
- ☐ For Construction
- ☐ For Comments
- ☐ For Payment
- ☐ For Your Information
- ☒ Other Processing

DRAWING NO.	DATE	NUMBER OF COPIES	DESCRIPTION
	6/10/2014	2	FDEP Notice of Intent Form (Signed by Water Department)
	6/10/2014	3	FDOT Utility Permit Form (Signed (stamped) by Mayor & Initialed b
			Water Department Director)

THESE ARE TRANSMITTED as checked below:

- ☐ Special Delivery
- ☐ Certified Mail
- ☐ First Class Mail
- ☐ Parcel Post
- ☒ Your Messenger
- ☐ Our Messenger
- ☐ United Parcel Service
- ☐ Express
- ☐ Insured
- ☐ Interoffice Mail
- ☐ E-Mail
- ☐ Other _____

REMARKS:

RECD PAYMENT 14 JUN 25 PM 01:11

cc: file

Very truly yours,
TAMPA WATER DEPARTMENT
ENGINEERING DIVISION

John A. Rañon, P.E.
Project Engineer

Received by: _____
Signature & Date

Received
JUN 11 2014
Greeley and Hansen
Tampa Office

C:\Users\wt8h\Desktop\Trans - TWD to G&H 061014.doc

GREELEY AND HANSEN
Celebrating 100 YEARS: Quality · Vision · Future

1715 N. Westshore Boulevard, Suite 464
Tampa, Florida 33607
p 813 873 3666
f 813 873 3637
www.greeley-hansen.com

LETTER OF TRANSMITTAL

TO: Michael McClurg
Permit Department
FDOT
2820 Leslie Road
Tampa, FL 33619

DATE: 07-01-14

SUBJECT: Blue Sink Project Utility Permit

ATTN:

FILE NO.:

Please find the following enclosed:

☒ Drawing(s) ☐ Specification(s) ☐ Report(s) ☐ Calculation(s) ☐ Correspondence
☐ Other: _____

Item No.	No. of Copies	Date	Description
1	1	07-01-14	Signed and Sealed Plan Sheets GC-1, GC-3 - GC-6, GC-9, GC-11, C-2 - C-4

☒ As requested
☒ For information/use
☐ For review and comment
☐ For approval

☐ For file
☐ Other:

☐ For distribution to:
_____
_____
_____
_____

Comment(s): Please refer to Sheet C-4, Note 3 on C-4 and FDOT General Notes: Utility Permit on Sheet C-3 for work in Florida Ave. Please refer to Sheet C-2 and other detail sheets for proposed water and sewer connections in Florida Ave.

c: Janice Davis, PE, TWD
David Socha, PE, MWH
_____
_____
_____

Yours very truly,

Greeley and Hansen LLC

Name: Mike Pekkala, P.E.

G:\Work\Tampa\Blue Sink Phase 2\23 Regulatory Agency Coord\23.03 Permit Applications\FDOT\T_McClurg_07-01-14.docx

MEMORANDUM

Water Department

DATE: April 4, 2014

TO: Brad L. Baird, P.E., Director

FROM: Dave Coleman, Planning DC

SUBJECT: *Blue Sink Pump Station*
151 W. 115th Ave.
14-03-340

Your application for water service for the above-referenced project has been reviewed by the Tampa Water Department. In accordance with Sec. 26-74 of City Code, this commitment for water service is hereby provided contingent upon your satisfaction of all conditions specified herein. In addition, all other applicable requirements contained both within the City of Tampa Code and Tampa Water Department Technical Manual must be met.

Based on evaluation of the information provided in your application for service, it has been determined that a local water distribution main and water facilities are required for your project, and must be designed and installed by you at your expense.

This commitment for water service is also subject to and includes, but is not limited to, the following terms and conditions: You shall construct approximately 480' of 2" HDPE water main and required appurtenances. You shall connect to the existing 12" main on N. Florida Ave. and extend it west to the property.

Your cost for the water facilities is:

Connection fee based on 27 GPM	Waived
Cost to drop in a 1" domestic water meter	$155.00
Inspection fee	200.00
Total for domestic service	$355.00
Inspection fee for local 2" distribution main	480.00
TOTAL COST FOR WATER SERVICE	$835.00

Additional requirements need to be met during each phase of the construction of your development project and are labeled Pre-Construction, Construction, and Post Construction and Final Acceptance. These requirements are as follows:

Pre-Construction

1. Provide us with all final design drawings and specifications for the project including design calculations in accordance with Tampa Water Department standards. Prior to the start of any construction, your plans must be stamped "Plans Appear to be in General Conformance with Water Department Standards" by the Tampa Water Department.

2. **As a condition of this commitment agreement you hereby covenant and agree that you shall comply with all Federal, State and local laws, rules, ordinances and regulations applicable to your work under this commitment, including but not limited to the City of Tampa Ethics ordinance, all applicable sections in Chapter 26, City of Tampa Code that**

prohibit hydrant tampering and illegal connections, and all applicable State statutes that prohibit the use of devices or equipment that result in the benefit of utility service without proper payment; and must obtain, at your own expense, all permits, licenses or other authorization necessary for the prosecution of your work.

3. You shall engage an experienced and properly licensed underground contractor. If the contractor has not previously performed this type of work with the City of Tampa, you must furnish proof of licensing and competence to perform the work, including a list of recent similar jobs with references.

4. After construction plans have been approved and stamped by the Tampa Water Department Design Section, required permits for this construction have been obtained, and before construction starts, you must schedule a pre-construction meeting with our Contract Administration Department through Jim Hudock at 635-3411. You must provide to Mr. Hudock shop drawings, submittals, and a completed "Approved Materials List" form for all materials to be used. You must also provide survey information and field staking of all property corners and easement along the right-of-way prior to construction.

Construction

1. Furnish and install the 2" HDPE water main and appurtenances and the required service line and meter box, according to Tampa Water Department standards.

2. You will hold the City harmless for any liability regarding the new water facilities during the construction process. Until the agreement specified below is executed, you assume liability for all accidents.

3. Your contractor will follow the attached policy on performing wet taps.

Post Construction and Final Acceptance

1. Submit to the City two (2) sets of signed and sealed record drawings, and an AutoCadd and PDF disk of the same.

2. ***You will execute an agreement that will be sent to you to donate your water main to the City.***

3. You guarantee the water facilities against any defects in workmanship and materials for a period of thirteen months following the date of acceptance of the water facilities. Under this guarantee, you shall repair and replace without delay, at your own expense, any faulty water facilities, correct any failure of any part of the water facilities to perform in accordance with the specifications for the water facilities, and repair and replace any water facilities damaged by any such failure.

   The meter will not be provided by the Water Department until all Water Department requirements are met.

Contact Harry Smith at 231-5266 for any necessary backflow prevention requirements.

On all of your future correspondence regarding this project, please refer to application no. 14-03-340.

I may be reached at 274-7094 regarding any questions concerning your application for water service and this conditional commitment. We look forward to continuing to work with you on your development project.

MDC/fd
Attach.

c: Harry Smith
Claudia Ewing
Ron Calderoni
Edwin Rivers
Wastewater (Teresa Burns, Lu-Keacia Newson)
Brian Pickard, P.E. – ***w/attach.***
Mike Pekkala – ***w/attach.*** (mpekkala@greeley-hansen.com)
David Socha – ***w/attach.*** (david.a.socha@mwhglobal.com)

h:\letter\14-03-340(30&31b)

CITY OF TAMPA

Bob Buckhorn, Mayor | Water Department

To: File

Atlas Page -- B-12

From: Dave Coleman, Water/Planning
Date: 4/04/2014

Application No.: 14-03-340

WO 8019

This project would require one (1) work order described as - - -

Developer installed 2" HDPE water main, 1" DM

Activity Number - - WTO443CBLM

Services	$680.00
Material	.00
Labor	.00
Total	$680.00

Constructed by - - Yet To Be Determined

Comments

The work order "comments" would be ---

306 E. Jackson St., 5E • Tampa, Florida 33602 • (813) 274-8121 • FAX: (813) 274-7435

5

Utility Service Application

for Multi-family and Non-residential Developments (page 1 of 2)

Owner Information

Full name of property owner (if company, provide contact person): CITY OF TAMPA WATER DEPARTMENT			Phone (813)480-5192
Address: 151 W. 115TH AVE.	City TAMPA	State FL	Zip 33612
Mailing address (if different from above): 7125 N. 30TH ST.	City TAMPA	State FL	Zip 33610
Email: brian.pickard@tampagov.net	Tax Exempt # (if applicable)		
Federal ID # or last four (4) digits of Social Security #:			

Development Information

Name of development: N/A (SEE ABOVE)			
Address: (SEE ABOVE)	City	State	Zip
Billing address (if different from above): (SEE ABOVE)	City	State	Zip
Tax Folio # and/or legal description (lot, block, subdivision, and/or metes & bounds): SEE LEGAL DESCRIPTION ON DRAWING DEC-2			
Type of development: TWD PUMPING STATION	Number of units:	Total sq. ft. of space: 1531 SF	

Structure: ☐ Existing ☒ Proposed | If existing, date building was constructed:

City Limits: ☒ Inside ☐ Outside

Is project to be constructed in phases? ☐ Yes ☒ No

Phase	Projected Date of Construction
	8/2014 TO 12/31/2015

Construction Services Project / Permit Number: 420 434

RECEIVED
Tampa Water Department
MAR 24 2014
Engineering-DSC

Authorized Agent Information

Name of party authorized to act on owner's behalf: N/A			Phone
Address:	City	State	Zip
Email:			

Water Department Information

$70 app fee

Anticipated daily water usage (gallons per day): 60 GPD (SEE ATTACHMENT C)	Special water uses:
If existing, current water source: N/A	Indicate specific date water is required: SEPTEMBER 2015

Wastewater Department Information

Anticipated daily wastewater discharge (gallons per day): 60 GPD (SEE ATTACHMENT C)	Special User? BOD > 230 mg/L ☐ Yes ☒ No
Size and type of unmetered (non-city) water sources: 0	TSS > 190 mg/L ☐ Yes ☒ No N> 30 mg/L ☐ Yes ☒ No

480' WM 2" HDPE
B-12
4 3/4" DM @ 10gpd
1 3/4" IM @ 5.2gpd 14-03-340

Utility Service Application
for Multi-family and Non-residential Developments (page 2 of 2)

Professional Services Information			
Name of Engineering Firm (if applicable): GREELEY AND HANSEN LLC		Phone (813) 873-3666	
Address: 1715 N. WESTSHORE BLVD., SUITE 464	City TAMPA	State FL	Zip 33607
Email: MIKE PEKKALA (mpekkala@greeley-hansen.com)			
Name of Architectural Firm (if applicable): MWH GLOBAL, INC.		Phone (813) 221-1981	
Address: 1000 N. ASHLEY DR., SUITE 1000	City TAMPA	State FL	Zip 33602
Email: DAVID SOCHA (david.a.socha@mwhglobal.com)			
Name of Contractor: TBD		Phone	
Address:	City	State	Zip
Email:			

Water Department Information

Please indicate how you intend to meet your water needs during construction:

☒ Portable Hydrant Meter

☐ Existing Service (please specify): _____

☐ Other (please specify): _____

Applicant understands that all City of Tampa water used during any portion of the construction phase of the above project must be metered and billed. Applicant will take all actions necessary to ensure that all contractors and subcontractors working on the above project are informed of the need to meter all water used while working at the above site and acknowledges that any unauthorized water used for the above project may be billed to the applicant. A separate application for temporary services shall be submitted.

Wastewater Department Information

Please indicate how you intend to meet your wastewater disposal needs during construction:

☐ Existing Service (please specify): _____

☒ Other (please specify): PORT-O-LET PROVIDED UNDER CONSTRUCTION CONTRACT

Applicant understands that all City of Tampa wastewater discharged during any portion of the construction phase of the above project must be metered and billed. Applicant will take all actions necessary to ensure that all contractors and subcontractors working on the above project are informed of the need to meter all wastewater discharged while working at the above site and acknowledges that any unauthorized wastewater discharged for the above project may be billed to the applicant. A separate application for temporary services shall be submitted.

Signature of Owner or Authorized Agent:	Date: 2/12/14

CITY OF TAMPA

Bob Buckhorn, Mayor

Wastewater Department

Anthony L. Kasper, P.E.
Director

June 13, 2014

Mr. Mike Pekkala, P.E.
Greeley and Hansen, LLC
1715 N. Westshore Blvd., Suite 464
Tamap, Florida 33607
mpekkala@greeley-hansen.com

Re: Service Request 03-20-14A, ***Approval for Construction***, Blue Sink Pump Station, located at 151 W. 115th Avenue (TWD Pumping Station), Folio Number(s): 95008.0000, Atlas B-12, Proposed Flow 60 GPD.

Dear Mr. Pekkala:

The Wastewater Department has reviewed the plans for the referenced project submitted on June 13, 2014, and hereby approves for construction of the sanitary sewer facility located in the right-of-way.

Please be advised this construction approval is good for 180 days. If construction has not commenced in this time frame, an extension can be considered based on your written request giving current status. However, if there is a change in our Technical Standards and/or related field conditions, you will be required to resubmit your plans for our review.

The approval does not relieve the developer, the engineer of record, or the contractor of the responsibility to seek approval from other concerned regulatory agencies. If the sanitary sewer plans are altered, for any reason, the revised plans should be submitted to the Wastewater Department for review and approval. The developer or his agent is also responsible for establishing the correct locations of all utilities which might be affected by the proposed construction and the notification of the utility owners before the construction begins.

At least 3 weeks prior to any construction, you should contact our Planning Division, Mr. Alex Gonzalez, 306 E. Jackson Street, 6E, Tampa, Florida 33602 at (813) 274-1293, and supply him with further construction information. This information should include all required shop drawings, the contractor's name, starting date, projected schedule, and other information required by Mr. Gonzalez. It is imperative that your contractor be fully informed of the notification and submittal requirements outlined in this letter. Failure to comply with all Department requirements will delay processing of the Certificate of Occupancy for the project.

Also, the Planning Division should be contacted by telephone five days prior to the actual start of field operations in order to ensure availability of inspection personnel. Failure to contact the Planning Division at the specified times will invalidate our approval.

Mr. Mike Pekkala, P.E.
Blue Sink Pumping Station

Service Request No. 03-20-14A

All work and materials shall comply with current City of Tampa Sanitary Sewer Standards. This Department's Planning Division will make final determination as to acceptability of the workmanship and materials on all sanitary sewer facilities connected to our system. Accordingly, any work which is performed prior to notifying Planning Division or without a Department inspector present may be subject to removal and replacement.

Prior to connection or acceptance, all the following must be accomplished:

1. All capacity fees shall be paid. *(If applicable)*

2. All work performed in the public right-of-way shall be surveyed by a surveyor registered in the State of Florida. As-built drawings shall be based on these survey notes.

3. An infiltration/exfiltration test shall be performed on the new sewer, on-site and off-site. Test results certified by the engineer of record or a reputable testing laboratory must be submitted to the Department of Sanitary Sewers.

4. Notification of cost of construction of the wastewater facilities in the right-of-way itemized for the gravity system shall be submitted to the Department of Sanitary Sewers.

5. A pressure test shall be successfully performed on the proposed force main, on-site and off-site.

6. As-built drawings shall be submitted to and approved by this Department. City-approved, permanent street names must be labeled. These as-built drawings must be on 24" x 36" sheets, dated and signed by the engineer of record as being "As-built." **AutoCAD drawing files (Rel. 2000 or later) of these as-built drawings shall also be furnished to this department.**

7. In addition to the as-built drawings, white sheets shall be submitted to the Department that provide the address for each lot and details on the location of each lateral.

8. In addition, **4 sets of prints** shall accompany the submittal.

9. A Transfer of Ownership agreement must be executed to transfer the ownership of the new wastewater facilities to the City of Tampa. This agreement is prepared by the City and must be signed by the owner(s) or a registered officer of the Corporation. The following information must be submitted in order for the City to prepare the agreement:

    a. Provide overall cost (labor and materials) of the wastewater facilities within the public right-of-way. The cost should include a breakdown of the facilities installed in the public right-of-way that differentiates each size, type and lineal footage of sewer pipe (i.e. 207 L.F. of 8" PVC and 1,320 L.F. of 10" PVC). Also include the number of manholes if applicable.

    b. Provide exact mailing address, name of corporation, firm, or partnership and name(s) of the owner(s) or corporate officers legally capable of executing the Transfer of Ownership

Mr. Mike Pekkala, P.E.
Blue Sink Pumping Station

Service Request No. 03-20-14A

Agreement. (If a partnership, two owner signatures will be required on the Agreement).

This information must be submitted to the Wastewater Department as soon as possible. Once the information is received, the agreement will be prepared and 3-copies will be forwarded for signatures. All 3-copies must be signed and returned to the Wastewater Department before the As-built drawings will be approved and the Certificate of Occupancy for the project will be released.

If you have any questions, comments, or concerns regarding this letter, please contact Ms. Kelli S. Ford with the Planning Section at (813) 274-7397.

Sincerely,

Jeff Hilton, P.E.
Planning Division Head

JH/ksf

Enclosure(s): 2 Sets of Approved Construction Plans

xc: City of Tampa Water Department
Alex Gonzalez w/1 Approved Construction Plan
Oscar Estrada, Wastewater Collection Division w/1 Approved Construction Plan
SR File w/1 Approved Construction Plan

ENVIRONMENTAL PROTECTION COMMISSION
HILLSBOROUGH COUNTY

NOTIFICATION OF ACCEPTANCE OF USE OF A GENERAL PERMIT

PERMITTEE:

Janice Davis, P.E., Chief Design Engineer
City of Tampa Water Department
306 East Jackson Street, 5E
Tampa, FL 33602

ISSUE DATE:	7/2/2014
PROJECT:	Blue Sink MFL Pump Station
PERMIT NUMBER:	0327400-001-DWC
COUNTY:	Hillsborough
CONNECTED TO:	Howard F. Curren AWWTP
FACILITY ID:	FL0020940
EXPIRATION DATE:	July 24, 2019

Dear Ms. Davis:

SUBJECT: BLUE SINK MFL PUMP STATION
115TH AVENUE AND FLORIDA AVENUE, TAMPA
60 GALLONS PER DAY
1 RAW WATER PUMP STATION FACILITY

This letter acknowledges receipt of your Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System for the subject project. Our office received the Notice on June 25, 2014.

As a delegated local program of the Florida Department of Environmental Protection (Department), this is to advise you that the Environmental Protection Commission (EPC) does not object to your use of such General Permit.

Please note the attached requirements apply to your use of such general permits for constructing the proposed domestic wastewater collection/transmission system.

You are further advised that the construction activity must conform to the description contained in your Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System and that any deviation will subject the permittee to enforcement action and possible penalties.

Sincerely,

Rafah Alkhatib

Rafah Alkhatib, Engineering Specialist II
Domestic Wastewater Permitting

cc: Jeff Hilton, P.E., C.O.T., DPW
Charles M. Pekkala, P.E., Greeley and Hansen

SPECIFIC REQUIREMENTS FOR USE OF THE GENERAL PERMIT FOR DOMESTIC WASTEWATER COLLECTION/TRANSMISSION SYSTEMS:

1. This general permit is subject to the general permit conditions of Rule 62-4.540, F.A.C., as applicable. This rule is attached to this document or can be retrieved from the Department's Internet site at: http://www.dep.state.fl.us/water/rulesprog.htm#ww [62-4.540]

2. This general permit does not relieve the permittee of the responsibility for obtaining a dredge and fill permit where it is required. [62-604.600(6)(b)1]

3. This general permit can not be revised, except to transfer the permit. [62-604.600(6)(b)2]

4. This general permit will expire five years from the date of issuance. If the project has been started and not completed by that time, a new permit must be obtained before the expiration date in order to continue work on the project. [62-4.030]

5. Upon completion of construction of the collection/transmission system project, and before placing the facilities into operation for any purpose other than testing for leaks or testing equipment operation, the permittee shall submit to the EPC Form 62-604.300(8)(b), Request for Approval to Place a Domestic Wastewater Collection/Transmission System into Operation. This form is available at the Department's Internet site at: http://www.dep.state.fl.us/water/wastewater/forms.htm [62-604.700(2)]

6. The new or modified collection/transmission facilities shall not be placed into service until the EPC clears the project for use. [62-604.700(3)]

7. Abnormal events shall be reported to the EPC in accordance with Rule 62-604.550, F.A.C. For unauthorized spills of wastewater in excess of 1000 gallons per incident, or where information indicates that public health or the environment may be endangered, oral reports shall be provided to (813) 627-2600 and the STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519 as soon as practical, but no later than 24 hours from the time the permittee or other designee becomes aware of the circumstances. Unauthorized releases or spills less than 1000 gallons per incident are to be reported orally to the EPC within 24 hours from the time the permittee, or other designee becomes aware of the circumstances. [62-604.550]

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 acknowledgment 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, F.S., 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 Rule 62-4.120, F.A.C.
(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 the 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 subsection 62-4.530(1), F.A.C.
(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 subsection 62-4.530(1), F.A.C. However, the permittee shall give notice of continued use of a general permit thirty days before it expires.

Specific Authority 403.814(1) FS. Law Implemented 253.123, 253.124, 403.061, 403.087, 403.088, 403.702-.73, 403.814, 403.851-.864 FS.
History–New 7-8-82, Formerly 17-4.54, Amended 8-31-88, Formerly 17-4.540.

June 20, 2014

Janice Davis, PE
City of Tampa Water Department
306 E. Jackson Street 5 E
Tampa, FL 33602

Re: Letter Acknowledging Acceptability of Use of a General Permit For Construction of Water Main Extensions

PWS ID Number:	6290327
Permit Number:	0168017-1148-DEP-DSGP
Receive Date:	June 18, 2014
Expiration Date:	June 19, 2019
Project Name:	Blue Sink M.F.L. Pump Station
Project Location:	At the intersection of 115th Ave. and Florida Ave., in the City of Tampa, from the east side of Florida Ave. westward in the north right of way of 115th Ave. to the pumping station side.

Dear Ms. Davis:

On June 18, 2014, the Hillsborough County Health Department received a *"Notice of Intent to Use the General Permit for Construction of Water Main Extensions for PWSs"* [DEP Form No. 62-555.900(7)] under the provisions of Rule 62-4.530 and Chapter 62-555, Florida Administrative Code (F.A.C.). The proposed project includes: 480 LF of 2-inch HDPE Water Main from an existing 12-inch water main located in Florida Avenue, within the right of way of Florida Ave. and the north right of way of 115th Ave. to the pumping station water meter at the west end of the 115th Ave. right of way. The water main will service the pumping station only.

Based upon the submitted Notice and accompanying documentation, this correspondence is being sent to advise that the Department does not object to the use of such general permit at this time. Please be advised that the permittee is required to abide by Rule 62-555.405, F.A.C., all applicable rules in Chapters 62-4, 62-550, 62-555, F.A.C., and the General Conditions for All General Drinking Water Permits (found in 62-4.540, F.A.C.). The permittee shall comply with all sampling requirements specific to this project. These requirements are attached for review and implementation.

Pursuant to F.A.C. Rule 62-4.540(2), the general permit is valid only for the specific activity indicated, i.e., substantial deviations to the design and construction of this project, e.g., moving the point of connection, etc. will require a new general permit. The project must conform to the description contained in your Notice of Intent to Use the General Permit, and be complete or substantially complete prior to requesting clearance to place the system into service. Clearance application record drawings must show chlorine injection point(s) and bacteriological sample locations identifiable on lab sheets. Pursuant to Rule 62-555.345, F.A.C., the permittee shall submit a certification of construction completion [DEP Form No. 62-555.900(9)] to the Department and obtain approval, or clearance, from the Department before placing any water main extension constructed under this general permit into operation for any purpose other than disinfection or testing for leaks.

When any existing asbestos cement (AC) pipes are replaced under this permit, the permittee shall do so in accordance with the applicable rules of the Federal Asbestos Regulation and Florida DEP requirements. For specific requirements applicable to AC pipes, the permittee should contact the Florida Department of Environmental Protection Southwest District Office Air and Waste Management section managers prior to commencing any such activities at (813) 632-7600. Please be aware that a notification is required to be submitted to the Department for a regulated project.

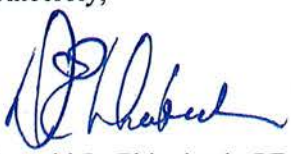
If the project was designed under the responsible charge of a professional engineer and is permitted by the Department, construction of the project must be under the responsible charge of a professional engineer. This certification must be based upon the observations of the construction made by that engineer or a representative under his direct supervisor and upon the review of shop drawings, test records or results, and record drawings either made by the professional engineer or a representative under his direct supervision.

Within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service in total by the Department, both the permittee and the proposed permittee shall sign and submit an application for transfer of the permit using Form 62-555.900(8), F.A.C., with the appropriate fee. The permitted construction is not authorized past the 30-day period unless the permit has been transferred.

This permit will expire five years from the date of issuance. If the project has been started and not completed by that time, a new permit must be obtained before the expiration date in order to continue work on the project, per Rule 62-4.030, F.A.C.

Should you have any questions, please call the permitting department at (813) 307-8015 x 5934, or visit our website.

Sincerely,



Donald R. Ehlenbeck, PE
Professional Engineering Administrator

DRE/aa

cc: Charles M. Pekkala, PE – Greeley & Hansen LLC

General Conditions

The permittee shall be aware of and operate under the Permit Conditions below. These applicable conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes. [F.A.C. Rule 62-555.533(1)]

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in this permit. The issuance of a permit does not relieve any person from complying with the requirements of Chapter 403, F.S., or Department rules.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.
7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times (reasonable time may depend on the nature of the concern being investigated), access to the premises where the permitted activity is located or conducted to:
    a. Have access to and copy any records that must be kept under conditions of the permit;
    b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
    c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.
8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:
    a. A description of and cause of noncompliance; and
    b. The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.
10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard.
11. This permit is transferable only upon Department approval in accordance with Rule 62-4.120 and [*62-730.300J*, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.
12. This permit or a copy thereof shall be kept at the work site of the permitted activity.
13. This permit also constitutes:
    a. Determination of Best Available Control Technology (BACT)
    b. Determination of Prevention of Significant Deterioration (PSD)
    c. Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
    d. Compliance with New Source Performance Standards
14. The permittee shall comply with the following:
    a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
    b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
    c. Records of monitoring information shall include:
        i. the date, exact place, and time of sampling or measurements;
        ii. the person responsible for performing the sampling or measurements;
        iii. the dates analyses were performed;
        iv. the person responsible for performing the analyses;
        v. the analytical techniques or methods used;
        vi. the results of such analyses.
15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

A Civil Penalty May Be Incurred

if this project is placed into operation before obtaining a clearance from the Hillsborough County Health Department.

Requirements for clearance upon completion of projects are as follows:

1. **Clearance Form**
   Submission of a complete and fully executed Department of Environmental Protection (DEP) Form 62-555.900(9) *Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components into Operation*. The DEP clearance application form is only applicable to DEP general permits, and the DOH clearance application form is only applicable to DOH single-service general permits, i.e., a DEP CLEARANCE APPLICATION WILL NOT BE ACCEPTED FOR A DOH SINGLE-SERVICE CONNECTION CLEARANCE AND VICE VERSA. All application forms are available from the Hillsborough County Health Department Drinking Water Permitting website at: http://www.hillscountyhealth.org/env_water_permitting.htm, or by mail at: P.O. Box 5135, Tampa, FL 33675-5135.

2. **Record Drawings**
   Submit record drawing of utility plan and clearly show chlorine injection point(s) and bacteriological sample location(s). Show all deviations from said permit.

3. **Pressure Test**
   A copy of a satisfactory hydrostatic pressure test of the new water lines preformed in accordance with AWWA C600 Standards. Pursuant to AWWA Standards, pressure test(s) must precede bacteriological/chlorine sample(s). Report must include: test date, location of test traceable to record drawing, allowed leakage calculations, and actual leakage (pressure loss).

4. **Bacteriological Report**
   Copies of satisfactory bacteriological analyses (a.k.a. Main Clearance), of water taken within sixty (60) days of completion of construction, and prior to submittal, from locations within the distribution system or water main extension to be cleared, in accordance with Rules 62-555.315(6), 62-555.340, and 62-555.330, F.A.C. and American Water Works Association (AWWA) Standard C 651-92, as follows:

   - Connection to an existing system, or between the new water line and existing water line,
   - The end points of the proposed addition,
   - Any water lines branching off a main extension, and
   - A minimum of every 1,200 feet on straight runs of pipe

   Each location shall be sampled on two consecutive days at least six hours apart, with **sample points and chlorine residual readings clearly indicated on the lab sheet**, i.e., sample locations must be traceable back to record drawings. PURSUANT TO AWWA STANDARD C600, CHLORINE RESIDUAL MUST BE RECORDED ON THE LAB SHEET FOR EACH WATER SAMPLE AT THE TIME OF BACTERIOLOGICAL SAMPLING, OR THE ANALYSIS WILL NOT BE ACCEPTABLE FOR USE IN CLEARANCE OF THE SYSTEM. Note: Determine whether the water system disinfects with free chlorine or chloramines. If the water system disinfects with free chorine, free chlorine concentration must be within 0.2 to 4.0 mg/L. If the water system disinfects with chloramines, total chlorine must be within 0.6 to 4.0 mg/L. If any sample contains more than 4.0 mg/L, or below the required minimum concentration, the sample shall be considered invalid. A sample will also be considered invalid if it shows the presence of total coliform and the main must be re-disinfected until and re-sampled until two consecutive samples at each sampling location show the absence of coliform.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
10117 PRINCESS PALM AVENUE, SUITE 120
TAMPA, FLORIDA 33610

November 8, 2013

REPLY TO
ATTENTION OF

Regulatory Division
South Permits Branch
Tampa Permits Section
SAJ-2013-01988 (NW-TEH)

Mr. Brad Baird
City of Tampa
306 E. Jackson St.
Tampa, FL 33602

Dear Mr. Baird:

The U.S. Army Corps of Engineers (Corps) assigned your application for a Department of the Army permit, which the Corps received on July 10, 2013, the file number SAJ-2013-01988 (NW-TEH). The project, known as "Blue Sink MFL Pump Station Project", includes the construction of a pump station, pump house, inlet, discharge pipe, and transmission line, requiring temporary impacts of 0.01 acre and permanent impacts of 0.004 acre to aquatic resources. The project is located east of the intersection of W 115th Avenue and N Ola Avenue in the City of Tampa, Hillsborough County, Florida in Section 13 of Township 28 South and Range 18 East (Latitude 28.052731 N°; Longitude 82.462270 W°).

Your project, as depicted on the enclosed drawings, is authorized by Nationwide Permit (NWP) Number No. 12. In addition, project specific conditions have been enclosed. This verification is valid until **March 18, 2017**. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit. Please access the U.S. Army Corps of Engineers' (Corps) Jacksonville District's Regulatory Internet page to access Internet links to view the Final Nationwide Permits, Federal Register Vol. 77, dated February 21, 2012, specifically pages 10270 – 10290, the Corrections to the Final Nationwide Permits, Federal Register 77, March 19, 2012, and the List of Regional Conditions. The Internet page address is:

http://www.saj.usace.army.mil/Missions/Regulatory.aspx

Please be aware this Internet address is case sensitive and should be entered as it appears above. Once there you will need to click on "Source Book"; and, then click on "Nationwide Permits." These files contain the description of the Nationwide Permit authorization, the Nationwide Permit general conditions, and the regional conditions, which apply specifically to this verification for NWP No. 12. Enclosed is a list of the six General Conditions, which apply to all Department of the Army authorizations. You must comply with all of the special and general

conditions and any project specific condition of this authorization or you may be subject to enforcement action. In the event you have not completed construction of your project within the specified time limit, a separate application or re-verification may be required.

The following special conditions are included with this verification:

1. **Self-Certification:** Within 60 days of completion of the work authorized, the attached *Self-Certification Statement of Compliance* (Attachment 2) must be completed and submitted to the U.S. Army Corps of Engineers. Mail the completed form to the Regulatory Division, Special Projects and Enforcement Branch, 10117 Princess Palm Avenue, Suite 120, Tampa, Florida 33610.

2. **Erosion Control:** Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area. Immediately after completion of the final grading of the land surface, all slopes, land surfaces, and filled areas shall be stabilized using sod, degradable mats, barriers, or a combination of similar stabilizing materials to prevent erosion. The erosion control measures shall remain in place and be maintained until all authorized work has been completed and the site has been stabilized.

3. **Temporary Wetland Impacts:** Within 30 days from the date of completing the authorized work the Permittee shall restore 0.01 acre of temporary wetland impacts to pre-existing contours, elevations, vegetation, habitat type, and hydrology.

4. **Eastern Indigo Snake Protection Measures**: The Permittee shall comply with U.S. Fish and Wildlife Service's 2013 "Standard Protection Measures for the Eastern Indigo Snake" (Attachment 3). All gopher tortoise burrows, active or inactive, shall be evacuated prior to site manipulation in the vicinity of the burrow. If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission (FWC) Authorized Gopher Tortoise Agent permit. The excavation method selected shall minimize the potential for injury of an indigo snake. The Permittee shall follow the excavation guidance provided in the most current FWC Gopher Tortoise Permitting Guidelines found at http://myfwc.com/gophertortoise. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Holes, cavities, and snake refugia other than gopher tortoise burrows shall be inspected each morning before planned site manipulation of a particular area, and if occupied by an indigo snake, no work shall commence until the snake has vacated the vicinity of the proposed work.

4. **Cultural Resources/Historic Properties:**

a. No structure or work shall adversely affect impact or disturb properties listed in the *National Register of Historic Places* (NRHP) or those eligible for inclusion in the NRHP.

b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition ; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

This letter of authorization does not give absolute Federal authority to perform the work as specified on your application. The proposed work may be subject to local building restrictions mandated by the National Flood Insurance Program. You should contact your local office that issues building permits to determine if your site is located in a flood-prone area, and if you must comply with the local building requirements mandated by the National Flood Insurance Program.

If you are unable to access the internet or require a hardcopy of any of the conditions, limitations, or expiration date for the above referenced NWP, please contact me by telephone at 813-769-7063.

