

THE CITY OF DAYTONA BEACH
BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR
REPLACEMENT

INVITATION TO BID No. 20343
CITY PROJECT NO. 6810
PROJECT SPECIFIC CONSTRUCTION SERVICES
NIGP COMMODITY CODE 28539, 91223, 92838, 93639



THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT - ENGINEERING DIVISION
P.O. BOX 2451
DAYTONA BEACH, FLA. 32115

ISSUE DATE: March 11, 2020

ITB-Project Specific Construction 10/23/19

INVITATION TO BID – PROJECT SPECIFIC CONSTRUCTION SERVICES

The City of Daytona Beach will receive Bids for the “**BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR REPLACEMENT**”, Invitation to Bid No. 20343, at the City of Daytona Beach Purchasing Division, City Hall Room 146, 301 S. Ridgewood Ave., Daytona Beach, Florida 32114, until **2:00 p.m., on April 15, 2020**, at which time Bids will be opened publicly and read aloud. Bids received after said time will be returned unopened.

Sealed Bids must be addressed to:

Joanne Flick, Purchasing Agent
The City of Daytona Beach Purchasing Division
301 S. Ridgewood Ave., Room 146
Daytona Beach, Fl., 32114

with “Sealed Bid for BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR REPLACEMENT , ITB No. 20343” plainly written on the outside of the envelope.

The work generally consists of Project includes furnishing all labor, equipment, materials, and construction services to complete the project work as noted in the Project Documents. The primary work includes installation of two (2) new 750kW diesel generators at the Bethune Point Water Reclamation Facility. The Order of Magnitude for this project is \$1,487,500 - \$1,925,000.

Bid Documents may be obtained as pdf files on-line at www.codb.us/841/Purchasing. There is no charge for downloading Bid Documents. The Bid Documents and all other Contract Documents, including Drawings and Technical Specifications if applicable, are also on file at the Daytona Beach Purchasing Division, 301 S. Ridgewood Avenue, Room 146, Daytona Beach, Florida, 32114. A complete set of these Documents may be obtained upon payment of \$75, NON-REFUNDABLE. Checks must be made payable to the City of Daytona Beach, Florida. All inquiries and checks pertaining to this Project which are mailed should be directed to Post Office Box 2451, Daytona Beach, Florida 32115-2451.

Each Bid must be accompanied by **Bid Security** in an amount not less than 10% of the total Bid.

BIDDERS SHALL NOTE RECENT REVISIONS THAT REQUEST SUBMISSION OF “GOOD FAITH EFFORT” DOCUMENTATION EVIDENCING THE BIDDER’S ATTEMPTS TO ACHIEVE THE CITY’S MBE/WBE CONTRACT PARTICIPATION AND EMPLOYMENT GOALS.

A NON-MANDATORY PRE-BID CONFERENCE will be held at the Daytona Beach Utilities Conference Room, 1 Shady Place, Daytona Beach, Florida 32114, on March 18, 2020 at 10:00 AM. Interested contractors are *urged* to attend.

The successful contractor will be required to furnish separate 100% performance and payment bonds.

The City reserves the right to reject any and all Bids, or any portion of any Bid, or to waive any informalities in the bidding.

Bids may be held by the City for a period not to exceed 60 days from the date of opening of Bids for the purpose of reviewing the Bid and investigating the qualifications of bidders prior to awarding the contract.

By: KIRK ZIMMERMAN, CPPB
CITY OF DAYTONA BEACH
Issue Date: March 11, 2020

INSTRUCTIONS TO BIDDERS – PROJECT SPECIFIC CONSTRUCTION SERVICES

THESE INSTRUCTIONS ARE STANDARD FOR ALL BID SOLICITATIONS FOR PROJECT SPECIFIC CONSTRUCTION SERVICES ISSUED BY THE CITY OF DAYTONA BEACH. THE CITY MAY DELETE, SUPERSEDE, OR MODIFY ANY OF THESE STANDARD INSTRUCTIONS FOR A PARTICULAR SOLICITATION BY USE OF SPECIAL INSTRUCTION SHEETS.

1. BID DOCUMENTS. The Bid Documents consist of the Invitation to Bid; these Instructions; Special Instructions, if any; the Bid Proposal Letter, the Bid Schedule and all other Forms to be completed, signed, and submitted by the Bidder; and all additional documents required to be completed and submitted by the Bidder as part of the Bid.

In making copies of Bid Documents available, the City does so only for the purpose of obtaining Bids and does not confer a license or grant to use the Bid Documents for any other purpose.

2. COMPLETING THE BID. In order for the Bid to be considered complete:

A. The Bid Proposal Letter, the Bid Schedule, and all other required Forms must be completed. All blank spaces must be filled with dark ink or via typing. All corrections and erasures must be initialed by the party submitting the Bid on behalf of the Bidder.

B. All information/documentation that is required to be submitted by this solicitation must be provided in the manner indicated.

C. The Bidder is requested to submit only the Bid Proposal Letter and other Forms, documents, and information specifically required. Any extraneous documents or information submitted by the Bidder will be discarded. The Bidder be asked to sign a written contract only if the City awards a contract to Bidder.

D. Unless Special Instructions are included in this solicitation specifically allowing for partial or lot-by-lot bids where the Bid Schedule only calls for unit prices, the Bidder must provide quotes for all unit prices and extended unit prices (if any) as set forth in the Bid Schedule. If this solicitation allows for partial or lot-by-lot bids, the Bidder must comply with the Special Instructions in completing filling out the unit prices and extended unit prices set forth in the Bid Schedule.

E. The Bid Price (including unit prices and extended prices if applicable), must be stated in numerals.

F. If this solicitation requires unit prices and there is a conflict between the unit prices and the extended totals, the unit price will take precedence. Likewise, discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

G. The Bidder must not submit alternative bids unless this solicitation specifically authorizes alternate bids. If this solicitation specifically allows the submission of alternate bids, the Bidder must submit the standard and the alternative bid in order to be considered responsive.

H. The Bid may not contain qualifications or exceptions of any kinds.

I. All other submittal requirements stated herein must be met.

3. SIGNING THE BID. The Bid Proposal Letter, the Bid Schedule and all other Forms and documents requiring Bidder's signature must contain the original signature of an individual authorized to bind the Bidder. The signature must be located in the space(s) marked for the Bidder's signature. In addition, the person signing the Bid must also sign all of the other Forms to be submitted.

4. REQUESTS FOR INTERPRETATIONS. If the Bidder is in doubt as to the meaning of any of the Bid Documents or other Contract Documents included in this solicitation, the Bidder may submit a written request to the City for an interpretation, care of the Purchasing Agent at the address set forth in the Invitation for delivery of the completed Bid or through the City's web page <http://www.codb.us/841/Purchasing> by clicking "Public Solicitation", then the desired bid, and finally the "submit question" button at the top of the page. Such requests must be received **10 days** prior to Bid opening in order to be considered. The City is not obligated to respond to such requests. Any clarification or interpretation issued by the City in the form of a written addendum or reply to all users via the web based platform and will be deemed to be a part of the Bid Documents.

No oral clarification or interpretation will be binding.

5. ADDENDA TO BID DOCUMENTS. Prior to Bid opening, the City may on the City's own initiative or in response to a request for clarification, furnish addenda for additions or alterations to these Instructions, the Bid Documents, and to any or any Drawings, Specifications, or other Contract Documents previously supplied by the City. In addition, the City may by addenda extend the date scheduled for Bid Opening.

The Purchasing Agent will make reasonable efforts to notify all potential bidders of the issuance of an Addendum. The Purchasing Agent will also post Addenda on the Purchasing Division's web page, www.codb.us/841/Purchasing.

However, the Bidder is solely responsible for ensuring that the Bid submitted reflects all such Addenda.

6. BID SECURITY. The Bidder must submit Bid Security equal to 10% of the Bid. The Bid Security will be in the form of a Bid bond; or any of the following alternate forms: cashier's check, certified check, money order, notes at par value, U.S. Currency, or U.S. Government Bond. Any Bid Security provided must be in original form; copies are unacceptable. The City has the right to retain the Bid security as liquidated damages should the Successful Bidder fail to comply with the terms of the Bid. The City will return the bid security to unsuccessful Bidders after the contract award.

Any Bid bond provided must be in a form approved or provided by the City, and must be accompanied by sufficient evidence of the issuing agent's authority. The surety company executing the bond must be authorized to do business in the State of Florida. If the Bid bond is in an amount greater than \$5,000.00 the surety company executing the bond is listed by the United States Treasury Department as being approved for writing bonds for federal Projects on its current list in an amount not less than the required bond amount.

7. BID ENVELOPE. The Bid, including the Bid Proposal Letter, all other required Bid documents, and required Bid security, must be returned in an opaque, sealed envelope. The envelope must display the name and address of the Bidder, the Bid number and name of the Bid/contract as set forth on the Invitation to Bid, and the date and time scheduled for Bid opening. The envelope must be addressed to:

Purchasing Agent
City of Daytona Beach
Room 146
301 S. Ridgewood Avenue
Daytona Beach, FL 32114

8. SUBMISSION OF BID. The Bidder must submit the Bid by mail, hand delivery, at or prior to the time fixed for bid opening in the Invitation for Bids. A bid submitted after the time fixed for bid opening will not be accepted. The Bid must be delivered to the Purchasing Agent at the address above. A bid submitted to any other location will not be considered. Telephonic, electronic, and faxed bids will not be considered.

The only form of electronic submittal that will be accepted will be through the City web page www.codb.us/841/Purchasing then selecting "Public Solicitation", then choosing the proper bid, and clicking the "Submit Bid" button at the top of the page. Any other form of electronic submittal such as email or fax will be rejected.

9. AMENDMENT AND WITHDRAWAL OF BID. The Bidder may amend or withdraw the Bid at any time prior to bid opening, but only with prior written notice to the Purchasing Agent, submitted in the same manner as the Bid. The notice must be signed by a properly authorized agent of the Bidder.

Mere negligence on the part of the Bidder in preparing the Bid does not constitute a right to withdraw the Bid subsequent to bid opening.

Amendments may be made only through the submission of a complete Bid along with a written statement, signed by the same person who signed the Bid, that the submission is intended to fully replace the Bidder's earlier submission. The City is not required to honor an amendment that fails to comply with this Paragraph 10.

10. DISQUALIFICATION OF BIDDERS.

A. **Only One Bid Permitted:** The Bidder may submit only one Bid. If the Bidder submits more than one bid for the work involved, all bid proposals submitted from the Bidder will be rejected.

B. **Collusion:** If the City determines that collusion exists among bidders, the City will reject the Bids of all participants in the collusion.

C. **Scrutinized Companies List:** If the Bidder is found to have submitted a false certification as provided by F.S. Section 238.175(5), or been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, the City will have the option to immediately terminate this Contract.

11. BID OPENING. Bid opening will be scheduled at the location and on the date and time specified by the Invitation for Bid, or by any applicable Bid Addenda that the City may issue. At Bid opening, the City will open and record the Bid so long as it is proper and has been timely submitted. In recording the Bid the City will state the name of the Bidder and the Bid Price.

The Bidder is solely responsible to ensure that the Bid is time and date stamped by the Purchasing Agent prior to bid opening. Late bids will be rejected and returned unopened.

The Bidder may be present at bid opening but is not required to be present.

12. BID AS OFFER; FIRM PRICING; NO GUARANTEES AS TO QUANTITIES ORDERED. In submitting the Bid, the Bidder certifies that the Bidder is making a firm offer that will remain open for 60 days following Bid Opening unless properly and timely withdrawn by the Bidder prior to Bid Opening in conformance with these Instructions unless the City, in the City's sole discretion, rejects the Bid after Bid Opening. Extensions of time beyond the 60 day-period will only be by agreement of the City, the Successful Bidder, and the surety for the Successful Bidder.

In addition, if this solicitation requests submission of unit prices: (i) all unit prices will be deemed to be held firm for the duration of the Contract, including any extension thereof, unless specifically authorized by the Contract Documents; and (ii) quantities stated are an estimate only and no guarantee is given or implied as to quantities that will actually be required during the contract period.

13. FEDERAL TAXES. The Bid price will be exclusive of all federal taxes. If the Bidder believes that certain other taxes are properly payable by the City, the Bidder may list such taxes separately in each case directly below the respective item Bid price. Tax exemption certificates will be furnished upon request.

14. BID PRICE INCLUSIVE OF COSTS. The Bid Price is inclusive of all of the Bidder's direct and indirect costs of performing the Work.

15. BIDS AND PUBLIC RECORDS. Sealed Bids received by the City pursuant to this solicitation will be temporarily exempt from disclosure in accordance with Florida's Public Records Laws. Thereafter, bids will be open for inspection by any person pursuant to Public Records Law.

If the Bidder believes that the Bid or any portion thereof is permanently exempt from disclosure under the public records laws, the Bidder must state the grounds for this position in CAPITAL LETTERS on a cover sheet accompanying the sealed Bid. The Bidder will be contacted prior to the opening of the Bid and a determination will be made as to whether or not it is exempt prior to opening. If a determination is made that it is not exempt from disclosure, the Bidder may in writing request the return of the sealed Bid.

16. BID OPENING RESULTS. The Bidder may secure information pertaining to bid opening results on the Purchasing Division webpage under the "Closed Solicitations" link, by visiting the Purchasing Division Office Monday through Friday between 8:00 am and 3:00 pm, or by emailing a request to purchasing@codb.us. Copies of Bid tabulation sheets will be furnished upon request and receipt of a valid email address or self-addressed stamped envelope.

17. BIDDER CAPABILITY/REFERENCES. Prior to contract award, the City may require Bidder to show that Bidder has the necessary facilities, Equipment, ability, and financial resources to perform the work specified in a satisfactory manner and within the time specified.

In addition, the City may require Bidder to demonstrate that Bidder has experience in work of the same or similar nature as the work required herein, and to provide references satisfactory to the City.

18. REVIEW; BASIS OF AWARD. Bids will be reviewed in accordance with the procedures set forth in these Instructions to Bidders and the applicable provisions of the Purchasing Code, Chapter 30 of the Daytona Beach Code of Ordinances. Any contract awarded pursuant to this solicitation will be made on the basis of the criteria for award of bids provided in the Purchasing Code.

A link to the Code of Ordinances is available on the City's web site, www.codb.us/841/Purchasing.

19. LOCAL PREFERENCE. The Purchasing Code, Chapter 30, Code of the City of Daytona Beach provides for a preference to local vendors whenever the application of such a preference is reasonable in light of the dollar-value of proposals received in relation to such expenditures.

As used in City Code, the term, "local vendor" means a person or business entity which has maintained a permanent place of business with full-time employees within the city limits of the City of Daytona Beach for a minimum of six months prior to the date Bids or proposals were received for the purchase or contract at issue, which generally provides from such permanent place of business the kinds of goods or services solicited, and which at the time of the solicitation fully complies with state and local laws, including City zoning and licensing ordinances.

Pursuant to City Code, if the lowest responsive Bid is submitted by a non-local vendor, and a Bid submitted by a local vendor is within 10% of the lowest Bid, then these two vendors will each have the opportunity to submit a best and final Bid equal to or lower than the amount of the lowest Bid within five working days after Bid opening. The Bid will be awarded to the bidder submitting the lowest responsive Bid or final Bid. In case of a tie between a local vendor and a non-local vendor, the Bid will be awarded to the local vendor.

If the Bidder intends to qualify as a local vendor, the Bidder must complete and sign the Local Vendor affidavit and submit it as part of the Bid. A Bidder who fails to properly complete and sign this affidavit or submit it with the Bid, will not further considered for local preference.

If the Bidder submits a properly completed Local Vendor affidavit as part of its Bid, the City reserves the right to verify that the Bidder meets the definition of Local Vendor, including by requiring the Bidder to supply

additional documentation. In all instances, the City will be the final arbiter as to whether the Bidder qualifies for local preference.

With certain exceptions, application of local preference is discretionary. For more information on how the Local Preference may apply, see the Purchasing Code.

20. IDENTICAL TIE BIDS. If there are two or more low responsive Bids from responsible bidders that are identical in price and other evaluation criteria, the tie will be awarded to the following in order of preference: a) the bidder qualifying for local preference under Code 30-86; b) the bidder in compliance with the drug free workplace certification requirements set forth in Florida Statutes 287.087; or c) the most responsible bidder as defined under the City Code 30-82 (9)(c).

21. RIGHT TO ACCEPT OR REJECT BIDS. The City will reject Bids which contain modifications, qualifications, or exceptions, or which are incomplete, unbalanced, conditional, obscure, or which contain additions not requested, or irregularities of any kind, or which do not comply in every respect with these Instructions to Bidders and the Contract Documents, unless the City in its sole discretion determines that the non-compliance is minor.

The City does not bind itself to accept the minimum Bid stated herein, but reserves the right to accept any Bid, which in the judgment of the City will best serve the needs and interests of the City.

22. CRA MAY AWARD PURCHASE ORDERS ISSUED PURSUANT TO CONTRACT. In the case of a continuing/term supply or service contract awarded pursuant to this solicitation, if the funds to be used to pay for a portion of the supply or service are from redevelopment trust funds, the Community Redevelopment Agency (CRA) is authorized to issue the purchase order corresponding to the supply or service instead of the City.

23. CITY'S PROJECT-SPECIFIC CONSTRUCTION CONTRACT FORM. The City's contract form for Project specific construction Projects, which is included in this solicitation, contains additional terms and conditions, including indemnification and insurance requirements, completion deadlines, and liquidated damages, that the Bidder should review prior to submitting the Bid. The City reserves the right to make minor changes to the form contract prior to execution by the successful bidder to correct errors, make other minor formatting changes, or for legal sufficiency. The City will provide the successful bidder the final contract for execution.

24. LICENSES. At time of Bid submittal, the Bidder must hold the required licensure to be the prime contractor for all work to be performed under this solicitation. Any Subcontractors or sub-consultants whom the Bidder proposes to use to perform work under this solicitation must also hold the required licensure at the time of Bid submittal. Required licensure must be maintained in full force and effect during the contract term.

25. BIDDER RESPONSIBILITY FOR PREPARATION COSTS. Neither the City nor the City's officers or agents will be liable for the costs incurred by the Bidder in reviewing or responding to this solicitation.

26. POST-AWARD SUBMITTAL REQUIREMENTS. Within 15 business days after the City's issuance of a notice of award, the Successful Bidder must submit each of the following:

- A. A fully-executed contract, using the form provided with or referenced by the notice of intent to award.
- B. Proof of insurance, in accordance with the requirements of the Contract. See the Contract form for more information regarding insurance requirements.
- C. Performance Security, as further described below, in an amount equal to 100% of the Contract Price.

The award is subject to cancellation and the Bid security subject to forfeiture if this deadline is not met.

27. PERFORMANCE SECURITY. Performance Security is required. Payment and performance bonds may be submitted; or an alternative form of security as specified in Florida Statutes § 255.05(7) may be provided upon the City's prior written approval.

If the Successful Bidder elects to use payment and performance bonds for required Performance Security, the Successful Bidder will use forms provided by the City. Copies of the City's current form bonds will be provided with the Notice of Award. Completed bonds must be originals, not copies, with raised corporate seals included where applicable. The bonds must be accompanied by sufficient evidence of the authority of the issuing agent, including a certified copy of the power of attorney of the person signing the bond on the surety's behalf. The surety company executing the bonds must be must be rated "A" or better by A.M. Best Key Rating Guide, authorized to do business in the State of Florida, and must be listed by the United States Treasury Department Treasury Fiscal Service, Bureau of Government Financial Operations, Federal Register, Part V, latest revision, entitled: "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies," as being approved for writing bonds for federal Projects on its current list in an amount not less than the required bond amount.

END OF INSTRUCTIONS TO BIDDERS SECTION

SPECIAL INSTRUCTIONS

SI 1. MINIMUM CONSTRUCTION EXPERIENCE QUALIFICATIONS. The Bid requires that the BIDDER has sufficient experience in similar construction projects. This Special Instruction sets forth certain Minimum Construction Experience Qualifications (“Minimum Qualifications”) that must be met by the BIDDER, and describes the reference information that the BIDDER must submit as part of the Bid to allow the City to confirm that these Minimum Qualifications are met. The imposition of the Minimum Qualifications stated herein will not be deemed to restrict the City’s ability to determine whether the BIDDER is “responsible” as that term is referenced in Section 30-82(8) of Chapter 30 of the City of Daytona Beach Code of Ordinances.

1. Definitions.

“Task” means the following specific type of construction-related activity: Stand-by Power Upgrades

2. Who Must Meet the Minimum Qualifications?

The BIDDER must meet a Minimum Qualification associated with a Task listed below, if the BIDDER proposes to perform 50% or more of the Task through the BIDDERS’ own forces for the Project. A Significant Task Subcontractor must meet a Minimum Qualification associated with a Task listed below, if the BIDDER proposes to have the Subcontractor perform 50% of the Task in the course of the Project.

3. What are the Minimum Qualifications?

The Minimum Qualifications are:

Stand-by Power Upgrades: The BIDDER shall be a licensed contractor and shall have completed a minimum of three (3) projects of similar scope and standby power capacity (1.0 MW) at an active water/wastewater treatment facility, while maintaining operation of the facility at all times. Contractor shall provide three (3) project examples with references that were completed within 10 years of the due date of this ITB.

A project will be considered counted toward meeting the applicable Minimum Qualification listed above only if, in addition the conditions referenced, both of the following conditions are met: (i) the project was undertaken, or the BIDDER’s portion of the project completed, no earlier than 2010, and (ii) the BIDDER performed at least 50% of the Task described for that project.

A project will be deemed “successful” only if: (i) the entire project, including the Task referenced, achieved final acceptance; or (ii) the Task referenced was deemed substantially complete (i.e., the Facility Owner accepted the equipment installed for the Facility Owner’s beneficial use).

A project will not be deemed to be “successful” for purposes above, even if it otherwise meets the foregoing, conditions, if any of the following occurred: (i) the BIDDER was terminated from the project for cause, (ii) in association with the work listed, the BIDDER

received any enforcement agency warning letters, administrative fines or penalties, or the BIDDER was required to pay damages by a court of law, for Occupational Safety and Health Administration (OSHA) violations in association with work; (iii) after project completion, the Facility Owner requested the BIDDER to provide warranty work and the BIDDER failed to provide such work to the Facility Owner's satisfaction; or (iv) the Facility Owner or the Facility Owner's contact person (listed below), for any other reason provides the City a negative reference regarding the BIDDER.

4. What is the BIDDER Required to Provide?

To help the City determine whether the required Minimum Qualifications are met, the BIDDER must submit the following as part of the signed and sealed Bid. All documents are included at the end of this Section ("Reference Package")

A. A list of Significant Task Subcontractors, including the name of the person or firm, and the task for which the Subcontractor will act as a Significant Task Subcontractor.

B. A Reference Package. The Reference Package will contain a title page containing the CITY contract number and title as referenced in the Invitation to Bid; the name of the CONTRACTOR, followed by References for the BIDDER. The References will be tabbed and indexed.

C. Each Project contained within the Reference Package will contain contact information with a person familiar with the referenced project who can verify that the Minimum Qualification is being met.

The BIDDER is encouraged to provide a backup contact person in each instance in case the City is unable to reach the primary contact person.

5. How will the city use the Information Submitted Above?

In evaluating the Bids received, the City intends to contact each reference listed (and with respect to OSHA violations, the appropriate agencies) to verify that the Minimum Qualifications were met. BIDDERS meeting the Minimum Qualifications (including with respect to their Significant Task Subcontractors) will be considered qualified to perform the work and their Bid considered responsive provided other material requirements of the Bid are met.

SI 2. Minority and Women Owned Business Enterprise Participation. The Daytona Beach City Commission has established a goal of 10% MBE/WBE participation in business contracts (i.e., contractors, subcontractors, and suppliers) with the City. The goal may be adjusted on a case-by-case basis to reflect experience and the relevant availability of MBE/WBE businesses.

Bidders are asked to provide documentation of their "good faith efforts" to achieve the MBE/WBE participation goal as outlined below.

A. Definitions:

Bid means all purchases prices sought by any procurement method

Construction means the process of building, altering, repairing, improving, or demolishing any public structure, building, roadway, or other public improvements of any kind to any public real property. It does not include the routine operation, repair, or maintenance of existing structures, buildings, or real property.

Contract means all types of city agreements, regardless of what they may be called, for the purchase or disposal of supplies or services or performance of construction with the following exceptions: salaries/employee benefits, taxes, judgments, travels, dues, pensions, utilities, subscriptions, auto allowances, debt service requirements and postage. It includes contracts for a fixed price, costs, cost plus a fixed fee, or incentive contracts, contracts providing for the issuance of job or task orders, leases, letter contracts, and purchase orders.

Good faith efforts includes demonstrations and actions which show that the stated goal was pursued far beyond neutrality; indeed, was pursued intensely. Acting in a manner such that a prudent and reasonable person would conclude that the stated goal would be achieved.

Minority means Blacks, Hispanics, American Indians, Alaskan Natives, Asians, and Pacific Islanders.

Minority-Owned Business Enterprise (MBE) means a business which is certified as an MBE by the State of Florida Office of Supplier Diversity or other Florida public agency.

Services means the furnishing of labor, time, or effort by a contractor, not involving the delivery of a specific end product other than reports which are merely incidental to the required performance. This term includes professional services, but does not include employment agreements or collective bargaining agreements.

Supplies means all property, including but not limited to equipment, materials, printing, insurance, and leases, but excluding land or a permanent interest in land.

Women-Owned Business Enterprise (WBE) means a business firm which is certified as a WBE by the State of Florida Office of Supplier Diversity or other Florida public agency

B. Contract Participation Good Faith Effort Documentation

(1) Bidders are asked to document its good faith efforts to achieve the 10% contract participation goal by submitting Attachment A with the Bid, listing all MBEs and WBEs contacted by the Bidder with a request to submit a subcontracting/supplier quote. Attachment A should be accompanied by copies of MBE/WBE certification for each MBE/WBE subcontractor and supplier.

The State of Florida Office of Supplier Diversity maintains a searchable database of Florida Minority and Woman Owned Businesses. Bidders may utilize that database or any other public agency maintained database of certified MBEs and WBEs to locate and contact MBE/WBEs for potential participation in the Bid. The State's database may be accessed through the Purchasing Division webpage: <http://www.codb.us/841.purchasing> by clicking the "Minority & Women Owned Businesses Registration and Searchable Database" link.

(2) Bidders are asked to submit Attachment B with the Bid, listing all MBE and WBE subcontractors and suppliers selected to be awarded subcontracts or purchase orders by the Bidder if awarded the Contract.

(3) If the Bidder is an MBE or WBE and self-performs a minimum of 10% of the work with its own forces, the 10% participation goal will be considered achieved. Bidder should submit Attachment B and the Bidder's MBE/WBE certification with the Bid to document Bidder's achievement of the goal.

(4) Nothing in this section shall be construed to require the award of a contract or a sub-contract to an MBE, WBE, or other purveyor of supplies, services or construction which fails to meet contract specifications or for which the bid is unreasonably priced or for which the bid is not in the best interest of the City nor is the lowest and best bid.

(5) The Successful Bidder should submit copies of MBE and WBE subcontracts and purchase orders within 15 days of receipt of the City's Notice of Intent to Award.

C. MBE/WBE Reporting During performance of the contract, the Successful Bidder will report payments made to MBE and WBE subcontractors and suppliers with each progress payment using Attachment E.

D. Minority and Women Employment

(1) Employment .The city commission has established a goal of 10% employment of minorities and women (combined) in the work forces of its contractors and subcontractors. The goals for minority and women employment may be adjusted on a case-by-case basis to reflect experience and availability of minorities and women with requisite skills.

(2) Bidders should list the total number of employees working for the Bidder on Attachment C and submit that Attachment with the Bid.

(3) Bidders should list the total number of and percentage of minority and women employees working for each subcontractor and supplier. Bidders should submit Attachment D, "Subcontractor/Supplier Employment Levels", upon issuance by the City of a Notice of Intent to Award.

SUBMITTAL CHECKLIST

The following items will be submitted with the Bid Proposal Letter. Each blank on the form will be filled out. Use NA (not applicable) rather than leaving blank.

Item(s) Required with Submittal	
	BID PROPOSAL LETTER
	BID SCHEDULE
	NONCOLLUSION AFFIDAVIT OF PRIME BIDDER
	DRUG-FREE WORKPLACE CERTIFICATION
	AFFIDAVIT ON PUBLIC ENTITY CRIMES
	LOCAL VENDOR AFFIDAVIT <i>(only if filing for local preference)</i>
	MINORITY AND WOMEN OWNED BUSINESS ENTERPRISES CERTIFICATION FORM
	MINORITY AND WOMEN OWNED BUSINESS ENTERPRISE OFFICER CERTIFICATION FORM
	REFERENCE PACKAGE
	Bid Security (10% for all Construction Bids)
	Attachment A - Good Faith Effort Documentation – optional & voluntary
	Attachment B – MBE/WBE Contract Participation – optional & voluntary
	Attachment C – Bidder Employment Levels – optional & voluntary
Label the outer most package with the following:	
	Bid Number
	Date of the Opening
	Contractor Name and Address
Item(s) Required after Bid Submittal	
	<u>Certificate of Insurance</u> indicating the coverages outlined in this solicitation, including naming the City as additional insured <i>(requested when Notice of Intent to Award is Issued)</i>
	Contract signed by Authorized Representative of the Vendor <i>(completed contract sent with Notice of Intent to Award)</i>
	Payment & Performance Bonds to be returned as instructed within 15 days after the Notice of Award is issued <i>(P & P Bonds acceptable to the City will be sent with Notice of Award)</i>
	Attachment E – Minority and Woman Owned Business Enterprise Usage Form with each pay application
Voluntary MBE/WBE Reporting	
	Attachment D – Subcontractor/Supplier Employment Levels
	MBE/WBE Subcontracts and Purchase Orders

BID PROPOSAL LETTER - ITB NO.: 20343

TO THE MAYOR AND COMMISSIONERS
THE CITY OF DAYTONA BEACH, A FLORIDA MUNICIPAL CORPORATION

Dear Mayor and Commissioners:

This Bid is submitted by _____
(insert Bidder's full legal name; include D/B/A if applicable)

Business Address: _____
(include P.O. Box/street address, city, state and zip code)

Business Phone: _____ Business Fax: _____
(include area code) (include area code)

Business Email: _____
(leave blank if n/a)

The undersigned, as bidder or bidder's authorized representative, hereby declares and affirms each of the following:

1. That bidder has had the opportunity to examine the Project site(s) and is fully informed in regard to all conditions pertaining to the site(s).
2. That bidder is fully informed regarding local conditions where the work will be required.
3. That bidder has thoroughly examined all Contract Documents, including Plans and Specifications as applicable, relative to the work to be performed, and that BIDDER is sufficiently knowledgeable of the work to be performed.
4. That bidder hereby agrees to furnish all labor, Materials, and Equipment to do the work in strict accordance with the Contract Documents for the price(s) stated in the attached Bid Schedule.
5. That, subject to the terms and conditions stated in the Contract Documents, bidder will perform the work in accordance with the completion date(s) specified in the Contract Documents, and will pay liquidated damages in the amounts specified in the Contract Documents for bidder's failure to comply with the completion date(s).
6. That bidder agrees to indemnify and hold harmless the CITY any other interests as set forth in the Contract Documents.
7. That insofar as the attached Bid Schedule includes extended unit prices, the use of extended unit quantities will not be construed to be a guarantee that the CITY will purchase such quantities if a contract is awarded; and that, subject to the terms and conditions of the Contract, bidder will be entitled to payment only based on the units constructed, installed, or otherwise placed in service.

BID PROPOSAL LETTER -- ITB No.: 20343, cont.

8. That BIDDER has received the following Addenda (*leave blank if inapplicable*):

No. _____ Dated: _____ No. _____ Dated: _____

No. _____ Dated: _____ No. _____ Dated: _____

(*list any additional Addenda by number and date*): _____

9. That, if within the time period specified in the bid solicitation, bidder fails to execute the form Contract, provide proof of insurance, and submit (if required) Performance Security, the bid award will be subject to cancellation and the Bid Security provided with this Bid will be subject to forfeiture.

10. That all information provided by bidder as part of this Proposal is truthful to the best of BIDDER's knowledge.

11. That bidder is (*mark the appropriate box and include the additional information, as applicable*):

An individual person/sole proprietor

A Florida corporation/ limited liability company

A foreign corporation/limited liability company authorized to do business in Florida*
_____ (*specify state of incorporation/formation*)

A Florida limited partnership

A foreign limited partnership authorized to do business in Florida*
_____ (*specify state of incorporation / formation*)

A general partnership**

A joint venture***

Other _____ (*specify, including type of entity*)

* *Attach proof of formation/registry from State of Florida.*

** *Provide on separate, signed sheet(s) of paper, full legal name and address of the partnership; and names of all general partners.*

*** *Provide on separate signed sheet(s) of paper the full legal names of all persons/firms comprising the joint venture.*

BID PROPOSAL LETTER -- ITB NO.: 20343, CONT.

12. That BIDDER has completed and attached all required attachments with this Bid Proposal, including Bid Schedule, Non-Collusion Affidavit, Drug Free Workplace Certification, MWBE Certifications, and Public Entity Crimes Affidavit.

In signing below, I certify that I am the above-named BIDDER or a person duly authorized by BIDDER to bind BIDDER to these terms and conditions.

By: _____
(Signature)

Printed Name: _____

Title: _____

Date signed: _____

Email: _____

**BID SCHEDULE - ITB NO. 20343
BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR
REPLACEMENT**

Ref. No.	Description	Unit of Measure (UOM)	Estimated Qty (Est Qty)	Unit Price	Extended Price
1	Mobilization, Demobilization, and General Requirements	LS	1		\$ -
2	As-Built Drawings	LS	1		\$ -
3	Erosion Control (Silt Fence)	LF	170		\$ -
4	Demolition	LS	1		\$ -
5	New Generator, Enclosure, and Accessories	EA	2		\$ -
6	Concrete Foundations				
	<i>(Pile Cap/Foundation, Thickened Slab @ 14 Piles, Stair Slabs @ 2 Locations, Generator Slabs @ 2 Locations, Electrical Equipment)</i>	LS	1		\$ -
7	Auger Cast Concrete Piles and Reinforcing Steel	EA	14		\$ -
8	Access Platform, Stairs and Railing	EA	1		\$ -
9	Equipment Installation	LS	1		\$ -
10	Testing of Electrical Equipment	LS	1		\$ -
11	Florida Power Allowance	LS	1	50000	\$ 50,000.00
	TOTAL BID				

The Bid Schedule located at <http://www.codb.us/841/Purchasing> , click “Public Solicitations” and “Bethune Point Generator Replacement” can be substituted for this page. The bid schedule found on the website is a protected excel spreadsheet that calculates the extended price.

Submitted by:

Contact Name: (signature)	Contact Name: (printed)
Vendor Name:	Phone:
Address:	Email:

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

STATE OF _____)
COUNTY OF _____)

_____, being first duly sworn deposes and says that:

- (1) He is _____ of _____, the Bidder that has submitted the attached Bid;
- (2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham bid;
- (4) Neither the said Bidder nor any of its officers, partners, Owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Daytona Beach, FL (Local Public Agency) or any person interested in the proposed Contract;
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, Owners, employees, or parties in interest, including this affiant.

By: _____
(Signature)
Name Typed: _____
Title: _____
Bidder: _____

Subscribed and sworn to before me

This _____ day of _____, 20____

(Signature of Notary Public)
My commission expires: _____

DRUG-FREE WORKPLACE CERTIFICATION

IDENTICAL TIE BIDS: - If there are two or more low responsive Bids from responsible bidders that are identical in price and other evaluation criteria, the tie will be awarded to the following in order of preference: a) the bidder qualifying for local preference under Code 30-86; b) the bidder in compliance with the drug free workplace certification requirements set forth in Florida Statutes 287.087; or c) the most responsible bidder as defined under the City Code 30-82 (9)(c).

In order to have a drug-free workplace program, a business will:

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

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

(3) Give each employee engaged in providing the commodities or contractual services that are under Bid a copy of the statement specified in section (1), above.

(4) In the statement specified in section (1), above, notify the employees that, as a condition of working on the commodities or contractual services that are underbid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or *nolo contendere* to, any violation occurring in the workplace no later than five days after such conviction.

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

(6) Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

By: _____
(Signature)

Title: _____
(leave blank if sole proprietor)

Date: _____

AFFIDAVIT ON PUBLIC ENTITY CRIMES

(SWORN STATEMENT PURSUANT TO SECTION 287.133(3) (a), FLORIDA STATUTES)

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

This sworn statement is submitted to the City of Daytona Beach

by _____
(insert individual's printed name and title)

for _____ whose business address
(insert name of Bidder)

is _____

- I. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any Bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.
- II. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.
- III. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:
 - 1. A predecessor or successor of a person convicted of a public entity crime; or
 - 2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The Ownership by one person of shares constituting a controlling interest in another person, or a pooling of Equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.
- IV. I understand that a "person" as defined in Paragraph 287.133(1)(e), **Florida Statutes**, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which Bids or applies to Bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

V. Based on information and belief, THE STATEMENT WHICH I HAVE MARKED BELOW is true in relation to the entity submitting this sworn statement (*Place initial of check mark next to applicable statement*):

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

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

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

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

(Signature) (Date)

STATE OF _____)
COUNTY OF _____)

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

_____ who, after first being sworn by me, affixed his/her signature
(Name of individual signing)

in the space provided above on this _____ day of _____, 20_____.

Attest: _____
(Notary Public)

My commission expires: _____

(Notary Seal)

LOCAL VENDOR AFFIDAVIT

Complete and submit this form ONLY if you qualify for local preference as provided in the City of Daytona Beach Purchasing Code.

A copy of the Bidder's Daytona Beach Business Tax Receipt must be submitted with this Affidavit.

NAME OF BIDDER: _____

LOCAL BUSINESS ADDRESS *(street address being used to claim Local Preference, including zip code):*

The undersigned certifies under penalty of perjury each of the following:

The Local Business Address has continuously been used as a Permanent Place of Business with at least one full-time employee since _____.
(Insert date)

The Local Business Address has consistently offered or provided the goods or services being solicited by the City of Daytona Beach during the time referenced above.

The Local Business Address has not been established with the sole purpose of obtaining the advantages that may be granted pursuant to the Local Preference provisions of the City of Daytona Beach Purchasing Code.

Signature *(Must be same person as person signing the Bid Proposal)*

Print Name/Title

Subscribed and sworn to before me

This _____ day of _____, 20____

(Signature of Notary Public)
My commission expires: _____

The City of Daytona Beach reserves authority to require a copy of the corporate charter, corporate income tax filing return, and any other documents(s) to evaluate the Bidder's Local Preference claim.

**MINORITY AND WOMEN OWNED BUSINESS ENTERPRISES
CERTIFICATION FORM**

The Bidder hereby certifies that in accordance with applicable provisions of the Daytona Beach Purchasing Code, Chapter 30, Daytona Beach Code of Ordinances, a good faith effort has been made to contact the following minority and women owned business enterprises:

(Use separate sheet if additional space is needed. If separate sheet is used, include a reference to this form, and sign and date the sheet).

SIGNATURE: _____

NAME TYPED: _____

TITLE: _____

The Bidder further certifies that of the minority and women owned business enterprises contacted, he was unable through a good faith effort to obtain any minority or women owned business enterprise to work on this Project.

SIGNATURE: _____

NAME TYPED: _____

TITLE: _____

**MINORITY AND WOMEN OWNED BUSINESS ENTERPRISE OFFICER
CERTIFICATION FORM**

I, _____,
Name of Executive Officer
certify that _____
Name of MBE Officer

has been named Minority and Women Owned Business Enterprise Officer for

Company

Corporation

Date: _____

By: _____

Name Typed: _____

Title: _____

Address: _____

**ATTACHMENT A
GOOD FAITH EFFORT DOCUMENTATION**

SECTION 1: PRIME CONTRACTOR

ITB #20343

BETHUNE POINT WATER RECLAMATION
FACILITY GENERATOR REPLACEMENT

Bidder:

Bidder is MBE Yes No

Bidder is WBE Yes No

The Bidder hereby certifies that in accordance with applicable provisions of the Daytona Beach Purchasing Code, Chapter 30, Daytona Beach Code of Ordinances, a good faith effort has been made to contact the following Minority and Women Owned Business Enterprises:

SECTION 2: SUBCONTRACTORS/SUPPLIERS

Sub/Supplier Company Name	Trade/ Commodity	Check if MBE	Check if WBE	Contact Name	Contact Phone #	Date of Contact

**ATTACHMENT B
MBE/WBE CONTRACT PARTICIPATION**

SECTION 1: PRIME CONTRACTOR

ITB 20343

BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR REPLACEMENT

Bidder: _____

Bidder is MBE Yes No
 Bidder is WBE Yes No

Total Bid Amount \$ _____

Value of Self-Performed Work \$ _____

Percentage of Self-performed Work % _____

Bidder will list all certified MBE/WBE subcontractors and suppliers selected by the Bidder for award of subcontracts or purchase orders if Bidder is awarded the Contract.

SECTION 2: SUBCONTRACTOR/SUPPLIERS

Sub/Supplier Company Name	Trade/Commodity	Check if MBE	Check if WBE	Award Amount	Percentage of Sub Performed Work

Submit copies of all subcontracts/PO's to MBE and WBE subcontractors and suppliers upon receipt of the Notice of Intent to Award

Use additional sheets as necessary.

ATTACHMENT C - BIDDER EMPLOYMENT LEVELS

BIDDER: _____

ITB 20343
BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR
REPLACEMENT

Bidders shall indicate the total number of full-time staff employed by the Bidder at the time of bid opening, the total number of full time women employees, and the total number of full time minority employees. Bidders will calculate the total number of minority and women employees, and the percentage of all employees who are women and minorities.

- A Total Employees: _____
- B Total Women Employees: _____
- C Total Minority Employees: _____
- D Total Women & Minority Employees (B + C): _____
- E Percentage Women Employees (B ÷ A): _____
- F Percentage Minority Employees (C ÷ A): _____
- Total Percentage Women & Minority Employees (D ÷ A): _____

Prepared by: _____

(Signature)

Name Printed: _____

Title: _____

ATTACHMENT D - SUBCONTRACTOR/SUPPLIER EMPLOYMENT LEVELS

SUBCONTRACTOR: _____

ITB 20343

BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR
REPLACEMENT

PRIME CONTRACTOR: _____

Each subcontractor and supplier with contracts or purchase orders valued in excess of \$???. Shall indicate the total number of full-time staff employed by the Bidder at the time of bid opening, the total number of full time women employees, and the total number of full time minority employees. Subcontractor and Suppliers will calculate the total number of minority and women employees, and the percentage of all employees who are women and minorities

A Total Employees: _____
B Total Women Employees: _____
C Total Minority Employees: _____
D Total Women & Minority Employees (B + C): _____
E Percentage Women Employees (B ÷ A): _____
F Percentage Minority Employees (C ÷ A): _____
Total Percentage Women & Minority Employees (D ÷ A) _____

Prepared by: _____

(Signature)

Name Printed: _____

Title: _____

Bidder shall submit Attachment D within 15 days of issuance of the Notice of Intent to Award.

REFERENCE PACKAGE

MINIMUM QUALIFICATIONS OF PROSPECTIVE BIDDER

CITY CONTRACT NUMBER: 20343

PROJECT TITLE: Bethune Point WRF Generator Replacement

TO: City of Daytona Beach Purchasing Department
Attn: Joanne Flick
301 South Ridgewood Avenue, Room 146
P.O. Box 2451 Daytona Beach, FL 32115-2451
flickj@codb.us

CONTRACTOR FIRM NAME:

BUSINESS ADDRESS:

CITY, STATE, ZIP CODE:

PHONE NUMBER: _____ **FAX NUMBER:** _____

EMAIL ADDRESS:

LIST OF SIGNIFICANT TASK SUBCONTRACTORS

Task: Stand-by Power Upgrades

Name of Firm(s):

TASK: Standby Power Upgrades

Reference No. 1

Bidder: _____

Name of Project: _____

Location of Project _____

Type of Work on Project: _____

Project Components:

- | | Yes | No |
|---|--------------------------|--------------------------|
| a. Minimum of 1.0 MW of standby power installed? | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Improvements completed while facility maintained operation? | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Any loss of power during project as result of construction activities? | <input type="checkbox"/> | <input type="checkbox"/> |

If yes, explain: _____

Dates Work was performed: _____

Work Completion:

- a. Was project completed no earlier than 2010 (Yes/No) _____
- b. Did the Bidder perform at least 50% of the work described for that project? (Yes/No) _____
- c. Did project achieve final acceptance? (Yes/No) _____ or, was the project deemed substantially complete and available for beneficial use by the Facility Owner? (Yes/No) _____

Summary of any OSHA safety violations or significant injuries during the course of the work: _____

Name of Facility Owner: _____

Address: _____

Primary Contact Person for Facility Owner: _____

Employed by Owner: (Yes/No) _____ Consultant: (Yes/No) _____

Resident Construction Engineer: (Yes/No) _____ Project Administrator: (Yes/No) _____

Contact Person Company Name: _____

Telephone Number: _____ Email Address: _____

Secondary Contact Person: _____

Company Name: _____

Telephone Number: _____ Email Address: _____

TASK: Standby Power Upgrades

Reference No. 2

Bidder: _____

Name of Project: _____

Location of Project _____

Type of Work on Project: _____

Project Components:

- | | Yes | No |
|---|--------------------------|--------------------------|
| a. Minimum of 1.0 MW of standby power installed? | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Improvements completed while facility maintained operation? | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Any loss of power during project as result of construction activities? | <input type="checkbox"/> | <input type="checkbox"/> |

If yes, explain: _____

Dates Work was performed: _____

Work Completion:

- a. Was project completed no earlier than 2010 (Yes/No) _____
- b. Did the Bidder perform at least 50% of the work described for that project? (Yes/No) _____
- c. Did project achieve final acceptance? (Yes/No) _____ or, was the project deemed substantially complete and available for beneficial use by the Facility Owner? (Yes/No) _____

Summary of any OSHA safety violations or significant injuries during the course of the work: _____

Name of Facility Owner: _____

Address: _____

Primary Contact Person for Facility Owner: _____

Employed by Owner: (Yes/No) _____ Consultant: (Yes/No) _____

Resident Construction Engineer: (Yes/No) _____ Project Administrator: (Yes/No) _____

Contact Person Company Name: _____

Telephone Number: _____ Email Address: _____

Secondary Contact Person: _____

Company Name: _____

Telephone Number: _____ Email Address: _____

TASK: Standby Power Upgrades

Reference No. 3

Bidder: _____

Name of Project: _____

Location of Project _____

Type of Work on Project: _____

Project Components:

- | | Yes | No |
|---|--------------------------|--------------------------|
| a. Minimum of 1.0 MW of standby power installed? | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Improvements completed while facility maintained operation? | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Any loss of power during project as result of construction activities? | <input type="checkbox"/> | <input type="checkbox"/> |

If yes, explain: _____

Dates Work was performed: _____

Work Completion:

- a. Was project completed no earlier than 2010 (Yes/No) _____
- b. Did the Bidder perform at least 50% of the work described for that project? (Yes/No) _____
- c. Did project achieve final acceptance? (Yes/No) _____ or, was the project deemed substantially complete and available for beneficial use by the Facility Owner? (Yes/No) _____

Summary of any OSHA safety violations or significant injuries during the course of the work: _____

Name of Facility Owner: _____

Address: _____

Primary Contact Person for Facility Owner: _____

Employed by Owner: (Yes/No) _____ Consultant: (Yes/No) _____

Resident Construction Engineer: (Yes/No) _____ Project Administrator: (Yes/No) _____

Contact Person Company Name: _____

Telephone Number: _____ Email Address: _____

Secondary Contact Person: _____

Company Name: _____

Telephone Number: _____ Email Address: _____

DRAFT
PROJECT-SPECIFIC CONSTRUCTION CONTRACT
ITB 20343

THE PARTIES TO THIS CONTRACT are the City of Daytona Beach, a Florida municipal corporation, hereinafter the "CITY" or "Owner," and >, a >, hereinafter the "CONTRACTOR."

WITNESSETH, that the CONTRACTOR and the CITY agree as follows, for the mutual valuable consideration provided herein:

ARTICLE I. SCOPE OF WORK

The CONTRACTOR will, at its sole cost and expense, provide, perform, and complete the construction Project commonly known as "BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR REPLACEMENT" and more fully described in the Contract Documents, hereinafter the "Work".

ARTICLE II. CONTRACT DOCUMENTS

The Contract Documents are further described in the General Conditions, and if applicable the Supplemental General Conditions. In addition, the Plans, dated 1/22/2020 and referenced herein are the Plans or drawings prepared by Burl Reardon, P.E. (the "Engineer/Architect" or "E/A"), provided or made available with the CITY's Invitation to Bid, as amended by any addenda to the Bid Documents, are a part of the Contract Documents. These Plans are not physically attached hereto but are incorporated herein by reference. CONTRACTOR acknowledges receipt of all such Plans.

The Contract Documents are intended to include all information necessary for CONTRACTOR's proper prosecution and timely completion of the Work. CONTRACTOR will prosecute the Work as necessary to produce the results indicated by the Contract Documents. The Contract Documents are complementary, and what is required by one will be as binding as if required by all.

ARTICLE III. COMMENCEMENT AND COMPLETION

The CITY and the CONTRACTOR mutually agree that time is of the essence with respect to the dates and times set forth in the Contract Documents. To that end, the CONTRACTOR will commence the Work not later than the Commencement Date set forth in the General Conditions, and will diligently and continuously prosecute the Work at such a rate, and with sufficient forces as will allow the CONTRACTOR to achieve Substantial Completion within **210** days after the Commencement Date and Final Completion within **240** days after the Commencement Date, subject only to any adjustments in the Contract Time that may be authorized by Change Orders properly issued in accordance with the Contract Documents. In executing this Contract, CONTRACTOR affirms that the time set for completion is reasonable.

The CITY will suffer financial loss if Final Completion of the Work is not achieved within the Contract Time. Accordingly, and in lieu of actual damages or proof thereof, if CONTRACTOR fails to meet these deadlines, CONTRACTOR will be liable to the CITY for liquidated damages as follows:

In the amount of **\$570** for each and every day of unexcused delay in achieving Substantial Completion; and

In the amount of **\$285** for each and every day of unexcused delay from the date that Substantial Completion is achieved until Final Completion is achieved.

The CITY will have the right to offset such liquidated damages against any remaining portion of the Contract Price due CONTRACTOR, but will not be limited to the offset if it is insufficient. If the unpaid balance of the Contract Price is less than the amount of the Liquidated Damages, the CONTRACTOR or its Surety must pay the deficiency to the CITY upon demand.

ARTICLE IV. CONTRACT PRICE

Subject to any adjustments that may be authorized pursuant to this Contract, the Contract Price due the CONTRACTOR is \$>_____ for work completed and accepted in accordance with the Contract Documents. The Contract Price represents the CONTRACTOR's sole compensation from the CITY for prosecution of the Work. The Contract Price will be paid in a series of Progress Payments and a Final Payment, and is subject to retainage, as further described in the Contract Documents.

ARTICLE V. PERFORMANCE SECURITY

CONTRACTOR must provide a payment bond and a performance bond, or alternate form of Performance Security in an amount equal to 100% of the Contract Price.

Additional requirements associated with the provision of Performance Security, including requirements to increase the amount provided, are set forth in the General Conditions and, if applicable, the Supplemental General Conditions.

ARTICLE VI. INDEMNIFICATION

A. CONTRACTOR hereby indemnifies and holds harmless the CITY from and against all liabilities, damages, losses, and costs, including but not limited to reasonable attorneys' fees, arising out of or resulting from the Work provided that the liabilities, damages, losses, and costs are caused in whole or in part by any negligence, recklessness, or intentional wrongful misconduct of CONTRACTOR, any Subcontractor, anyone directly or indirectly employed by any one of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. This indemnification agreement is separate and apart from, and in no way limited by, any insurance provided pursuant to this agreement or otherwise.

B. CONTRACTOR indemnifies the CITY against any claim of Supplier's or Subcontractor's lien (in cases where such payment is not already guaranteed by payment bond). If any claim or lien remains unsatisfied after all payments are made, CONTRACTOR must refund to the CITY all monies that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

C. For purposes of the obligations stated in this Article, references to the CITY include the CITY's officers, employees, and agents.

D. CONTRACTOR's obligations under this Article are made without regard to the availability of insurance of the CITY or the Engineer/Architect.

ARTICLE VII. INSURANCE

A. Required Insurance.

CONTRACTOR will purchase and maintain, at its own expense, the following types and amounts of insurance, primary and non-contributory with the CITY's own insurance, in form and companies satisfactory to the CITY:

1. **Workers' Compensation Insurance** – As required by Florida Statutes, Chapter 440, Workers' Compensation Insurance, for all employees of CONTRACTOR employed at the Project site or in any way connected with the Work.

The insurance required by this provision will comply fully with the Florida Workers' Compensation Law and include Employers' Liability Insurance with limits of not less than \$500,000 per accident. Any associated or subsidiary company involved in the service must be named in the Workers' Compensation coverage.

2. **Liability insurance – Including Commercial General Liability coverage** for operations, independent contractors, products-completed operations, broad form property damage, collapse and underground, and personal injury on an "occurrence" basis, insuring the CONTRACTOR and any other interests, including but not limited to any associated or subsidiary companies involved in the Work; and **Automobile Liability coverage** insuring claims for damages because of bodily injury or death of any person or property damage arising out of the Ownership, maintenance, or use of any motor vehicle used by CONTRACTOR at the Project site or in any way connected with the Work.