Thank you for your cooperation with our permit program. The Corps Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to visit http://per2.nwp.usace.army.mil/survey.html and complete our automated Customer Service Survey. Your input is appreciated – favorable or otherwise. Again, please be aware this Internet address is case sensitive and should be entered as it appears above.

Sincerely,

Tracy Hurst
Biologist, Tampa Permits Section

Attachments:
1. Permit Drawings
2. Self-Certification Form
3. Standard Protection Measures for the Eastern Indigo Snake

cc (w/atts):

Mr. Kenneth Broome, MWH, Americas, Inc.
Mr. Nick Nichols, Nichols and Associates, LLC
Ms. Angela Ryan, USACE Enforcement

GENERAL CONDITIONS
33 CFR PART 320-330
PUBLISHED FEDERAL REGISTER DATED 13 NOVEMBER 1986

1. The time limit for completing the work authorized ends on **March 18, 2017**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort of if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Financial Management Support
Chuck Rohling - Manager

Item Segment Overview

No Records Returned

Federal Project Overview
Financial Project Overview
Item Segment Contracts
Item Segment Overview
- Item Segment Lookup
- Item Segment Search
Phase / Activity Crosswalk
Project Cost Overview

Printing Hints Open

Version: Tentative (G1) Include Candidates?

Item Segment Open

Federal Project Open

Search Close

Managing: None Selected Geographic: None Selected County: None Selected

Fiscal Year: Beginning: 2015 Ending: 2019

Item Status: From: Candidate Line Item (000) To: Line Item Completed (100)

Description:

Component Group: None Selected

Transportation System: None Selected

Item Group: None Selected

SIS: None Selected

Phase Grouping: None Selected

Contract Class: None Selected

Work Mix: OR None Selected

Airport Site: None Selected JACIP Project ID:

Seaport ID: None Selected

Transit System: None Selected

Roadway ID: 10020000 Mile Post: Beginning: 7.237 Ending: 7.275

Bridge Number:

Economic Region: None Selected

Search

Reset All

EXHIBIT 1

UTILITY MATRIX AND UTILITY CONTACT LETTERS

EXHIBIT 1

City of Tampa, Florida
Blue Sink and Tampa Bypass Canal Diversion MFL Pumping Stations

Utility Contact List

Company Name	Title	First Name	Last Name	Street Address 1	City, State, Zip	Contact Number
Verizon Florida Inc.	Mr.	David	Wynns	1909 US Hwy. 301 N	Tampa, FL, 33619	813-627-8343
Tampa Electric Company	Ms	Ronnie	Alexander	P.O. Box 111	Tampa, FL 33601	813-275-3433
Bright House Networks LLC.	Mr.	Randy	Lyle	4145 S. Falkenburg Rd.	Riverview, FL 33578	813-436-2163
City of Tampa Wastewater Department	Mr.	Micah	Ledden	306 E. Jackson Street	Tampa, FL 33602	813-274-8936
City of Tampa Water Department	Ms.	Janice	Davis	306 E. Jackson Street	Tampa, FL 33602	813-274-7435
City of Tampa Transportation Department	Mr.	Mike	Scanlon	306 E. Jackson Street	Tampa, FL 33602	813-274-8333

GREELEY AND HANSEN

1715 N. West Shore Boulevard, Suite 464
Tampa, Florida 33607
p 813 873 3666
f 813 873 3637
www.greeley-hansen.com

July 1, 2013

Mr. Ray Davis
TECO Peoples Gas - Tampa
1400 Channelside Dr.
Tampa, FL 33605

Subject: City of Tampa
Blue Sink and Tampa Bypass Canal Diversion MFL Pumping Stations

Dear Mr. Davis:

An addition to the Blue Sink Pumping Station Project includes construction of a small diameter water main from the new Blue Sink Pumping Station, along 115th Avenue till the intersection of 115th Avenue and N. Florida Avenue, as shown on the attached figures. This pipe is proposed to connect to the existing pipe located along the east Right-of-way of North Florida Avenue.

As the design engineers for this project, we would like to obtain information regarding your utility. Please provide all information you may have on your facilities in the project area shown in the attached figures.

If you have any questions, please feel free to contact us at (813) 873-3666 or send an email to me at nnaik@greeley-hansen.com.

Yours very truly,

Greeley and Hansen LLC

Nita Naik, P.E.
Enclosure

GREELEY AND HANSEN

1715 N. West Shore Boulevard, Suite 464
Tampa, Florida 33607
p 813 873 3666
f 813 873 3637
www.greeley-hansen.com

July 1, 2013

Mr. Ronnie Alexander
Tampa Electric Company
P. O. Box 111
Tampa, FL 33601

Subject: City of Tampa
Blue Sink and Tampa Bypass Canal Diversion MFL Pumping Stations

Dear Mr. Alexander:

An addition to the Blue Sink Pumping Station Project includes construction of a small diameter water main from the new Blue Sink Pumping Station, along 115th Avenue till the intersection of 115th Avenue and N. Florida Avenue, as shown on the attached figures. This pipe is proposed to connect to the existing pipe located along the east Right-of-way of North Florida Avenue.

As the design engineers for this project, we would like to obtain information regarding your utility. Please provide all information you may have on your facilities in the project area shown in the attached figures.

If you have any questions, please feel free to contact us at (813) 873-3666 or send an email to me at nnaik@greeley-hansen.com.

Yours very truly,

Greeley and Hansen LLC

Nmaik

Nita Naik, P.E.
Enclosure

GREELEY AND HANSEN

1715 N West Shore Boulevard, Suite 464
Tampa, Florida 33607
p 813 873 3666
f 813 873 3637
www.greeley-hansen.com

July 1, 2013

Mr. Randy Lyle
Bright House Networks LLC
4145 S. Falkenburg Rd.
Riverview, FL 33578

Subject: City of Tampa
Blue Sink and Tampa Bypass Canal Diversion MFL Pumping Stations

Dear Mr. Lyle:

An addition to the Blue Sink Pumping Station Project includes construction of a small diameter water main from the new Blue Sink Pumping Station, along 115th Avenue till the intersection of 115th Avenue and N. Florida Avenue, as shown on the attached figures. This pipe is proposed to connect to the existing pipe located along the east Right-of-way of North Florida Avenue.

As the design engineers for this project, we would like to obtain information regarding your utility. Please provide all information you may have on your facilities in the project area shown in the attached figures.

If you have any questions, please feel free to contact us at (813) 873-3666 or send an email to me at nnaik@greeley-hansen.com.

Yours very truly,

Greeley and Hansen LLC

Nita Naik, P.E.
Enclosure

GREELEY AND HANSEN

1715 N. West Shore Boulevard, Suite 464
Tampa, Florida 33607
p 813 873 3666
f 813 873 3637
www.greeley-hansen.com

July 1, 2013

Mr. David Wynns
Verizon Florida, Inc.
1909 U.S. Hwy. 301 N
Tampa, FL 33619

Subject: City of Tampa
Blue Sink and Tampa Bypass Canal Diversion MFL Pumping Stations

Dear Mr. Wynns:

An addition to the Blue Sink Pumping Station Project includes construction of a small diameter water main from the new Blue Sink Pumping Station, along 115th Avenue till the intersection of 115th Avenue and N. Florida Avenue, as shown on the attached figures. This pipe is proposed to connect to the existing pipe located along the east Right-of-way of North Florida Avenue.

As the design engineers for this project, we would like to obtain information regarding your utility. Please provide all information you may have on your facilities in the project area shown in the attached figures.

If you have any questions, please feel free to contact us at (813) 873-3666 or send an email to me at nnaik@greeley-hansen.com.

Yours very truly,

Greeley and Hansen LLC

Nita Naik, P.E.
Enclosure

GREELEY AND HANSEN

1715 N. West Shore Boulevard, Suite 464
Tampa, Florida 33607
p 813 873 3666
f 813 873 3637
www.greeley-hansen.com

July 1, 2013

Mr. Mike Scanlon
City of Tampa Transportation Dept.
306 E. Jackson Street
Tampa, FL 33602

Subject: City of Tampa
Blue Sink and Tampa Bypass Canal Diversion MFL Pumping Stations

Dear Mr. Scanlon:

The City of Tampa Blue Sink Pumping Station Project includes construction of a small diameter water main from the new Blue Sink Pumping Station, along 115th Avenue till the intersection of 115th Avenue and N. Florida Avenue, as shown on the attached figures. This pipe is proposed to connect to the existing pipe located along the east Right-of-way of North Florida Avenue.

As the design engineers for this project, we would like to obtain information regarding your utility. Please provide all information you may have on your facilities in the project area shown in the attached figures.

If you have any questions, please feel free to contact us at (813) 873-3666 or send an email to me at nnaik@greeley-hansen.com.

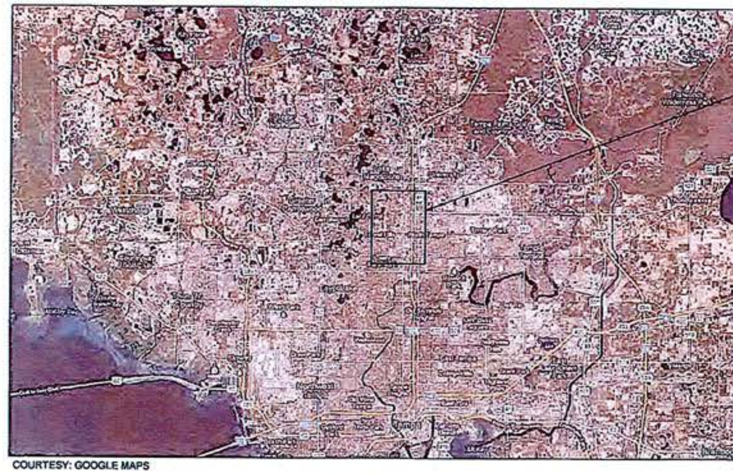
Yours very truly,

Greeley and Hansen LLC

Nita Naik, P.E.
Enclosure

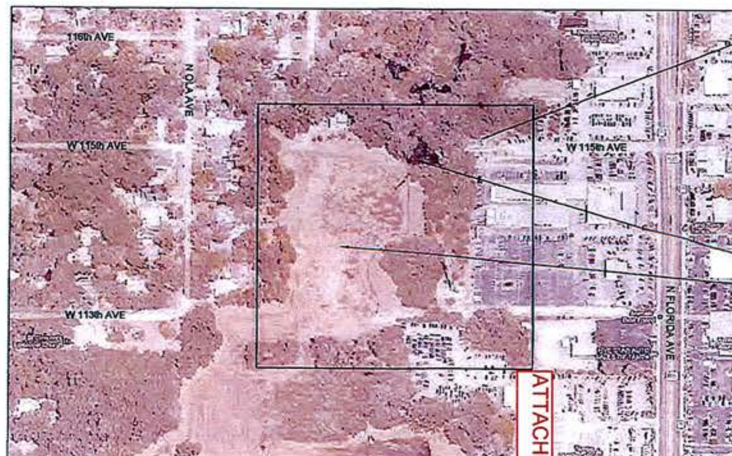
EXHIBIT 2

LOCATION MAP



COURTESY: GOOGLE MAPS

VICINITY MAP



COURTESY: GOOGLE MAPS

LOCATION MAP

DAVID A. SOCHA LICENSE No. 73821 STATE OF FLORIDA PROFESSIONAL ENGINEER

David A. Socha, PE
Engineer
State of Florida - License No 73821
Date:

REV	DATE	BY	DESCRIPTION	SCALE	WARNING						
				AS SHOWN	0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED S.WYGONIK DRAWN S.WYGONIK CHECKED	DESIGN DEVELOPMENT PHASE - JUNE 2013 NOT FOR CONSTRUCTION This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.	MWH.	GREELEY AND HANSEN	CITY OF TAMPA, FLORIDA WATER DEPARTMENT	BLUE SINK MFL PUMPING STATION GENERAL LOCATION AND VICINITY MAP

SHEET G-2

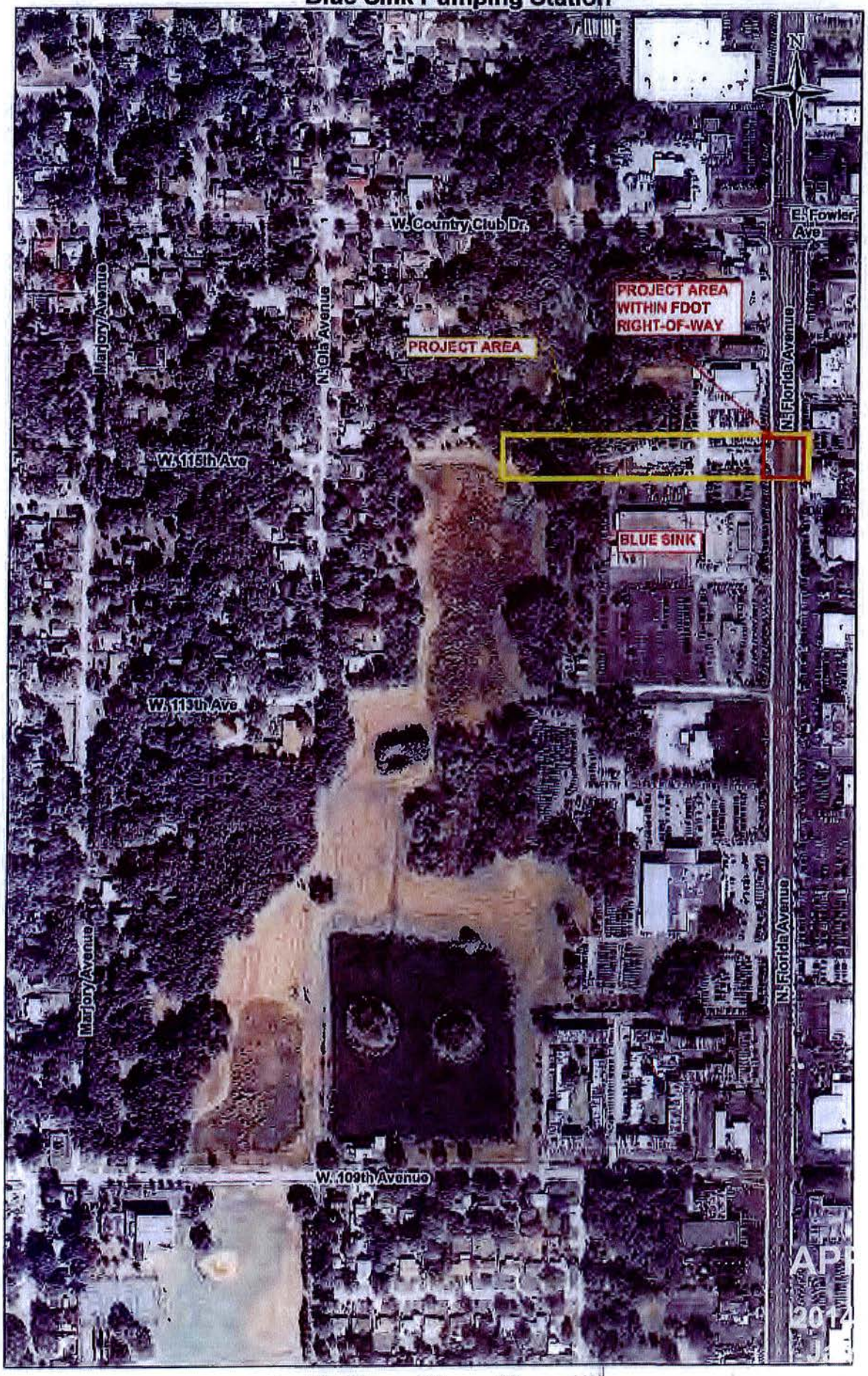
1011672

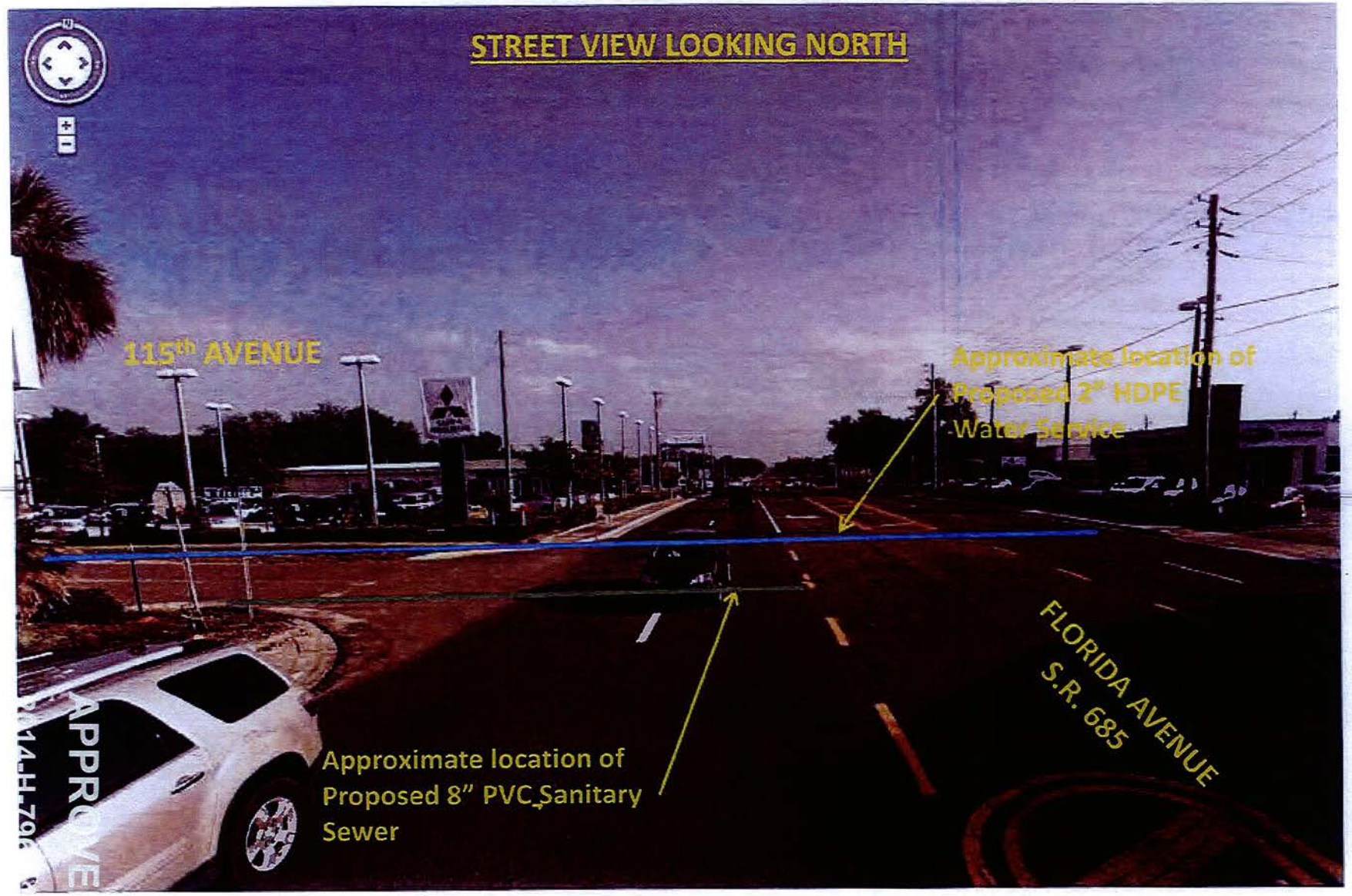
File: C:\pwwork\lidms\60340\TBSD_G02.dwg User: slwygoni Plot Date: Mon 03-Jun-2013 - 09:48AM

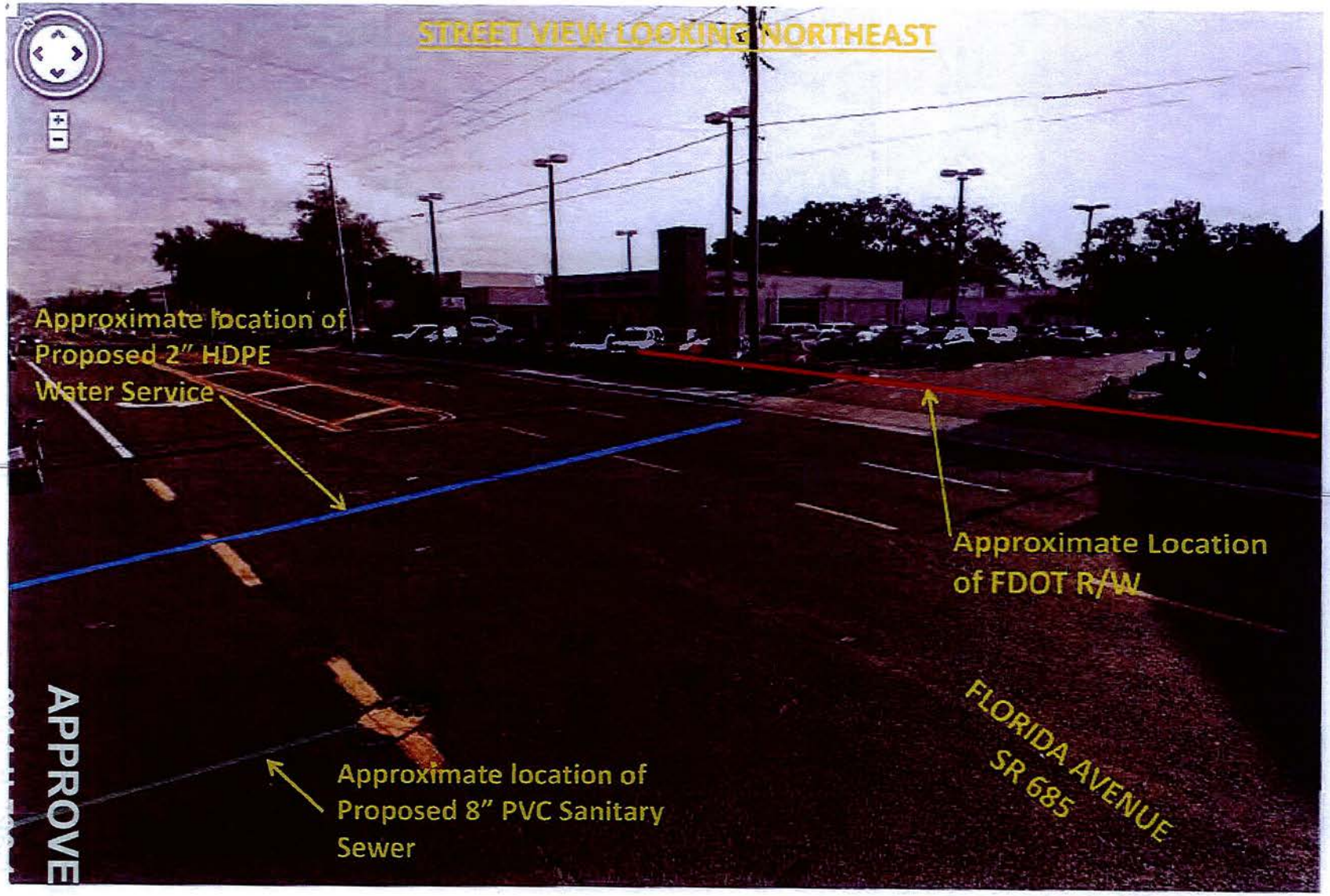
EXHIBIT 3

AERIAL VIEW AND PHOTOS

Blue Sink Pumping Station




STREET VIEW LOOKING NORTH
115th AVENUE
Approximate location of Proposed 2" HDPE Water Service
FLORIDA AVENUE S.R. 685
Approximate location of Proposed 8" PVC Sanitary Sewer


STREET VIEW LOOKING NORTHEAST
Approximate location of Proposed 2" HDPE Water Service
Approximate Location of FDOT R/W
FLORIDA AVENUE SR 685
Approximate location of Proposed 8" PVC Sanitary Sewer
APPROVE


STREET VIEW LOOKING SOUTH
Approximate location of
Proposed 8" PVC Sanitary
Sewer
115th AVENUE
Approximate location of
Proposed 2" HDPE
Water Service
FLORIDA AVENUE
S.R. 685

APPROVE

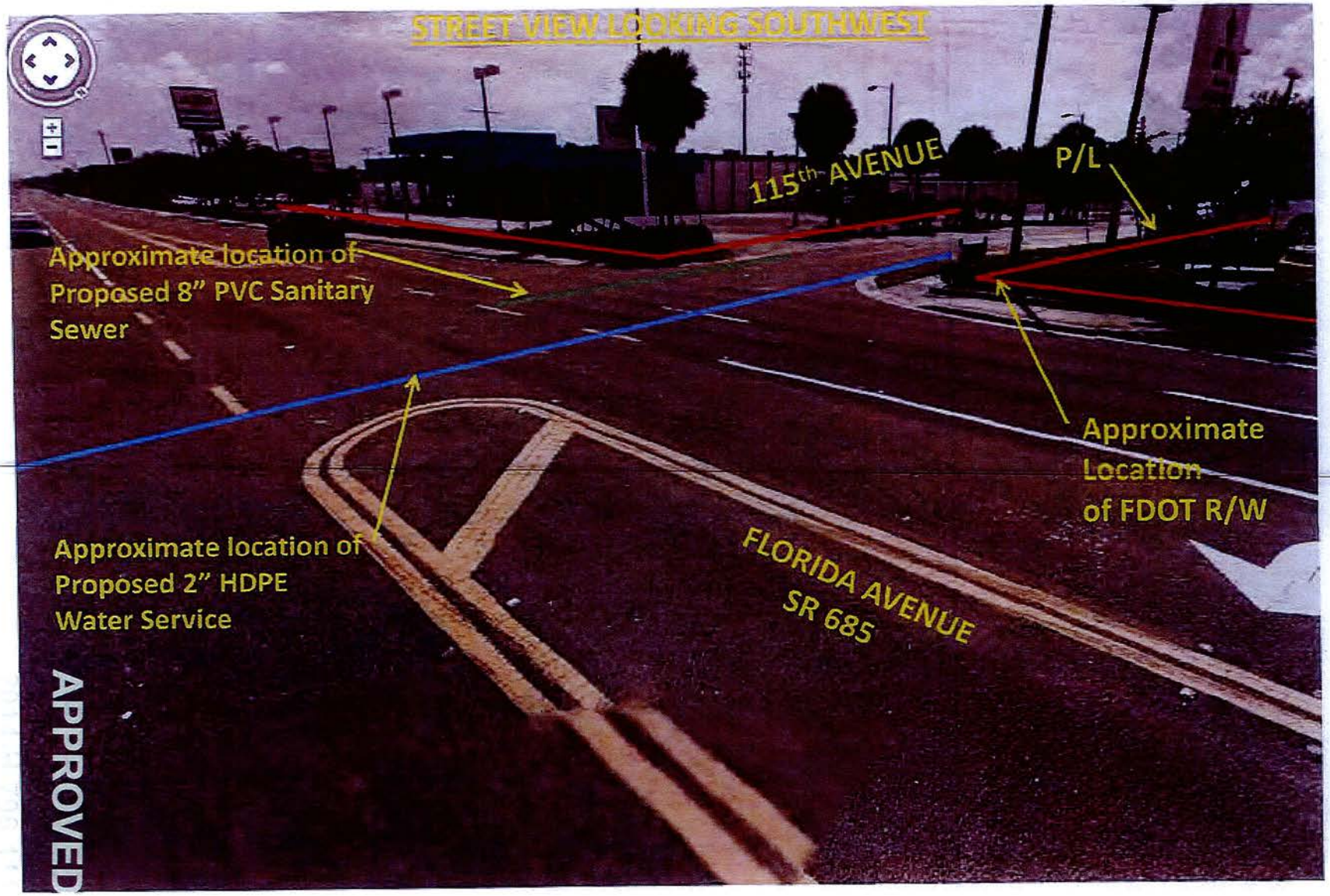
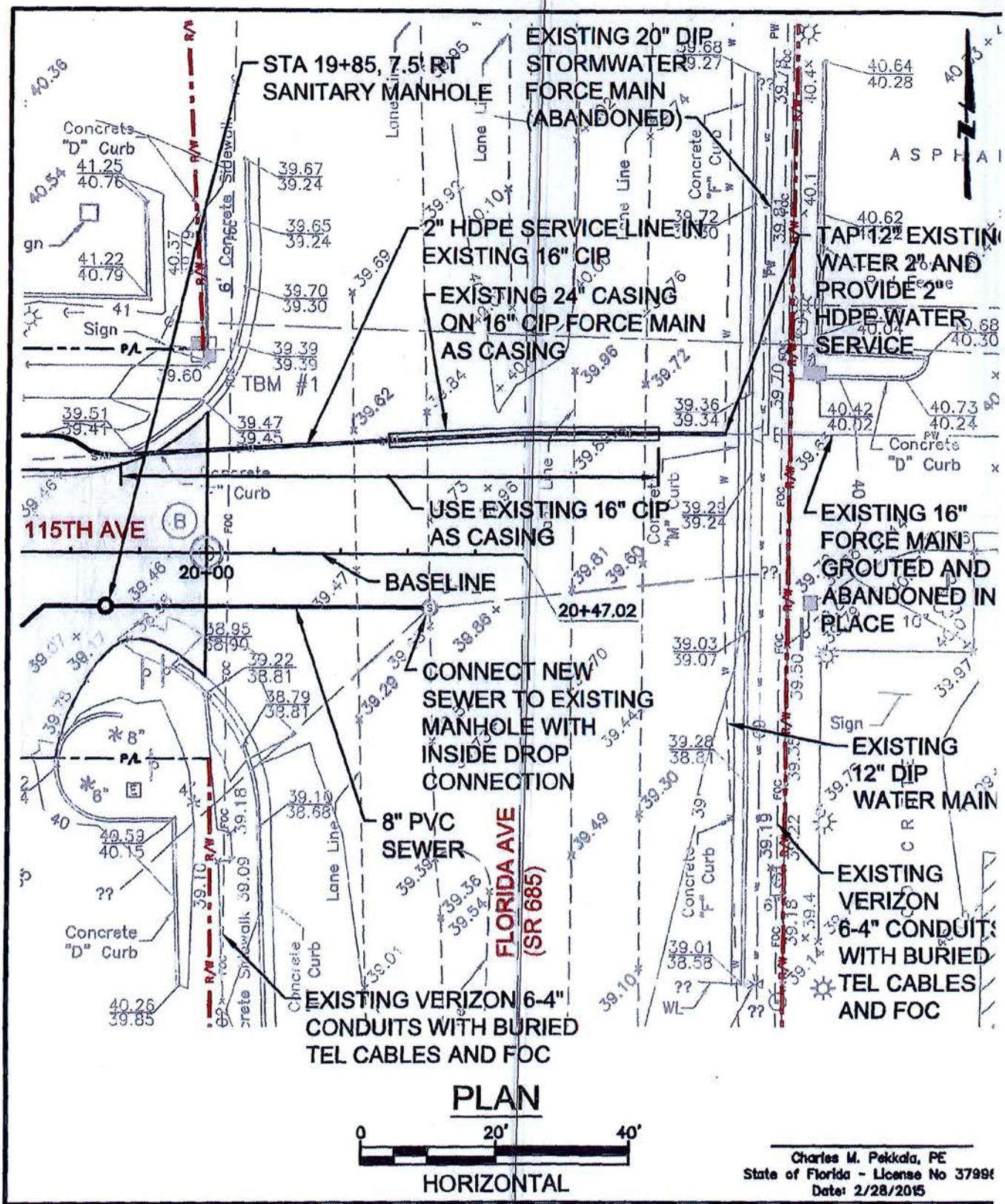

STREET VIEW LOOKING SOUTHWEST
115th AVENUE
P/L
Approximate location of Proposed 8" PVC Sanitary Sewer
Approximate Location of FDOT R/W
Approximate location of Proposed 2" HDPE Water Service
FLORIDA AVENUE SR 685
APPROVED

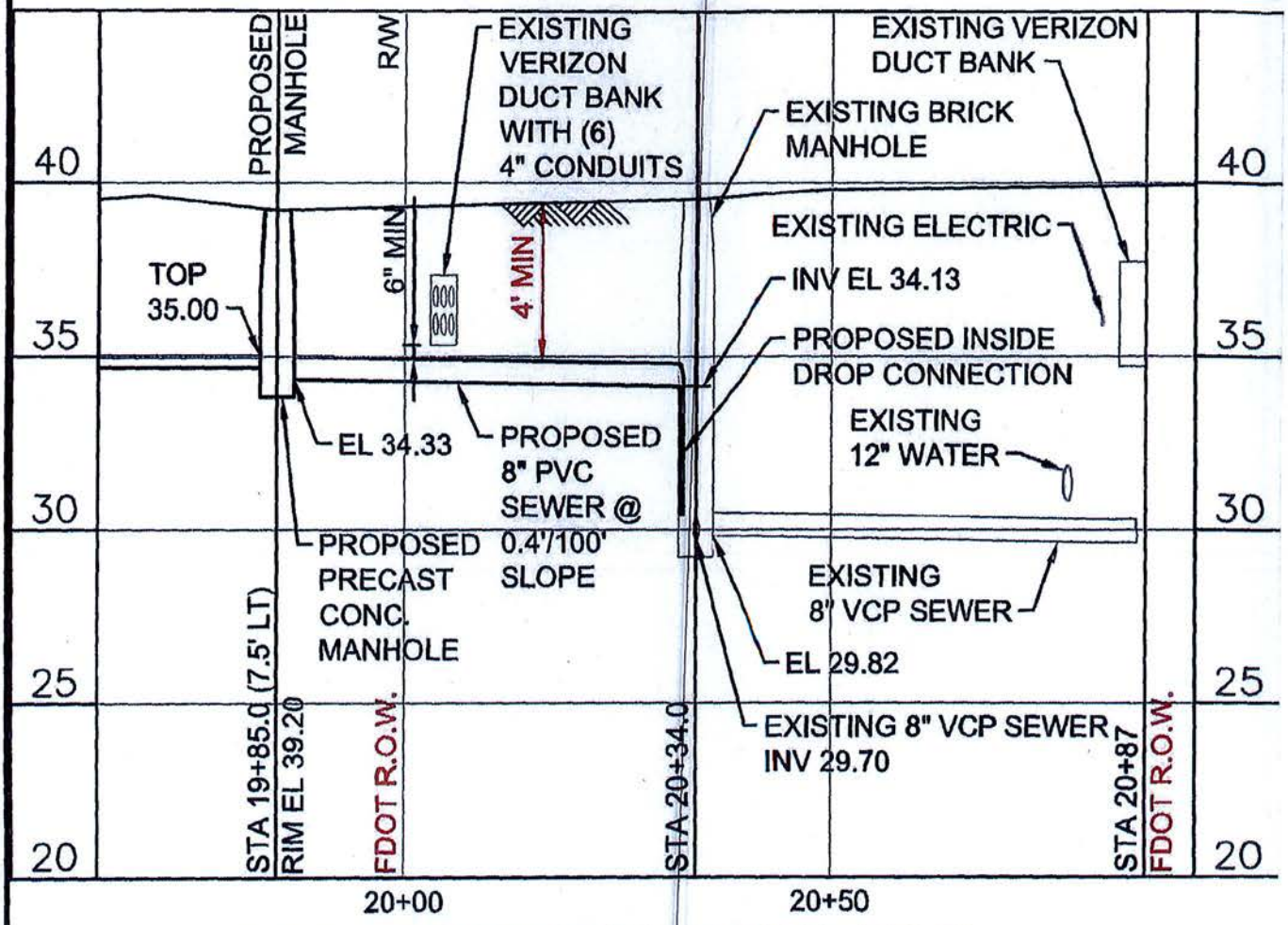
EXHIBIT 4

PLAN AND PROFILE SHEETS



Charles M. Pekkala, PE
State of Florida - License No 37998
Date: 2/28/2015

DES NMN	CKD CMP			CITY OF TAMPA
DR JMW	APPD CMP			WATER DEPARTMENT
GREELEY AND HANSEN 1715 NORTH WESTSHORE BLVD., STE. 464 TAMPA, FLORIDA 33607 CERTIFICATE OF AUTHORIZATION NO. 37				BLUE SINK MFL PUMPING STATION FDOT PERMIT
	NO.	DATE	APPD	REVISION
				DATE SEPT 2013 NO. 1

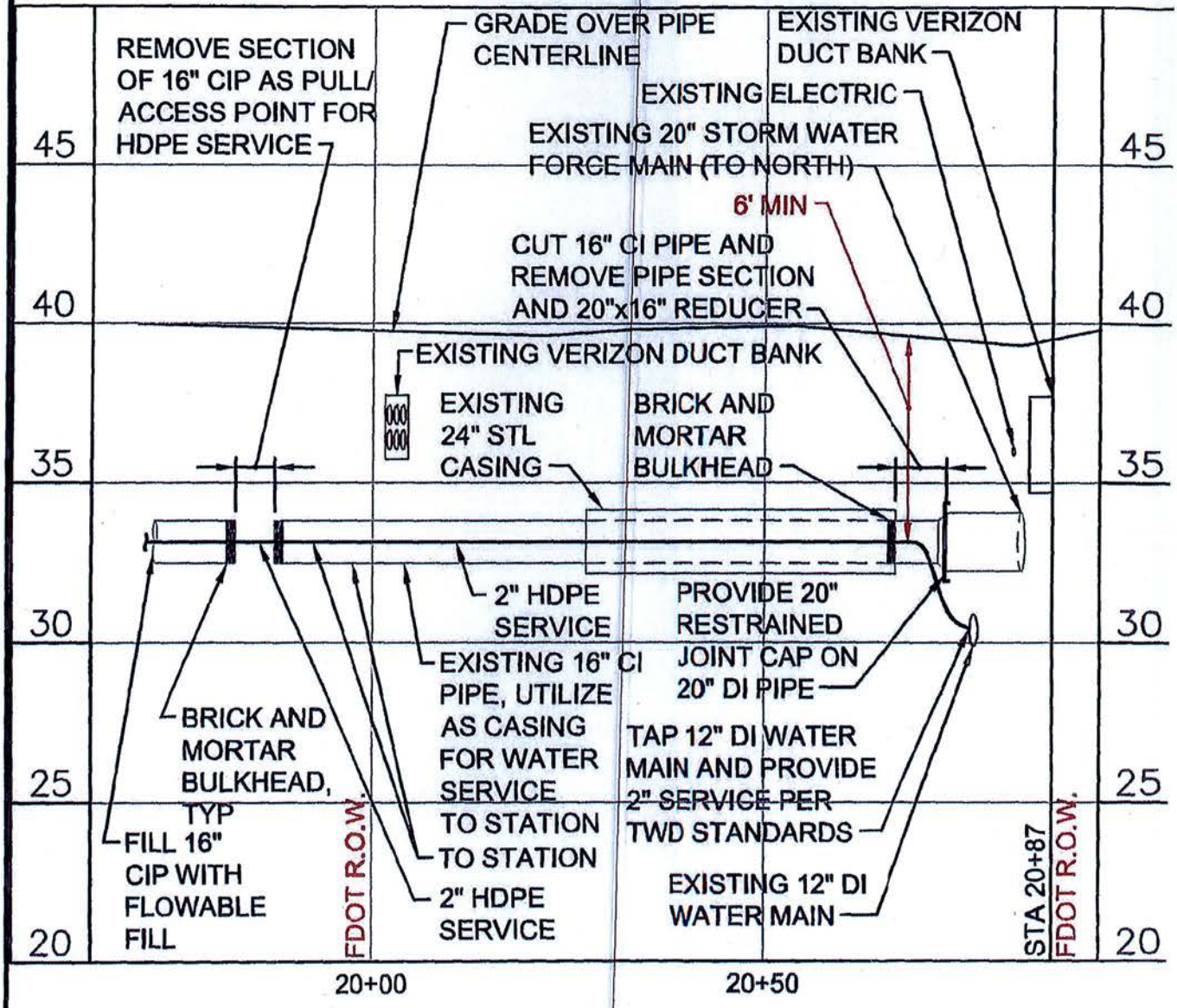


DISCHARGE FORCE MAIN PROFILE

0 5' 10' VERTICAL

Charles M. Pekkala, PE
State of Florida - License No 37996
Date: 2/28/2015

DES NMN	CKD CMP				CITY OF TAMPA
DR JMW	APPD CMP				WATER DEPARTMENT
GREELEY AND HANSEN 1715 NORTH WESTSHORE BLVD., STE. 484 TAMPA, FLORIDA 33607 CERTIFICATE OF AUTHORIZATION NO. 37					BLUE SINK MFL PUMPING STATION FDOT PERMIT
		NO.	DATE	APPD	REVISION
					DATE SEPT 2013 NO. 2



PROFILE - WATER SERVICE CONNECTION

0 5' 10' VERTICAL

Charles M. Pekkala, PE
State of Florida - License No 37998
Date: 2/28/2015

DES NMN	CKD CMP					CITY OF TAMPA
DR JMW	APPD CMP					WATER DEPARTMENT
GREELEY AND HANSEN 1715 NORTH WESTSHORE BLVD., STE. 464 TAMPA, FLORIDA 33607 CERTIFICATE OF AUTHORIZATION NO. 37						BLUE SINK MFL PUMPING STATION FDOT PERMIT
		NO.	DATE	APPD	REVISION	DATE SEPT 2013 NO 3

CIVIL GENERAL NOTES

1. DEVELOPMENT SUMMARY
   - a. DESCRIPTION: THE BLUE SINK MFL PUMP STATION PROJECT CONSISTS OF CONSTRUCTING A NEW PUMPING STATION REQUIRED BY SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT RULE TO TRANSFER WATER FROM BLUE SINK TO THE HILLSBOROUGH RIVER FOR ENVIRONMENTAL ENHANCEMENT PURPOSES. THE PROJECT COMPONENTS INCLUDE NEW 2 MGD PUMPING STATION WITH ELECTRICAL ROOM, TWO 16-INCH SUCTION PIPES FROM THE SINK TO THE PUMPING STATION, ONE 18-INCH DISCHARGE PIPE FROM THE STATION TO A CONNECTION POINT WITH 16-INCH RAW WATER PIPING BY OTHERS, A 4-INCH FORCE MAIN FOR SUMP PUMP DISCHARGE AND A 1.5-INCH WATER SERVICE.
   - b. OWNER: CITY OF TAMPA WATER DEPARTMENT
   - c. PROPERTY ADDRESS: 151 W. 115TH AVE., TAMPA, FL
   - d. ZONING: CI
   - e. LEGAL DESCRIPTION: SEE SHEET DEC-2
   - f. SPECIAL DISTRICTS: THE PROJECT IS NOT IN A SPECIAL/HISTORICAL DISTRICT.
   - g. FLOODPLAIN: EL = 31.7 FEET NAVD 1988 (32.54 FEET NGVD 1929), ZONE AE, MAP NO. 12057C0212H.
   - h. IMPERVIOUS SUMMARY OF PUMPING STATION SITE
     - i. DEMOLITION OF ASPHALT ROAD: 1529.3ed SF
     - ii. DEMOLITION OF BUILDING AND MASONRY WALL 1203.5 SF
     - iii. NEW ASPHALT PARKING AND SIDEWALK: 1115 SF
     - iv. NEW BUILDING: 1530.8 SF
     - v. NEW A/C UNIT PADS 20 SF
     - vi. SUMMARY NEW NET IMPERVIOUS AREA: -87 SF
2. STORMWATER REQUIREMENTS: THE NET IMPERVIOUS AREA FOR THE PUMPING STATION PROJECT IS 2654 SF. THIS AREA IS LESS THAN THE 3000 SF CITY OF TAMPA THRESHOLD. NO STORMWATER MANAGEMENT SYSTEM IS REQUIRED OR PROVIDED.
3. NOTIFY THE ENGINEER IF ACTUAL CONDITIONS VARY FROM THOSE SHOWN.
4. ALL WORK CONDUCTED ON THE PUBLIC PORTION OF WATER SYSTEM WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE TAMPA WATER DEPARTMENT TECHNICAL MANUAL, LATEST EDITION. PERFORM 4-INCH FORCE MAIN WORK IN ACCORDANCE WITH THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS STANDARDS.
5. MAINTAIN, RELOCATE OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM WORK TO MAINTAIN THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENTS.
6. DIMENSIONS ARE TO THE FACE OF CURB, EDGE OF PAVEMENT, EDGE OF WALL AND CENTER OF YARD PIPE FITTINGS.
7. ELEVATIONS ARE GIVEN TO FINISHED GRADE UNLESS OTHERWISE NOTED.
8. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
9. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES STRUCTURES AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION THESE PLANS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES AFFECTING HIS WORK PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR SHALL PROVIDE AT LEAST 48 HOURS NOTICE TO THE VARIOUS UTILITY COMPANIES IN ORDER TO PERMIT THE LOCATION OF EXISTING UNDERGROUND UTILITIES IN ADVANCE OF CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE VARIOUS UTILITY COMPANIES BY CALLING THE SUNSHINE ONE CALL CENTER (1-800-432-4770) OR, IF NECESSARY, BY CONTACTING THE UTILITY COMPANIES DIRECTLY.
11. UTILITIES AND STRUCTURES NOT SHOWN ON THE PLANS TO BE REMOVED OR REPLACED SHALL BE PROTECTED IN PLACE AND UTILITY SERVICE SHALL BE MAINTAINED. WHERE TEMPORARY CONFLICTS OCCUR BETWEEN EXISTING UTILITIES AND THE NEW CONSTRUCTION, THE CONTRACTOR SHALL PROTECT IN PLACE OR RELOCATE THE UTILITIES AND MAINTAIN UTILITY SERVICE TO THE SATISFACTION OF THE UTILITY COMPANY. UTILITIES AND STRUCTURES SHOWN ON THE PLANS TO BE REMOVED AND REPLACED OR RELOCATED, SHALL CONFORM TO THE REQUIREMENTS OF THE APPLICABLE TECHNICAL SPECIFICATIONS.
12. THE CONTRACTOR SHALL PROVIDE ADEQUATE, TEMPORARY THRUST RESTRAINT AT BENDS AND TEES IN EXISTING WATER MAINS AND OTHER PRESSURIZED CONDUITS IN PROXIMITY TO HIS EXCAVATIONS AS REQUIRED TO PREVENT ANY DISLODGEMENT, SEPARATION OR LEAKAGE OF THESE FACILITIES.
13. WHERE SHOWN, PROVIDE 18-INCH DIAMETER PRESSURE CLASS 250 CEMENT MORTAR LINED DUCTILE IRON RAW WATER MAIN IN ACCORDANCE WITH AWWA C151. POLYETHYLENE ENCASE ALL PIPE AND FITTINGS IN ACCORDANCE WITH AWWA C104. FOR DUCTILE IRON PIPE, PROVIDE MAXIMUM UNRESTRAINED JOINT DEFLECTIONS ONE DEGREE LESS THAN THE PIPE MANUFACTURER'S RECOMMENDED MAXIMUM. FOR RESTRAINED JOINT DUCTILE IRON PIPE, DO NOT EXCEED THE MAXIMUM JOINT DEFLECTIONS RECOMMENDED BY THE PIPE MANUFACTURER.
14. WHERE SHOWN, PROVIDE 16" AND 18" HIGH DENSITY POLYETHYLENE (HDPE) DR 11 BUTT-FUSION WELDED PIPE AND FITTINGS MEETING AWWA C906.
15. ALL PIPE BEDDING SHALL BE CLASS C UNLESS OTHERWISE SHOWN, SPECIFIED OR REQUIRED.
16. THE CONTRACTOR SHALL INSTALL ALL PIPING, INCLUDING THE PROPOSED RAW WATER MAIN TO THE ELEVATIONS AND SLOPES SHOWN ON THE DRAWINGS. A MINIMUM COVER OF 36" SHALL BE MAINTAINED UNLESS SPECIFICALLY SHOWN OTHERWISE. THERE SHALL BE NO INTERMEDIATE HIGH POINTS OR LOW POINTS BETWEEN V.P.I.'S. EXCEPT THAT, IN NO CASE SHALL THE VERTICAL SEPARATION BETWEEN THE PROPOSED WATER MAIN AND CROSSING UNDER A SANITARY OR STORM SEWER BE LESS THAN 12 INCHES AND THE HORIZONTAL SEPARATION LESS THAN 6 FEET FROM SANITARY SEWER OR 3 FEET FROM STORM SEWER (FROM OUTSIDE OF WATER MAIN TO OUTSIDE OF SANITARY OR STORM SEWER). THE VERTICAL SEPARATION BETWEEN THE WATER MAIN AND CROSSING OVER A SANITARY OR STORM SEWER SHALL BE 6" OR GREATER. THE HORIZONTAL SEPARATION BETWEEN THE WATER MAIN AND SANITARY OR STORM SEWER CAN BE REDUCED TO 3 FEET (OUTSIDE OF WATER MAIN TO OUTSIDE OF SANITARY OR STORM SEWER) IF THE WATER MAIN IS LAID AT LEAST 6" HIGHER THAN THE SANITARY OR STORM SEWER. PRIOR TO START OF CONSTRUCTION, THE CONTRACTOR SHALL LOCATE AND OBTAIN THE ELEVATIONS OF ALL UTILITIES IN AROUND AND CROSSING THE PROPOSED PIPELINE BY POTHOLING AND, WHERE THE REQUIRED SEPARATIONS CANNOT BE ACHIEVED, NOTIFY THE ENGINEER, WHO WILL DIRECT THE CONTRACTOR TO ADJUST EITHER THE VERTICAL OR HORIZONTAL ALIGNMENT AS NECESSARY. REGULATIONS ALLOW, AND THE ENGINEER MAY ALLOW, CERTAIN EXCEPTIONS TO THESE MINIMUM CLEARANCES AS DESCRIBED IN FLORIDA ADMINISTRATIVE CODE 62-555-314.

CIVIL GENERAL NOTES - CONTINUED

17. UNLESS OTHERWISE SHOWN, ALL FENCES DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED WITH NEW MATERIALS OF THE SAME TYPE AND HEIGHT, INCLUDING GATES.
18. ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION BY SODDING. SEEDING AND MULCH SHALL ONLY BY UTILIZED IF DIRECTED BY THE ENGINEER.
19. DO NOT UNNECESSARILY REMOVE THE EXISTING VEGETATION AND ALTER EXISTING TOPOGRAPHY. PROVIDE ADEQUATE PROTECTION MEASURES (I.E., HAYBALES, BAFFLES, SODDING AND SANDBAGGING) AS SHOWN OR REQUIRED TO MINIMIZE EROSION AND DOWNSTREAM SEDIMENTATION CAUSED BY SURFACE WATER RUNOFF ON EXPOSED LAND SURFACES.
20. ALL TREES NOT SHOWN FOR DEMOLITION SHALL BE PROTECTED BY TREE BARRICADES. ERECT BARRICADES PRIOR TO ANY LAND ALTERATION ACTIVITIES. DURING CONSTRUCTION ACTIVITIES, DO NOT REMOVE VEGETATION BY GRUBBING, OR PLACE SOILS DEPOSITS, DEBRIS, SOLVENTS, CONSTRUCTION MATERIAL, MACHINERY OR OTHER EQUIPMENT OF ANY KIND WITHIN THE DRIPLINE OF A TREE THAT REMAINS ON SITE.
21. PROMPTLY AND ADEQUATELY STABILIZE ANY AREA SUBJECT TO EROSION AND VEGETATIVE MATERIAL BY SODDING, SEEDING, PLUGGING OR OR SPRIGGING. IF SLOPE IS GREATER THAN 5:1, SODDING WILL BE THE ONLY ACCEPTABLE FORM OF STABILIZATION. PERMANENT RESTORATION SHALL BE BY SODDING.
22. THE CONTRACTOR SHALL STOCKPILE AND MAINTAIN SURPLUS OF SUITABLE JOB EXCAVATED MATERIAL FOR BEDDING OR BACKFILL FOR THIS PROJECT. THE CONTRACTOR SHALL COVER ALL STOCKPILES WITH TARPS OR CAREFULLY SURROUND STOCKPILES WITH SILT FENCES, HAYBALES OR THE LIKE TO PREVENT SILTATION FROM RUNOFF.
23. THE CONTRACTOR SHALL DISPOSE OF ALL DEBRIS FROM CONSTRUCTION AT HIS OWN EXPENSE.

SURVEY AND CONTROL NOTES

1. FEATURES AND UTILITIES DEPICTED ON SURVEY ARE FROM VISIBLE EVIDENCE ONLY.
2. NO UNDERGROUND FOUNDATIONS OR FOOTERS WERE EXCAVATED OR LOCATED.
3. THE HORIZONTAL DATUM UTILIZED FOR THIS PROJECT IS NAD 1983 (2007) FLORIDA WEST ZONE, U.S. SURVEY FEET.
4. THE VERTICAL DATUM UTILIZED FOR THIS PROJECT IS NGVD 1929, U.S. SURVEY FEET. THE BENCHMARK UTILIZED WAS CITY OF TAMP BENCHMARK "HV-02 0199" WITH AN ELEVATION OF 30.00 FEET.
5. DATUM CONVERSION: NAVD 1988 = NGVD 1929 - 0.84 FEET.
6. NOT A BOUNDARY SURVEY.
7. THE SURVEY WAS CONDUCTED TO SHOW THE CONDITIONS WITHIN THE LIMITS OF THE PROJECT AREA. ALL OTHER IMPROVEMENTS ARE NOT DEPICTED.
8. ALL WATER ELEVATIONS SHOWN ON THE SURVEY REPRESENT DATA COLLECTED ON MARCH 6, 2012 AND ARE INDICATIVE ONLY OF THE CONDITIONS AT THAT TIME.
9. SUBAQUEOUS INFORMATION WAS COLLECTED ON MARCH 6, 2012 WITH THE SUPPORT OF VIKING DIVING SERVICES, INC.
10. REFER TO DRAWINGS DC-1 AND DC-2 FOR ADDITIONAL INFORMATION ON SURVEY, TEMPORARY BENCHMARKS AND THE LIKE.

DRAINAGE SYMBOLS

SILT FENCE

PIPING AND UTILITIES

UTILITIES (SINGLE LINE) SEE PIPE SCHEDULE FOR ADDITONAL PIPING INFO

—— G ——	UTILITIES (SIZE WHERE NOTED)
– – G – –	UNDERGROUND
RW	RAW WATER
PW	POTABLE WATER
IRRG	IRRIGATION LINE
SDR	STORM DRAIN
SS	SANITARY SEWER
TEL	TELEPHONE
COMM	COMMUNICATIONS LINE
FOC	FIBER OPTIC CABLE
CATV	CABLE TV
ELEC	POWER
UNID	UNIDENTIFIED
ABND	ABANDONED UTILITY
SPD	SUMP PUMP DISCHARGE
MH	MANHOLE (IN PLAN)
	BURIED VALVES IN VALVE BOX GATE VALVE
	ECCENTRIC PLUG VALVE

GEOTECHNICAL SYMBOLS

B-X	SOIL BORING LOCATION
MW	MONITORING WELL

GENERAL CIVIL SYMBOLS

- NEW
- EXISTING
- FUTURE
- EXISTING TO BE REMOVED OR DEMOLISHED
- CENTERLINE
- EARTH (IN SECTION)
- COMPACTED EARTH (IN SECTION)
- S=0.0123 — SLOPE ON PAVED SURFACE
- 3:1 — BERM SLOPE (HORZ TO VERT)

SURVEY LEGEND & ABBREVIATIONS

	SET 5/8" CAPPED IRON ROD
	SET P.K. NAIL & DISK
	FOUND IRON ROD OR PIPE
	FOUND P.K. NAIL & DISK
	FOUND "X" CUT
	FOUND RAILROAD SPIKE
P.S.M.	PROFESSIONAL SURVEYOR AND MAPPER
Id.	IDENTIFICATION
	TEMPORARY BENCHMARK
TBM	TEMPORARY BENCHMARK
MW	MONITORING WELL
SWFWMD	SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
??	UNKNOWN DESTINATION
	BACK OF CURB ELEVATION
	EDGE OF PAVEMENT ELEVATION
	SPOT ELEVATION
	SPOT ELEVATION ON HARD SURFACE
(F)	FIELD MEASUREMENT
(D)	DEED REFERENCE
(P)	PLAT REFERENCE
DIP	DUCTILE IRON PIPE
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
ERCP	ELLIPTICAL REINFORCED CONCRETE PIPE
S-1	SANITARY MANHOLE
D-1	STORM MANHOLE
(1)	SUBAQUEOUS DATA (AS OBTAINED BY OTHERS)
CCR	FDEP CERTIFIED CORNER RECORD
FDEP	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
1	TOP OF RUST STAIN (ALONG WALL BASED ON AN ELEVATION OF 23.92')
	ELECTRIC VAULT
	FIRE HYDRANT
	IRRIGATION CONTROL VALVE
	MITERED END SECTION
	LIGHT POLE
	SQUARE POST
	POWER POLE
	GUY WIRE
	SIGN
	UNKNOWN TREE
	PALM
	OAK
	TRAFFIC VAULT
	WATER METER
	CATCH BASIN
	STORM MANHOLE
	SANITARY MANHOLE
	WATER VALVE
	ELECTRIC PULL BOX
	ROUND POST
	FENCE
	OVERHEAD UTILITY LINES
	SANITARY LINE
	TREE LINE
	GUARD RAIL
	UNDERGROUND ELECTRIC
	21.7' CONTOUR
FFE	FINISHED FLOOR ELEVATION
WL	WATER LINE
	JURISDICTIONAL WETLAND LINE (BASED ON AN ELEVATION OF 23.92')

ROAD AND PAVING SYMBOLS

- ASPHALT CEMENT PAVING
- PERMEABLE PAVING

CONTROL SYMBOLS

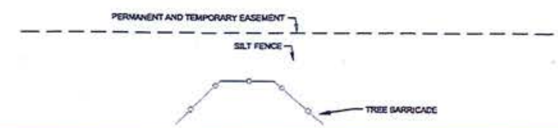
- N XXXXXXX / E XXXXXXX — SITE COORDINATES
- XXX.XX — FINISHED ELEVATION

STRUCTURES

- FENCE (CHAINLINK)
- FENCE (WOOD)
- STRUCTURE
- STRUCTURE (BELOW GRADE)
- CB — CATCH BASIN

LEGEND

PIPELINE CONSTRUCTION



CHARLES M. PEKKALA, No. 37898, STATE OF FLORIDA, LICENSED PROFESSIONAL ENGINEER — 7/1/14

Charles M. Pekkala, PE
Civil Engineer
State of Florida – License No 37998

REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED MPEKKALA
DRAWN JWHITE
CHECKED JATKINSON

ISSUED FOR BID - JUNE 2014

ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

MWH® — 1000 N. ASHLEY DRIVE, TAMPA, FLORIDA 33602, CERTIFICATE OF AUTHORIZATION No. 8773

GREELEY AND HANSEN — 1713 NORTH WESTSHORE BLVD, TAMPA, FLORIDA 33607, CERTIFICATE OF AUTHORIZATION No. 37

CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

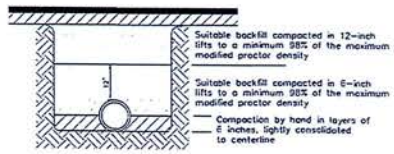
BLUE SINK MFL PUMPING STATION

GENERAL CIVIL
STANDARD NOTES AND SYMBOLS

SHEET GC-1

1011673

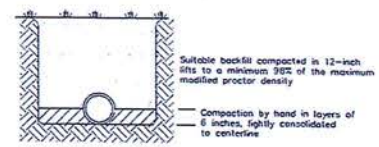
Plot Date: Thu 26-Jun-2014 - 10:33PM · User: jyalv
File: C:\pwwork\d\dms60329\TBSD_GC01.dwg



NOTES:

1. Type 2 trench is defined as a flat-bottom trench. Lightly consolidate backfill to centerline of pipe.
2. This standard shall be utilized in the absence of specific standards. The standard of the agency controlling the Right-of-Way shall govern unless otherwise directed by the Engineer.
3. Suitable backfill shall be defined as material free from cinders, ashes, refuse, clay, organic matter, boulders, rocks or stones, or other material that in the opinion of the Engineer is unsuitable.

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	TRENCHING, BEDDING AND BACKFILL DETAIL FOR PAVED AREAS	2.01

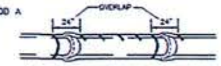


NOTES:

1. Type 2 trench is defined as a flat-bottom trench. Lightly consolidate backfill to centerline of pipe.
2. This standard shall be utilized in the absence of specific standards. The standard of the agency controlling the Right-of-Way shall govern unless otherwise directed by the Engineer.
3. Suitable backfill shall be defined as material free from cinders, ashes, refuse, clay, organic matter, boulders, rocks or stones, or other material that in the opinion of the Engineer is unsuitable.

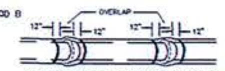
TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	TRENCHING, BEDDING AND BACKFILL DETAIL FOR NON-PAVED AREAS	2.02

METHOD A



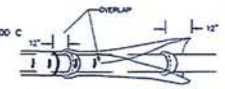
Polyethylene tube is cut into lengths approximately two feet longer than the pipe section and placed around it. After the pipe joint is assembled, the polyethylene tube is made to overlap the joint and the overlap secured in place. Since the tube is considerably larger than the barrel of pipe, it is made to fit snugly by folding over at the top and securing with tape every 24" along the pipe section.

METHOD B



Polyethylene tube is cut one foot shorter than the length of the pipe section. After placement of the pipe, it is folded and secured snugly overall. A three foot length of polyethylene tube placed over the end of the preceding section is then pulled in place over the joint after assembly and secured.

METHOD C



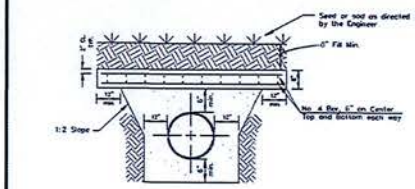
Polyethylene sheet is cut to a length two feet longer than the pipe section. The sheet is wrapped around the pipe so that it overlaps circumferentially over the top quadrant of the pipe, then secured. After joint assembly, the surplus length of polyethylene film is secured around the joint, providing an overlap at each joint. Tape at each joint and at 3' intervals in between.

NOTES: 1. Use blue polyethylene film and tape only.
2. Polyethylene film shall be a minimum of 8 mil thickness

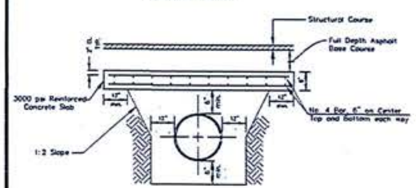
TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	POLYETHYLENE ENCASEMENT INSTALLATION DETAIL	2.05

GENERAL SHEET NOTES:

1. DETAILS SHOWN ON THIS SHEET REPRESENT CITY OF TAMPA WATER DEPARTMENT STANDARD DETAILS. FOR CONSTRUCTION, C... N AND REFER TO THE CITY OF TAMPA WATER DEPARTMENT'S CURRENT TEC...ICAL STANDAR... MANUAL AND DETAILS.



GRASSED SECTION



ROADWAY SECTION

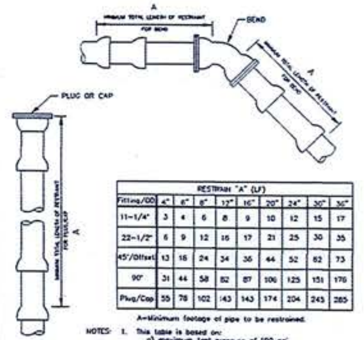
NOTES:
1. Structural course and base course requirement shall be established by the agency having jurisdiction.
2. Shock pads for mains too shallow for the above configuration shall be designed on a case-by-case basis.

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	REINFORCED CONCRETE SHOCK PAD (FOR COVER LESS THAN 2.5')	2.06

Charles M. Pekkala, PE
Civil Engineer
State of Florida License No. 37996

REV	DATE	BY	DESCRIPTION	SCALE	WARNING		ISSUED FOR BID - JUNE 2014				BLUE SINK MFL PUMPING STATION	SHEET
				NO SCALE	0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED MPEKKALA DRAWN WHITE CHECKED JATKINSON	ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS	MWH	GREELEY AND HANSEN	CITY OF TAMPA, FLORIDA WATER DEPARTMENT	GENERAL CIVIL STANDARD DETAILS - II	GC-3 1011673

Plot Date: Thu 26-Jun-2014 - 10:31PM User: ... File: C:\...GC03.dwg

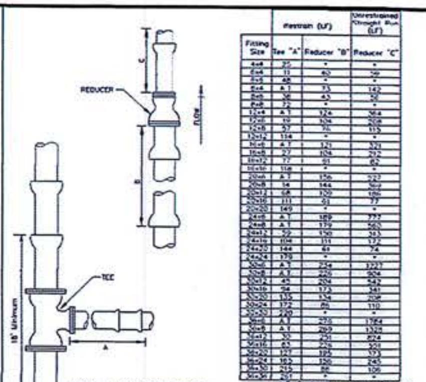


RESTRAIN "A" (LF)									
Fitting/OD	4"	6"	8"	12"	16"	20"	24"	30"	36"
11-1/4°	3	4	6	8	9	10	12	15	17
22-1/2°	6	9	12	16	17	21	25	30	35
45°/Offset	13	18	24	34	36	44	52	62	73
90°	31	44	58	82	87	106	125	151	176
Plug/Cap	55	78	102	143	143	174	204	243	285

A-Minimum footage of pipe to be restrained.

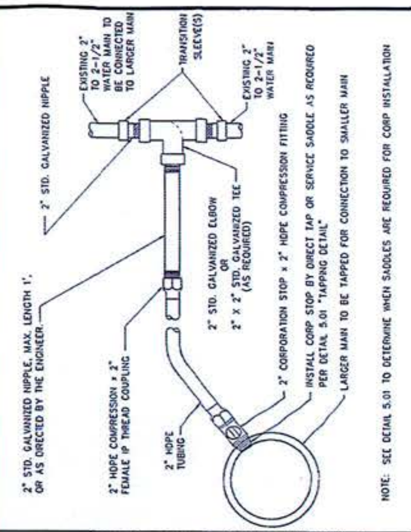
NOTES:
1. This table is based on:
   a) maximum test pressure of 190 psi
   b) laying condition type 2 (see Details 2.01 and 2.02)
   c) poor soil conditions
   d) using D.I.P.
   e) 3 feet of cover for 12" and smaller mains; 4 feet of cover for 16" and larger mains
   f) Horizontal bends only - Engineer to submit calculations for vertical restraints
2. For polywrapped D.I.P., increase the footage to restrain by 25%.
3. For PVC pipe, increase the footage to restrain by 20%.
4. "Restrained" pipe shall be Manufactured Restrained Joint pipe, push-on joint pipe restrained w/gasket-type "Gripper Restraints", or mechanical joint pipe restrained by Megalug (or approved equivalent).
5. Any additional fittings within the restrained section shall be restrained accordingly.

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	RESTRAINED JOINT STANDARD FOR BENDS, PLUGS, AND CAPS	2.11



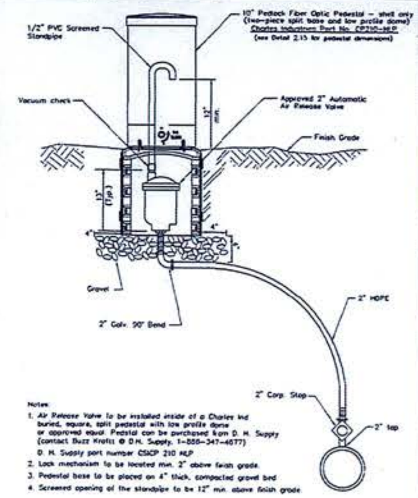
NOTES:
1. This table is based on:
   a) maximum test pressure of 190 psi
   b) laying condition type 2 (see Details 2.01 and 2.02)
   c) poor soil conditions
   d) using D.I.P.
   e) 3 feet of cover for 12" and smaller mains; 4 feet of cover for 16" and larger mains
   f) Horizontal bends only - Engineer to submit calculations for vertical restraints
2. Restraint For Reducers: If "C" straight run of pipe downstream of reducer not available, then restrain "B" upstream of reducer.
3. For polywrapped D.I.P., increase the footage to restrain by 25%.
4. For PVC pipe, increase the footage to restrain by 20%.
5. "Restrained" pipe shall be Manufactured Restrained Joint pipe, push-on joint pipe restrained w/gasket-type "Gripper Restraints", or mechanical joint pipe restrained by Megalug (or approved equivalent).
6. Any additional fittings within the restrained section shall be restrained accordingly.