THE COMMERCIAL GENERAL LIABILITY INSURANCE POLICY WILL NAME THE CITY AS AN ADDITIONAL INSURED. CONTRACTOR'S Commercial General Liability insurance policy shall provide coverage to CONTRACTOR, and CITY when required to be named as an additional insured either by endorsement or pursuant to a blanket additional insured endorsement, for those sources of liability which would be covered by the latest edition of the standard Commercial General Liability Coverage Form (ISO Form CG 00 01) without the attachment of any endorsements excluding or limiting coverage for Products/Completed Operations, Independent Contractors, Property of CITY in Contractor's Care, Custody or Control or Property of CITY on which contracted operations are being performed, Explosion, Collapse or Underground hazards (XCU Coverage, Contractual Liability or Separation of Insureds). When CITY is added as additional insured by endorsement, ISO Endorsements CG 20 10 and CG 20 37 or their equivalent shall be used to provide such Additional Insured status.

The limit of liability will be a combined single limit for bodily injury and property damage of no less than \$1,000,000 per occurrence. If insurance is provided with a general aggregate, the aggregate will be in an amount of no less than \$2,000,000. The Risk Manager may authorize lower liability limits for the automobile policy only, at the Risk Manager's sole discretion.

Unless specifically waived hereafter in writing by the Risk Manager, CONTRACTOR agrees that the insurer will waive its rights of subrogation, if any, against the CITY on of the above-listed types of required insurance coverage.

3. **Builders' Risk** - The CONTRACTOR is required to maintain Builders Risk Insurance on an "all risk" basis, including but not limited to the completed value basis on the insurable portion of the work for the benefit of the CITY, the CONTRACTOR and Subcontractors as their interests may appear. The CITY, the CONTRACTOR and any Subcontractor insured therein waive all rights against each other for damages caused by fire and other perils to the extent covered by the insurance obtained pursuant to this paragraph.

B. Subcontractors' Insurance. Each of CONTRACTOR's Subcontractors will be required to provide insurance in substantially similar form to the insurance required of CONTRACTOR above based on the services they will provide to the Project.

C. Proof of Insurance. CONTRACTOR will furnish proof of insurance acceptable to the CITY prior to or at the time of execution of this Contract. CONTRACTOR will not commence Work until all required insurance has been approved by the CITY. CONTRACTOR will furnish evidence of all required insurance in the form of certificates of insurance which will clearly outline all hazards covered as itemized above, the amounts of insurance applicable to each hazard and the expiration dates.

Upon request of the Risk Manager, CONTRACTOR will also provide the CITY copies of the insurance contracts referenced by the certificates.

D. Cancellation and Replacement. CONTRACTOR will file replacement certificates 30 days prior to expiration or termination of any required insurance occurring prior to expiration or termination of this Contract. If such insurance terminates without CONTRACTOR's prior knowledge, immediately upon becoming aware of such termination CONTRACTOR will provide notice to the City's Risk Manager at P.O. Box 2451, Daytona Beach, Florida 32115-2451.

The CITY reserves the right to suspend any or all of the Work until such insurance has been replaced, or to obtain replacement insurance at CONTRACTOR's sole cost.

E. Termination of Insurance. CONTRACTOR will not cancel any required insurance coverage until the work is completed, accepted by the CITY and CONTRACTOR has received written notification from the Risk Manager that CONTRACTOR is authorized to cancel the insurance and the Effective Date of such authorization. The Risk Manager will provide such written notification at the request of CONTRACTOR if the request is made no earlier than two weeks before the work is to be completed.

The liabilities of CONTRACTOR under this Contract will survive and not be terminated, reduced, or otherwise limited by any expiration or termination of insurance coverage. Neither approval nor failure to disapprove insurance furnished by the contractor will relieve the CONTRACTOR or its sub-contractors from responsibility to provide insurance as required by the contract.

ARTICLE VIII. NOTICES

A. Where the Contract Documents authorize or require the CITY to provide notice to CONTRACTOR, notice may be provided by delivery by hand to CONTRACTOR's designated Superintendent at the Project Site, or in the absence or unavailability of the Superintendent to any other person on the Project Site who holds himself or herself out as managing the Work on behalf of CONTRACTOR, or in lieu of either of these, by written notice to the address provided below.

B. Where the Contract Documents authorize or require CONTRACTOR to provide notice to the CITY, notice may be provided only by written notice to the address provided below.

C. Written notice is valid only if sent by certified United States mail, return receipt requested, facsimile with confirmation receipt required, or by recognized courier such as Federal Express with confirmation receipt requested. All such notices will be deemed to have been duly given and provided on (i) the date of receipt, (ii) upon receipt or refusal of delivery if transmitted by registered or certified mail, return receipt requested, or (iii) the first business day after the date of deposit, if transmitted by reputable overnight courier service, whichever occurs first. Written notices will be sent to the following persons:

If to the CITY:
Attn: Shannon Ponitz
Utilities Director
The City of Daytona Beach
125 Basin Street, Suite 204
Daytona Beach, FL 32114
Fax: 386-671-8501

If to the CONTRACTOR:
Attn: _____

Fax: _____

provided, however, that either Party may by written notice change the address designated for receipt of written and faxed notices.

ARTICLE IX. DISPUTE RESOLUTION

If a dispute exists concerning this Contract, the Parties agree to use the following procedure prior to pursuing any judicial remedies.

A. **Negotiations Required.** A Party will request in writing that a meeting be held between representatives of each Party within 14 days of the request or such later date that the Parties may agree to. Each Party will attend and will include, at a minimum, a senior level decision maker (an Owner, officer, or employee of each organization) empowered to negotiate on behalf of their organization. The purpose of this meeting is to negotiate the matters constituting the dispute in good faith. The Parties may mutually agree in writing to waive this step and proceed directly to mediation as described below.

B. **Non-Binding Mediation.** Mediation is a forum in which an impartial person, the mediator, facilitates communication between parties to promote reconciliation, settlement, or understanding among them. Within 30 days after the procedure described above proves unsuccessful or the Parties mutually waive the procedure, the Parties will submit to a non-binding mediation. The mediation, at a minimum, will provide for (i) conducting an on-site investigation, if appropriate, by the mediator for fact gathering purposes, (ii) a meeting of all Parties for the exchange of points of view and (iii) separate meetings between the mediator and each Party to the dispute for the formulation of resolution alternatives. The Parties will select a mediator trained in mediation skills and certified to mediate by the Florida Bar, to assist with resolution of the dispute. The Parties will act in good faith in the selection of the mediator and give consideration to qualified individuals nominated to act as mediator. Nothing in this Contract prevents the Parties from relying on the skills of a person who also is trained in the subject matter of the dispute or a contract interpretation expert. Each Party will attend and will include, at a minimum, a senior level decision maker (an Owner, officer, or employee of each organization) empowered to negotiate on behalf of their organization.

If the Parties fail to reach a resolution of the dispute through mediation, then the Parties are released to pursue any judicial remedies available to them.

ARTICLE X. GENERAL PROVISIONS

A. This Contract will be governed by the laws of the state of Florida without regard to any choice of law principles that could result in application of the laws of any other jurisdiction. Venue for any legal action or proceeding arising out of this Contract is exclusively in the federal or state courts in and for Volusia County, Florida. The Parties hereby waive any right to stay or dismiss any action or proceeding brought under or in connection with this Contract that is brought before the above-referenced courts on the basis of *forum non-conveniens*.

B. In case of litigation arising out of this Contract where the meaning of one or more provisions is at issue, the CITY will not be penalized by virtue of its having drafted this Contract. CONTRACTOR has carefully reviewed and had the opportunity to seek advice of legal counsel prior to executing this Contract.

C. The CITY and CONTRACTOR agree that they have knowingly waived the right to trial by jury and have instead agreed that, in the event of any litigation arising out of or connected to this Contract, to proceed with a trial before the court, unless both parties subsequently agree otherwise in writing.

D. In performing the services provided for herein, CONTRACTOR is an independent contractor and not an employee of the CITY.

E. The waiver of any provision of this Contract will not be deemed to be a waiver of any other provision of this Contract. No waiver of any provision of this Contract will be deemed to constitute a continuing waiver unless expressly provided in writing, nor will a waiver of any default be deemed a waiver of any subsequent defaults of the same type. The failure at any time to enforce this Contract, whether the default is known or not, does not constitute a waiver or estoppel of the right to do so.

F. All terms and conditions of this Contract which contemplate a period of time beyond completion or termination, will survive such completion or termination and not be merged therein or otherwise terminated.

G. If any word, phrase, clause, sentence or provision of the Contract, or the application of same to any person or set of circumstances is for any reason held to be unconstitutional, invalid or unenforceable, that finding will only effect such word, phrase, clause, sentence or provision, and such finding will not affect the remaining portions of this Contract; this being the intent of the Parties in entering into the Contract; and all provisions of the Contract are declared to be severable for this purpose.

H. The undersigned representative of CONTRACTOR affirms that in executing this Contract on behalf of CONTRACTOR, he or she is fully authorized to bind CONTRACTOR to the terms and conditions herein set forth.

I. No CITY officer, employee, or independent consultant who is involved in the development, evaluation, or decision-making process of the performance of any solicitation will have a financial interest, direct or indirect, in the Contract resulting from that solicitation. Any violation of this

provision, with the knowledge, expressed or implied, of CONTRACTOR will render the Contract voidable by the CITY.

J. This Contract represents the entire and integrated agreement between the CITY and CONTRACTOR with respect to the subject matter hereof and supersedes all prior negotiations, representations or agreements, either written or oral.

IN WITNESS WHEREOF, the Parties have executed this Contract on the dates written below.

THE CITY OF DAYTONA BEACH

>CONTRACTOR

By: _____
Derrick L. Henry, Mayor

By: _____
Printed Name: _____
Title: _____

Attest: _____
Letitia LaMagna, City Clerk

Date: _____

Date: _____

Approved as to legal form:

By: _____
Robert Jagger, City Attorney

GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMS

1.1 Defined Terms.

Whenever used in the Contract the following terms have the meanings indicated, which are applicable to both the singular and plural thereof

“50-Percent Completion” means the point at which the Owner has expended 50% of the Adjusted Contract Price.

“Adjusted Contract Price” means the Contract Price as set forth in the Contract, as previously adjusted by valid Change Order.

“Bid” means the offer of the Bidder.

“Bid Schedule” means the Bid Schedule submitted by CONTRACTOR with the Bid; unless CONTRACTOR was the sole responsive bidder and the Parties have negotiated final pricing as part of the bid solicitation process pursuant to the Purchasing Code, in which instance the term means the Revised Bid Schedule included within the Contract Documents.

“Change Instrument” means a Field Directive or a Change Order.

“Change Order” means a written directive issued by the Owner authorizing an adjustment in the Contract Price, the Contract Time, the scope of Work, or any other material term or condition of the Contract. When approved by the City Commission, a Change Order may be in the form of a formal amendment to this Contract.

“City Code” means the City of Daytona Beach Code of Ordinances.

“City Commission” or *“Commission”* means the City of Daytona Beach City Commission.

“City Manager” means the City Manager for the City.

“Commencement Date” means the date established in the Notice to Proceed upon which the Contract Time begins to run; or if no such date is provided in the Notice to Proceed, the date of the Notice to Proceed.

“Construction Contract form” means that part of the titled as “Project-Specific Construction Contract” or something similar, and signed by the Parties.

“Contract” includes all Contract Documents.

“Contract Administrator” means the individual specifically authorized to administer the Contract on the Owner’s behalf; provided, however that in all instances the City Manager may act as the Contract Administrator.

“Contract Price” means the total compensation due to CONTRACTOR for the Work to be performed under the contract, subject only to those adjustments provided in the Contract Documents.

“Contract Time” means the total period of time stated in the Contract between the Commencement Date and the deadline for Final Completion, subject only to those adjustments provided in the Contract Documents.

“Critical Path” means the longest series of tasks that runs consecutively from the beginning to the end of the Project, as determined by duration and workflow sequence. This longest path sets the managerial standard for how quickly the Project can be completed, given appropriate resources.

“Day” or “Days” means calendar days unless otherwise specifically noted in the Contract Documents.

“Defective Work” or “Nonconforming Work” means Work that:

- (i) Does not conform to the requirements of the Contract;
- (ii) Does not meet the requirements of any inspection, test, or approval as referred to in the Contract or as required by law;
- (iii) Contains defects;
- (iv) Represents a substitute for that required by the Technical Provisions, unless properly approved and authorized as provided in the Contract; or
- (v) Has been damaged or destroyed prior to Final Completion.

“Effective Date” means the date on which this Contract is approved by City Commission.

“E/A” (also, “Engineer/Architect”, “Architect, or “Engineer” as applicable) generally means the professional licensed architect or engineer who develops the criteria and concept for the Project, performs the analysis, and is responsible for the preparation of the Technical Provisions and Plans. The E/A may be the Owner’s in-house staff or a consultant retained by the Owner. No contractual relationship is created by this Contract between CONTRACTOR and the E/A.

“Equipment” means the machinery and Equipment, together with the necessary supplies for upkeep and maintenance thereof, and all other tools and apparatus necessary for the construction and acceptable completion of the Work.

“Field Directive” means a written order prepared and signed by the Owner, not involving a change in Contract Price or Contract Time, directing a minor change in the Work where a Change Order is not required.

“Final Completion” means acceptance of the Work by the Owner as evidenced by its signature upon the Certificate of Final Completion.

“Force Account” means a method for payment of additional Work that is based on CONTRACTOR’s labor, Equipment and Materials costs with consideration for overhead and profit.

“Force Majeure Event” means conditions or other circumstances, such as acts of God, that: (i) were not foreseen, and could not have been reasonably foreseen, by CONTRACTOR or the Owner, (ii) are beyond the control of CONTRACTOR and the Owner, and (iii) materially hinder or interfere with the ability of CONTRACTOR to prosecute the Work; provided, however, that no such condition or circumstance will be a Force Majeure event if it is the result of CONTRACTOR’s fault, negligence, or material breach of this Contract. Examples of Force Majeure events include wars, floods, strikes and labor disputes, unusual delay in transportation, epidemics abroad, earthquakes, and severe adverse weather conditions not reasonably anticipated.

“Hazardous Materials” has the meaning as provided by law.

“Legal Requirements” means, collectively, all applicable federal, state, and local laws, codes, ordinances, rules, regulations, orders and decrees of any government or quasi-government entity having jurisdiction over the Project or Site, the practices involved in the Project or Site, or any Work. The term includes the City Code and other CITY ordinances and regulations.

“Materials” means goods or substances to be incorporated in the Work under the Contract.

“Milestone” means a significant event specified in the Contract Documents relating to an intermediate completion date or time prior to Final Completion of the Work.

“*Owner*” means the City of Daytona Beach; or, if the form Contract so provides, the Community Redevelopment Agency for the CITY. All references within the Technical Provisions to the “CITY” (whether or not capitalized) are intended to refer to the “Owner” unless logic dictates otherwise.

“*Plans*” means the plan documents prepared by the E/A and identified in the Table of Contents or otherwise incorporated into the Contract, including reproductions thereof, showing the location, character, dimensions, and details of the Work. The term may also be referred to herein as “drawings,” “contract drawings,” “contract Plans,” or similar terms; but not “Shop Drawings.”

“*Project*” means the subject of the Work and its intended result.

“*Project Site*” or “*Site*” means the land or premises on which the Project is located, and in addition any land and areas identified in and permitted for use by CONTRACTOR by the Contract, subject to conditions that may apply such as for rights-of-way, permits, and easements.

“*The Prompt Payment Act*” means the Local Government Prompt Payment Act, F.S. § 218.70 et seq. (2014), as hereafter amended.

“*Purchasing Code*” means the provisions of Chapter 30 of the City Code.

“*Referenced Standards*” includes standards, standard details, Specifications, manuals, regulations or codes of any technical society, organization or association, or of any governmental or quasi-governmental authority referred to in the Contract to describe the nature or quality of any of the Work, whether such reference be specific or by implication, and means the latest standard, standard detail, specification, manual, regulation or code in effect at the time of Bid opening, except as may be otherwise specifically stated in the Contract.

“*Resident Project Representative*” means, where the E/A is a private firm or person under contract with the CITY to act as the E/A, the authorized representative of E/A assigned to the Project Site; and in all other instances, the Contract Administrator.

“*Risk Manager*” means the Risk Manager for the CITY or designee; provided however, that the City Manager may act on behalf of the Risk Manager.

“*Schedule of Values*” means the written breakdown of the Contract Price by Construction Specification Institute divisions or by other format acceptable to the Owner, prepared by CONTRACTOR for Owner’s review and approval.

“*Shop Drawings*” means all drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR as required by this Contract.

“*Site-Related Reports*” means any environmental, geotechnical, subsoil, and related reports relating to conditions at the Project Site which were used or made available for the Owner’s or E/A’s use in creating the Plans.

“*Specifications*” means the Technical Provisions and Plans.

“*Stored Materials*” means delivered Materials or Equipment that are located at the Project Site, or with the Owner’s approval at another location, and that have not yet been incorporated into the Work.

“*Subcontractor*” means a person or firm that under a direct contract with CONTRACTOR to perform a portion of the Work, and also unless logic dictates otherwise, sub-Subcontractors and persons or firms doing work through such sub-Subcontractors.

“*Substantial Completion*” means the completion of the Work, or an agreed upon portion of the Work, so as to allow the Owner to occupy and use the Project or a portion thereof for its intended purposes.

“*Sub-Subcontractor*” means a person or firm who has a direct or indirect contract at any tier with a Subcontractor to perform a portion of the Work.

“*Supplemental General Conditions*” means that part of the Contract labeled as such and identified in the Table of Contents or otherwise incorporated into the Contract, that amends and supplements these General Conditions.

“*Supplier*” means a person or firm having a contract with CONTRACTOR or with any Subcontractor of any tier to furnish Materials to be incorporated in the Work.

“*Technical Provisions*” means those provisions of the Contract containing or referencing required technical Specifications and standards. The term includes all such technical Specifications and standards of other governmental jurisdictions, or professional association where referenced in the Contract, including any exceptions thereto regardless of whether these are attached to or enumerated within the Contract.

Whenever this Contract refers to but does not include a specific Technical Provision, the reference will be deemed to be to the version of the referenced Technical Provision included in the applicable CITY engineering or utility standard unless logic dictates otherwise.

“*Unilateral Change Instrument*” means a Change Instrument issued by the Owner and not executed by CONTRACTOR.

“*Unit Price Schedule*” means the Bid Schedule.

“*Working Hours*” means 7:00 am through 6:00 pm, Monday through Friday excluding holidays designated by the CITY.

1.2 Abbreviations. The following abbreviations, when used in the Contract, represent the full text shown.

AAN	American Association of Nurserymen, Inc.
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	The Associated General Contractors of America, Inc.
AGMA	American Gear Manufacturers Association
AIA	American Institute of Architects.
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute, Inc.
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Research Association
EASA	Electrical Apparatus Service Association
EPA	Environmental Protection Agency of the United States Government
FDHR	Florida Division of Historical Resources
FEMA	Federal Emergency Management Agency
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FSS	Federal Specifications and Standards
IEEE	Institute of Electrical and Electronics Engineers

IES	Illuminating Engineering Society
IFAS	Institute of Food and Agricultural Sciences
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineers Association
ISA	International Society of Arboriculture
ISO	International Organization for Standards
MPO	Volusia County Metropolitan Planning Organization
MSTCSD	Minimum Specifications for Traffic Control Signals and Devices
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of Corrosion Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute for Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NSPE	National Society of Professional Engineers
OSHA	Occupational Safety and Health Administration
SAE	Society of Automotive Engineers
SJWRMD	St. Johns River Water Management District
SI	International System of Units
SSPC	Society of Protective Coatings
UL	Underwriters' Laboratories
USACOE	United States Army Corps of Engineers
USGS	United States Geological Service

Each of the above abbreviations, when followed by a number or letter designation, or combination of numbers and letters, designates a specification, test method, or other code or recommendation of the particular authority or organization shown. Where the above-referenced abbreviations refer to a written standard, Specifications, test method, or other code, the reference will be deemed to be the edition of the code promulgated at the time of Bid opening.

1.3 Use of Terms.

1.3.1 Singular and Plural. The Owner, E/A, CONTRACTOR, Subcontractor, sub-Subcontractor, Supplier, other contractors, surety, insurer and others may be referred to in the Contract Documents as if singular in number. In the event that more than one person or entity occupies the position referred to and unless otherwise indicated, the term is interpreted to include all such persons or entities.

1.3.2 Technical Terms and Trade Usage. Terms in the Contract which have well-known technical or construction industry meanings and are not otherwise defined are used in accordance with such recognized meanings unless the context clearly indicates otherwise.

ARTICLE 2 –ORGANIZATION AND INTENT OF CONTRACT

2.1 Interpreting the Contract.

2.1.1 Order of Precedence. In cases of conflict or discrepancy among Contract Documents, interpretations will generally be based on the following order of precedence, ranked from highest to lowest priority:

- .1 Change Orders;
- .2 The Construction Contract Form;
- .3 Supplemental General Conditions, if any;
- .4 General Conditions;

- .5 Technical Provisions;
- .6 Plans (figured dimensions will govern over scaled dimensions);
- .7 The Invitation to Bid and General and Supplemental Instructions to Bidders, including Addenda thereto;
- .8 The Bid Schedule;
- .9 All other documents required to be submitted and submitted as part of CONTRACTOR's Bid Proposal; and
- .10 All other Contract Documents that are neither listed above nor expressly incorporated into one of the foregoing Contract Documents;

with the understanding that a common sense approach will be used as necessary so that the Contract Documents produce the intended response.

2.1.2 Contract Documents Complementary. The Contract Documents are complementary, and what is required by one is as binding as if required by all. Anything mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, are of like effect as if shown or mentioned in both.

2.1.3 Intent to Require Completed Project. The intent of the Contract Documents is to require that CONTRACTOR provide all Materials and labor, including tools, Equipment and supervision, necessary for the proper execution and completion of the Work as a functioning whole or required for a completed Project.

2.1.4 Work Required if Reasonably Inferable. Performance by CONTRACTOR is required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. Where no explicit quality or standards for Materials or workmanship are established for the Work, the Work is to be of good quality for the intended use and consistent with the quality of surrounding Work which conforms to the requirements of the Contract Documents and to the standards for construction of the Project generally.

2.1.5 Organization of Drawings and Specifications. Organization of the Drawings around professional disciplines such as civil, architectural, structural, plumbing, mechanical, and electrical, and of the Specifications into divisions, sections, and articles, does not control CONTRACTOR in dividing the Work among sub-contractors or in establishing the extent of Work to be performed by any trade or excuse CONTRACTOR of its obligation to properly allocate and provide for the performance of all Work under the Contract.

2.1.6 Documents Excluded from the Contract. The Contract Documents do not include the Site-Related Reports referenced herein or other documents issued or provided to CONTRACTOR for the information of CONTRACTOR or for reference purposes and which are not specifically incorporated in the Contract Documents.

2.1.7 Titles, Headings, and Capitalization. The titles and headings of the various sections and subsections of these General Conditions and other Contract Documents are intended only as a matter of reference and convenience and in no way define, limit, or prescribe the scope or intent of the Contract Documents. The use, or inadvertent failure to use, capitalization of terms used in the Contract Documents is not intended to define or limit the meaning of the term.

2.1.8 Other Interpretive Rules.

2.1.8.1 Provisions of the Contract Documents that use the active voice-imperative mood writing style are directions to CONTRACTOR and are intended as commands. In such instance, the subject "the Bidder" or "CONTRACTOR" is understood.

2.1.8.2 Provisions of the Contract Documents that use the passive voice writing style are also directions to CONTRACTOR and intended as commands unless logic clearly dictates otherwise.

2.1.8.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

2.2 Referenced Standards.

2.2.1 Standards Incorporated. All Referenced Standards are incorporated into the Contract as fully as if printed and bound with the Specifications, but only to the limited extent that such standards are applicable to the Work.

2.2.2 Availability of Referenced Standards. CONTRACTOR is responsible for obtaining and having available at the Project Site a copy of each Referenced Standard insofar as it is applicable to the Work.

2.2.3 Precedence of Contract Documents Over Referenced Standards. No provision of a Referenced Standard is effective to change (i) the procedures established in the Contract Documents or by any applicable laws or regulations, or (ii) the duties and responsibilities of the Owner, E/A or CONTRACTOR from those set forth in the Contract Documents; nor is any provision of a Referenced Standard effective to assign to the Owner or the E/A any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the Contract.

ARTICLE 3 - PRELIMINARY MATTERS

3.1 Pre-Contract Submittals. The OWNER reserves the right to require certain Submittals before executing the Contract. Submittals required before execution of the Contract include, but are not limited to insurance certificates acceptable to the OWNER as provided in the Contract and any other submittals required by the Bid Documents. Bidders are requested to provide copies of MBE/WBE subcontracts and purchase orders from subcontractors and suppliers listed on Attachment D from the Bid Proposal Letter documenting subcontractor and supplier minority and women employment levels.

3.2 Project Information. Within ten days after the Effective Date, the Owner will furnish CONTRACTOR free of charge, two signed, sealed, hard copies and one electronic copy of the Plans in AutoCAD and the Technical Provisions in PDF format, and one copy of each of the Site Related Reports, if any. All Site Related Reports are given to CONTRACTOR for information only, are not warranted as to accuracy, and are not a part of the Contract Documents. CONTRACTOR will not be entitled to rely on the accuracy or the completeness of any information contained in these Reports in performing the Work required herein, or in seeking claims for Contract Price or Contract Time adjustments. It is the CONTRACTOR's responsibility to determine and verify all information provided by Owner including, but not limited to grades and elevations.

3.3 CONTRACTOR's Review of Contract Documents and Site Related Reports. Before undertaking a Project, CONTRACTOR will carefully study the Contract Documents and any Site Related Reports provided by Owner, to check and verify pertinent figures shown thereon compares accurately to all applicable field measurements. CONTRACTOR will promptly report in writing to the Contract Administrator any conflict, error, ambiguity, or discrepancy that CONTRACTOR discovers and will obtain a written interpretation or clarification from the Contract Administrator before proceeding with any Work affected thereby. CONTRACTOR will be liable to the Owner for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents or Site Related Reports of which CONTRACTOR knew or reasonably should have known.

3.4 Pre-Construction Submittals.

3.4.1 CONTRACTOR will prepare and submit all required pre-construction submittals within 15 Days after the Effective Date, except where the Contract Administrator extends time for submittal in writing. The submittals will include each of the following:

3.4.1.1 A proposed Progress Schedule, developed using Microsoft Project software unless otherwise approved by the Contract Administrator. The Progress Schedule will (i) indicate the times (number of

days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract, (ii) identify the Critical Path for completing the Work, (iii) identify when all Subcontractors will be utilized, and (iv) take into consideration any Working Hours limitations. The Progress Schedule will contain sufficient detail to indicate that CONTRACTOR has identified all required Work elements and tasks, has provided for a sufficient and proper workforce and integration of Subcontractor, has provided sufficient resources and has considered the proper sequencing of the Work required to result in a successful Project that can be completed in accordance with any Milestones and within required completion deadlines.

3.4.1.2 A proposed Schedule of Values, except where the Contract Price is based solely on Unit Prices set forth in the Bid Schedule. The Schedule of Values will be prepared in such a manner that each item of Work is shown as one or more line items on AIA Document G703, Continuation Sheet (latest ed.) or such other form as the Owner may prescribe, and will contain such detail and be supported by such data as to allow the Owner and the E/A to substantiate accuracy. Upon approval by the Owner, the Schedule of Values will be used as the basis for reviewing progress payment requests. After the Owner has approved the initial Schedule, CONTRACTOR will revise and resubmit for the Owner's approval, amended Schedules of Values as necessary to reflect adjustments in the Contract Price resulting from approved Change Orders. A Schedule of Values may be required if a substantial portion of the Contract Price is a lump sum bid item.

3.4.1.3 An organizational chart showing the principals and management personnel who will be involved with the Work, including each one's responsibilities for the Work.

3.4.1.4 Preliminary Shop Drawings. Shop Drawings will be neat, legible, and drawn to scale. CONTRACTOR will specifically identify any proposed deviations from dimensions, details, and other requirements as provided by the Plans and Specifications. When submitting Shop Drawings, CONTRACTOR will also provide a written narrative explanation itemizing each proposed deviation from the Specifications or other Contract requirements. No such deviations will be deemed to be accepted unless they are specifically approved in accordance with the procedures for substitutes and Change Orders.

3.4.1.5 To the extent not set forth in the Contract, a letter designating the Superintendent and, if such designation is required by the Supplemental General Conditions, the Project Manager.

3.4.1.6 A letter designating CONTRACTOR's safety representative, who will be responsible for general safety and excavation safety measures along with certifications or other documentation of the safety representative's qualifications.

3.4.1.7 If applicable, an excavation safety system plan.

3.4.1.8 If applicable, a plan illustrating proposed locations of temporary facilities.

3.4.1.9 A completed Non-Use of Asbestos Affidavit (prior to construction).

3.4.1.10 A map of proposed "haul routes" for delivery of Materials and transportation of Equipment to the Project Site.

3.4.1.11 A letter designating the Florida Registered Professional Land Surveyor for layout of the Work, if the Work requires the services of a surveyor.

3.4.1.12 Any other documents as required by the Owner, consistent with the terms of the Contract.

The Supplemental General Conditions (if any) or the Technical Provisions may amplify, waive, or otherwise amend requirements for the above-referenced submittals.

3.4.2 The Owner will have the right to accept or reject each of the required submittals. The Owner will provide CONTRACTOR written notice as to any submittals that are rejected, in which instance CONTRACTOR will promptly resubmit them. Alternatively in such instance, the Owner will have the right but not the obligation to

schedule a preconstruction meeting; provided that the preconstruction meeting is scheduled no later than 30 days after the Effective Date, and the Owner may delay issuance of the Notice to Proceed until the Owner and CONTRACTOR have held the meeting.

3.4.3 The Owner's acceptance of the above-referenced submittals will be deemed to be general only relating solely to their sufficiency and compliance with the intent of the Contract. Such acceptance does not constitute the Owner's adoption, affirmation, or direction of CONTRACTOR's means and methods, and does not constitute a Change Instrument. Owner's acceptance of the Progress Schedule will not impose on the Owner, responsibility or liability for the sequencing, scheduling, or progress of the Work, and will not relieve CONTRACTOR from CONTRACTOR's responsibility for complying with the terms and conditions of this Contract. CONTRACTOR will at all times remain responsible for the factual accuracy of all such submittals.

3.5 Notice to Proceed. No work will proceed until the OWNER has issued a written Notice to Proceed. The OWNER will issue a Notice to Proceed within 60 days after the Effective Date, provided that CONTRACTOR has submitted all required documents, including insurance and, where applicable, Performance Security. The OWNER in its sole discretion may delay issuing the Notice if CONTRACTOR has not completed its preconstruction submittals within that time, or with CONTRACTOR's written concurrence for any other or no reason.

3.6 Limitations on Custody and Use of Plans. CONTRACTOR will not re-use the Plans and Technical Provisions, including modifications thereto, on any other Project or for any other client. CONTRACTOR may not own or claim a copyright in the Site-Related Reports, or the Plans or any other Contract Documents. With the exception of the signed Contract Documents, all sets of the above-referenced documents are the property of the Owner, and will be returned to the Owner on request or at the completion of the Work prior to issuance of Final Payment.

3.7 Availability of Lands. The Owner will provide access to the Project Site, secure any easements necessary therefore, and notify CONTRACTOR of any restrictions in such access. The Owner may identify in the Contract Documents encumbrances or restrictions not of general application which are known by the Owner and specifically related to use of the Site, but which are not of public record. CONTRACTOR will comply with such encumbrances and restrictions in performing the Work. Permanent easements for the completed facility or for changes in existing facilities will be obtained and paid for by the Owner, unless otherwise provided in the Contract Documents.

ARTICLE 4 – OWNER'S RESPONSIBILITIES

4.1 Contract Administrator. The Contract Administrator is authorized to administer the Contract on behalf of the Owner, commencing on the Effective Date and terminating on the date CONTRACTOR performance is completed (including final payment) or terminated.

4.1.1 The Contract Administrator's authority is limited as follows:

- .1 Provide direction to CONTRACTOR to ensure satisfactory and complete performance;
- .2 Issue Field Directives;
- .3 Monitor and inspect CONTRACTOR performance to ensure acceptable timeliness and quality;
- .4 Maintain necessary documentation and records regarding CONTRACTOR performance and other pertinent matters;
- .5 Furnish timely written notice of CONTRACTOR performance failures to the City Manager and to the City Attorney, as appropriate;
- .6 Determine acceptance or rejection of CONTRACTOR's performance;
- .7 Approve or reject applications for payment, other than application for final payment;
- .8 Furnish necessary reports to the City Manager;
- .9 Recommend Change Instruments or stop work orders to the City Manager; and

- .10 Recommend termination of Contract or work authorizations for default or convenience to the City Manager.

4.1.2 The authority of the Contract Administrator is limited to the functions set forth above. In particular, the Contract Administrator is NOT authorized to make determinations (as opposed to recommendations) that:

- .1 Alter or modify Contracts;
- .2 Terminate or cancel Contracts;
- .3 Approve, as opposed to recommend, Change Orders or Contract Amendments;
- .4 **Except as expressly provided herein**, interpret ambiguities in Contract language; or
- .5 Approve final applications for payment; or
- .6 Waive the Owner's contract rights.

4.2 **City Manager.** The City Manager has all of the authority of the Contract Administrator. The City Manager has authority to approve final applications for payment except where approval also requires approval of a Change Order that is not within the City Manager's authority, below. In addition, the City Manager is authorized to issue (i) Change Orders increasing Contract Price or Contract Time as provided in the Purchasing Code or as specifically authorized by the City Commission; (ii) Change Orders reducing Contract Price or Contract Time; and (iii) stop work orders where reasonably necessary to preserve property or prevent injury.

4.3 **Authority Reserved in City Commission.** All administrative authority not specifically conferred upon the Contract Administrator or City Manager is reserved to the City Commission. Modifications to the Contract required to be approved by the Commission may be in the form of Change Orders or formal amendments, as appropriate.

4.4 **General Obligation to Avoid Delays.** Information or services under the Owner's control will be furnished by the Owner with reasonable promptness to avoid delay in orderly progress of the Work. The Owner will have a reasonable amount of time to investigate site conditions, review submittals, analyze requests for changes, and to make other decisions in the orderly administration of the Contract. CONTRACTOR will notify the Owner in writing, if the time for the investigation, review, analysis of any submittals, required for changes or otherwise required for the Owner's decision, impacts in any way the Critical Path of the current approved Progress Schedule.

4.5 **Owner-Provided Inspectors.** The Owner will provide persons to perform Owner-required inspections.

ARTICLE 5 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS

CONTRACTOR will obtain any additional temporary construction facilities, stockpiling or storage sites not otherwise provided. CONTRACTOR will be responsible for providing at his own expense and without liability to the Owner, any additional land and access thereto that may be required for temporary construction facilities, or for storage of Materials. CONTRACTOR will be required to obtain approval of any private property Owner for such additional lands and access unless specifically provided otherwise in the Contract Documents.

5.1 Subsurface and Physical Conditions.

5.1.1 CONTRACTOR affirms that CONTRACTOR has carefully examined the Plans and the Site-Related Reports, if any. CONTRACTOR acknowledges that the Site-Related Reports are **not** a guarantee of specific site conditions which may vary between boring locations, and that the Project Site is unwarranted.

5.1.2 CONTRACTOR affirms that prior to executing this Contract, CONTRACTOR has had the opportunity to become familiar with the Project Site and the local conditions under which the Project is to be constructed and operated, and to undertake its own geotechnical studies to the extent that CONTRACTOR deems appropriate. CONTRACTOR will not be entitled to any additional time or compensation as a result of any conditions at the Project Site which would have been disclosed to CONTRACTOR by a site visit or by undertaking its own geotechnical studies.

5.1.3 CONTRACTOR will provide the Owner written notice as soon as reasonably possible, but no later than three Days, if unforeseen conditions are encountered at the Project Site which are subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature that differ materially from those normally encountered in the type of work being performed under this Contract. CONTRACTOR may not disturb the conditions until the Owner conducts an investigation. The Owner will promptly investigate such conditions.

5.1.3.1 If it is determined that such conditions differ materially and cause an increase or decrease in CONTRACTOR's cost of or time required for performance of any part of the Work, the Contract Administrator will recommend an equitable adjustment in the Contract Price or Contract Time, or both. If it is determined that such conditions are not materially different from those indicated in the Contract Documents, the Contract Administrator will notify CONTRACTOR in writing of such findings and the Contract will not be adjusted.

5.1.3.2 CONTRACTOR will be liable to the Owner for failure to report any such conflict, error, ambiguity, or discrepancy of which CONTRACTOR knew or reasonably should have known, and for CONTRACTOR's failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents within said three-Day period, and for any increases in Project costs, or damages accruing, in association with CONTRACTOR's disturbance of the conditions pending Owner's investigation.

5.1.4 Notwithstanding any other provision of this Contract, CONTRACTOR is solely responsible for the location and protection of any and all public utility lines and utility customer service lines in the Work area. "Public utility lines" means the utility distribution and supply system, and "utility customer service lines" means the utility lines connecting customers to the utility distribution and collection system. Generally, existing utility customer service line connections are not shown on the Plans. CONTRACTOR will notify "One Call" and exercise due care to locate, mark, uncover and otherwise protect all such lines in the construction zone and any of CONTRACTOR's work or storage areas. CONTRACTOR's responsibility for the location and protection of utilities is primary and non-delegable. CONTRACTOR will indemnify or reimburse such expenses or costs (including fines that may be levied against the Owner) that may result from unauthorized or accidental damage to all public lines and utility customer service lines in the work area. The Owner reserves the right to repair any damage CONTRACTOR causes to such utilities at CONTRACTOR's expense. If a public or customer service line is damaged by CONTRACTOR, CONTRACTOR will give verbal notice within one hour and written notice within 24 hours, to the Owner and to the utility representatives identified on the Plans.

5.1.5 CONTRACTOR will take reasonable precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological or historical significance. No objects of this nature will be disturbed without written permission of the Owner and the FDHR. When such objects are uncovered unexpectedly, CONTRACTOR will stop all Work in close proximity and notify the Owner and the FDHR of their presence and will not disturb them until written permission and permit to do so is granted. All primitive rights and antiquities uncovered on the Owner's property will remain property of FDHR conforming to applicable provisions of Florida Statutes. If the Owner, in consultation with the FDHR, determines that exploration or excavation of primitive records or antiquities on Project Site is necessary to avoid loss, CONTRACTOR will perform salvage work attendant to preservation. If the Work stoppage or salvage work causes an increase in CONTRACTOR's cost of, or time required for, performance of the Work, the Contract Price or Contract Time will be equitably adjusted subject to compliance with the provisions herein for Changes and Delays.

5.2 Protection of Reference Points. Unless otherwise specified, the Owner will furnish a base line and a suitable number of bench marks adjacent to the work. From the information provided by the Owner, CONTRACTOR will develop and make all detailed surveys, stakes, lines, and elevations, as CONTRACTOR deems necessary. CONTRACTOR will carefully protect and preserve benchmarks, reference points, and stakes. If these benchmarks, reference points, or stakes are disturbed or destroyed due to CONTRACTOR's failure to comply with the above-referenced requirement, CONTRACTOR will bear the cost of expenses of relocating and replacing them, including the costs of a Registered Professional Land Surveyor if the Owner determines the same to be necessary.

5.3 Hazardous Materials.

5.3.1 To the extent provided by applicable law, the Owner will be responsible for any pre-existing Hazardous Material uncovered or revealed at the Project Site which was not shown, indicated or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work.

5.3.1.1 CONTRACTOR will immediately stop Work in the affected area and will take all necessary precautions to avoid further disturbance of the Materials. CONTRACTOR will also will immediately notify the Owner and, if required by applicable law or regulations, all government or quasi-government entities with jurisdiction over the Project or Project Site.

5.3.1.2 Upon receiving notice of the presence of suspected Hazardous Materials, the Owner will take the necessary measures required to ensure that the Hazardous Materials are remediated or rendered harmless. Such necessary measures will include the Owner retaining qualified independent experts to (i) ascertain whether Hazardous Materials have actually been encountered, and, if they have been encountered, (ii) prescribe the remedial measures that the Owner will take either to remove the Hazardous Materials or render the Hazardous Materials harmless.

5.3.1.3 CONTRACTOR will be obligated to resume Work at the affected area of the Project only after the Owner provides written certification that (i) the Hazardous Materials have been removed or rendered harmless and (ii) all necessary approvals have been obtained from all government and quasi-government entities having jurisdiction over the Project or Site. CONTRACTOR will be responsible for continuing the Work in the unaffected portion of the Project and the Project Site.

5.3.1.4 CONTRACTOR will be entitled, in accordance with these General Conditions, to an adjustment in its Contract Price or Contract Time(s) to the extent CONTRACTOR's cost or time of performance have been adversely impacted by the presence of Hazardous Materials.

5.3.2 CONTRACTOR will maintain at the Project Site, available to the Owner, appropriate information pertaining to all Hazardous Materials brought to the Project Site by CONTRACTOR or any Subcontractor, and as may be required by the Supplemental General Conditions, if any. CONTRACTOR will ensure that all such Materials are properly labeled or identified, and will properly store, handle and use them at all times. In accordance with federal Hazard Communication Standard (29 CFR § 1910.1200) and all other applicable Legal Requirements, manufacturers and distributors are required to label each Hazardous Material or chemical container, and to provide Material Safety Data sheets to the purchaser. CONTRACTOR will comply with these laws and will provide the Owner with copies of all relevant documents, including Material Safety Data sheets prior to performance or services or contemporaneous with delivery of goods. CONTRACTOR will provide and designate appropriate and secure areas for their storage and will notify the Owner of their presence and location at Project Site. CONTRACTOR will not store Hazardous Materials at the Project Site in excess of those reasonably needed for CONTRACTOR's prosecution of the Work, and will properly remove or dispose of all Hazardous Materials, including combustible waste, as soon as possible after completion of the operations in which they are utilized.

5.3.3 No asbestos-containing Materials will be incorporated into the Work or brought on Project Site without prior approval of the Owner. CONTRACTOR will not knowingly use, specify, request or approve for use any asbestos containing Materials or lead-based paint without the Owner's written approval. When a specific product is specified, CONTRACTOR will endeavor to verify that the product does not include asbestos containing material.

5.3.4 CONTRACTOR will be solely responsible for use, storage and remediation of any Hazardous Materials brought to Project Site by CONTRACTOR, Subcontractors, sub-Subcontractors, Suppliers, and anyone else for whom CONTRACTOR is responsible. CONTRACTOR will indemnify, defend and hold harmless the Owner and the Owner's officers, directors, employees and agents from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from those Hazardous Materials introduced to Project Site by CONTRACTOR, Subcontractors, sub-Subcontractors, Suppliers, or anyone for whose acts they may be liable.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.1 General Responsibilities.

6.1.1 Scope of Work. CONTRACTOR will provide, perform, and complete all necessary work, labor, services, transportation, Equipment, Materials, apparatus, machinery, tools, fuels, gas, electric, water, waste disposal, information, data and other means and items necessary to accomplish the Project at the Work Site, including measures for sediment control, storm water management, and waste disposal, in compliance with this Contract. CONTRACTOR is required to perform all Work specified in the Contract Documents and reasonably inferable from these Documents as being necessary to produce the intended results.

6.1.2 Quality. All Materials and Work will be of good quality for the intended use and consistent with the quality of surrounding Work, and will conform to the requirements of the Contract Documents and to the standards for construction of the Project generally. All Materials will be new.

6.1.3 Construction Means and Methods. CONTRACTOR will provide continuous on-site supervision and direction of the Work using CONTRACTOR's best efforts. CONTRACTOR will have control over construction means, methods, techniques, sequences, and procedures, unless the Contract Documents give other specific instructions concerning these matters, and is solely responsible therefore.

6.1.4 Discipline at the Project Site. CONTRACTOR will enforce strict discipline and good order among CONTRACTOR's employees and other persons for whose Work CONTRACTOR is responsible, including CONTRACTOR's employees, Subcontractors, sub-Subcontractors, and Suppliers, and the agents and employees of any of them.

6.1.5 Responsibility for Subordinates. CONTRACTOR is responsible for the acts and omissions of all persons performing portions of the Work at the Project Site, including but not limited to CONTRACTOR's employees, Subcontractors, sub-Subcontractors, and Suppliers, and the agents and employees of any of them.

6.1.6 Assignment, Scheduling and Coordination. CONTRACTOR is solely responsible for and has control over assigning, scheduling and coordinating all portions of the work under the Contract performed by CONTRACTOR's own forces and by its Subcontractors, sub-Subcontractors, and Suppliers, in accordance with the approved Progress Schedule, unless the Contract Documents give other specific instructions concerning these matters.

6.1.7 Obligations Not Relieved. CONTRACTOR is not relieved of its obligations to perform the Work in accordance with the Contract Documents, by the activities or duties of the Owner or the E/A in the administration of the Contract or of construction, or by tests, inspections, or approvals required or performed by persons other than CONTRACTOR.

6.1.8 Ongoing Duty to Report Problems with Contract Documents. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between any Contract Document and any Legal Requirement or of any such standard, specification, manual, or code or instructions of any manufacturer or Supplier, CONTRACTOR will within three Days of such discovery report it to the Owner in writing, and CONTRACTOR will not proceed with the Work affected thereby until a Change Order has been issued. CONTRACTOR will be liable to the Owner for failure to report any such conflict, error, ambiguity, or discrepancy of which CONTRACTOR knew or reasonably should have known. CONTRACTOR will be liable to the Owner for CONTRACTOR's failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents within said three-day period.

6.1.9 Inspection of Work. CONTRACTOR will make frequent inspections during the progress of the Work to confirm that work previously performed by CONTRACTOR is in compliance with the requirements of this Contract, and that any portion of Work previously performed by CONTRACTOR or by others is in proper condition to receive subsequent Work.

6.2 Diligent Prosecution. CONTRACTOR will at all times be responsible for the diligent prosecution of the Work so as to complete the Work within the Contract Time.

6.2.1 CONTRACTOR will have an affirmative obligation to rearrange Milestones, notwithstanding the manner in which they are scheduled in the current approved Progress Schedule, as circumstances may require. If in order to meet this obligation CONTRACTOR rearranges the order of Work in a manner that materially departs from the current approved Progress Schedule, CONTRACTOR will within 3 Days thereafter provide notice to the Owner, who may require CONTRACTOR to submit a revised Progress Schedule reflecting the rearrangement. No revised Progress Schedule extending the Contract Time will be approved without the issuance of a Change Order in compliance with the Contract Documents.

6.2.2 CONTRACTOR will carry on the Work and adhere to the current approved Progress Schedule, including during all disputes or disagreements with the Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, except as the Owner and CONTRACTOR may otherwise agree through a Change Order or Contract amendment.

6.3 Supervision and Superintendence.

6.3.1 CONTRACTOR will supervise the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

6.3.2 CONTRACTOR will have an English-speaking, competent Superintendent on the Work at all times that work is in progress. The Superintendent will be CONTRACTOR's representative on the Work and will have the authority to act on the behalf of CONTRACTOR. All communications given to the Superintendent will be as binding as if given to CONTRACTOR, even where written notice is otherwise required. Either CONTRACTOR or the Superintendent will provide a cellular telephone number and an emergency and home telephone number at which one or the other may be reached if necessary when Work is not in progress. The Superintendent will be an employee of CONTRACTOR, unless waived in writing by the Owner. If CONTRACTOR proposes a management structure with a Project Manager supervising, directing, and managing construction of the work in addition to or in substitution of a Superintendent, the requirements of these Construction Documents with respect to the Superintendent will likewise apply to any such Project Manager.

6.3.2.1 CONTRACTOR will present the resume of the proposed Superintendent to the Owner showing evidence of experience and successful superintendence and direction of work of a similar scale and complexity. The Owner may reject the proposed Superintendent if the Owner determines that the proposed Superintendent does not have sufficient experience in line with the Work, in which instance CONTRACTOR will propose a different Superintendent for Owner approval.

6.3.2.2 CONTRACTOR will not replace the Superintendent without written notice to the Owner. If CONTRACTOR deems it necessary to replace the Superintendent, CONTRACTOR will provide the necessary information for approval, as stated above, on the proposed new Superintendent.

6.3.2.3 CONTRACTOR may designate a qualified substitute Superintendent if the designated Superintendent is temporarily away from the Work, subject to Owner approval.

6.3.2.4 CONTRACTOR will replace the Superintendent upon the Owner's request, if the Superintendent is unable to perform to the Owner's satisfaction.

6.4 Labor, Materials, and Equipment.

6.4.1 CONTRACTOR will employ only orderly and competent workers, skillful in performance of the type of Work required under this Contract. CONTRACTOR will prohibit the use and possess any alcoholic or other intoxicating beverages, illegal drugs, or controlled substances while on the job or on the Owner's property. Subject to the applicable provisions of Florida law, neither CONTRACTOR, nor Subcontractors, Suppliers, or other agents of CONTRACTOR, may use or possess any firearms or other weapons while on the job or on the Owner's property. If the Owner notifies CONTRACTOR that any officer, employee, Subcontractor, Supplier, or other agent is

incompetent, disorderly, abusive, or disobedient, has knowingly or repeatedly violated safety regulations, has possessed any firearms in contravention of the applicable provisions of Florida law, or has possessed or was under the influence of alcohol or drugs on the job, CONTRACTOR will immediately remove that person from performing Contract Work, and may not employ that person again on the Work without the Owner's prior written consent. CONTRACTOR will at all times maintain good discipline and order on- and off-Project Site in all matters pertaining to the Project. CONTRACTOR will pay workers no less than the wage rates established by law, and maintain weekly payroll reports as evidence thereof.

6.4.2 CONTRACTOR will not use any preexisting facilities of the Owner without the specific written consent of the Owner, except as indicated in the Contract Documents. CONTRACTOR is solely responsible for temporary facilities and services provided or utilized by CONTRACTOR and will remove those not required to remain at the completion of the Work or any portion thereof, will promptly correct any damage caused by the erection, use or removal of temporary facilities; and will restore the Project Site and any adjacent areas to their original condition or that required by the Contract Documents upon completion of the Work.

6.4.3 CONTRACTOR will store, handle, install, and test all Materials in accordance with the manufacturer's or Suppliers' most recent instructions and recommendations. CONTRACTOR will promptly notify the Owner if these instructions and recommendations are in conflict with any provision of the Contract Documents.

6.4.4 All Materials and Equipment will be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with instructions of the applicable manufacturer and Supplier, except as otherwise provided in the Contract Documents. The Contract Administrator or E/A may require CONTRACTOR to furnish one or more of the following:

6.4.4.1 Satisfactory evidence (i.e., reports of required tests, manufacturer's certificates of compliance with material requirements, mill reports, etc.) as to the kind and quality of Materials and Equipment.

6.4.4.2 Samples of required Equipment and Materials prior to having such Equipment and Materials delivered to the Project Site. Each sample submitted by CONTRACTOR will carry a label giving the name of CONTRACTOR, the Project, and the name of the producer. The accompanying certificate or letter from CONTRACTOR will state that the sample complies with the contract requirements, will give the name and brand of the product, its place of origin, the name and address of the producer and all Specifications or other detailed information which will assist the Owner in reviewing the sample promptly. It will also include the statement that all Materials or Equipment furnished for use in the Project will comply with the samples or certified statements. In addition, the accompanying certificate will include a written narrative explanation itemizing the extent to which the sample deviates from the Specifications or other Contract requirements.

6.4.5 The Owner will not be required to consider delays in the Work caused by delivery of non-complying Materials or Equipment, or by late or improper submission test reports or manufacturer's certificates for Owner approval, as just cause for an extension of the Contract Time. The Owner's acceptance of any test report, certificate, or sample will be general only and will not constitute a waiver of the Owner's right to demand full compliance with Contract requirements, nor relieve CONTRACTOR from ensuring full compliance with the Contract.

6.4.6 CONTRACTOR will assign to the Owner, any rights CONTRACTOR may have to bring antitrust suits against Suppliers for overcharges on Materials incorporated in the Project growing out of illegal price fixing agreements. CONTRACTOR will cooperate with the Owner should the Owner wish to prosecute suits against Suppliers for illegal price fixing.

6.4.7. Upon CONTRACTOR's request and the Contract Administrator's written approval, CONTRACTOR may locate stored Materials off-site, so long as they are in a bonded and insured facility, accessible to the Owner, and are clearly marked as Owner's property.

6.4.8 Title to Materials delivered to the Project Site or stored off-site will not be deemed to pass to the Owner until the Owner accepts such title by paying for same. The Owner will be entitled but is not required to request title documentation. Risk of loss will not pass to the Owner until title passes.

6.5 Concerning Subcontractors, Suppliers, and Others.

6.5.1 CONTRACTOR will retain direct control of and give direct attention to the fulfillment of this Contract. CONTRACTOR agrees not to assign this Contract, by power of attorney or otherwise, without the Owner's prior written consent.

6.5.2 Unless the Supplemental General Conditions provide otherwise, CONTRACTOR will not subcontract the performance of the entire Project or the supervision and direction of the Work without the Owner's prior written consent. CONTRACTOR will not employ any Subcontractor or other person or organization, whether initially or as a substitute, against whom the Owner may have reasonable objection. The Owner will communicate such objections by written notice. CONTRACTOR will not substitute any Subcontractor that has been accepted by the Owner, unless the Owner first accepts the substitute in writing.

6.5.3 CONTRACTOR will enter into written agreements with all Subcontractors and Suppliers which specifically bind the Subcontractors and Suppliers to the applicable terms and conditions of the Contract Documents for the Owner's benefit. The Owner reserves the right to specify that certain requirements will be adhered to by all Subcontractors and sub-Subcontractors as indicated in other portions of the Contract Documents, in which instance these requirements will be made a part of the written agreement between CONTRACTOR and each Subcontractor. CONTRACTOR's standard subcontract form is subject to the Owner's review and approval. Within five working Days of the Owner's request for Subcontractor contract documents, CONTRACTOR will provide them to the Owner.