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	RESTRAINED JOINT STANDARD FOR TEES AND REDUCERS	2.12



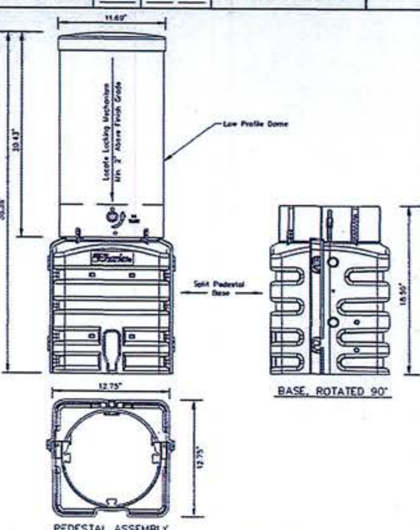
NOTE: SEE DETAIL 5.01 TO DETERMINE WHEN SADDLES ARE REQUIRED FOR CORP INSTALLATION

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	"TAPPED" CONNECTION FROM DI.CI. OR PVC PIPE TO <4" WATER MAINS	2.13

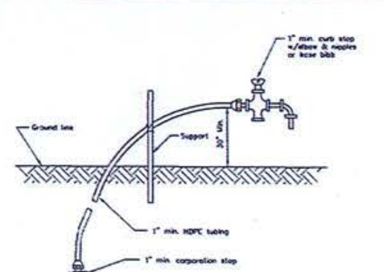


Notes:
1. Air Release Valve to be installed inside of a Charles Ind buried, square, split pedestal with low profile dome or approved equal. Pedestal can be purchased from D. H. Supply (contact Buzz Krelis @ D.H. Supply, 1-888-347-4677)
D. H. Supply part number CSICP 210 MLP
2. Lock mechanism to be located min. 2" above finish grade.
3. Pedestal base to be placed on 4" thick, compacted gravel bed
4. Screened opening of the standpipe to be 12" min. above finish grade

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	AUTOMATIC AIR RELEASE VALVE	2.14



TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	PEDESTAL FOR AUTOMATIC AIR RELEASE VALVE	2.15



Notes:
1. Water outlet shall be held up off the ground so as not to interfere with the sampling process
2. Corporation stop to be removed and brass plug installed in tapped main after operation

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	TEMPORARY SAMPLE TAP INSTALLATION w/DI, CI, OR PVC PIPE	2.18

GENERAL SHEET NOTES:

1. DETAILS SHOWN ON THIS SHEET REPRESENT CITY OF TAMPA WATER DEPARTMENT STANDARD DETAILS. FOR CONSTRUCTION, OBTAIN AND REFER TO THE CITY OF TAMPA WATER DEPARTMENT'S CURRENT TECHNICAL STANDARDS MANUAL AND DETAILS.
2. FOR CITY DETAIL 2.14, PROVIDE A 2" COMBINATION AIR RELEASE AND VACUUM VALVE IN LIEU OF THE 2" AIR RELEASE VALVE SHOWN IN THE DETAIL.

CHARLES M. PEKKALA LICENSE No. 37996 STATE OF FLORIDA PROFESSIONAL ENGINEER
7/11/14

Charles M. Pekkala, PE
Civil Engineer
State of Florida - License No. 37996

REV	DATE	BY	DESCRIPTION	SCALE	WARNING			
				NO SCALE	0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED MPEKKALA DRAWN WHITE CHECKED JATKINSON	ISSUED FOR BID - JUNE 2014 ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS	

MWH. 1000 N. ASHLEY DRIVE, TAMPA, FLORIDA 33602 CERTIFICATE OF AUTHORIZATION No. 8773

GREELEY AND HANSEN

CITY OF TAMPA, FLORIDA WATER DEPARTMENT

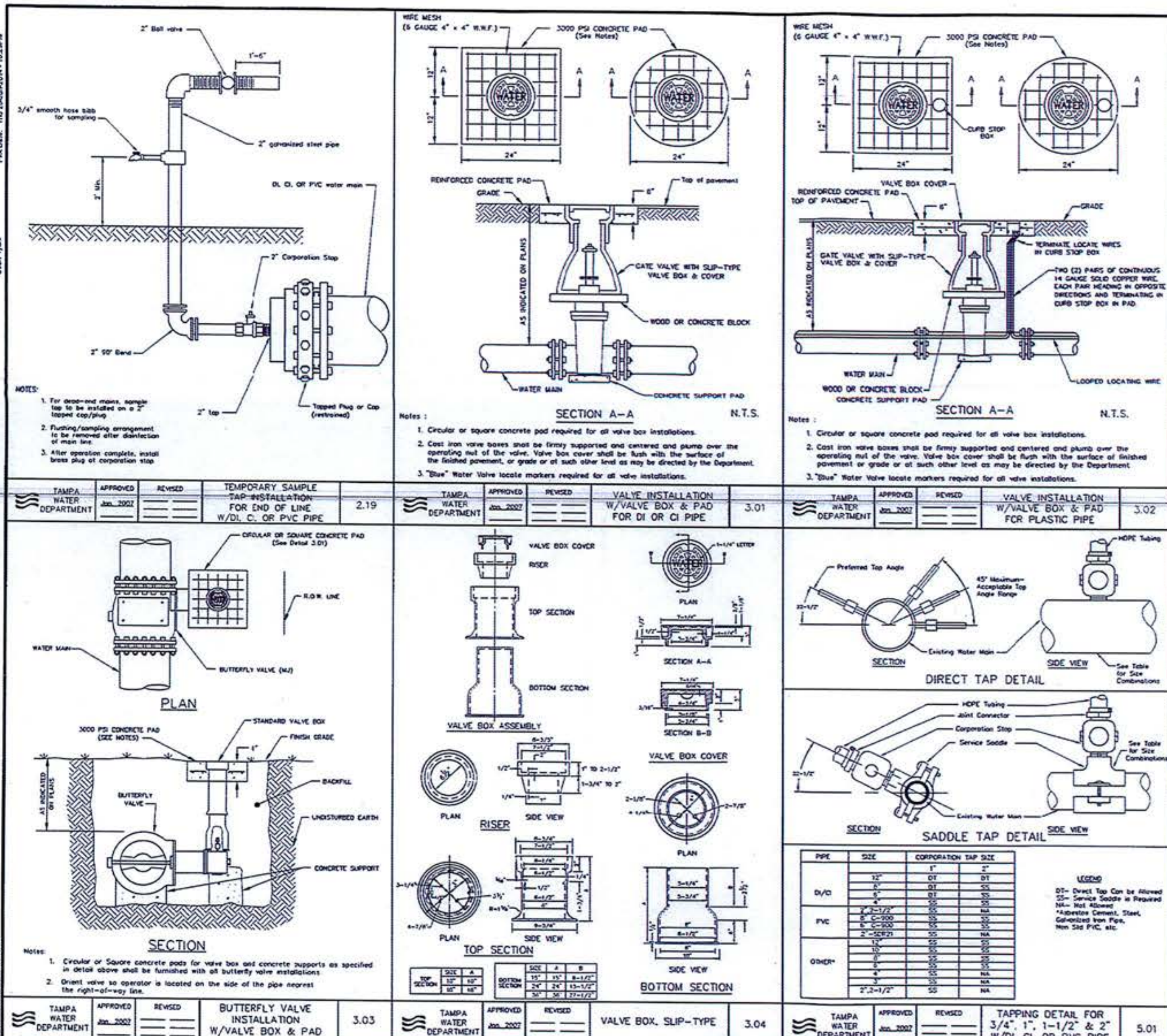
BLUE SINK MFL PUMPING STATION

GENERAL CIVIL STANDARD DETAILS - III

SHEET GC-4

1011573

File: C:\pwwork\... GC04.dwg User: ryals Plot Date: Thu 26-Jun-2014 - 10:30PM


2" Ball valve
1'-6"
3/4" smooth hose bibb for sampling
2" galvanized steel pipe
DI, CI, OR PVC water main
2" Corporation Stop
2" 90° Bend
2" tap
Tapped Plug or Cap (restrained)
NOTES:
1. For dead-end mains, sample tap to be installed on a 2" tapped cap/plug
2. Flushing/sampling arrangement to be removed after disinfection of main line.
3. After operation complete, install brass plug at corporation stop
TAMPA WATER DEPARTMENT
TEMPORARY SAMPLE TAP INSTALLATION FOR END OF LINE W/DI, CI, OR PVC PIPE
2.19
WIRE MESH (6 GAUGE 4" x 4" W.W.F.)
3000 PSI CONCRETE PAD (See Notes)
REINFORCED CONCRETE PAD
GRADE
Top of pavement
GATE VALVE WITH SLIP-TYPE VALVE BOX & COVER
WOOD OR CONCRETE BLOCK
WATER MAIN
CONCRETE SUPPORT PAD
AS INDICATED ON PLANS
SECTION A–A
N.T.S.
Notes :
1. Circular or square concrete pad required for all valve box installations.
2. Cast iron valve boxes shall be firmly supported and centered and plumb over the operating nut of the valve. Valve box cover shall be flush with the surface of the finished pavement, or grade or at such other level as may be directed by the Department.
3. "Blue" Water Valve locate markers required for all valve installations.
VALVE INSTALLATION W/VALVE BOX & PAD FOR DI OR CI PIPE
3.01
CURB STOP BOX
VALVE BOX COVER
TOP OF PAVEMENT
TERMINATE LOCATE WIRES IN CURB STOP BOX
TWO (2) PAIRS OF CONTINUOUS 14 GAUGE SOLID COPPER WIRE. EACH PAIR HEADING IN OPPOSITE DIRECTIONS AND TERMINATING IN CURB STOP BOX IN PAD.
LOOPED LOCATING WIRE
VALVE INSTALLATION W/VALVE BOX & PAD FOR PLASTIC PIPE
3.02
CIRCULAR OR SQUARE CONCRETE PAD (See Detail 3.01)
R.O.W. LINE
WATER MAIN
BUTTERFLY VALVE (MJ)
PLAN
3000 PSI CONCRETE PAD (SEE NOTES)
STANDARD VALVE BOX
FINISH GRADE
BACKFILL
BUTTERFLY VALVE
UNDISTURBED EARTH
CONCRETE SUPPORT
SECTION
Notes:
1. Circular or Square concrete pads for valve box and concrete supports as specified in detail above shall be furnished with all butterfly valve installations.
2. Orient valve so operator is located on the side of the pipe nearest the right-of-way line.
BUTTERFLY VALVE INSTALLATION W/VALVE BOX & PAD
3.03
VALVE BOX COVER
RISER
TOP SECTION
BOTTOM SECTION
VALVE BOX ASSEMBLY
PLAN
SECTION A–A
SECTION B–B
VALVE BOX COVER
RISER
SIDE VIEW
TOP SECTION
BOTTOM SECTION
VALVE BOX, SLIP-TYPE
3.04
Preferred Tap Angle
45° Maximum Acceptable Tap Angle Range
Existing Water Main
SECTION
SIDE VIEW
HDPE Tubing
See Table for Size Combinations
DIRECT TAP DETAIL
Joint Connector
Corporation Stop
Service Saddle
SADDLE TAP DETAIL
LEGEND
DT– Direct Tap Can be Allowed
SS– Service Saddle is Required
NA– Not Allowed
*Asbestos Cement, Steel, Galvanized Iron Pipe, Non Std PVC, etc.
TAPPING DETAIL FOR 3/4", 1", 1-1/2" & 2" W/DI, CI, OR PVC PIPE
5.01
APPROVED Jan. 2007
REVISED

GENERAL SHEET NOTES:

1. DETAILS SHOWN ON THIS SHEET REPRESENT CITY OF TAMPA WATER DEPARTMENT STANDARD DETAILS. FOR CONSTRUCTION, OBTAIN AND REFER TO THE CITY OF TAMPA WATER DEPARTMENT'S CURRENT TECHNICAL STANDARDS MANUAL AND DETAILS.
2. FOR DETAILS 3.01, 3.02 AND 3.03 PROVIDE A 2" BRASS IDENTIFICATION TAG ADHERED TO VALVE HOUSEKEEPING PAD WITH STAINLESS SELF TAPPING SCREWS AND EPOXY. THE TAG SHALL IDENTIFY SERVICE TYPE, SIZE, RACYS LHC AND NUMBER OF TURNS.

CHARLES M. PEKKALA LICENSE No. 37996 STATE OF FLORIDA PROFESSIONAL ENGINEER 7/1/14

REV	DATE	BY	DESCRIPTION	SCALE: NO SCALE	WARNING: 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED: MPEKKALA
DRAWN: JWHITE
CHECKED: JATKINSON

ISSUED FOR BID - JUNE 2014

ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

MWH

GREELEY AND HANSEN

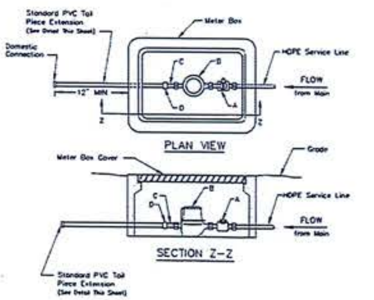
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

GENERAL CIVIL
STANDARD DETAILS - IV

SHEET GC-5

1011073



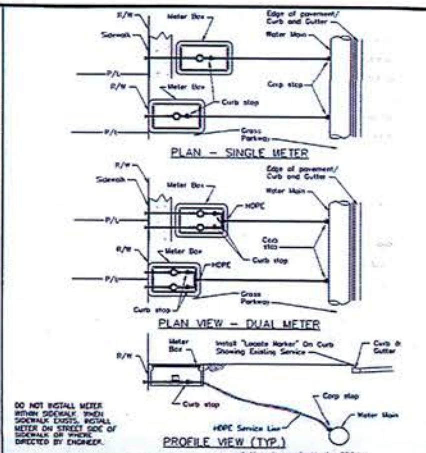
METER INSTALLATION
-PARTS LIST-

ITEM	DESCRIPTION
A	HDPE CJ X METER, SWIVEL NUT (CURB STOP)
B	METER
C	BRASS METER COUPLING
D	*PVC FIP X WELD COUPLING

* All PVC pipe and fittings shall be SCH 80 except for standard tail piece section which will be SCH 40

NOTE: Parts list is for standard installation; actual parts required may vary as directed by the Engineer

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	SINGLE METER SET DETAIL 3/4", 1", 1-1/2", 2"	5.02



DO NOT INSTALL METER WITHIN SIDEWALK. WHEN SIDEWALK EXISTS, INSTALL METER ON STREET SIDE OF SIDEWALK OR WHERE DIRECTED BY ENGINEER.

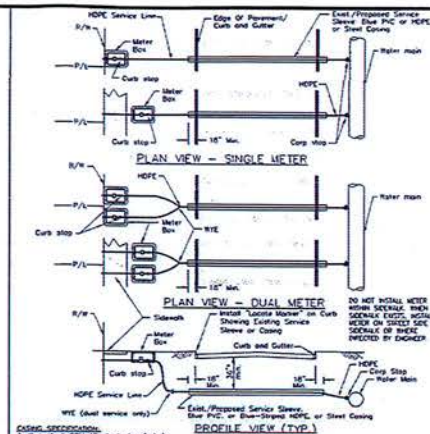
* Line size applicable for DDCVA

SINGLE METER SIZE (inches)	SERVICE LINE SIZE (inches) (0-15')
3/4	1
1	1
1-1/2	2
2*	2

DUAL METER SIZE (inches)	SERVICE LINE SIZE (inches) (0-15')
3/4	2
1	2
1-1/2	n/a
2	n/a

(Feet refer to distance from water main to meter)

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	SINGLE & DUAL METERED SERVICE - SHORT SIDE 3/4", 1", 1-1/2" AND 2"	5.04



DO NOT INSTALL METER WITHIN SIDEWALK. WHEN SIDEWALK EXISTS, INSTALL METER ON STREET SIDE OF SIDEWALK OR WHERE DIRECTED BY ENGINEER.

CASING SPECIFICATION:
1. If pushed-SCH 40 steel pipe (min.)
2. If laid in open trench-SCH 40 steel pipe or SCH 80 PVC solvent weld pipe.

*Or greater, if required by ROW controlling agency
**Line sizes applicable for 2" DDCV

SINGLE METER SIZE (inches)	SERVICE LINE SIZE (inches) (15'-80')	(80'-150')	CASING SIZE (inches)
3/4	1	2	2 / 4
1	2	2	4
1-1/2	2	2	4
2**	4" D.I.P.	4" D.I.P.	12

DUAL METER SIZE (inches)	SERVICE LINE SIZE (inches) (15'-80')	(80'-150')	CASING SIZE (inches)
3/4	2	2	4
1	2	4" D.I.P.	4 / 12
1-1/2	n/a	n/a	n/a
2	n/a	n/a	n/a

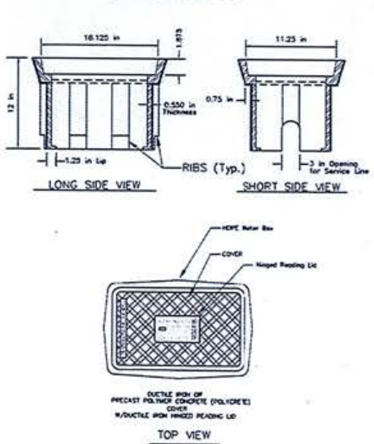
(Feet refer to distance from water main to meter)

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	SINGLE & DUAL METERED SERVICE - LONG SIDE 3/4", 1", 1-1/2" AND 2"	5.05

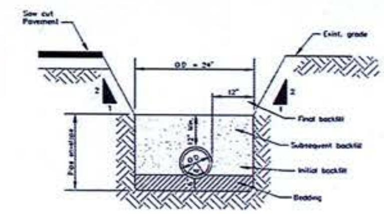
GENERAL SHEET NOTES:

1. DETAILS SHOWN ON THIS SHEET REPRESENT CITY OF TAMPA WATER DEPARTMENT STANDARD DETAILS. FOR CONSTRUCTION, OBTAIN AND REFER TO THE CITY OF TAMPA WATER DEPARTMENT'S CURRENT TECHNICAL STANDARDS MANUAL AND DETAILS.

#37 HDPE METER BOX



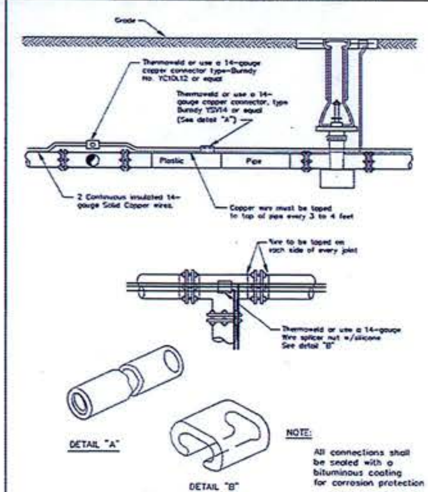
TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	3/4" OR 1" SINGLE SERVICE HDPE METER BOX	5.10



NOTES:

1. Pipe envelope bedding and backfill shall be compacted in 6" loose lifts.
2. Backfill above pipe envelope shall be compacted in 12" loose lifts maximum.
3. Backfill must be compacted to 95% modified proctor out of paved areas and 98% modified proctor in paved areas.

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	PIPE BEDDING AND TRENCH FOR PVC PIPE	7.01



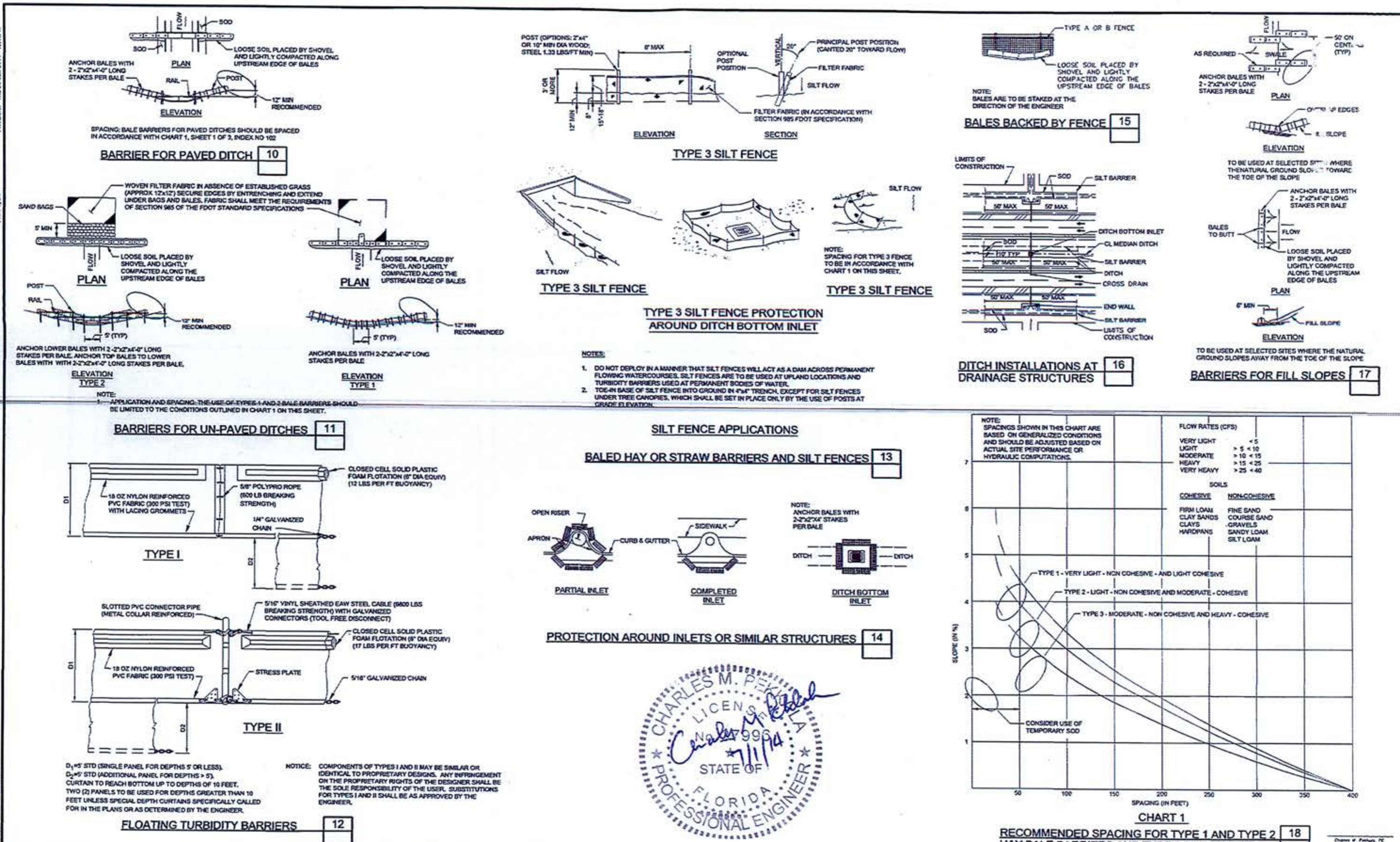
NOTE:
All connections shall be sealed with a bituminous coating for corrosion protection

NTS

TAMPA WATER DEPARTMENT	APPROVED Jan. 2007	REVISED	DOUBLE COPPER TRACER WIRE ON PVC PIPE	7.02

CHARLES M. PEKKALA LICENSE No. 37996 STATE OF FLORIDA PROFESSIONAL ENGINEER 7/1/14

REV	DATE	BY	DESCRIPTION	SCALE: NO SCALE	WARNING: 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED MPEKKALA DRAWN WHITE CHECKED JATKINSON	ISSUED FOR BID - JUNE 2014 ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS	MWH	GREELEY AND HANSEN	CITY OF TAMPA, FLORIDA WATER DEPARTMENT	BLUE SINK MFL PUMPING STATION GENERAL CIVIL STANDARD DETAILS - V	SHEET GC-6 1011673


BARRIER FOR PAVED DITCH 10
SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART 1, SHEET 1 OF 3, INDEX NO 102
ANCHOR BALES WITH 2 - 2"x2"x4'-0" LONG STAKES PER BALE
LOOSE SOIL PLACED BY SHOVEL AND LIGHTLY COMPACTED ALONG UPSTREAM EDGE OF BALES
12" MIN RECOMMENDED
PLAN
ELEVATION
WOVEN FILTER FABRIC IN ABSENCE OF ESTABLISHED GRASS (APPROX 12'x12') SECURE EDGES BY ENTRENCHING AND EXTEND UNDER BAGS AND BALES. FABRIC SHALL MEET THE REQUIREMENTS OF SECTION 985 OF THE FDOT STANDARD SPECIFICATIONS
SAND BAGS
5' MIN
ANCHOR LOWER BALES WITH 2-2"x2"x4'-0" LONG STAKES PER BALE. ANCHOR TOP BALES TO LOWER BALES WITH WITH 2-2"x2"x4'-0" LONG STAKES PER BALE.
ELEVATION TYPE 2
ANCHOR BALES WITH 2-2"x2"x4'-0" LONG STAKES PER BALE
ELEVATION TYPE 1
NOTE:
1. APPLICATION AND SPACING: THE USE OF TYPES 1 AND 2 BALE BARRIERS SHOULD BE LIMITED TO THE CONDITIONS OUTLINED IN CHART 1 ON THIS SHEET.
BARRIERS FOR UN-PAVED DITCHES 11
POST (OPTIONS: 2"x4" OR 10" MIN DIA WOOD; STEEL 1.33 LBS/FT MIN)
6' MAX
OPTIONAL POST POSITION
PRINCIPAL POST POSITION (CANTED 20° TOWARD FLOW)
FILTER FABRIC
SILT FLOW
FILTER FABRIC (IN ACCORDANCE WITH SECTION 985 FDOT SPECIFICATION)
ELEVATION
SECTION
TYPE 3 SILT FENCE
TYPE 3 SILT FENCE PROTECTION AROUND DITCH BOTTOM INLET
NOTE: SPACING FOR TYPE 3 FENCE TO BE IN ACCORDANCE WITH CHART 1 ON THIS SHEET.
NOTES:
1. DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.
2. TOE-IN BASE OF SILT FENCE INTO GROUND IN 4"x4" TRENCH, EXCEPT FOR SILT FENCES UNDER TREE CANOPIES, WHICH SHALL BE SET IN PLACE ONLY BY THE USE OF POSTS AT GRADE ELEVATION.
SILT FENCE APPLICATIONS
BALED HAY OR STRAW BARRIERS AND SILT FENCES 13
OPEN RISER
APRON
CURB & GUTTER
SIDEWALK
NOTE: ANCHOR BALES WITH 2-2"x2"x4' STAKES PER BALE
DITCH
PARTIAL INLET
COMPLETED INLET
DITCH BOTTOM INLET
PROTECTION AROUND INLETS OR SIMILAR STRUCTURES 14
TYPE A OR B FENCE
LOOSE SOIL PLACED BY SHOVEL AND LIGHTLY COMPACTED ALONG THE UPSTREAM EDGE OF BALES
NOTE: BALES ARE TO BE STAKED AT THE DIRECTION OF THE ENGINEER
BALES BACKED BY FENCE 15
LIMITS OF CONSTRUCTION
SOD
SILT BARRIER
50' MAX
DITCH BOTTOM INLET
CL MEDIAN DITCH
CROSS DRAIN
END WALL
DITCH INSTALLATIONS AT DRAINAGE STRUCTURES 16
TO BE USED AT SELECTED SITES WHERE THE NATURAL GROUND SLOPES TOWARD THE TOE OF THE SLOPE
BALES TO BUTT
FILL SLOPE
TO BE USED AT SELECTED SITES WHERE THE NATURAL GROUND SLOPES AWAY FROM THE TOE OF THE SLOPE
BARRIERS FOR FILL SLOPES 17
CLOSED CELL SOLID PLASTIC FOAM FLOTATION (6" DIA EQUIV) (12 LBS PER FT BUOYANCY)
5/8" POLYPRO ROPE (600 LB BREAKING STRENGTH)
18 OZ NYLON REINFORCED PVC FABRIC (300 PSI TEST) WITH LACING GROMMETS
1/4" GALVANIZED CHAIN
TYPE I
SLOTTED PVC CONNECTOR PIPE (METAL COLLAR REINFORCED)
5/16" VINYL SHEATHED EAW STEEL CABLE (9800 LBS BREAKING STRENGTH) WITH GALVANIZED CONNECTORS (TOOL FREE DISCONNECT)
CLOSED CELL SOLID PLASTIC FOAM FLOTATION (8" DIA EQUIV) (17 LBS PER FT BUOYANCY)
18 OZ NYLON REINFORCED PVC FABRIC (300 PSI TEST)
STRESS PLATE
5/16" GALVANIZED CHAIN
TYPE II
D1=5' STD (SINGLE PANEL FOR DEPTHS 5' OR LESS).
D2=5' STD (ADDITIONAL PANEL FOR DEPTHS > 5').
CURTAIN TO REACH BOTTOM UP TO DEPTHS OF 10 FEET.
TWO (2) PANELS TO BE USED FOR DEPTHS GREATER THAN 10 FEET UNLESS SPECIAL DEPTH CURTAINS SPECIFICALLY CALLED FOR IN THE PLANS OR AS DETERMINED BY THE ENGINEER.
NOTICE: COMPONENTS OF TYPES I AND II MAY BE SIMILAR OR IDENTICAL TO PROPRIETARY DESIGNS. ANY INFRINGEMENT ON THE PROPRIETARY RIGHTS OF THE DESIGNER SHALL BE THE SOLE RESPONSIBILITY OF THE USER. SUBSTITUTIONS FOR TYPES I AND II SHALL BE AS APPROVED BY THE ENGINEER.
FLOATING TURBIDITY BARRIERS 12
NOTE: SPACINGS SHOWN IN THIS CHART ARE BASED ON GENERALIZED CONDITIONS AND SHOULD BE ADJUSTED BASED ON ACTUAL SITE PERFORMANCE OR HYDRAULIC COMPUTATIONS.
FLOW RATES (CFS)
VERY LIGHT < 5
LIGHT > 5 < 10
MODERATE > 10 < 15
HEAVY > 15 < 25
VERY HEAVY > 25 < 40
SOILS
COHESIVE: FIRM LOAM, CLAY SANDS, CLAYS, HARDPANS
NON-COHESIVE: FINE SAND, COURSE SAND, GRAVELS, SANDY LOAM, SILT LOAM
TYPE 1 - VERY LIGHT - NON COHESIVE - AND LIGHT COHESIVE
TYPE 2 - LIGHT - NON COHESIVE AND MODERATE - COHESIVE
TYPE 3 - MODERATE - NON COHESIVE AND HEAVY - COHESIVE
CONSIDER USE OF TEMPORARY SOD
SLOPE (IN %)
SPACING (IN FEET)
CHART 1
RECOMMENDED SPACING FOR TYPE 1 AND TYPE 2 HAY BALE BARRIERS AND TYPE 3 SILT FENCES 18
CHARLES M. PEKKALA
LICENSE No. 47996
STATE OF FLORIDA
PROFESSIONAL ENGINEER
7/1/14

REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED: MPEKKALA
DRAWN: WHITE
CHECKED: JATKINSON

ISSUED FOR BID - JUNE 2014

ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

MWH

GREELEY AND HANSEN

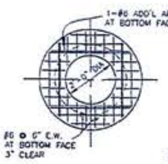
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

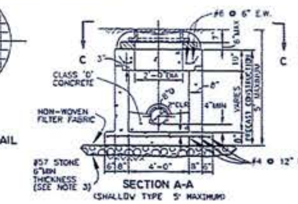
GENERAL CIVIL
DETAILS - III

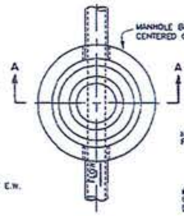
SHEET GC-9

1011673

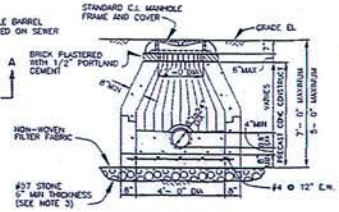


CONCRETE SLAB DETAIL
SECTION C-C





PLAN

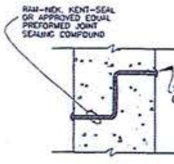


SECTION A-A
5'-0" TO 7'-0" DEEP
(SEE NOTE 4)

STANDARD MANHOLE – SHALLOW TYPE
FOR SEWERS 24" OR LESS IN DIAMETER

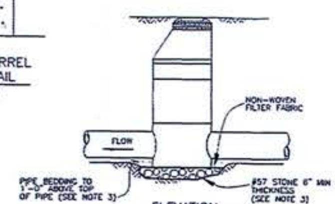
NOTES

1. REINFORCING STEEL FOR ALL MANHOLES SHALL CONFORM TO ASTM-DES: C-48 AND PLACED AS DESCRIBED IN THE SPECIFICATIONS.
2. ALL PIPE STUBS FROM MANHOLES FOR FUTURE CONNECTIONS OR OTHER CONTRACT DIVISIONS SHALL BE PROVIDED WITH WATER TIGHT PLUGS PLACED FROM WITHIN THE MANHOLE.
3. SEE SPECIFICATIONS FOR MATERIALS REQUIREMENTS AND PLACEMENTS AND COMPACTION OF PIPE AND STRUCTURE BEDDING.
4. STANDARD SHALLOW-TYPE MANHOLES WITH DEPTHS BETWEEN A MAXIMUM OF 7'-0" AND A MINIMUM OF 5'-0" MUST HAVE A CONCRETE CONE FOR THE TOP SECTION.
5. ALL MANHOLE JOINTS MUST BE SEALED WITH AN ACCEPTABLE JOINT SEALING COMPOUND REGARDLESS OF WHETHER AN O-RING GASKET IN A PREFORMED GROOVE IS USED.
6. FILTER FABRIC SHALL BE NON-WOVEN FABRIC PER D.O.T. SPECIFICATION SECTIONS 514 AND 985 AND SHALL BE WRAPPED ENTIRELY AROUND THE #57 STONE.



MANHOLE BARREL
JOINT DETAIL
NOT TO SCALE
(SEE NOTE 5)

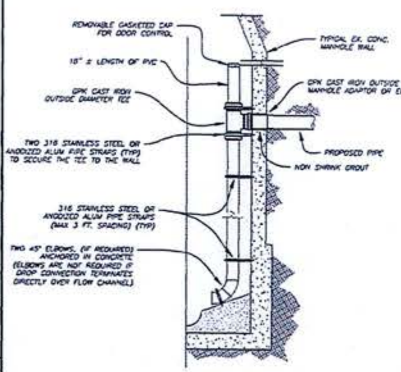
SCHEDULE FOR DROP MANHOLE	
INLET PIPE DIAMETER "D"	DROP PIPE DIAMETER "d"
8"	8"
10"	8"
12"	10"
15"	12"
18"	15"
21"	18"
24"	18"



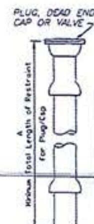
ELEVATION
FOR SEWERS 24" OR LESS IN DIAMETER
NOT TO SCALE

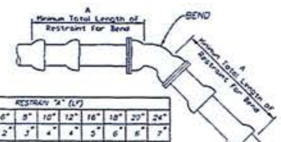
GENERAL SHEET NOTES:

1. DETAILS SHOWN ON THIS SHEET REPRESENT CITY OF TAMPA DEPARTMENT OF SANITARY SEWER'S STANDARD DETAILS. FOR CONSTRUCTION, OBTAIN AND REFER TO THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWER'S CURRENT TECHNICAL STANDARDS MANUAL AND DETAILS.



HALF SECTION INSIDE DROP CONNECTION DETAILS
Not to Scale





RESTRAIN "A" (LF)									
FITTING	4"	6"	8"	10"	12"	16"	18"	20"	24"
11-1/4°	2'	2'	3'	4'	4'	5'	6'	6'	7'
22-1/2°	3'	5'	6'	7'	9'	11'	12'	13'	15'
45°	7'	10'	13'	15'	18'	23	25	27	31
90°	17'	24	31	37	43	55	62	65	75
PLUG/CAP	38	53	69	83	96	126	139	153	178

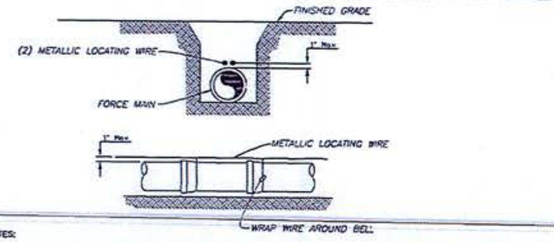
A=MINIMUM FOOTAGE OF PIPE TO BE RESTRAINED

* MINIMUM ONE PIPE JOINT UPSTREAM AND DOWNSTREAM OF EACH FITTING SHALL BE RESTRAINED

NOTES:

1. This table is based on:
   a) Maximum test pressure of 100 psi
   b) Laying condition Class "C"
   c) Poor soil conditions
   d) Horizontal bends only (see note 2)
   e) Using PVC
2. Restrained lengths for vertical bends and tees are to be determined on a case by case basis, and specified on the design plans.
3. Restraining devices for PVC pipe shall be by Megalug or equal, meeting ASTM F1674.
4. Any additional fittings within the restrained section shall be restrained accordingly.

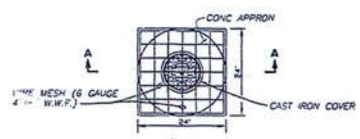
FITTING RESTRAINT DETAIL
(AWWA C900/C905 PVC PIPE)



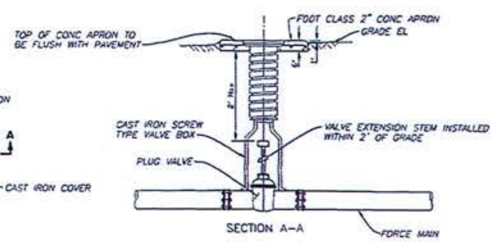
NOTES:

1. Pipe shall require 2 green insulated metallic locating wires capable of detection by a cable locator and shall be buried directly above the centerline of the pipe. Use duct tape as necessary to hold wire directly on top of pipe.
2. Direct bury pipe shall have (2) 12 gauge insulated solid copper wires. Directional drilled pipe shall have (2) 8 gauge insulated solid copper wires or (2) 10 gauge insulated copper clad steel wires. For directional drilled HDPE pipe a 1" conduit may be pulled back with the locating wires to ease installation and to prevent the wires from breaking.
3. Wire insulation must be suitable for buried service. HDPE or HMWPE are acceptable insulation materials. Nylon insulation is not acceptable.
4. Wires must be spliced together with wire connectors suitable for buried service. Connectors shall be corrosion and moisture proof such as DBR Kit by 3M, Snakebite by Copperhead Industries or equal. Twisting the wires and sealing with electrical tape alone is not acceptable.
5. All tracer wires must pass a continuity test in presence of a City Inspector. No pipe will be accepted by the City until a continuity test passes.
6. Locating wire shall terminate at the top of each valve box and air release valve. Wire shall be capable of extending 24" above top of box in such a manner so as not to interfere with valve operation.

PIPE LOCATING WIRE DETAIL
Not To Scale



PLAN



SECTION A–A

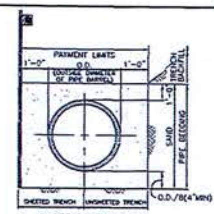
VALVE BOX DETAIL
Not To Scale

IMPORTANT - FOR EACH OPERABLE VALVE:

PROVIDE A BRASS IDENTIFICATION TAG EPOXIED TO THE CONCRETE APRON THAT IS A MINIMUM 2" IN DIAMETER AND 1/8-INCH THICK. THE TAG SHALL BE ENGRAVED WITH "SEWER", SIZE OF VALVE, TYPE OF VALVE, AND DIRECTION AND NUMBER OF TURNS TO OPEN.

FOR EXAMPLE, A 4-INCH PLUG VALVE ON A WASTEWATER FORCE MAIN THAT REQUIRES 1/4 TURNS TO THE LEFT(COUNTERCLOCKWISE) TO BE FULLY OPEN WOULD REQUIRE THE FOLLOWING ON AN IDENTIFICATION TAG:

VALVE OPERATION DISK
Not To Scale



CLASS C BEDDING

REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED MPEKKALA
DRAWN WHITE
CHECKED JATKINSON

ISSUED FOR BID - JUNE 2014

ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

MWH®

GREELEY AND HANSEN

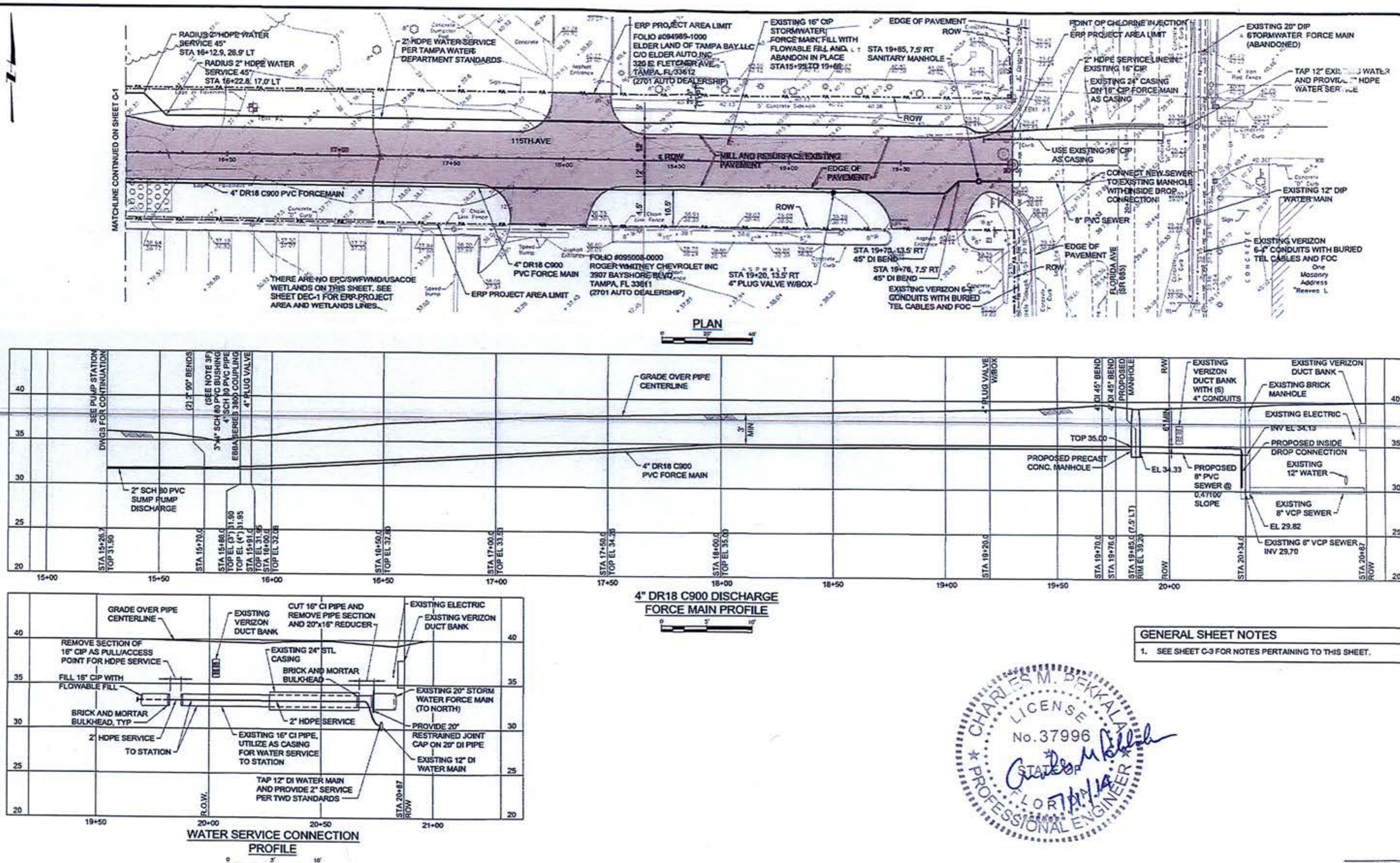
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

GENERAL CIVIL
DETAILS - V

SHEET GC-11

1011673



GENERAL SHEET NOTES

1. SEE SHEET C-3 FOR NOTES PERTAINING TO THIS SHEET.

CHARLES M. PEKKALA LICENSE No. 37996 STATE OF FLORIDA PROFESSIONAL ENGINEER 7/1/14

REV	DATE	BY	DESCRIPTION	SCALE	WARNING	DESIGNED MPEKKALA / DRAWN JWHITE / CHECKED JATKINSON	ISSUED FOR BID - JUNE 2014
				H: 1"=20' V: 1"=5'	0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE		ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

MWH. GREELEY AND HANSEN

CITY OF TAMPA, FLORIDA WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

CIVIL

SITE AND YARD PIPING PLAN - II

SHEET C-2

1011673

CIVIL NOTES

1. REFER TO DRAWING DEC-2 FOR INSTALLATION OF EROSION CONTROL MEASURES AND FENCING.
2. ACCESS TO THE PUMPING STATION SITE AND EAST SIDE OF BLUE SINK IS ALONG 115TH AVENUE FROM FLORIDA AVENUE. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" SHOWN ON DRAWING GC-7 FOR LOCATION OF ACCESS POINTS TO THE SITE. A TEMPORARY CONSTRUCTION STAGING AND STORAGE AREA ON 115TH AVENUE IS IDENTIFIED ON THE PLAN. DO NOT BLOCK ACCESS TO THE CAR DEALERSHIPS LOCATED ON THE NORTH AND SOUTH SIDES OF 115TH AVENUE. IF ADDITIONAL STORAGE OR CONSTRUCTION PARKING IS REQUIRED, PROVIDE OFF SITE STORAGE AND PARKING AT ANOTHER LOCATION.
3. PROJECT INCLUDES CONSTRUCTION OF A 4-INCH FORCE MAIN, MANHOLE AND 8-INCH SANITARY SEWER IN THE RIGHT OF WAY. CONSTRUCTION OF THE FORCE MAIN, MANHOLE AND SEWER SHALL COMPLY WITH THE CURRENT MATERIALS AND CONSTRUCTION STANDARDS OF THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS (DSS). COMPLY WITH THE FOLLOWING:
   a. AT LEAST 3 WEEKS PRIOR TO ANY CONSTRUCTION, THE DEVELOPER'S REPRESENTATIVE SHALL CONTACT ALEX GONZALEZ OF THE WASTEWATER PLANNING DIVISION, 2545 N. GUY VERGER BLVD., TAMPA, FLORIDA 33605 (PHONE 813-274-1293), AND SUPPLY HIM WITH FURTHER CONSTRUCTION INFORMATION. THIS INFORMATION SHOULD INCLUDE ALL REQUIRED SHOP DRAWINGS, THE CONTRACTOR'S NAME, STARTING DATE, PROJECTED SCHEDULE, AND OTHER INFORMATION REQUIRED BY THE PLANNING DIVISION. THE PLANNING DIVISION OFFICE MUST ALSO BE CONTACTED BY TELEPHONE FIVE DAYS PRIOR TO THE ACTUAL START OF FIELD OPERATIONS IN ORDER TO ENSURE AVAILABILITY OF INSPECTION PERSONNEL. IT IS IMPERATIVE THAT YOUR CONTRACTOR BE FULLY INFORMED OF THE NOTIFICATION AND SUBMITTAL REQUIREMENTS. FAILURE TO COMPLY WITH THESE REQUIREMENTS WILL DELAY THE APPROVAL AND ACCEPTANCE OF THE CONSTRUCTED FACILITIES AND THE RELEASE OF THE CERTIFICATE OF OCCUPANCY FOR THE PROJECT.
   b. THE CONTRACTOR SHALL PERFORM AN INFILTRATION/EXFILTRATION TEST ON ALL GRAVITY SEWERS AND A PRESSURE TEST ON ALL FORCE MAINS (AS APPLICABLE) IN ACCORDANCE TO THE CITY OF TAMPA'S WASTEWATER DEPARTMENT REGULATIONS. SAID TEST ARE TO BE CERTIFIED BY THE ENGINEER OF RECORD AND SUBMITTED TO THE CITY OF TAMPA WASTEWATER DEPARTMENT FOR APPROVAL. THE SCHEDULING, COORDINATION AND NOTIFICATION TO ALL PARTIES IS THE CONTRACTOR'S RESPONSIBILITY.
   c. ONE OR MORE OF THE FOLLOWING CERTIFICATES/SHOP DRAWINGS, DEPENDING ON THE TYPE OF CONNECTION, WILL BE REQUIRED. THESE ITEMS MUST BE REVIEWED AND APPROVED BY THE COLLECTIONS DIVISION PRIOR TO STARTING CONSTRUCTION AND SHALL BE SUBMITTED IN ACCORDANCE WITH NOTE NO. A.
      i. DIP/PVC CERTIFICATE OF MANUFACTURE.
      ii. MANHOLE SHOP DRAWINGS AND STRENGTH REPORT.
      iii. FRAME AND COVER SHOP DRAWINGS.
      iv. FLEXIBLE COUPLING SHOP DRAWINGS.
      v. CASING PIPE CERTIFICATE.
      vi. JACKING PIT DETAIL.
      vii. CRUSHED STONE SUBMITTAL.
      viii. VALVE SHOP DRAWING.
      ix. MANHOLE DROP CONNECTION DETAIL.
   d. THE CERTIFICATE OF OCCUPANCY WILL NOT BE ISSUED UNTIL THE FOLLOWING HAS BEEN COMPLETED:
      i. FINAL INSPECTION IN CONJUNCTION WITH DEPARTMENT PERSONNEL COMPLETED.
      ii. AS-BUILTS HAVE BEEN SUBMITTED AND ACCEPTED.
      iii. ALL NECESSARY TESTING COMPLETED AND CERTIFIED.
      iv. PAYMENT OF ALL CAPACITY FEES.
      v. ISSUANCE OF F.D.E.P. CERTIFICATION OF COMPLETION APPROVAL (IF APPLICABLE).
   e. FOR SUMP PUMP PIPING FROM SUMP PUMPS, SEE PLUMBING DRAWINGS FOR PORTION INSIDE BUILDING AND DRAWING C1 AND C2 FOR PORTION OUTSIDE OF BUILDING AND ON THE PUMPING STATION SITE. SUMP PUMP PIPING ORIGINATES FROM DUPLEX, 1.5-HP SUBMERSIBLE PUMPS. SEE DRAWING GP-2 FOR COPY OF PUMP CURVE.
   f. FOR SUMP PUMP PIPING INSIDE THE BUILDING AND ON THE PUMPING STATION SITE PROVIDE 3-INCH SCHEDULE 80 SOLVENT WELDED PVC. CONNECT THE 3-INCH SUMP PUMP DISCHARGE TO THE 4-INCH PVC FORCE MAIN ON THE PUMPING STATION SITE WITH A 3-INCH BY 4-INCH SCHEDULE 80 PVC BUSHING, SHORT LENGTH OF 4-INCH DIAMETER SCHEDULE 80 PVC PIPE AND AN EBBA IRON SERIES 3800 RESTRAINED COUPLING WITH TRANSITION GASKET FOR THE 4-INCH SCHEDULE 80 PIPE.
   g. PROVIDE 4-INCH C900 (DR 18) GREEN PVC FORCE MAIN FROM INSIDE THE PUMPING STATION SITE TO THE TERMINATION POINT AT THE SANITARY SEWER. ALL FORCE MAIN VALVES, FITTINGS AND BENDS SHALL HAVE RESTRAINED MECHANICAL JOINTS. RESTRAIN 4-INCH PIPE UPSTREAM AND DOWNSTREAM OF THE VALVES AND BENDS IN ACCORDANCE WITH DSS RESTRAINT TABLE DETAIL. RESTRAINING DEVICES SHALL BE EBBA IRON "MEGALUG" OR APPROVED EQUAL. CONSTRUCT THE PROPOSED FORCE MAIN ACCORDING TO THE STATIONS AND INVERT ELEVATIONS PROVIDED ON THE PLANS WITH NO INTERMEDIATE HIGH OR LOW POINTS BETWEEN VERTICAL POINTS OF INTERSECTION. PROVIDE A METALLIC LOCATING WIRE ON THE FORCE MAIN IN ACCORDANCE WITH CITY OF TAMPA'S PIPE LOCATING WIRE DETAIL. DO NOT DEFLECT THE PIPE JOINTS. BEND PIPE TO OBTAIN VERTICAL DEFLECTIONS SHOWN. PROVIDE A 4-INCH DUCTILE IRON PLUG VALVE INSIDE THE STATION SITE AND OUTSIDE THE RIGHT OF WAY OF FLORIDA AVENUE AS SHOWN ON DRAWING C-2.
   h. PROVIDE A NEW SANITARY MANHOLE IN THE RIGHT-OF-WAY OF 115TH AVE AND TERMINATE THE 4-INCH PVC FORCE MAIN IN THIS MANHOLE. CONNECT THE NEW PRE-CAST CONCRETE SANITARY MANHOLE TO THE EXISTING SANITARY BRICK MANHOLE IN FLORIDA AVE WITH 8-INCH PVC SANITARY SEWER, AND A NEW INSIDE DROP CONNECTION AT THE EXISTING BRICK MANHOLE. THE NEW PVC SEWER SHALL BE SDR26 C900 PIPE. NOTE THAT FLORIDA AVE IS A STATE ROAD. CONDUCT ALL WORK IN ACCORDANCE WITH THE FDOT PERMIT.
4. PROVIDE WATER SERVICE FROM THE EXISTING 12-INCH DUCTILE IRON WATER MAIN TO THE STATION SITE. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE TAMPA WATER DEPARTMENT CURRENT MATERIAL STANDARDS AND DETAILS. NOTE THAT FLORIDA AVE IS A STATE ROAD. CONDUCT ALL WORK IN ACCORDANCE WITH THE FDOT PERMIT.
   a. UTILIZE THE EXISTING 16-INCH CAST IRON STORMWATER FORCE MAIN LOCATED IN FLORIDA AVE AS A CASING FOR THE NEW 2-INCH HDPE WATER SERVICE. THE PORTION OF THE STORMWATER FORCE MAIN TO BE UTILIZED IS SHOWN ON C-2. THE REMAINDER OF THE EXISTING STORMWATER FORCE MAIN IN 115TH AVE OR THE STATION SITE SHALL BE FILLED WITH FLOWABLE FILL AND ABANDONED IN PLACE, OR DEMOLISHED, AS SHOWN ON SHEETS C-1 AND C-2.
   b. TAP THE 12-INCH WATER MAIN IN FLORIDA AVE AND PROVIDE A 2-INCH HDPE SERVICE FROM THE NEW TAPPED CONNECTION TO THE PROPOSED WATER METER, AT APPROXIMATE STATION 16+00.
   c. PROVIDE A NEW CITY OF TAMPA WATER METER AND BOX IN ACCORDANCE WITH TAMPA WATER DEPARTMENT STANDARDS. ARRANGE AND PAY ALL FEES ASSOCIATED WITH THE WATER SERVICE.
   d. WATER SERVICE FROM THE NEW METER TO THE PUMPING STATION SHALL BE SCHEDULE 80 SOLVENT WELDED PVC PIPE. REFER TO THE PLUMBING DRAWINGS FOR BACKFLOW PREVENTION AND PIPING WITHIN THE PUMP STATION BUILDING. REFER TO THE LANDSCAPING PLAN FOR CONNECTION TO THE PUMP STATION IRRIGATION SYSTEM AND BACKFLOW PREVENTION FOR THE IRRIGATION SYSTEM.
   e. TAP OF CITY WATER MAIN TO BE PERFORMED BY CITY WATER DEPARTMENT PERSONNEL ONLY.CONTRACTOR SHALL EXCAVATE, FURNISH, AND INSTALL APPROVED TAPPING SLEEVE AND TAPPING VALVE, AND CONDUCT PRESSURE TEST OF TAPPING SLEEVE (TEST TO BE WITNESSED BY CITY). CITY TO PERFORM ACTUAL TAP. CALL THE CITY'S CONSTRUCTION SERVICES DEPARTMENT AT 635-3432 TO SCHEDULE THE TAP.
   f. THE PUBLIC PORTION OF THE WATER MAIN MUST BE INSTALLED BY AN EXPERIENCED WATER MAIN CONTRACTOR. IF THE WATER MAIN CONTRACTOR HAS NOT BEEN PREVIOUSLY APPROVED BY THE CITY, IT WILL BE NECESSARY TO SUBMIT PROOF OF COMPETENCE TO PERFORM THE WORK.
   g. CONTACT THE CITY'S CONSTRUCTION SERVICES DEPARTMENT AT 635-3432 TO COORDINATE AND SCHEDULE A PRE-CONSTRUCTION MEETING TO REVIEW MATERIALS SUBMITTALS AND DISCUSS INSTALLATION TECHNIQUES AND PROCEDURES RELATED TO THE PUBLIC WATER FACILITIES. CONTACT SHOULD OCCUR A MINIMUM OF 10 WORKING DAYS PRIOR TO INTENDED START OF WORK.
   h. VALVES ON EXISTING PUBLIC WATER MAIN ARE TO BE OPERATED ONLY BY CITY PERSONNEL.
   i. ALL COMPONENTS OF THE PUBLIC WATER SYSTEM, INCLUDING FITTINGS, CONNECTIONS AND VALVES SHALL BE PROPERLY PRESSURE TESTED AND ACCEPTED BY THE OWNER'S ENGINEER. PRESSURE TESTS SHALL BE IN ACCORDANCE WITH WATER DEPARTMENT SPECIFICATIONS. CONTRACTOR TO NOTIFY OWNER'S ENGINEER AND CITY INSPECTOR A MINIMUM 3 WORKING DAYS IN ADVANCE OF TEST.
   j. NO TREES SHALL BE PLANTED WITHIN 10 FEET OF INSTALLED AND EXISTING WATER MAINS.
5. REFER TO THE ELECTRICAL DRAWINGS FOR THE STATION ELECTRICAL SERVICE. ARRANGE AND PAY ALL FEES ASSOCIATED WITH THE TECO POLE-MOUNTED UTILITY TRANSFORMER AND ELECTRICAL SERVICE.
6. REFER TO SHEET C-4 FOR REPAVING OF 115TH AVE, PROVIDING THE STATION DRIVEWAY AND MILLING AND OVERLAY OF FLORIDA AVE ONCE WATER AND SEWER UTILITY SERVICES ARE INSTALLED AND PAVEMENT RESTORED.
7. ALL BURIED 4-INCH FORCE MAIN PIPING SHOWN ON THIS SHEET SHALL BE DR18 GREEN-COLORED C900 PVC PIPE MEETING THE REQUIREMENTS OF SPECIFICATION SECTION 339550 POLY VINYL CHLORIDE PRESSURE PIPING, RUBBER JOINTS. PROVIDE PROTECTO 401 LINED DUCTILE IRON FITTINGS MEETING THE REQUIREMENTS OF SECTION 339220 DUCTILE IRON PIPING. POLYETHYLENE ENCASE ALL FITTINGS AND VALVES. PRESSURE TEST PIPE AT 100 PSIG AND MEET LEAKAGE REQUIREMENTS AS SPECIFIED IN SECTION 017430 - PRESSURE PIPE TESTING AND DISINFECTION. SEE OTHER NOTES THIS SHEET FOR COORDINATION REQUIREMENTS WITH THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS.
8. BURIED POTABLE WATER PIPING SHOWN ON THIS SHEET UPSTREAM OF THE WATER METER SHALL BE DR-9 CTS BLUE 2-INCH HIGH DENSITY POLYETHYLENE TUBING MEETING AWWA C-901 AND CITY OF TAMPA WATER DEPARTMENT STANDARDS. PRESSURE TEST AT 100 PSIG AND MEET ZERO LEAKAGE REQUIREMENTS AND DISINFECT AS SPECIFIED IN SECTION 017430 - PRESSURE PIPE TESTING AND DISINFECTION.
9. 8-INCH GRAVITY SEWER SHOWN ON THIS SHEET SHALL BE SDR 26 GREEN PVC SEWER PIPE MEETING THE REQUIREMENTS OF SPECIFICATION SECTION 339540 SMALL POLY VINYL CHLORIDE NON PRESSURE PIPING, RUBBER JOINTS. TEST PIPE FOR LEAKAGE IN ACCORDANCE WITH CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS STANDARDS.
10. SERVICE CONNECTION TO THE EXISTING WATER MAIN, PIPE BEDDING, LOCATING TAPE OR WIRE AND OTHER APPURTENANT WORK FOR THE POTABLE WATER SERVICE AND RAW WATER MAINS SHALL CONFORM TO THE CITY OF TAMPA WATER DEPARTMENT MATERIALS STANDARDS AND DETAILS.
11. CONSTRUCTION OF THE FORCE MAIN, PIPE BEDDING, VALVES, LOCATING WIRE, MANHOLE, INSIDE DROP CONNECTION TO THE EXISTING MANHOLE AND OTHER APPURTENANT WORK FOR THE FORCE MAIN AND SEWER SHALL CONFORM TO THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS MATERIALS STANDARDS AND DETAILS.

F.D.O.T. GENERAL NOTES: UTILITY PERMIT

1. THE FOLLOWING APPLIES TO WORK IN FLORIDA AVENUE (SR 685).
   a. CALL JAMES MEYER (FDOT) @ 813-612-3200 TO SCHEDULE A PRE-CONSTRUCTION MEETING.
   b. SUBMIT TO FDOT DOCUMENTATION OF SUCCESSFUL COMPLETION OF AN APPROVED WORK ZONE TRAFFIC CONTROL COURSE FOR INSTALLING AND/OR MAINTAINING THE APPROVED MAINTENANCE OF TRAFFIC PLAN. FURNISH DOCUMENTATION AT THE FDOT PRE-CONSTRUCTION MEETING OR BEFORE OCCUPYING THE STATE RIGHT OF WAY. ALL LANE CLOSURES MUST BE APPROVED IN ADVANCE BY FDOT.
   c. A COPY OF THE APPROVED PERMIT AND DRAWINGS MUST BE ON THE JOBSITE FOR WORK TO BEGIN IN THE FDOT RIGHT OF WAY.
   d. ANY SIDEWALK DISTURBED WILL BE REPLACED, BY SECTION, TO FDOT SPECIFICATIONS.
   e. ALL PORTIONS OF FDOT RIGHT OF WAY DISTURBED MUST BE SODDED.
   f. NEW SIDEWALK PERMITTED TO CITY OR COUNTY ONLY AND SHALL INCORPORATE HANDICAP RAMPS WHERE SIDEWALK INTERSECTS ROADS AND STREETS.
   g. IN ACCORDANCE WITH FLORIDA STATUTE 335.1825 (2), "THE PERMITTEE, HOWEVER, SHALL BEAR THE COST OF ALTERATION OF ANY CONNECTION WHICH IS REQUIRED BY THE DEPARTMENT DUE TO INCREASED OR ALTERED TRAFFIC FLOWS GENERATED BY CHANGES IN THE FACILITIES OR NATURE OF BUSINESS CONDUCTED AT THE LOCATION SPECIFIED IN THE PERMIT, IF THE DEPARTMENT ESTABLISHES THE NEED FOR SUCH ALTERATION."
   h. ALL CONSTRUCTION AND/OR MAINTENANCE IN THE FDOT R/W SHALL CONFORM TO THE FEDERAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE DEPARTMENT'S ROADWAY AND TRAFFIC DESIGN STANDARDS AND THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
   i. IF CONSTRUCTION, RECONSTRUCTION, REPAIR OR MAINTENANCE ACTIVITY NECESSITATES THE CLOSING OF ONE OR MORE TRAVEL LANES OF ANY ROAD ON THE STATE PRIMARY, COUNTY ROAD OR CITY STREET SYSTEM, FOR A PERIOD OF TIME EXCEEDING TWO HOURS, THE PARTY PERFORMING SUCH WORK WILL BE RESPONSIBLE TO GIVE NOTICE TO THE APPROPRIATE LAW ENFORCEMENT AGENCY WHICH HAS JURISDICTION WHERE SUCH ROAD IS LOCATED PRIOR TO COMMENCING WORK ON THIS PROJECT PER FLORIDA STATUTE 335.15 AND 338.07.
   j. OPEN CUTTING OF ROADWAY FOR INSTALLATION OF UTILITY OR DRAINAGE FACILITIES WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL FROM FDOT.
   k. NOTE THAT SIDEWALK SHALL BE CONSTRUCTED PER FDOT INDEX 304 AND 310. DETECTABLE WARNING STRIPS, A.K.A. TRUNCATED DOMES, FOR DISTRICT SEVEN CONSTRUCTION AND MAINTENANCE SHOULD BE EITHER INSET CERAMIC TILES OR THERMOPLASTIC DETECTABLE WARNING STRIPS. THESE WARNING SURFACES SHALL ONLY BE PROVIDED BY THE FOLLOWING VENDORS/MANUFACTURERS OR AS APPROVED BY THE ENGINEER.
   l. INLINE TRUNCATED DOME EZ TILE SUPPLIED BY PROFESSIONAL PAVEMENT PRODUCTS
   m. TOPMARK SUPPLIED BY FLINT TRADING
   n. VANGUARD TRUNCATED DOME SUPPLIED BY VANGUARD
   o. NOTE THAT DRIVEWAYS ARE TO BE CONSTRUCTED PER FDOT INDEX 515. THOUGH INDEX 515 ALLOWS A 2% SLOPE ACROSS SIDEWALKS, CURRENT ADA REQUIREMENTS ARE THAT 2% IS THE MAXIMUM ALLOWABLE SLOPE AS CONSTRUCTED. PLEASE DESIGN SIDEWALK SLOPE WITHIN FDOT RIGHT OF WAY AT 1.5% TO ALLOW CONSTRUCTION VARIANCES.
   p. FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (2013) (A.K.A. STANDARD SPECS).
   q. FDOT DESIGN STANDARDS FOR DESIGN, CONSTRUCTION, MAINTENANCE AND OPERATIONS ON THE STATE HIGHWAY SYSTEM, JAN., 2013, (A.K.A. STANDARD INDEX) APPLY. COMPLIANCE WITH ALL APPLICABLE INDICES IS REQUIRED.
   r. FLORIDA DEPARTMENT OF TRANSPORTATION ROADWAY PLANS PREPARATION MANUAL, VOLUME 1, CHAPTERS 2 AND 25. (REVISED 2012).
2. COMPLY WITH FLORIDA DEPARTMENT OF TRANSPORTATION FLEXIBLE PAVEMENT DESIGN MANUAL FOR NEW CONSTRUCTION AND PAVEMENT REHABILITATION, JANUARY 2012.
3. ALL TRAFFIC STRIPES AND MARKINGS ARE TO BE LEAD FREE, NON SOLVENT BASED THERMOPLASTIC. THE PERMITTEE SHALL FURNISH THE DEPARTMENT WITH THE MANUFACTURER'S CERTIFICATION THAT THE THERMOPLASTIC IS "LEAD FREE".
4. LANE CLOSURE MAY NEED TO BE ALTERED DEPENDING ON THE AREA THE WORK IS TAKING PLACE.