6.5.3.1 CONTRACTOR is asked to provide copies of all subcontracts and purchase orders issued to MBE/WBE subcontractors and suppliers. MBE/WBE subcontractors or suppliers may not be replaced without good cause. CONTRACTOR shall make a good faith effort to replace any terminated MBE/WBE subcontractor or supplier with another MBE/WBE certified subcontractor or supplier.

6.5.4 CONTRACTOR will be fully responsible to the Owner for all acts and omissions of the Subcontractors, Suppliers, and other persons and organizations performing or furnishing any of the Work under contract with CONTRACTOR and under contract with CONTRACTOR's Subcontractors or Suppliers, just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents will create for the benefit of any such Subcontractor or other person or organization any contractual relationship between the Owner and any such Subcontractor or other person or organization, nor will it create any obligation on the part of the Owner or E/A to pay or to see to the payment of any moneys due any such Subcontractor or other person or organization except as may otherwise be required by Legal Requirements.

6.5.5 CONTRACTOR will be solely responsible for efficiently scheduling and coordinating the Work of Subcontractors and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR in order to avoid any delays or inefficiencies in the prosecution of the Work. CONTRACTOR will require all Subcontractors and such other persons and organizations performing or furnishing any of the Work to communicate with the Owner through CONTRACTOR.

6.5.6 The divisions and sections of the Technical Provisions and the identification of any Plans will not control CONTRACTOR in dividing or delineating the Work to be performed by any specific trade.

6.5.7 CONTRACTOR will pay each Subcontractor their appropriate share of payments made to CONTRACTOR not later than ten Days of CONTRACTOR's receipt of payment from the Owner.

6.5.7.1 CONTRACTOR will submit Attachment E, MBE/WBE Usage, outlining the payments made to MBE/WBE subcontractors and suppliers pursuant to each progress payment.

6.5.8 To the extent allowed by Florida law, the Owner will be deemed to be a third party beneficiary to each subcontract and may, if the Owner elects, following a termination of CONTRACTOR, require that the Subcontractor(s) perform all or a portion of unperformed duties and obligations under its subcontract(s) for the benefit of the Owner, rather than CONTRACTOR; however, if the Owner requires any such performance by a Subcontractor for the Owner's direct benefit, then the Owner will be bound and obligated to pay such Subcontractor

the reasonable value for all Work performed by such Subcontractor to the date of the termination of CONTRACTOR, less previous payments, and for all Work performed thereafter. If the Owner elects to invoke the Owner's right under this Section, the Owner will provide notice of such election to CONTRACTOR and the affected Subcontractor(s).

6.6 Patent Fees and Royalties.

6.6.1 CONTRACTOR will be responsible at all times for compliance with applicable patents and copyrights encompassing, in whole or in part, any design, device, material, or process utilized, directly or indirectly, in the performance of the Work or the formulation or presentation of its Bid.

6.6.2 CONTRACTOR will pay all royalties and license fees and will provide, prior to commencement of Work hereunder and at all times during the performance of same, for lawful use of any design, device, material or process covered by letters, patent or copyright by suitable legal agreement with the patentee, copyright holder, or their duly authorized representative whether or not the Owner specifies a particular design, device, material, or process.

6.6.3 CONTRACTOR will defend all suits or claims for infringement of any patent or copyright and will save the Owner harmless from any loss or liability, direct or indirect, arising with respect to CONTRACTOR's process in the formulation of its Bid or the performance of the Work or otherwise arising in connection therewith. The Owner reserves the right to provide its own defense to any suit or claim of infringement of any patent or copyright in which event CONTRACTOR will indemnify and save harmless the Owner from all costs and expenses of such defense as well as satisfaction of all judgments entered against the Owner.

6.6.4 The Owner will have the right to stop the Work or terminate this Contract at any time if CONTRACTOR fails to disclose to the Owner that CONTRACTOR's work methodology includes the use of any infringing design, device, material, or process.

6.7 Permits, Fees. CONTRACTOR will secure and pay for at CONTRACTOR's expense, all permits and licenses of a temporary nature that are required for the prosecution of the Work; provided, however, that the Owner will reimburse CONTRACTOR for any CITY-required permits unless specified otherwise in the Supplemental General Conditions.

Unless the Supplemental General Conditions provide otherwise, the Owner will obtain licenses and easements for permanent structures and or permanent changes in existing facilities.

6.8 Construction Operations.

6.8.1 CONTRACTOR will confine operations at the Project Site to those areas permitted by all Legal Requirements, and will not unreasonably encumber the Project Site with Materials and Equipment. CONTRACTOR will assume full responsibility for any damage to any portion of the Project Site, or to the Owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. If an adjacent property Owner or occupant files a claim because of or in connection with the performance of the Work, CONTRACTOR will promptly settle the claim by negotiation or as otherwise provided by law. CONTRACTOR will indemnify, defend and hold harmless the Owner and anyone directly or indirectly employed by the Owner, from and against all claims, costs, losses, and damages (including court costs and reasonable attorney's fees) arising out of or resulting from any claim or action, legal or equitable, brought by any such the Owner or occupant against the Owner, E/A or any other party indemnified hereunder to the extent caused by or based upon performance of the Work or failure to perform the Work.

6.8.2 CONTRACTOR will establish the exterior lines and elevations of all buildings and structures to be erected on the Project Site, and lines and grades of site work such as roads, utilities, and site grading, based on reference points, the location of existing structures and improvements, or benchmarks identified in the site surveys provided by the Owner. CONTRACTOR will provide a professional certification by a professional engineer or land surveyor as to the actual location of building lines prior to constructing any foundations. CONTRACTOR will establish the building grades, lines, and levels, and column, wall, and partition lines required by Subcontractors in laying out the Work. At the completion of the Work, CONTRACTOR will provide another professional certification

by a registered engineer or land surveyor as to the location of completed improvements in relation to property lines, building lines, easements, and other boundaries.

6.8.3 CONTRACTOR will not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor will CONTRACTOR subject any part of the Work, the Project Site, or adjacent property to stresses or pressures that will endanger it.

6.8.4 All Work will be performed solely during Working Hours, unless (i) more restrictive hours are required by CITY ordinances or other Legal Requirements governing CONTRACTOR's performance of the Work, or (ii) the Contract Administrator approves expanded Working Hours in writing, such as in the event of emergencies, in which instance the Contract Administrator's approval may be terminated at any time and for any reason without recourse to CONTRACTOR. The Owner has the right to impose further restrictions on Working Hours reasonably related to the use of occupied facilities. No delays resulting from compliance with applicable Legal Requirements may form the basis for any claim by CONTRACTOR for delay damages or additional compensation or for any extensions of the Contract Time; any delays arising from restrictions related to the use of occupied facilities are non-compensable and any claims for extensions of the Contract Time relating to them will be filed in accord with Article 11 or the same will be conclusively deemed to have been waived. CONTRACTOR will not permit Work outside of Working Hours without the written consent of the Owner; such consent, if given, may be conditioned upon payment by CONTRACTOR of the Owner's additional costs and fees incurred in monitoring such off-hours Work. CONTRACTOR will notify the Owner as soon as possible if Work will be performed outside such times in the interest of the safety and protection of persons or property at the Project Site or adjacent thereto, or in the event of an emergency. In no event will CONTRACTOR permit Work to be performed at the Project Site without the presence of CONTRACTOR's Superintendent and person responsible for the protection of persons and property at the Project Site and compliance with all Legal Requirements, if different from the Superintendent.

6.8.5 Temporary Utilities. CONTRACTOR, at its own expense, will:

6.8.5.1 Furnish all temporary heat, cooling ventilation, and humidity control including all required apparatus and fuel as may be necessary to protect the Work fully, both during its execution and until Final Completion and acceptance. CONTRACTOR will not use any method of heating, cooling, ventilation, or humidity control of the building unless approved by the Owner in advance.

6.8.5.2 Provide all temporary on-Site water service required to perform the Work, to assure safety at the Site, and as otherwise required. All temporary services will be removed by CONTRACTOR.

6.8.5.3 Furnish all temporary electric service required to perform the Work, to assure safety at the Site, and as otherwise required.

6.8.5.4 CONTRACTOR will provide and maintain in a neat, sanitary condition such accommodations for the use of CONTRACTOR's employees, Subcontractors, and others for whom CONTRACTOR may be responsible, as may be necessary to comply with Legal Requirements, and will commit no public nuisance.

6.8.6 Site Maintenance. During the progress of the Work and on a daily basis, CONTRACTOR will keep the Project Site free from accumulation of waste Materials, rubbish, and other debris resulting from the Work. If CONTRACTOR fails to do so in a manner reasonably satisfactory to the Owner within 48 hours after notice or as otherwise required by the Contract Documents, the Owner may clean the Project Site and back charge CONTRACTOR for all costs associated with the cleaning. At Substantial Completion, CONTRACTOR will leave the Project Site clean, including but not limited to the cleaning of manholes, inlets, and gravity underground piping systems, and ready for the Owner's occupancy, and will at this point also remove all temporary buildings, waste, trash, debris, and surplus Materials. At Final Completion, CONTRACTOR will remove all tools, appliances, construction Equipment, and machinery, in addition to the above-referenced Materials, and leave the Project Site clean and ready for Owner's occupancy. This requirement will not apply to property used for permanent disposal of rubbish or waste Materials in accordance with permission for such disposal granted to CONTRACTOR by the Owner. CONTRACTOR will, at a minimum, restore to original condition all property not designated for alteration by the Contract Documents. If CONTRACTOR fails to clean up at the completion of the Work, the Owner may do so and the cost thereof will be charged against CONTRACTOR.

6.8.7 Risk of Performance. If CONTRACTOR performs any work involving an apparent error, inconsistency, ambiguity, construction impracticality, omission, or violation of Legal Requirements in the Contract Documents of which CONTRACTOR is aware, or which could reasonably have been discovered by the review required by CONTRACTOR by this Contract, without prompt written notice to the Owner and the E/A and request for correction, clarification or additional information, as appropriate, CONTRACTOR does so at its own risk and expense and all claims relating thereafter are specifically waived.

6.9 Legal Requirements.

6.9.1 CONTRACTOR will diligently and promptly call for locates required, in accordance with Sunshine State One Call of Florida requirements.

6.9.2 CONTRACTOR will give all other notices and comply with all other Legal Requirements, including arranging for and obtaining any required inspections, tests, approvals or certifications from any public body having jurisdiction over the Work or any part thereof. Except where these Legal Requirements provide otherwise, neither the Owner nor the E/A will be responsible for monitoring CONTRACTOR's compliance with any Legal Requirements.

6.9.3 Maintaining clean water, air, and earth or improving thereon will be regarded as of prime importance. CONTRACTOR will plan and execute its operations in compliance with all applicable Legal Requirements concerning control and abatement of water pollution and prevention and control of air pollution, including where applicable the terms and conditions of the CITY's current National Pollutant Discharge Elimination System (NPDES) permit.

6.10 Taxes.

6.10.1 CONTRACTOR will pay only those sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the laws and regulations of the State of Florida in the performance of this Contract.

6.10.2 The Owner is an exempt organization as defined by Florida Statutes and is therefore exempt from payment of sales and use taxes.

6.11 Maintenance of Records and Documents.

6.11.1 CONTRACTOR will maintain at the Site, available to the Owner for reference during the progress of the Work, a copy of the current approved Progress Schedule and any approved revisions thereto. CONTRACTOR will keep current records of and mark on a copy of the current approved Progress Schedule the actual Commencement Date, progress, and completion date of each scheduled activity indicated on the Progress Schedule.

6.11.2 CONTRACTOR will maintain in a safe place at the Project Site, or other location acceptable to the Owner, one record copy of all Drawings, Specifications, Addenda, Change Instruments and written interpretations and clarifications issued pursuant to this Contract (collectively, "Record Documents") in good order and annotated to show all changes made during construction. The Record Documents and all final samples and final Shop Drawings will be available to the Owner and E/A for reference during performance of the Work. Upon Substantial Completion of the Work, CONTRACTOR will deliver these Record Documents, and final samples and Shop Drawings, to the Owner.

6.11.3 To the extent applicable, CONTRACTOR will comply with the requirements of Florida Statutes Section 119.0701, which include the following:

6.11.3.1 Keeping and maintaining public records that the CITY requires for performance of the service provided herein.

6.11.3.2 Upon the request of the City Clerk of the CITY, (i) providing the City Clerk with a copy of requested public records or (ii) allowing inspection or copying of the records, within a reasonable time after receipt of the CITY Clerk's request, at a cost that does not exceed the cost provided in Ch. 119, Florida Statutes, or as otherwise provided by law.

6.11.3.3 Ensuring that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law until completion of this Contract, and following such completion if CONTRACTOR fails to transfer such records to the CITY.

6.11.3.4 Upon completion of this Contract, keep and maintain public records required by the CITY to perform the service. CONTRACTOR will meet all applicable requirements for retaining public records. All records stored electronically must be provide to the CITY upon request from the CITY Clerk, in a format that is compatible with the CITY's information technology systems.

6.11.3.5 IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTRACTOR MUST CONTACT THE CITY CLERK, WHOSE CONTACT INFORMATION IS AS FOLLOWS:

(Phone)	386 671-8023
(Email)	clerk@codb.us
(Address)	301 S. Ridgewood Avenue Daytona Beach, FL 32114

6.11.4 Nothing herein will be deemed to waive CONTRACTOR's obligation to comply with Section 119.0701(3)(a), Florida Statutes, as amended by Chapter 2016-20, Laws of Florida (2016).

6.12 Safety and Protection.

6.12.1 CONTRACTOR will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Upon request, and prior to installation of measures, CONTRACTOR will submit a site security plan to the Owner. By reviewing the plan or making recommendations or comments, the Owner will not assume liability nor will CONTRACTOR be relieved of liability for damage, injury, or loss. CONTRACTOR will take all necessary precautions for the safety of and will provide the necessary protection to prevent damage, injury, and loss to:

6.12.1.1 The public;

6.12.1.2 All persons on the Project Site or who may be affected by the Work;

6.12.1.3 All the Work and Materials and Equipment to be incorporated therein, whether in storage on or off Project Site; and

6.12.1.4 Other personal property, fixtures and other items at the Project Site or adjacent thereto, including, but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction.

6.12.2 CONTRACTOR will comply with the Occupational Safety and Health Administration's (OSHA) Excavation Safety Standard, 29 U.S.C § 651 et seq., 29 C.F.R. 1926.650 Sub Part P., and the Trench Safety Act, Section 553.60 et seq. In addition CONTRACTOR will comply with all other applicable laws and regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss, and will erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR will notify Owners of adjacent property and of underground facilities, and utility Owners when prosecution of the Work may affect them,

and will cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in Subparagraphs 6.12.1.3 and 6.12.1.4, above, caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, or any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, will be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of the Owner, or E/A, or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the faults or negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and protection of the Work will continue until such time as all the Work is completed and the Owner has issued a Certificate of Final Completion (except as otherwise expressly provided in connection with Substantial Completion). Without limitation, CONTRACTOR will comply with the following specific provisions:

6.12.3 CONTRACTOR will designate in writing a qualified and experienced safety representative at Project Site whose duties and responsibilities will be the prevention of accidents and the maintaining and supervising of safety precautions and programs. Upon request of the Owner, CONTRACTOR will provide certifications or other documentation of the safety representative's qualifications.

6.12.4 CONTRACTOR will be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at Project Site in accordance with Legal Requirements.

6.12.5 CONTRACTOR will comply with the following requirements in emergencies:

6.12.5.1 In emergencies affecting the safety or protection of persons or the Work at Project Site or adjacent thereto, CONTRACTOR, without special instruction or authorization from the Owner or E/A, is obligated to act reasonably to prevent threatened damage, injury or loss and to mitigate damage or loss to the Work. CONTRACTOR will give the Owner telephone notification as soon as reasonably practical and a prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the express provisions of this Contract Documents have been caused thereby. If the Owner determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Change Order will be issued; otherwise the Owner will not be responsible for CONTRACTOR's emergency action.

6.12.5.2 Authorized agents of CONTRACTOR will respond immediately to call-out at any time of any Day or night when circumstances warrant the presence on Project Site of CONTRACTOR or his agent to protect the Work or adjacent property from damage, restriction or limitation or to take such action or measures pertaining to the Work as may be necessary to provide for the safety of the public. Should CONTRACTOR or CONTRACTOR's agent fail to respond and take action to alleviate such an emergency situation, the Owner may direct other forces to take action as necessary to remedy the emergency condition, and the Owner will deduct any cost of such remedial action from the funds due CONTRACTOR under this Contract.

6.12.5.3 If there is an accident involving injury to any individual or damage to any property on or near the Work, CONTRACTOR will provide to the Contract Administrator verbal notification within one hour and written notification within 24 hours of the event and will be responsible for recording the location of the event and the circumstances surrounding the event through photographs, interviewing witnesses, obtaining medical reports, police accident reports and other documentation that describes the event. CONTRACTOR will provide the Owner copies of such documentation within 48 hours of the event.

6.12.5.4 CONTRACTOR will cooperate with the Owner in any investigation of any such incident. CONTRACTOR will immediately report such incidents to any other governmental or quasi-governmental authorities having jurisdiction over safety-related matters as may be required by law.

6.13 Indemnification.

6.13.1 Any obligation of CONTRACTOR to indemnify or hold harmless under this Contract will not be limited in any way by any limitation on the amount or type of damages, or compensation or benefits payable by or

for CONTRACTOR or any such Subcontractor, Supplier, or other person or organization for whom CONTRACTOR may be responsible under workers' compensation acts, disability benefit acts, or other employee benefit acts.

6.13.2 Any obligation of CONTRACTOR to indemnify and hold harmless under this Contract, will not extend to the liability of the Owner, E/A, E/A's consultants, and their officers, directors, partners, employees or agents, when caused primarily by negligent preparation of maps, drawings, surveys, designs or Specifications upon which is placed the applicable state-authorized design professional seal of the Owner, E/A, or Owner's or E/A's consultant's, officers, directors, partners, employees or agents.

6.13.3 If CONTRACTOR fails to follow the Owner's directives concerning use of Project Site, scheduling or course of construction, or engages in other conduct which proximately causes damage to property based on inverse condemnation or otherwise, then and in that event, CONTRACTOR will indemnify the Owner against all costs resulting from such claims.

6.13.4 If CONTRACTOR unreasonably delays progress of the Work being done by others on Project Site so as to cause loss for which the Owner becomes liable, then CONTRACTOR will indemnify the Owner from and reimburse the Owner for such loss.

6.14 Survival of Obligations. All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with this Contract, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Contract.

6.15 Losses from Natural Causes. Unless otherwise specified, all loss or damage to CONTRACTOR arising out of the nature of the Work to be done or from action of the elements, floods or from unforeseeable circumstances in prosecution of the Work or from unusual obstructions or difficulties which may be encountered in prosecution of the Work, will be sustained and borne by CONTRACTOR at its own cost and expense.

6.16. Notice of Claim. Should CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of Owner or of any of Owner's employees or agents or others for whose acts Owner is liable, CONTRACTOR must file a claim within 30 calendar Days of the event giving rise to such injury or damage. The provisions of this Section will not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.

6.17 Financial Records.

6.17.1 For purposes of this Section 6.17, "financial records" means all records generated by or on behalf of CONTRACTOR and each Subcontractor and Supplier of CONTRACTOR, whether paper, electronic, or other media, which are in any way related to performance of or compliance with this Contract, including, without limitation:

- .1 Accounting records;
- .2 Written policies and procedures;
- .3 Subcontract files (including proposals of successful and unsuccessful Bidders, Bid recaps, etc.);
- .4 Original estimates and estimating work sheets;
- .5 Correspondence;
- .6 Change Order files (including documentation covering negotiated settlements);
- .7 Back charge logs and supporting documentation;
- .8 General ledger entries detailing cash and trade discounts earned, insurance rebates and dividends;
- .9 Lump sum agreements between CONTRACTOR and any Subcontractor or Supplier;

- .10 Records necessary to evaluate: Contract compliance, Change Order pricing, and any Claim submitted by CONTRACTOR or any of its payees; and
- .11 Any other CONTRACTOR record that may substantiate any charge related to this Contract.

6.17.2 CONTRACTOR will allow the Owner, and the Owner's authorized representatives, to inspect, audit, and reproduce all Records generated by or on behalf of CONTRACTOR and each Subcontractor and Supplier, upon the Owner's written request. Further, CONTRACTOR will allow the Owner, and the Owner's authorized representatives, to interview any of CONTRACTOR's employees, all Subcontractors, all Suppliers, and all of their respective employees.

6.17.3 CONTRACTOR will retain all its Records, and require all its Subcontractors and Suppliers to retain their respective Records, during this Contract and for three years after final payment, until all audit and litigation matters that the Owner has brought to the attention of CONTRACTOR are resolved, or as otherwise required by law, whichever is longer. The Owner's right to inspect, audit, or reproduce Records, or interview employees of CONTRACTOR or its respective Subcontractors or Suppliers, exists during this Contract, and for three years after final payment, until all audit and litigation matters that the Owner has brought to CONTRACTOR's attention are resolved, or as otherwise required by law, whichever is longer, and at no cost to the Owner, either from CONTRACTOR or any of its Subcontractors or Suppliers that may furnish Records or make employees available for interviewing.

6.17.4 CONTRACTOR must provide sufficient and accessible facilities during its normal business hours for the Owner to inspect, audit, or reproduce Records, or all three, and to interview any person about the Records.

6.17.5 CONTRACTOR must insert these requirements in each written contract between CONTRACTOR and any Subcontractor or Supplier and require each Subcontractor and Supplier to comply with these provisions.

ARTICLE 7 - OTHER WORK

7.1 Coordinating Other Work. The Owner may perform other work related to the Project at Project Site by the Owner's own forces, or let other contracts for the Project or Project Site, or have other work performed by utility Owners. CONTRACTOR and the Owner agree to and will use best efforts to cooperate and coordinate the Work with others performing work and other work related to the Project in order to avoid conflicts and delays in the Work. If CONTRACTOR believes that delay or additional cost is involved because of such action by the Owner, CONTRACTOR may make a Claim as provided in Article 11.

7.2 Proper and Safe Access by Other Contractors. CONTRACTOR will afford other contractors and each utility Owner (and the Owner, if the Owner is performing the additional work with the Owner's employees) proper and safe access to the Project Site and a reasonable opportunity for the introduction and storage of Materials and Equipment and the execution of such other work and will properly connect and coordinate the Work with theirs. CONTRACTOR will do all cutting, fitting, patching, and finishing of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR will not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of the Owner and the other contractors whose work will be affected. CONTRACTOR will promptly remedy damage wrongfully caused by CONTRACTOR to completed or partially completed construction or to property of the Owner or separate contractors.

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

7.4 Progress Schedules. The Owner will provide for coordination of the activities of the Owner's own forces, of each separate CITY contractor, and of any other utility Owners performing work in relation to the Work of CONTRACTOR, who will cooperate with them. CONTRACTOR will participate with the Owner any other

contractors retained by the Owner, in reviewing their construction progress schedules when directed to do so. On the basis of such review, CONTRACTOR will make any revisions to the current approved Progress Schedule deemed necessary after a joint review and mutual agreement. The agreed-upon progress schedules will then constitute the progress schedules to be used by CONTRACTOR, the Owner, and any other contractor retained by the Owner until subsequently revised.

7.5 Improper Timing or Delays. Costs caused by delays or by improperly timed activities or defective construction will be borne by the party responsible therefore.

ARTICLE 8 – WARRANTIES

8.1 General Warranty.

CONTRACTOR warrants that the Work and all of its components will be free from defects and flaws in design, workmanship, and Materials for the duration of the General Warranty Period described below; will strictly conform to the requirements of the Contract; and will be fit, sufficient and suitable for the purposes expressed in, or reasonably inferred from, the Contract. This general warranty is in addition to any other warranties expressed or implied by law, which are hereby reserved unto the Owner.

8.1.1 General Warranty Period. The General Warranty Period will be one year from Substantial Completion, except for those items of Equipment or those aspects of work placed in service or approved by the Owner after Substantial Completion, in which instance the warranty for the particular Equipment or aspect of work will be one year from the date of Owner approval; provided, however, that the General Warranty Period for particular Equipment placed in continuous service before Substantial Completion may start to run from an earlier date, if expressly provided in this Contract.

8.1.2 Duty to Correct. CONTRACTOR will correct any and all defects that defects in material or workmanship which may appear during the General Warranty Period, even if discovered after the General Warranty Period, by repairing (or replacing with new items or new Materials, if necessary) any such defect at no cost to the Owner, within a reasonable period of time, and to the Owner's satisfaction.

8.1.3 General Warranty is Absolute. The only exceptions to the General Warranty will be defects or damage caused by abuse, modification or improper maintenance or operation by persons other than CONTRACTOR or CONTRACTOR's Subcontractors, sub-Subcontractors or Suppliers; or normal wear and tear under normal usage. In all other respects the General Warranty will be absolute.

8.2 Special Warranties. CONTRACTOR will furnish all additional special warranties required by this Contract no later than Substantial Completion. The Owner may require special warranties in connection with the approval of accepted equals and other substitute Materials, Equipment, methods, and procedures, and in connection with Work which is defective or nonconforming.

8.3 Limitation as to Certain Equipment. As to any Equipment which the Owner has reserved the sole right to have installed, the Warranties under this Article 8 will extend to ensure that the Equipment is installed according to the Plans and Technical Provisions, and that any manufacturer or product warranties are conveyed to the Owner; but in such instance CONTRACTOR will not be held liable for the operating performance of such Equipment.

8.4 Relation to Specific Correction Provisions and Other Remedies. CONTRACTOR's general warranty and any additional or special warranties are not limited by CONTRACTOR's obligations to specifically correct Defective/Nonconforming Work, nor are they limited by any other remedies provided in the Contract Documents. CONTRACTOR will also be liable for any damage to property or persons (including death), including consequential and direct damages, relating to any breach of the General Warranty or any additional or special warranties required.

8.5 Third Party Warranties. CONTRACTOR will obtain and assign or transfer to the Owner, all product warranties available from manufacturers or Suppliers of Materials to be used in the Project. CONTRACTOR will also obtain and assign or transfer to Owner, any additional third party warranties as to Materials or methods as specified in the Contract Documents. The Owner's acceptance of any assigned warranties or guaranties will be a

precondition to final payment and will not relieve CONTRACTOR of any of CONTRACTOR's guaranty or warranty obligations under this Contract.

ARTICLE 9 – E/A'S STATUS DURING CONSTRUCTION

9.1 Applicability. The provisions of this Article will apply only where the Contract Documents specifically authorize a consultant of the Owner to act as the E/A to review and modify Technical Provisions, Plans, and other technical Specifications associated with the Work. In all instances in which there is no such specific authorization, the provisions of this Article will have no effect, and any authorization or delegation within the Contract Documents to the E/A, will be deemed to be to the Contract Administrator. In addition, where the Contract Documents contain language specifically authorizing a consultant of the Owner to act as E/A, the Owner retains the right to assign or assume such authority upon written notice to CONTRACTOR.

9.2 The Owner's Sole Benefit. The assignment, if any, of any authority, duties or responsibilities to the E/A under this Contract, or under any agreement between the Owner and the E/A, or any undertaking, exercise or performance thereof by the E/A, is intended to be for the sole and exclusive benefit of the Owner and not for the benefit of CONTRACTOR, Subcontractor, Supplier, or any other person or organization, or for any surety or employee or agent of any of them.

9.3 CONTRACTOR Remains Responsible. The E/A will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto. The E/A is not responsible for any failure of CONTRACTOR to comply with laws and regulations applicable to the furnishing or performing the Work. The E/A is not responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with this Contract. Failure or omission of the E/A to discover, or object to or condemn any Defective Work or material will not release CONTRACTOR from the obligation to properly and fully perform the Contract.

9.3.1 The E/A is not responsible for the acts or omissions of CONTRACTOR, or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.3.2 If the Owner and E/A agree, the E/A will review each Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and other documentation required to be delivered, but only to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests and approvals that the results certified indicate compliance with, this Contract.

9.4 Applicability to E/A's Agents. The limitations upon authority and responsibility set forth in this Article 9 will also apply to the E/A's consultants, Resident Project Representative and assistants.

9.5 Visits to Project Site. If the Owner and E/A agree, the E/A will make visits to the Project Site at intervals appropriate to the various stages of construction as E/A deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, the E/A will endeavor for the benefit of the Owner to determine, in general, if the Work is proceeding in accordance with this Contract. The E/A will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The E/A's efforts will be directed toward providing for the Owner a greater degree of confidence that the completed Work will conform generally to this Contract. On the basis of such visits and on-site observations, E/A will keep the Owner informed of the progress of the Work and will endeavor to guard the Owner against Defective Work. The E/A's visits and on-site observations are subject to all the limitations on the E/A's authority and responsibility set forth in this Article 9.

9.6 Resident Project Representative. If the Owner and E/A agree, E/A will furnish a Resident Project Representative to assist the E/A in providing more continuous observation of the Work. The responsibilities and authority and limitations of any such Resident Project Representative and assistants will be as provided in this Article 9 and in the Supplemental General Conditions. The Owner may designate another representative or agent to represent the Owner at Project Site who is not the E/A, E/A's consultant, agent or employee.

9.7 Clarifications and Interpretations. The E/A may determine that written clarifications or interpretations of the requirements of the Technical Provisions (in the form of drawings or otherwise) are necessary. Such written clarifications or interpretations will be consistent with the intent of and reasonably inferable from the Contract Documents, will be issued with reasonable promptness by the Owner and will be binding on the Owner and CONTRACTOR. If the Owner or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times, the Owner or CONTRACTOR may make a Claim therefore as provided in these General Conditions.

9.8 Recommendations as to Defective Work. The E/A will recommend that the Owner disapprove or reject Work which the E/A believes to be defective, or believes will not produce a completed Project that conforms to this Contract or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by this Contract.

ARTICLE 10 – ACCEPTED EQUALS AND SUBSTITUTIONS

10.1 Accepted Equals. Whenever an item of material or Equipment is specified or described in the Contract Documents by using the name of a proprietary item, the specification or description is intended to require the item named, unless the Contract Documents, in specifying the name, specifically authorize the use of functionally equivalent item through the use of terms such as “as equal,” “or equal,” or “equivalent.” For purposes herein, an item is only “functionally equivalent” if it is available at the same or lower cost, and if it is sufficiently similar to the item specified, including as to durability, warranty, acquisition time, and availability, so that no change in related Work will be required, and no change in the useful life, maintenance, repair cost, or quality of the completed work is anticipated.

10.2 CONTRACTOR May Propose Substitutions. CONTRACTOR may propose a substitution for any item of material or Equipment, and for any means, method, technique, sequence, or procedure of construction, specified in the Contract Documents. CONTRACTOR’s will propose such substitutes at CONTRACTOR’s sole cost and expense, and at CONTRACTOR’s sole risk as to disruptions to the Critical Path of the current approved Progress Schedule. CONTRACTOR will provide Owner sufficient data and documentation to allow the Owner to review the proposal.

10.3 Owner’s Evaluation. The Owner will be allowed a reasonable time within which to evaluate each proposal made by CONTRACTOR pursuant to this Section. The Owner will be the sole judge of acceptability. No accepted equal or substitute will be ordered, installed, or utilized until the Owner’s review is complete, which will be evidenced by a Change Instrument. The Owner may require CONTRACTOR to furnish at CONTRACTOR’s expense a special performance guarantee or other surety bond with respect to any accepted equal or substitution or for any other delay or disruption to the Critical Path of the Project Schedule attributable to any such substitution. The Owner will not be responsible for any delay due to review time for any proposed substitution, unless such an extension is due to CONTRACTOR, consistent with the requirements of this Contract for changes and delays. The Owner will not be responsible for increased costs associated with the review or approval of a proposed substitution, unless the increase is required as provided in association with changes and delays. In any event, no such extension or increase will be deemed provided unless specified in the Change Instrument approving the substitution.

10.4 CONTRACTOR to Remain Responsible. The Owner’s acceptance of a substitution will not relieve CONTRACTOR from primary responsibility and liability for the suitability and performance of any proposed substitute item or substituted method or procedure, and will not relieve CONTRACTOR from its primary responsibility and liability for curing Defective Work and performing warranty work, which CONTRACTOR will cure and perform, regardless of any claim CONTRACTOR may choose to advance against the Owner or manufacturer.

ARTICLE 11 – DELAYS AND ADJUSTMENTS TO CONTRACT TIME AND CONTRACT PRICE

11.1 Delay. Delays are classified in one of the following categories:

11.1.1 An excusable delay is a delay caused by a Force Majeure event. An excusable delay may entitle CONTRACTOR to an extension of Contract Time but not an increase in Contract Price.

11.1.2 A compensable delay is a delay which is caused solely and exclusively by acts or omissions of the Owner, excepting actions taken by the Owner to protect the public health or safety or to conform to law. A compensable delay may entitle CONTRACTOR to both an extension of Contract Time and an increase in Contract Price.

11.1.3 An unexcused delay is any delay other than an excusable or compensable delay. An unexcused delay entitles CONTRACTOR to no adjustment to Contract Time or Contract Price.

11.2 Events Not Constituting a Delay. The following events will not be considered an excusable delay of any kind even though they are not anticipated by CONTRACTOR, not within CONTRACTOR's control, and are not reasonably foreseeable:

11.2.1 Events that pose no delay to items of Work on the Critical Path of the current approved Progress Schedule.

11.2.2 Events that would not prevent CONTRACTOR from achieving Final Completion before the expiration of the Contract Time, where CONTRACTOR may otherwise accelerate other items of Work without undue expense.

11.2.3 Weather, unless the weather is more severe than the adverse weather normally anticipated for the Project Site for the month in question, based on a generally accepted source of data such as the National Weather Service.

11.2.4 Events, including actions of the Owner, that impact Critical Path activity, because the activity was previously delayed due to unexcused delays.

11.3 Notice of Delay Required. CONTRACTOR will provide written notice of any actual or prospective delay promptly, and in no event later than ten Days after the occurrence of the event giving rise to such delay. CONTRACTOR will give the notice to both the E/A and the Contract Administrator within the specified time. In the case of a continuing delay, CONTRACTOR will provide an initial notice and a further notice at each progress meeting throughout the duration of the delay. The notice will contain all of the specific information required in the following Subsection.

11.4 Contents/Supporting Documents. CONTRACTOR's notice of delay will identify those portions of the current approved Progress Schedule affected by the delay and will include an estimate of the cost and probable effect of the delay, if any, on the progress of the Work. Supporting documentation will include, but is not limited to:

11.4.1 A written detailed statement of the reasons and causes for the delay;

11.4.2 Inclusive dates of the delay;

11.4.3 Specific trades and portions of the Work affected by the delay;

11.4.4 Status of Work affected before commencement of the delay;

11.4.5 Effect of the delay on available "float" time;

11.4.6 A Critical Path Method (CPM) analysis demonstrating that the delay has affected an activity then on the Critical Path at the time of the occurrence of the delay as shown on the most current approved Progress Schedule; and

11.4.7 If CONTRACTOR claims that the delay is an excusable delay or compensable delay, evidence that the delay was unforeseeable, beyond CONTRACTOR's control, and without the fault or negligence of CONTRACTOR or the negligence of anyone for whose acts CONTRACTOR is responsible including any Subcontractor, sub-Subcontractor or Supplier; and in the case of a compensable delay, was caused solely and

exclusively by the acts or omissions of the Owner (excepting actions taken by the Owner to protect the public health or safety or to conform to law) or anyone for whose acts the Owner is responsible, and which are unreasonable under the circumstances involved and not reasonably within the contemplation of the parties.

11.5 Failure to Comply with Notice Requirements. The notice required by this Article 11 operates as a condition precedent to the assertion of any claim for extension of Contract Time, increase in Contract Price, or damages by CONTRACTOR. If CONTRACTOR fails to give the Owner timely written notice of a claim as required by this Article 11, CONTRACTOR will be deemed to have waived the claim, and the Owner will have no further liability respecting the claim.

11.6 Review and Adjustment of Schedules. Upon receipt of a notice from CONTRACTOR of the occurrence of a delay complying with the requirements of this Article, the Owner will review the current approved Progress Schedule to determine (i) whether the delay is in fact an excusable or compensable delay, and (ii) whether any adverse effects of the delay can be overcome by an adjustment in the Progress Schedule, including the application of any unused "float" time available in the Schedule. The Owner may require CONTRACTOR to submit a more detailed Progress Schedule than previously required in order to permit the Owner to evaluate the delay. Based on such review, CONTRACTOR will, if required by the Owner, submit for the Owner's approval a revised Progress Schedule, which minimizes the adverse effects of the delay.

11.7 Limitation on Adjustments Due to Delays Generally. No extension of the Contract Time or increase in the Contract Price will be allowed for an unexcused delay. No extension of the Contract Time or increase in the Contract Price will be made to the extent that performance is, was or would have been suspended, delayed or interrupted by another cause for which CONTRACTOR is responsible. No increase in the Contract Price will be made to the extent performance was or would have been suspended, delayed or interrupted by another cause for which the Owner is not solely and exclusively responsible.

11.8 Additional Limitations on Adjustments to Contract Time Due to Delays. No extension of Contract Time will be provided where, notwithstanding a Force Majeure event or other claimed delay, CONTRACTOR may achieve Final Completion within the Contract Time through adjustments to the current approved Progress Schedule.

11.9 Additional Limitations on Adjustments to Contract Price Due to Delays. Any obligation on the part of the Owner to pay CONTRACTOR for compensable delay is solely intended to reimburse CONTRACTOR for actual expense arising out of the compensable delay. No consequential damages will be allowed to CONTRACTOR in connection with any claimed delays. Damages for compensable delay will be determined by the Force Account method set forth in Subsection 13.3.2.

11.9.1 Standby Equipment costs will not be allowed during periods when the Equipment would have otherwise been idle. Standby Equipment time will not exceed more than eight hours per Day, 40 hours per week, and 176 hours per month. Standby Equipment costs will be paid at 50 percent of the applicable Rental Rate Blue Book rates and calculated by dividing the monthly rate by 176, multiplying the result by the number of standby hours and multiplying that number by the regional adjustment factor and the rate adjustment factor contained in the Blue Book. Operating costs will not be allowed.

11.10 Liquidated Damages Due to CONTRACTOR's Delays. Liquidated Damages, if any, are set forth in the Contract form.

11.11 No Damages are Due to CONTRACTOR for Prevention of Early Completion. CONTRACTOR represents that its Bid includes all costs, overhead and profit which may be incurred throughout the Contract Time, including the period between Substantial and Final Completion. Accordingly, CONTRACTOR may not make any claim for delay damages based in whole or in part on the premise that CONTRACTOR would have completed the Work prior to the expiration of the Contract Time but for any claimed delay.

11.12 Acceleration to Avoid Delays. If CONTRACTOR's progress is not maintained in accordance with the current approved Progress Schedule, or the Owner determines that CONTRACTOR is not diligently proceeding with the Work or has evidence reasonably indicating that CONTRACTOR will not be able to conform to the current approved Progress Schedule, CONTRACTOR will, promptly and at no additional cost to the Owner, take all

measures necessary to accelerate its progress to overcome the delay and ensure that there will be no further delay in the progress of the Work and notify the Owner thereof. Any extension of Working Hours requires approval of the Owner, which will not be unreasonably withheld but may be subject to reasonable conditions including payment for additional or overtime services of the Owner the Architect/Engineer and any other applicable consultants, testing or regulatory agency costs.

ARTICLE 12 – CHANGES

12.1 Materially Different Site Conditions. For purposes herein, “materially different site conditions” means conditions that are different from those indicated in the Contract Documents, that are unknown to CONTRACTOR, and that could not be reasonably anticipated based upon on the following: (i) typical soil or subsurface conditions for the area in which the Project Site is located; (ii) site visits CONTRACTOR made, or was encouraged or permitted to make by the Bid Documents, prior to Bid submission; or (iii) a careful review of any Site-Related Reports.

12.1.1 CONTRACTOR may be entitled to an increase in Contract Time for materially differing site conditions as an excusable delay as provided in Article 11, subject to the exclusions and conditions of that article including notice requirements.

12.1.2 CONTRACTOR may also be entitled to an increase in Contract Price for materially different site conditions, where these conditions will require additional labor or Materials, or both, exceeding the amount estimated in the Schedule of Values or Bid Schedule, as applicable, by 5% or more, provided, that CONTRACTOR complies with the notice requirements in Section 12.3. In such instance, the basis for adjusting Contract Price is set forth in Section 13.3.

12.2 Materially Different Structural Conditions (Remodeling or Renovation Contracts). If this is a Contract for a remodeling or renovation of an existing structure and CONTRACTOR encounters materially different conditions in the structure (not as to the Site or subsurface conditions) from those indicated in the Contract Documents provided by the Owner as part of the Bid or Proposal Documents, CONTRACTOR will give written notice thereof to the Owner and the E/A promptly before conditions are disturbed and in no event later than ten Days after first observing such conditions. Failure of CONTRACTOR either (i) to provide notice before disturbing the existing conditions or (ii) failure to give notice within ten Days of first observing such conditions is conclusively deemed a waiver of any claim relating to such conditions.

12.2.1 Investigation and Determination. The E/A will promptly investigate any alleged differing conditions as to the structure (but not as to the Site or subsurface conditions) and provide a written report of its findings to the Owner. If the Owner finds that the conditions of the structure differ materially and require a change in the Work and cause an increase or decrease in CONTRACTOR’s cost of, or time required for, performance of any part of the Work, the Owner may make an adjustment in the amount payable to CONTRACTOR or the Contract Time, as applicable. If the Owner determines that the conditions of the structure are not materially different or that no change in the terms of the Contract is justified, the Owner will so notify CONTRACTOR in writing.

12.3 Constructive Changes and Disputed Adjustments.

12.3.1 Notice to the Owner and E/A. CONTRACTOR will advise the Owner and the E/A in writing promptly and in no event later than ten Days after (i) issuance of any interpretation, clarification, instruction, direction or order whether orally or in writing from either the Owner or the E/A, or (ii) the occurrence of any event or discovery of any condition (including any condition as provided in Section 12.1 and if applicable, 12.2), which CONTRACTOR believes or has reason to believe entitles CONTRACTOR to an increase in the amount payable to CONTRACTOR or an extension of the Contract Time; and except in the case of an emergency involving possible loss of life or bodily injury or significant property damage, the required written notice will be provided prior to proceeding with the Work. Failure of CONTRACTOR to provide such notice constitutes an acceptance of the interpretation, clarification, instruction, direction, order, event, or condition without adjustment to the Contract Price or the Contract Time and a conclusive waiver of any claim relating to the same. In order to be valid, a claim for an adjustment of Contract Price or Contract Time must contain the specific adjustment requested and must be supported by a detailed explanation of the basis for the claim. In addition to be valid, a claim for increase in Contract Time must be supported by the documentation specified in Subsection 11.4, and a claim for an increase in the Contract Price

must be documented and calculated as specified in Subsection 13.3.2. Failure of CONTRACTOR to object as and when specified in this Subsection is deemed an acceptance of interpretation, clarification, instruction, direction or order as issued and a waiver of any claim by CONTRACTOR to any adjustment to the Contract Price or the Contract Time.

12.3.2 Disputed Adjustments. All disputed adjustments under this Contract will be determined in accordance with the Contract, Article IX if, as conditions precedent thereto, CONTRACTOR has timely provided all notices and objections required under the terms of the Contract.

ARTICLE 13 - CHANGE INSTRUMENTS

13.1 Introduction.

13.1.1 The Owner may issue a Change Instrument to require changes in the Work without invalidating the Contract.

13.1.1.1 A Field Directive may be issued to require minor changes in the Work that, in the Owner's view, do not change the Scope of Work, present a delay, or require an adjustment to Contract Time or Contract Price. Examples of such situations where Field Directives may be appropriate are unanticipated field conditions or unavailability of specified Materials and Equipment.

13.1.1.2 All other changes to the Work will require the issuance of a Change Order issued in conformance with these General Conditions.

13.2 Change Order Required for Contract Time and Contract Price Adjustments. Adjustments to Contract Time or Contract Price will be granted only through a properly-issued Change Order.

13.3 Change Orders Adjusting Contract Price. All Change Orders adjusting Contract Price will be invalid unless approved in accordance with the authority provided by the Purchasing Code.

13.3.1 Basis for Contract Price Adjustment. Subject to any federal procurement standards that may apply if the Project is a federally funded Project, in which case the standards will govern to the extent of conflict, a Change Order may provide for an adjustment in the Contract Price based only on one of the following methods:

.1 Unit Prices as stated in the Bid Schedule.

.2 A fixed not-to-exceed or lump sum agreed to by the Owner and CONTRACTOR and stated in the Change Order, properly itemized and supported by sufficient substantiating data to permit evaluation which will be limited to estimated costs of labor, Materials, supplies and Equipment, rental cost of machinery and Equipment, additional bond cost, plus a fixed fee for profit and overhead (which includes office overhead and site-specific overhead and general conditions) of 10% if the Work is performed by CONTRACTOR, or 5% if the Work is performed by a Subcontractor or sub-Subcontractor. The Subcontractors' or sub-Subcontractors' overhead and profit in turn will not exceed 10%. The total percentage of overhead and profit payable by the Owner (to both CONTRACTOR and all sub tier Subcontractors), regardless of the sub-tier which performs the work, will not exceed 15%.

.3 Actual costs, properly itemized, plus a profit factor, using the Force Account method set forth in Section 13.3.2.

.4 In the absence of an agreement between the Owner and CONTRACTOR, the Owner will determine the amount of the Contract Price Adjustment using any of the methods outlined in Subsections 13.3.1.1 – 13.3.1.3, above, whichever will result in the lowest cost to the Owner.

.5 No cost will be included in a Change Order for time spent preparing the Change Order, nor will costs be included for an estimate of time to negotiate the Change Order costs for machinery, tools, or Equipment.

13.3.2 Force Account Method for Contract Price Increases. Before using the Force Account method provided for herein, the Owner and CONTRACTOR agree to negotiate a Change Order using the other methods identified in Subsection 13.3.1, above, as appropriate, to determine the adjustment in the Contract Price. If neither of these methods can be agreed upon before a change in the Work is commenced which will result in an adjustment in the Contract Price, then the change in the Work will be performed by a Change Order using the Force Account method, and payment will be made as follows:

13.3.2.1 For all personnel, CONTRACTOR will receive actual field cost wage rates for each hour that said personnel are actually engaged in such Work, as substantiated by its certified payroll, to which will be added an amount equal to 15% of the sum thereof as compensation for CONTRACTOR's and any effected Subcontractor's total overhead and profit. No separate charge will be made by CONTRACTOR or its Subcontractor(s) for organization or overhead expenses. CONTRACTOR will also receive an amount equal to 55% of the wages paid personnel, excluding the 15% compensation provided above, for CONTRACTOR's and any effected Subcontractor's cost of premiums on liability insurance, workers' compensation insurance, social security and unemployment insurance. The actual cost of CONTRACTOR's bond(s) on the extra Work will be paid based on invoices from surety. No charge for superintendence will be made unless considered necessary and ordered by the Owner.

13.3.2.2 CONTRACTOR will receive the actual cost, including freight charges, of the Materials used and installed on such Work, to which costs will be added a sum equal to 20% thereof as compensation for CONTRACTOR's and any effected Subcontractor's total overhead and profit. In case material invoices indicate a discount may be taken, the actual cost will be the invoice price minus the discount.

13.3.2.3 For machinery, trucks, power tools, or other similar Equipment (the "Equipment") agreed to be necessary by the Owner and CONTRACTOR, the Owner will allow CONTRACTOR the applicable daily, weekly or monthly rate as given in the latest edition of the "Rental Rate Blue Book" as published by Equipment Watch (1-800-669-3282) for each hour that said Equipment is in use on such work, which rate includes the cost of fuel, lubricants and repairs. The established Equipment rates will be paid for each hour that the Equipment is utilized in the Work. If the Equipment is used intermittently during the Work, full payment for an eight-hour Day will be made if the Equipment is not idle more than four hours of the Day. If the Equipment is idle more than four hours in a Day, then payment will be made only for the actual hours worked. No additional compensation will be allowed on the Equipment for CONTRACTOR's or any affected Subcontractor's overhead and profit. The Owner may accept an actual rental invoice in lieu of the method of calculation set forth in this Paragraph for Equipment rented exclusively for Force Account Work or for Equipment not included in the Rental Rate Blue Book.

13.3.2.4 The compensation provided for herein, will be received by as payment in full for work done pursuant to the Change Order and will include use of small tools, and total overhead expense and profit. CONTRACTOR and the Owner will compare records of work done by Change Order at the end of each Day. Copies of these records will be made upon forms provided for this purpose by the Owner and signed by both the Owner and CONTRACTOR, with one copy being retained by the Owner and one by CONTRACTOR. Refusal by CONTRACTOR to sign these records within two working Days of presentation does not invalidate the accuracy of the record.

13.3.3 Additional Performance Security in Conjunction with Change Order. The CITY may require CONTRACTOR to increase or supplement previously-provided Performance Security to cover any additional costs of performing services required under a Change Order that increases Contract Price, commensurate with such additional cost. In such instance, any compensation due CONTRACTOR for CONTRACTOR's cost of providing such increase or supplement will be reflected in the Change Order or otherwise borne by CONTRACTOR.

13.4 Payment for Work Covered by Change Order. Additional monies due CONTRACTOR pursuant to a valid Change Order providing for an adjustment to the Contract Price, will be paid for in accordance with the

Progress Payment schedule established by the Contract, in which case payment will be subject to retainage requirements set forth in the Contract; or at the time of Final Payment.

13.5 Absence of Proposed Adjustments. If a Change Instrument is silent as to any adjustment to the Contract Price or the Contract Time, it will be conclusively presumed that none is intended and none will be allowed unless CONTRACTOR files an objection as and when specified in the following Subsection.

13.6 Action upon Receipt of Change Instrument. Upon receipt of a Change Instrument, CONTRACTOR will promptly proceed with the change in the Work involved.

13.6.1 CONTRACTOR will advise the Owner in writing, promptly and in any event no later than ten Days after issuance of the Unilateral Change Instrument, of CONTRACTOR's objection (i) to the amount or method, if any, provided for in the Change Instrument for adjustment to Contract Price or Contract Time, or (ii) to the absence of any adjustment to the Contract Price or Contract Time. In order to be valid, a claim for an adjustment of Contract Price or Contract Time, must contain the specific adjustment requested, must be supported by a detailed explanation of the basis for the claim. In addition, to be valid a claim for increase in Contract Time must be supported by the documentation specified in Subsection 11.4, and a claim for an increase in the Contract Price must be documented and calculated as specified in Subsection 13.3.1. Failure of CONTRACTOR to object as and when specified in this Subsection is deemed an acceptance of the Unilateral Change Order as issued and a waiver of any claim by CONTRACTOR to any adjustment to the Contract Price or the Contract Time.

13.7 Waiver of Claim. Except for emergencies involving possible loss of life or bodily injury or significant property damage, CONTRACTOR's commencement of the Work that is subject to a Change Instrument will constitute a complete waiver by CONTRACTOR as to such claim regardless of whether CONTRACTOR has within the ten-day period notified the Owner of a claim consistent with the requirements of Subsection 13.6.1.

13.8 Owner's Right to Use Third Parties for Additional Work. If the Owner and CONTRACTOR are unable to negotiate the terms of a Change Order for the performance of additional Work, the Owner may, at its election, perform such additional Work with its own forces or with another CONTRACTOR and such work will be considered "Other Work."

13.9 Owner's Right to Accelerate Schedule. The Owner reserves the right to issue a Change Instrument to accelerate the Work which may be subject to an appropriate adjustment, if any, in the Contract Price. If the Owner requires an acceleration of the Project Schedule and no adjustment is made in the Contract Price, or if CONTRACTOR disagrees with any adjustment made, any claim an adjustment must comply with the requirements of Subsection 13.6.1 or be deemed to be conclusively waived.

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

14.1 Access to Work. The Owner, including the Contract Administrator and other employees and agents, including E/A and E/A's consultants, independent testing laboratories, and governmental agencies having jurisdiction, will each have access to the Work at reasonable times for observing, inspecting and testing. CONTRACTOR will provide them proper and safe conditions for such access, and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

14.2 Tests and Inspections.

14.2.1 CONTRACTOR will give timely notice of readiness of the Work for all required inspections, tests or approvals, and will cooperate with inspection and testing personnel to facilitate required inspections or tests. All testing will be performed by the CONTRACTOR. Only verification testing will be performed by the CITY. CONTRACTOR is not required to enter test results into MAC.

14.2.2 The Owner will employ and pay for services of an independent testing laboratory to perform all inspections, tests or approvals required by the Contract Documents except:

- .1 For inspections, tests or approvals covered by Paragraph 14.2.3 below;
- .2 That costs incurred with tests or inspections conducted pursuant to Paragraph 14.3.3 below will be paid as provided in Paragraph 14.3.3;
- .3 For re-inspecting or re-testing Defective Work; and
- .4 As otherwise specifically provided in the Contract Documents. All testing laboratories will meet the requirements of ASTM E-329.

14.2.3 If Legal Requirements specifically require any Work (or part thereof) to be inspected, tested, or approved by an employee or other representative of a governmental or related authority, CONTRACTOR will assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith and furnish the Owner the required certificates of inspection or approval.

14.2.4 CONTRACTOR will also be responsible for arranging and obtaining and will pay all costs in connection with any inspections, tests or approvals required for the Owner's and E/A's review of Materials or Equipment to be incorporated in the Work, or of Materials, mix designs or Equipment submitted for review prior to CONTRACTOR's purchase thereof for incorporation in the Work.