Lane closure times 7:00PM to 5:00AM
One (1) lane shall be completed at a time to maintain
Traffic flow one lane in each direction.
North Bound then South Bound

CHARLES M. PEKKALA
LICENSE
No. 3[illegible]
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

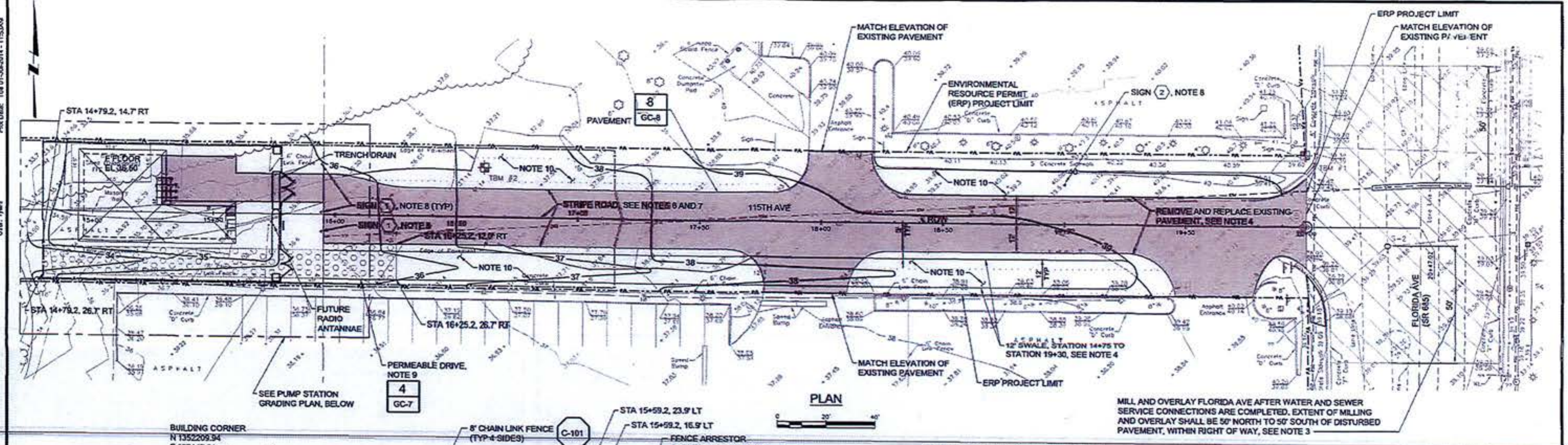
REV	DATE	BY	DESCRIPTION	SCALE	WARNING		ISSUED FOR BID - JUNE 2014
				NO SCALE	0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED MPEKKALA DRAWN JWHITE CHECKED JATKINSON	ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

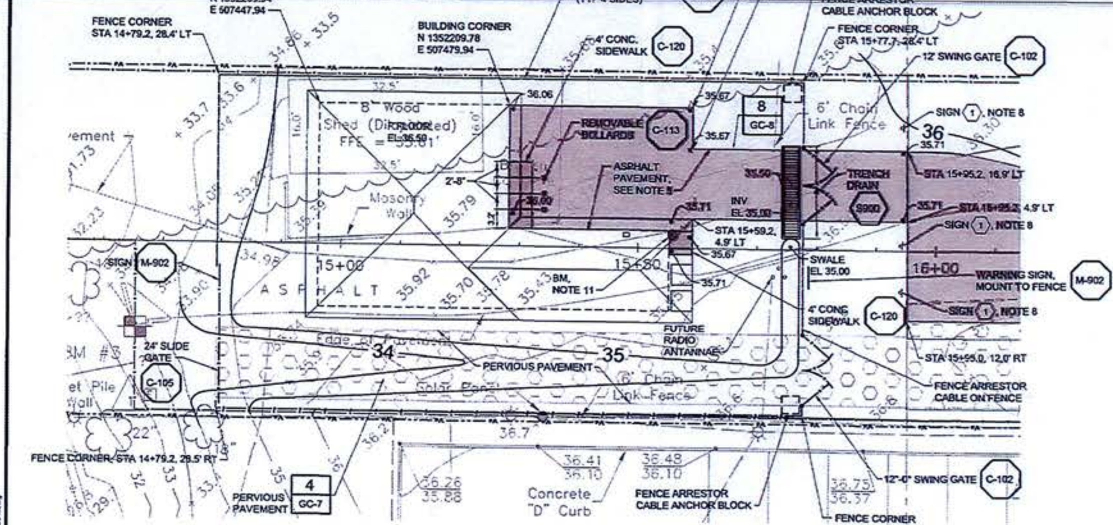
MWH® | GREELEY AND HANSEN

CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION
CIVIL
SITE AND YARD PIPING PLAN - III

SHEET C-3
1011673





PUMP STATION GRADING PLAN

SIGNAGE TABLE (115TH AVE)

MARK	SIGN	REQUIREMENTS
1	END OF ROAD DIAMOND MARKER SIGN, CASE II	FDOT INDEX 17349, CASE II WITH RED REFLECTORS ON 2"Ø x ⅛" ALUMINUM ROUND POST AND FDOT INDICE 11860 DRIVEN POST FOUNDATION
2	"DEAD END" DIAMOND MARKER SIGN WITH RECTANGULAR "300 FT" DISTANCE PANEL	FDOT INDEX 17349, W14-1 ON 2"Ø x ⅛" ALUMINUM ROUND POST AND FDOT INDICE 11860 DRIVEN POST FOUNDATION. SET PER CASE V OF FDOT INDICE 17302

LEGEND

PROVIDE CLEAN FILL WHERE EXISTING PAVEMENT AND BASE IS DEMOLISHED OUTSIDE OF PAVEMENT LIMITS

GENERAL SHEET NOTES

1. REFER TO SHEETS DEC-1 AND DEC-2 FOR EROSION CONTROL AND TREE PROTECTION MEASURES TO BE MAINTAINED DURING CONSTRUCTION.
2. REFER TO SHEETS C-1 AND C-2 FOR CONSTRUCTION OF SITE UTILITIES AND PUMPING STATION.
3. CONSTRUCTION OF WATER AND SEWER SERVICE CONNECTIONS TO EXISTING WATER MAIN AND EXISTING SANITARY SEWER ARE SHOWN ON SHEET C-2. FLORIDA AVENUE IS A STATE ROAD, SEE FDOT GENERAL NOTES ON SHEET C-3 FOR REQUIREMENTS FOR WORKING IN SR 685. AFTER THE WATER AND SEWER SERVICES HAVE BEEN CONSTRUCTED AND ACCEPTED BY THE CITY AND THE ROAD REPAIRED AND ACCEPTED BY THE CITY AND FDOT, MILL THE EXISTING PAVEMENT 1-INCH AND RESURFACE THE MILLED AREA WITH 1-INCH MINIMUM [redacted] (FC-9.5) IN ACCORDANCE WITH THE FDOT PERMIT AND CONTRACT REQUIREMENTS. RESTORE ALL LANE STRIPING, REFLECTORS AND OTHER EXISTING MARKINGS IN ACCORDANCE WITH FDOT REQUIREMENTS.
4. REBUILD 115TH AVENUE WITH NEW BASE AND PAVEMENT FROM THE WEST FLORIDA AVENUE RIGHT OF WAY TO THE PUMPING STATION SITE IN ACCORDANCE WITH THE DETAILS SHOWN ON THE PLANS. DISPOSE OF EXISTING PAVEMENT AND ANY BASE MATERIAL. GRADE ROAD TO MATCH EXISTING PAVEMENT IN FLORIDA AVENUE AND PRIVATE DRIVEWAYS IN 115TH AVENUE, TO NEW CONTOURS SHOWN ON THE PLAN, AND TO MAINTAIN EXISTING DRAINAGE AND GRADE. PROVIDE SWALE ON SOUTH SIDE OF 115TH AVENUE AS SHOWN ON THE PLAN.
5. PROVIDE NEW ASPHALT PAVEMENT IN THE STATION SITE MATCHING THE ROADWAY CONSTRUCTION OF 115TH AVENUE, PER DETAIL 8/GC-8.
6. PROVIDE WHITE EDGE OF ROAD STRIPING FOR NEW PAVING IN 115TH AVENUE ON NORTH AND SOUTH SIDE OF ROAD MEETING FDOT STANDARDS.
7. PROVIDE YELLOW SKIP LINE CENTER STRIPING AND BIDIRECTIONAL YELLOW REFLECTORS IN 115TH AVENUE MEETING FDOT STANDARDS.
8. PROVIDE NEW SIGNAGE FOR 115TH AVENUE PER TABLE SHOWN ON THIS SHEET.
9. CONSTRUCT NEW PERMEABLE DRIVE PER DETAIL SHOWN ON SHEET GC-7, MATCHING GRADING CONTOURS SHOWN ON THE PLAN.
10. SOD ALL DISTURBED AREAS IN THE 115TH AVENUE RIGHT OF WAY AFTER ROADWAY CONSTRUCTION IS COMPLETED. THE CONTRACTOR IS RESPONSIBLE FOR WATERING AND MAINTAINING THE RIGHT OF WAY SODDING DURING THE WARRANTEE PERIOD FOR THE PROJECT. AT A MINIMUM, WATERING SHALL BE CONDUCTED FOLLOWING SCHEDULE: MONTH 1 = DAILY; MONTH 2 = THREE TIMES WEEKLY; MONTH 3-5 = WEEKLY. THE SPECIFIED FREQUENCY IS A MINIMUM. PROVIDE ADDITIONAL WATERING ON THE FREQUENCY NEEDED TO MAINTAIN THE SOD UNTIL IT IS VIABLE AND IS WELL ESTABLISHED.
11. PROVIDE NEW BENCHMARK IN ACCORDANCE WITH CITY OF TAMPA STANDARDS. PROVIDE 4-INCH DIAMETER BRONZE DISK SECURED WITH GLUE AND TAPCON. PROVIDE BENCHMARKS ON CONCRETE SIDEWALK AT ELECTRIC ROOM DOOR AND ON MONITORING WELL PAD.

CHARLES M. PEKKALA LICENSE No. 37996 STATE OF FLORIDA PROFESSIONAL ENGINEER 7/7/14

REV	DATE	BY	DESCRIPTION

SCALE: H: 1"=20' H: 1"=10'

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED: MPEKKALA
DRAWN: JWHITE
CHECKED: JATKINSON

ISSUED FOR BID - JUNE 2014

ANY PRINTS NOT BEARING THIS STAMP MAY HAVE BEEN PRINTED PRIOR TO ADVERTISING AND CANNOT BE CONSIDERED AS BID DOCUMENTS

MWH | GREELEY AND HANSEN

CITY OF TAMPA, FLORIDA WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

CIVIL
SITE GRADING, PAVING AND FENCING PLAN

SHEET C-4

1011673

CIVIL GENERAL NOTES

1. DEVELOPMENT SUMMARY
   a. DESCRIPTION: THE BLUE SINK MFL PUMP STATION PROJECT CONSISTS OF CONSTRUCTING A NEW PUMPING STATION REQUIRED BY SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT RULE TO TRANSFER WATER FROM BLUE SINK TO THE HILLSBOROUGH RIVER FOR ENVIRONMENTAL ENHANCEMENT PURPOSES. THE PROJECT COMPONENTS INCLUDE NEW 2 MGD PUMPING STATION WITH ELECTRICAL ROOM, TWO 16-INCH SUCTION PIPES FROM THE SINK TO THE PUMPING STATION, ONE 16-INCH DISCHARGE PIPE FROM THE STATION TO A CONNECTION POINT WITH 16-INCH RAW WATER PIPING BY OTHERS, A 4-INCH FORCE MAIN FOR SUMP PUMP DISCHARGE AND A 1.5-INCH WATER SERVICE.
   b. OWNER: CITY OF TAMPA WATER DEPARTMENT
   c. PROPERTY ADDRESS: 151 W. 115TH AVE., TAMPA, FL
   d. ZONING: CI
   e. LEGAL DESCRIPTION: SEE SHEET DEC-2
   f. SPECIAL DISTRICTS: THE PROJECT IS NOT IN A SPECIAL/HISTORICAL DISTRICT.
   g. FLOODPLAIN: FL = 31.7 FEET NAVD 1988 (32.54 FEET NGVD 1929), ZONE AL, MAP NO. 12057C0212H.
   h. IMPERVIOUS SUMMARY OF PUMPING STATION SITE
      i. DEMOLITION OF ASPHALT ROAD: 1529.3 SF
      ii. DEMOLITION OF BUILDING AND MASONRY WALL: 1203.5 SF
      iii. NEW ASPHALT PARKING: 1045 SF
      iv. NEW SIDEWALK: 24 SF
      v. NEW BUILDING: 1530.9 SF
      vi. NEW ELECTRICAL TRANSFORMER: 54 SF
      vii. SUMMARY NEW NET IMPERVIOUS AREA: -79 SF
2. STORMWATER REQUIREMENTS: THE NET IMPERVIOUS AREA FOR THE PUMPING STATION PROJECT IS 2654 SF. THIS AREA IS LESS THAN THE 3000 SF CITY OF TAMPA THRESHOLD, NO STORMWATER MANAGEMENT SYSTEM IS REQUIRED OR PROVIDED.
3. NOTIFY THE ENGINEER IF ACTUAL CONDITIONS VARY FROM THOSE SHOWN.
4. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE TAMPA WATER DEPARTMENT TECHNICAL MANUAL LATEST EDITION. PERFORM 4-INCH FORCE MAIN WORK IN ACCORDANCE WITH THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS STANDARDS.
5. MAINTAIN, RELOCATE OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM WORK TO MAINTAIN THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENTS.
6. DIMENSIONS ARE TO THE FACE OF CURB, EDGE OF PAVEMENT, EDGE OF WALL AND CENTER OF YARD PIPE FITTINGS.
7. ELEVATIONS ARE GIVEN TO FINISHED GRADE UNLESS OTHERWISE NOTED.
8. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
9. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES STRUCTURES AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION THESE PLANS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES AFFECTING HIS WORK PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR SHALL PROVIDE AT LEAST 48 HOURS NOTICE TO THE VARIOUS UTILITY COMPANIES IN ORDER TO PERMIT THE LOCATION OF EXISTING UNDERGROUND UTILITIES IN ADVANCE OF CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE VARIOUS UTILITY COMPANIES BY CALLING THE SUNSHINE ONE CALL CENTER (1-800-432-4770) OR, IF NECESSARY, BY CONTACTING THE UTILITY COMPANIES DIRECTLY.
11. UTILITIES AND STRUCTURES NOT SHOWN ON THE PLANS TO BE REMOVED OR REPLACED SHALL BE PROTECTED IN PLACE AND UTILITY SERVICE SHALL BE MAINTAINED. WHERE TEMPORARY CONFLICTS OCCUR BETWEEN EXISTING UTILITIES AND THE NEW CONSTRUCTION, THE CONTRACTOR SHALL PROTECT IN PLACE OR RELOCATE THE UTILITIES AND MAINTAIN UTILITY SERVICE TO THE SATISFACTION OF THE UTILITY COMPANY. UTILITIES AND STRUCTURES SHOWN ON THE PLANS TO BE REMOVED AND REPLACED OR RELOCATED, SHALL CONFORM TO THE REQUIREMENTS OF THE APPLICABLE TECHNICAL SPECIFICATIONS.
12. THE CONTRACTOR SHALL PROVIDE ADEQUATE, TEMPORARY THRUST RESTRAINT AT BENDS AND TEES IN EXISTING WATER MAINS AND OTHER PRESSURIZED CONDUITS IN PROXIMITY TO HIS EXCAVATIONS AS REQUIRED TO PREVENT ANY DISLODGEMENT, SEPARATION OR LEAKAGE OF THESE FACILITIES.
13. WHERE SHOWN, PROVIDE 16-INCH DIAMETER PRESSURE CLASS 250 CEMENT MORTAR LINED DUCTILE IRON RAW WATER MAIN IN ACCORDANCE WITH AWWA C151. POLYETHYLENE ENCASE ALL PIPE AND FITTINGS IN ACCORDANCE WITH AWWA C104. FOR DUCTILE IRON PIPE, PROVIDE MAXIMUM UNRESTRAINED JOINT DEFLECTIONS ONE DEGREE LESS THAN THE PIPE MANUFACTURER'S RECOMMENDED MAXIMUM. FOR RESTRAINED JOINT DUCTILE IRON PIPE, DO NOT EXCEED THE MAXIMUM JOINT DEFLECTIONS RECOMMENDED BY THE PIPE MANUFACTURER.
14. WHERE SHOWN, PROVIDE 16" AND 18" HIGH DENSITY POLYETHYLENE (HDPE) DR 17 BUTT-FUSION WELDED PIPE AND FITTINGS MEETING AWWA C906.
15. ALL PIPE BEDDING SHALL BE CLASS C UNLESS OTHERWISE SHOWN, SPECIFIED OR REQUIRED.
16. THE CONTRACTOR SHALL INSTALL ALL PIPING, INCLUDING THE PROPOSED RAW WATER MAIN TO THE ELEVATIONS AND SLOPES SHOWN ON THE DRAWINGS. A MINIMUM COVER OF 36" SHALL BE MAINTAINED UNLESS SPECIFICALLY SHOWN OTHERWISE. THERE SHALL BE NO INTERMEDIATE HIGH POINTS OR LOW POINTS BETWEEN V.P.I.S, EXCEPT THAT, IN NO CASE SHALL THE VERTICAL SEPARATION BETWEEN THE PROPOSED WATER MAIN AND CROSSING UNDER A SANITARY OR STORM SEWER BE LESS THAN 12 INCHES AND THE HORIZONTAL SEPARATION LESS THAN 6 FEET FROM SANITARY SEWER OR 3 FEET FROM STORM SEWER (FROM OUTSIDE OF WATER MAIN TO OUTSIDE OF SANITARY OR STORM SEWER). THE VERTICAL SEPARATION BETWEEN THE WATER MAIN AND CROSSING OVER A SANITARY OR STORM SEWER SHALL BE 6" OR GREATER. THE HORIZONTAL SEPARATION BETWEEN THE WATER MAIN AND SANITARY OR STORM SEWER CAN BE REDUCED TO 3 FEET (OUTSIDE OF WATER MAIN TO OUTSIDE OF SANITARY OR STORM SEWER) IF THE WATER MAIN IS LAID AT LEAST 6" HIGHER THAN THE SANITARY OR STORM SEWER. PRIOR TO START OF CONSTRUCTION, THE CONTRACTOR SHALL LOCATE AND OBTAIN THE ELEVATIONS OF ALL UTILITIES IN AROUND AND CROSSING THE PROPOSED PIPELINE BY POTHOLING AND, WHERE THE REQUIRED SEPARATIONS CANNOT BE ACHIEVED, NOTIFY THE ENGINEER, WHO WILL DIRECT THE CONTRACTOR TO ADJUST EITHER THE VERTICAL OR HORIZONTAL ALIGNMENT AS NECESSARY. REGULATIONS ALLOW, AND THE ENGINEER MAY ALLOW, CERTAIN EXCEPTIONS TO THESE MINIMUM CLEARANCES AS DESCRIBED IN FLORIDA ADMINISTRATIVE CODE 62-555-314.

CIVIL GENERAL NOTES - CONTINUED

17. UNLESS OTHERWISE SHOWN, ALL FENCES DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED WITH NEW MATERIALS OF THE SAME TYPE AND HEIGHT, INCLUDING GATES.
18. ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION BY SODDING. SEEDING AND MULCH SHALL ONLY BY UTILIZED IF DIRECTED BY THE ENGINEER.
19. DO NOT UNNECESSARILY REMOVE THE EXISTING VEGETATION AND ALTER EXISTING TOPOGRAPHY. PROVIDE ADEQUATE PROTECTION MEASURES (I.E., HAYBALES, BAFFLES, SODDING AND SANDBAGGING) AS SHOWN OR REQUIRED TO MINIMIZE EROSION AND DOWNSTREAM SEDIMENTATION CAUSED BY SURFACE WATER RUNOFF ON EXPOSED LAND SURFACES.
20. ALL TREES NOT SHOWN FOR DEMOLITION SHALL BE PROTECTED BY TREE BARRICADES. ERECT BARRICADES PRIOR TO ANY LAND ALTERATION ACTIVITIES. DURING CONSTRUCTION ACTIVITIES DO NOT REMOVE VEGETATION BY GRUBBING, OR PLACE SOILS DEPOSITS, DEBRIS, SOLVENTS, CONSTRUCTION MATERIAL, MACHINERY OR OTHER EQUIPMENT OF ANY KIND WITHIN THE DRIPLINE OF A TREE THAT REMAINS ON SITE.
21. PROMPTLY AND ADEQUATELY STABILIZE ANY AREA SUBJECT TO EROSION AND VEGETATIVE MATERIAL BY SODDING, SEEDING, PLUGGING OR OR SPRIGGING. IF SLOPE IS GREATER THAN 5:1, SODDING WILL BE THE ONLY ACCEPTABLE FORM OF STABILIZATION. PERMANENT RESTORATION SHALL BE BY SODDING.
22. THE CONTRACTOR SHALL STOCKPILE AND MAINTAIN SURPLUS OF SUITABLE JOB EXCAVATED MATERIAL FOR BEDDING OR BACKFILL FOR THIS PROJECT.
23. THE CONTRACTOR SHALL DISPOSE OF ALL DEBRIS FROM CONSTRUCTION AT HIS OWN EXPENSE.

SURVEY AND CONTROL NOTES

1. FEATURES AND UTILITIES DEPICTED ON SURVEY ARE FROM VISIBLE EVIDENCE ONLY.
2. NO UNDERGROUND FOUNDATIONS OR FOOTERS WERE EXCAVATED OR LOCATED.
3. THE HORIZONTAL DATUM UTILIZED FOR THIS PROJECT IS NAD 1983 (2007) FLORIDA WEST ZONE, U.S. SURVEY FEET.
4. THE VERTICAL DATUM UTILIZED FOR THIS PROJECT IS NGVD 1929, U.S. SURVEY FEET. THE BENCHMARK UTILIZED WAS CITY OF TAMP BENCHMARK "HV 02 0199" WITH AN ELEVATION OF 30.90 FEET.
5. DATUM CONVERSION: NAVD 1988 = NGVD 1929 - 0.84 FEET.
6. NOT A BOUNDARY SURVEY.
7. THE SURVEY WAS CONDUCTED TO SHOW THE CONDITIONS WITHIN THE LIMITS OF THE PROJECT AREA. ALL OTHER IMPROVEMENTS ARE NOT DEPICTED.
8. ALL WATER ELEVATIONS SHOWN ON THE SURVEY REPRESENT DATA COLLECTED ON MARCH 6, 2012 AND ARE INDICATIVE ONLY OF THE CONDITIONS AT THAT TIME.
9. SUBAQUEOUS INFORMATION WAS COLLECTED ON MARCH 6, 2012 WITH THE SUPPORT OF VIKING DIVING SERVICES, INC.
10. REFER TO DRAWINGS DC-1 AND DC-2 FOR ADDITIONAL INFORMATION ON SURVEY, TEMPORARY BENCHMARKS AND THE LIKE.

DRAINAGE SYMBOLS

SILT FENCE

PIPING AND UTILITIES

UTILITIES (SINGLE LINE) SEE PIPE SCHEDULE FOR ADDITONAL PIPING INFO

- G — UTILITIES (SIZE WHERE NOTED)
- G — UNDERGROUND

RW	RAW WATER
PW	POTABLE WATER
IRRG	IRRIGATION LINE
SDR	STORM DRAIN
SS	SANITARY SEWER
TEL	TELEPHONE
COMM	COMMUNICATIONS LINE
FOC	FIBER OPTIC CABLE
CATV	CABLE TV
ELEC	POWER
UNID	UNIDENTIFIED
ABND	ABANDONED UTILITY
SPD	SUMP PUMP DISCHARGE

MH — MANHOLE (IN PLAN)

COTG / PCOTG — CLEANOUT TO GRADE OR PRESSURE CLEANOUT TO GRADE (IN PLAN)

BURIED VALVES IN VALVE BOX
GATE VALVE
ECCENTRIC PLUG VALVE

GEOTECHNICAL SYMBOLS

B-X — SOIL BORING LOCATION
MW — MONITORING WELL

GENERAL CIVIL SYMBOLS

NEW
EXISTING
FUTURE
EXISTING TO BE REMOVED OR DEMOLISHED
CENTERLINE
EARTH (IN SECTION)
COMPACTED EARTH (IN SECTION)
S=0.0123 — SLOPE ON PAVED SURFACE
3:1 — BERM SLOPE (HORZ TO VERT)

SURVEY LEGEND & ABBREVIATIONS

	SET 5/8" CAPPED IRON ROD
	SET P.K. NAIL & DISK
	FOUND IRON ROD OR PIPE
	FOUND P.K. NAIL & DISK
	FOUND "X" CUT
	FOUND RAILROAD SPIKE
P.S.M.	PROFESSIONAL SURVEYOR AND MAPPER
Id.	IDENTIFICATION
	TEMPORARY BENCHMARK
TBM	TEMPORARY BENCHMARK
MW	MONITORING WELL
SWFWMD	SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
??	UNKNOWN DESTINATION
	BACK OF CURB ELEVATION
	EDGE OF PAVEMENT ELEVATION
	SPOT ELEVATION
	SPOT ELEVATION ON HARD SURFACE
(F)	FIELD MEASUREMENT
(D)	DEED REFERENCE
(P)	PLAT REFERENCE
DIP	DUCTILE IRON PIPE
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
ERCP	ELLIPTICAL REINFORCED CONCRETE PIPE
S-1	SANITARY MANHOLE
D-1	STORM MANHOLE
(1)	SUBAQUEOUS DATA (AS OBTAINED BY OTHERS)
CCR	FDEP CERTIFIED CORNER RECORD
FDEP	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
(1)	TOP OF RUST STAIN (ALONG WALL BASED ON AN ELEVATION OF 23.92')
	ELECTRIC VAULT
	FIRE HYDRANT
	IRRIGATION CONTROL VALVE
	MITERED END SECTION
	LIGHT POLE
	SQUARE POST
	POWER POLE
	GUY WIRE
	SIGN
	UNKNOWN TREE
	PALM
	OAK
	TRAFFIC VAULT
	WATER METER
	CATCH BASIN
	STORM MANHOLE
	SANITARY MANHOLE
	WATER VALVE
	ELECTRIC PULL BOX
	ROUND POST
	FENCE
	OVERHEAD UTILITY LINES
	SANITARY LINE
	TREE LINE
	GUARD RAIL
	UNDERGROUND ELECTRIC
	21.7' CONTOUR
FFE	FINISHED FLOOR ELEVATION
WL	WATER LINE
	JURISDICTIONAL WETLAND LINE (BASED ON AN ELEVATION OF 23.92')

ROAD AND PAVING SYMBOLS

ASPHALT CEMENT PAVING
GEOGRID PAVING

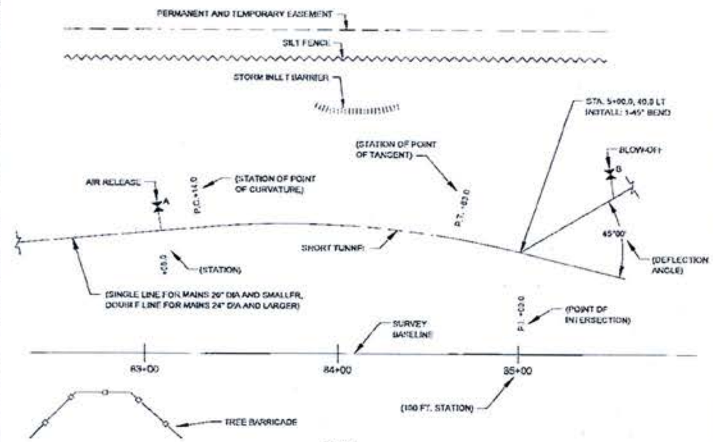
CONTROL SYMBOLS

N XXXXXXX / E XXXXXXX — SITE COORDINATES
XXX.XX — FINISHED ELEVATION

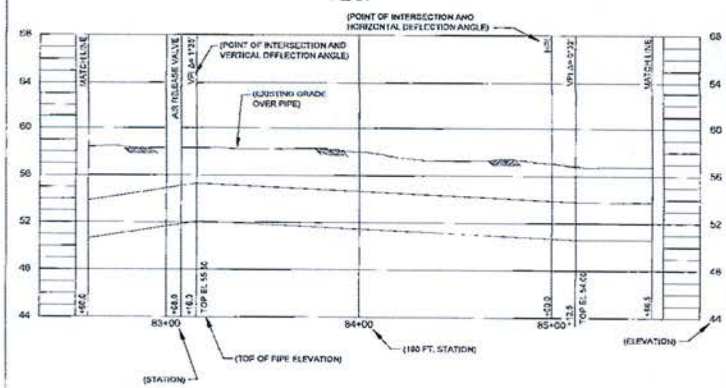
STRUCTURES

FENCE (CHAINLINK)
FENCE (WOOD)
STRUCTURE
STRUCTURE (BELOW GRADE)
CB — CATCH BASIN

LEGEND
NEW PIPELINE CONSTRUCTION



PLAN



PROFILE

				SCALE	WARNING		
REV	DATE	BY	DESCRIPTION	NO SCALE	0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED M.FEKKALA / DRAWN J.WHITE / CHECKED	DESIGN DEVELOPMENT PHASE - JUNE 2013 — NOT FOR CONSTRUCTION. This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH — 1000 N. ASHLEY DRIVE, TAMPA, FLORIDA 33602

GREELEY AND HANSEN — TAMPA, FLORIDA

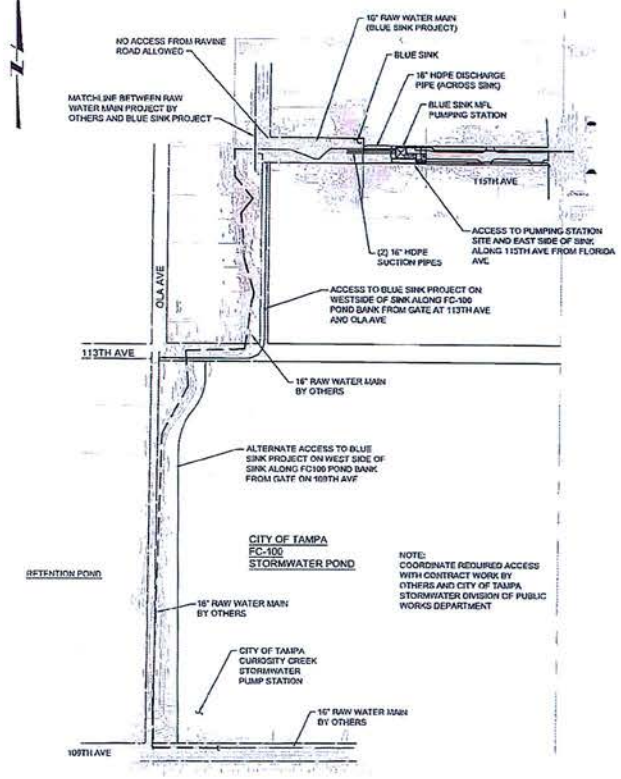
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

GENERAL CIVIL
STANDARD NOTES AND SYMROLS

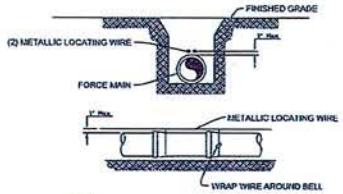
SHEET GC-1

1011073



SITE ACCESS AND COORDINATION WITH OTHERS | 1

0 200 400
SCALE IN FEET



NOTES:

1. PIPE SHALL REQUIRE 2 INSULATED METALLIC LOCATING WIRES CAPABLE OF DETECTION BY A CABLE LOCATOR AND SHALL BE BURIED DIRECTLY ABOVE THE CENTERLINE OF THE PIPE. WIRE SHALL BE 8 GAUGE COPPER WIRE OR 10 GAUGE COPPER CLAD STEEL WIRE. THICKER WIRE IS ALLOWED.
2. LOCATING WIRE SHALL TERMINATE AT THE TOP OF EACH VALVE BOX AND AIR RELEASE VALVE. WIRE SHALL BE CAPABLE OF EXTENDING 24" ABOVE TOP OF BOX IN SUCH A MANNER SO AS NOT TO INTERFERE WITH VALVE OPERATION.
3. USE DUCT TAPE AS NECESSARY TO HOLD WIRE DIRECTLY ON THE TOP OF THE PIPE.

PIPE LOCATING WIRE DETAIL | 2

IMPORTANT - FOR EACH OPERABLE VALVE:
PROVIDE A BRASS IDENTIFICATION TAG EPOXIED TO THE CONCRETE APRON THAT IS A MINIMUM 3" IN DIAMETER AND MINIMUM THICKNESS. THE TAG SHALL BE ENGRAVED WITH "SEWER", SIZE OF VALVE, TYPE OF VALVE, AND DIRECTION AND NUMBER OF TURNS TO OPEN.

FOR EXAMPLE, A 4-INCH PLUG VALVE ON A SANITARY SEWER FORCE MAIN THAT REQUIRES 1¼ TURNS TO THE LEFT(COUNTERCLOCKWISE) TO BE FULLY OPEN WOULD REQUIRE THE FOLLOWING ON AN IDENTIFICATION TAG:

SEWER
4" P.V.
1¼ T.O.L.

VALVE OPERATING DISK | 3

Charles M. Pekkala, PE
Civil Engineer
State of Florida - License No. 37996
Date: 7/2/2013

CHARLES M. PEKKALA
LICENSE
No. 37996
STATE OF FLORIDA
PROFESSIONAL ENGINEER
7/2/13

REV	DATE	BY	DESCRIPTION
0	6/6/13	JMW	60% SUBMITTAL

SCALE: 1" = 200'

WARNING: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED M PEKKALA
DRAWN J WHITE
CHECKED

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION

This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH
1000 N. ASHLEY DRIVE, TAMPA, FLORIDA 33602
CERTIFICATE OF AUTHORIZATION No. 6772

GREELEY AND HANSEN
1715 NORTH WESTSHORE BLVD.
TAMPA, FLORIDA 33607
CERTIFICATE OF AUTHORIZATION No. 30

CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

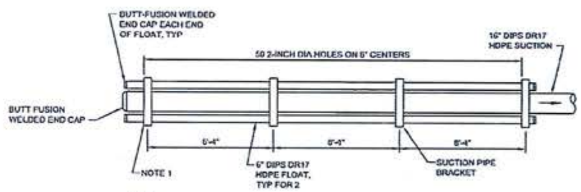
BLUE SINK MFL PUMPING STATION

GENERAL CIVIL
DETAILS - I

SHEET
GC-4

1011873

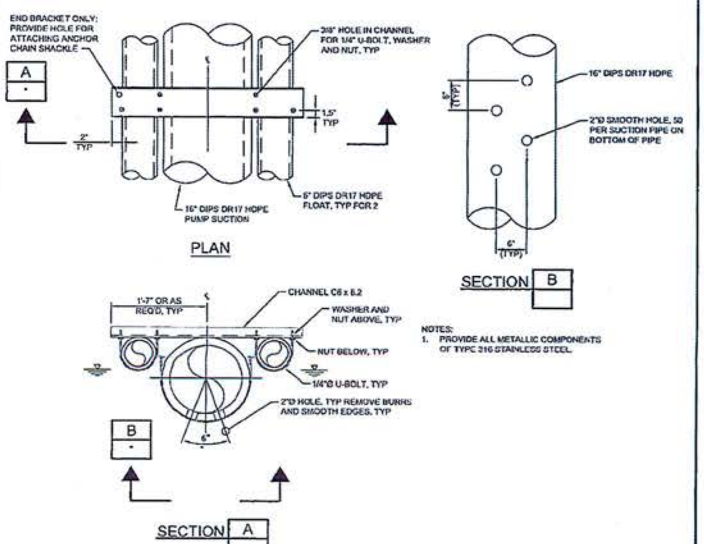
Plot Date: Wed 26-Jun-2013 - 04:03PM
User: jwhite
File: C:\pwwork\jwhite\d0337878\BSD_GC04.dwg



NOTES:
1. PROVIDE 135# PYRAMID MOORING ANCHOR ON BOTTOM OF SINK. ATTACH ANCHOR TO END SUCTION PIPE BRACKET WITH 30 FEET OF 3/8" PROOF COIL CHAIN, 7500 POUND BREAKING STRENGTH, 1LB PER FOOT WEIGHT. ATTACH CHAIN TO ANCHOR AND SUCTION PIPE BRACKET WITH SCREW PIN ANCHOR SHACKLE. PROVIDE GALVANIZED ANCHOR, CHAIN AND HARDWARE.

PLAN - SUCTION PIPE 5
SCALE: NTS

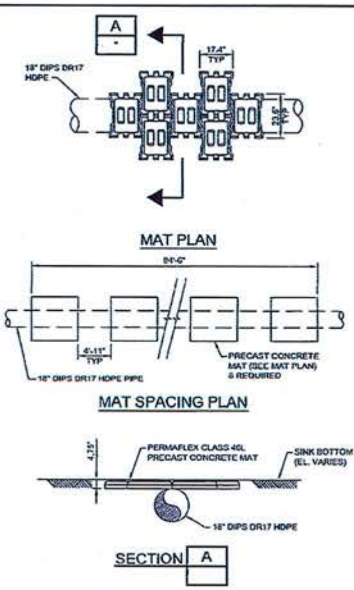
4 0 4 8 FT 1/4"=1'-0"



NOTES:
1. PROVIDE ALL METALLIC COMPONENTS OF TYPE 316 STAINLESS STEEL.

SUCTION PIPE BRACKET 6
SCALE: NTS

1 0 1 2 FT 1"=1'-0"



PRECAST CONCRETE BLOCK MAT 7

1 0 1 2 3 4 5 6 7 FT 3/8"=1'-0"

Charles M. Pekkala, PE
Civil Engineer
State of Florida - License No 37896
Date: 3/28/2013

REV	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED: M.PEKKALA
DRAWN: J.WHITE
CHECKED:

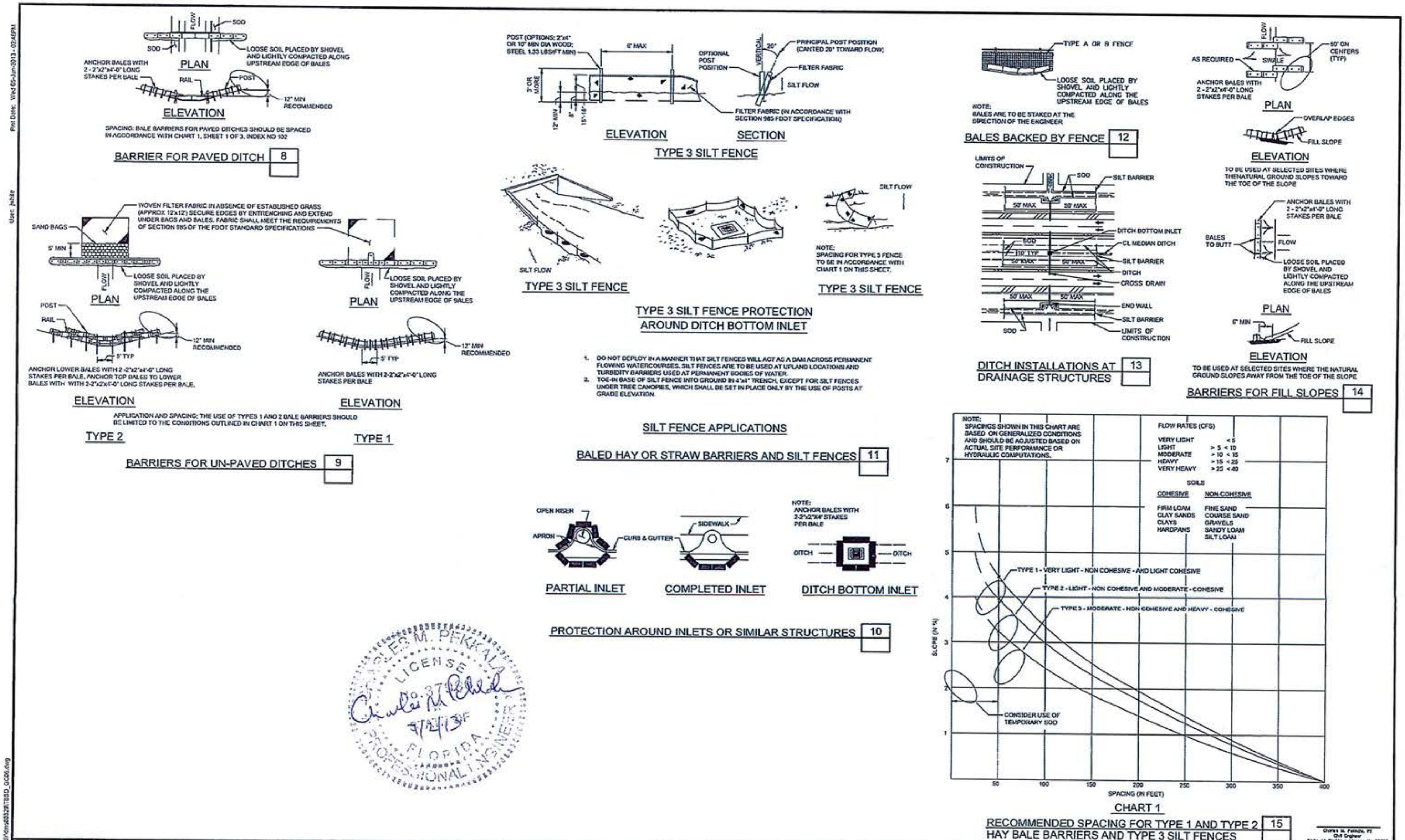
DESIGN DEVELOPMENT PHASE - JUNE 2013
NOT FOR CONSTRUCTION
This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH
GREELEY AND HANSEN

CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION
GENERAL CIVIL
DETAILS - II

SHEET
GC-5
1011873


BARRIER FOR PAVED DITCH 8
SPACING: BALE BARRIERS FOR PAVED DITCHES SHOULD BE SPACED IN ACCORDANCE WITH CHART 1, SHEET 1 OF 3, INDEX NO 102
BARRIERS FOR UN-PAVED DITCHES 9
APPLICATION AND SPACING: THE USE OF TYPES 1 AND 2 BALE BARRIERS SHOULD BE LIMITED TO THE CONDITIONS OUTLINED IN CHART 1 ON THIS SHEET.
TYPE 2
TYPE 1
TYPE 3 SILT FENCE
TYPE 3 SILT FENCE PROTECTION AROUND DITCH BOTTOM INLET
1. DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.
2. TOE-IN BASE OF SILT FENCE INTO GROUND IN 4"x4" TRENCH, EXCEPT FOR SILT FENCES UNDER TREE CANOPIES, WHICH SHALL BE SET IN PLACE ONLY BY THE USE OF POSTS AT GRADE ELEVATION.
SILT FENCE APPLICATIONS
BALED HAY OR STRAW BARRIERS AND SILT FENCES 11
PARTIAL INLET
COMPLETED INLET
DITCH BOTTOM INLET
PROTECTION AROUND INLETS OR SIMILAR STRUCTURES 10
BALES BACKED BY FENCE 12
NOTE: BALES ARE TO BE STAKED AT THE DIRECTION OF THE ENGINEER
DITCH INSTALLATIONS AT DRAINAGE STRUCTURES 13
BARRIERS FOR FILL SLOPES 14
TO BE USED AT SELECTED SITES WHERE THE NATURAL GROUND SLOPES AWAY FROM THE TOE OF THE SLOPE
NOTE: SPACINGS SHOWN IN THIS CHART ARE BASED ON GENERALIZED CONDITIONS AND SHOULD BE ADJUSTED BASED ON ACTUAL SITE PERFORMANCE OR HYDRAULIC COMPUTATIONS.
FLOW RATES (CFS)
VERY LIGHT <5
LIGHT >5 <10
MODERATE >10 <15
HEAVY >15 <25
VERY HEAVY >25 <40
SOILS
COHESIVE: FIRM LOAM, CLAY SANDS, CLAYS, HARDPANS
NON-COHESIVE: FINE SAND, COURSE SAND, GRAVELS, SANDY LOAM, SILT LOAM
TYPE 1 - VERY LIGHT - NON COHESIVE - AND LIGHT COHESIVE
TYPE 2 - LIGHT - NON COHESIVE AND MODERATE - COHESIVE
TYPE 3 - MODERATE - NON COHESIVE AND HEAVY - COHESIVE
CONSIDER USE OF TEMPORARY SOD
SLOPE (IN %)
SPACING (IN FEET)
CHART 1
RECOMMENDED SPACING FOR TYPE 1 AND TYPE 2 HAY BALE BARRIERS AND TYPE 3 SILT FENCES 15

REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

WARNING: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED J.J.PEKKALA
DRAWN J.WHITE
CHECKED

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION

This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH®

GREELEY AND HANSEN

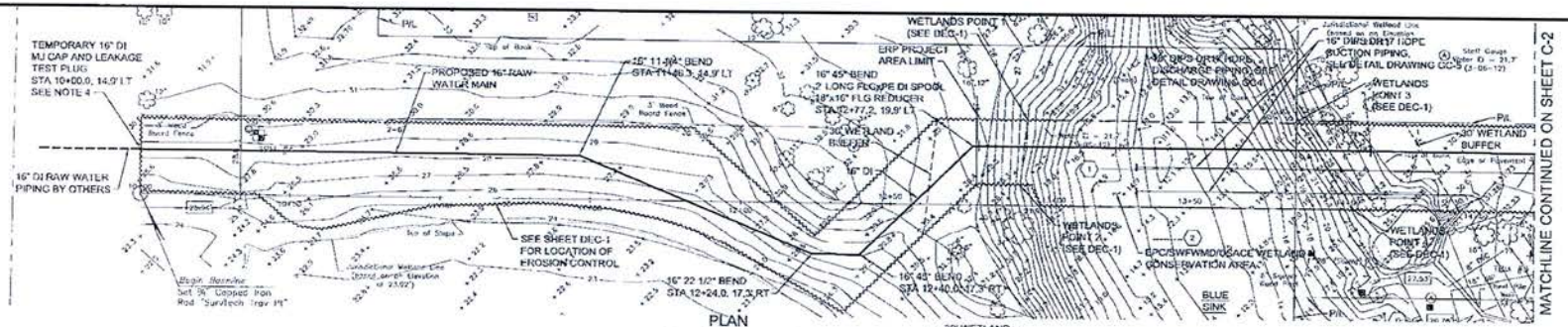
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

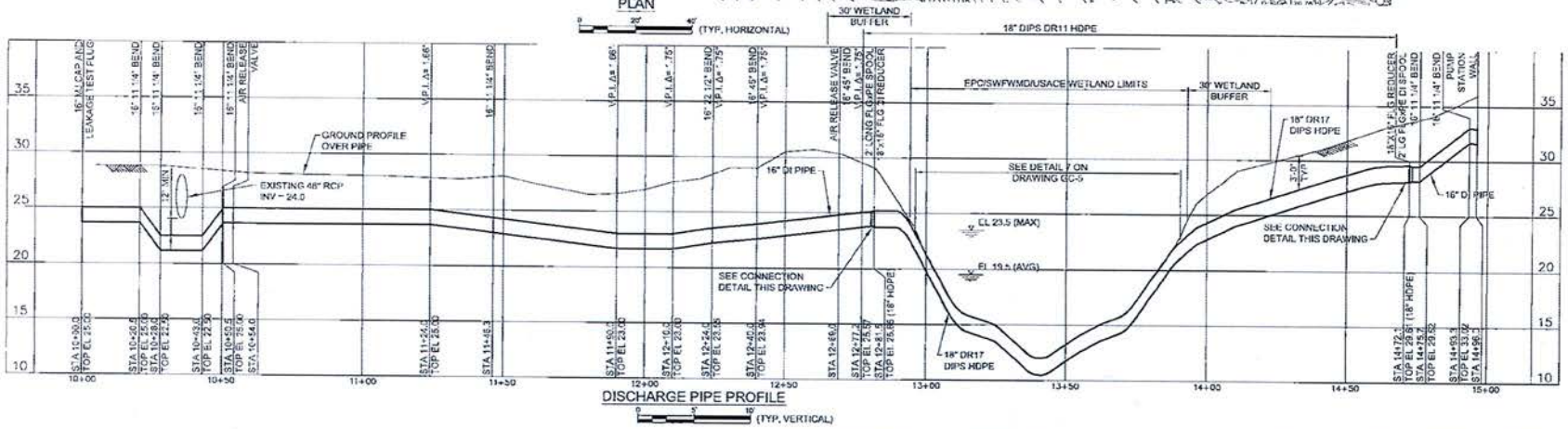
GENERAL CIVIL
DETAILS - III

SHEET GC-6

1011673

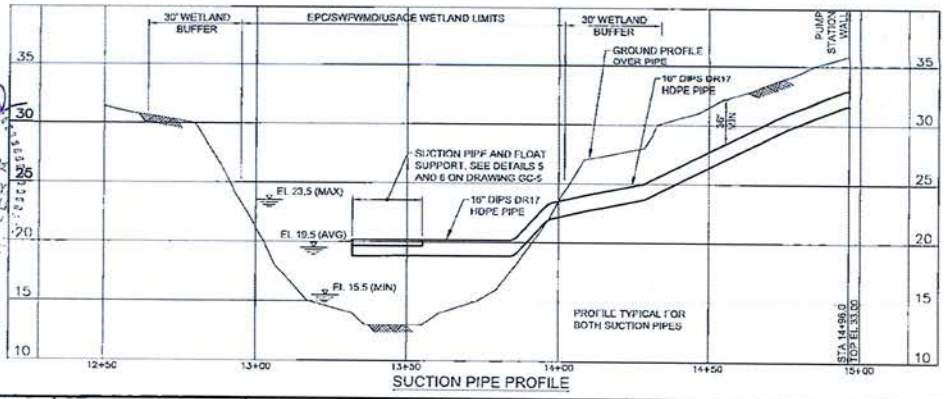


PLAN



DISCHARGE PIPE PROFILE

(TYP. HORIZONTAL) (TYP. VERTICAL)



SUCTION PIPE PROFILE

GENERAL SHEET NOTES

1. REFER TO SHEET DEC-1 FOR INSTALLATION OF EROSION CONTROL MEASURES AND TREE REMOVAL. LIMIT ALL ACTIVITIES TO AREAS DELINEATED BY SILT FENCE/CONSTRUCTION AREA.
2. ACCESS TO THE WEST SIDE OF BLUE SINK IS FROM THE CITY OF TAMPA FC-100 STORMWATER PROPERTY. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" ON DRAWING GC-4 FOR LOCATION OF ACCESS POINTS TO THIS SITE. SITE ACCESS FROM OR PARKING ON RAVINE ROAD IS NOT ALLOWED.
3. THERE WILL BE CONTRACT WORK BY OTHERS ALONG THE EMBANKMENT OF THE FC-100 STORMWATER POND. COORDINATE CONSTRUCTION ACTIVITIES TO MINIMIZE INTERFERENCE.
4. IF THE 16-INCH DUCTILE IRON WATER MAIN BY OTHERS IS PRESENT, CONNECT TO THE WATER MAIN, OTHERWISE PROVIDE A DUCTILE IRON PLUG OR CAP.
5. THERE ARE STATE, FEDERAL AND COUNTY JURISDICTIONAL WETLANDS ON THESE PLANS. ALL GRADES SHALL BE RETURNED TO PRE-CONSTRUCTION CONFIGURATIONS

CONNECTION DETAIL
NO SCALE

REV	DATE	BY	DESCRIPTION

SCALE: 1" = 20'

WARNING: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED M. PERSAUD
DRAWN J. WHITE
CHECKED

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION

This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH®
4400 N. ASHLEY DRIVE, TAMPA, FLORIDA 33607
CERTIFICATE OF AUTHORIZATION No. 6772

GREELEY and HANSEN
100 NORTH WESTSHORE BLVD
TAMPA, FLORIDA 33607
CERTIFICATE OF AUTHORIZATION No. 27

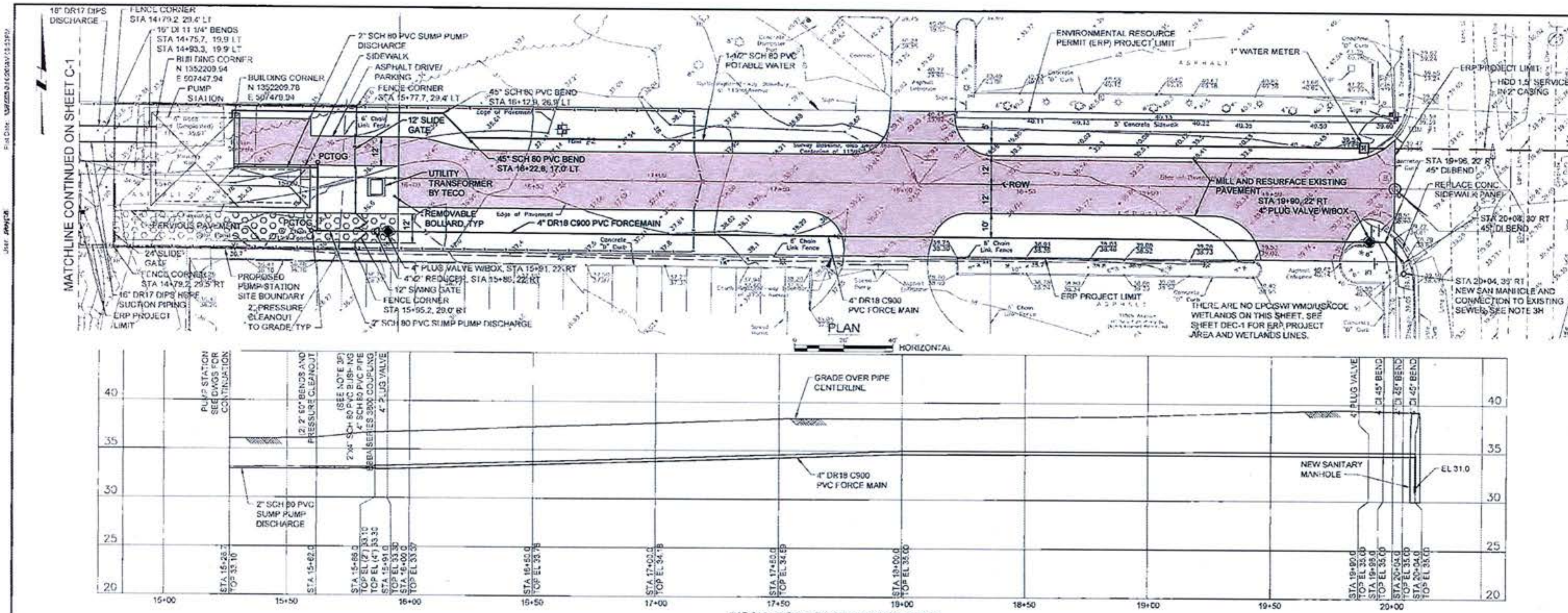
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

CIVIL
SITE AND YARD PIPING PLAN - I

SHEET C-1

1611673



DISCHARGE FORCE MAIN PROFILE

VERTICAL

NOTES

1. REFER TO DRAWING DC-2 FOR INSTALLATION OF EROSION CONTROL MEASURES AND FENCING.
2. ACCESS TO THE PUMPING STATION SITE AND EAST SIDE OF BLUE SINK IS ALONG 115TH AVENUE FROM FLORIDA AVENUE. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" SHOWN ON DRAWING GC-4 FOR LOCATION OF ACCESS POINTS TO THE SITE. A TEMPORARY CONSTRUCTION STAGING AND STORAGE AREA ON 115TH AVENUE IS IDENTIFIED ON THE PLAN. DO NOT BLOCK ACCESS TO THE CAR DEALERSHIPS LOCATED ON THE NORTH AND SOUTH SIDES OF 115TH AVENUE. IF ADDITIONAL STORAGE OR CONSTRUCTION PARKING IS REQUIRED, PROVIDE OFF SITE STORAGE AND PARKING AT ANOTHER LOCATION.
3. PROJECT INCLUDES CONSTRUCTION OF A 4-INCH FORCE MAIN IN THE RIGHT OF WAY. COMPLY WITH THE FOLLOWING:
   a. AT LEAST THREE WEEKS PRIOR TO CONSTRUCTION, NOTIFY THE RESIDENT ENGINEER AND THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS FIELD ENGINEERING OFFICE (259-1693) AND SUPPLY THEM WITH ALL THE REQUIRED SHOP DRAWINGS, THE CONTRACTOR'S NAME, STARTING DATE, PROJECTED SCHEDULE AND OTHER INFORMATION AS REQUIRED. CONTACT THE FIELD ENGINEERING OFFICE 5 DAYS PRIOR TO CONSTRUCTION TO ENSURE AVAILABILITY OF INSPECTION PERSONNEL. ANY WORK PERFORMED PRIOR TO NOTIFYING FIELD ENGINEERING OR WITHOUT A DEPARTMENT INSPECTOR PRESENT MAY BE SUBJECT TO REMOVAL AND REPLACEMENT.
   b. PERFORM A PRESSURE TEST ON THE FORCE MAIN IN ACCORDANCE WITH THE CITY OF TAMPA REGULATIONS. SAID TESTS MUST BE CERTIFIED BY THE ENGINEER OF RECORD AND SUBMITTED TO THE CITY OF TAMPA DEPARTMENT OF SANITARY SEWERS FOR APPROVAL. THE SCHEDULING, COORDINATION AND NOTIFICATION OF ALL PARTIES IS THE CONTRACTOR'S RESPONSIBILITY.
   c. THE FOLLOWING CERTIFICATES/SHOP DRAWINGS ARE REQUIRED. REVIEW THESE WITH THE DESIGN DIVISION PRIOR TO APPROVAL FOR CONSTRUCTION AND SUBMIT IN ACCORDANCE WITH ABOVE NOTE "A".
      i. PVC PIPE CERTIFICATE OF MANUFACTURE.
      ii. JOINT RESTRAINTS
      iii. EBBA TRANSITION COUPLINGS, PVC PRESSURE FITTINGS, PIPE SHOP DRAWINGS, LINK-SEAL, MANHOLE, AND PIPE SUPPORTS.
      iv. CRUSHED STONE SUBMITTAL.
      v. VALVE, VALVE BOX, AND VALVE OPERATION DISK SHOP DRAWINGS.
   d. THE CERTIFICATE OF OCCUPANCY FOR THE PUMPING STATION WILL NOT BE ISSUED UNTIL THE FOLLOWING HAS BEEN COMPLETED:
      i. FINAL INSPECTION WITH DEPARTMENT PERSONNEL.
      ii. AS-BUILTS SUBMITTED AND ACCEPTED BY THE DEPARTMENT.
      iii. ALL NECESSARY TESTING COMPLETED AND CERTIFIED.
      iv. PAYMENT OF ALL CAPACITY FEES.
      v. ISSUANCE OF FDEP CERTIFICATION OF APPROVAL, IF APPLICABLE.
   e. FOR SUMP PUMP PIPING FROM SUMP PUMPS, SEE DRAWING P-1 AND P-2 FOR PORTION INSIDE BUILDING AND THIS DRAWING FOR PORTION OUTSIDE OF BUILDING AND ON THE PUMPING STATION SITE. SUMP PUMP PIPING ORIGINATES FROM DUPLEX, 1/2-HP SUBMERSIBLE PUMPS. SEE DRAWING P-2 FOR COPY OF PUMP CURVE.
   f. FOR SUMP PUMP PIPING INSIDE THE BUILDING AND ON THE PUMPING STATION SITE PROVIDE 2-INCH SCHEDULE 80 SOLVENT WELDED PVC. CONNECT THE 2-INCH SUMP PUMP DISCHARGE TO THE 4-INCH PVC FORCE MAIN ON THE PUMPING STATION SITE WITH A 2-INCH BY 4-INCH SCHEDULE 80 PVC BUSHING, SHORT LENGTH OF SCHEDULE 80 PVC PIPE AND AN EBBA IRON SERIES 3800 RESTRAINED COUPLING WITH TRANSITION GASKET FOR THE 4-INCH SCHEDULE 80 PIPE.
   g. PROVIDE 4-INCH C900 (DR 18) GREEN PVC FORCE MAIN FROM INSIDE THE PUMPING STATION SITE TO THE TERMINATION POINT AT THE SANITARY SEWER. ALL FORCE MAIN VALVES, FITTINGS AND BENDS SHALL HAVE RESTRAINED MECHANICAL JOINTS. RESTRAINING DEVICES SHALL BE EBBA IRON "MEGALUG" OR APPROVED EQUAL. CONSTRUCT THE PROPOSED FORCE MAIN ACCORDING TO THE STATIONS AND INVERT ELEVATIONS PROVIDED ON THE PLANS WITH NO INTERMEDIATE HIGH OR LOW POINTS BETWEEN VERTICAL POINTS OF INTERSECTION. PROVIDE A METALLIC LOCATING WIRE ON THE FORCE MAIN IN ACCORDANCE WITH CITY OF TAMPA'S PIPE LOCATING WIRE DETAIL (SHOWN ON DRAWING GC-4). DO NOT DEFLECT THE PIPE JOINTS. BEND PIPE TO OBTAIN VERTICAL DEFLECTIONS SHOWN. PROVIDE A 4-INCH DUCTILE IRON PLUG VALVE INSIDE THE STATION SITE AND OUTSIDE THE RIGHT OF WAY OF FLORIDA AVENUE AS SHOWN ON THIS DRAWING. PROVIDE VALVE OPERATION DISK AS SHOWN ON THE DETAIL ON DRAWING GC-4.
   h. THERE IS AN EXISTING 8-INCH VITRIFIED CLAY PIPE SEWER LOCATED FROM THE PROPERTY LINE OF THE CAR DEALERSHIP TO AN EXISTING MANHOLE ON FLORIDA AVENUE. TERMINATE THE NEW FORCE MAIN AT THE EXISTING SEWER SYSTEM BY CONSTRUCTING A NEW SANITARY MANHOLE OVER THE EXISTING SEWER BETWEEN THE PROPERTY LINE AND THE ROAD, IN THE EXISTING SIDEWALK AREA. EXPOSE THE SANITARY SEWER AT THE POINT OF CONNECTION PRIOR TO SUBMISSION OF THE SHOP DRAWINGS FOR THE NEW MANHOLE, AND CONFORM THE NEW MANHOLE ELEVATIONS TO THE EXISTING ELEVATIONS OF THE SEWER AND SIDEWALK. CONSTRUCT A NEW "DOGHOUSE" MANHOLE OVER THE EXISTING SEWER. OUTSIDE OF THE MANHOLE, TRANSITION FROM C900 PVC PIPE TO SCHEDULE 80 PVC PIPE WITH A RESTRAINED EBBA IRON SERIES 3800 COUPLING, WITH A TRANSITION GASKET FOR THE 4-INCH SCHEDULE 80 PIPE. THE SCHEDULE 80 PVC FORCE MAIN SHALL PENETRATE THE MANHOLE THROUGH A CORED HOLE IN THE MANHOLE AND SHALL BE SEALED IN THE MANHOLE WITH MODULAR WALL SEAL (LINK-SEAL) WITH TYPE 316 STAINLESS STEEL HARDWARE. INSIDE THE MANHOLE, DIRECT THE FORCE MAIN TO THE INVERT OF THE MANHOLE WITH A 90 DEGREE SCHEDULE 80 SOLVENT WELDED PVC 90 DEGREE BEND AND DROP PIPE TO THE INVERT OF THE MANHOLE. PROVIDE TYPE 316 STAINLESS STEEL SUPPORTS AND HARDWARE TO SECURELY ANCHOR THE FORCE MAIN DISCHARGE INSIDE THE MANHOLE. CONDUCT CONNECTION WORK THAT MAY IMPACT THE OPERATION OF THE EXISTING SANITARY SEWER AT NIGHT AND COORDINATE WITH OWNER OF PROPERTY.
4. PROVIDE ALL WATER SERVICE FROM THE CONNECTION AT THE MAIN ON THE EAST SIDE OF FLORIDA AVE TO THE PUMPING STATION.
5. ARRANGE FOR AND PAY ALL FEES ASSOCIATED WITH THE TECO UTILITY TRANSFORMER AND ELECTRICAL SERVICE.
6. PROVIDE NEW ASPHALT PAVING AND BASE FOR DRIVEWAYS WITHIN THE PUMPING STATION SITE. OUTSIDE OF THE PUMPING STATION SITE, MILL AND OVERLAY THE EXISTING 115TH AVENUE PAVEMENT AS SHOWN.
7. MAINTAIN EXISTING GRADE ELEVATIONS FOR THE RESURFACING OF 115TH AVE, AND WITHIN THE PUMPING STATION SITE.

REV	DATE	BY	DESCRIPTION

SCALE: H: 1"=20' V: 1"=5'

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED M PEKKALA — DRAWN J WHITE — CHECKED

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION
This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

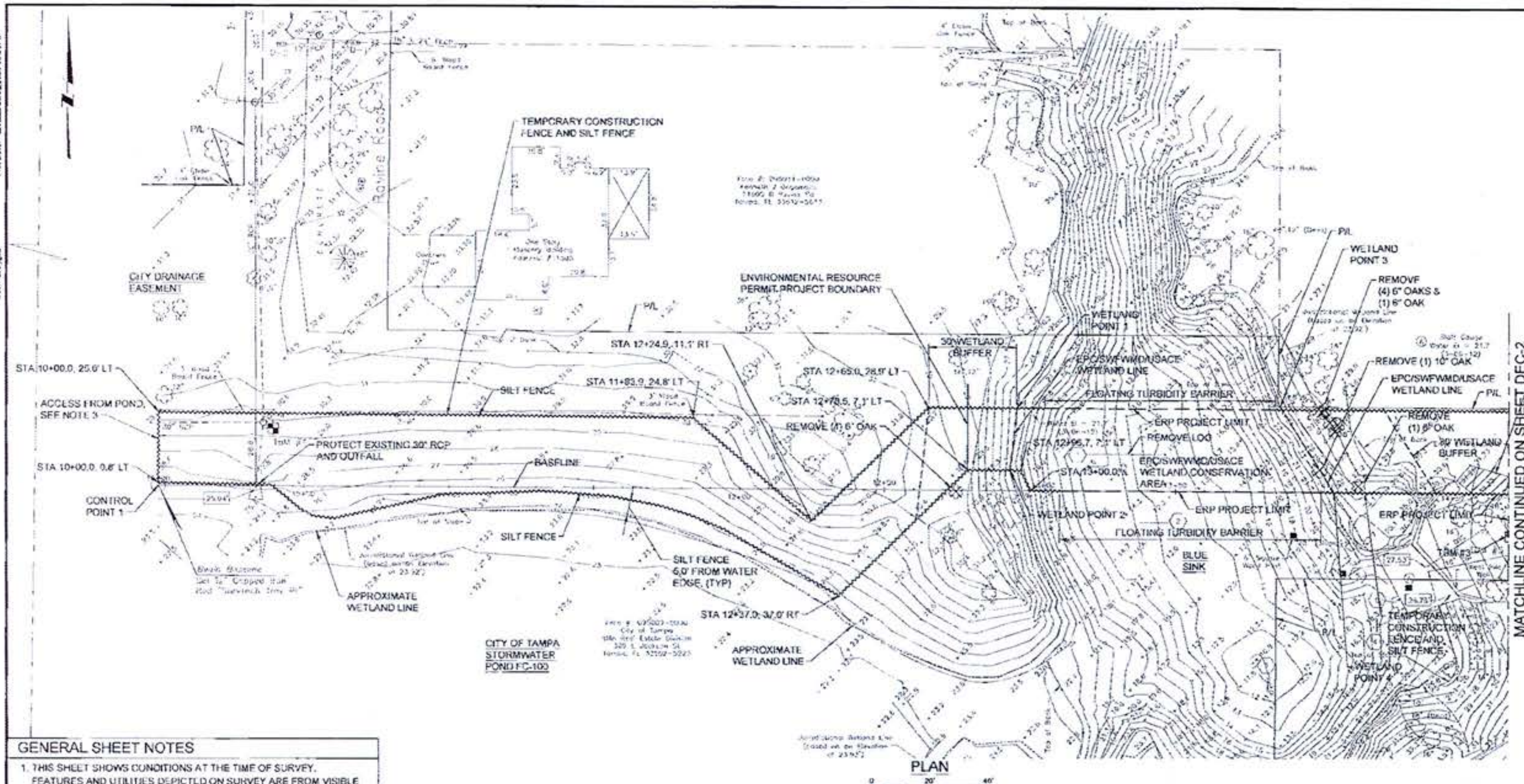
MWH — GREELEY AND HANSEN — CITY OF TAMPA, FLORIDA WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

CIVIL
SITE AND YARD PIPING PLAN - II

SHEET C-2

1011673



GENERAL SHEET NOTES

1. THIS SHEET SHOWS CONDITIONS AT THE TIME OF SURVEY. FEATURES AND UTILITIES DEPICTED ON SURVEY ARE FROM VISIBLE EVIDENCE ONLY.
2. THIS SHEET SHOWS EXISTING CONDITIONS, LOCATION OF EROSION AND TURBIDITY CONTROL MEASURES AND TREE REMOVAL. REFER TO DRAWING C-1 FOR CONSTRUCTION IN THIS AREA.
3. ACCESS TO THE WEST SIDE OF BLUE SINK IS FROM THE CITY OF TAMPA FC-100 STORMWATER PROPERTY. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" ON DRAWING GC-4 FOR LOCATION OF ACCESS POINTS TO THIS SITE. SITE ACCESS FROM OR PARKING ON RAVINE ROAD IS NOT ALLOWED.
4. DELINEATE CONSTRUCTION AREA ON WEST SIDE OF BLUE SINK WITH SUPER SILT FENCE AS SHOWN ON THE PLAN.
5. WHEN CONSTRUCTION WORK IS BEING CONDUCTED IN THE SINK, PROVIDE FLOATING TURBIDITY CURTAIN AS SHOWN. WHEN CONSTRUCTION ACTIVITIES ARE NOT BEING CONDUCTED IN THE SINK, PROTECT THE SINK FROM ANY RUNOFF WITH SUPER SILT FENCE.
6. ON THE EAST SIDE OF THE SINK, PROVIDE TEMPORARY CONSTRUCTION FENCE AND SUPER SILT FENCE AS SHOWN ON THE PLAN. PROVIDE ACCESS GATES AS REQUIRED FOR THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT TO THEIR WATER MEASUREMENT INSTRUMENTS.
7. REMOVE TREES SHOWN ON THE PLAN. PROTECT ALL OTHER TREES FROM DAMAGE.