14.3 Uncovering Work.

14.3.1 If any Work (or the work of others) that is to be inspected, tested or approved is covered by CONTRACTOR without written concurrence of the Contract Administrator, or if any Work is covered contrary to the written request of the Contract Administrator, it will, if requested by the Contract Administrator, be uncovered and recovered at CONTRACTOR's expense.

14.3.2 Uncovering Work as provided in Paragraph 14.3.1 above, will be at CONTRACTOR's expense unless CONTRACTOR has given the Owner timely notice of CONTRACTOR's intention to cover the same and the Owner has not acted within five working Days to such notice.

14.3.3 If the Owner considers it necessary or advisable that covered Work be observed, inspected or tested, CONTRACTOR will uncover, expose or otherwise make available for observation, inspection or testing that portion of the Work in question, furnishing all necessary labor, material and Equipment. If the Owner determines that such Work is defective, CONTRACTOR will pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and the Owner will be entitled to an appropriate decrease in the Contract Price, and may make a Claim therefore as provided in these General Conditions. However, if such Work is not found to be defective, CONTRACTOR will be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and CONTRACTOR may make a Claim therefore as provided in these General Conditions.

14.4 The Owner May Stop the Work.

14.4.1 If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable Materials or Equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to this Contract, the Owner may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work will not give rise to any duty on the part of the Owner to exercise this right for the benefit of CONTRACTOR or any surety or other party.

14.4.2 If CONTRACTOR fails to correct Defective Work or submit a satisfactory plan to take corrective action, with procedure and time schedule, the Owner may order CONTRACTOR to stop the Work, or any portion thereof, until cause for such order has been eliminated, or take any other action permitted by this Contract. A notice to stop the Work, based on defects, will not stop calendar or Working Days charged to the Project.

14.5 Correction or Removal of Defective Work. If required by the Owner, CONTRACTOR will promptly, as directed, either correct all Defective Work, whether or not fabricated, installed or completed, or, if the Work has

been rejected by the Owner, remove it from Project Site and replace it with Work that is not defective. CONTRACTOR will correct or remove and replace Defective Work, or submit a plan of action detailing how the deficiency will be corrected, within the time frame identified in the notice of Defective Work. CONTRACTOR will pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

14.6 Correction Required. If within the Warranty Period, or such longer period of time as may be prescribed by Legal Requirements or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work, including Work performed after the Substantial Completion date, is found to be defective, CONTRACTOR will promptly, without cost to the Owner and in accordance with the Owner's written instructions:

14.6.1 Correct such Defective Work, or, if it has been rejected by the Owner, remove it from Project Site and replace it with Work that is not defective, and

14.6.2 Satisfactorily correct or remove and replace any damage to other Work or the work of others resulting from the Defective Work.

If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the Defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR. The warranty period will be deemed to be renewed and recommenced in connection with the completed items of Work requiring correction.

14.7 Coordination with Owner. If correction of Defective Work will affect the function or use of the facility, CONTRACTOR will not proceed with correction of Defective Work without prior coordination and approval of the Owner.

14.8 Acceptance of Defective Work. If, instead of requiring correction or removal and replacement of Defective Work, the Owner decides to accept it, the Owner may do so. CONTRACTOR will pay all claims, costs, losses and damages attributable to the Owner's evaluation of and determination to accept such Defective Work. For purposes of this Section, the Owner's acceptance of sample Materials or Equipment will not be deemed to be acceptance of Defective Work. If any such acceptance occurs prior to recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents and compensating the Owner for the diminished value of the Defective Work. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to the Owner after a calculation by the Owner of the diminution in value of the Defective Work.

14.9 The Owner May Correct Defective Work. If CONTRACTOR fails within a reasonable time after written notice of the Owner to correct Defective Work, or to remove and replace rejected Work, or if CONTRACTOR fails to perform the Work in accordance with this Contract, or if CONTRACTOR fails to comply with any other provision of this Contract, the Owner may, after seven Days' written notice to CONTRACTOR, correct and remedy any such deficiency. If, in the opinion of the Contract Administrator, significant progress has not been made during this seven-day period to correct the deficiency, the Owner may exercise any actions necessary to remedy the deficiency. In exercising the rights and remedies under this paragraph, the Owner will proceed expeditiously. In connection with such corrective and remedial action, the Owner may exclude CONTRACTOR from all or part of Project Site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, and incorporate in the Work all Materials and Equipment stored at Project Site or for which the Owner has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR will allow the Owner, its agents and employees, the Owner's other contractors, E/A and E/A's consultants access to Project Site to enable the Owner to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by the Owner in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions to this Contract with respect to the Work. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's Defective Work. CONTRACTOR will not be allowed an

extension of the Contract Times (or Milestones), or claims of damage because of any delay in the performance of the Work attributable to the exercise by the Owner of the Owner's rights and remedies hereunder.

14.10 Testing and Inspections Outside of Working Hours. This Contract contemplates that all testing and inspections will be done during Working Hours as defined herein. Whenever the Owner is required to test or inspect outside of Working Hours, on weekends, or during Holidays observed by the Owner, the Owner will be entitled to a reduction in the Contract Price to the extent of any overtime costs incurred by the Owner, unless such testing or inspection is required to be performed at that time due to:

14.10.1 Emergency conditions that are not the fault of CONTRACTOR, and Subcontractors, sub-Subcontractors, Suppliers, or other persons for whom CONTRACTOR is responsible;

14.10.2 A Force Majeure event, the Owner's disruption, or other events which, pursuant to this Contract, would otherwise require an extension of the Contract Time.

14.11 CONTRACTOR Remains Responsible for the Work. The following will not be deemed to be a release of CONTRACTOR's obligation to perform the Work in accordance with this Contract:

14.11.1 Observations by the E/A;

14.11.2 The issuance of a Certificate of Substantial Completion or any payment by the Owner to CONTRACTOR under this Contract;

14.11.3 Partial use or occupancy of the Work or any part thereof by the Owner;

14.11.4 Any acceptance by the Owner or any failure to do so;

14.11.5 Any review of a Shop Drawing or sample submittal;

14.11.6 Any inspection, test or approval by others; or

14.11.7 Any correction of Defective Work by the Owner.

ARTICLE 15 – PROGRESS PAYMENTS, PARTIAL UTILIZATION AND FINAL COMPLETION

15.1 General Method of Payment. Payment of the Contract Price will be made in a series of Progress Payments and after Final Completion, a Final Payment, in accordance with this Article.

15.1.1 If CONTRACTOR has provided Payment and Performance Bonds, no payment will be made unless and until CONTRACTOR records the bonds and provides the Owner certified copies of the recorded bonds in accordance with Florida Statutes Section 255.05(b).

15.2 Application for Payment. CONTRACTOR may submit to the Owner, no more than once a month and no sooner than 30 Days following commencement of the Work, an application for payment for those portions of the Work completed as of the date of the application. The Owner may, by notice, designate a specific Day of each month for submission of the application for payment. Each application for payment will be in a form acceptable to the Owner, and will include the following documentation and information:

15.2.1 The current approved Progress Schedule;

15.2.2 If applicable, the Schedule of Values;

15.2.3 Unless CONTRACTOR has provided payment and performance bonds and recorded them in the public records as provided in Florida Statutes Section 255.05, releases of liens from Subcontractors or Suppliers;

15.2.4 CONTRACTOR's written certification (i) as to the value of the Work completed, (ii) that partial or final waivers of lien have been received covering all such Work, (iii) and that all prior Progress Payments have been properly applied to the payment or reimbursement of the costs with respect to which they were paid;

15.2.5 If payment is requested on the basis of Materials or Equipment not incorporated in the Work but delivered and suitably stored at Project Site or at another location agreed to in writing, the application for payment by such bills of sale, data, and other procedures satisfactory to the Owner substantiating the Owner's title to such Materials or Equipment or otherwise protecting the Owner's interest;

15.2.6 A completed Minority and Women-Owned Business Enterprise (MBE/WBE) Usage Report, using forms provided by the Owner. CONTRACTOR will complete all blank spaces shown on these Report forms. If no amounts have been paid to MBE/WBE Subcontractors, the completed form will so indicate; and

15.2.7 The consent of the surety, if any, to the requested payment.

15.2.8 Documentation of payments made to MBE and WBE subcontractors and suppliers, on Attachment E, Minority and Women Owned Business Enterprise Usage Form.

Each application for payment will be deemed to be a warranty and guarantee by CONTRACTOR that title to all Work, Materials and Equipment covered by the application, whether incorporated in the Project or not, will pass to the Owner free and clear of all liens no later than the time of payment to CONTRACTOR.

15.3 Review of Application for Payment. As soon as practicable after receipt of an application for Payment, and within the 20-day period following receipt of the application as provided by the Prompt Payment Act, the Owner will approve, partially approve, or reject the application. The Owner will provide written notice if payment is rejected or partially rejected, specifying the deficiency in the application for payment and the action necessary to make the request proper. In addition to rejecting payment of all or a portion of the application for failure to comply with submittal requirements referenced above, the Owner will have the right to reject all or a portion of the application for any of the following reasons:

15.3.1 Defective Work not remedied;

15.3.2 Third party Claims filed or reasonable evidence indicating probable filing of such Claims;

15.3.3 Unless CONTRACTOR has provided payment and performance bonds and complied procedurally with Florida Statutes Section 255.05, failure of CONTRACTOR to make payments properly to Subcontractor or for labor, Materials or Equipment;

15.3.4 Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;

15.3.5 Damage to the Owner or another CONTRACTOR;

15.3.6 Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

15.3.7 Failure of CONTRACTOR to submit a Schedule of Values in accordance with the Contract Documents, if one is required;

15.3.8 Failure of CONTRACTOR to submit a submittal schedule in accordance with the Contract Documents;

15.3.9 Failure of CONTRACTOR to submit and update a Progress Schedule in accordance with the Contract Documents;

15.3.10 Failure of CONTRACTOR to maintain a record of changes on drawings and documents;

15.3.11 Failure of CONTRACTOR to maintain weekly payroll reports and, as applicable, provide copies of reports in a timely manner upon request of the Owner;

15.3.12 CONTRACTOR's neglect or unsatisfactory prosecution of the Work, including failure to clean up;
or

15.3.13 CONTRACTOR's failure to comply with the submittal requirements of Section 15.2, above, or with any other provision of this Contract.

If any portion of the application is rejected the Owner will provide CONTRACTOR a written notice as to the reasons for rejection, within the time frame provided in the Prompt Payment Act. CONTRACTOR will then make the necessary corrections and re-submit the application or portion of application rejected.

15.4 Progress Payments. The Owner will make payment on an approved or partially approved application, less amounts set aside for retainage within the deadlines provided by the Prompt Payment Act. If CONTRACTOR and the Owner disagree on the basis or amount of the payment, or if CONTRACTOR is unwilling to make the necessary corrections or modifications and re-submit the Request as to those items rejected by the Owner, then the Owner may approve and process the Request by making such adjustments thereto as the Owner deems appropriate so that CONTRACTOR receives without delay, payment of the amount determined by the Owner to have been earned and owing to CONTRACTOR. Each payment application will be accompanied by Attachment E, Minority and Women Owned Business Enterprise Usage Form

15.5 Amounts Withheld from Progress Payments. The Owner will withhold an amount from each such approved progress payment, as follows:

15.5.1 If the Contract Price is \$200,000 or more, the amount of retainage will be determined by the Prompt Payment Act, which as of the Effective Date provides for a 10% retainage until 50-Percent Completion, and a 5% retainage thereafter.

15.5.2 In all other instances, the amount of retainage will be ten percent for each progress payment.

Subject to any limitations that may be imposed by the Prompt Payment Act if applicable, the Owner will hold all retainage until Final Payment. However, if the Work is near Substantial or Final Completion and delay occurs due to no fault or neglect of CONTRACTOR, the Owner may pay a portion of the retained amount to CONTRACTOR. CONTRACTOR, at the Owner's option, may be relieved of the obligation to complete the Work and thereupon, CONTRACTOR will receive payment of the balance due for the work completed and accepted, subject to the conditions applicable to Owner's termination of work without cause.

15.6 Delayed Payments. Should the Owner fail to make payment to CONTRACTOR of the amount approved for any application for payment within the time frames provided in the Prompt Payment Act, the Owner will pay to CONTRACTOR, in addition to amount approved, interest thereon at the rate specified in the Act, from date due until fully paid, which will fully liquidate any injury to CONTRACTOR growing out of such delay in payment.

15.7 Substantial Completion.

15.7.1 When CONTRACTOR considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, CONTRACTOR will notify the Owner and request a determination as to whether the Work or designated portion thereof is substantially complete. If the Owner does not consider the Work substantially complete, the Owner will notify CONTRACTOR giving reasons therefore. After performing any required Work, CONTRACTOR will then submit another request for the Owner to determine Substantial Completion. If the Owner considers the Work substantially complete, the Owner will prepare and deliver a certificate of Substantial Completion which will establish the date of Substantial Completion, will include a punch list of items to be completed or corrected before Final Payment, will establish the time within which CONTRACTOR will finish the punch list, and will establish responsibilities of the Owner and CONTRACTOR for security, maintenance, heat, utilities, damage to the Work, warranty and insurance. Failure to include an item on the punch list does not alter the responsibility of CONTRACTOR to complete all Work in accordance with this Contract. The Work will not be deemed to be substantially or finally complete until any certificates of occupancy required to occupy the Project are

issued. The Owner and CONTRACTOR will both sign the certificate of Substantial Completion, to evince acceptance of the responsibilities assigned to them in such certificate.

15.8 Partial Utilization. The Owner will have the option to use any portion of the Work prior to Substantial Completion of the Project where:

15.8.1 The Contract Documents specifically provide for such portion to be partially utilized prior to Substantial Completion; or

15.8.2 Upon the Owner's request, if CONTRACTOR agrees and, upon joint inspection, the parties agree that the portion of the Work in question is Substantially Complete. In such instance, the Owner will issue a certificate of Substantial Completion, attaching thereto a punch list of items to be completed or corrected before Final Payment and fixing the responsibility between the Owner and CONTRACTOR for maintenance, heat and utilities as to that part of the Work.

The Owner will have the right to exclude CONTRACTOR from any part of the Work which is so certified to be Substantially Complete but the Owner will allow CONTRACTOR reasonable access to complete or correct items on the punch list.

15.9 Final Inspection and Final Completion. CONTRACTOR will provide the Owner the Notice of Completion sufficiently in advance of the Completion Date to allow for scheduling of the final inspection and for completion or correction of all Punch List Work before the Completion Date. Upon receipt of CONTRACTOR's Notice of Completion, the Owner will make a review of the Work and notify CONTRACTOR in writing of all Punch List Work, if any, to be completed or corrected. Following CONTRACTOR's completion or correction of all Punch List Work, the Owner again review the Work and prepare and deliver to CONTRACTOR either a written notice of additional Punch List Work to be completed or corrected or a written Certificate of Final Completion, signifying final acceptance of the Work.

15.9.1 If the sole remaining unfinished item to complete the Work is the reestablishment of vegetation, at the Owner's option the Owner may issue a Certificate of Final Completion on the condition that CONTRACTOR executes a re-vegetation letter, with letter of credit or other guarantee in form and amount satisfactory to the Owner, to ensure completion of this item. This Work will be accomplished within 120 Days of the date of Final Completion of the Work. When permanent erosion control has been established, the Owner will initiate an inspection for final acceptance of the erosion controls. If the re-vegetation is not completed within the 120 Days, the Owner, at its option, may complete the Work using the posted guarantee.

15.9.2 In all other instances, the Owner will only be obligated to issue a Certificate of Final Completion accepting the Work as finally complete, when the whole and all parts thereof will have been completed to the satisfaction of the Owner in full compliance with this Contract.

15.10 Final Application for Payment. As soon as practical after the Owner's issuance of the Certificate of Final Completion, CONTRACTOR will submit to the Owner a properly completed application for Final Payment in the form approved or provided by the Owner. The application will include or attach the following:

15.10.1 Three complete manuals containing all maintenance and operating instructions, warranties, and other associated documents for Equipment or other Materials that have been installed or otherwise included in the Work;

15.10.2 Record documents (as provided in Paragraph 6.11.2 of these General Conditions);

15.10.3 Unless CONTRACTOR has provided payment and performance bonds and procedurally complied with Florida Statutes, Section 255.05:

15.10.3.1 Legally effective final releases or waivers of liens from CONTRACTOR, and from all Subcontractors and sub-Subcontractors which performed services for CONTRACTOR and all Suppliers of material or Equipment to CONTRACTOR;

15.10.3.2 An affidavit that all of CONTRACTOR's debts, and claims, including from all Subcontractors, Subcontractors, and Suppliers in connection with the Work, have been paid or otherwise satisfied;

15.10.4 Complete and legally effective releases or waivers satisfactory to the Owner of all claims other than claims of Subcontractors, Sub-Subcontractors, and Suppliers, filed in association with the Work;

15.10.5 The consent of the surety, if any, to final payment;

15.10.6 Non-Use of Asbestos Affidavit (After Construction);

15.10.7 Certificate evidencing that required insurance will remain in force after final payment and through the warranty period; and

15.10.8 Any other documentation required pursuant to this Contract.

15.11 If Final Application is Rejected. If the Owner rejects the request for Final Payment, the Owner will provide CONTRACTOR written notice stating the reasons therefore within the time required by the Prompt Payment Act.

15.12 Final Payment; Waiver of Claims. Final Payment will be deemed to have taken place when CONTRACTOR or any of its representatives negotiates the Owner's final payment check, whether labeled final or not, for cash or deposits check in any financial institution for its monetary return. The making and acceptance of Final Payment will constitute:

15.12.1 A waiver of claims by the Owner against CONTRACTOR, except claims arising from unsettled claims, from Defective Work appearing after final inspection, from failure to comply with this Contract or the terms of any warranty specified therein, or from CONTRACTOR's continuing obligations under this Contract; and

15.12.2 A waiver of all claims by CONTRACTOR against the Owner other than those which were made in writing through the date that the check for final payment was issued and which are unsettled.

15.13 Partial Final Payment in Extenuating Circumstances. If the Owner determines that after CONTRACTOR has achieved Substantial Completion, Final Completion is materially delayed through no fault of CONTRACTOR, the Owner may without terminating this Contract, make payment of balance due for that portion of the Work fully completed and accepted. Such payment will be made under the terms and conditions governing Final Payment, except that it will not constitute a waiver of claims by the Owner, and will not cause a transfer of title or relieve CONTRACTOR for responsibility for the Substantially Completed Work.

ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION

16.1 The Owner May Suspend Work Without Cause. At any time and without cause, the Owner may suspend the Work or any portion thereof for a period of not more than 90 Days by written notice to CONTRACTOR which will fix the date on which the Work will be resumed. CONTRACTOR will resume the Work on the date so fixed. CONTRACTOR will be allowed an adjustment in the Contract Price or an extension of the Contract Time, or both, directly attributable to any such suspension if CONTRACTOR makes an approved Claim for such an adjustment as provided herein.

16.2 The Owner May Terminate Without Cause. Upon seven Days' notice to CONTRACTOR, the Owner may, without cause and without prejudice to any right or remedy of the Owner, elect to terminate the Contract. In such case, CONTRACTOR will be paid for completed and acceptable Work executed in accordance with this Contract prior to the date of termination, and if the Contract Price is **NOT** based on unit prices, the following:

16.2.1.1 Reasonable demobilization costs;

16.2.1.2 Reasonable anticipated profits on completed and accepted Work not previously paid and not included in separate pay items calculated to date of termination but not for anticipated profit on the entire Contract not previously paid, unabsorbed overhead, or lost opportunity; and

16.2.1.3 All claims incurred in settlement of terminated contracts with Subcontractor and others, including for anticipated profits on completed and accepted Work not previously paid and not included in separate pay items calculated to date of termination but not for anticipated profit on the entire Contract not previously paid, unabsorbed overhead, or lost opportunity. CONTRACTOR agrees to negotiate in good faith with Subcontractors and others to mitigate the Owner's cost.

16.3 The Owner May Terminate With Cause.

16.3.1 Upon the occurrence of any one or more of the following events:

- .1 If CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents
- .2 If CONTRACTOR disregards or fails to comply with Legal Requirements;
- .3 If CONTRACTOR disregards the authority of the Contract Administrator or the City Manager;
- .4 If CONTRACTOR makes fraudulent statements;
- .5 If CONTRACTOR fails to maintain a work force adequate to accomplish the Work within the Contract Time;
- .6 If CONTRACTOR fails to make adequate progress and endangers successful completion of the Contract; or
- .7 If CONTRACTOR otherwise materially breaches the Contract;

The Owner may, after giving CONTRACTOR (and the surety, if any) seven Days' notice terminate the Contract. The Owner, at its option, may proceed with negotiation with surety for completion of the Work. Alternatively, the Owner may under these circumstances exclude CONTRACTOR from the Project Site and take possession of the Work (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all Materials and Equipment stored at Project Site or for which the Owner has paid CONTRACTOR but which are stored elsewhere, and finish the Work as the Owner may deem expedient. In such case CONTRACTOR will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by the Owner arising out of or resulting from completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses and damage exceed such unpaid balance, CONTRACTOR or surety will pay the difference to the Owner. If a termination for cause is found to be wrongful, the termination will be converted to a termination without cause, and CONTRACTOR's remedy for wrongful termination is limited to the recovery of the payments permitted for termination without cause.

16.3.2 Where CONTRACTOR's services have been so terminated by the Owner, the termination will not affect any rights or remedies of the Owner against CONTRACTOR and surety then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by the Owner will not release CONTRACTOR from liability.

16.4 CONTRACTOR May Stop Work or Terminate. If through no act or fault of CONTRACTOR, the Work is suspended for a period of more than 90 Days by the Owner or under an order of court or other public authority, or (except during disputes) the Contract Administrator fails to forward for processing any mutually acceptable Application for Payment within 30 Days after it is submitted, or (except during disputes) the Owner fails for 60 Days after it is submitted to pay CONTRACTOR any sum finally determined by the Owner to be due, then CONTRACTOR may, upon seven Days' written notice to the Owner, and provided the Owner does not remedy such suspension or failure within that time, terminate the Agreement and recover from the Owner payment on the same terms as if Owner terminated without cause pursuant to this Contract. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if (except during disputes) the Contract Administrator has failed to forward

for processing any mutually acceptable Application for Payment within 30 Days after it is submitted, or (except during disputes) the Owner has failed for 60 Days after it is submitted to pay CONTRACTOR any sum finally determined by the Owner to be due, CONTRACTOR may upon seven Days' written notice to the Owner stop the Work until payment of all such amounts due CONTRACTOR, including interest thereon. The provisions of this Section are not intended to preclude CONTRACTOR from making a Claim for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this Section.

16.5 Discretionary Notice to Cure. In its complete discretion, the Owner may, but is not required to, provide a Notice to Cure to CONTRACTOR and its surety to cure any of the conditions constituting a breach of Contract or an anticipatory breach of contract and, if required by the Owner, to attend a meeting with the Owner, regarding the Notice to Cure, the event of default or the anticipatory breach of contract. The Notice to Cure will set forth the time limit in which the cure is to be completed or commenced and diligently prosecuted. Upon receipt of any Notice to Cure, CONTRACTOR will prepare a report describing its program and measures to affect the cure of the event of default or anticipatory breach of contract within the time required by the Notice to Cure. The CONTRACTOR's report will be delivered to the Owner at least three Days prior to any requested meeting with the Owner and surety.

16.6 Bankruptcy. If CONTRACTOR declares bankruptcy or is adjudged bankrupt or makes an assignment for the benefit of creditors or if a receiver is appointed for the benefit of creditors or if a receiver is appointed by reason of CONTRACTOR's insolvency, CONTRACTOR may be unable to perform this Contract in accordance with the Contract requirements. In such an event, the Owner may demand CONTRACTOR or its successor in interest provide the Owner with adequate assurance of CONTRACTOR's future performance in accordance with the terms and conditions of the Contract. If CONTRACTOR fails to provide adequate assurance of future performance to the Owner's reasonable satisfaction within ten Days of such a request, the Owner may terminate the Contract for cause or without cause, as set forth above. If CONTRACTOR fails to provide timely adequate assurance of its performance and actual performance, the Owner may prosecute the Work with its own forces or with other contractors on a time and material or other appropriate basis and the cost of which will be charged against the balance of the Contract Price otherwise due to CONTRACTOR.

16.7 Duty to Mitigate. If the Owner terminates this Contract or suspends CONTRACTOR's work, CONTRACTOR agrees to and will take all reasonable actions to mitigate its damages and any and all claims which may be asserted against the Owner.

16.8 Responsibility during Demobilization. While demobilizing, CONTRACTOR will take all necessary and reasonable actions to preserve and protect the Work, the Project Site and other property of the Owner or others at the Project Site.

16.9 CONTRACTOR to Remove Equipment. In the case of termination of this Contract before completion for any cause whatsoever, CONTRACTOR, if notified to do so by the Owner, will promptly remove any part or all of his Equipment or supplies from the property of the Owner; failing to, the Owner will have the right to remove such Equipment and supplies at the expense of CONTRACTOR.

16.10 CONTRACTOR to Clean Up Project Site. If either Owner or CONTRACTOR terminates the Contract before Substantial or Final Completion, CONTRACTOR will leave the Project Site in a clean condition as if Final Completion had been achieved, unless Owner directs otherwise; and if CONTRACTOR fails to comply clean up the Project Site as required, the Owner may do so and the cost thereof will be charged against CONTRACTOR.

END OF GENERAL CONDITIONS SECTION

SUPPLEMENTAL GENERAL CONDITIONS

SGC 1: CITY DIRECT PURCHASE POLICY

The CITY reserves the right to issue CITY Purchase Orders directly to suppliers of materials to be incorporated into the Work of Project as described in the Contract, in order to obtain the exemption from sales taxes available under Fla. Stat. § 212.08(6), in accordance with the procedures listed below. For purposes of this Policy, the term, "materials," means all items of tangible personal property which CITY may be eligible to directly purchase tax free in accordance with Fla. Stat. § 212.08(6), and implementing administrative regulations; and all other terms will have the meaning provided or suggested in the Contract, where applicable.

1. The CONTRACTOR will provide to the CITY a list of all materials to be used in the Work, including those items of material required to be used by the Architect/Engineer, and will denote on that list any items that the CONTRACTOR deems suitable for CITY to purchase directly. CONTRACTOR will also denote those items that are to CONTRACTOR's knowledge likely to have long lead times or that are available from only one or a severely limited number of suppliers.
2. The CITY may accept or reject the CONTRACTOR's recommendations and will in CITY's discretion directly purchase those items that CITY deems suitable for direct purchase. The CITY's election to make direct purchases under this Policy will not eliminate or affect the CONTRACTOR's responsibilities under the Contract except as specifically noted herein. Among other things, CONTRACTOR will remain responsible for controlling the means and methods by which the Work is to proceed; working diligently to complete the Work in accordance with applicable deadlines; and for tracking ordering and delivery of materials so as to maintain the critical path. Neither the procedures herein, nor the CITY's election to directly purchase certain materials, will alter or the applicability of the procedures and standards to be used under the Contract for claims for delay or change orders.
3. The CONTRACTOR will require that all quotes for materials received by CONTRACTOR for tangible personal property to be incorporated into the Project: (i) itemize sales tax as a separate item; (ii) include language that the quotations are assignable to the CITY; and (iii) include language stating that if assigned to CITY, no sales tax will be charged upon provision of CITY's sales tax exemption certificate. Nothing herein will prohibit the CITY from requiring the supplier of materials to be directly purchased by CITY, from requiring the supplier to issue a written quotation directly to CITY, even where CONTRACTOR has provided CITY with an assignable quotation as provided herein.
4. CITY will provide CONTRACTOR a list of items of tangible personal property to be purchased directly by CITY. CONTRACTOR will remain responsible for directly purchasing all items of such property that CITY does not elect to purchase directly.
5. For those items of tangible personal property that CITY elects to directly purchase, CONTRACTOR will prepare City form Purchase Order Requests, consistent with the quotes provided by the suppliers and this Policy.
6. CONTRACTOR will forward the completed Purchase Order Request to the City's Purchasing Agent, and provide a copy to the Project Manager.
7. The CITY will issue a Purchase Order to the supplier based on the information provided by the CONTRACTOR and the supplier's written quotation. The City will provide a copy of the Purchase Order to the CONTRACTOR.
8. Upon receipt of the CITY's Purchase Order, CONTRACTOR will issue a deductive contract adjustment to the Subcontractor or supplier that will account for the value of the material and the sales tax as it pertains to that Subcontractor's or supplier's contract with the CONTRACTOR. All sales tax savings shall be credited to the CITY through a deductive change order under the CITY's Contract with CONTRACTOR.
9. CITY will acquire title to and assume responsibility for materials directly purchased by CITY under this Policy, upon delivery to the job site.

10. Suppliers shall directly invoice the CITY. Invoices will be forwarded to the CONTRACTOR for verification. Immediately as materials directly purchased by CITY are delivered to the Project site, the CONTRACTOR will review the condition of the materials delivered for conformity with Contract specifications and the supplier's invoice for conformity with this Policy, including confirmation that the invoice references CITY's Purchase Order and is billed to CITY, not CONTRACTOR or Subcontractor. CONTRACTOR will promptly advise the CITY of any deficiencies in the materials or invoice. The intent of this requirement is to require CONTRACTOR to act diligently to allow CITY to meet its obligations to the supplier under Florida's Prompt Payment Act, Fla. Stat. § 218.70 *et seq.* Nothing herein will prohibit the CONTRACTOR from requiring a Subcontractor of CONTRACTOR's conduct a similar review for CONTRACTOR's benefit; however, CONTRACTOR will remain responsible to CITY for promptly reviewing the materials and invoice in accordance with this Section.

11. Upon being satisfied that directly purchased materials and the accompanying invoice from the supplier are satisfactory, CITY will pay the supplier for the items purchased. Under no circumstances will CONTRACTOR be responsible for paying the supplier. The CITY will issue a check for the approved invoice amount and mail this check directly to the supplier, accompanied by the Certificate of Entitlement. A copy of the check will be forwarded to the CONTRACTOR so that CONTRACTOR can accurately track and summarize all CITY Direct Purchase payments.

In the event the CITY does not timely execute the appropriate documents submitted by the CONTRACTOR for direct purchase, the CONTRACTOR may, upon timely notice to the CITY, order such materials irrespective of loss of sales tax savings. It is the intent of these provisions to implement the cost savings afforded by the sales tax exemption without delay of the Work and that the CONTRACTOR retain complete control of the Progress Schedule. While the CITY'S direct purchase of materials or supplies shall not relieve the CONTRACTOR of responsibility to maintain and safeguard such materials and supplies until they are incorporated into the Work and accepted by the CITY, the CITY shall assume liability for the materials at the time they are delivered to the jobsite. The CONTRACTOR shall not be entitled to a time extension in the event that delay is occasioned by the CITY'S direct purchase of materials.

12. The CITY will bear the economic burden of obtaining insurance covering damage or loss or will directly enjoy the economic benefit of the proceeds of any such insurance. Nothing herein will prohibit the CITY from requiring CONTRACTOR to supply additional coverage, such as through a builder's risk policy or installation floater, to insure materials directly purchased by CITY from damage and risk of loss.

13. The CITY does hereby defend, hold harmless, and indemnify the CONTRACTOR from any and all liability for unpaid sales taxes which the CONTRACTOR may suffer as a result of claims, demands, costs, interest, penalties or judgments against the CONTRACTOR made by or in favor of the State of Florida on account of failure to pay Florida State Sales Taxes on materials purchased by the CITY under this Policy. The CITY agrees to defend against any such claims or actions brought against the CONTRACTOR whether rightfully or wrongfully brought or filed. The CONTRACTOR agrees that it will promptly notify the CITY of any such claim, demand, or action. Furthermore, the CONTRACTOR expressly agrees that, if and when requested by the CITY, it will enter into such amendments to this Contract as the CITY, upon consultation with its legal counsel, may deem necessary or useful to preserve or ensure its right under Florida law to the sales tax exemption contemplated by this subsection. CITY's obligation to indemnify and hold harmless CONTRACTOR as provided herein is subject to limitations, including monetary limitations, contained in Florida Statutes Section 768.28.

SGC 2: CONSTRUCTION AT THE BETHUNE POINT WATER RECLAMATION FACILITY: The CONTRACTOR will supply information on each employee, including subcontractors, accessing the Bethune Point Water Reclamation Facility (BPWRF). The following requirements must be met in order to perform work at the BPWRF:

- CONTRACTOR must provide confirmation that background checks are performed on employees, including subcontractors. Background checks must include a review for violent felonies.
- All employees, including subcontractors, must wear an ID badge when on site at the BPWRF. At a minimum, ID badges must include company name, contact information and name of employee.

- CONTRACTOR must provide a list of all employees, including subcontractors, accessing the BPWRF. CONTRACTOR must notify the City immediately of any personnel changes.
- CONTRACTOR must provide a single, reachable point of contact for all issues regarding construction at the BPWRF. This contact is responsible for keeping a log of who is on site at all times.
- Before the end of the previous work week, CONTRACTOR must provide a scheduled start and stop time for each work day for the following work week to the CITY for approval. CITY staff will check the CONTRACTOR in at the BPWRF each work day. This is the only way the CONTRACTOR will access the BPWRF.

CONTRACTOR will be notified of any worker determined to be problematic or deemed to be in the CITY's best interest for restriction. CONTRACTOR must remove said worker from the BPWRF immediately. The required information can be provided by e-mail, fax or US mail. Contact information will be provided at the pre-construction meeting.

CONTRACT DOCUMENTS

For the Construction of the

CITY OF DAYTONA BEACH BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR REPLACEMENT

**INVITATION TO BID No. >#
CONTRACT NO. >K**

**PROCUREMENT REQUIREMENTS
CONTRACTING REQUIREMENTS
TECHNICAL SPECIFICATIONS**

DIV 00-16

JANUARY 2020

Prepared For:



Utilities Department
125 Basin Street, Suite 131
Daytona Beach, FL 32114

Prepared By:





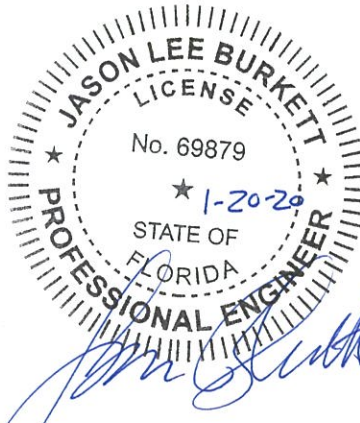
201 E. Pine Street, Suite 1000
Orlando, FL 32801

Tetra Tech #200-26561-18002

Revised Bid Set

PROJECT MANUAL

**CITY OF DAYTONA BEACH
BETHUNE WATER RECLAMATION FACILITY
GENERATOR REPLACEMENT**

Portion of Engineering Documents for Which Responsible	Name and License Number	Company Name, Address, and Business No.	Signature, Seal, and Date
General	Jennifer C. Ribotti, PE FL PE #81226	Tetra Tech, Inc. 201 E. Pine St., Suite 1000 Engineering Business No. 2429	
Civil	Burl D. Reardon, PE FL PE #64037	Tetra Tech, Inc. 201 E. Pine St., Suite 1000 Orlando, FL 32801 Engineering Business No. 2429	
Structural	Jason L. Burkett, PE FL PE #69879	Tetra Tech, Inc. 201 E. Pine St., Suite 1000 Orlando, FL 32801 Engineering Business No. 2429	

PROJECT MANUAL

**CITY OF DAYTONA BEACH
BETHUNE WATER RECLAMATION FACILITY
GENERATOR REPLACEMENT**

Portion of Engineering Documents for Which Responsible	Name and License Number	Company Name, Address, and Business No.	Signature, Seal, and Date
Electrical	Banks R. Wason, PE FL PE #73973	Tetra Tech, Inc. 201 E. Pine St., Suite 1000 Orlando, FL 32801 Engineering Business No. 2429	 <p>The seal is circular with a double-line border. The outer ring contains the text 'BANKS RAYMOND WASON' at the top and 'PROFESSIONAL ENGINEER' at the bottom, separated by two stars. Inside the ring, the text 'LICENSE No 73973' is visible, with a handwritten date '12/4/24' over it. At the bottom of the inner circle, it says 'STATE OF FLORIDA'.</p>

**CITY OF DAYTONA BEACH
BETHUNE POINT WATER RECLAMATION FACILITY GENERATOR REPLACEMENT**

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DIVISION 0

BIDDING / PROCUREMENT DOCUMENTS



PROJECT SPECIFIC

CONSTRUCTION

SERVICE PACKET

APPLICATION AND CERTIFICATION FOR PAYMENT

TO OWNER: PROJECT: APPLICATION NO: Distribution to:

Contract No.: P.O. No. : OWNER

ENGINEER

PERIOD TO: CONTRACTOR

FROM CONTRACTOR:

CONTRACT FOR: CONTRACT DATE:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, is attached.

- 1. ORIGINAL CONTRACT SUM \$ _____
- 2. Net change by Change Orders \$ _____
- 3. CONTRACT SUM TO DATE (Line 1 ± 2) \$ _____
- 4. TOTAL COMPLETED & STORED TO \$ _____
DATE - (Dollar Values Column Cumul. To Date on pgs 2, 3 &4)
- 5. RETAINAGE:
 - a. _____ of Completed Work \$ _____
 - b. _____ of Stored Material \$ _____
 - Total Retainage (Lines 5a + 5b) \$ _____
- 6. TOTAL EARNED LESS RETAINAGE \$ _____
(Line 4 Less Line 5 Total)
- 7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate) \$ _____
- 8. CURRENT PAYMENT DUE \$ _____
- 9. BALANCE TO FINISH, INCLUDING RETAINAGE \$ _____
(Line 3 less Line 6)

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS		
NET CHANGES by Change Order		

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.
CONTRACTOR:

By: _____ Date: _____

State of: _____ County of: _____

Subscribed and sworn to before me this _____ day of _____, 2018

Notary Public: _____

My Commission expires:

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ENGINEER:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.



The City of Daytona Beach

Utilities Department

PROJECT PAYMENT AUTHORIZATION FORM

Contractor: _____ Contract #: _____
 Project: _____ P.O. #: _____
 Date: _____ Cont. Invoice #: _____
 Pay Request #: _____
 For Period: _____ to _____

1 Original Contract Amount: _____
 2 Approved Change Orders: _____
 3 Current Contract Amount: _____ \$0.00

	PREVIOUSLY COMPLETED	THIS PERIOD	COMPLETED TO DATE
4 Amount Completed to Date:			\$0.00
5 Stored Materials:			\$0.00
6 Adjusted Amount Completed and Stored To Date:	\$0.00	\$0.00	\$0.00
7 Less: Retainage To Date at 10%	\$0.00	\$0.00	\$0.00
8 Total Amount Earned	\$0.00	\$0.00	\$0.00
9 Less: Previous Payments To Date			\$0.00
10 Add/(Less): Other- Retainage Release			
11 TOTAL AMOUNT DUE THIS INVOICE	\$0.00	\$0.00	\$0.00

Percent Complete: _____ #DIV/0!
 Percent of Contract Time Remaining: _____

CERTIFICATION OF CONTRACTOR

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

 Authorized Contractor Representative and Signator

Signature: _____
 Print Name: _____ Date: _____

The City of Daytona Beach Utilities Engineering Department
 Approved for Payment by Utilities Project Manager

Signature: _____
 Print Name: _____ Date: _____

The City of Daytona Beach Utilities Engineering Department
 Quantities Verified by: Inspector

Signature: _____
 Print Name: _____ Date: _____

Approved for Payment by Engineer of Record
 Signature: _____

Print Name: _____ Date: _____

SECTION 00846

MATERIALS STORED ON SITE FORM

Pay Estimate No. _____	Project _____	Date Prepared _____
For Period Ending _____	Prepared by _____	Page _____ of _____

A	B	Value Last Period			(-) Value Mat'l Installed			(+) Value Mat'l Delivered			Value This Period			O
		C	D	E	F	G	H	I	J	K	L	M	N	
Item	Description	Quantity	Unit Price	Invoice Amount	Quantity	Unit Price	Invoice Amount	Quantity	Unit Price	Invoice Amount	Quantity	Unit Price	Invoice Amount	Release Of Lien

SECTION 00847
SHOP DRAWING SUBMITTAL FORM

Owner: City of Daytona Beach

Specification No.: _____
Project: City of Daytona Beach – Bethune Point
Water Reclamation Facility Generator
Replacement

Contractor: _____

FOR TETRA TECH USE ONLY:	
DATE RECEIVED	_____
DATE RETURNED	_____

Project No.: 200-26561-18002

Owner's Project No.: _____

Contractor's Submittal No.: _____

Contractor's Project No.: _____

Resubmittal Yes No

ITEM NO	RESUBMITTAL NO.	NO. COPIES	VENDOR	DESCRIPTION	ENGINEER'S ACTION
ACTION CODE (As defined in the General Conditions)					
A	APPROVED			SUBMITTED BY: _____	<i>Contractor</i>
AN	APPROVED AS NOTED				
AR	AMEND AND RESUBMIT				
R	REJECTED (DO NOT ORDER OR FABRICATE UNTIL APPROVED)			DATE: _____	
ENGINEERS COMMENTS:					

- Distribution
- Contractor _____ Copies
 - Owner _____ Copies
 - Tt Office _____ Copies
 - Tt Subconsultant _____ Copies
 - Tt Field _____ Copies

Discipline Review:

Reviewed By _____ Date

Discipline Review:

Reviewed By _____ Date

Project Manager _____ Date

SECTION 00850

FIELD ORDER

[]	OWNER:	_____	No. Copies	_____	
[]	ENGINEER:	_____	No. Copies	_____	
[]	ARCHITECT:	_____	No. Copies	_____	FIELD ORDER
[]	CONTRACTOR:	_____	No. Copies	_____	NO. _____
[]	FIELD	_____	No. Copies	_____	
[]	OTHER:	_____	No. Copies	_____	

PROJECT DATA

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____
OTHER: _____

NUMBER: _____
DATE: _____
DRAWING NO: _____
SPECIFICATION SECTION: _____

To: (Contractor)

You are hereby directed to execute promptly this Field Order which interprets the Contract Documents or orders minor changes in the Work without change in Contract Sum or Contract Time.

If you consider that a change in Contract Sum or Contract Time is required, please submit your itemized proposal to the Engineer immediately and before proceeding with this Work. If your proposal is found to be satisfactory and in proper order, this Field Order will in that event be superseded by a Change Order.

Description (of interpretation or change): _____

Attachments (listing of attached documents that support description):

1. Contractor Request for Information No.: _____
2. _____
3. _____
4. _____
5. _____

PROJECT NO: _____

BY: _____

DATE: _____

END OF SECTION

SECTION 00851

CONTRACTOR REQUEST FOR INFORMATION

[]	OWNER:	_____	No. Copies	_____	
[]	ENGINEER:	_____	No. Copies	_____	CONTRACTOR
[]	ARCHITECT:	_____	No. Copies	_____	REQUEST FOR
[]	CONTRACTOR:	_____	No. Copies	_____	INFORMATION
[]	FIELD	_____	No. Copies	_____	NO. _____
[]	OTHER:	_____	No. Copies	_____	

PROJECT DATA

CONTRACT DATA

NAME: _____
LOCATION: _____
OWNER: _____

NUMBER: _____
DATE: _____
DRAWING NO: _____
SPECIFICATION SECTION: _____

QUESTION:

BY: _____ DATE: _____

REPLY:

BY: _____ DATE: _____

END OF SECTION

SECTION 00861

WORK DIRECTIVE FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	WORK DIRECTIVE NO. _____
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME:	_____	NUMBER:	_____
LOCATION:	_____	DATE:	_____
OWNER:	_____	DRAWING NO.:	_____
CONTRACTOR:	_____	SPECIFICATION	
		SECTION:	_____

TO: (Contractor) _____

You are directed to proceed promptly with the following change(s):

Description:

Purpose of Work Directive Change:

If a claim is made that the above changes(s) have affected Contract Price or Contract Time, any claim for a Change Order based thereon will involve one of the following methods of determining the effect of the change(s).

Method of determining change
in Contract Price:

- Time and materials
- Unit prices
- Cost plus fixed fee
- Other _____

Method of determining change
in Contract Time:

- Contractor's records
- Engineer's records
- Other _____

Estimated increase (decrease) in Contract Price. Estimated increase (decrease) in Contract
\$ _____

If the change involves an increase, the
estimated amount is not to be exceeded
without further authorization.

Times.

Substantial Completion _____ days;
Ready for final payment _____ days.
If the change involves an increase, the
estimated times are not to be exceeded
without further authorization.

RECOMMENDED:

AUTHORIZED:

BY: _____
(Engineer)

BY: _____
(Owner)

Attachments (listing of attached documents that support description):

1. Contractor Request for Information No.: _____
2. Request for Proposal for Proposed Change (RFP) No.: _____
3. _____
4. _____
5. _____

END OF SECTION

SECTION 00863

CHANGE PROPOSAL SUMMARY FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	CHANGE
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	PROPOSAL
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	SUMMARY
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	NO. _____
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME:	_____	NUMBER:	_____
LOCATION:	_____	DATE:	_____
OWNER:	_____	DRAWING NO.:	_____
CONTRACTOR:	_____	SPECIFICATION	
		SECTION:	_____

REFERENCE:	Work Directive No. _____	RFP No. _____
	Field Order No. _____	Other _____

DESCRIPTION: _____

PRICING INFORMATION

1.	DIRECT LABOR	Skill/Trade	Manhours	Rate	Cost
1.A	Production Labor	_____	_____	_____	_____
1.B	Supervision		_____	_____	_____
<input type="checkbox"/>	Foreman				
<input type="checkbox"/>	Superintendent				
1.C	Field Engineering		_____	_____	_____
1.D	Expenses		_____	_____	_____
					Subtotal(1)

2. MATERIALS & EQUIPMENT

	Description	Quantity	Unit Price	Cost
2.A	Incorporated in Work			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.B	Consumed in Performance			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.D	Direct Costs			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
2.E	Bonds, Insurance			
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
				Subtotal(2)

3. TOTAL LABOR, MATERIALS & EQUIPMENT

Subtotal (1)	+	Subtotal (2)	=	Total
--------------	---	--------------	---	-------

END OF SECTION

SECTION 00864

REQUEST FOR PROPOSAL FOR PROPOSED CHANGE FORM

<input type="checkbox"/>	OWNER:	_____	No. Copies _____	REQUEST FOR PROPOSAL FOR PROPOSED CHANGE (RFP) NO. _____
<input type="checkbox"/>	ENGINEER:	_____	No. Copies _____	
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies _____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies _____	
<input type="checkbox"/>	FIELD:	_____	No. Copies _____	
<input type="checkbox"/>	OTHER:	_____	No. Copies _____	

PROJECT DATA:

CONTRACT DATA

NAME: _____	NUMBER: _____
LOCATION: _____	DATE: _____
OWNER: _____	DRAWING NO.: _____
CONTRACTOR: _____	SPECIFICATION SECTION: _____

TO: (Contractor) _____

Provide the undersigned a proposal for the following change in the work within seven (7) calendar days after receipt of this request. The written proposal must clearly delineate the scope of the proposed change in work providing an itemized estimate of time and all material and labor (by trade), subcontract and overhead costs and fees. Any amount claimed for subcontracts must be similarly supported.

Description of change in work:

Change Order Type: (Deletion) (Addition) (Revision)

Constraints of Change: _____

Initiated by: _____

Proposal must be received by: _____ (7 days from date below)

Attachments (listing of attached documents that support description):

1. Contractor Request for Information No.: _____
2. _____
3. _____
4. _____
5. _____

PROJECT NO.: _____

_____ DATE: _____

END OF SECTION

SECTION 00865

CHECK OUT FORM

[] OWNER: _____ No. Copies _____
[] ENGINEER: Tetra Tech No. Copies _____ CHECK-OUT
[] ARCHITECT: _____ No. Copies _____
[] CONTRACTOR: _____ No. Copies _____ MEMO NO. _____
[] FIELD: _____ No. Copies _____
[] OTHER: _____ No. Copies _____

PROJECT DATA:

CONTRACT DATA

NAME: _____ NUMBER: _____
LOCATION: _____ DATE: _____
OWNER: _____ DRAWING NO.: _____
CONTRACTOR: _____ 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 on page 00865-2.
3. The equipment is operating satisfactorily, except for items noted on page 00865-2.
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.

Checked By: _____
Name of Manufacturer's Rep. _____ Name of General Contractor _____
Address and Phone # of Rep. _____ Authorized Sign./Title/Date _____
Sig./Title/Person Making Check _____ Name of Subcontractor _____
Date Checked _____ Authorized Sig./Title/Date _____

Manufacturer's Representative Notations: Exceptions noted at time of check were:

Manufacturer's Representative to note adequacy of related equipment that directly affects operation, performance or function of equipment checked. (No comment presented herein will indicate adequacy of related systems or equipment):

END OF SECTION

SECTION 00866

CERTIFICATE OF COMPLETED DEMONSTRATION FORM

<input type="checkbox"/>	OWNER	_____	No. Copies	_____	CERTIFICATE OF COMPLETED DEMONSTRATION MEMO NO. _____
<input type="checkbox"/>	ENGINEER:	<u>Tetra Tech</u>	No. Copies	_____	
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies	_____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies	_____	
<input type="checkbox"/>	FIELD:	_____	No. Copies	_____	
<input type="checkbox"/>	OTHER:	_____	No. Copies	_____	

PROJECT DATA

NAME: _____
 LOCATION: _____
 OWNER: _____
 OTHER: _____

CONTRACT DATA

NUMBER: _____
 DATE: _____
 DRAWING NO: _____
 SPECIFICATION
 SECTION: _____

NOTE TO CONTRACTOR:

Submit five (5) copies of all information listed below for checking at least one (1) 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 (5) copies of this form. After this has been done, a written request for a final inspection of the system shall be made.

MEMORANDUM:

This memo 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 of equipment items.
 - (3) Performance verification information as recorded by the Contractor.
 - (4) Check-Out Memo 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.

(Name of General Contractor)

By: _____
(Authorized Signature, Title and Date)

(Name of Subcontractor)

By: _____
(Authorized Signature, Title and Date)

Operation and Maintenance Manuals, Instruction Prints, Demonstration and Instruction in Operation Received:

(Name of Owner)

By: _____
(Authorized Signature/Title/Date)

END OF SECTION



DIVISION 1

GENERAL REQUIREMENTS

SECTION 01000

PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The Work to be done consists of the furnishing of all labor, materials, and equipment, and the performance of all Work included in this Contract. The summary of the Work is presented in Section 01010: Summary of Project.

- B. Work Included:
 - 1. The Contractor shall furnish all labor, superintendence, materials, plant power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion of the Work. The Owner will reimburse Contractor for all City required permits. The Contractor shall perform and complete the Work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all Work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.

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

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

- C. Public Utility Installations and Structures:
 - 1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, 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.

2. 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.
3. The Contractor shall protect all public utility installations and structures from damage during the Work. Access across any buried public utility installation or structure shall be made to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor shall be repaired by the Contractor, at his expense. No separate payment shall be made for such protection or repairs to public utility installations or structures.
4. Public utility installations or structures owned or controlled by the Owner or other governmental body which are shown on the Drawings to be removed, relocated, replaced, or rebuilt by the Contractor shall be considered as a part of the general cost of doing the Work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefor.
5. Where public utility installations or structures owned or controlled by the Owner or other governmental body are encountered during the course of the Work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement, or rebuilding is necessary to complete the Work under this Contract, such Work shall be accomplished by the utility having jurisdiction, or such Work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously, and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement, or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.
6. The Contractor shall, at all times in performance of the Work, employ acceptable methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage, or destruction of public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.
7. The Contractor shall give written notice to Owner and other governmental utility departments and other owners of public utilities of the location of his

proposed construction operations, at least 48-hours in advance of breaking ground in any area or on any unit of the Work.

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

1.02 DRAWINGS AND PROJECT MANUAL

- A. Drawings: When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small-scale drawings.
- B. Supplementary Drawings:
 1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the Work to be done or to illustrate the Work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer, and the Contractor will be furnished one (1) complete set of reproducible drawings (22 inches by 34 inches) and one (1) reproducible copy of the specifications.
 2. The Supplementary Drawings shall be binding upon the Contractor with the same force as the Contract Drawings. Where such Supplementary Drawings require either less or more than the estimated quantities of Work, credit to the Owner or compensation therefor to the Contractor shall be subject to the terms of the Agreement.
- C. Contractor to Check Drawings and Data:
 1. The Contractor shall verify all dimensions, quantities, and details shown on the Drawings, Supplementary Drawings, schedules, Specifications, or other data received from the Engineer, and shall notify 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.
 2. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility or the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.
- D. Specifications: The Technical Specifications consist of three (3) parts: General, Products, and Execution. The General part of a Specification contains General

Requirements which govern the Work. The Products and Execution parts modify and supplement the General Requirements by detailed requirements for the Work and shall always govern whenever there appears to be a conflict.

E. Intent:

1. All Work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the Work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, the interpretation of these Specifications shall be made upon that basis.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer:

1. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request and at the Engineer's option, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
2. Any two (2) or more pieces of material or equipment of the same kind, type, or classification, and being used for identical types of service, shall be made by the same manufacturer.

B. Delivery:

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

C. Tools and Accessories:

1. The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind, or size of equipment, one (1) complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.
2. Spare parts shall be furnished as specified herein and as recommended by the manufacturer necessary for the operation of the equipment, not including materials required for routine maintenance.
3. Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight, and principal rate data.

D. Service of Manufacturer's Engineer:

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

1.04 INSPECTION AND TESTING

A. General:

1. 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 (5) copies of the reports shall be submitted, and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.
2. If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract Documents, the Contractor will be notified thereof, and he will be directed to refrain from delivering said material or equipment, or to remove it promptly

from the site or from the Work and replace it with acceptable material, without cost to the Owner.

3. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with the recognized test codes of the ANSI, ASME, NETA or the IEEE, except as may otherwise be stated herein.
4. The Contractor shall be fully responsible for the proper operation of equipment during testing and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

B. Costs:

1. All inspection and testing of materials furnished under this Contract will be provided by the Contractor, unless otherwise expressly specified.
2. The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor, and such costs shall be deemed to be included in the Contract Price.
3. Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the Owner for compliance. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests of materials and equipment which are rejected for non-compliance.

C. Certificate of Manufacture:

1. Contractor shall furnish to Engineer authoritative evidence in the form of a certificate of manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents.
2. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

D. Shop Tests:

1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents.
2. Five (5) copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible

official of the manufacturing company and/or independent laboratory, shall be submitted to the Engineer for approval.

3. The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

E. Start-up Tests:

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

F. Demonstration Tests:

1. Prior to Contractor's request for a Substantial Completion inspection, all equipment and piping installed under this Contract shall be subjected to demonstration tests as specified or required to prove compliance with the Contract Documents.
2. The Contractor shall furnish labor, fuel, energy, water, and all other materials, equipment, and instruments necessary for all demonstration tests, at no additional cost to the Owner. Contractor shall assist in the demonstration tests as applicable.

1.05 LINES AND GRADES

A. Grade:

1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.
2. The Engineer will establish bench marks and baseline controlling points. Reference marks for lines and grades as the Work progresses will be located by the Contractor to cause as little inconvenience to the prosecution of the Work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

B. Surveys:

1. The Contractor shall furnish and maintain, at his own expense, stakes and other such materials.
2. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies.
3. 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 by the Engineer.
4. The Contractor shall locate all utilities in possible conflict with the work included in this contract, including storm drainage and electrical infrastructure. Contractor shall maintain these utilities unless otherwise directed by the Owner or the Engineer.

C. Safeguarding Marks:

1. The Contractor shall safeguard all points, stakes, grade marks, monuments, and bench marks made or established on the Work, bear the cost of re-establishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes, and marks.
2. The Contractor shall safeguard all existing and known property corners, monuments, and marks adjacent to but not related to the Work and shall bear the cost of re-establishing them if disturbed or destroyed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01010

SUMMARY OF PROJECT

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. This Contract is for the standby power upgrades at the City of Daytona Beach's Bethune Point Water Reclamation Facility as specified herein. The Work consists of furnishing all labor, equipment, and materials for the construction of the facilities consisting of, but not limited to, the following:
- Furnish and install two (2) new 750kW diesel generators at the Bethune Point Water Reclamation Facility (BPWRF).
 - Provide sound attenuating, hurricane rated enclosure, fuel storage, electrical gear and appurtenances for the diesel generators. All components shall be assembled at the vendor's facility unless noted otherwise in the equipment submittals.
 - Furnish and install concrete slabs, mat foundation, access platform, stairs, and aluminum railings. Provide structural plans and calcs signed and sealed by a licensed Professional Engineer of the State of Florida for the platform, stairs, and railing.
 - Provide auger-cast concrete piles to support the generators along with the required testing, inspections and reports for the piles.
 - Installation of the new standby power equipment, including required electrical work, earth work and concrete work.
 - Test and place into service the new standby power equipment.
 - Installation of fiber optic cable, conduit, proofing, pull boxes and lids, from the existing well house to the water treatment plant.
 - Provide complete electrical labor, materials, oversight, planning, permitting, inspections and testing to meet the intent of the plans and specifications.
 - Coordinate, manage, pay all associated costs and hold all required meetings with Florida Power & Light (FPL) for work in the utility vault. Provide \$50,000 allowance in bid for FPL's scope of work. Submit actual invoices from FPL with request for payment application.
 - When power must be shut off temporarily for switchovers, provide a temporary generator, connection and operation of influent pump station. Influent pump

station must remain active at all times. Coordinate with operators prior to any removal of power.

1.02 PROJECT SEQUENCE

- A. The Contractor shall establish his work sequence based on the use of crews to facilitate completion of construction and testing within the specified Contract Time. The proposed project sequence, including Contractor's plans for provision of temporary facilities, shall be submitted to the Engineer prior to construction.
- B. The proposed sequence of construction shall maintain operation of the Bethune Point Water Reclamation Facility at all times. Any system outage affecting the operation of the existing Facility shall be approved by the Owner in writing a minimum of seven (7) days prior to commencing work.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 GENERAL

- A. Refer to Section 01010 for a description of the work required for completion of the Work.
- B. Subject to the provisions in the Contract General Conditions, all work and payment for the work is represented by the Total Bid amount shown on the Bid Form.
- C. Payment for all work done in compliance with the Contract Documents, inclusive of furnishing all manpower, equipment, materials, and performance of all operations relative to construction of this project, will be made under Pay Items. Work for which there is not a pay item will be considered incidental to the Contract and no additional compensation will be allowed.
- D. The Owner reserves the right to modify work as may be necessary, and increase or decrease quantities of work to be performed, including deduction or cancellation of any one or more of the Pay Items. Changes in the work shall not be considered as a waiver of any conditions of the Contract nor invalidate any provisions thereof. When changes result in changes in the quantities of the work to be performed, the Contractor will accept payment according to Contract Unit Prices that appear in the original contract.
- E. The Contractor's attention is again called to the fact that the quotations for the various items of work are intended to establish a total price cost for completing the work in its entirety. Should the Contractor feel that the cost of any item of the work has not been established by the Bid Form, he shall submit a question to the City so that his proposal for the project can accurately reflect his total price for completing the work in its entirety.
- F. The quantities for payment under this Contract shall be determined by actual measurement and payment of the completed items, in place, ready for service and accepted by the Owner, in accordance with the applicable method of measurement therefore contained herein. A representative of the Contractor shall witness all field measurements.
- G. Work performed by the Contractor outside the limits of construction shall be at the Contractor's expense.

1.02 MEASUREMENT

- A. Measurement for Lump Sum bid items shall be based on the percent of actual completion as determined by the Contractor and agreed upon by the Engineer and Owner.
- B. Measure for Unit Price bid items shall be based on the actual quantity installed and accepted by the Engineer and Owner
- C. Measurement of volumes shall be the actual "as-built" volume pertinent to payment items. Quantities on the Bid Form are estimated and may be increased or decreased by the Owner without limit.
- D. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the Owner, in accordance with the applicable method of measurement therefore contained herein.

1.03 PAYMENT ITEMS

- A. Separate payment will be made for the Unit Price and Lump Sum Items listed on the Bid Form. Related work not specifically listed or identified, but evidently necessary for satisfactory completion of the Item, shall be considered to be included.
- B. No separate payment will be made for the following items. The cost of such work shall be included in the unit price of applicable pay items as listed in the Bid Schedule and as described in this section, 1.03, C, unless otherwise noted in the construction plans:
 - 1. Clearing and grubbing including removal and disposal of all above and below ground improvements such as but not limited to trees, brush, residential commercial and bridge structures, septic tanks and drain-fields, roadway pavement and concrete, drainage and utilities systems, etc. unless otherwise specified.
 - 2. Trench and roadway excavation, including rock and cemented coquina excavation and disposal, excavation and removal of unsuitable soils and unsuitable materials of any nature unless otherwise specified.
 - 3. Structure excavation including rock and cemented coquina excavation and disposal, excavation and disposal of unsuitable materials of any nature except as otherwise specified.
 - 4. Dewatering and disposal of surplus water, prevention of sediment and erosion pollution and prevention of flooding.
 - 5. Structural fill, backfill, including furnishing, placement, compaction and final grading of suitable fill material, pipe bedding and compacted granular material.
 - 6. The temporary removal and replacement of fences and walls.

7. Foundation and borrow materials, except as otherwise specified.
 8. Paved and unpaved roadway restoration or replacement including but not limited to all disturbed improvements within the right of way, adjacent traffic signal system components included within the limits of lump sum work, unless otherwise specified.
 9. Maintenance of vehicular and pedestrian traffic including detours and haul routes.
 10. Shoring, sheeting and worksite safety.
- C. Items are as enumerated on the bid form.
1. Mobilization, Demobilization, and General Requirements (Bid Item No. 1)
 - a. Measurement of various items for Mobilization and Demobilization will not be made for payment and all items shall be included in the lump sum price. Mobilization/Demobilization shall be limited to a maximum of 5% of the Bid Price.
 - b. Measurement for various items covered under General Requirements will not be made for payment and all items shall be included in the lump sum price.
 - c. Payment for Mobilization and Demobilization will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for the preparatory work and operations in mobilizing for beginning Work on the project including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of field office, safety equipment and first aid supplies, sanitary and other facilities, as required by these Specifications, and State and local laws and regulations; and any other preconstruction expense necessary for the start of the Work; general location of utilities including labor, materials and equipment necessary to physically locate all utilities in the immediate area of the project using non-destructive digging equipment, the cost of field engineering, permits and fees, construction schedules, hurricane preparedness plan, stormwater pollution prevention plan, preconstruction video and photographs, project sign, shop drawings, temporary facilities, tree protection, lay down storage area, construction aids, temporary fencing, coordination with independent materials and other testing, reviews and inspection, re-inspection and any rework resulting from failed material testing, cleaning, site cleanup, landscaping, site and sodding restoration, survey, and operating and maintenance data. The Contractor shall submit invoices substantiating the cost of mobilization with each pay request. Payment will be made in accordance with the General Conditions. Mobilization/Demobilization shall be limited to a maximum of 5% of the Bid Price.

- d. Payment for General Requirements shall include all Insurance requirements costs, the costs of all bonds, Indemnification, fees and permitting, and all administrative costs associated with acquiring and maintaining the necessary coverage as described in the Contract Documents. This item will be paid upon each payment request made by the Contractor. The Contractor shall attach with the payment request invoices to substantiate that appropriate insurance and bonds have been obtained by the Contractor. Payment will be based on percentage of work completed during the pay period at time of pay application to the nearest 10% complete. The cumulative total shall not exceed the Lump Sum Bid Pay Item Amount.
2. As-Built Drawings (Bid Item No. 2):
- a. Measurement of various items As-Built Drawings will not be made for payment and all items shall be included in the lump sum price.
 - b. Payment for As-Built Drawings will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for progressive As-Built surveys during all phases of the work and submitted with each pay application, and Final As-Built drawings at completion to be submitted to the City for approval and Owner.
 - c. Payment will be based on percent completion of bid item as follows:
 - 1) 70% payment based on proof of progressive surveys and percent of work completed during the pay period at time of pay application to the nearest 10% as agreed to by Owner.
 - 2) 30% payment when Final As-Built drawings have been submitted to the City and approved by the Engineer and Project Manager.
3. Erosion Control (Silt Fencing) (Bid Item No. 3)
- a. Measurement of various items for Erosion Control (silt fencing) will be based on linear foot actually placed as measured at the ground surface.
 - b. Payment for erosion control (silt fencing) will be made at the Contract unit price per linear foot for the size and type installed, which price and payment shall be full compensation for all labor, equipment, maintenance and materials necessary for temporary erosion and water pollution in areas where construction activities may cause silt runoff, as well as other materials required for satisfactory erosion control. Payment will be made on a monthly basis on a percentage equally divided throughout the duration of the project or at the City Engineer's discretion. All cost will be included under the payment per linear feet of erosion control (silt fencing).
4. Demolition (Bid Item No. 4)

- a. Measurement of various items for Demolition will not be made for payment and all items shall be included in the lump sum price.
 - b. Payment for Demolition will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for the all labor, materials, equipment services, testing, backfill, compaction, removal of debris from site, sod removal, transportation and appropriate disposal of all items not retained by Owner which generally includes, but is not limited to: electrical wiring, sidewalks, conduits, piping not associated with other line items and any additional demolition shown on the Drawings but not mentioned herein. Payment will be based on percentage of work completed during the pay period at time of pay application to the nearest 10% complete. The cumulative total shall not exceed the Lump Sum Bid Pay Item Amount.
5. New Generator, Enclosure, and Accessories (Bid Item No. 5)
- a. Measurement for the generator equipment and associated appurtenances to be paid for will be determined by the actual count of units delivered to the project site and accepted by the contractor.
 - b. Payment for generator equipment will be made at the Contract lump sum price, which price shall be full compensation for all material and services required for the provision or modification of the generator equipment, fuel tank, paralleling equipment, site work including any backfill and compaction, signed and sealed equipment tie down details, signed and sealed wind load drawings and calculations, testing, inspections, finish grading and site restoration, sodding, utility protection, utility relocation if required, and all work and materials required to provide the complete project as shown in the project drawings, including transportation costs.
6. 12" Thick Concrete Pile Cap with Reinforcement and Accessories (Bid Item No. 6)
- a. Measurement for the concrete pile cap and associated reinforcement and accessories to be paid for will not be made for payment and all items shall be included in the lump sum price.
 - b. Payment for the concrete pile cap and slabs will be made at the Contract unit price, which price shall be full compensation for all material and services required for the concrete slabs, site work including any backfill and compaction, testing, inspections, finish grading and site restoration of the entire project site including but not limited to the installation of any drainage swales or conveyance measures as shown on the plans, sodding, utility protection, utility relocation if required, and all work and materials required to provide

the complete project as shown in the project drawings, including transportation costs.

7. Concrete Foundation - Stair and Equipment Pads (Bid Item No. 6)

- a. Measurement for the concrete equipment pads and associated appurtenances to be paid for will not be made for payment and all items shall be included in the lump sum price.
- b. Payment for the concrete equipment pads will be made at the Contract unit price, which price shall be full compensation for all material and services required for the generators, electrical equipment and stair landing slabs, site work including any backfill and compaction, testing, inspections, finish grading and site restoration of the entire project site including but not limited to the installation of any drainage swales or conveyance measures as shown on the plans, sodding, utility protection, utility relocation if required, and all work and materials required to provide the complete project as shown in the project drawings, including transportation costs.

8. 14" Diameter Auger-cast Concrete Piles with Reinforcement and Accessories (Bid Item No. 7)

- a. Measurement for the concrete piles and associated reinforcement and accessories to be paid for will be based on each concrete pile satisfactorily installed and accepted by the Owner.
- b. Payment for the concrete piles will be made at the Contract unit price, which price shall be full compensation for all material and services required for the concrete piles, reinforcing steel, site work including any backfill and compaction, testing, inspections, and all work and materials required to install the piles as shown in the project drawings, including transportation costs.

9. Access Platform, Stairs and Railing (Bid Item No. 8)

- a. Measurement for the access platform, stairs, railing and associated appurtenances will be based on each platform and associated appurtenances satisfactorily installed and accepted by the Owner.
- b. Payment for the access platform, stairs, railing and associated appurtenances will be made at the Contract unit price, which price shall be full compensation for all material and services required for the access platform stairs, protective railings, all required appurtenances, structural plans and calculations by a licensed Florida Professional Engineer for all access platforms, stairs, and railings, site work including any backfill and compaction, testing, inspections, finish grading and site restoration of the entire project site including but not limited to the

installation of any drainage swales or conveyance measures as shown on the plans, sodding, utility protection, utility relocation if required, and all work and materials required to provide the complete project as shown in the project drawings, including transportation costs.

10. Equipment Installation (Bid Item No. 9)

- a. Measurement of Installing electrical equipment will be based on the installation to the nearest ten percent submitted by the contractor and approved by the Engineer.
- b. Measurement Payment for Installing will be made at the Contract lump sum price for the size and type installed, which price and payment shall be full compensation for installation in locations indicated on the Construction Drawings which includes all equipment and all other work necessary to complete the installation as specified. Payment will be based on percentage of work completed during the pay period at time of pay application to the nearest 10% complete. The cumulative total shall not exceed the Lump Sum Bid Pay Item Amount.

11. Testing of Electrical Equipment (Bid Item No. 10)

- a. Measurement of testing of electrical equipment will not be made for payment and all items shall be included in the lump sum price.
- b. Payment for all labor, equipment and material for all work necessary and required for testing of the electrical equipment shall include but not be limited to; provision of fuel, load bank equipment, test equipment, operational testing NETA testing, and all incidental work required to satisfactorily complete this item.

12. Florida Power and Light (FPL) Allowance (Bid Item No. 11)

- a. Measurement for Florida Power and Light (FPL) Allowance is for items not indicated on drawings but may be required based on access to the vault room for medium voltage equipment, which should be performed by **FPL crew members only**. The allowance will not be made for payment and all items shall be included in the lump sum price.
- b. Payment for Florida Power and Light Allowance will be made at the actual cost of work performed by Florida Power & Light (FPL), verified by submittal of invoices from FPL as part of the payment application. Payment for all labor, equipment and material for all work necessary and required shall include but not be limited to; services required for FPL coordination, meetings, materials, equipment, restoration for all work in the utility vault and work required to complete the project that is not included in other payment items. Payment will be based on work completed during the pay period at time of pay application based on

the approved schedule of values. The cumulative total shall not exceed the lump sum bid pay item amount.

END OF SECTION

SECTION 01027

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Submit Applications for Payment to the Engineer in accordance with schedule established by Conditions of the Contract and Agreement between Owner and Contractor. Contractor shall use the Application and Certificate for Payment Form included in Section 00844 as the official pay request form.
- B. Related Requirements Described Elsewhere:
 - 1. Agreement.
 - 2. Progress Payments, Retainages, and Final Payment: General Conditions as amended by the Supplementary Conditions.
 - 3. Construction Progress Schedules: Section 01310.
 - 4. Schedule of Values: Section 01370.
 - 5. Contract Closeout: Section 01700.
 - 6. Project Record Documents: Section 01720.

1.02 FORMAT REQUIRED

- A. Submit applications typed on the form provided in Division 0, Section 00844: Application and Certificate for Payment Form, with itemized data typed on 8-1/2 inch x 11 inch or white paper continuation sheets.
- B. Provide itemized data on continuation sheets of format, schedules, line items, and values specified on the Application and Certificate for Payment Form. The Contractor shall use the item descriptions and contract values included in schedule of values, approved and accepted by the Engineer as a basis for preparation of the Application for Payment Form.

1.03 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in percent complete for each activity and dollar values to agree with respective percents.
3. Execute certification with signature of a responsible officer of Contractor.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of the Work, with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when Work has been performed or products stored. Round off values to nearest dollar, or as specified for Schedule of Values.
3. List each Change Order executed prior to date of submission, at the end of the continuation sheets. List by Change Order Number, and description, as for an original component item of the Work.
4. To receive approval for payment on component material stored on site, submit copies of the original invoices with the Application and Certificate for Payment.
5. As provided for in the Application and Certificate for Payment Form, the Contractor shall certify, for each current pay request, that all previous progress payments received from the Owner, under this Contract, have been applied by the Contractor to discharge in full, all obligations of the Contractor in connection with Work covered by prior Applications for Payment, and all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest, and encumbrances. Contractor shall attach to each Application and Certificate for Payment like affidavits by all Subcontractors.

1.04 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. Contractor shall submit suitable information, with a cover letter identifying:

1. Project.
2. Application number and date.
3. Detailed list of enclosures.
4. For stored products:
 - a. Item number and identification as shown on application.
 - b. Description of specific material.

- B. Submit one (1) copy of data and cover letter for each copy of application.
- C. The Contractor is to maintain an updated set of drawings to be used as record drawings in accordance with Section 01720: Project Record Documents. As a prerequisite for monthly progress payments, the Contractor is to exhibit the updated record drawings for review by the Owner and the Engineer.
- D. Each monthly application for payment shall incorporate the corresponding "monthly progress status report" and updated construction schedule, prepared in accordance with the requirements of Section 01310: Construction Progress Schedules.
- E. As a prerequisite for payment, Contractor shall submit a duly executed letter from surety consenting to payment due and progress to date.

1.05 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in application form as specified for progress payments. Provide information as required by the General Conditions and Section 01700: Contract Closeout.
- B. Furnish evidence of completed operations and insurance in accordance with the General Conditions.
- C. Provide close-out submittals as required by the General Conditions.

1.06 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the Engineer between the first (1st) and the tenth (10th) day after the end of each calendar month for which payment is requested as stipulated in the Agreement. Review the percents complete with the Engineer and resolve any conflicts or discrepancies.
- B. Number of copies for each Application for Payment: Five (5) copies plus additional copies for Contractor's needs.
- C. When the Engineer finds the Application and Certificate for Payment Form is properly completed and correct, he will execute the Certificate for Payment and transmit the forms to the Owner, with a copy to the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Provide and pay for field engineering service for Project.
1. Survey work required in execution of Work.
 2. Civil, structural, or other professional engineering services specified or required to execute Contractor's construction methods.
 3. The method of field staking for the construction of the Work shall be at the option of the Contractor. The Owner has provided the engineering survey necessary to establish reference points which in his judgement are necessary to enable the Contractor to proceed with his work.
 4. The accuracy of any method of staking shall be the responsibility of the Contractor. All engineering for vertical and horizontal control shall be the responsibility of the Contractor.
 5. The Contractor shall be held responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the Contractor, the Contractor shall not proceed with any work until he has established such points, marks, lines, and elevations as may be necessary for the prosecution of the Work.
 6. The Contractor shall retain the services of a registered land surveyor licensed in the State of Florida to identify existing control points and maintain a survey during construction.
- B. Related Requirements Described Elsewhere:
1. Summary of Project: Section 01010.
 2. Project Record Documents: Section 01720.

1.02 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. Qualified engineer or registered land surveyor, acceptable to the Owner and the Engineer.

- B. Registered professional engineer of the discipline required for the specific service on the Project, currently licensed in the State of Florida.

1.03 SURVEY REFERENCE POINTS

- A. Locate and protect control points prior to starting site work, and preserve all permanent reference points during construction.
 - 1. Make no changes or relocations without prior written notice to the Engineer.
 - 2. Report to the Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to replace Project control points which may be lost or destroyed at no additional cost to the Owner. Establish replacement based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

- A. Establish a minimum of two (2) permanent bench marks on site, referenced to data established by survey control points.
 - 1. Record locations, with horizontal and vertical data, on Project Record Documents.
- B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:
 - 1. Site improvements:
 - a. Stakes for grading, fill, and topsoil replacement.
 - b. Utility slopes and invert elevations.
 - 2. Building foundation and floor levels.
 - 3. Controlling lines and levels required for mechanical and electrical trades.
- C. From time to time, verify layouts by same methods.

1.05 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses as required in Section 01720.

1.06 SUBMITTALS

- A. Submit name and address of surveyor and professional engineer to the Engineer.
- B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.
- C. Submit certificate signed by a registered engineer or surveyor certifying that elevations and locations of improvements are in conformance with the Contract Documents, or if not in conformance, certify as to variances from the Contract Documents.
- D. Submit drawings showing locations of all structures constructed. This drawing shall be included with the Project Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01065

PERMITS AND FEES

PART 1 - GENERAL

- A. The CONTRACTOR shall secure and pay for **all** permits, fees and licenses related to his work, including but not limited to, necessary construction permits, as provided for in the General Conditions except as otherwise provided herein.

Permits By Contractor

- 1. Local Regulatory Agency Permit(s) (i.e., City, County, etc.). The Owner will reimburse the Contractor for any City required permits unless specified otherwise in the Supplemental General Conditions.
- B. The CONTRACTOR shall adhere to all permit requirements as contained in permits obtained by the OWNER and CONTRACTOR.
 - 1. FDEP Application for a Minor Modification (Applicable parts of Form 1 and 2A).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 STANDARDS AND ABBREVIATIONS

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

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

- B. Abbreviations:

AA	Aluminum Association
AAA	American Arbitration Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHO	The American Association of State Highway Officials
ABA	American Bar Association
ABMA	American Boiler Manufacturers Association
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIEE	American Institute of Electrical Engineers (Now IEEE)
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Condition Association
ANSI	American National Standard Institute
APA	American Plywood Association

API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ARI	American Refrigeration Institute
ASA	American Standards Association (Now ANSI)
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSCBC	American Standard Safety Code for Building Construction
ASSHTO	American Association of State Highway Transportation Officials
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CDA	Copper Development Association
CFS	Cubic Feet Per Second
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DOT Spec	Standard Specification for Road and Bridge Construction Florida Department of Transportation, 1982
E/A	Engineer and/or Architect
EDA	Economic Development Association
EI	Edison Electric Institute
EPA	Environmental Protection Agency
FAC	Florida Administrative Code
FCI	Fluid Control Institute
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
Fed Spec	Federal Specification
FPS	Feet Per Second
FS	Federal Standards
GPM	Gallons Per Minute
HMI	Hoist Manufacturers Institute
HP	Horsepower
HSBII	Hartford Steam Boiler Inspection and Insurance Co.
ID	Inside Diameter

IEEE	Institute of Electrical and Electronic Engineers
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
MGD	Million Gallons Per Day
MHI	Materials Handling Institute
MMA	Monorail Manufacturers Association
MOT	Maintenance of Traffic
N _a OCl	Sodium Hypochlorite
NBFU	National Board of Fire Underwriters
NBHA	National Builders' Hardware Association
NBS	National Bureau of Standards
NCSA	National Crushed Stone Association
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NLA	National Lime Association
NPC	National Plumbing Code
NPT	National Pipe Threads
NSC	National Safety Council
NSF	National Sanitation Foundation
OD	Outside Diameter
OSHA	U.S. Department of Labor, Occupational Safety and Health Act
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	United States Products Standards
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PSIG	Pounds per Square Inch Gauge
RAS	Return Activated Sludge
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SFWMD	South Florida Water Management District
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
SSPC	Structural Steel Painting Council
STA	Station (100 feet)
TDH	Total Dynamic Head
TH	Total Head
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
USASI or	United States of America Standards Institute

WAS Waste Activated Sludge

C. Additional abbreviations and symbols are shown on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01091

REFERENCE SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL

- A. 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 specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work 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 herein or shown on the Drawings shall be waived because of any provision of or omission from said standards or requirements.
- B. Assignment of Specialists. In certain instances, specification test requires (or implies) that specific work is to be assigned to specialist or expert entities who must be engaged for the performance of the 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. They are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of Work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of Contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of the Specifications, all Work specified herein shall conform to or exceed the requirements of such referenced documents which are not in conflict with the requirements of these Specifications or applicable codes.
- B. References herein to "Building Code" shall mean the Florida Building Code. The latest edition of the code as approved and used by the local agency as of the date of award as adopted by the agency having jurisdiction shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.
- C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall bid the most stringent requirements.

- D. Applicable Standard Specifications. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed. Requirements of the standards referenced in Section 01070, Paragraph 1.01B shall, at a minimum, be met when applicable.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01100

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 PUBLIC NUISANCE

- A. The Contractor shall not create a public nuisance including, but not limited to, encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.
- B. Sound levels measured by the Engineer shall not exceed 65 dBA on the jobsite. This sound level shall be measured at the nearest property line of the nearest residence. Sound levels in excess of these values are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Engineer or Owner for excessive noise shall not relieve the Contractor of the other portions of this Specification including, but not limited to, completion dates and bid amounts.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.02 CONSTRUCTION OPERATIONS ON PLANT PROPERTY

- A. The Contractor shall conduct access, hauling, filling, and storage operations as specified herein and as shown on the Contract Drawings.
 - 1. On-site spoil areas will become property of the Contractor and removed from the site.
- B. Construct all fill areas so runoff will not flood improved areas.
- C. Plant operations must remain unobstructed at all times.

1.03 EXISTING UTILITIES

- A. Pipe locations. All pipes shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.
- B. Utility Conflicts. Contractor must identify all locations where there is the possibility of conflicts with existing utilities. Contractor will promptly notify the Owner and Engineer in writing in accordance with these documents. Contractor acknowledges that resolving utility conflicts can sometimes require permitting. The Owner will grant additional days

to the Contractor to cover the length of unanticipated delay in writing. However, under no circumstances will the Contractor be eligible for remobilization costs.

1.04 LANDSCAPING & RESTORATION

- A. Contractor shall be responsible for replacing all landscaping disturbed during construction with landscaping of equal or better quality, quantity, material and size. The extent of existing landscaping is not shown on drawing and shall be the responsibility of Contractor to restore to conditions existing prior to commencement of work.

1.05 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by workmen.

1.06 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the Engineer. The costs for such test pits shall be borne by the Contractor.

1.07 JURISDICTIONAL DISPUTES

- A. It shall be the responsibility of the Contractor to pay all costs that may be required to perform any of the Work shown on the Drawings or specified herein in order to avoid any work stoppages due to jurisdictional disputes.

1.08 INCLEMENT WEATHER

- A. In the event of inclement weather, or whenever the Engineer directs; the Contractor shall, and shall cause subcontractors to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials have been damaged or injured by reason of failure on the part of the Contractor or any subcontractors to so protect the Work, such Work and materials shall be removed and replaced at the expense of the Contractor.

1.09 COORDINATION OF WORK

- A. The Contractor shall cooperate fully so as to eliminate or minimize the creation of conflicts. Adjustments from time to time may be required in the Contractor's work location and/or schedule provided a reasonable notice is given by the Owner's plant superintendent or Engineer.

1.10 TRAFFIC/PEDESTRIANS

- A. All chemicals used during project construction, or furnished for project operations, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of the State Department of Health, Florida Department of Environmental Protection and if required, also the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with the manufacturer's instructions or recommended use procedures.

1.11 SAFETY & HEALTH REGULATIONS

- A. The Contractor shall comply with the Department of Labor Safety & Health Regulations for construction promulgated under the Occupational Safety & Health Act of 1970, (PL 91-596) and under Section 107 of the Contract Work Hours & Safety Standards Act (PL 91-54).
- B. All equipment furnished and installed under this Contract shall comply to Part 1910, Occupational Safety & Health Standards & Amendments thereto.
- C. The Contractor shall comply with the Florida Trench Safety Act (90-96, Florida Law).

1.12 INSPECTION

- A. The authorized representatives and agents of the Environmental Protection Agency and Controlling State and Local Pollution Control Agencies shall be permitted to inspect all work, material, payrolls, personnel records, invoices of materials and any other relevant data and records. The Owner and Engineer shall be permitted access to any work area for the inspection of work and materials. The Owner may, at the Contractor's expense, order the uncovering or removal of any finished work if circumstances indicate faulty work or materials were used in the original installation. The Owner and Engineer shall also be permitted to inspect material invoices, payrolls or any other relevant data or records as may be necessary or required to satisfy the requirements of the Contract.

1.13 ENVIRONMENTAL PROTECTION

- A. General:
 - 1. Contractor shall comply with all Federal, State and Local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils,

bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter. In the event of conflict between such laws and regulations and the requirements of the Specifications, the more restrictive requirements shall apply. Environmental protection requirements specified in other Sections shall be considered as supplementing the requirements of this Section.

- i. Public Notice of Pollution: Any release of substance to the outdoor air, land or waters of the state at an installation (within the meaning of the Florida Statute Section 403.031(4), F.S.) at any level or quantity that is not authorized by law shall be reported to the Owner's Plant Superintendent, Engineer, any affected property owner, State Watch Office under FDEP requirements such as those contained in rules, permits, orders and variances, the general public, and local government (the Mayor, the chair of the City Commission, or the comparable senior elected official representing the municipality in which the installation is located, and the City Manager or comparable senior official in which the installation is located).
 - ii. Public notice per F.A.C., 62-4.161 shall occur within 48 hours of a reportable release or discovery of a reportable release. **Any FDEP and/or media notifications must be reviewed by the City and Engineer prior to being submitted or released.** Notices required to be submitted to the Department must be submitted via electronic delivery to pollution.notice@dep.state.fl.us. Notices required to be submitted to local governments, broadcast television affiliates, and newspapers of general circulation must be submitted via electronic or hand delivery. Notices required to be submitted to property owners must be submitted via mail, electronic delivery, or hand delivery unless the substance is present in surface waters of the state in which case the notice must be submitted to the general public in accordance with F.A.C. 62-4.161. Failure to provide the notification required by this rule shall be considered a violation of Department rule and subject to the imposition of penalties pursuant to section 403.161, F.S.
2. Failure of the Contractor to fulfill any of the requirements of this Section may result in the Owner ordering the stopping of construction operations.
 3. Failure on the part of the Contractor to perform the necessary measures to control erosion, siltation, and pollution will result in the Engineer notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the Engineer or CODB will stop the Work as provided above, or may proceed to have such measures performed by others. The cost of such work performed by others plus related fees by the Engineer will be deducted from monies due the Contractor on his Contract.

4. All erosion and pollution control features installed by the Contractor shall be acceptably maintained by the Contractor during the time that construction work is being done.
 5. Repair or replace damaged or inoperative erosion and pollution control devices as directed by the Engineer or the Project Manager.
 6. Where there is a high potential for erosion and possible water pollution, the Contractor shall not expose, by his construction methods or procedures, an area of erosive land at any one time larger than the minimum amount required for the proper and efficient construction operation. If the exposure of any incomplete work corresponding to the exposure period required for erosion is anticipated, temporary protective measures shall be taken to prevent the erosion or collapse of land in that immediate construction area.
- B. Erosion and Pollution Control Schedule: At or prior to the preconstruction meeting, the Contractor shall submit to the Owner for his information, three (3) copies of his erosion and pollution control work schedule. This schedule shall show the time relationship between phases of the Work which must be coordinated to reduce erosion and pollution, and shall describe construction practices and temporary control measures which will be used to minimize erosion and pollution. The schedule shall also show the Contractor's proposed method of erosion control on haul roads and borrow and material pits, and his plan for disposal of waste materials or other sources of pollution. Maps or other documents may also be required to show the proposed final surface gradient of proposed borrow pits, soil type base course pits, and waste areas. No work shall be started until the erosion and pollution control schedules and methods of operations have been submitted to the Owner for his information.
- C. Air Pollution Controls:
1. Contractor shall control dust caused by his operations in the construction of the Project, including but not specifically limited to the following:
 - a. Clearing, grubbing, and stripping.
 - b. Excavation and placement of embankment.
 - c. Cement and aggregate handling.
 - d. Limerock stabilization.
 - e. Use of haul roads.
 - f. Sandblasting or grinding.

1.14 SITE CLEANUP AND RESTORATION

- A. The Contractor shall keep the working area free at all times of tools, materials and equipment not essential to the progress of the Work. Debris, waste materials, and rubbish shall be properly disposed of and not allowed to accumulate. If the Contractor should fail to do this, the Owner will make the necessary arrangements to effect the cleanup by others and will back charge the cost to the Contractor. If such action becomes necessary on the part of and in the opinion of the Owner, the Owner will not be responsible for the inadvertent removal of material which the Contractor would not have disposed of had he effected the required cleanup.
- B. Where material or debris has washed or flowed into or been placed in watercourses, ditches, gutters, drains, catch basins, or elsewhere as result of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the Work, and the ditches, channels, drains etc., kept in a clean and neat condition.
- C. On or before the completion of the Work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations, in a neat and satisfactory condition.
- D. The Contractor shall restore the entire project site to its original or better condition, with the exception of any area(s) designated for alteration by the Contract Documents. The Contractor shall restore or replace; when and as directed, any public or private property damaged by his work, equipment, or employees to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration.
- D. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors and on completion of the Work shall deliver it undamaged and in fresh and new appearing condition.

1.16 LAWS AND REGULATIONS

- A. The Contractor shall give all notices and comply with all the laws, rules, regulations, ordinances, etc., that may be applicable at the time the Work is started on the project. Should the Contractor discover the Drawings or Specifications are contradictory to, or in variance with the above, he shall notify the Engineer immediately, in writing, in order that any required changes or modifications can be made. It is not the Contractor's

responsibility to make certain that the Drawings or Specifications are in non-compliance with any of the above; however, should he be aware of any existing discrepancy, or have reason to believe such may exist and performs work without proper notice to the Engineer, the Contractor shall pay any cost involved in making the necessary alterations or corrections.

1.17 CONTRACTOR'S USE OF PREMISES

- A. All project construction work will be accomplished on the Owner's property, public/private rights-of-way/easements or within temporary construction easements and the Contractor shall confine his activity to those designated areas. The Contractor shall not enter upon private property for any reason without securing prior permission from the property owner. Such permission, including any stipulations, shall be in writing and a copy shall be delivered to the Engineer prior to the Contractor's entry or occupation of the subject property. This requirement will be rigidly enforced, particularly with regard to the utilization of vacant areas adjacent to the work site for the storage of materials or parking equipment.
- B. The Contractor shall perform his work in such manner that he will not damage adjacent public or private property. Any damage to existing physical structures or utility services shall be repaired or restored promptly at no expense to the Owner.
- C. The Contractor shall avoid damage to and preserve all existing vegetation (grass, shrubs, trees, etc.) on or near the work area which do not, within reason, interfere with construction. The Contractor will be responsible for and required to replace or restore all such vegetation damaged or destroyed at no cost to the Owner. The Contractor will also be responsible for any unauthorized cutting or damage to trees, shrubs, etc., and also damage caused by careless operation of equipment, storage of materials and rutting or tracking of grass by equipment.
- D. The Contractor shall conduct access, hauling, filling, and storage operations as specified herein and as shown on the Contract Drawings.
 - 1. On-site borrow areas are designated as follows: Suitable material, as approved by Engineer, from excavations for project structures. Any additional borrow material required shall be provided by the Contractor from off-site.
 - 2. On-site spoil areas will become property of the Contractor and are to be disposed off-site.
- E. Construct all fill areas so runoff will not flood improved areas.
- F. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation, cooperation, and coordination with the Owner. Some such connections may have to be made during off-peak hours (late night or early morning hours). The Contractor shall give a minimum of 72 hours' notice to the Owner when tie-ins with the existing plant utilities are required.

- G. For major utility pipeline tie-ins and relocations, the Contractor shall submit a detailed Plan of Action for review and approval by the Owner and the Engineer. No major utility relocation or tie-ins shall proceed until the Plan of Action for that Work is approved.

1.18 HAZARDOUS LOCATIONS

- A. The Contractor shall be responsible for identification of hazardous locations, appropriate construction methods, and all other safety issues.

1.19 ADDITIONAL PROVISIONS

- A. The Contractor shall provide at his own cost all necessary temporary facilities for access to, and for protection of, all existing structures. The Contractor is responsible for all damage to existing structures, equipment, and facilities caused by his construction operations, and must repair all such damage when and as ordered by the Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall cooperate and coordinate with the Engineer and Owner to schedule and administer the preconstruction meeting, periodic progress meetings, and specifically called meetings throughout the progress of the Work. The Contractor shall:
 - a. Make physical arrangements for meetings.
 - b. Preside at Progress meetings.
 - c. 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.
4. The Contractor shall record the preconstruction meeting and each progress meeting in its entirety, and shall provide the Engineer with a regular compact disc (CD) or USB copy of such recording, having good quality and clarity, and a typed transcript of the minutes of each meeting. A copy of the minutes of each progress meeting shall be available five (5) business days after the meeting.

B. Related Requirements Described Elsewhere:

1. Construction Progress Schedules: Section 01310.
2. Shop Drawings, Working Drawings, and Samples: Section 01340.
3. Project Record Documents: Section 01720.

1.02 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: A local site, convenient for all parties, designated by the Owner.
- C. Attendance:
 - 1. Owner's Plant Superintendent.
 - 2. Engineer and his professional consultants.
 - 3. Contractor and his superintendent.
 - 4. Major subcontractors.
 - 5. Representatives of major suppliers and manufacturers as appropriate.
 - 6. Others as requested by the Contractor, Owner, and Engineer.
- D. The Engineer shall preside at the preconstruction meeting. The Engineer shall provide for keeping minutes and distribution of minutes to the Owner, Contractor and others. 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. Contractor shall provide a preliminary construction schedule to demonstrate complete fulfillment of contract requirements utilizing critical path method at the Pre-Construction Meeting.
- F. 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.
 - 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.
 - e. 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. Guarantees on completed work.
19. Equipment to be used.
20. Project layout and staking of work.
21. Project inspection.
22. Labor requirements.
23. Laboratory testing of material requirements.
24. Provisions for material stored on site and monthly inventory of materials stored.
25. Requirements of other organizations such as utilities, railroads, highway departments, building departments.
26. Rights-of-way and easements.
27. Housekeeping procedures.
28. Liquidated damages.
29. Posting of signs and installation of Project Sign.
30. Pay request submittal dates.
31. Equal opportunity requirements.

1.03 PROGRESS MEETINGS

- A. The Contractor 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.
- B. Hold called meetings as required by progress of the Work.
- C. Location of the meetings: Owner's Offices.
- D. Attendance:
 1. Engineer and his professional Subconsultants as needed.
 2. Contractor and his Superintendent.

3. Owner's Plant Superintendent.
 4. Subcontractors (active on the site, as appropriate to the agenda).
 5. Others as appropriate to the agenda (suppliers, manufacturers, other subcontractors, etc.).
- E. The Contractor shall preside at the meetings and provide for keeping minutes and distribution of the minutes to the Owner, Engineer, and others. The purpose of the meetings will be to review the progress of the Work. Contractor shall provide updated progress construction schedule at each progress meeting.
- 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 shall attend progress meetings and shall 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 shall provide a current submittal log at each progress meeting in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Promptly after award of the Contract, prepare and submit to the Engineer estimated construction progress schedules demonstrating complete fulfillment of all Contract requirements utilizing a Critical Path Method (hereinafter referred to as CPM) in planning, coordinating, and performing the Work under this Contract (including all activities of subcontractors, equipment vendors, and suppliers). The principles and definition of CPM terms used herein shall be as set forth in the Associated General Contractors of America (AGC) publication, Construction Planning & Scheduling Manual, Copyright 1984, but the provisions of this Specification shall govern the planning, coordinating, and performance of the Work.
2. Submit revised progress schedules on a monthly basis. No partial payments shall be approved until there is an approved construction progress schedule on hand.

B. Related Requirements Described Elsewhere:

1. General Conditions: Section 00700.
2. Summary of Project: Section 01010.
3. Project Meetings: Section 01200.
4. Applications for Payment: Section 01027.
5. Shop Drawings, Working Drawings, and Samples: Section 01340.
6. Schedule of Values: Section 01370.

1.02 QUALIFICATIONS

- A. A statement of computerized CPM capability shall be submitted in writing prior to the award of the Contract and shall verify that either Contractor's organization has in-house capability to use the CPM technique or that Contractor will employ a CPM consultant who is so qualified.

- B. In-house capability shall be verified by description of construction projects to which Contractor or Contractor's consultant has successfully applied computerized CPM and shall include at least two (2) projects valued at least half the expected value of this project.

1.03 FORM OF SCHEDULES

- A. Prepare schedules in the form of a horizontal bar chart.
 - 1. Provide a separate horizontal bar for each trade or operation within each structure or item.
 - 2. Horizontal time scale:
 - a) Show starting and completion dates for each activity in terms of the number of days after Notice to Proceed. All completion dates shown shall be within the period specified for contract completion.
 - b) Identify the first work day of each month.
 - 3. Scale and Spacing: Sufficient to allow space for notations and future revisions.
 - 4. Maximum Sheet Size: 24 inches by 36 inches.
- B. Format of Listings: The chronological order of the start of each item of work for each structure.
- C. Identification of Listings: By major specification section numbers as applicable and by structure.
- D. Construction Progress Schedules shall be computer generated using software equal to Primavera Project Planner for Windows by Primavera Systems, Inc., Microsoft Project, or approved equal.

1.04 CONTENT OF SCHEDULES

- A. Construction Progress Schedule:
 - 1. Show the complete sequence of construction by activity and by structure.
 - 2. Show the dates for the beginning and completion of each major element of construction in no more than a two (2) week increment scale. Specifically list, but do not limit to:
 - a. Shop Drawing Schedule.
 - b. Installation of temporary facilities.

- c. Site clearing.
 - d. Site utilities.
 - e. Foundation work.
 - f. Subcontractor work.
 - g. Equipment installations.
 - h. Finishings.
 - i. Electrical.
 - j. Operator training and receipt of operation and maintenance manuals.
 - k. Equipment Testing.
 - l. Equipment and process start-up.
 - m. Receipt of spare parts.
 - n. Project closeout.
- 3. Show projected percentage of completion for each item, as of the first day of each month.
 - 4. Show projected dollar cash flow requirements for each month of construction and for each activity as indicated by the approved Schedule of Values.
- B. Submittals for construction progress schedules shall be in accordance with Section 01340: Shop Drawings, Work Drawings, and Samples. Indicate on the schedule the following:
- 1. The dates for Contractor's submittals.
 - 2. The dates submittals will be required for Owner-furnished products, if applicable.
 - 3. The dates approved submittals will be required from the Engineer.
- C. A typewritten list of all long lead items (equipment, materials, etc.).
- D. To the extent that the progress schedule or any revised progress schedule shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been approved by the Engineer. Failure to include any element

of work required for the performance of this Contract shall not excuse the Contractor from completing all work required within any applicable completion date, notwithstanding the Engineer's approval of the progress schedule.

- E. Scheduling Constraints: The work within Owner's property must be completed within the maximum number of days start to finish, as indicated in the Contract. Additionally, work must proceed on a continuous basis, without stoppages, except for nights and weekends. There shall be no lapses between phases of construction.

1.05 PROGRESS REVISIONS

- A. Indicate progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
 - 1. Major changes in scope.
 - 2. Activities modified since previous submission.
 - 3. Revised projections of progress and completion.
 - 4. Other identifiable changes.
- C. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the impact on the schedule.
 - 2. Corrective action recommended, and its effect.
 - 3. The effect of changes on schedules of other prime contractors.
- D. If the Work falls behind the critical path schedule by two (2) weeks or more, the Contractor shall prepare a recovery schedule.

1.06 SUBMISSIONS

- A. Submittal Requirements.
 - 1. Logic network and/or time-phased bar chart, computer generated.
 - 2. Computerized network analysis:
 - a. Sort by early start
 - b. Sort by float
 - c. Sort by predecessor/successor

3. Narrative description of the logic and reasoning of the schedule.

B. Time of Submittals.

Within ten (10) working days after Notice to Proceed, Contractor shall submit a network diagram describing the activities to be accomplished in the project and their dependency relationships, (predecessor/successor) as well as a tabulated schedule as herein defined. The total length of time indicated on the initial CPM schedule shall equal the exact number of days in the Contract Time as defined in Section 00500: Agreement. The schedule produced and submitted shall also indicate calendar dates, including project starting and completion dates, based on the Contract Commencement and completion dates indicated in the Notice to Proceed. The Engineer will complete the review of the complete schedule within fifteen (15) working days after receipt. During the review process, the Engineer may meet with a representative of Contractor to review the proposed plan and schedule to discuss any clarifications that may be necessary.

C. Within ten (10) working days after the conclusion of the Engineer's review period, Contractor shall revise the network diagram as required and resubmit the network diagram and a tabulated schedule produced therefrom. The revised network diagram and tabulated schedule shall be reviewed and accepted or rejected by the Engineer within fifteen (15) working days after receipt. The network diagram and tabulated schedule, when accepted by the Engineer, shall constitute the project work schedule unless a revised schedule is required due to substantial changes in the Work, a change in Contract Time or a recovery schedule is required and requested.

D. Acceptance. The finalized schedule will be acceptable to the Engineer when, in the opinion of the Engineer, it demonstrates an orderly progression of the Work to completion in accordance with the Contract Documents. Such acceptance will neither impose on the Engineer responsibility for the progress or scheduling of the Work nor relieve Contractor from full responsibility therefore. The finalized schedule of shop drawing submittals will be acceptable to the Engineer when, in the opinion of the Engineer, it demonstrates a workable arrangement for processing the submittals in accordance with the requirements. The finalized Schedule of Values (lump sum price breakdown), as applicable, will be acceptable to the Engineer as to form and content when, in the opinion of the Engineer, it demonstrates a substantial basis for equitably distributing the Contract Price. When the network diagram and tabulated schedule have been accepted, the Contractor shall submit to the Engineer six (6) copies of the time-scaled network diagram, six (6) copies of a computerized tabulated schedule in which the activities have been sequenced by numbers, six (6) copies of a computerized tabulated schedule in which the activities have been sequenced by early starting date, and six (6) copies of a computerized, tabulated schedule in which activities have been sequenced by total float, and six (6) copies sorted by predecessor/successor.

E. Revised Work Schedules. Contractor, if requested by the Engineer, shall provide a revised work schedule if, at any time, the Engineer considers the completion date to be

in jeopardy because of "activities behind schedule." The revised work schedule shall include a new diagram and tabulated schedule conforming to the requirements of Paragraph 1.09 herein, designed to show how Contractor intends to accomplish the Work to meet the completion date. The form and method employed by Contractor shall be the same as for the original work schedule. No payment will be made if activities fall more than two (2) weeks behind schedule and a revised work schedule is not furnished.

- F. Schedule Revisions. The Engineer may require Contractor to modify any portions of the work schedule that become infeasible because of "activities behind schedule" or for any other valid reason. An activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule. No change may be made to the sequence, duration, or relationships of any activity without approval of the Engineer.

1.07 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to:
 - 1. Engineer.
 - 2. Jobsite file.
 - 3. Subcontractors.
 - 4. Other concerned parties.
 - 5. Owner (two copies).
- B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

1.08 CHANGE ORDERS

- A. Upon approval of a change order, the approved changes shall be reflected in the next scheduled revision or update submittal of the construction progress schedule by the Contractor.

1.09 CPM STANDARDS

- A. CPM, as required by this Section, shall be interpreted to be generally as outlined in the Associated General Contractor's (AGC) publication, Construction Planning & Scheduling Manual, Copyright 1984.
- B. Work schedules shall include a graphic network and computerized, tabulated schedules as described below. To be acceptable the schedule must demonstrate the following:
 - 1. A logical succession of work from start to finish.

2. Definition of each activity. Activities shall be identified by major specification section numbers, as applicable, and by major structure.
3. A logical flow of work crews/equipment (crews are to be defined by manpower category and man-hours; equipment by type and hours).
4. Show all work activities and interfaces including submittals as well as major material and equipment deliveries.

C. Networks.

1. The CPM network, or diagram, shall be in the form of a time-scaled diagram of the customary activity-on-type and may be divided into a number of separate pages with suitable notation relating the interface points among the pages. Notation on each activity line shall include a brief work description and a duration, as described in Paragraph 1.09, D. herein.
2. All construction activities and procurement shall be indicated in a time-scaled format, and a calendar shall be shown on all sheets along the entire sheet length. Each activity arrow shall be plotted so the beginning and completion dates of said activity can be determined graphically by comparison with the calendar scale. All activities shall be shown using the symbols that clearly distinguish between critical path activities, non-critical path activities, and float for each non-critical activity. All non-critical path activities shall show estimated performances time and float time in scaled form.

- D. The duration indicated for each activity shall be in calendar days and shall represent the single best time considering the scope of the work and resources planned for the activity including time for inclement weather. Except for certain non-labor activities, such as curing concrete or delivering materials, activity durations shall not exceed fourteen (14) days nor be less than one (1) day unless otherwise accepted by the Engineer.

- E. Tabulated Schedules. The initial schedule shall include the following minimum data for each activity.

1. Activity Beginning and Ending Numbers (i-j numbers) (single activity numbers may be used).
2. Duration.
3. Activity Description.
4. Early Start Date (Calendar Dated).
5. Late Start Date (Calendar Dated).

6. Early Finish Date (Calendar Dated).
 7. Late Finish Date (Calendar Dated).
 8. Identified Critical Path.
 9. Total Float (Note: No activity may show more than 20 days float).
 10. Cost of Activity.
 11. Equipment Hours, by type; Man-Power Hours, by crew or trade.
- F. Project Information. Each tabulation shall be prefaced with the following summary data.
1. Project Name.
 2. Contractor.
 3. Type of Tabulation (Initial or Updated).
 4. Project Duration.
 5. Project Scheduled Completion Date.
 6. Effective or Starting Date of the Schedule.
 7. New Project Completion Date and Project Status (if an updated or revised schedule).
 8. Actual Start Date and Actual Finish Date (for all updated schedules.)

1.10 SCHEDULE MONITORING

- A. At not less than monthly intervals or when specifically requested by Engineer, Contractor shall submit to the Engineer a computer printout of an updated schedule for those activities that remain to be completed. Typically, the updated schedule will be submitted with the application for payment as specified below.
- B. The updated schedule shall be submitted in the form, sequence, and number of copies requested for the initial schedule.

1.11 PROGRESS MEETINGS

For the monthly progress meeting, Contractor shall submit a revised CPM schedule and a three-week look-ahead schedule, showing all activities completed, in progress, uncompleted, or

scheduled to be worked during the weeks. The three weeks include the current week plus the next two weeks. All activities shall be from the approved CPM and must be as shown on the CPM unless behind or ahead of schedule. One copy of the revised CPM schedule shall be submitted with each copy of that month's application for payment, six (6) copies minimum.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01340

SHOP DRAWINGS, WORKING DRAWINGS, AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall submit to the Engineer for review and approval, such Shop Drawings, Test Reports, and Product Data on materials and equipment (hereinafter in this Section called Data), and material samples (hereinafter in this Section called Samples) as are required for the proper control of work, including but not limited to those Shop Drawings, Data, and Samples for materials and equipment specified elsewhere in the Specifications and in the Drawings.
2. Within fourteen (14) calendar days after the Notice to Proceed, the Contractor shall submit to the Engineer a complete list of preliminary Data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Contract Documents. **This procedure is required in order to expedite final review of Shop Drawings.**
3. The general procedure for shop drawing and submittal review includes: Contractor to review prior to submitting to the Engineer (1.02 under this section), Engineer reviews and approves, City review and approves (with City stamp), Engineer incorporates any City comments, and returns to the Contractor. No work or materials shall be ordered (1.02, D under this section) without the approval and stamp by both the Engineer and City.
4. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:
 - a. Submittal description and number assigned.
 - b. Date to Engineer.
 - c. Date returned to Contractor (from Engineer).
 - d. Status of submittal (Approved, Approved as Noted, Amend and Resubmit, and Rejected).