WETLAND SUMMARY TABLE

UPLAND AREA:	34,368.88 SF	
WETLAND AREA:	2,878.25 SF	
ENVIRONMENTAL RESOURCE PERMIT PROJECT AREA:	37247.13 SF	
WETLAND POINTS	NORTHING	EASTING
1	1352217.18	507247.30
2	1352194.16	507244.76
3	1352216.50	507337.62
4	1352186.48	507356.17
WETLAND LINES		
1-2	21.93 LINEAR FEET	
3-4	35.29 LINEAR FEET	
WETLAND IMPACT 427 S.F.		

SUBAQUEOUS DATA

PER SUBCONTRACTOR PERFORMING SUBAQUEOUS DATA COLLECTION:

"BOTTOM IS MUDDY WITH CLAY BOTTOM, SMALL/NATURAL DEBRIS THROUGHOUT. ENTIRE BOTTOM HAS NO MAJOR DIFFERENCES IN DEPTH AND IS CONSISTENT WITH ELEVATION TO CREATE A GRADUAL CHANGE IN DEPTH. NEAR CHANNEL, THE BOTTOM BECOMES DEEP MUD 3 TO 5 FEET DEEP. THERE IS LIMESTONE DEBRIS ON EDGE OF CHANNEL."

(1) 25' LONG 8" LOG
(2) 10' LONG 12" LOG
(3) FENCE POST
(4) FENCE POST
(5) 4" X 4" WOOD PILE DRIVEN INTO GROUND; FOUND 2 LOCATED NEXT TO EACH OTHER THAT ALMOST REACH SURFACE; A FEW OTHERS FOUND ALONG SAME LINE BROKEN AT BOTTOM
(6) CONCRETE ALONG SHEET PILE WALL HAS NO UNDERMINING OR PITTED DAMAGE; SLAB COMES OUT 3' TOWARDS POND (3' X 6')
(7) FALLEN TREE & ROOT STRUCTURE; 30' DIAMETER (INCLUDES ROOT STRUCTURE & BRANCHES)

SURVEY NOTES

1. TEMPORARY BENCHMARKS
   a. TBM#3: FOUND PK NAIL & DISC "SWFWMD" IN THE SOUTHWEST CORNER OF "L" SHAPED MASONRY WALL 30+/- NORTHEAST OF SINK AREA. ELEVATION = 34.32'.
   b. TBM#4: NORTH RIM OF D-4 AT WEST END OF PROJECT AREA. ELEVATION = 30.30'.
2. CONTROL POINT 1:
   a. NORTHING 1352188.52
   b. EASTING 506951.66
   c. ELEVATION = 26.01 FEET
3. SANITARY STRUCTURE S-1
   a. TOP ELEVATION 30.56 FEET
   b. PIPE SIZE = PIPE INFORMATION COULD NOT BE OBTAINED.
   c. INVERT ELEVATION 30.56 FEET.
   d. DIRECTION = UNAVAILABLE
4. DRAINAGE STRUCTURE D-1
   a. TOP ELEVATION = 30.38 FEET
   b. PIPE WEST (MATERIAL = 12" RCP; INVERT ELEVATION = 28.23 FEET)
   c. PIPE EAST (MATERIAL = 14" X 23" ERCP, INVERT ELEVATION 26.43 FEET)
5. DRAINAGE STRUCTURE D-2
   a. TOP ELEVATION = 30.33 FEET
   b. PIPE EAST (MATERIAL = 12" RCP; INVERT ELEVATION 26.43 FEET)
6. DRAINAGE STRUCTURE D-3
   a. TOP ELEVATION 31.03 FEET
   b. PIPE SOUTH (MATERIAL = 30" RCP; INVERT ELEVATION = 24.43 FEET)
   c. PIPE NORTHEAST (MATERIAL = 30" RCP; INVERT ELEVATION = 24.43 FEET)
7. DRAINAGE STRUCTURE D-4
   a. TOP ELEVATION = 30.30 FEET
   b. PIPE INFORMATION COULD NOT BE OBTAINED. STRUCTURE WAS PARTIALLY FILLED WITH WATER AND PIPES WERE RECESSED.
   c. BOTTOM OF STRUCTURE ELEVATION = 24.01 FEET.

REV	DATE	BY	DESCRIPTION	SCALE	WARNING		
				1" = 20'	IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED M. PERKALA	DRAWN J. WHITE

CHECKED

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION

This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH

GREELEY AND HANSEN

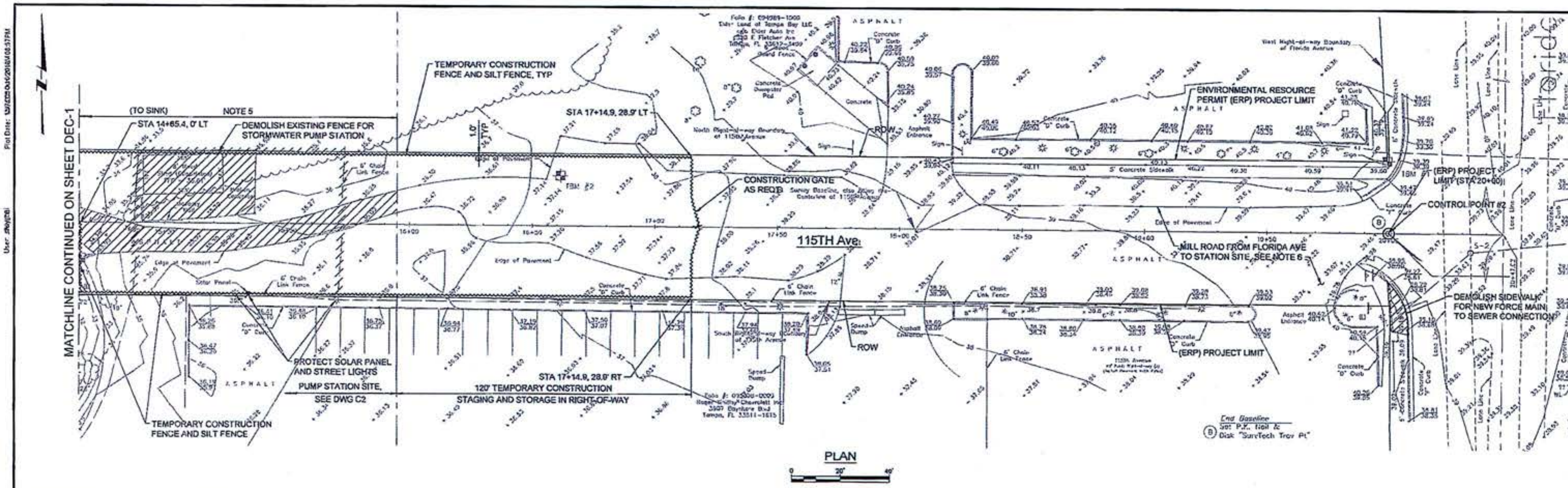
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

DEMOLITION EROSION CONTROL PLAN - 1

SHEET DEC-1

1011673



GENERAL SHEET NOTES

1. THIS SHEET SHOWS CONDITIONS AT THE TIME OF SURVEY. FEATURES AND UTILITIES DEPICTED ON SURVEY ARE FROM VISIBLE EVIDENCE ONLY.
2. THIS SHEET SHOWS EXISTING CONDITIONS, LOCATION OF EROSION AND TURBIDITY CONTROL MEASURES AND DEMOLITION. REFER TO DRAWING C-2 FOR CONSTRUCTION IN THIS AREA.
3. ACCESS TO THE EAST SIDE OF BLUE SINK IS ALONG 115TH AVENUE FROM FLORIDA AVENUE. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" ON DRAWING GC-4 FOR LOCATION OF ACCESS POINTS TO THE SITE. A TEMPORARY CONSTRUCTION STAGING AND STORAGE AREA ON 115TH AVENUE IS IDENTIFIED ON THE PLAN. DO NOT BLOCK ACCESS TO THE CAR DEALERSHIPS LOCATED ON THE NORTH AND SOUTH SIDES OF 115TH AVENUE. IF ADDITIONAL STORAGE OR CONSTRUCTION PARKING IS REQUIRED, PROVIDE OFF SITE STORAGE AND PARKING AT ANOTHER LOCATION.
4. PROVIDE TEMPORARY CONSTRUCTION FENCE AND SUPER SILT FENCE AS SHOWN ON THE PLAN. PROVIDE ACCESS GATES AS REQUIRED FOR THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT TO THEIR WATER MEASUREMENT INSTRUMENTS.
5. IN THE DELINEATED AREA TO THE SINK, REMOVE ALL MANMADE FEATURES, INCLUDING STORAGE SHED, MASONRY WALL, BROKEN CONCRETE, FENCING, ASPHALT AND ROAD BASE AND THE LIKE THAT ARE ASSOCIATED WITH THE CITY OF TAMPA STORMWATER DIVISION OF THE PUBLIC WORKS DEPARTMENT STORMWATER PUMPING STATION. DO NOT DISTURB SHEET PILE WALL OR REVETMENTS AT THE SINK EMBANKMENT. SOME ITEMS MAY BE CURRENTLY DEMOLISHED SINCE SURVEY WAS CONDUCTED TO FACILITATE GEOTECHNICAL WORK. INSPECT SITE PRIOR TO BIDDING. DO NOT REMOVE FENCING OR FEATURES ON THE SOUTH SITE BOUNDARY THAT ARE PART OF THE CHEVROLET DEALERSHIP PARKING LOT FENCING, LIGHTING OR OWNED BY THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT.
6. AFTER CONSTRUCTION OF THE PUMPING STATION AND ASSOCIATED PIPING ARE FINISHED, MILL THE EXISTING 115TH AVE. ASPHALT PAVING FOR RESURFACING.

LEGAL DESCRIPTION BLUE SINK PUMP STATION

THE WEST 210 FEET OF THE NORTH 30 FEET OF THE SOUTHEAST 1/4 OF THE NORTHEAST 1/4 OF THE NORTHWEST 1/4 AND THE WEST 210 FEET OF THE SOUTH 30 FEET OF THE NORTHEAST 1/4 OF THE NORTHEAST 1/4 OF THE NORTHWEST 1/4 OF SECTION 13, TOWNSHIP 28 SOUTH, RANGE 18 EAST, HILLSBOROUGH COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE NORTHEAST CORNER OF THE NORTHWEST 1/4 OF SECTION 13, TOWNSHIP 28 SOUTH, RANGE 18 EAST, THENCE COINCIDENT WITH THE EAST BOUNDARY OF THE NORTHWEST 1/4 OF SAID SECTION 13, S 00°29'57" W A DISTANCE OF 636.91 FEET TO A POINT COINCIDENT WITH THE EASTERLY EXTENSION OF THE NORTH RIGHT-OF-WAY BOUNDARY OF 115TH AVENUE; THENCE DEPARTING SAID EAST BOUNDARY, COINCIDENT WITH SAID EASTERLY EXTENSION AND COINCIDENT WITH THE NORTH RIGHT-OF-WAY BOUNDARY N 89°42'32" W A DISTANCE OF 451.95 FEET TO THE POINT OF BEGINNING; THENCE DEPARTING SAID NORTH RIGHT-OF-WAY BOUNDARY, S 00°30'15" W A DISTANCE OF 60.00 FEET TO A POINT COINCIDENT WITH THE SOUTH RIGHT-OF-WAY BOUNDARY OF 115TH AVENUE; THENCE N 89°42'32" W A DISTANCE OF 210.00 FEET; THENCE N 00°30'15" E A DISTANCE OF 60.00 FEET TO A POINT COINCIDENT WITH AFORESAID NORTH RIGHT-OF-WAY BOUNDARY OF 115TH AVENUE; THENCE S 89°42'32" E A DISTANCE OF 210.00 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 12600.09 SQUARE FEET, 0.289 ACRES, MORE OR LESS.

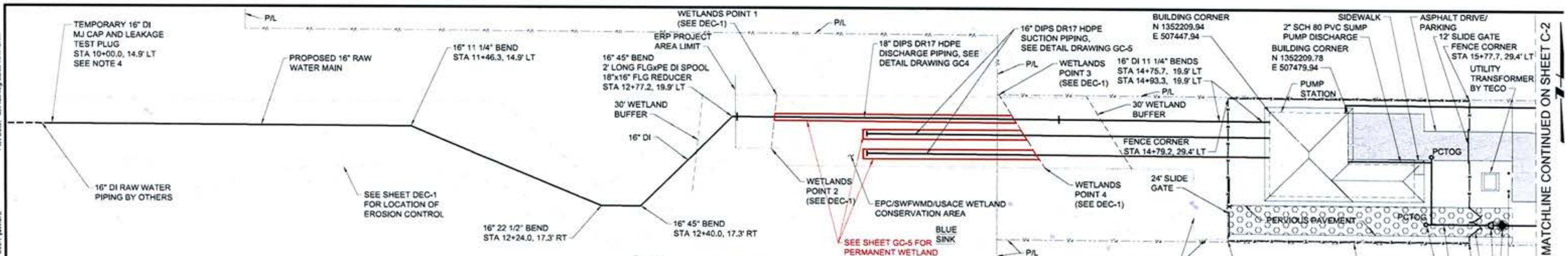
SURVEY NOTES

1. TEMPORARY BENCHMARKS
   a. TBM#1: FOUND PK NAIL & DISC ON BACK OF CONCRETE "D" CURB AT THE NORTHWEST INTERSECTION OF 115TH AVENUE AND NORTH FLORIDA AVENUE. ELEVATION = 40.38'.
   b. TBM#2: SET PK NAIL AND DISC 330 FEET +/- WEST OF THE INTERSECTION OF 115TH AVENUE AND NORTH FLORIDA AVENUE. ELEVATION = 37.33'.
2. CONTROL POINT 2:
   a. NORTHING 1352183.47
   b. EASTING 507951.65
   c. ELEVATION = 39.23 FEET
3. SANITARY STRUCTURE S-2
   a. TOP ELEVATION 39.53 FEET
   b. PIPE SIZE = PIPE INFORMATION COULD NOT BE OBTAINED. MANHOLE PAVED OVER.
   c. INVERT ELEVATION UNAVAILABLE.

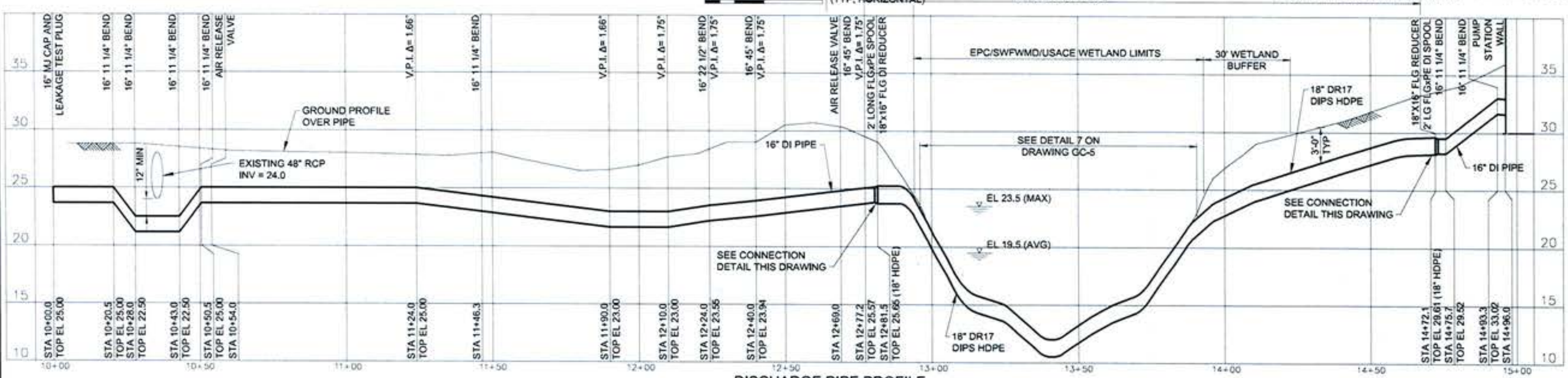
CHARLES M. PEKKALA LICENSE ... STATE OF FLORIDA PROFESSIONAL ENGINEER
7/31/13

Charles M. Pekkala, PE
Civil Engineer
State of Florida - License No 37993
Date: 7/28/2013

REV	DATE	BY	DESCRIPTION	SCALE	WARNING		DESIGN DEVELOPMENT PHASE - JUNE 2013				BLUE SINK MFL PUMPING STATION	SHEET
				1" = 20'	0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED M. PEKKALA DRAWN J. WHITE CHECKED	NOT FOR CONSTRUCTION This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.	MWH 6200 N. ASHLEY DRIVE, TAMPA, FLORIDA 33607 CERTIFICATE OF AUTHORIZATION No. 8773	GREELEY AND HANSEN CERTIFICATE OF AUTHORIZATION No. 37	CITY OF TAMPA, FLORIDA WATER DEPARTMENT	DEMOLITION EROSION CONTROL PLAN - II	DEC-2 1011673



PLAN

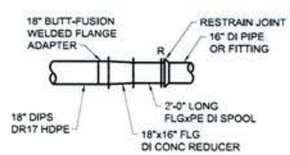


DISCHARGE PIPE PROFILE

(TYP, VERTICAL)

GENERAL SHEET NOTES

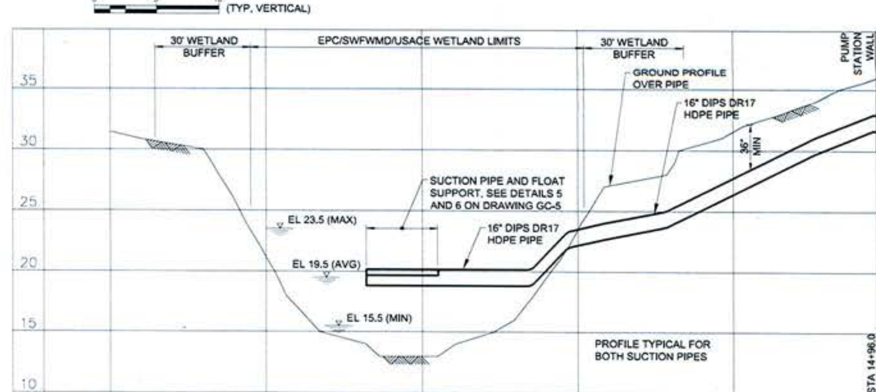
1. REFER TO SHEET DEC-1 FOR INSTALLATION OF EROSION CONTROL MEASURES AND TREE REMOVAL. LIMIT ALL ACTIVITIES TO AREAS DELINEATED BY SILT FENCE/CONSTRUCTION AREA.
2. ACCESS TO THE WEST SIDE OF BLUE SINK IS FROM THE CITY OF TAMPA FC-100 STORMWATER PROPERTY. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" ON DRAWING GC-4 FOR LOCATION OF ACCESS POINTS TO THIS SITE. SITE ACCESS FROM OR PARKING ON RAVINE ROAD IS NOT ALLOWED.
3. THERE WILL BE CONTRACT WORK BY OTHERS ALONG THE EMBANKMENT OF THE FC-100 STORMWATER POND. COORDINATE CONSTRUCTION ACTIVITIES TO MINIMIZE INTERFERENCE.
4. IF THE 16-INCH DUCTILE IRON WATER MAIN BY OTHERS IS PRESENT, CONNECT TO THE WATER MAIN, OTHERWISE PROVIDE A DUCTILE IRON PLUG OR CAP.
5. THERE ARE STATE, FEDERAL AND COUNTY JURISDICTIONAL WETLANDS ON THESE PLANS. ALL GRADES SHALL BE RETURNED TO PRE-CONSTRUCTION CONFIGURATIONS



NOTES:

1. PROVIDE BACKER RING FOR 18" BUTT-FUSION WELDED FLANGE ADAPTER OF TYPE 316 STAINLESS STEEL.
2. PROVIDE TYPE 316 STAINLESS STEEL BOLTS AND NUTS FOR BURIED FLANGED PIPING.

CONNECTION DETAIL
NO SCALE



SUCTION PIPE PROFILE

TEMPORARY WETLAND IMPACTS DURING CONSTRUCTION

REV	DATE	BY	DESCRIPTION	SCALE 1" = 20'	WARNING: IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED M. PEKKALA; DRAWN J. WHITE; CHECKED

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION
This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH — 1000 N. ASHLEY DRIVE, TAMPA, FLORIDA 33602

GREELEY AND HANSEN — 1710 NORTH WESTSHORE BLVD TAMPA, FLORIDA 33607

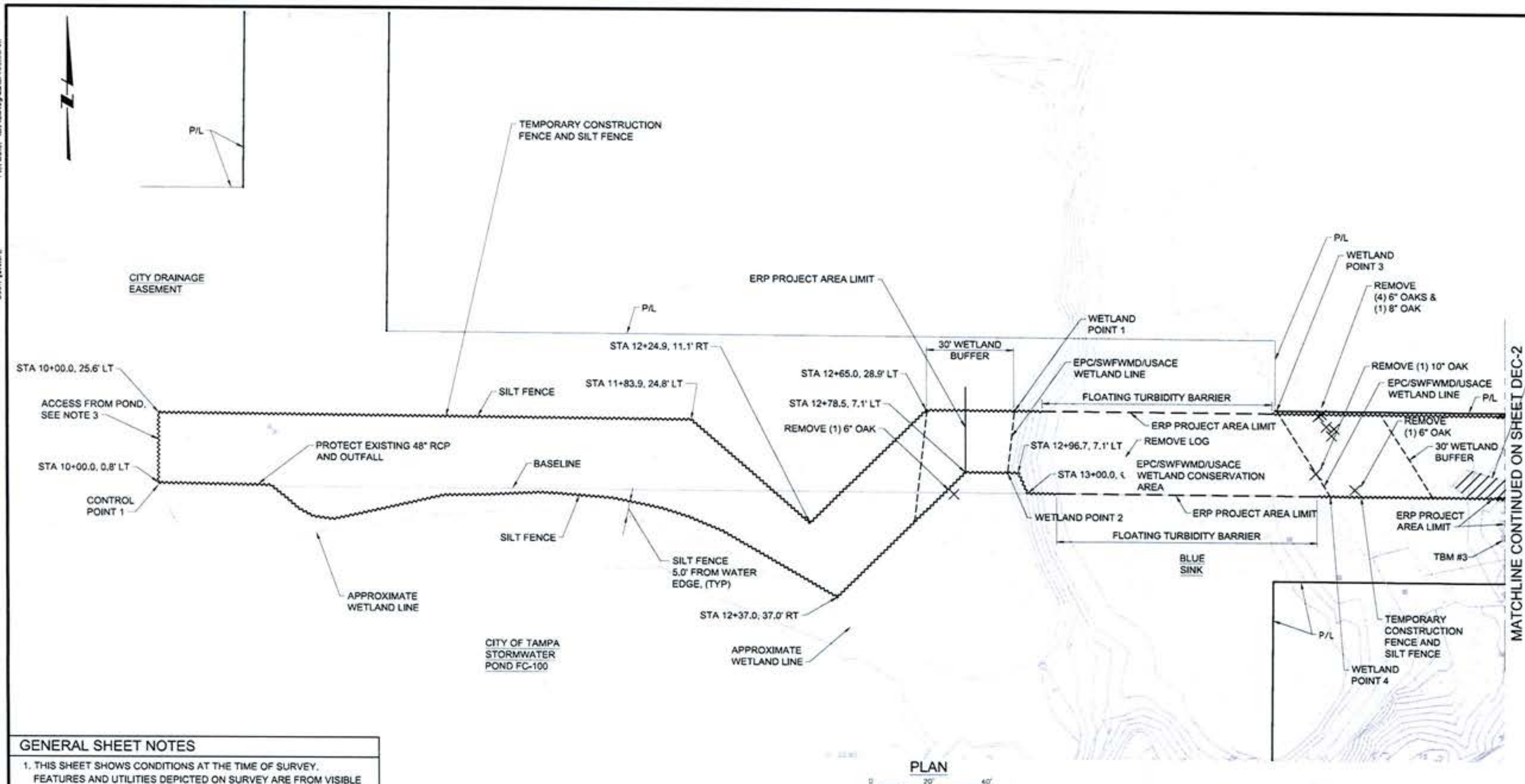
CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

CIVIL
SITE AND YARD PIPING PLAN - I

SHEET C-1

1011673



GENERAL SHEET NOTES

1. THIS SHEET SHOWS CONDITIONS AT THE TIME OF SURVEY. FEATURES AND UTILITIES DEPICTED ON SURVEY ARE FROM VISIBLE EVIDENCE ONLY.
2. THIS SHEET SHOWS EXISTING CONDITIONS, LOCATION OF EROSION AND TUBIDITY CONTROL MEASURES AND TREE REMOVAL. REFER TO DRAWING C-1 FOR CONSTRUCTION IN THIS AREA.
3. ACCESS TO THE WEST SIDE OF BLUE SINK IS FROM THE CITY OF TAMPA FC-100 STORMWATER PROPERTY. SEE DETAIL "SITE ACCESS AND COORDINATION WITH OTHERS" ON DRAWING GC-4 FOR LOCATION OF ACCESS POINTS TO THIS SITE. SITE ACCESS FROM OR PARKING ON RAVINE ROAD IS NOT ALLOWED.
4. DELINEATE CONSTRUCTION AREA ON WEST SIDE OF BLUE SINK WITH SUPER SILT FENCE AS SHOWN ON THE PLAN.
5. WHEN CONSTRUCTION WORK IS BEING CONDUCTED IN THE SINK, PROVIDE FLOATING TURBIDITY CURTAIN AS SHOWN. WHEN CONSTRUCTION ACTIVITIES ARE NOT BEING CONDUCTED IN THE SINK, PROTECT THE SINK FROM ANY RUNOFF WITH SUPER SILT FENCE.
6. ON THE EAST SIDE OF THE SINK, PROVIDE TEMPORARY CONSTRUCTION FENCE AND SUPER SILT FENCE AS SHOWN ON THE PLAN. PROVIDE ACCESS GATES AS REQUIRED FOR THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT TO THEIR WATER MEASUREMENT INSTRUMENTS.
7. REMOVE TREES SHOWN ON THE PLAN. PROTECT ALL OTHER TREES FROM DAMAGE.

WETLAND SUMMARY TABLE

UPLAND AREA: 34,368.88 SF

WETLAND AREA: 2,878.25 SF

ENVIRONMENTAL RESOURCE PERMIT PROJECT AREA: 37247.13 SF

WETLAND POINTS	NORTHING	EASTING
1	1352217.18	507247.30
2	1352194.16	507244.76
3	1352216.50	507337.62
4	1352186.48	507356.17

WETLAND LINES	
1-2	21.93 LINEAR FEET
3-4	35.29 LINEAR FEET

WETLAND IMPACT
440 S.F.

SUBAQUEOUS DATA

PER SUBCONTRACTOR PERFORMING SUBAQUEOUS DATA COLLECTION:

"BOTTOM IS MUDDY WITH CLAY BOTTOM, SMALL/NATURAL DEBRIS THROUGHOUT. ENTIRE BOTTOM HAS NO MAJOR DIFFERENCES IN DEPTH AND IS CONSISTENT WITH ELEVATION TO CREATE A GRADUAL CHANGE IN DEPTH. NEAR CHANNEL, THE BOTTOM BECOMES DEEP MUD 3 TO 5 FEET DEEP. THERE IS LIMESTONE DEBRIS ON EDGE OF CHANNEL."

1. 25' LONG 8" LOG
2. 10' LONG 12" LOG
3. FENCE POST
4. FENCE POST
5. 4" X 4" WOOD PILE DRIVEN INTO GROUND; FOUND 2 LOCATED NEXT TO EACH OTHER THAT ALMOST REACH SURFACE; A FEW OTHERS FOUND ALONG SAME LINE BROKEN AT BOTTOM
6. CONCRETE ALONG SHEET PILE WALL HAS NO UNDERMINING OR PITTED DAMAGE; SLAB COMES OUT 3' TOWARDS POND (3' X 6')
7. FALLEN TREE & ROOT STRUCTURE; 30' DIAMETER (INCLUDES ROOT STRUCTURE & BRANCHES)

SURVEY NOTES

1. TEMPORARY BENCHMARKS
   - a. TBM#3: FOUND PK NAIL & DISC "SWFWMD" IN THE SOUTHWEST CORNER OF "L" SHAPED MASONRY WALL 30'+/- NORTHEAST OF SINK AREA. ELEVATION = 34.32'.
   - b. TBM#4: NORTH RIM OF D-4 AT WEST END OF PROJECT AREA. ELEVATION = 30.30'.
2. CONTROL POINT 1:
   - a. NORTHING 1352188.52
   - b. EASTING 506951.66
   - c. ELEVATION = 26.01 FEET
3. SANITARY STRUCTURE S-1
   - a. TOP ELEVATION 30.56 FEET
   - b. PIPE SIZE = PIPE INFORMATION COULD NOT BE OBTAINE
   - c. INVERT ELEVATION 30.56 FEET.
   - d. DIRECTION = UNAVAILABLE
4. DRAINAGE STRUCTURE D-1
   - a. TOP ELEVATION = 30.38 FEET
   - b. PIPE WEST (MATERIAL = 12" RCP; INVERT ELEVATION = 28.23 FEET)
   - c. PIPE EAST (MATERIAL = 14" X 23" ERCP, INVERT ELEVATI 26.43 FEET)
5. DRAINAGE STRUCTURE D-2
   - a. TOP ELEVATION = 30.33 FEET
   - b. PIPE EAST (MATERIAL = 12" RCP; INVERT ELEVATION 28.4 FEET)
6. DRAINAGE STRUCTURE D-3
   - a. TOP ELEVATION 31.03 FEET
   - b. PIPE SOUTH (MATERIAL = 30" RCP; INVERT ELEVATION = 24.43 FEET)
   - c. PIPE NORTHEAST (MATERIAL = 30" RCP; INVERT ELEVATI = 24.43 FEET)
7. DRAINAGE STRUCTURE D-4
   - a. TOP ELEVATION = 30.30 FEET
   - b. PIPE INFORMATION COULD NOT BE OBTAINED. STRUCTURE WAS PARTIALLY FILLED WITH WATER AND PIPES WERE RECESSED.
   - c. BOTTOM OF STRUCTURE ELEVATION = 24.01 FEET.

REV	DATE	BY	DESCRIPTION	SCALE
				1" = 20'

WARNING: 0 ½ 1 — IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED: M. PEKKALA
DRAWN: J. WHITE
CHECKED:

DESIGN DEVELOPMENT PHASE - JUNE 2013

NOT FOR CONSTRUCTION
This document is an interim document and not suitable for construction. As an interim document, it may contain data that is potentially inaccurate or incomplete and is not to be relied upon without the express written consent of the preparer.

MWH — 1000 N. ASHLEY DRIVE, TAMPA, FLORIDA 33602 CERTIFICATE OF AUTHORIZATION No. 4773

GREELEY AND HANSEN — 1710 NORTH WESTSHORE BLVD TAMPA, FLORIDA 33607 CERTIFICATE OF AUTHORIZATION No. 37

CITY OF TAMPA, FLORIDA
WATER DEPARTMENT

BLUE SINK MFL PUMPING STATION

DEMOLITION EROSION CONTROL
PLAN - I

SHEET
DEC-1

1011673

ATTACHMENT 2

SELF-CERTIFICATION STATEMENT OF COMPLIANCE

Permit Number: SAJ-2013-01988 (NW-TEH)

Permittee's Name & Address (please print or type): _____

_____

_____

Telephone Number: _____

Location of the Work: _____

_____

Date Work Started: _____ Date Work Completed: _____

PROPERTY IS INACCESSIBLE WITHOUT PRIOR NOTIFICATION: YES _____NO_____
PLEASE CONTACT _____ AT _____
TO SCHEDULE AN INSPECTION

Description of the Work (e.g. bank stabilization, residential or commercial filling, docks, dredging, etc.):

_____

_____

Acreage or Square Feet of Impacts to Waters of the United States: _____

Describe Mitigation completed (if applicable): _____

_____

_____

Describe any Deviations from the Permit (attach drawing(s) depicting the deviations):

_____

_____

I certify that all work, and mitigation (if applicable), was done in accordance with the limitations and conditions as described in the permit. Any deviations as described above are depicted on the attached drawing(s).

_____
Signature of Permittee

_____
Date

ATTACHMENT 3

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or "approval" from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or "approval" from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11" x 17" or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A <u>LIVE</u> EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A <u>DEAD</u> EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.

2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.

3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).

2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.

3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.

ATTENTION:

THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida ES Office – (904) 731-3336
Panama City ES Office – (850) 769-0552
South Florida ES Office – (772) 562-3909

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

LEGAL STATUS: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

August 12, 2013

ATTENTION:

THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

Please read the following information provided by the U.S. Fish and Wildlife Service to become familiar with standard protection measures for the eastern indigo snake.