- e. Date of resubmittal and return (as applicable).
- f. Date material release (for fabrication).
- g. Projected date of fabrication.
- h. Projected date of delivery to site.
- i. Status of O&M manuals submittal.
- j. Specification Section.
- k. Drawings sheet number.

B. Related Requirements Described Elsewhere:

- 1. General Conditions
- 2. Shop Drawing Submittal Form: Section 00847.
- 3. Construction Progress Schedules: Section 01310.
- 4. Material and Equipment: Section 01600.
- 5. Project Record Documents: Section 01720.

1.02 CONTRACTOR'S RESPONSIBILITY

A. It is the responsibility of the Contractor to check all drawings, data and samples prepared before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear the Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents. If the Contractor takes exception to the specifications, the Contractor shall note the exception in the letter of transmittal to the Engineer.

B. Determine and verify:

- 1. Field measurements.
- 2. Field construction criteria
- 3. Catalog numbers and similar data.
- 4. Conformance with Specifications.

- C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning and ending of manufacture, testing, and installation of materials, supplies, and equipment. This schedule shall indicate those that are critical to the progress schedule.
- D. The Contractor shall not begin any of the work covered by a Shop Drawing, Data, or a Sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, with approval from both the Engineer and the City.
- E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking and appropriate action from the time the Engineer receives them. The City will also review submittals during this review period.
- F. 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, Project Data, and Sample submitted.
 - 5. Notification of Deviations from Contract Documents.
 - a. The Contractor shall indicate in **bold type** at the top of the cover sheet of submittal of shop drawing if there is a deviation from the Drawings, Specifications, or referenced specifications or codes.
 - b. The Contractor shall also list any deviations from the Drawings, Specifications, or referenced specifications or codes and identify in green ink prominently on the applicable Shop Drawings.
 - 6. Submittal Log Number conforming to Specification Section Number.
- G. The Contractor shall submit seven (7) copies of descriptive or product data information and Shop Drawings to the Engineer plus the number of copies which the Contractor requires returned. All blueprint Shop Drawings shall be submitted with one (1) set of mylar reproducibles and the same number of prints as Shop Drawings, plus the number of copies which the Contractor requires returned. The Engineer will review the blueprints and return to the Contractor the set of marked-up mylar reproducibles with appropriate review comments.

- H. 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 the Engineer of the necessary Shop Drawings.
- I. The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposes to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of the Drawings and Specifications.
- J. The Contractor shall not use Shop Drawings as a means of proposing alternate items to demonstrate compliance with the Drawings and Specifications.
- K. Each submittal will bear a stamp indicating that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal as illustrated below.

<p>(OWNER'S NAME) (PROJECT NAME) (PROJECT NUMBER)</p> <p>SHOP DRAWING NO.: _____</p> <p>SPECIFICATION SECTION: _____ DRAWING NO. _____</p> <p>WITH RESPECT TO THIS SHOP DRAWING OR SAMPLE, I HAVE DETERMINED AND VERIFIED ALL QUANTITIES, DIMENSIONS, SPECIFIED PERFORMANCE CRITERIA, INSTALLATION REQUIREMENTS, MATERIALS, CATALOG NUMBERS, AND SIMILAR DATA WITH RESPECT THERETO AND REVIEWED OR COORDINATED THIS SHOP DRAWING OR SAMPLE WITH OTHER SHOP DRAWINGS AND SAMPLES AND WITH THE REQUIREMENTS OF THE WORK AND THE CONTRACT DOCUMENTS.</p> <p>_____ NO VARIATION FROM CONTRACT DOCUMENTS</p> <p>_____ VARIATION FROM CONTRACT DOCUMENTS AS SHOWN</p> <p>(CONTRACTOR'S NAME) (CONTRACTOR'S ADDRESS)</p> <p>BY: _____ DATE: _____</p> <p style="text-align: center;">AUTHORIZED SIGNATURE</p>

- L. Drawings and schedules shall be checked and coordinated with the work of all trades and sub-contractors involved, before they are submitted for review by the Engineer and

shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS

- A. The Engineer's review of Shop Drawings, Data, and Samples as submitted by the Contractor will be to determine if the items(s) generally conforms to the information in the Contract Documents and is compatible with the design concept. The Engineer's review and exceptions, if any, will not constitute an approval of dimensions, connections, quantities, and details of the material, equipment, device, or item shown.
- B. The review of drawings and schedules will be general, and shall not be construed:
 - 1. As permitting any departure from the Contract Documents.
 - 2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials.
 - 3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.
- C. If the drawings or schedules as submitted describe variations and show a departure from the Contract Documents which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or contract time, the Engineer may return the reviewed drawings without noting an exception.
- D. "Approved As Noted" - Contractor shall incorporate Engineer's comments into the submittal before release to manufacturer. The Contractor shall send a letter to the Engineer acknowledging the comments and their incorporation into the Shop Drawing.
- E. "Amend And Resubmit" - Contractor shall resubmit the Shop Drawing to the Engineer. The resubmittal shall incorporate the Engineer's comments highlighted on the Shop Drawing.
- F. "Rejected" - Contractor shall correct, revise and resubmit Shop Drawing for review by Engineer.
- G. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.
- H. If the Contractor considers any correction indicated on the drawings to constitute a change to the Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

- I. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
 - J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items for:
 - 1. Systems.
 - 2. Processes.
 - 3. As indicated in specific Specifications Sections.
- All drawings, schematics, manufacturer's product Data, certifications, and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interface review.
- K. Only the Engineer shall utilize the color "red" in marking Shop Drawing submittals.
 - L. Shop drawing and submittal data shall be reviewed by the Engineer for each original submittal and first resubmittal; thereafter review time for subsequent resubmittals shall be charged to the Contractor and the Contractor shall reimburse the Owner for services rendered by the Engineer as specified in the Supplementary Conditions.

1.04 SHOP DRAWINGS

- A. When used in the Contract Documents, the term "Shop Drawing" shall be considered to mean Contractor's plans for materials and equipment which become an integral part of the Project. Shop Drawings shall be complete and detailed and shall consist of fabrication, erection, setting and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams. Catalogs cuts, catalogs, pamphlets, descriptive literature, and performance and test data shall be considered only as supportive information to required Shop Drawings as defined above. As used herein, the term "manufactured" applies to standard units usually mass-produced; and "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements.
- B. Manufacturer's catalog sheets, brochures, diagrams, illustrations, and other standard descriptive data shall be clearly marked to identify pertinent materials, products, or models. Delete information which is not applicable to the Work by striking or cross-hatching.
- C. Each Shop Drawing shall be submitted with an 8-1/2" by 11" cover sheet which shall include a title block for the submittal. Each Shop Drawing cover sheet shall have a blank

area 3-1/2 inches high by 4-1/2 inches wide, located adjacent to the title block. The title block/cover sheet shall display the following:

1. Project Title and Number.
 2. Name of project building or structure.
 3. Number and title of the Shop Drawing.
 4. Date of Shop Drawing or revision.
 5. Name of Contractor and subcontractor submitting drawing.
 6. Supplier/manufacturer.
 7. Separate detailer when pertinent.
 8. Specification title and Section number.
 9. Applicable Drawing number.
- D. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog data sheets, catalog cuts, performance curves, diagrams, verification of conformance with applicable standards or codes, materials of construction, and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish, and all other pertinent Data.
- E. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, and address, and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.
- F. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the Work in accordance with the Contract, even though such drawings have been reviewed.
- G. All manufacturers or equipment suppliers who propose to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five (5) installations where identical equipment has been installed and has been in operation for a period of at least two (2) years unless specified otherwise in the Specification Section applicable.

1.05 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "Working Drawings" shall be considered to mean the Contractor's plan for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and falsework for underpinning, and for such other work as may be required for construction but does not become an integral part of the Project.
- B. Copies of working drawings as noted in paragraph 1.05 A. above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for the Work.
- C. Working Drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida, and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks to new or existing work are assumed by the Contractor; the Owner and Engineer shall have no responsibility therefor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Submit to the Engineer an itemized Schedule of Values, corresponding to the bid items, which totals the bid amount for the Work, at the Pre-Construction Conference, and as otherwise specified or requested to be submitted earlier as evidence of the Apparent Low Bidder's qualifications.
2. Upon request of the Engineer support for the values will be provided with data which will substantiate their correctness. The data shall include, but not be limited to quantity of materials, all sub-elements of the activity, and their units of measure.
3. The Schedule of Values shall establish the actual value for each activity of the Work to be completed taken from the approved Critical Path Method (CPM) Construction Schedule, and shall be used as the basis for the Contractor's Applications for Payment.

B. Related Requirements Described Elsewhere:

1. Conditions of the Construction Contract.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule on 8-1/2 inch x 11 inch white paper. Contractor's standard forms and computer printouts may be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of project and location.
2. Owner and purchase order number.
3. Engineer and project number.
4. Name and address of Contractor.
5. Contract designation.
6. Date of submission.

- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing item prices for progress payments during construction.
- C. Identify each line item with the number and the title of the respective section of the Specifications.
- D. For each major item of the Work, list sub-values of major products or operations under the major item.
- E. For the various portions of the Work:
 - 1. The amount for each item shall reflect a total installed cost including a directly proportional amount of the Contractor's overhead and profit.
 - 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials. Payment for materials shall be limited to the invoiced amount only.
 - b. The total installed value.
- F. Round off figures to nearest dollar amount.
- G. The sum of the costs of all items listed in the schedule shall equal the total Contract Price.
- H. For each item which has an installed value of more than \$15,000, provide a breakdown of costs to list major products or operations under each item.

1.03 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a separate schedule of unit prices for materials to be stored on site and for those materials incorporated into the Work for which progress payments will be requested.
- B. Format shall parallel that shown in Section 00846: Materials Stored On Site Form and Section 00845: Schedule of Values Form.
- C. The unit values for the materials shall be broken down into:
 - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.

- D. Only materials unique to the project may be billed when stored on site. Materials of standard use such as conduit, wire, small-diameter pipe, steel, etc., shall not be accepted for payment.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

1.04 REVIEW AND RESUBMITTAL

- A. After review by Engineer, revise and resubmit Schedule of Values and Schedule of Unit Material Values as required.
- B. Resubmit revised schedules in same manner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Scope of Work: The Contractor shall employ a competent photographer to take construction record photographs prior to start of work and periodically during the course of the Work. All photographs shall be taken digitally and provided to the Owner on a flash drive.
- B. Related Requirements Described Elsewhere:
 - 1. Project Requirements: Section 01000
 - 2. Summary of Project: Section 01010
 - 3. As-Built/Record Documents: Section 01720

1.02 PHOTOGRAPHY REQUIRED

- A. Photographs taken in conformance with this Section shall be furnished to the Engineer with each pay request.
- B. Photographs shall be taken at each of the major stages of construction and as directed by the Engineer.
- C. Non-Aerial photographs may be taken by the Contractor's personnel but must be of professional quality as herein specified. Photographs which are deemed unsatisfactory by the Engineer will be rejected and retakes will be required at no additional cost to the Owner.
- D. Views and Quantities Required:
 - 1. Six (6) prints of one (1) view of each activity as directed by the Resident Project Representative, up to a limit of fifteen (15) activities photographed per month.
 - 2. Six (6) prints of five (5) views of overall Project site monthly, as directed by the Resident Project Representative.

E. Digital Files:

1. The photographer shall maintain digital files of the entire Project and then shall convey the digital files to the Owner at the completion of the Project.
2. The photographer shall agree to furnish additional prints to Owner and the Engineer at commercial rates applicable at time of purchase.

1.03 COST OF PHOTOGRAPHY

- A. The Contractor shall pay costs for specified photography and prints. Parties requiring additional photography or prints will pay the photographer directly.

PART 2 - PRODUCTS

2.01 PRINTS

A. Type of Print:

1. Paper: Single weight, color print paper.
2. Finish: Smooth surface, glossy.
3. Size: 8-inch x 10-inch for construction photos and preliminary aerial photos, 16 inch x 20 inch for selected aerial photos.

B. Identify each print on back, listing:

1. Name of project.
2. Detailed description of view, including point from which exposure made, compass direction of view, vertical direction of view (horizontal, looking up, looking down, etc.), identification of main features in view and any other data and information pertinent to the purpose and identification the exposure photographer feels necessary to include.
3. Date and time of exposure.
4. Name and address of photographer.
5. Photographer's numbered identification of exposure.
6. Weather conditions under which exposure made.

C. Print Mounting

1. Each print to be inserted in a clear plastic envelope designed for the purpose.
 - a. Print deterioration not to be caused by envelope material or fabrication.
 - b. Designed to prevent print from accidentally slipping out of the envelope.
 - c. Front and back of print to be visible through the plastic envelope.
 - d. Permit convenience removal and insertion of print.
 - e. To have 1-inch hinged binding edge suitable for binder insertion.

PART 3 - EXECUTION

3.01 TECHNIQUE

- A. Factual Presentation.
- B. Correct exposure and focus.
 1. High resolution and sharpness.
 2. Maximum depth-of-field.
 3. Minimum distortion.

3.02 VIEWS REQUIRED

- A. Photograph from locations to adequately illustrate condition of construction and state of progress.
 1. At successive periods of photography, take at least one photograph from the same overall view as previously photographed.
 2. Consult with the Engineer at each period of photography for instructions concerning views required.

3.03 DELIVERY OF PRINTS

- A. Deliver prints to the Owner to accompany each Application For Payment.

B. Distribution of construction prints as soon as processed is anticipated to be as follows:

1. Owner (two (2) sets)
2. Engineer (two (2) sets)
3. Project record file (one (1) set to be stored by Contractor until the end of the project which shall be delivered with Project Record Documents as specified in Section 01720).
4. Contractor (one (1) set)

END OF SECTION

SECTION 01390

COLOR DVD PRECONSTRUCTION RECORD

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Prior to commencing work, the Contractor shall have a continuous color DVD recording taken along the entire length of the Project and at all proposed construction sites within the Project area to serve as a record of pre-construction conditions. Contractor shall provide video of all manufacturer's and contractor training required in Section 01650. Video and audio shall be standard DVD done in standard MPEG2 format. Audio portion shall describe the location of the video footage.
- B. Contractor to lay out Project along with pipe alignment and station points prior to video.

1.02 QUALITY ASSURANCE

- A. The Contractor shall engage the services of a professional electrographer. The color DVD shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business or preconstruction color DVD documentation.
- B. The electrographer shall furnish to the Engineer a list of all equipment to be used for the DVD, i.e., manufacturer's name, model number, specifications and other pertinent information.
- C. Additional information to be furnished by the electrographer are the names and addresses of two references that the electrographer has performed color DVD for, on projects of a similar nature, within the last 12 months.
- D. Owner's Representative must be present during filming. Provide Owner forty-eight (48) hours notice prior to start of filming.
- E. No construction shall begin prior to review and approval of the DVD covering the construction area by the Owner and Engineer. The Engineer shall have the authority to reject all or any portion of a DVD not conforming to specifications and order that it be redone at no additional charge.
- F. The Contractor shall reschedule unacceptable coverage within five (5) days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the DVD coverage.
- G. DVD shall not be made more than ninety (90) days prior to construction in any area. All DVDs and written records shall become property of Owner.

PART 2 - PRODUCTS

2.01 DVD

- A. DVD shall be new. Reprocessed DVDs will not be acceptable.

PART 3 - EXECUTION

3.01 EQUIPMENT

- A. All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor.
- B. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion and interruptions.
- C. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be more than ten (10) feet. In some instances, DVD coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance provided by the Contractor.
- D. The color video camera used in the recording system shall have a horizontal resolution of 350 lines at center, a luminance signal to noise ratio of 45 dB and a minimum illumination requirement of one (1) foot candle.

3.02 RECORDED INFORMATION - AUDIO

- A. Each DVD shall begin with the current date, project name and municipality and be followed by the general location, i.e., viewing side and direction of progress. The audio track shall consist of an original live recording. The recording shall contain the narrative commentary of the electrographer, recorded simultaneously with his fixed elevation video record of the zone of influence of construction.
- B. The Owner and Engineer reserves the right to supplement the audio portion of the DVD as deemed necessary. A representative of the Owner or Engineer shall be selected to provide such narrative.

3.03 RECORDED INFORMATION - VIDEO

- A. All video recordings shall, by electronic means, display on the screen the time of day, the month, day and year of the recording. This time and date information must be continuously and simultaneously generated with the actual recording.
- B. Each DVD shall have a log of that DVD's contents. The log shall describe the various segments of coverage contained on that DVD in terms of the names of streets or easements, coverage beginning and end, directions of coverage, video unit counter numbers, engineering stationing numbers and the date.

3.04 LIGHTING

- A. All video shall be done during time of good visibility. No recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.

3.05 SPEED OF TRAVEL

- A. The rate of speed in the general direction of travel of the vehicle used during recording shall not exceed 44 feet per minute. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object.

3.06 AREA OF COVERAGE

- A. Video coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio coverage. Such coverage shall include, but not be limited to, existing driveways, sidewalks, curbs, pavements, ditches, mailboxes, landscaping, culverts, fences, signs, and headwalls within the area covered, all the way to the right-of-way line and include station points and addresses.

END OF SECTION

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Contractor will employ and pay for services of an Independent Testing Laboratory to perform testing specifically indicated on the Contract Documents or specified in the Specifications and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.
2. The Contractor shall provide Engineer with all test results herein within five (5) days of receipt.

B. Related Requirements Described Elsewhere:

1. Conditions of the Contract.
2. Respective section of the Specifications: Certification of products.
3. Each Specification section listed: Laboratory tests required, and standards for testing.
4. Testing laboratory inspection, sampling and testing is required for, but not limited to the following:
 - a. Generator testing.
 - b. Excavating, Backfilling, and Compaction.
 - c. Stabilized Sub-base.
 - d. Cast-in-Place Concrete: Section 03300.

C. The following schedule defines the responsibilities of various tests.

Test	Notes	Paid for By
Generator testing	Load bank, NETA and emissions testing.	Contractor
Soil Compaction	Pipe Work	City
Settlement Monitoring	As required by testing laboratory	Contractor
Concrete	Slump test each delivery and compression test five cylinders every 50 C.Y. minimum.	City

D. Additional Tests: In the event that first test samples do not meet the applicable material specification, the Contractor shall take measures to conform the material and equipment to the Specifications.

1.02 LABORATORY DUTIES: LIMITATIONS OF AUTHORITY

- A. Cooperate with Engineer and Contractor; provide qualified personnel promptly on notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specific standards; ASTM, other recognized authorities, and as specified.
 - 2. Determine and report on compliance with requirements of Contract Documents.
- C. Promptly notify the Engineer and Contractor of material or operations which do not meet the specifications.
- D. Promptly submit five (5) copies of reports of inspections and tests to the Engineer including:
 - 1. Date issued.
 - 2. Project title and Engineer's job number.
 - 3. Testing Laboratory name and address.
 - 4. Name and signature of inspector.

5. Date of inspection or sampling.
 6. Record of temperature and weather.
 7. Date of test.
 8. Identification of product and Specification section.
 9. Location in project.
 10. Type of inspection or test.
 11. Compliance with Contract Documents or not.
- E. Perform additional services as required by Owner.
- F. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Approve or reject any portion of work.
 3. Perform any duties of the Contractor.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel. Provide access to Work and manufacturer's operations.
- B. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
- C. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacturer or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

- D. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To facilitate inspections and tests.
- E. Notify laboratory a minimum of three (3) working days in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 CONSTRUCTION UTILITIES

- A. The Contractor shall arrange with the power and telephone companies, if necessary, to obtain temporary electrical service for construction purposes.
- B. The Contractor shall pay all power and telephone company installation and use charges for the telephone service and electrical energy utilized for temporary power and light.
- C. The Contractor shall make his own arrangements at his own expense for obtaining the water supply and sanitary facilities necessary for construction purposes, and he shall acquire and pay for all water consumed during construction.

1.02 TEMPORARY BUILDINGS

- A. The Contractor shall provide on-site temporary buildings and/or other structures for storing (tools or machinery and supplies). The City shall designate these areas for the Contractor. The Contractor is responsible for securing storage facilities.

1.03 CLEAN-UP

- A. Upon completion of daily work, all excess material and rubbish shall be removed from the job site, and any off-site locations used, and disposed of in a lawful manner and in accordance with the Contract Documents. The surrounding construction area, easements, and any other affected grounds shall be left in a condition as good or better than existed prior to construction. Any remedial actions, measures or reconstruction of damaged properties shall be accomplished at the Contractor's expense.

1.04 USE OF PREMISES

- A. The Contractor shall confine his apparatus and the storage of materials to area permitted by laws, ordinances, permits, or directions of the Engineer and shall not unduly encumber the project route area with his materials.

1.05 SOIL EROSION

- A. The Contractor shall take all required and necessary actions as outlined in Section 01568, to minimize siltation and soil erosion during construction.

1.06 ACCESS ROADS

- A. Streets, roads, and drives used by the Contractor for access to and from the site of the work shall be protected from damage. Any such damage done shall be repaired and left in good condition at the end of the construction period. Upon completion of construction, access areas and temporary easements shall be restored to the pre-construction condition at no additional cost to the Owner.

1.07 MAINTENANCE DURING CONSTRUCTION

- A. The Contractor shall maintain, at his expense, the work during construction and until final acceptance of all work under the contract.
- B. In the event the Contractor fails to remedy any unsatisfactory situation within twenty-four (24) hours after receipt of written notice from the Engineer describing the unsatisfactory conditions, the Owner may immediately proceed with adequate forces and equipment to maintain the project, and the entire cost of this maintenance will be deducted from the monies otherwise due the Contractor under the Contract.
- C. As an alternative to the above specified maintenance, the cost of all of the items that are not properly maintained may be deducted at the Contract Prices from the current partial payment request even if such items have been paid for in previous estimates.

1.08 SANITARY FACILITIES

- A. The Contractor shall provide and maintain temporary sanitary accommodations for the use of his employees, the Engineer, and those of his subcontractors as may be necessary to comply with health requirements and regulations and as directed by the Engineer. No nuisance will be permitted from these accommodations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01505

MOBILIZATION

PART 1 - GENERAL

1.01 DEFINITION AND SCOPE

- A. Mobilization shall include the costs of obtaining all permits, insurance and bonds, moving onto the site of all plant and equipment; furnishing and erecting plants, temporary buildings, and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to, the following principal items.
1. Move onto the site all Contractor's equipment required for first month operations.
 2. Install temporary construction power, wiring, and lighting facilities.
 3. Establish fire protection plan and safety program.
 4. Secure construction water supply.
 5. Provide field office trailers for Contractor and as may be specified for Owner and Engineer use.
 6. Provide on-site sanitary facilities as specified.
 7. Arrange for and erect Contractor's work and storage yard and employee's parking facilities.
 8. Submit all required insurance certificates and bonds.
 9. Obtain all required permits.
 10. Post all OSHA, EPA, Department of Labor, and all other required notices.
 11. Have Contractor's superintendent at the job site full time.
 12. Submit a detailed construction CPM schedule acceptable to the Engineer as specified.
 13. Submit a schedule of values of the Work.
 14. Submit a schedule of submittals.

1.02 DEMOBILIZATION

- A. Demobilization is the timely and proper removal of all contractor owned material, equipment or plant, from the job site and the proper restoration or completion of work necessary to bring the site into full compliance with the contract documents.

1.03 PAYMENT FOR MOBILIZATION/DEMOBILIZATION

- A. The Contractor's attention is directed to the condition that payment for mobilization or any part thereof, shall not exceed 5 percent (%) of the total contract price.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01525

CONSTRUCTION AIDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Furnish, install and maintain required construction aids, remove on completion of Work.
- B. Related Requirements Described Elsewhere:
 - 1. Summary of Project: Section 01010.
 - 2. Comply with applicable requirements specified in Divisions 2 and 3.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required by personnel and to facilitate execution of the Work: scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment such as temporary valves and fittings. Refer to respective Sections for particular requirements for each trade.
- B. When permanent stair framing is in place, provide temporary treads, platforms and railings, for use by construction personnel.
- C. Maintain facilities and equipment in first-class condition.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Consult with the Engineer, review site conditions and factors which affect construction procedures and construction aids, which may be affected by execution of the Work.

3.02 GENERAL

- A. Relocate construction aids as required by progress of construction, by storage of work requirements and to accommodate legitimate requirements of Owner and other contractors employed at the site.

3.03 REMOVAL

- A. Completely remove temporary materials, equipment and services:
 - 1. When construction needs can be met by use of permanent construction.
 - 2. At completion of work.
- B. Clean and restore areas damaged by installation by use of temporary facilities.
 - 1. Remove foundations and underground installations for construction aids.
 - 2. Grade and grass areas of site affected by temporary installations to required elevations, slopes, ground cover and clean the area.
- C. Restore permanent facilities used for temporary purposes to specified condition or in kind if not specified.

END OF SECTION

SECTION 01568

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion and sedimentation controls as required by Rules and Regulations and permit conditions.
2. Temporary erosion controls include, but are not limited to, grassing, mulching, setting, watering and reseeding on-site surfaces and soil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner.
3. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner.
4. Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

B. Related Work Described Elsewhere:

1. Earthwork: Section 02200
2. Sodding: Section 02485.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

- A. Netting shall be fabricated of material acceptable to the Owner.

2.02 SEDIMENTATION CONTROL

- A. Netting shall be fabricated of material acceptable to the Owner.

PART 3 - EXECUTION

3.01 EROSION CONTROL

- A. Minimum procedures for grassing are:
1. Scarify slopes to a depth of not less than 6 inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
 2. Sow seed within 24 hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
 3. Apply mulch loosely and to a thickness of between 3/4 inch and 1-1/2 inches.
 4. Apply netting over mulched areas on sloped surfaces.
 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

- A. Install and maintain silt fencing and appurtenances as shown on the approved descriptions and working drawings.

3.03 PERFORMANCE

- A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the State of Florida, the Owner or Engineer, the Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

3.04 INSPECTION AND MAINTENANCE

- A. During construction the Contractor shall provide at a minimum weekly or within 24 hours of any storm event of 0.25 inches or greater of the temporary erosion and sedimentation controls. Inspection and maintenance practices shall be at a minimum as follows:
1. Less than one half of the site will be denuded at one time.
 2. All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
 3. Built up sediment will be removed from silt fences when it has reached one-third the height of a fence.
 4. Silt fences will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.

5. Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.
6. A maintenance inspection report will be made after each inspection and kept with the stormwater pollution prevention plan. A copy of the report form to be completed by the inspector is included in the stormwater pollution prevention plan attached.
7. The site superintendent will select the individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.
8. Personnel selected for inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.
9. The site superintendent will select an individual who will be responsible for the recording of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initialized. These records will be kept with the stormwater pollution prevention plan.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Material and equipment incorporated into the Work:
1. Manufactured and fabricated products:
 - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Two (2) or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 2. Do not use material or equipment for any purpose other than that for which it is designed or specified.

1.02 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including five copies of the Engineer.
1. Maintain one (1) set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.
 2. Do not proceed with work without clear instructions.

- C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.03 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with progress schedules, coordinate to avoid conflict with work and conditions at the site.
 - 1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
 - 3. All electrical and instrumentation needs to be stored in a climate controlled unit.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.04 STORAGE AND PROTECTION

- A. The Contractor shall furnish a covered, weather-protected storage structure providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this Project. Storage or equipment shall be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including connection of heaters, placing of storage lubricants in equipment, etc. Corroded, damaged or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.
- B. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather-tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.

4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.
- D. Cement, sand and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural and miscellaneous steel, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting.
- E. All materials, which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.
- F. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- G. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove covering when no longer needed.
- H. The Contractor shall be responsible for all material, equipment and supplies sold and delivered to the Owner under this Contract until final inspection of the work and acceptance thereof by the Owner. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.
- I. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven (7) days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering and any other costs associated with making the necessary corrections.

1.05 STORAGE AND HANDLING OF EQUIPMENT ON SITE

- A. Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed:
 1. Materials shall not be shipped until approved by the Engineer and Owner's Plant Superintendent. The intent of this requirement is to avoid unnecessary delivery

of unapproved materials and to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall major equipment or finish products be delivered to the site more than one month prior to installation without written authorization from the Engineer and the Owner's Plant Superintendent. Materials shipped to the site, or temporarily stored off-site in approved locations, shall be stored in accordance with Paragraph 1.04, herein.

2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Engineer, until such time as the equipment is to be installed.
3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed with the Engineer by him. These instructions shall be carefully followed and a written record of this kept by the Contractor.
5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half the load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the Owner.
7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.
8. No equipment from other jobs, contracts or projects shall be stored on the job site.

1.06 SPARE PARTS

- A. Spare parts for certain equipment provided under Divisions 16: Electrical, have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost. No spare parts from other jobs, contracts or projects shall be stored on the job site.

1.07 GREASE, OIL AND FUEL

- A. All grease, oil and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.
- B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three (3) weeks of operation after substantial completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01650

START-UP AND DEMONSTRATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. Demonstrate to Owner and Engineer that the Work functions as a complete and operable system under normal and emergency operating conditions.

B. Requirements

1. Equipment testing and plant startup is requisite to satisfactory completion of the contract and, therefore, shall be completed within the required contract time for substantial completion.
2. The Contractor shall furnish all personnel, power, chemicals, fuel, oil, grease, and all other necessary equipment, facilities, and services required for conducting the tests.

C. Related Work Described Elsewhere:

1. Construction Progress Schedules: Section 01310.

1.02 START-UP GUIDELINES

- ###### A. The Contractor shall startup and test all equipment, subsystems, and the complete plant under the guidelines listed below. The startup and testing shall be performed in the following segments:

1. Individual Equipment Units. Description and requirements for startup and testing of individual equipment units are located under the equipment's individual specification section.

PART 2 - PRODUCTS

2.01 START-UP PLAN

- A. Submit for approval by the Engineer and Owner's Plant Superintendent a detailed start-up plan outlining the schedule and sequence of all tests and start-up activities, including submittal of checkout forms, submittal of demonstration test procedures, start-up, demonstration and testing, submittal of certification of completed demonstration and training. Start-up and commissioning may not begin until the plan is approved by the Engineer and Owner's Plant Superintendent.
- B. Provide adequate chemicals and diesel fuel to perform start-up services. After completion and acceptance of the performance testing, fuel tanks shall be completely filled.

PART 3 - EXECUTION

3.01 COMPONENT TEST AND CHECK-OUT

- A. Start-up Certification: Prior to system start-up, successfully complete all the testing required of the individual components of the Work. Submit six (6) copies of Check-Out Memos for each individual component or piece of equipment, signed by the Contractor or the subcontractor and the manufacturer's representative. All copies of the Operation and Maintenance Manuals must be provided before start-up may begin. These forms shall be completed and submitted before Instruction in Operation to Owner's Plant Superintendent or a request for initiating any final inspections. Insert one (1) copy of this form into the applicable section of each Operation and Maintenance Manual.
- B. Demonstrate to the Engineer and the Owner's Plant Superintendent, that all temporary jumpers and/or bypasses have been removed and that all of the components are operating under their own controls as designated.
- C. Coordinate start-up activities with the Owner's Plant Superintendent and operating personnel at the treatment plant site and with the Engineer prior to commencing system start-up.

3.02 START-UP

- A. Initiate start-up and training in accordance with and with the use of the plant operation and maintenance manuals.
- B. Observe the component operation and make adjustments as necessary to optimize the performance of the Work.

- C. Coordinate with Owner's Plant Superintendent for any adjustments desired or operational problems requiring debugging.
- D. Make adjustments as necessary.

3.03 START-UP DEMONSTRATION AND TESTING

- A. After all Work components have been constructed, field tested, and started up in accordance with the individual Specifications and manufacturer requirements, and after all Check-Out Forms have been completed and submitted, perform the Start-Up Demonstration and Testing. The demonstration period shall be held upon completion of all systems at a starting date to be agreed upon in writing by the Owner's Plant Superintendent. Prior to beginning the start-up demonstration testing, the Contractor shall submit a detailed schedule of operational circumstances for approval by the Engineer. The schedule of operational circumstances shall describe, in detail, the proposed test procedures for each piece of equipment. Provide similar test procedure forms for each piece of equipment or section of the Work to include all particular aspects and features of that equipment or section of the Work and as specified in the Technical Sections of the Specifications.
- B. Acceptability of the Work's performance will be based on the Work performing as specified under these actual and simulated operating conditions. The intent of the start-up demonstration and testing is for the Contractor to demonstrate to the Owner's Plant Superintendent 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 final acceptance.
- C. Demonstrate the essential features of all electrical systems including, but not limited to, the following as they apply to the Work:
 - 1. Electrical systems controls and equipment.
 - a. Electrical power equipment.
 - b. Generation Equipment.
 - c. Power transfer equipment.
- D. Upon successful completion of the Start-up, Demonstration and Testing, the Owner's personnel will receive the specified training for each system. Training of the Owner's personnel will not be considered valid unless it takes place using a system that has successfully passed the Start-up, Demonstration and Testing. Operator training shall be coordinated through the Owner's Plant Superintendent.

- E. Upon completion of all specified operator training, the Contractor shall submit to the Engineer six (6) copies of the Certificate of Completed Demonstration Form, for each item of equipment or system in the Work, signed by the Contractor, Subcontractor, Engineer, and the Owner's Plant Superintendent. Insert one (1) copy of this form in the applicable section of each Operation and Maintenance Manual. A sample Certificate of Completed Demonstration Form is provided in Section 00866.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Comply with requirement stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.
- B. Related Requirements Described Elsewhere:
 - 1. Cleaning: Section 01710.
 - 2. Project Record Documents: Section 01720.

1.02 SUBSTANTIAL COMPLETION

- A. The Work will not be substantially complete, and Contractor may not request substantial completion inspection unless the following submittals and work is completed:
 - 1. Project Record Documents are complete and have been submitted and reviewed to the requirements of Section 01720.
 - 2. All training of Owner's personnel completed.
 - 3. All areas to be used and occupied are safe, operable in automatic and complete.
 - 4. All painting (other than touchup), finishes, fencing, final grading, grassing, planting, sidewalk construction and paving shall have been completed or near completion and ready for inspection.
 - 5. All deficiencies noted on inspection reports or nonconformances are corrected or the correction plan approved.
- B. When the conditions of paragraph 1.02 A. are met the Contractor shall submit to the Engineer:
 - 1. A written notice that he considers the Work, or portion thereof, is substantially complete, and request an inspection.
 - 2. A punchlist of items to be corrected. (Uncompleted work which is not related to the safe, effective, efficient use of the Project may be allowed on the punchlist

with the Engineer's approval. This may include painting touchups and finishes, cleanup, grassing and planting).

- C. Within a reasonable time after receipt of such notice, the Engineer will make an inspection to determine the status of completion.
- D. Should the Engineer determine that the Work is not substantially complete:
 - 1. The Engineer will promptly notify the Contractor in writing, giving the reasons therefor.
 - 2. Contractor shall remedy the deficiencies in the Work and send another written notice of substantial completion to the Engineer.
 - 3. The Engineer will within reasonable time, reinspect the Work. The Contractor will be liable for reinspection fees as described in paragraph 1.04, herein.
- E. When the Engineer finds that the Work is substantially complete, he will:
 - 1. Schedule a walk-through of the facility to include the Owner's Plant Superintendent. Engineer shall determine the completeness of the punchlist and readiness of the facility for occupancy by the Owner.
 - 2. Prepare and deliver to Owner a tentative Certificate of Substantial Completion with the tentative punchlist of items to be completed or corrected before final inspection.
 - 3. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when the Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected. Any incomplete work allowed on a punchlist must be reinspected upon completion and any deficiencies found will be added to the punchlist.

1.03 FINAL INSPECTION

- A. Prior to Contractor's request for a final inspection the following submittals and work must be complete:
 - 1. Project Record Documents must be approved.
 - 2. All spare parts and maintenance materials must be suitably delivered to the Owner's Plant Superintendent per the requirements of the Technical Sections of the Specifications.

3. Contractor to submit evidence of compliance with requirements of governing authorities.
- B. After satisfying the requirements of paragraph 1.03 A. and when Contractor considers the Work complete, he shall submit written certification 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 the Owner's Plant Superintendent and are operational.
 5. All punchlist items have been corrected or completed and the Work is ready for final inspection.
- C. The Engineer will, within reasonable time, make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- D. Should the Engineer consider that the Work is incomplete or defective:
1. The Engineer 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 another written certification to the Engineer that the Work is complete.
 3. The Engineer will, within a reasonable amount of time, reinspect the Work and the Contractor shall be liable for reinspection fees as described in paragraph 1.04, herein.
- E. When the Engineer finds that the Work is acceptable under the Contract Documents, the Contractor may make closeout submittals.

1.04 REINSPECTION FEES

- A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:
1. Contractor will compensate the Owner for such additional services.
 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS

- A. Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.
- B. Certificate of Insurance for Products and Completed Operations.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Engineer.
- B. Statement shall reflect all adjustments to the Contract Sum:
 - 1. The original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a. Previous change orders or written amendment.
 - b. Allowances.
 - c. Unit prices.
 - d. Deductions for uncorrected work.
 - e. Penalties and bonuses.
 - f. Deductions for liquidated damages.
 - g. Deductions for reinspection payments.
 - h. Other adjustments.
 - 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.
- C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Execute cleaning, during progress of the Work and at completion of the Work.

1.02 DISPOSAL REQUIREMENTS

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

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations or personal activities.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically, or as directed by the Owner, and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. The Contractor shall employ construction techniques that minimize the production and distribution of dust.
- B. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- C. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.
- C. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas, to verify that the entire Work is clean.

3.04 PROTECTION OF AREAS NOT TO BE COATED

- A. All areas that are not specified to be coated or repaired shall be adequately protected to avoid any damage or overspray during all repairs, washing, blasting, and painting operations. The Contractor shall confer with the Owner before conducting any work, to clarify these areas. The Contractor shall be responsible for all damages that may be caused by this painting operation to the site and surrounding areas.
- B. Any damage shall be repaired at the Contractor's expense.

END OF SECTION

SECTION 01720

AS-BUILTS/RECORD DOCUMENTS

PART 1 - GENERAL

1.01 Scope of Work

- A. This Section sets forth the requirements for preparing as-built/record drawings and documents for verification of construction and archiving for future use. CONTRACTOR shall secure the services of a Florida licensed surveyor (pursuant to Chapter 472, F.S.) to collect data and prepare as-built/record drawings in accordance with City of Daytona Beach Utilities standards as follows:

1.02 Reference

- A. The preparation Work shall be in accordance with this Section and supplementary details in the City of Daytona Beach Utilities Department Standard Details, latest edition.

1.03 Quality Assurance

- A. Thoroughly coordinate changes within the As-Built Documents, making adequate and proper entries on each page of specifications and each sheet of drawings and other documents where such entry is required to show progress and changes properly.

1.04 Record Documents

- A. Maintain at the site and always available for City's use one record copy of:
 - 1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.
 - 2. Change Orders, Verbal Orders, and other modifications to Contract.
 - 3. Written instructions by the City as well as correspondence related to Requests for Information (RFIs).
 - 4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests.
 - 5. Field test records, inspection certificates, manufacturer certificates and construction photographs.
 - 6. Progressive As-Built Drawings
 - 7. Current Surveyor's tables for the As-Built Assets Attribute Tables.

- B. Maintain the documents in an organized, clean, dry, legible condition and completely protected from deterioration and from loss and damage until completion of the Work, transfer of all record data to the final As-built Drawings for submittal to the City.
- C. Store As-Built Documents and samples in Contractor's office apart from documents used for construction. Do not use As-Built document for construction purposes. Label each document "AS-BUILT" in neat large printed letters. File documents and samples in accordance with CSI/CSC format.
- D. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

PART 2 - PRODUCTS

2.01 As-Built/Record Drawings

In order to ensure that the City's project records are maintained to the highest standards and the information can easily be added to the City's electronic records the following information is required on all as-built/record drawings:

- A. The intent of these details for As-built/record drawings are required for all public facilities constructed. Prior to construction completion these as-built/record requirements will be reviewed to be certain the Contractor's surveyor has a clear understanding of what is required for completion of this work.
- B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.
- C. Call attention to the entry by highlighting with a "cloud" drawn around the area affected.
- D. In the event of overlapping changes, use different colors for entries of the overlapping changes.
- E. Design call-outs shall have a thin strike line through the design call-out and all As-Built information must be labeled (or abbreviated "AB") and be shown in a bolder text that is completely legible.
- F. Make entries in the pertinent other documents while coordinating with the Engineer and the City for validity.
- G. Entries shall consist of graphical representations, plan view and profiles, written comments, dimensions, State Plane Coordinates, details and any other information as required to document field and other changes of the actual Work completed. As a minimum, make entries to also record:
 - 1. Pavement and curb widths shall be verified and dimensioned as appropriate to confirm paving limits (on site plans).

2. Roadway elevations shall be recorded at all grade changes, 100' intervals along roadway, and other intervals as needed along all streets. Street centerline and curb invert elevations shall be recorded as noted. The as-built centerline profile of all streets shall also be shown on the plan and profile so it may be compared to the design profile grade lines. In the event that the as-built centerline longitudinal grade does not meet the City minimum standards, additional longitudinal grades of the adjacent curbing and similar roadway cross-section surveys to verify the correct cross slope, shall be required to verify that the system will function as originally designed.
3. For perpendicular crossings of storm water, sanitary sewer, potable water, or reclaimed water, the as-built plans shall clearly indicate which utilities are located over or under other utilities, as necessary.
4. Any special features such as, walls, fencing, etc. which are a part of the approved construction drawings should also be located and dimensioned.
5. As-built drawings are to be prepared by a Florida licensed surveyor and shall include a signed certification statement by the Florida licensed engineer of record. Two (2) paper copy sets of as-built record drawings shall be provided, a CD with a digital copy in a compatible AutoCAD format, and PDF format.
6. Elevations shall be referenced to NGVD 1988 Data. As-built survey information shall be referenced to at least two Florida State Plane east coordinates NAD 83.
7. Benchmark Datum utilizes monumentation from the North American Vertical Datum of 1929 with elevations adjusted to NGVD 1988 data. Any NAVD 1929 monument with the limits of construction is to be protected.

2.02 Submittals

- A. CONTRACTOR shall submit each month to CITY the Project Activity Summary that shows current construction activities and a copy of notices to agencies including the City regarding road closures; plus a record of events that will be needed in the future.
- B. CONTRACTOR shall submit to CITY as required the proposed shut-off schedule, capping, temporary service scheduling, record of notices to customers and proposed roadway closings.
- C. CONTRACTOR shall submit copies of published notices.
- D. CONTRACTOR shall submit Final as-built for each utility included in the plans. Send the two paper copies and the AutoCAD files for pre-approval. The final submittal shall include two (2) Paper Copies of Record, signed and sealed by surveyor (rolled not folded), a CD with the AutoCAD files, and a set of PDF files (Mylars are no longer required). Below are minimum detail samples of how the As-built drawing information will need to be presented.

- E. These are examples of how to display and label valves, fittings, and pipes on the plans. Include a location arrow going to the identified object:

Valve Example:

20" GATE VALVE
STA. 22+33 (LT.55.0')
LAT. = 29°12'53.009"N
LONG. = 81°04'03.355"W
N = 1,774,373.4058
E = 634,602.7566
TOP OF NUT ELEV. = 27.50
GROUND ELEV. = 30.50

Pipe Example:

20" DIP WATER MAIN
STA. 22+00 (RT.55.0')
LAT. = 29°12'50.009"N
LONG. = 81°04'26.355"W
N = 1,774,373.4058
E = 634,602.7566
TOP OF PIPE ELEV. = 27.50
GROUND ELEV. = 30.50

Manhole Example:

STA. 20+33 (LT. 85.5')
3/4" Iron Rod with Plastic Cap...
N = 1,774,373.4058
E = 634,602.7566
LAT. = 29°04'53.355" W
LONG. = 81°04'53.355" W
RIM ELEV. = 22.55
NORTH 15" RCP INVERT ELEV. = 10.35
WEST 24" CMP INVERT ELEV. = 10.25
BOTTOM ELEV. = 10.00

(All Bench Marks used must be shown on the plans)

Bench Mark Example:

BM#13
STA. 20+33 (LT. 85.5')
3/4" Iron Rod with Plastic Cap...
N = 1,774,373.4058
E = 634,602.7566
LAT. = 29°04'53.355" W
LONG. = 81°04'53.355" W
ELEV. = 32.55

PART 3- EXECUTION

3.01 General

All drawings shall be prepared to True State Plane Coordinates. CONTRACTOR shall provide all materials, equipment, labor needed to prepare and submit accurate As-Built/Record Drawings.

- A. It is acceptable to CITY if the surveyor utilizes an after the fact approach to collecting and verifying the location and depth by vertical PVC pipes placed by the CONTRACTOR as markers for this purpose. The surveyor shall verify to the accuracy defined in Florida Statutes the As-built conditions and certify the Record Drawings.
- B. CITY shall not be considered the best source of information for valve locations that may have been lost during final grading, the surveyor or CONTRACTOR shall excavate and properly mark all valve boxes and each valve shall have a tag or color coded to define water, sewer or reuse water valves. The use of temporary PVC pipe markers color coded is acceptable so long as cross references are provided on the Record Drawings to prevent the tops from a water valve being placed on a sewer valve.
- C. THE CONTRACTOR SHALL PROVIDE THE UTILITIES DEPARTMENT ENGINEERING DIVISION THE FINAL AS BUILT/RECORD DRAWINGS ON CD AND TWO SIGNED AND SEALED PAPER COPIES ROLLED NOT FOLDED. THE AS-BUILT RECORD DRAWINGS SHALL BE PREPARED USING AUTOCAD FORMAT 2014 OR LATER (THE CD SHALL CONTAIN THE AUTOCAD FILES, X-REF'S, AND PDF'S. ALL FILES SHALL BE WORKING FILES AND NOT LOCKED). IN MODEL SPACE THE DRAWING SHALL BE IN FL83-EF STATE PLANE COORDINATES AND SHALL BE ABLE TO BE INSERTED INTO THE CITY'S OVERALL GIS SYSTEM. THE RECORD DRAWINGS SHALL ALSO BE PRINTED ON TWO PAPER COPIES SIGNED AND SEALED BY A FLORIDA BOARD OF PROFESSIONAL LAND SURVEROR. A DISCLAIMER MAY BE NOTED IN A TRANSMITTAL LETTER PLUS THE SURVEYOR MAY ADD A SPECIAL NOTICE ON EACH SHEET REGARDING THE LOCATION OF THE TRUE ORIGINAL RECORD DRAWINGS OR PLACE LIMITS ON RESPONSIBILITY SHOULD SOMEONE IN THE FUTURE SOMEONE NEED TO MODIFY THE AUTOCAD FILES.
- D. Identify the source markers for the survey used for Record Drawings.

3.02 Preconstruction Meeting

- A. Preconstruction Meeting: It is recommended that the Surveyor attend the Preconstruction meeting.

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract according to Table 01730-A.
 - a. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
2. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.02 IMPLEMENTATION

A. Manual: Preparation and Description

1. Preparation of data shall be done by personnel:
 - a. Trained and experienced in maintenance and operation of described products.
 - b. Familiar with requirements of this SECTION.
 - c. Skilled as technical writer to the extent required to communicate essential data.
 - d. Skilled as draftsman competent to prepare required drawings.
2. Description
 - a. Prepare data in the form of an instructional manual for use by CITY'S personnel.
 - b. Format:
 - i. Size: 8-1/2 inches x 11 inches.
 - ii. Paper: 20 pound minimum, white, for typed pages.
 - iii. Text: Manufacturer's printed data, or neatly typewritten.

- c. Drawings:
 - i. Provide reinforced punched binder tab, bind in with text.
 - ii. Reduce larger drawings and fold to size of text pages, but do not use drawing prints larger than 14 inches x 17 inches.
- d. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - i. Provide typed description of products and major component parts of equipment.
 - ii. Provide indexed tabs.
- e. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - i. Title of Project.
 - ii. Identity of separate structure as applicable.
 - iii. Identity of general subject matter covered in the manual.

3. Binders:

- a. Commercial quality three-post binders with durable and cleanable plastic covers.
- b. Maximum post height: 2 inches.
- c. When multiple binders are used, correlate the data into related consistent groupings.

4. Content

- a. At a minimum provide a neatly typewritten table of contents for each volume, arranged in systematic order.
 - i. CONTRACTOR, name of responsible principal, address and telephone number.
 - ii. A list of each product required to be included, indexed to content of the volume.
 - iii. List, with each product, name, address and telephone number of:
 - aa. Subcontractor or installer.

- ab. A list of each product required to be included, indexed to content of volume.
 - ac. Identify area of responsibility of each.
 - ad. Local source of supply for parts and replacements.
 - b. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
 - c. Product Data:
 - i. Include only those sheets which are pertinent to the specific product.
 - ii. Annotate each sheet to:
 - aa. Clearly identify specific product or part installed.
 - ab. Clearly identify data applicable to installation.
 - ac. Delete references to inapplicable information.
 - d. Supplemental product data: as necessary to clearly illustrate:
 - i. Relations of component parts of equipment and systems.
 - ii. Control and flow diagrams.
 - e. Written text, as required to supplement product data for the particular installation.
 - i. Organize in consistent format under separate headings for different procedures.
 - ii. Provide logical sequence of instructions of each procedure.
 - f. Coordinate drawings with information in Record Documents to assure correct illustration of completed installation.
 - g. Do not use Record Documents as maintenance drawings.
 - h. Copy of each warranty, bond and service contract issued.
 - i. Provide information sheet for City's personnel:
 - aa. Proper procedures in event of failure.

- ab. Instances which might affect validity of warranties or bonds.

B. Manual for Materials and Finishes

1. Submit six copies of complete manual in final form.
2. Content: for architectural products, applied materials and finishes.
 - a. Manufacturer's data, giving full information on products.
 - i. Catalog number, size, composition.
 - ii. Color and texture designations.
 - iii. Information required for reordering special manufactured products.
 - b. Instructions for care and maintenance.
 - i. Manufacturer's recommendation for types of cleaning agents and methods.
 - ii. Cautions against cleaning agents and methods which are detrimental to product.
 - iii. Recommended schedule for cleaning and maintenance.
3. Content: for moisture protection and weather-exposed products.
 - a. Manufacturer's data, giving full information on products.
 - i. Applicable standards.
 - ii. Chemical composition.
 - iii. Details of installation.
 - b. Instructions for inspection, maintenance and repair.
4. Additional requirements for maintenance data: As requested by the ENGINEER.

C. Manual for Equipment and Systems

1. Submit six copies of complete manual in final form.
2. Content, for each electric and electronic system, as appropriate:
 - a. Description of system and component parts.

- i. Function, normal operating characteristics, and limiting conditions.
 - ii. Performance curves, engineering data and tests.
 - iii. Complete nomenclature and commercial number of replaceable parts.
- b. Circuit directories of panel boards.
 - i. Electrical service
 - ii. Controls
 - iii. Communications
- c. As installed color coded wiring diagrams.
- d. Operating procedures:
 - i. Routine and normal operating instructions.
 - ii. Sequences required.
 - iii. Special operating instructions.
- e. Maintenance procedures:
 - i. Routine operations.
 - ii. Guide to "trouble-shooting".
 - iii. Disassembly, repair and reassembly.
 - iv. Adjustment and checking.
- f. Manufacturer's printed operating and maintenance instructions.
- g. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- h. Other data as required under pertinent sections of specifications.

4. Prepare and include additional data when the need for such data become apparent during instruction of City's personnel.

D. Submittal Schedule

1. All submittal documents shall be provided in both hardcopy, bounded in separate three-ring binders, indexed, tabbed with sectional dividers, and no larger than 8½-inch x 11-inch and bookmarked electronic media - Adobe® Acrobat® portable document format. Two sets of hardcopy and two sets of electronic media shall be provided. All drawings shall be provided in both hardcopy, bounded, indexed, and no larger than 11-inch x 17-inch and bookmarked electronic media - Autodesk® AutoCAD® file format AND Adobe® Acrobat® portable document format. Two sets of hardcopy and two sets of electronic media shall be provided.
2. Submit three (3) copies of completed data in final form no later than 30 days following the ENGINEER'S review of the last shop drawing and/or other submittal specified under SECTION 01340.
 - a. One copy will be returned with comments to be incorporated into final copies.
3. Submit six (6) copies of approved manual in final form and PDF formats to the ENGINEER within 30 days after the reviewed copy is received.
4. Append six (6) copies of addendum to the operation and maintenance manuals as applicable and certificates as specified and PDF format within 30 days after final inspection and start-up testing.

E. Instruction of City's Personnel

1. Prior to final inspection or acceptance, the manufacturer's representative shall fully instruct City's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.
2. Operating and maintenance manual shall constitute the basis of instruction.
 - a. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

TABLE 01730-A

REQUIRED O&M MANUALS

Specification Section	Equipment
16230	Power Generation Equipment

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work:
 - 1. Compile specified warranties and bonds as specified in these Specifications.
- B. Related Work Described Elsewhere:
 - 1. Contract Closeout: Section 01700.

1.02 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: Two (2) each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product of work item.
 - 2. Firm, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond or service and maintenance contract.
 - 5. Duration of warranty, bond or service maintenance contract.
 - 6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity or warranty or bond.
 - 7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8-1/2 inches by 11 inches, punch sheets for standard three (3) ring binder.
 - a. Fold larger sheets to fit into binders.
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three (3) D-ring type binders with durable and cleanable white plastic covers and maximum D-ring width of two (2) inches. Binders shall be presentation type with clear vinyl covers on front, back, and spine. Binders shall include two sheet lifters and two horizontal inside pockets.

1.04 WARRANTY SUBMITTALS REQUIREMENTS

- A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the Owner.
- B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Divisions 16: Electrical and which has at least a 1 hp motor or which lists for more than \$1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.
- C. In the event that the equipment manufacturer or supplier is unwilling to provide a one (1) year warranty commencing at the start of the Correction Period, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two (2) year warranty from the manufacturer shall not relieve the Contractor of the one (1) year warranty, starting at the time of Owner's acceptance of the equipment.
- D. The Owner shall incur no labor or equipment cost during the guarantee period.

- E. Guarantee shall cover all necessary labor, equipment, materials, and replacement parts resulting from faulty or inadequate equipment design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer or the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01800

MISCELLANEOUS WORK AND CLEANUP

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. This Section includes operations which cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent to work involved. The Contractor shall furnish all labor, materials, equipment and incidentals to complete the work under this Section.
2. The work of this Section includes, but is not limited to, the following:
 - a. Cleaning up.
 - b. Incidental work.

PART 2 - PRODUCTS

2.01 MATERIALS

- ###### A.
- Materials required for this Section shall be of the same quality as materials that are to be restored. Where possible, the Contractor shall reuse existing materials that are removed and then replaced.

PART 3 - EXECUTION

3.01 RESTORING OF FENCES

- ###### A.
- The Contractor shall remove, store and replace existing fences during construction, if applicable. Only the sections directed by the Engineer shall be removed. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced with fencing equal to or better than that damaged, and the work shall be satisfactory to the Engineer.

3.02 CLEAN UP

- A. The Contractor shall remove all construction material, buildings, equipment and other debris remaining on the job as the result of construction operations and shall render the site of the work in a neat and orderly condition. All suitable excess excavated material shall remain on site.

3.03 INCIDENTAL WORK

- A. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the contract as specified and as shown on the Drawings.

END OF SECTION



DIVISION 2

SITework

SECTION 02140

DEWATERING (DURING CONSTRUCTION)

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work to be performed under this Section shall include the design and installation of a temporary wellpoint system until completion of construction to dewater subsurface waters from structures as required.
- B. Related Work Described Elsewhere:
 - 1. Shop Drawings, Working Drawings, and Samples: Section 01340.
 - 2. Earthwork: Section 02200.
- C. The Contractor, if required, shall obtain necessary permits from the Water Management District for dewatering.

1.02 QUALITY ASSURANCE

- A. Qualifications: The temporary dewatering system shall be designed by a firm who regularly engages in the design of dewatering systems and who is fully experienced, reputable and qualified in the design of such dewatering systems. The firm shall have a successful record of operation for a minimum of five (5) years prior to bid date.
- B. In lieu of experience, the dewatering firm shall provide a performance and warranty bond for 1.5 times the total installed cost of the temporary dewatering system. This bond shall be executed prior to award and/or contract execution.
- C. Standards: The dewatering of any excavation areas and the disposal of water during construction shall be in strict accordance with all local and State government rules and regulations.

1.03 SUBMITTALS

- A. Materials and Shop Drawings: Shop drawings required to establish compliance with the Specifications shall be submitted in accordance with the provisions of Section 01340: Shop Drawings, Working Drawings, and Samples. Submittals shall include at minimum the following:
 - 1. Design notes and drawings.

2. Descriptive literature of the temporary dewatering system.
3. Layout of all piping involved.
4. Bill of materials.
5. Water Management District permit, if required.

1.04 CRITERIA

- A. The wellpoint system shall be developed to the point that is capable of dewatering such that groundwater levels are maintained at least three (3) feet below the bottom of excavations. Each wellpoint system shall be capable of dewatering and maintaining groundwater levels at the respective structures. Observation wells shall be constructed for the purpose of testing each system.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The equipment specified herein shall be standard dewatering equipment of proven ability as designed and manufactured by firms having experience in the design and production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practices and methods.
- B. The Contractor shall be required to monitor the performance of the dewatering system during the progress of the work and require such modifications as may be required to assure that the systems will perform satisfactorily. Dewatering systems shall be designed in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils and to preserve the integrity of adjacent structures.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Dewatering: The Contractor shall install a temporary wellpoint dewatering system for the removal of subsurface water encountered during construction of the proposed structures.

3.02 PROTECTION AND SITE CLEAN-UP

- A. At all times during the progress of the Work the Contractor shall use all reasonable precautions to prevent either tampering with the wellpoints or the entrance of foreign material.

- B. After the wellpoint system is no longer needed, the Contractor shall remove all of his equipment, materials, and supplies from the site of the work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started. The site shall be thoroughly cleaned and approved by the Engineer.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included under this Section consists of dewatering, excavating, trenching, sheeting/shoring, filling, grading, backfilling, and compacting those soil materials required for the construction of the embankments, structures, piping, ditches, utility structures and appurtenances as shown on the Drawings and specified herein.

- B. Definitions
 - 1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material as determined by ASTM D1557.
 - 2. Optimum Moisture Content: The optimum moisture content shall be determined by ASTM D 1557 to determine the maximum dry density for relative compaction. Field moisture content shall be determined on the basis of the fraction passing the 3/4-inch sieve.
 - 3. Rock Excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.
 - 4. Suitable: Suitable material shall be non-cohesive, non-plastic granular local sand that is free from vegetation, organic material, marl, silt or muck. The materials shall also meet detailed requirements specified herein. The Contractor shall furnish all additional fill material required.
 - 5. Unsuitable: Unsuitable materials are highly organic soil (peat or muck) classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, and A-8 in accordance with AASHTO Designation M 145.

- C. Plan For Earthwork
 - 1. The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work.

2. Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations to the Engineer for review. The Contractor shall reflect the equipment and methods to be employed in the excavation. Prices established in the Proposal for the work to be done will reflect all costs pertaining to the work. No claims for extras based on substrata or groundwater table conditions will be allowed.
- D. Trench Safety Act: The Contractor shall comply with all of the requirements of the Florida Trench Safety Act (Chapter 90-96, CS/CB 2626, Laws of Florida). The Contractor shall acknowledge that included in various items of his bid proposal and in the total bid price are costs for complying with the provisions of the Act.
- E. Related Work Described Elsewhere
1. Shop Drawings, Working Drawings, and Samples: Section 01340.
 2. Testing and Testing Laboratory Services: Section 01410.
 3. Temporary Erosion and Sedimentation Control: Section 01568.
 4. Earthwork: Section 02200.

1.02 APPLICABLE PUBLICATIONS

- A. All publications and standard specifications referred to herein are the latest or current issue of that publication or specification as of the specification date.

1.03 QUALITY ASSURANCE

- A. The requirements for testing and laboratory services are specified in Section 01410: Testing and Testing Laboratory Services.

1.04 FEDERAL AND STATE REGULATORY REQUIREMENTS

- A. All trench excavations which exceed 5 feet in depth shall comply with the applicable trench safety standards as stated in the OSHA excavation safety standards 29 CFR S. 1926.650 Subpart P as regulated and administered by the Florida Department of Labor and Employment Security as the "Florida Trench Safety Act."

1.05 JOB CONDITIONS

- A. If, in the opinion of the Engineer, conditions encountered during construction warrant a change in the footing elevation, or in the depth of removal of unsuitable material from that indicated in the soils report, an adjustment will be made in the contract price.

1.06 SUBMITTALS

- A. Submit to the Engineer for review the proposed methods of construction, including dewatering, excavation, bedding, filling, compaction and backfilling for the various portions of the work. Review shall be for information only. The Contractor shall remain responsible for the adequacy and safety of the methods. Where sheeting and bracing is required for construction, the design shall be performed by a Professional Geotechnical Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General
 - 1. All fill material from on and off-site sources shall be subject to the approval of the Engineer.
 - 2. All fill material shall be unfrozen and free of organic material, trash, or other objectionable material. Excess or unsuitable material shall be removed from the job site by the Contractor.
- B. Common Fill Material
 - 1. Common Fill shall be sand not containing stones, rock, concrete or other rubble larger than 2 inches in diameter. No more than 10% of the material, by weight, shall pass a 200 mesh sieve and organic matter in the material shall be less than 1% by weight.
 - 2. The Contractor shall utilize as much excavated material as possible for reuse in accordance with the Drawings and Specifications or as directed by the Engineer.
 - 3. The Engineer shall direct the Contractor on the type of material allowed in certain sections of the earthwork operations.
- C. Select Common Fill
 - 1. Select Common Fill material shall be free from stones larger than 1 1/2 inches and no more than 5% of the material shall pass a 200 mesh sieve. The amount of organic matter in the material shall not exceed 1% by weight.
 - 2. The Contractor shall utilize as much excavated material as possible for reuse in accordance with the Drawings and Specifications or as directed by the Engineer.
 - 3. The Engineer shall direct the Contractor on the type of material allowed in certain sections of the earthwork operations.

- D. Structural Fill: Structural fill shall be well graded sand to gravelly sand having the following gradation:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
1 - inch	100
No. 4	75-100
No. 40	15-80
No. 100	0-30
No. 200	0-10

- E. Bedding Rock: Manufactured angular, granular material, 1/4 to 1-1/2 inches (6 to 40 mm) in size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately.

1. Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming with ASTM C33 stone size No. 89 and with particle size limits as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
1/2	100
3/8	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 50	0-5

- F. Other Material: All other material, not specifically described, but required for proper completion of the work shall be selected by the Contractor and approved by the Engineer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protection

1. Sheeting and Bracing:

- a. Furnish, put in place, and maintain sheeting and bracing as required to support the sides of excavations, to prevent movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling, braced wood lagging and soldier beams or other approved methods. If the Owner is of the opinion that sufficient or proper supports have not been provided, he may order additional supports be installed at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids beside the sheeting, but if voids are formed, they shall be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the Owner.
- b. The Contractor shall construct sheeting outside the neat lines of the foundation unless another configuration is desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall withstand all pressure to which the structure or trench will be subjected. Any deformation shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.
- c. Where sheeting and bracing is required for construction, the Contractor shall engage a Professional Geotechnical Engineer, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall conform with the design, and certification of this shall be provided by the Professional Geotechnical Engineer.
- d. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.
- e. The Contractor shall leave in place to be embedded in the backfill, all sheeting and bracing not shown on the Drawings but which the Owner directs him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or

property, whether public or private. The Owner may direct that timber used for sheeting and bracing be cut off at any specified elevation.

- f. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction, or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted for that purpose, or otherwise directed by the Owner.
- g. The right of the Owner to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
- h. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than one (1) foot above the top of any pipe.

2. Pumping and Drainage

- a. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fills, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels. The Contractor shall submit to the Engineer for review a plan for dewatering systems prior to commencing work. The installed dewatering system shall be in conformity with the overall construction plan. The Contractor shall be required to monitor the performance of the dewatering systems during the progress of the work and require such modifications as may be required to assure that the systems are performing satisfactorily.
- b. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the bottom of the excavation and to preserve the integrity of adjacent structures. Well or sump installations shall be constructed with proper sand filters to prevent intermixing of finer grained soil from the surrounding ground.
- c. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to

sumps, and pumped from the excavation to maintain a bottom free from standing water.

- d. The Contractor shall take all additional precautions to prevent buoyant uplift of any structure during construction.
- e. The conveying of dewatered liquids in open ditches or trenches will not be allowed. Permission to use any storm sewers, or drains, for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. The Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the Owner or the authority having jurisdiction, at no cost to the Owner.
- f. Flotation shall be prevented by the Contractor by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
- g. Removal of dewatering equipment shall be accomplished after the system is no longer required; the material and equipment constituting the system, shall be removed by the Contractor.
- h. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on groundwater quality.

3.02 EXCAVATION

A. General

- 1. Excavation consists of removal, storage and disposal, if necessary, of material encountered when establishing required grade elevations and in accordance with the notes shown in the Drawings.
- 2. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
- 3. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of the Engineer. Unauthorized excavation, as well as remedial work shall be at the Contractor's expense. Backfill and compact unauthorized

excavations as specified for authorized excavations of same classification, unless otherwise specified or directed by the Engineer.

4. When excavation has reached required subgrade elevations, make an inspection of conditions. If the material is unsuitable or has clay and/or organic material, and if authorized by Engineer to remove, carry excavation deeper and replace excavated material with Bedding Rock. Removal and replacement of unsuitable subgrade material, as directed by the Engineer, will not be paid for as extra work.
5. If the Contractor excavates below grade through error or for his own convenience or through failure to properly dewater the excavation or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the preceding paragraph, in which case the work of excavating below grade and finishing and placing the refill shall be performed at his own expense.
6. Stockpile satisfactory excavated materials at a location approved by the Engineer until required for backfill or fill. Stockpiles shall be placed and graded for proper drainage. All soil materials shall be located away from the edge of excavations. Excess soil materials shall be disposed of by the Contractor.

B. Trench Excavation

1. Excavation for all trenches required for the installation of pipes shall be made to the depths indicated on the Drawings and in such a manner and to such widths as will give suitable room for laying the pipe within the trenches, for bracing and supporting and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry.
2. Excavation shall not exceed normal trench width. Normal trench width is defined as indicated on the Drawings. Any excavation which exceeds the normal trench width, shall require special backfill requirements as determined by the Engineer.
3. Rock shall be removed to provide at least eight inches clearance around the bottom and sides of the pipe being laid.
4. Where pipe is to be laid in Bedding Rock or encased in concrete, the trench may be excavated to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
5. Where the pipes are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. Manually trim and shape trench bottom to receive pipe at correct line and grade. Shape trench to provide a uniform, continuous support along the entire length of the barrel of

each pipe section. Hand-shape firm unyielding bedding so that the bottom segment will be in continuous contact with the pipe barrel.

3.03 PLACEMENT OF MATERIALS

A. Fills

1. Material placed in fill areas shall be deposited within the lines and to the grades shown on the Drawings making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved. If sufficient Common Fill material is not available from excavation on site, the Contractor shall provide borrow as required.
2. Fill shall be brought up in substantially level lifts not exceeding 8 inches in depth. The entire surface of the work shall be maintained free from ruts and in such condition that construction equipment can readily travel over any section. Fill shall not be placed against concrete structures until they have attained sufficient strength.
3. During the process of placing fill, all roots, debris and stones greater in size than specified herein shall be removed from the fill areas and the Contractor shall assign a sufficient number of employees to this work to insure satisfactory compliance with these requirements.
4. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.
5. All fill materials shall be placed and compacted "in-the-dry". The Contractor shall dewater excavated areas as required to perform the work in such a manner that will preserve the undisturbed state of the natural soils. The Contractor shall not claim excavated material as unsuitable due to moisture content. The Contractor shall sufficiently dewater excavated materials for use as backfill.
6. Prior to filling, the ground surface shall be prepared by removing vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials. Plow strip or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with the existing surface.
7. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each classification.

- B. Backfill around structures shall be placed in uniform layers not exceeding 8 inches in depth. Backfill material shall be Common Fill meeting requirements set forth in

Paragraph 2.01. All backfill shall be placed and compacted "in-the-dry." Backfill operations around structures shall not be started until the concrete has attained sufficient strength to resist the loads imposed by the backfill material.

3.04 COMPACTION

A. General

1. The Contractor shall control soil compaction during construction to provide the densities specified. It shall be the Contractor's responsibility to notify the Engineer in writing that compaction tests can be performed. Written notice from the Contractor shall precede completion of compaction operations by at least two (2) working days.
2. Material which is too wet shall be spread over the fill area and permitted to dry, assisted by harrowing if necessary, until the moisture content is reduced to allowable limits. If added moisture is required, water shall be applied to provide a satisfactory moisture content. If too much water is added, the area shall be permitted to dry before compaction is continued. The Contractor shall supply all hose, piping, valves, sprinklers, pumps, sprinkler tanks, hauling equipment and other materials and equipment necessary to place water in the fill in the manner specified.
3. When a trench or excavation bottom has a density less than that specified herein for the particular area classification, the Contractor shall compact the material to the required depth and percentage of maximum density.

B. Percentage of Maximum Density Requirements

1. All fill and backfill in unpaved areas shall be densified to at least 95% of the maximum dry density as determined by ASTM D1557, unless specified otherwise.
2. All fill and backfill under roadways, driveways, sidewalks, or any other type of paving, shall be densified to at least 98% of the maximum dry density as determined by ASTM D1557.

C. Special Foundation Preparation Requirements for Process Structures and Buildings

1. Following excavation, the Contractor shall proof-roll the exposed subgrade with a rubber-tired roller having a weight of at least 10 to 15 tons.
2. Any soft soils shall be excavated in accordance with Paragraph 3.02 and replaced with Structural Fill placed in lifts not exceeding 8 inches in depth.
3. After proof-rolling and placement and compaction of the replacement material, the sub-grade shall be compacted using a 10 to 15 ton vibratory roller to at least

95% of the maximum density as determined by ASTM D1557, to a depth of at least two (2) feet below the surface of the subgrade or a depth as required by geotechnical analysis.

3.05 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers.
- B. If, in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

3.06 FINAL GRADING

- A. After other earthwork work has been finished, and filling and backfilling operations are completed, all areas on the site of the work which are to be graded shall be brought to grade within a tolerance of +/- 0.1 feet at the indicated elevations, slopes, and contours where seeding or sodding is not required or, where sodding is required, within three (3) inches of finished grade. Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to hand work. All surfaces shall be graded to secure effective drainage. Unless otherwise shown, a slope of at least one percent shall be provided.

3.07 EXCESS EXCAVATED MATERIALS

- A. Insofar as needed, suitable excavated materials shall be used in fills and embankments shown on the Drawings. All excess excavated material shall be disposed of off-site by the Contractor.
- B. The Contractor shall segregate different types of excavated materials (i.e. sands, clayey sands) in the stockpile area. All unsuitable materials shall be disposed of by the Contractor offsite in a legal manner.
- C. The Contractor shall slope and compact the stockpile with a light roller to maintain stability.
- D. The Contractor shall maintain proper soil and erosion control measures.

END OF SECTION

SECTION 02220

EXCAVATION, BACKFILLING, AND COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included under this Section consists of dewatering, excavating, trenching, sheeting/shoring, grading, backfilling, and compacting those soil materials required for the construction of the structures, piping, ditches, utility structures and appurtenances as shown on the Drawings and specified herein.
- B. Related Work Specified Elsewhere:
 - 1. Earthwork: Section 02200.
 - 2. Testing and Testing Laboratory Services: Section 01410.
 - 3. Dewatering During Construction: Section 02140.
- C. Definitions:
 - 1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material.
 - 2. Optimum Moisture Content: The optimum moisture content shall be determined by ASTM D 1557 specified to determine the maximum dry density for relative compaction. Field moisture content shall be determined on the basis of the fraction passing the 3/4-inch sieve.
 - 3. Rock Excavation: Excavation of any hard natural substance which requires the use of special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.
 - 4. Suitable: Suitable materials for fills shall be classified as A-1, A-3 or A-2-4 in accordance with AASHTO Designation M-145 and shall be free from vegetation, organic material, marl, silt or muck. Not more than 10 percent (%) by weight of fill material shall pass the No. 200 Sieve. The Contractor shall furnish all additional fill material required.
 - 5. Unsuitable: Unsuitable materials are classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, and A-8 in accordance with AASHTO Designation M-145.

D. Plan For Earthwork:

1. The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract according to the General Conditions.
2. Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations to the Engineer for review. The Contractor shall reflect the equipment and methods to be employed in the excavation. Prices established in the Proposal for the work to be done will reflect all costs pertaining to the work. No claims for extras based on substrata or groundwater table conditions will be allowed.

- E. Trench Safety Act: The Contractor shall comply with all of the requirements of the Florida Trench Safety Act (Chapter 90-96, CS/CB 2626, laws of Florida). The Contractor shall acknowledge that included in various items of his bid proposal and in the total bid price are costs for complying with the provisions of the Act. Additionally, the Contractor is required to break out the costs for complying with the Florida Trench Safety Act. FAILURE TO COMPLY WITH THE REQUEST IN THIS SECTION SHALL RESULT IN THE BID BEING DECLARED NONRESPONSIVE. Failure to comply with the provisions of the Act shall result in a per item penalty of \$1,000 per day that the work is out of compliance.

1.02 APPLICABLE PUBLICATIONS

- A. All publications and standard specifications referred to herein are the latest or current issue of that publication or specification as of the specification date.

1.03 QUALITY ASSURANCE

- A. The requirements for testing and laboratory services is specified in Section 01410: Testing and Testing Laboratory Services.

1.04 FEDERAL AND STATE REGULATORY REQUIREMENTS

- A. All trench excavations which exceed 4 feet in depth shall comply with the applicable trench safety standards as stated in the OSHA excavation safety standards 29 CFR S. 1926.650 Subpart P as regulated and administered by the Florida Department of Labor and Employment Security as the "Florida Trench Safety Act."

1.05 JOB CONDITIONS

- A. If, in the opinion of the Engineer, conditions encountered during construction warrant a change in the footing elevation, or in the depth of removal of unsuitable material from

that indicated in the soils report, an adjustment will be made in the contract price, as provided in the General and Special Conditions.

1.06 PROTECTION

A. Pre-Construction Survey:

1. Prior to commencing excavation, backfill or dewatering, the Engineer and Contractor shall jointly conduct a survey of those existing structures which, in the opinion of the Engineer, may be subject to settlement or distress resulting from excavation or dewatering operations.
2. The Contractor shall monitor the structures surveyed to ascertain evidence of settlement or distress. If settlement or distress becomes evident the Contractor shall be required to repair the structures to the previous condition to the satisfaction of the Engineer. Costs shall be paid by the Contractor.

1.07 SUBMITTALS

- A. Submit to the Engineer for review the proposed methods of construction, including dewatering, excavation, bedding, filling, compaction and backfilling for the various portions of the work. Review shall be for method only. The Contractor shall remain responsible for the adequacy and safety of the methods.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. All fill material from on and off-site sources shall be subject to the approval of the Engineer.
2. All fill material shall be unfrozen and free of organic material, trash, or other objectionable material. Excess or unsuitable material as designated by the Engineer shall be removed from the job site by the Contractor.

B. Common Fill Material:

1. Common fill shall be sand not containing stones, rock, concrete or other rubble larger than 2 inches in diameter. It shall have physical properties which allow it to be easily spread and compacted.
2. The Contractor shall utilize as much excavated material as possible for reuse in accordance with the contract drawings and specifications or as directed by the Engineer.

3. The Engineer shall direct the Contractor on the type of material allowed in certain sections of the earthwork operations.

C. Structural Fill: Structural fill shall be well graded sand to gravelly sand having the following gradation:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
1 - inch	100
No. 4	75-100
No. 40	15-80
No. 100	0-30
No. 200	0-10

D. Class I Soils¹ : Manufactured angular, granular material, 1/4 to 1-1/2 inches (6 to 40 mm) in size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately.

1. Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming with ASTM C33 stone size No. 89 and with particle size limits as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
1/2	100
3/8	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 50	0-5

E. Class II Soils² :

1. GW: Well-graded gravels and gravel-sand mixtures, little or no fines. fifty (50) percent or more retained on No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.

2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. Fifty (50) percent or more retained on No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.

¹ Soils defined as Class I soils are not defined in ASTM D2487.

² In accordance with ASTM D2487, less than 5 percent pass No. 200 sieve.

3. SW: Well-graded sands and gravelly sands, little or no fines. More than fifty (50) percent passes No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
 4. SP: Poorly graded sands and gravelly sands, little or no fines. More than fifty (50) percent passes No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
- F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing By Weight</u>
No. 10	100
No. 20	0-30
No. 40	0-5

- G. Other Material: All other material, not specifically described, but required for proper completion of the work shall be selected by the Contractor and approved by the Engineer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clearing and Grubbing:
1. Clearing and grubbing shall be performed in accordance with Section 02110.
 2. Strip and dispose of topsoil off-site, unless otherwise directed to stockpile the material by the Engineer

3.02 PROTECTION

- A. Sheeting and Bracing:
1. The Contractor may, at his option, furnish steel sheeting and bracing to support the sides of excavations, to prevent movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling. If the Owner is of the opinion that sufficient or proper supports have not been provided, he may order additional supports be installed at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids beside the sheeting, but if voids are formed, they shall

be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the Owner.

2. The Contractor shall construct sheeting outside the neat lines of the foundation unless deemed otherwise for his method of operation. Sheeting shall be plumb. Sheeting and bracing shall withstand all pressure to which the structure or trench will be subjected. Any deformation shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.
3. Where sheeting and bracing is required to support the sides of excavations for structures, the Contractor shall engage a Professional Structural Engineer, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall conform with the design, and certification shall be provided by the Professional Structural Engineer.
4. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.
5. Owner may direct the Contractor in writing to leave in place sheeting at any time, during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private.
6. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction, or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted for that purpose, or otherwise directed by the Owner.
7. The right of the Owner to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

B. Pumping and Drainage:

1. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fills, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels as

stipulated in Section 02140. The Contractor shall engage a Professional Geotechnical Engineer registered in the State of Florida, to design the dewatering systems for all structures. The Contractor shall submit to the Engineer for review a plan for dewatering systems and recharge systems prior to commencing work. The installed dewatering system shall be in conformity with the overall construction plan, and certification of this shall be provided by the Professional Geotechnical Engineer. The Professional Geotechnical Engineer shall be required to monitor the performance of the dewatering systems during the progress of the work and require such modifications as may be required to assure that the systems are performing satisfactorily.

2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the bottom of the excavation and to preserve the integrity of adjacent structures. Well or sump installations shall be constructed with proper sand filters to prevent intermixing of finer grained soil from the surrounding ground.
3. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.
4. The Contractor shall take all additional precautions to prevent buoyant uplift of any structure during construction.
5. The conveying of dewatered liquids in open ditches or trenches will not be allowed. Permission to use any storm sewers, or drains, for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. The Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the Owner or the authority having jurisdiction, at no cost to the Owner.
6. Flotation shall be prevented by the Contractor by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
7. Removal of dewatering equipment shall be accomplished after the system is no longer required; the material and equipment constituting the system, shall be removed by the Contractor.
8. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on groundwater quality.

3.03 EXCAVATION

A. Excavating for Structures and Utilities:

1. Excavation work shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.
2. Excavation shall be made to such dimensions as will give suitable room for bracing and supporting, for pumping and draining, for installing the pipelines, and for all other work required.
 - a) Excavation for precast or prefabricated structures shall be carried to an elevation two (2) feet lower than the proposed outside bottom of the structure to provide space for the backfill material.
 - b) Excavation for structures constructed or cast-in-place in dewatered or dry excavations shall be carried down to the 2-feet below the bottom of the structure where dewatering methods are such that a dry evacuation bottom is exposed and the naturally occurring material at this elevation leveled and left ready to receive construction. Material disturbed below the founding elevation in dewatered excavations shall be replaced with Class B concrete.
3. Immediately document the location, elevation, size, material type and function of all new subsurface installations, and utilities encountered during the course of construction.
4. Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the Drawings and should anticipate the encounter of unknown obstructions during the course of the work.
5. Encounters with subsurface obstructions shall be hand excavated.
6. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. Subgrade soils which become soft, loose, "quick" or otherwise unsatisfactory for support of structures as a result of inadequate dewatering or other construction methods, shall be undercut a minimum of 12" and replaced with FDOT No. 57 Stone as required by the Engineer at the Contractor's expense.
7. The bottom of excavations shall be rendered firm and dry before placing any structure or pipe. Excavated material not suitable for backfill shall be removed from the site and disposed of by the Contractor in a legal manner. The bedding schedule for pipes shall be as shown in Table 02220-B.

8. Excavated material shall be stockpiled in such a manner as to prevent nuisance conditions. Surface drainage shall not be hindered by placement.
9. All structure and pipe locations and elevations as required herein must be permanently documented by the Contractor, on the Record Drawings prior to the Engineer's approval of the Application for Payment for that work.

3.04 DRAINAGE

- A. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations, and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition. The dewatering method used shall prevent disturbance of earth below grade.
- B. All water pumped or drained from the excavated area shall be disposed of in a suitable manner without undue interference with other work, without damage to surrounding property, and in accordance with pertinent rules and regulations.
- C. No construction, including pipe laying, shall be allowed in water. Groundwater shall be maintained at least 12 inches below excavation. No water shall be allowed to come into contact with masonry or concrete within 24 hours after being placed. The Contractor shall constantly guard against damage due to water and take full responsibility for all damage resulting from his failure to do so.
- D. The Contractor will be required at his expense to excavate below grade and refill with approved fill material if the Owner determines that adequate drainage has not been provided.

3.05 UNDERCUT

- A. If the bottom of any excavation is below that shown on the Drawings or specified because of Contractor error, convenience, or unsuitable subgrade due the Contractor's excavation methods, he shall refill to normal grade with fill at his own cost. Fill material and compaction method shall be as directed by the Engineer.

3.06 STABILIZATION

- A. Subgrades for concrete structures and trench bottoms shall be firm dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact.
- B. Subgrades for concrete structures or trench bottoms which are otherwise solid, but which becomes mucky on top due to construction operations, shall be reinforced with one or more layers of crushed rock or gravel. Not more than 1/2 inch depth of mud or muck shall be allowed to remain on stabilized trench bottoms when the pipe bedding

material is placed thereon. The finished elevation of stabilized subgrades for concrete structures shall not be above subgrade elevations shown on the Drawings.

- C. All stabilization work shall be performed by and at the expense of the Contractor.

3.07 FILL AND COMPACTION

A. Materials:

1. To the maximum extent available, excess earth obtained from structure and trench excavation shall be used for the construction of fills and embankments.
2. Materials used as backfill shall be free from rocks or stones larger than 2 inches in their greatest dimension; brush, stumps, logs, roots, debris, and organic or other deleterious materials; and must be acceptable to the Engineer.
3. Backfilling and construction of fills and embankments during freezing weather shall not be done except by permission of the Engineer. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials be in any backfill, fill or embankment.

B. Placement and Compaction:

1. Backfill materials shall be placed in approximately horizontal layers not to exceed 8 inches in uncompacted thickness. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled before compaction.
2. Each layer of material being compacted shall have the best practicable uniform moisture content to ensure satisfactory compaction. The Contractor will be required to add water and harrow, disc, blade, or otherwise work the material in each layer to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted by rolling or other method acceptable to the Engineer to 95 percent of relative density at optimum moisture content as determined by Modified Proctor Method, ASTM D1557 (latest edition).
3. Whenever a trench passes through a backfill or embankment, material shall be placed and compacted to an elevation 12 inches above the top of the pipe before the trench is excavated.

- C. Compact and backfill schedule for structures according to the schedule listed in Table 02220-A. Backfill schedule for pipes is listed in Table 02220-B. (Modified Proctor shall be ASTM D-1557, latest edition):

- D. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or elsewhere in the Contract Documents.

- E. Excavations shall be backfilled to the original grade or as indicated on the Drawings. Deviation from this grade because of settling shall be corrected. Backfill operation shall be performed to comply with all rules and regulations and in such a manner that it does not create a nuisance or safety hazard.
- F. Embankments shall be constructed true to lines, grades and cross sections shown on the plans or ordered by the Owner. Embankments shall be placed in successive layers of not more than 8 inches in thickness, loose measure, for the full width of the embankment. As far as practicable, traffic over the work during the construction phase shall be distributed so as to cover the maximum surface area of each layer.
- G. If the Contractor requests approval to backfill material utilizing lifts and/or methods other than those specified herein, such request shall be in writing to the Engineer. Approval will be considered only after the Contractor has performed tests, at the Contractor's expense, to identify the material used and density achieved throughout the backfill area utilizing the method of backfill requested. The Engineer's approval will be in writing.
- H. Foundation Preparation
 - 1. The existing ground beneath proposed tankage, building foundations and equipment base slabs and slabs on grade shall be removed and the area proof-rolled. Proof-rolling should consist of at least 10 passes of a self-propelled vibratory roller that impacts a dynamic force of not less than 40,000 pounds per drum to the soils. To minimize the effects of compaction induced vibrations on adjacent existing structures the compaction operation should be limited to a distance no closer than 25-feet from the existing structures. Each pass should overlap the preceding pass by 30 percent to insure complete coverage. Backfilled areas shall be compacted in 8-inch layers to a density of not less than 95 percent of Modified Proctor Dry Density as determined by ASTM D1557 (latest edition) for a depth of not less than 2-feet below the bottom of the foundations or concrete slabs. Any unsuitable foundation material shall be removed and replaced with suitable material.
 - 2. Slabs On Grade: Subgrades for concrete slabs shall be removed, backfilled, and compacted to the required grade. The top 2-feet of concrete slab subgrade in cut sections and all fill material shall be compacted in 8-inch layers to a density of not less than 95 percent of Modified Proctor Dry Density as determined by ASTM D1557, (latest edition).

3.08 TRENCH EXCAVATION (SEE DRAWINGS FOR DETAIL)

A. The Contractor shall not open more trench in advance of pipe laying than is necessary to expedite the work. Four hundred (400) feet shall be the maximum length of open trench on any line under construction. All trench excavation shall be open cut from the surface.

1. Alignment, Grade, and Minimum Cover: The alignment and grade or elevation of each pipeline shall be fixed and determined from offset stakes. Vertical and horizontal alignment of pipes, and the maximum joint deflection used in connection therewith shall be in conformity with requirements of the section covering installation of pipe.
2. Where pipe grades or elevations are not definitely fixed by the contract drawings, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe of 42 inches where in paved or graded streets where surface grades are definitely established and 36 inches in other locations. Greater pipe cover depths may be necessary on vertical curves or to provide necessary clearance beneath existing pipes conduits, drains, drainage structures, or other obstructions encountered at normal pipe grades. Measurement of pipe cover depth shall be made vertically from the outside top of pipe to finished ground or pavement surface elevation.

B. Limiting Trench Widths:

1. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing, and embedment. However, minimum permissible sidewall clearances between the installed pipe and each trench wall, expressed in inches, shall be as follows:

<u>Pipe Size</u>	<u>Minimum Sidewall Clearance</u>
60	24
54	21
48	19
36 or smaller	12

2. Stipulated minimum sidewall clearances are not minimum average clearances but are minimum clear distances which will be required.
3. Cutting trench banks on slopes to reduce earth load to prevent sliding and caving will be permitted only in areas where the increased trench width will not interface with surface features or encroach on right-of-way limits. Slopes shall not extend lower than one foot above the top of the pipe.

C. Mechanical Excavation:

1. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, and other existing property, utilities, or structures above or below ground. In all such locations, hand excavating methods shall be used.
2. Mechanical equipment used for trench excavation shall be of the type, design, and construction, and shall be so operated, that the rough trench excavation bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from an elevation one foot above the top of the installed pipe to the bottom of the trench, and that trench alignment is such that pipe when accurately laid to specified alignment will be centered in the trench with adequate clearance between the pipe and sidewalls of the trench. Undercutting the trench sidewall to obtain clearance will not be permitted.

D. Pavement Cutting:

1. Cuts in concrete pavement, asphalt pavement, and asphalt base pavements shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with an asphalt or concrete saw in a manner which will provide a clean groove for the full depth of pavement along each side of the trench and along the perimeter of cuts for structures.
2. Asphalt pavement and asphalt base pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 6 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting will be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the centerline of the trench.
3. Pavement removed for connections to existing lines or structures shall not be greater than necessary for the installation as determined by the Engineer.

E. Artificial Foundations in Trenches: Whenever so ordered by the Engineer, the Contractor shall excavate to such depth below grade as the Engineer may direct and the trench bottom shall be brought to grade with such material as the Engineer may order installed. All piling, concrete, or other foundations made necessary by unstable soil shall be installed as directed by the Engineer. Compensation for extra excavation and piling, concrete, or other foundations, except where provided by contract unit prices, shall be made in accordance with the contract provisions for extra work.

F. Bell Holes: Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

3.09 TESTS

- A. Testing is specified in Section 01410: Testing and Testing Laboratory Services.

3.10 DRAINAGE

- A. Trenches across roadways, driveways, walks, or other trafficways adjacent to drainage ditches or water courses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the trafficway to prevent impounding water after the pipe has been laid. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by the Contractor. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other water courses crossed by the line of trench shall be removed immediately after backfilling is completed and the original sections, grades, and contours of ditches or water courses shall be restored. Surface drainage shall not be obstructed longer than necessary.

3.11 FINAL GRADING

- A. After other outside work has been finished, and backfilling completed and settled, all areas on the site of the work which are to be graded shall be brought to grade with the tolerance of +/- 0.1 feet at the indicated elevations, slopes, and contours where seeding or sodding is not required or, where sodding is required within three (3) inches of finished grade. Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to hand work. All surfaces shall be graded to secure effective drainage. Unless otherwise shown, a slope of at least one percent shall be provided.
- B. After grading and where seeding is required, topsoil shall be evenly spread to a minimum depth of six (6) inches. Topsoil shall be from an Engineer approved source and shall be clear of trash, debris and surface vegetation more than six (6) inches in height.
- C. Grading and surfacing shall be completed to the satisfaction of the Engineer.

3.12 EXCESS EXCAVATED MATERIALS

- A. Insofar as needed, suitable excavated materials shall be used in fills and embankments shown on the Drawings. All suitable excess excavated material shall be placed at an on-site stockpile area as directed by the Owner.
- B. The Contractor shall segregate different types of excavated materials (i.e. sands, clayey sands) as possible in the stockpile area. All unsuitable materials shall be disposed of by the Contractor offsite in a legal manner.
- C. The Contractor shall slope and compact the stockpile with a light roller type vehicle to maintain stability.

D. The Contractor shall maintain proper soil and erosion control measures.

3.13 SETTLEMENT

A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in the General Conditions.

B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from the Engineer or Owner.

TABLE 02220-A

**COMPACTION AND BACKFILL SCHEDULE
FOR STRUCTURES**

Area	Material	Compaction
Beneath structures, foundations, slabs, and pavements. (minimum 5-foot depth below concrete foundation)	Structural Fill (Para. 2.01 C)	8-inch lifts compacted to 95% Modified Proctor maximum dry density. Fill should not be placed over any in-place soils until those layers have been compacted to 95% Modified Proctor maximum dry density.
Around structures, foundations and slabs (minimum 5-foot spacing)	Structural Fill (para. 2.01 C)	8-inch lifts compacted to 95% Modified Proctor maximum dry density. Use light rubber-tired or vibratory plate compactors.
From cleared existing surface to subgrade for paved and gravel roadway surfaces.	Common Fill (Para. 2.01 B)	12-inch lifts compacted to 95% Modified proctor maximum dry density.
Pipeline trenches from the bottom of the trench to the grade.	See Table 02220-B	6-inch lifts compacted to 95% Modified proctor maximum dry density.

END OF SECTION

**TABLE 02220-B
BACKFILL SCHEDULE FOR GRAVITY
AND PRESSURE PIPING**

Pipe Material	Pipe Size	Trench Condition	BEDDING Material	PIPE ENVELOPE				Others
				PRIMARY ZONE		SECONDARY ZONE		
				Material	Depth ^c	Material	Depth	
Ductile Iron, Stainless Steel, Culvert Pipe and Prestressed Concrete Cylinder Pipe	<16"	Normal ^a	Compacted Common Fill	Coarse Sand	0.5 O.D.	Coarse Sand	0.5 O.D.+12"	Class II Material should not have stones size >2". Organic content <1.1% by wt.
		Special ^b	Class I	Coarse Sand	0.5 O.D.	Coarse Sand	0.5 O.D.+12"	
	≥16"	Normal ^a	Class II	Common Fill	0.25 O.D.	Common Fill	--	
		Special ^b	Class I	Common Fill	0.25 O.D.	Common Fill	--	
Fiberglass, PVC and Other Plastic Pipe	<16"	Normal ^a	Coarse Sand	Coarse Sand	0.7 O.D.	Coarse Sand	0.3 O.D.+12"	
		Special ^b	Class I	Coarse Sand	0.7 O.D.	Coarse Sand	0.3 O.D.+12"	
	≥16"	Normal ^a	Class II	Class II	0.7 O.D.	Class II	0.3 O.D.+12"	
		Special ^b	Class I	Class II	0.7 O.D.	Class II	0.3 O.D.+12"	
R.C.P. and C.C.P.	<48"	Normal ^a	Class II	Class II	0.5 O.D.	Common Fill	--	
		Special ^b	Class I	Class II	0.5 O.D.	Common Fill	--	
	≥48"	Normal ^a	Class II	Class II	0.25 O.D.	Common Fill with max. stone size ≤2	0.75 O.D.+12"	
		Special ^b	Class I	Class II	0.25 O.D.	Common Fill with max. stone size ≤2	0.75 O.D.+12"	

Pipe Material	Pipe Size	Trench Condition	BEDDING Material	PIPE ENVELOPE				Others
				PRIMARY ZONE		SECONDARY ZONE		
				Material	Depth ^c	Material	Depth	
Pipe laid in rock (min. trench requirements) except for fiberglass and PVC pipe		Rock	Class I	Class II	0.5 O.D.	Common Fill with max. stone size ≤2"	0.5 O.D.+12"	
Gravity pipe (not specified above)		Normal	Coarse Sand	Coarse Sand	0.5 O.D.	Common Fill	0.50 O.D.+12"	
Pressure pipe (not specified above)		Normal	Suitable Undisturbed Earth or Compacted Common Fill	Common Fill with max. stone size ≤2"	0.5 O.D.	Common Fill with max. stone size ≤2"	0.50 O.D.+12"	

- a Dry soils.
b Saturated soils.
c Outside Diameter of pipe = O.D.

Notes:

- No Special bedding shall be required in case of suitable undisturbed earth type trench bottom.
- Bedding thickness shall be 12 inches unless specified otherwise.
- The backfill shall be compacted to 95% Modified Proctor maximum dry density and shall be placed in 6-inch lifts for pipe envelope and in 12-inch lifts from secondary zone to grade. Common fill shall be used as final backfill material.
- It is intended that additional excavation be conducted to remove unsuitable material below the pipe bedding level which prevents bedding compaction as required herein and replace such materials with suitable materials. Over excavation, geotextile fabric, gravel blanket, granular fill and other acceptable stabilization method shall be placed within 4 feet of the bedding level or within 10 feet of the existing ground (whichever is greater depth) at no additional cost to the Owner. Construction required beyond these limits shall be executed in accordance with the General Conditions. When indicated on the Drawings, the Contractor shall remove unsuitable material below bedding level to the limits indicated and replace with coarse sand or other acceptable stabilization method up to the bedding level without any additional cost to the Owner.

SECTION 02276

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion, sedimentation and turbidity controls as necessary.
2. Temporary erosion controls include, but are not limited to, grassing, mulching, setting, watering and reseeding on-site surfaces and soil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by federal, state and local requirements and by the Owner.
3. Temporary sedimentation controls include, but are not limited to silt fence, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by federal, state and local requirements and by the Owner.
4. Temporary turbidity controls include, but are not limited to, floating or staked turbidity barriers which will ensure that turbidity pollution will be either eliminated or maintained within acceptable limits as established by Federal, state, and local requirements and by the Owner.
5. Contractor is responsible for providing effective temporary erosion, sediment, and turbidity control measures during construction or until permanent controls become effective.

B. Related Work Described Elsewhere: Florida Building Code and Standard Building Code, FDOT Standard Specifications for road and bridge construction and FDOT Design Standards.

1.02 RELATED WORK

- A. Section 02200: Earthwork
- B. Section 02485: Sodding

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01340: Shop Drawings, Working Drawings and Samples, all technical product literature for commercial products to be used for sedimentation and erosion control.
- B. Submit and approved sediment and erosion control plan to the Engineer prior to initiating land disturbing activities.

1.04 REFERENCE STANDARDS

- A. The material and method of construction shall be in accordance with the Florida Department of Transportation Specifications and State of Florida Erosion and Sediment Control Designer and Reviewer Manual April 2010. Where conflict between the two regulations exists, the more stringent requirements shall apply as determined by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Silt Fence
 - 1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the MANUFACTURER or supplier as conforming to the requirements noted in Table 1.
 - 2. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F to 120°F.
 - 3. Steel posts (standard "U" or "T" section) for silt fence construction, they must have a minimum weight of 1.33 pounds per linear foot and shall have a minimum length of 5 feet.
 - 4. Wire fence reinforcement for silt fences using standard-strength filter cloth shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches.
- B. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

- C. Latex acrylic copolymer, such as Soil Sealant with coalescing agent as manufactured by Soil Stabilization Co., Merced, California shall be used as straw mulch tackifier.
- D. An asphalt tackifier shall only be used when temperatures are too low to allow the use of a latex acrylic copolymer and only with prior written approval from the ENGINEER.
- E. Erosion control matting shall be installed in all seeded drainage swales and ditches as directed by the ENGINEER. Erosion control matting shall be from the FDOT approved products list for the use specified.

PART 3 - EXECUTION

3.01 EROSION CONTROL

- A. Minimum Procedures for Grassing Are:
 - 1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps and roots larger than 1/2 inch in diameter and debris.
 - 2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
 - 3. Apply mulch loosely and to a thickness of between 3/4 inch and 1 1/2 inches.
 - 4. Apply netting over mulched areas on sloped surfaces.
 - 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.
- B. Sodding
 - 1. Sodding per specification Section 02485.

3.02 INSTALLATION

- A. Silt Fence Installation
 - 1. Silt fences shall be positioned as shown on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by the ENGINEER.
 - 2. The height of a silt fence shall be a minimum of 16 inches above the original ground surface and shall not exceed 34 inches above ground elevation.

3. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.
4. A trench shall be excavated approximately 4-inches wide and 4-inches deep on the upslope side of the proposed location of the measure.
5. When wire support is used, standard-strength filter cloth may be used. Posts for this type of installation shall be placed a maximum of 10-feet apart. The wire mesh fence must be fastened securely to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of two inches and shall not extend more than 34 inches above the original ground surface. The standard-strength fabric shall be stapled or wired to the wire fence, and 8 inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees.
6. When wire support is not used, extra-strength filter cloth shall be used. Posts for this type of fabric shall be placed a maximum of 6-feet apart. The filter fabric shall be fastened securely to the upslope side of the posts using one inch long (minimum) heavy-duty wire staples or tie wires and eight inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees.
7. If a silt fence is to be constructed across a ditch line or swale, the measure must be of sufficient length to eliminate endflow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope. Extra-strength filter fabric shall be used for this application with a maximum 3-foot spacing of posts.
8. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric.
9. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

B. Straw Bale Barrier Installation

1. Bales shall be placed around yard inlets with ends or sides of adjacent bales tightly abutting one another.
2. All bales shall be either wire-bound or string-tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging), the

excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.

4. Each bale shall be securely anchored by a least two stakes (minimum dimensions 2 inches x 2 inches x 36 inches) or standard "T" or "U" steel posts (minimum weight of 1.33 pounds per linear foot) driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.
5. The gaps between bales shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency.

3.03 MAINTENANCE AND INSPECTIONS

A. Inspections

1. Contractor shall make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas or into the vent trench, Contractor shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

3.04 REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized against erosion, remove sediment control devices. Dispose of waste materials in proper manner.
- B. Any sediment deposits remaining after the silt fence or straw bale barriers are removed shall be dressed to conform with the existing grade, prepared and seeded.
- C. Unless they will be incorporated into a permanent stormwater management control, check dams must be removed when their life has been completed. In temporary ditches and swales, check dams should be removed and the ditch filled in when they are no longer needed. In permanent structures, check dams should be removed when a permanent lining can be installed. In the case of grass-lined ditches, check dams should be removed when the grass has matured sufficiently to protect the ditch or swale. The area beneath the check dams should be sodded and mulched immediately after they are removed. The use of filter cloth underneath the stone will make the removal of the stone easier.

TABLE 1
 PHYSICAL PROPERTIES OF
 FILTER FABRIC IN SILT FENCE

<u>Physical Property</u>	<u>Test</u>	<u>Requirements</u>
Filtering Efficiency	ASTM 5141	75% (minimum)
Tensile Strength at 20% (max) Elongation*	VTM-52	Extra Strength - 50 lbs./linear inch (minimum) Standard Strength -30 lbs./linear inch (minimum)
Flow Rate	ASTM 5141	0.2 gal./sq.ft./minute (minimum)
Ultraviolet Radiation Stability %	ASTM-G-26	90% (minimum)

* Requirements reduced by 50% after six months of installation

END OF SECTION

SECTION 02451

AUGER CAST GROUT PILES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes auger cast grout piles.

1.02 UNIT PRICES

- A. Retain this article if Work specified in this Section is measured and paid for under the provisions of unit prices. Do not include amounts. Insert descriptions of items in Part 2 or 3 to provide information affecting the cost of the Work that is not included under the unit price.
- B. Contract Sum: Base Contract Sum on number and dimensions of piles from tip to pile top.
- C. Work of this Section is affected as follows:
 - 1. Pile Length: Additional payment for pile lengths in excess of that indicated, and credit for pile lengths less than that indicated, is calculated at unit prices stated in the Contract, based on net addition or deduction to total pile length as determined by Engineer and measured to nearest 12 inches.
 - 2. Number of Piles: Additional payment for number of piles in excess of that indicated, and credit for number of piles less than that indicated, is calculated at unit prices stated in the Contract.
 - 3. Unit prices include labor, materials, tools, equipment, and incidentals for excavation, grout fill, reinforcement, testing and inspection, and other items for complete pile installation.
 - 4. Test piles that become part of permanent foundation system are considered as an integral part of the Work.
 - 5. No payment is made for rejected piles, including piles out of specified tolerance or defective piles.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each grout mixture.
- C. Shop Drawings: For auger cast grout piles, prepared by or under the supervision of a qualified professional engineer.

1.05 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Material certificates.
- C. Equipment Data: Description of drilling and grout-pumping equipment.
- D. Pile inspection reports.
- E. Field quality-control reports.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1077, ASTM D 3740, and ASTM E 329 for testing indicated.
- B. Mix Designs: For each type of grout. Include description of type and proportions of ingredients.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.07 PRECONSTRUCTION TESTING

- A. Test Piles: Construct of diameter, depth, and at locations indicated on Drawings or, if not indicated, of same diameter and depth as largest production piles and at locations selected by Engineer, to confirm allowable load of piles and demonstrate Installer's construction methods, equipment, standards of workmanship, and tolerances.
 - 1. If Engineer determines that test pile does not comply with requirements, excavate for and cast another until it is accepted.
 - 2. Tests: Arrange and perform the following pile tests:
 - a. Axial Compressive Static Load Test: ASTM D 1143/D 1143M, Procedure A, Quick Test.

3. Equip each test pile with two telltale rods, according to ASTM D 1143/D 1143M, for measuring deformation during load test.
4. Provide pile reaction frame, anchor piles, equipment, and instrumentation with enough reaction capacity to perform tests. Notify Engineer at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.
 - a. Allow a minimum of seven days to elapse after installing test piles before starting pile testing.
 - b. Number of Test Piles: One pile.
5. Approval Criteria: Allowable load shall be the load acting on the test pile when the lesser of the following criteria are met, divided by a factor of safety of 2:
 - a. Net settlement of not more than 0.01 inch/ton of test load.
 - b. Total settlement of 1 inch provided the load settlement curve shows no sign of failure.
 - c. A plunging failure or sharp break in the load settlement curve.
6. Test Pile Records: Prepare records for each test pile, compiled and attested to by a qualified professional engineer. Include same data as required for permanent piles.
7. Test piles that comply with requirements, including location tolerances, may be used on Project.

1.08 FIELD CONDITIONS

- A. Protect structures, underground utilities, and other construction from damage caused by pile excavation.
- B. Site Information: A geotechnical report has been prepared for this Project and is included elsewhere in the Project Manual for information only.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for auger cast grout piles. Before excavating, lay out each pile to lines and levels required. Record actual measurements of each pile's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.
 1. Record and maintain information pertinent to each pile and indicate on record Drawings. Cooperate with Owner's testing and inspecting agency to provide data for required

PART 2 - PRODUCTS

2.01 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Centralizers: Devices to center steel reinforcement in excavation; spaced not less than 4 feet o.c. for vertical piles.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I/II.
 - 1. Fly Ash: ASTM C 618, Class F.
- B. Fine Aggregate: ASTM C 33/C 33M with 100 percent passing a No. 8 sieve, free of materials with deleterious reactivity to alkali in cement. Provide aggregate from single source.
- C. Water: ASTM C 94/C 94M and potable.
- D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 3. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- E. Fluidifier: ASTM C 937, with expansion of less than 4 percent.

2.03 RELATED MATERIALS

- A. Pile-Top Forms: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes.

2.04 GROUT MIXTURES

- A. Proportion grout mixture as follows:
 - 1. Minimum Compressive Strength: 5000 psi at 28 days; ASTM C 109/C 109M with cube specimens restrained from expansion according to ASTM C 942.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.43.

3. Grout Flow: 10 to 25 seconds; ASTM C 939 and ASTM C 109/C 109M using a flow cone with 0.75-inch opening.

2.05 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.06 GROUT MIXING

- A. Ready-Mixed Grout: Measure, batch, mix, and deliver according to ASTM C 94/C 94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.01 DRILLING AND PUMPING EQUIPMENT

- A. Drilling Rig: Capable of advancing hollow-stem, continuous-flight augers of design diameters to depths 20 percent greater than design depths; with stabilizing arm at bottom of leads to prevent rotation, and middle guide for augers greater than 40 feet in length.
- B. Hollow-Stem Auger: Continuous auger flighting without gaps or breaks, of diameter no more than 3 percent less than pile diameter; with grout pumping hole at bottom of auger head below cutting teeth. Seal grout-pumping hole with temporary tip plug to be fully opened by grout pressure or reinforcing bar during grout installation.
 1. Hollow Shaft Diameter: Minimum 1-1/4-inch clear ID.
- C. Grout Pump: Positive-displacement pump with a known volume per stroke. Minimum displacement pressure at pump of 350 lbf/sq. in..
- D. Automated Monitoring Equipment: Capable of measuring auger depth, penetration rate, and grout volume pumped per unit depth increment and of printing results.

3.02 EXCAVATION

- A. Excavate piles to elevations indicated or auger refusal. Establish and maintain axial alignment of leads and shaft before and during driving.
 1. Auger Refusal: Rate of less than 1 fpm.
- B. Drilling Tolerances:
 1. Location: Pile centers maximum 3 inches from locations indicated.
 2. Plumb: Within 2 percent from vertical.

3.03 INSTALLATION

- A. Grout Placement: Place grout in continuous operation.
 - 1. Lift auger 6 to 12 inches at start of grout pumping to facilitate tip plug removal, then return to previously established tip elevation.
 - 2. Develop an initial grout head of 60 inches before start of auger withdrawal and maintain during extraction.
 - 3. Monitor pumped grout volumes using automated monitoring equipment.
 - 4. Volume of placed grout is at least 120 percent of theoretical volume. If less than required volume is placed for any given 60-inch segment, lower auger a minimum of 60 inches, or to bottom of pile if less than 60 inches available, and restart withdrawal.
 - 5. If grout pumping is interrupted during placement, lower auger a minimum of 60 inches, or to bottom of pile if less than 60 inches available, and restart withdrawal.
- B. Steel Reinforcement Installation, General: Comply with recommendations in CRSI's "Manual of Standard Practice."
- C. Reinforcing Cages: Install immediately after grout placement and support at ground surface until initial set. Allow cages to fall into shaft freely under their own weight; do not force by vibrating or pushing with mechanical equipment.
- D. Adjacent Piles: Do not install piles within 10 pile diameters of piles grouted within the previous 12 hours.
- E. If location or out-of-plumb tolerances are exceeded, provide corrective construction. Submit corrective construction proposals to Architect for review before proceeding.

3.04 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Pile excavation, placement, and testing.
 - 2. Steel reinforcement welding.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Grout Tests: Testing of samples of fresh grout obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Flow Rate: ASTM C 939 and ASTM C 109/C 109M using a flow cone with 0.75-inch opening.

2. Compressive Strength: ASTM C 109/C 109M with cube specimens restrained from expansion according to ASTM C 942.
 - a. Testing Frequency: Obtain six 2-inch cubes for each 50 cu. yd. or fraction thereof of grout placed, but not less than one set for each day's pour. Obtain an additional set of cubes from each truck during test pile placement.
 - b. Strength of each grout mixture is satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Pile Inspection Reports: Prepare inspection reports for each auger cast grout pile.

3.05 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 02485

SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. Furnish all labor, materials, equipment and incidentals required to prepare lawn bed and install sodding as specified.
2. All pervious areas disturbed during construction, shall receive sodded grass lawns.

B. Related Work Described Elsewhere

1. Shop Drawings, Working Drawings and Samples: Section 01340.
2. Earthwork: Section 02200.

1.02 QUALITY ASSURANCE (NOT APPLICABLE)

1.03 SUBMITTALS

- A. Provide technical data as required in Section 01340 regarding all materials or installation procedures required under this Section.
- B. Submit representative topsoil samples for analysis by a private laboratory to determine nutrient deficiencies and outline a proper fertilization program.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Loam (topsoil) shall be fertile, natural soil, typical of the locality, free from large stones, roots, sticks, peat, weeds and sod and obtained from naturally well drained areas. It shall not be excessively acid or alkaline nor contain toxic material harmful to plant growth. Topsoil stockpiled under other Sections of this Division may be used, but the Contractor shall furnish additional loam at his own expense, if required.

2.02 SOD

- A. Sod shall be Argentine Bahia of firm texture having a compacted growth and good root development as approved.
- B. Sod shall be certified to meet Florida State Plant Board specifications, absolutely true to varietal type, and free from weeds or other objectionable vegetation, fungus, insects and disease of any kind.
- C. Before being cut and lifted the sod shall have been mowed 3 times with the final mowing not more than a week before cutting into uniform dimensions.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Areas to be sodded shall be cleared of all rough grass, weeds, and debris, and ground brought to an even grade as approved.
- B. The soil shall then be thoroughly tilled to a minimum 8 inch depth.
- C. Loam shall be placed to a minimum depth of 4 inches and shall be lightly compacted. No loam shall be spread in water.
- D. Lime shall be applied at a rate necessary to achieve a pH of 6 to 7.
- E. The areas shall then be brought to proper grade, free of sticks, stones, or other foreign matter over 1-inch in diameter or dimension. The surface shall conform to finish grade, less the thickness of sod, free of water-retaining depressions, the soil friable and of uniformly firm texture.

3.02 INSTALLATION

- A. During delivery, prior to planting, and during the planting of the lawn areas, the sod panels shall at all times be protected from excessive drying and unnecessary exposure of the roots to the sun. All sod shall be stacked during construction and protected so as not to be damaged by sweating or excessive heat and moisture.
- B. After completion of soil conditioning as specified above, sod panels shall be laid tightly together so as to make a solid sodded lawn area. On mounds and other slopes, the long dimension of the sod shall be laid perpendicular to the slope and with the joints offset relative to upper and lower panels. Immediately following sod laying the lawn areas shall be rolled with a lawn roller customarily used for such purposes, and then thoroughly watered.

- C. Bring the sod edge in a neat, clean manner to the edge of all paving and shrub areas. Top dressing with approved, clean weed free sand may be required at no additional cost to the Owner if deemed necessary by the Engineer.

3.03 MAINTENANCE

- A. The Contractor shall produce a dense, well established lawn. The Contractor shall be responsible for the repair and resodding of all eroded or bare spots until project acceptance and during the warranty period. Repair sodding shall be accomplished as in the original work except that fertilizing may be omitted. Sufficient watering shall be done by the Contractor to maintain adequate moisture for optimum development of the lawn areas. Sodded areas shall receive no less than 1.5 inches of water per week. The Contractor shall also mow lawn areas once per week until final completion of the Project.

3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATIONS

- A. Lawn areas planted under this Contract and lawn areas outside the designated areas damaged by Contractor's operations shall be repaired at once by proper sod bed preparation, fertilizing and resodding, in accordance with these Specifications.

END OF SECTION



DIVISION 3

CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The Contractor shall furnish all labor and materials required and install cast-in-place concrete complete as shown on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

- A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall conform to the requirements of the following standards:
 - 1. American Concrete Institute (ACI)
 - a. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - b. ACI 305 - Hot Weather Concreting.
 - c. ACI 306 - Cold Weather Concreting.
 - d. ACI 308 - Standard Practice for Curing Concrete.
 - e. ACI 309 - Guide for Consolidation of Concrete.
 - f. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - g. ACI 347 - Guide for Concrete Formwork.
 - 2. American Society for Testing and Materials (ASTM)
 - a. ASTM C33 - Concrete Aggregates.
 - b. ASTM C94 - Standard Specification for Ready-mix Concrete.
 - c. ASTM C143 - Slump for Portland Cement Concrete.
 - d. ASTM C150 - Standard Specification for Portland Cement.
 - e. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

- f. ASTM C173 - Air Content of Freshly Mixed Concrete by the Volumetric Method.
- g. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.
- h. ASTM C260 - Air Entraining Admixtures for Concrete.
- i. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- j. ASTM C494 - Chemical Admixtures for Concrete.
- k. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

3. Building Codes

- a. Standard Building Code (SBCCI).
- b. Local Codes and Regulations.

B. Plant Qualification: Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C-94.

C. Evaluation and Acceptance Of Concrete: Evaluation and acceptance of concrete will be in accordance with ACI-318, Chapter 4.

1.03 SUBMITTALS

A. Materials and Shop Drawings: The following information shall be submitted for approval in accordance with Section 01340: Shop Drawings, Working Drawings and Samples. No concrete shall be furnished until submittal has been approved.

- 1. Plant Qualification: Satisfactory evidence shall be submitted indicating compliance with the specified qualification requirements.
- 2. Materials: Satisfactory evidence shall be submitted indicating that materials to be used, including cement, aggregates and admixtures meet the specified requirements. Provide catalog data, chemical and mechanical analysis, and conformance with ASTM requirements.
 - a. Sources of cement, pozzolan and aggregates.
 - b. Air-entraining admixture.

- c. Water reducing admixture.
 - d. High range water-reducing admixture (plasticizer).
 - e. Sheet curing material.
 - f. Liquid curing compound.
3. Design Mix: The design mix to be used shall be prepared by qualified persons and submitted for approval. The design of the mix is the responsibility of the Contractor subject to the limitations of the Specifications. Approval of this submission will be required only as minimum requirements of the Specifications have been met. Such approval will in no way alter the responsibility of the Contractor to furnish concrete meeting the requirements of the Specifications relative to strength and slump.
4. Ready Mix Concrete: Provide delivery tickets or weighmasters certificate per ASTM C-94, including weights of cement and each size aggregate, amount of water in the aggregate, and amount of water added at the plant. Write in the amount of water added on the job.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement

- 1. Cement for all concrete shall be domestic Portland cement that conforms to the requirements of ASTM Designation C-150 Type I, Type II or Type III.
- 2. Only one (1) brand of cement shall be used in any individual structure unless approved by the Engineer. Cement which has become damaged, partially set, lumpy or caked shall not be used and the entire contents of the sack or container which contains such cement.

B. Pozzolan

- 1. Fly ash shall be Class C or F conforming to the requirements of ASTM C618, including the requirements of Table 1 except the loss of ignition, LOI, shall be limited to 3% maximum. Fly ash shall not exceed 20% of the cementitious content of the mix.

C. Aggregates

- 1. ASTM C-33. Coarse aggregates shall be size No. 67 (3/4 inch).

- D. Water: Clean and free from injurious amounts of deleterious materials.
- E. Air Entraining Admixture: ASTM C-260.
- F. Water Reducing and Retarding Admixtures:
 - 1. For concrete without superplasticizer: ASTM C-494, Type D, and shall contain no calcium chloride by weight of cement.
 - 2. For concrete with superplasticizer
 - a. ASTM C-494, Type F or G. The admixture shall be a second generation type, free of chlorides and alkalis (except for those attributable to water) and composed of a synthesized sulfonated complex polymer. The concrete shall be capable of maintaining its rheoplastic state in excess of two (2) hours if necessary. Superplasticizers admix shall be induced at the batch plant only, job site redosage shall not be permitted without prior approval from the Engineer.
 - b. Approved Materials:
 - (1) Rheobuild 716as manufactured by MAC-USA, Inc., Boca Raton, Florida, telephone: (407) 368-0121 or Rheobuild 716 as manufactured by Master Builders Technologies, Cleveland, Ohio.
 - (2) Daracem 100 as manufactured by W.R. Grace & Co. Construction Products Division, Pompano Beach, Florida.
 - (3) Engineer approved equal.
 - c. Manufacturer's job site representation: A competent field service representative from the manufacturer of each of the admixtures (superplasticizer) selected for use shall be available at the job site to provide advice and consultation on the use of the admixture materials, including the effect on the concrete in place. The representative shall be available on short call at any time requested by the Owner, Contractor, or concrete producer.
 - d. Manufacturer's representative will be responsible to recommend maximum discharge time for superplasticizer and to recommend method and procedure to induce superplasticizer into mixer.
 - e. Manufacturer's representative will be responsible to recommend quantities of admixtures to be used if variations are required because of temperature/humidity, wind, or other environmental considerations.

- G. Curing Compound: ASTM C-309, Type 1. The compound shall contain no ingredient which will adversely affect the bond of coatings or toppings. Curing compound shall be approved for use after 30 days.
 - 1. Curing compound for exposed concrete not to receive special finishes, protective coatings and/or concrete toppings shall be "Super Rez-Seal", as manufactured by Euclid Chemical Co., Cleveland, Ohio or equal.
 - 2. Curing compound for exposed concrete to receive special finishes, protective coatings and/or concrete toppings shall be "Kurez-DR", as manufactured by Euclid Chemical Co., Cleveland, Ohio or equal.
- H. Mortar for Repair of Concrete: Mortar used for repair of concrete shall be made of the same materials as used for concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cement to two and one-half (2-1/2) parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.
- I. Burlap Mats: Conform to AASHTO Specification M-182.
- J. Epoxy Bonding Agent: Sikadur 32 Hi Mod, or engineer approved equal.

2.02 MIXES

- A. General Requirements:
 - 1. Mix Design: Proportioning shall be on the basis of field experience and/or trial mixtures as specified in ACI-318, Section 4.3. Data on consecutive compression tests and standard deviation shall be submitted. Proportioning for small structures may be by the water/cement ratio under special approval by the Engineer. Concrete mix design shall comply with the Standard Building Code requirements.
 - 2. Air Content: Range 3.5 to 6% for Class A and B.
 - 3. Slump: 4 inches plus or minus 1 inch for Class A and B without superplasticizer.
8 inches plus or minus 1 inch for concrete with superplasticizer.
6 inches plus or minus 1 inch for tremie concrete.
 - 4. Water cement ratio = 0.45 (Class A Concrete) without superplasticizer.
= 0.55 (Class B Concrete) without superplasticizer.
= 0.37 Concrete with superplasticizer.

5. Minimum Compressive Strength at 28 days:
 - a. Class B, 3,000 psi: Slab on grade, driveways, concrete curbs, retaining walls, sidewalks, etc. not in contact with treated waters.
 - b. Class B, 3,000 psi: Slab on grade, driveways, concrete curbs, retaining walls, sidewalks, etc. not in contact with treated waters.
 - c. Slab on grade shall require Class B 3000 psi concrete.
- B. Production of Concrete:
 1. General: Concrete shall be ready mixed and shall be batched, mixed and transported in accordance with ASTM C-94, except as otherwise indicated.
 2. Air Entraining Admixture: Air entraining admixture shall be charged into the mixture as a solution and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water.
 3. Water Reducing and Retarding Admixture: Water reducing and retarding admixture shall be added and measured as recommended by the manufacturer. The addition of the admixture shall be separate from the air entraining admixture. The addition of the admixture shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Admixtures shall be stored, handled and batched in accordance with the recommendation of ASTM C-94.
- C. Delivery Tickets: In addition to the information required by ASTM C-94, delivery tickets shall indicate the cement content and the water/cement ratio.
- D. Temperatures: The temperature of the concrete upon delivery from the truck shall not exceed 95 degrees Fahrenheit (°F), otherwise ice shall be used to reduce the temperature of the concrete as recommended by ACI.
- E. Modifications To The Mix: No modifications to the mix shall be made in the plant or on the job which will decrease the cement content or increase the water-cement ratio beyond that specified. No modifications of any kind shall be made except by a qualified and responsible representative of the concrete producer.
 1. Any addition of water must be approved by the Engineer. Added water shall be incorporated by additional mixing of at least 35 revolutions. All added water shall be metered and the amount of water added shall be shown on each delivery ticket. Addition of water shall follow procedures of ASTM C-94 for slump adjustment.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Preparations Before Placing: No concrete shall be placed until the approval of the Engineer has been received. Approval will not be granted until forms are thoroughly clean, and reinforcing and all other items required to be set in concrete have been placed and thoroughly secured. The Engineer shall be notified a minimum of 24 hours before concrete is placed.
- B. Conveying:
1. General: Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete. No concrete shall be placed more than 90 minutes after mixing has begun for that particular batch.
 2. Buckets and Hoppers: Buckets and hoppers shall have discharge gates with a clear opening equal to no less than one-third of the maximum interior horizontal area, or five (5) times the maximum aggregate size being used. Side slopes shall be no less than 60 degrees. Controls on gates shall permit opening and closing during the discharge cycle. It is suggested the Contractor provide one (1) standby bucket and hopper for use in case of equipment failure.
 3. Runways: Extreme care shall be exercised to avoid displacement of reinforcing during the placing of concrete.
 4. Elephant Trunks: Hoppers and elephant trunks shall be used to prevent the free fall of concrete for more than 6 feet.
 5. Chutes: Chutes shall be metal or metal lined, and shall have a slope not exceeding one vertical to two horizontal, and not less than one vertical to three horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements, may be used only if they discharge into a hopper before distribution.
 6. Pumping Equipment: Pumping equipment and procedures, if used, shall conform to the recommendations contained in the report of ACI Committee 304 on "Placing Concrete by Pumping Methods", ACI 304.2R. The specified slump shall be measured at the point of discharge. The loss of slump in pumping shall not exceed 1-1/2 inches.
 7. Conveying Equipment Construction: Aluminum or aluminum alloy pipe for tremies or pump lines and chutes, except for short lengths at the truck mixer shall not be permitted.

8. Cleaning: Conveying equipment shall be cleaned at the end of each concrete operation.

3.02 APPLICATION

A. Placing:

1. General: Concrete shall be deposited continuously, or in layer of such thickness (not exceeding 2 feet in depth) that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness.
2. Supported Elements: At least 2 hours shall elapse after depositing concrete in columns or walls before depositing in beams, girders, or slabs supported thereon.
3. Segregation: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to procedures which will cause segregation.
4. Concrete Under Water: All concrete shall be placed in the dry.

B. Consolidating Concrete:

1. General: Concrete, with the exception of slabs less than 8 inches thick, shall be consolidated by means of internal vibrators operated by competent workmen.
 - a. Concrete Slabs: Concrete for slabs less than 8 inches shall be consolidated with vibrating screeds: slabs 8-inches to 12-inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds. Vibrators shall always be placed into concrete vertically and shall not be laid horizontally or laid over.
2. Vibrators: Vibrators shall have a minimum head diameter of at least 2 inches, a minimum centrifugal force of 700 and a minimum frequency of 8,000 vibrations per minute.
3. Vibrators for Confined Areas: In confined areas, the specified vibrators shall be supplemented by others having a minimum head diameter of 1-1/2 inches, a minimum centrifugal force of 300 pounds and a minimum frequency of 9,000 vibrations per minute.
4. Spare Vibrator: One (1) spare vibrator for each three (3) in use shall be kept on the site during all concrete placing operations.
5. Use of Vibrators: Vibrators shall be inserted and withdrawn at points approximately 18 inches apart. The duration of each insertion shall be from 5 to

15 seconds. Concrete shall not be transported in the forms by means of vibrators.

- C. Protection: Rainwater shall not be allowed to increase the mixing water, nor to damage the surface finish. Concrete shall be protected from construction overloads. Design loads shall not be applied until the specified strength has been attained.
- D. Construction Joints: Except as otherwise indicated on the Drawings, horizontal construction joints shall be provided at top of foundation members and slabs on grade and at the soffit of supported slabs and beams. Other horizontal and vertical construction joints shall be located as indicated on the Drawings. Joints will not be permitted except in the locations shown, unless recommended by the Contractor and approved by the Engineer.
- E. Bonding: Before depositing new concrete on or against concrete that has set, the surfaces of the set concrete shall be thoroughly cleaned so as to expose the coarse aggregate and be free of laitance, coating, foreign matter and loose particles. Forms shall be retightened. The hardened concrete of joints shall be dampened, but not saturated, and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least 1/2 inches thick on horizontal surfaces. The fresh concrete shall be placed before the grout has attained its initial set.
- F. Embedded Items: In addition to steel reinforcement, pipes, inserts and other metal objects as shown, specified or ordered shall be built into, set in or attached to the concrete. All necessary precautions shall be taken to prevent these objects from being displaced, broken or deformed. Before concrete is placed, care shall be taken to determine that all embedded parts are firmly and securely fastened in place as indicated. They shall be thoroughly clean and free from paint or other coating, rust, scale, oil, or any foreign matter. No wood shall be embedded in concrete. The concrete shall be packed tightly around pipes and other metal work to prevent leakage and to secure proper adhesion. Drains shall be adequately protected from intrusion of concrete.
- G. Concrete Finishes: Complete concrete surfaces in accordance with the following schedule:

1. Finish

Designation	Area Applied
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S	Slabs and floors of structures or building exposed to view. Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.
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E Exposed edges of slabs, floors and tops of walls. Finish with a 1/4 inch radius edge if a chamfer is not indicated.

2. General: As soon as forms can safely be removed, all irregular projections shall be chipped off flush with the concrete surfaces. All voids produced by spacers or any honeycombing shall be pointed up with grout and troweled flush with the concrete surface immediately after removal of forms and water cured to prevent shrinkage. Honeycombing shall be cut out to expose a sound concrete surface prior to pointing. The use of mortar pointing or patching shall be confined to the repair of small defects in relatively green concrete. Where in the opinion of the Engineer substantial repairs are required, the defective concrete shall be cut out to sound concrete and repaired with gunite or the concrete shall be removed and reconstructed as directed.
3. All concrete slabs to be troweled shall receive a floated finish. After floating, all concrete slabs except as otherwise indicated and in areas to receive roofing, insulation, tile or topping shall be troweled and immediately light broom finished. Stair treads shall receive a light broomed finish.
4. Floated Finish: After concrete has been placed. Consolidated, struck off and leveled, it shall not be worked further until water sheen has disappeared and the surface has hardened sufficiently to permit floating, the planeness of the slab shall be checked with a 10 foot straightedge applied at no less than two (2) angles. All high spots shall be cut down and all low spots shall be filled to produce a surface having a Class B Tolerance throughout. The slab shall then be refloated to a uniform sandy texture.
5. Light Broomed Finish: After floating, slabs to receive a light broomed finish shall be power troweled and finished struck with a soft broom rag. The troweling shall produce a smooth surface, relatively free of defects and a Class B Tolerance. Before the surface sets, the soft broom drag shall be passed over the surface to produce a surface uniform in texture and appearance.
6. Troweled Finish: After floating, slabs to receive a troweled finish shall be power troweled and finally hand troweled. The first troweling after power floating shall produce a smooth surface, relatively free of defects. Surfaces shall be hand troweled after the surface has hardened sufficiently. The final troweling shall be done by hand when a ringing sound is produced as the trowel is moved over the surfaces. Hand troweling shall produce a surface which is thoroughly consolidated, free from trowel marks, uniform in texture and appearance and plane to a Class B tolerance.
7. Finishing Tolerance: Surfaces shall be true planes within the following limits:
 - a. Class B: 1/4 inch in 10 feet is determined by a 10 foot straightedge placed anywhere on the slab in any direction.

- H. Saw cut Joints: Joints that are to be saw cut shall be cut not sooner than 2 hours after the concrete is poured and not later than 8 hours after the pour.

3.03 PROTECTING

A. Curing:

1. All exposed surfaces, including slabs shall receive a spray coat of curing compound applied in accordance with the manufacturer's recommendations. Exposed steel keyways and other embedded items shall be protected from the curing compound. Curing compounds shall not be used on surfaces to be coated and exposed to sewage or wastewater.
2. Curing compound shall be uniformly applied to the surfaces to be cured, in a single coat, continuous film by a mechanical sprayer. Application shall be in compliance with the manufacturer's recommendations.
3. Curing compound shall be applied in accordance with manufacturer's instructions. Should the film become damaged from any cause within the repaired curing period, the damaged portions shall be required immediately with additional compound. Upon removal of forms, the newly exposed surfaces shall immediately be coated to provide a curing treatment equal to that provided for the surface.

- B. Sheet Material Curing: Cover entire surface with sheet material. Securely anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.

3.04 REMOVAL OF FORMS

- A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 70 percent of the 28 day compressive strength prescribed by the design.
- B. Shores shall not be removed until the concrete has attained at least 60 percent of the specified strength and also sufficient strength to support safely its own weight and the construction live loads upon it.

3.05 TESTING

- A. An independent testing laboratory employed by the Contractor will make such tests required.
- B. Standard laboratory compressive test cylinders will be obtained by the laboratory when concrete is discharged at the point placing (i.e., discharge end of pumping equipment), and cylinders will be made and cured in accordance with the requirements of ASTM

Designation C-31. A set of five (5) cylinders will be obtained for each 50 cubic yards, or fraction thereof placed each day, nor less than once for each 5,000 sq. ft. or surface area of slabs or walls for each type of concrete. The cylinders will be cured under laboratory conditions and will be tested in two groups of two (2) at 7 and 28 days of age, with one (1) group held until released by the Engineer in accordance with the requirements of ASTM Designation C-39.

- C. The laboratory will conduct tests of Class A and Class B concrete as it is discharged from the mixer at the point of placing. Slump tests will be made for each truckload of concrete. Slump tests may be made on any batch, and failure to meet specified slump requirements will be sufficient cause for rejection of the batch. If water is added after initial test then the "load" shall be tested.
- D. Air content of the concrete mixture will be tested on every other truck in accordance with ASTM C173 or ASTM C231.
- E. Historical strength/break data may be submitted with mix design and may be used in the approval process provided the mix design is otherwise acceptable. If the mix design required modifications, a test batch may still be required.

3.06 FIELD CONTROL

- A. The Contractor shall advise the Engineer of his readiness to proceed at least twenty four (24) working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.
 - 1. The Contractor's Superintendent shall submit a certification that indicates preparedness to place concrete and is in accord with contract drawings and specifications. This certification shall be submitted on forms provided by the Engineer.
- B. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of test on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.
- C. The Contractor shall cooperate in obtaining cores by allowing free access to the Work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. The Contractor shall repair all core holes. The work of cutting and testing the cores will be at the expense of the Owner.

3.07 FAILURE TO MEET REQUIREMENTS

- A. Should the strengths shown by the test specimens made and testing in compliance with the previous provisions fall below the values given in Section 2.02.A.5, the Engineer shall have the right to require changes in proportions outlined to apply on the remainder of the Work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed. The cost of such additional curing shall be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In cases of failure to meet strength requirements the Contractor shall adjust the concrete mix to meet contract requirements.
- B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In case of failure of the core, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days.
- C. Should the strength of test cylinders fall below 85 percent of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.08 PATCHING

- A. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled, and surface defect which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.
- B. Immediately after removal of forms remove plugs and break off metal ties. Holes are then to be promptly filled upon stripping as follows: Moisten the hole with water, followed by a 1/16-inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch. Compact the grout into the hole until dense and an excess of paste appears on the surface. Trowel smooth with heavy pressure. Avoid burnishing.
- C. When patching exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of one to five days if necessary to bring the surface down to the adjacent concrete. Exercise

care to avoid damaging or staining the surrounding concrete. Wash thoroughly to remove all rubbed matter.

3.09 REPAIRS

- A. It is the intent of these Specifications to require quality work including adequate forming, proper mixture and placement of concrete and curing so completed concrete surfaces will not require patching.
- B. Defective concrete and honeycombed areas as determined by the Engineer shall be repaired as specified.
 - 1. General: Surface defects, including tie holes shall be repaired immediately after form removal. The areas to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. The Engineer shall be notified prior to commencing operations.
 - 2. Removal of Defective Concrete: All honeycombed and other defective concrete shall be removed down to sound concrete. Edges shall be cut perpendicular to the surface or slightly under cut. Sand blast surfaces to receive repair.
 - 3. Bonding Grout: Surfaces to be patched shall be thoroughly dampened and shall receive a coat of bonding grout brushed into the surface. Grout shall consist of one part cement to one part fine sand passing a No. 30 sieve. Grout shall be the consistency of thick cream.
 - 4. Placing Patching Mortar: After the bonding grout begins to lose its water sheen, a premixed patching mortar shall be applied. Patching mortar shall be thoroughly consolidated into place and stuck off so as to leave the patch slightly higher than the surrounding surface. It shall be left undisturbed for one hour to permit initial shrinkage and then finally finished.
 - 5. Tie Holes: After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.

3.10 MISCELLANEOUS WORK

- A. All bolts, anchors, miscellaneous metals or other sleeves and steel work required to be set in the concrete forms for attachment of masonry, structural, and mechanical equipment shall be set or installed under this Section. The Contractor shall be fully responsible for the setting of such materials in the forms and shall correct all such not installed in a proper location or manner at his own expense. Contractor shall coordinate the activities of other trades for installation of these items.
- B. Pipes or conduits for embedment, other than those merely passing through shall not be larger in outside diameter than one-third the thickness of the slab, wall, or beam in which they are embedded, unless indicated on the Drawings, nor shall they be spaced

closer than three (3) diameters on center, nor so located as to unduly impair the strength of the construction. The Engineer shall approve the location of all conduits and fixtures.

END OF SECTION

SECTION 03600

GROUT

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install grout complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01340, shop drawings and product data showing materials of construction and details of installation for:
- B. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.
 - 1. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.
 - 2. Cement grout. The submittal shall include the type and brand of the cement, the gradation of the fine aggregate, product data on any proposed admixtures and the proposed mix of the grout.
- C. Laboratory Test Reports
 - 1. Submit laboratory test data as required under Section 03300 for concrete to be used as concrete grout.
- D. Certifications
 - 1. Certify that commercially manufactured grout products and concrete grout admixtures are suitable for use after 30 days curing.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes
 - 2. ASTM C579 - Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes
 - 3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
 - 4. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- B. U.S. Army Corps of Engineers Standard (CRD)
 - 1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Qualifications
 - 1. Grout manufacturer shall have a minimum of 10 years experience in the production and use of the type of grout proposed for the work.
- B. Pre-installation Conference
- C. Well in advance of grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product proposed for use. Parties concerned with grouting shall be notified of the meeting at least 10 days prior to its scheduled date. Services of Manufacturer's Representative
 - 1. A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre-installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.
- D. Field Testing
 - 1. All field testing and inspection services required shall be provided by the Owner. The Contractor shall assist in the sampling of materials and shall

provide any ladders, platforms, etc, for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.

2. The field testing of Concrete Grout shall be as specified for concrete in Section 03300.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.
- B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.
- C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.
- D. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.
- E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

1.07 DEFINITIONS

- A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.
- B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.02 MATERIALS

- A. Nonshrink Cementitious Grout
 1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be Portland cement based,

contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

- a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by Master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by The Euclid Chemical Co.; NBEC Grout by U. S. Grout Corp. or equal.
- b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Corp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U. S. Grout Corp. or equal.

B. Nonshrink Epoxy Grout

1. Nonshrink epoxy-based grout shall be a pre-proportioned, three component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 14,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum thermal expansion of 30×10^{-6} when tested in conformity with ASTM C531. The grout shall be Ceilcote 648 CP by Master Builders Inc.; Five Star Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout-Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co. or equal.

C. Cement Grout

1. Cement grouts shall be a mixture of one part Portland cement conforming to ASTM C150, Types I, II, or III and 1 to 2 parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

D. Water

1. Free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.

- B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.
- C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.
 - 1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.
- D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of baseplates prior to the installation of the grout.
- E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable to the Engineer. Upon completion of the 24-hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Engineer for each specific location of grout installation.
- F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.
- G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.
 - 1. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.
- H. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.
- I. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Engineer.

3.02 INSTALLATION – GENERAL

- A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.

- B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.
- C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.
- D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.
- E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.
- F. Reflect all existing underlying expansion, control and construction joints through the grout.

3.03 INSTALLATION - CEMENT GROUTS AND NONSHRINK CEMENTITIOUS GROUTS

- A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.
- B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.
- C. Placements greater than 3-in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.
- D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.
- F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.

- G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.04 INSTALLATION - NONSHRINK EPOXY GROUTS

- A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.
- B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.
- C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.
- E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.
- F. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.05 INSTALLATION - CONCRETE GROUT

- A. Screed underlying concrete to the grade shown on the Drawings. Provide the surface with a broomed finish, aligned to drain. Protect and keep the surface clean until placement of concrete grout.
- B. Remove the debris and clean the surface by sweeping and vacuuming of all dirt and other foreign materials. Wash the tank slab using a strong jet of water. Flushing of debris into tank drain lines will not be permitted.
- C. Saturate the concrete surface for at least 24 hours prior to placement of the concrete grout. Saturation may be maintained by ponding, by the use of soaker hoses, or by other methods acceptable to the Engineer. Remove excess water just prior to placement of the concrete grout. Place a cement slurry immediately ahead of the concrete grout so that the slurry is moist when the grout is placed. Work the slurry over the surface with a broom until it is coated with approximately 1/16 to 1/8-in

thick cement paste. (A bonding grout composed of 1 part Portland cement, 1.5 parts fine sand, an approved bonding admixture and water, mixed to achieve the consistency of thick paint, may be substituted for the cement slurry.)

- D. Place concrete grout to final grade using the scraper mechanism as a guide for surface elevation and to ensure high and low spots are eliminated. Unless specifically approved by the equipment manufacturer, mechanical scraper mechanisms shall not be used as a finishing machine or screed.
- E. Provide grout control joints as indicated on the Drawings.
- F. Finish and cure the concrete grout as specified for cast-in-place concrete.

3.06 SCHEDULE

- A. The following list indicates where the particular types of grout are to be used:
- B. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the plans except for base plates greater in area than 3-ft wide by 3-ft long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.
- C. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3-ft by 3-ft. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.
- D. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.
- E. Cement grout: Cement grout may be used for grouting of incidental base plates for structural and miscellaneous steel such as post base plates for platforms, base plates for beams, etc. It shall not be used when nonshrink grout is specifically called for on the Drawings or for grouting of primary structural steel members such as columns and girders.

END OF SECTION



DIVISION 4

NOT USED



DIVISION 5

METALS

SECTION 05519

METAL GRATING STAIRS AND PLATFORMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes industrial-type, straight-run stairs with metal grating treads and railings attached to metal grating stairs.

1.02 COORDINATION

- A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.03 ACTION SUBMITTALS

- A. Product Data: For metal grating stairs and the following:
 - 1. Protective Coatings.
 - 2. Grout.
 - 3. Grating
- A. Shop Drawings: Include plans, elevations, sections, details, and attachments.
- B. Delegated-Design Submittal: For stairs and platforms, including analysis data signed and sealed by a Florida licensed professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01400 "Quality Requirements," to design stairs and railings.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of wind, gravity and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 - 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/360.

2.02 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.03 FASTENERS

- A. All fasteners shall be 316 stainless steel.

2.04 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.05 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Form exposed work with accurate angles and surfaces and straight edges.

- C. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 4 welds: good quality, uniform undressed weld with minimal splatter.
- D. Fabricate joints that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.06 ALUMINUM-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Industrial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
 - 1. Fabricate stringers of aluminum channels.
 - a. Provide closures for exposed ends of channel stringers.
 - 2. Construct platforms of aluminum channel headers and miscellaneous framing members as needed to comply with performance requirements indicated.
 - 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.
- C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."
 - 1. Fabricate treads and platforms from welded steel grating designed to meet the required loadings.
 - 2. Fabricate treads and platforms from welded aluminum grating with openings in gratings no more than 1/2 inch (12 mm) in least dimension.
 - 3. Surface: Serrated.
 - 4. Finish: As indicated.

5. Fabricate grating treads with cast-abrasive nosing and with angle or plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
6. Fabricate grating platforms with nosing matching that on grating treads. Provide toeplates at open-sided edges of grating platforms. Fasten grating to platform framing.

2.07 STAIR RAILINGS: Refer to Section 055213, "Pipe and Tube Railings".

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.02 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
 1. Use nonmetallic, nonshrink grout unless otherwise indicated.
 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

END OF SECTION

SECTION 05521

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Aluminum pipe and tube railings.

B. Related Requirements:

1. Section 05519 "Metal Grating Stairs and Platforms" for steel tube railings associated with platforms.

1.02 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.03 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Aluminum Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Blum, Julius & Co., Inc.
 - b. Hollaender Mfg. Co.
 - c. Thompson Fabricating, LLC.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.

2.03 METALS, GENERAL

- A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.04 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and

durability properties of alloy and temper designated below for each aluminum form required.

- B. Extruded Tubing: ASTM B 221, Alloy 6063-T5/T52.
- C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
- D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.
- E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.05 FASTENERS

- A. General: Provide the following:
 - 1. Aluminum Railings: Type 316 stainless-steel fasteners.
- B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.06 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.07 FABRICATION

- A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- B. Form work true to line and level with accurate angles and surfaces.
- C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- D. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- E. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- F. Form changes in direction by bending or by inserting prefabricated elbow fittings.
- G. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- H. Close exposed ends of railing members with prefabricated end fittings.
- I. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

2.08 ALUMINUM FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

3.02 ANCHORING POSTS

- A. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.

END OF SECTION



DIVISIONS 6 - 9

NOT USED



DIVISIONS 10 -14

NOT USED



DIVISION 15

NOT USED



DIVISION 16

ELECTRICAL

SECTION 16050

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: General administrative, procedural requirements, and installation methods for electrical installations specified in Division 16.
- B. The Drawings are schematic and are not intended to show every detail of construction.
 - 1. In general, conduits/raceways, transitions and offsets shown on Drawings indicate approximate locations in plan and elevation where the systems are intended to be run.
 - 2. CONTRACTOR shall fully coordinate electrical Work with other trades and the utility company to avoid interferences.
 - 3. In the event of interferences, CONTRACTOR shall request clarification from ENGINEER in writing.
- C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections, apply to Work of this Section.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with requirements of Section 01340, Shop Drawings covering the items included under this Section of Work. Shop Drawing submittals shall include:
 - 1. Submit product data covering the items included under this Section of Work.
- B. Conforming to Construction Drawings: Submit a complete set of Drawings showing the locations of the piping, ductwork, etc., as actually installed. Such Drawings shall be submitted to ENGINEER on tracing cloth, mylar, or sepia paper from which blueprints can be obtained.
- C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01730, operation and maintenance manuals for items included under this Section. Include following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.03 RECORD DOCUMENTS

- A. Prepare Record Documents in accordance with requirements in Section 01720. In addition, CONTRACTOR shall submit, prior to final payment, Drawings conforming to construction records of systems it has installed. Vendor drawings shall be sized as manufacturers' standard.

1.04 QUALITY ASSURANCE

- A. National Electrical Code: Comply with NFPA 70, National Electrical Code.
- B. UL Compliance and Labeling: Use products and components labeled by UL.

1.05 PERMITS, INSPECTIONS, AND LICENSES

- A. CONTRACTOR shall procure all necessary permits and licenses, observe and abide by all applicable laws, codes, regulations, ordinances, and rules of the State, territory, or political subdivision thereof, wherein Work is done, or any other duly constituted public authority, and further agrees to hold OWNER harmless from liability or penalty which might be imposed by reason of an asserted violation of such laws, codes, regulations, ordinances, or other rules.
 1. Upon completion of Work, CONTRACTOR shall secure certificates of inspection from the inspector having jurisdiction and shall submit 3 copies of the certificates to OWNER. CONTRACTOR shall pay the fees for the permits, inspections, licenses, and certifications when such fees are required.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification. Equipment shall be packaged to prevent damage during shipment, storage, and handling. Do not install damaged units; replace and remove damaged units from Site.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL ELECTRICAL INSTALLATION

- A. Provide electrical materials and equipment enclosures appropriate for areas in which they are installed. Each area will be designated on Drawings with a type of construction such as NEMA 4, or 4X, if it is other than NEMA 12. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.
 - 1. Exception: Provide manufacturer's standard construction for indoor or outdoor application where equipment is not manufactured to NEMA specifications (e.g., switchgear, transformers, and light fixtures; materials and equipment used in finished areas such as offices, laboratories, etc.).
- B. Provide nonmetallic electrical materials and equipment enclosures in NEMA 4X areas; watertight NEMA 4X and equipment enclosures for outdoor applications.
- C. Provide chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
- D. Supporting devices and sleeves shall be set in poured-in-place concrete and other structural components as they are constructed.
- E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom possible.
- F. Coordinate connection of electrical systems. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- G. Install systems, materials, and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by Drawings recognizing that portions of Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to ENGINEER.
- H. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components where installed exposed in finished spaces.
- I. As much as practical, connect equipment for ease of disconnecting with minimum of interference with other installations.
- J. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.02 RACEWAY INSTALLATION

- A. Outdoors, use the following materials:
 - 1. Exposed Conduit: Aluminum conduit and fittings.
 - 2. Underground Direct Buried Conduit: PVC schedule 80.
 - 3. Conduit Used to Connect to Vibrating Equipment including transformers and hydraulic, pneumatic or electric solenoid or motor-driven equipment: Liquidtight flexible metal conduit.
- B. Indoors, use the following wiring materials: Rigid aluminum conduit.
- C. Minimum size conduit shall be 3/4 inch unless shown otherwise.
- D. Conduit Thread Paint: Make threaded conduit joints watertight by coating threaded portions with a spray-on or brush-on zinc-bearing paint. Provide paint containing 90 percent minimum by weight of metallic zinc powder in the dried film. Clean field-cut threads of oil using the recommended solvent prior to coating threads.
- E. Install expansion fittings in all exposed rigid nonmetallic conduit runs of 20 feet or more.
- F. Install expansion/deflection fittings where conduit passes a building expansion joint or where conduits are attached to two structures joined by a concrete expansion joint.
- G. Exposed or Concealed Construction: Install conduit exposed inside buildings.
- H. Exposed Raceways: Install parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical. Make bends and offsets so the inside diameter is not effectively reduced. Keep the legs of a bend in the same plane and the straight legs of offsets parallel. Conduits shall slope away from loads to keep moisture from entering the load. Run parallel or banked raceways together. Make bends in parallel or banked runs from the same centerline so that the bends are parallel. Factory elbows may be used in banked runs only where they can be installed parallel. This requires that there be a change in the plane of the run, such as from wall to ceiling and that the raceways be of the same size. In other cases, provide field bends for parallel raceways. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.
- I. Space raceways, fittings, and boxes 0.25 inch from mounting surface in NEMA 4 and NEMA 7 areas. Spacers shall be one-piece construction of stainless steel, galvanized steel, PVC, ABS, or other noncorrosive material.

- J. Sleeves: Install in concrete floor slabs except where conduit passes through a housekeeping pad. Install in exterior walls below grade.
- K. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid metal conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this Contract, install screwdriver-operated threaded flush plugs with floor.
- L. Flexible Connections: Use short length (maximum 6 feet for lighting fixtures; maximum 3 feet for all other equipment) of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement, and all motors. Use liquidtight flexible conduit in wet locations and rated flexible connections for hazardous locations. Install separate ground conductor across flexible connections.
- M. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.
- N. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate metal conduit, use threaded rigid metal conduit fittings. For PVC externally coated rigid metal conduit, use only factory-coated fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduit.
- O. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL listed sealing compound. For concealed raceways, install each fitting in a flush metal box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
 - 1. Where required by the NEC.
- P. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- Q. Fasten electrical boxes firmly and rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete masonry.
- R. Provide fire-retardant barriers in all pull and junction boxes containing circuits that are otherwise continuously separated in conduit. Securely fasten these barriers within

box. Size barriers so that space between barrier and box wall does not exceed 0.125 inch anywhere around the perimeter of barrier.

- S. Support exposed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at box and access fittings may be omitted where box or access fittings are independently supported, and raceway terminals are not made with chase nipples or threadless box connectors.
- T. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from building structure.
- U. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box and tighten the chase nipples so no threads are exposed.
- V. Complete installation of electrical raceways before starting installation of conductors within raceways and prevent foreign matter from entering raceways by using temporary closure protection. Cap spare conduit. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- W. Install pull wires in empty raceways: Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

3.03 WIRE AND CABLE INSTALLATION

- A. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant where necessary.
- B. Keep branch circuit conductor splices to minimum. Splice feeders only where indicated. Use a standard kit. No splices are allowed for instrument and telephone cables, except at indicated splice points. No splices allowed inside conduit or underground. Splice only in above ground pull boxes or at termination point above ground.
- C. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material and are UL listed as pressure type connectors.

- D. Provide adequate length of conductors within electrical enclosures and train conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at terminal.
- E. Terminate power conductors at equipment using pressure-type terminals specifically designed for type of terminations to be made. Terminate no more than 2 conductors No. 8 AWG and smaller within the same pressure-type terminal. These 2 conductors shall be no more than 4 wire gauge sizes apart. Terminate no more than 1 conductor larger than No. 8 AWG within any pressure-type terminal.
 - 1. Exception: Power factor correction capacitor conductors may be terminated at the motor disconnect switch load terminals.
- F. Seal wire and cable ends until ready to splice or terminate.

3.04 CUTTING AND PATCHING

- 1. Perform cutting and patching in accordance with requirements in Section 02220. In addition, the following requirements apply.
 - 2. Perform cutting, fitting, and patching of electrical equipment and materials required to uncover Work to provide for installation of ill-timed Work, remove and replace Work that is either defective or does not conform to requirements of Drawings.
 - 3. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by new Work. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. Provide and maintain temporary partitions or dust barriers adequate to prevent spread of dust and dirt to adjacent areas.
 - 4. Patch existing finished surfaces and building components using new materials matching existing materials.

3.05 EQUIPMENT CHECKOUT AND TESTING

- A. In addition to testing recommended by equipment or material supplier and called for in equipment or material specification, perform the following.
- B. Equipment Testing: The following tests which are applicable for a particular item of equipment shall be performed:
 - 1. Infrared testing once equipment is up and running. CONTRACTOR shall be responsible for repairing or replacing hotspots. Copies of the infrared testing reports shall be delivered to the City upon completion.
- C. Proofing of Conduit.

1. Upon the completion of conduit installation, Contractor shall be required to proof each conduit to verify continuity and integrity of the system. All conduits must be proofed after backfilling, but prior to final paving.
 2. Proofing shall be accomplished by pulling a solid aluminum or steel mandrel or by blowing a pig. The outside diameter of the mandrel or pig shall be a minimum of 80% of the inside diameter of the conduit and 4 in. long. The mandrel or pig shall be approved by the Engineer prior to proofing.
 3. Conduit that is proofed without prior notification to fiber provider shall be considered incomplete and is subject to reproofing.
 4. Any installed mule tape or polypropylene rope may be used for this purpose, but the tape must be reinstalled upon completion of proofing. The reinstalled tape or new tape must be free of damage, equal to its original integrity and free of other defects that would render it unsuitable for cable pulling. All mule tape shall be a non-sticking type.
- D. Check-out Procedures. In general, check-out procedures (as listed below) which are applicable for a particular item of equipment shall be performed:
1. Vacuum interior of control panels and remove foreign material.
 2. Wipe clean with a lint-free cloth insulators, bushings, bus supports, etc.
 3. Check and adjust time delay, under-voltage devices, phase relay, over-current relays, etc., as required by coordination study or ENGINEER.
 4. Fill motor bearings requiring oil.
 5. Check and change, as required, thermal overload heater elements to correspond with motor full-load current and service factors of installed motor.
 6. Check direction of rotation of motors and reverse connections if necessary. Check rotation with motor mechanically uncoupled where reverse rotation could damage equipment.
 7. Equipment with two or more sources of power connected by tie breakers, transfer switches, or generator receptacles shall be checked for rotation from each possible combination of power sources. Power sources must have the same phase sequence for each source throughout entire facility.
 8. Check exposed bolted power connections for tightness. Where a tightening torque is indicated as a numeric value on equipment or in installation instructions provided by the manufacturer, a calibrated torque tool shall be used to achieve the indicated torque value, unless the equipment manufacturer has provided installation instructions for an alternative method of achieving the required torque NEC 2017 110.14(D). This will need to be witnessed by the Engineer or CODB project manager.

9. Check operation of breakers, contactors, etc., and control and safety interlocks.
10. Check tightness of bolted structural connections.
11. Check leveling and alignment of enclosures.
12. Check operating parts and linkages for lubrication, freedom from binding, vibration, etc.
13. Check tightness and correctness of control connections at terminal blocks, relays, meters, switches, etc. Where a tightening torque is indicated as a numeric value on equipment or in installation instructions provided by the manufacturer, a calibrated torque tool shall be used to achieve the indicated torque value, unless the equipment manufacturer has provided installation instructions for an alternative method of achieving the required torque NEC 2017 110.14(D). This will need to be witnessed by the Engineer or CODB project manager.
14. Clean auxiliary contacts and exposed relay contacts after vacuuming.

END OF SECTION

SECTION 16060

GROUNDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Electrical grounding and bonding Work as follows:
 - 1. Solidly grounded.
- B. Applications of electrical grounding and bonding Work in this Section:
 - 1. Electrical power systems.
 - 2. Grounding electrodes.
 - 3. Separately derived systems.
 - 4. Raceways.
 - 5. Service equipment.
 - 6. Enclosures.
 - 7. Equipment.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
 - 1. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.

1.03 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. UL Compliance: Comply with applicable requirements of UL Standards No. 467, "Electrical Grounding and Bonding Equipment," and No. 869, "Electrical Service Equipment," pertaining to grounding and bonding of systems, circuits, and equipment. In addition, comply with UL Standard 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL listed and labeled for their intended usage.
 - 2. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141, and 142 pertaining to grounding and bonding of systems, circuits, and equipment.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING

A. Materials and Components:

1. Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
2. Conductors: Electrical copper grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.
3. Grounding Electrodes: Steel with copper welded exterior, 3/4-inch diameter by 20 feet.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS

- A. Connect grounding conductors to underground grounding electrodes using exothermic weld process or mechanical compression type connectors.
- B. Ground electrical service system neutral at service entrance equipment to grounding electrodes.
- C. Ground each separately derived system neutral to effectively grounded metallic water pipe, effectively grounded structural steel member, and separate grounding electrode.
- D. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.
- E. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.
- F. Connect grounding electrode conductors to 1-inch diameter or greater, metallic cold water pipe using a suitably sized ground clamp. Provide connections to flanged piping at street side of flange.
- G. Bond grounding cables to both ends of metal conduit or sleeves through which such cables pass.

- H. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.
- I. Install braided type bonding jumpers with code-sized ground clamps on water meter piping to electrically bypass water meters.
- J. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible while following building lines to minimize transient voltage rises. Protect exposed cables and straps where subject to mechanical damage.
- K. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed and are subjected to corrosive action.

3.02 FIELD QUALITY CONTROL

- A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester using the 3-point fall of potential method. Testing shall be performed during normal dry weather conditions with at least 5 non-rain days elapsing prior to test. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms or less by driving additional ground rods; then retest to demonstrate compliance.
- B. Test ground paths for continuity by applying a low DC voltage source of current, capable of furnishing up to 100 amps, between electrical equipment grounds and ground grid. Grounding path must conduct a 100-amp current at a resistance of 0.010 ohms or less as calculated from circuit voltage.

END OF SECTION

SECTION 16070

SUPPORTING DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:
 - 1. Product data for each type of product specified.

1.03 QUALITY ASSURANCE

- A. Electrical components shall be listed and labeled by UL, ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
 - 1. Slotted Metal Angle and U-Channel Systems:
 - a. Allied Tube & Conduit.
 - b. American Electric.
 - c. B-Line Systems, Inc.
 - d. Cinch Clamp Co., Inc.
 - e. GS Metals Corp.
 - f. Haydon Corp.
 - g. Kin-Line, Inc.
 - h. Unistrut Diversified Products.
 - 2. Conduit Sealing Bushings:
 - a. Bridgeport Fittings, Inc.
 - b. Cooper Industries, Inc.

- c. Elliott Electric Mfg. Corp.
- d. GS Metals Corp.
- e. Killark Electric Mfg. Co.
- f. Madison Equipment Co.
- g. L.E. Mason Co.
- h. O-Z/Gedney.
- i. Producto Electric Corp.
- j. Raco, Inc.
- k. Red Seal Electric Corp.
- l. Spring City Electrical Mfg. Co.
- m. Thomas & Betts Corp.

2.02 COATINGS

- A. Coating: Supports, support hardware, and fasteners for interior, non-corrosive locations shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors, in NEMA 4 areas, corrosive areas, or embedded in concrete shall be stainless steel.

2.03 MANUFACTURED SUPPORTING DEVICES

- A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.
- B. Fasteners. Types, materials, and construction features as follows:
 - 1. Expansion Anchors: Carbon steel wedge or sleeve type indoors, stainless steel outdoors and NEMA 4X areas.
 - 2. Toggle Bolts: Steel springhead type indoors, stainless steel outdoors and NEMA 4X areas.
 - 3. Hanger Rods: 0.375-inch diameter minimum, steel indoors, stainless steel outdoors and NEMA 4X areas.
- C. Conduit Sealing Bushings: Factory fabricated, watertight conduit sealing bushing assemblies suitable for sealing around conduit or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.
- D. Cable Supports for Vertical Conduit: Factory fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable iron casting with hot-dip galvanized finish.
- E. U-Channel Systems: 12 gauge or 0.105-inch-thick stainless steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center in top surface. Provide fittings and accessories that mate and match with U-channel and are of same manufacturer.

2.04 FABRICATED SUPPORTING DEVICES

- A. Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.
- B. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.
- C. Pipe Sleeves: Provide a waterstop on pipe sleeves. Provide pipe sleeves of 2 standard sizes larger than conduit/pipe passing through it and of one of the following:
 - 1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gauge metal for sleeve diameter noted:
 - a. 3-inch and smaller: 20-gauge.
 - b. 4-inch to 6-inch: 16-gauge.
 - c. Over 6-inch: 14-gauge.
 - 2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
 - 3. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including, but not limited to, the following:
1. Buried electrical line warnings.
 2. Identification labeling for cables and conductors.
 3. Operational instruction signs.
 4. Warning and caution signs.
 5. Equipment labels and signs.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:
1. Product Data for each type of product specified.

PART 2 - PRODUCTS

2.01 ELECTRICAL IDENTIFICATION PRODUCTS

- A. Colored Adhesive Marking Tape for Wires and Cables: Self-adhesive, vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
- B. Underground Line Marking Tape: Permanent, bright colored, continuous printed, plastic tape compounded for direct-burial service not less than 6 inches wide by 4 mils thick. Printed legend indicative of general type of underground line below.
- C. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with pre-printed numbers and letter.
- D. Aluminum, Wraparound Cable Marker Bands: Bands cut from 0.014-inch-thick aluminum sheet, fitted with slots or ears for securing permanently around wire or cable jacket or

around groups of conductors. Provide for legend application with stamped letters or numbers.

- E. Engraved, Plastic Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16 inch minimum thick for signs up to 20 square inches or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners.
- F. Baked Enamel Warning and Caution Signs for Interior Use: Pre-printed aluminum signs, punched for fasteners, with colors, legend, and size appropriate to the location.
- G. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, pre-printed cellulose acetate butyrate signs with 20-gauge galvanized steel backing, with colors, legend, and size appropriate to location. Provide 1/4-inch grommets in corners for mounting.
- H. Fasteners for Plastic Laminated and Metal Signs: Self-tapping stainless steel screws or Number 10/32 stainless steel machine screws with nuts and flat and lock washers.
- I. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18 inch minimum width, 50-pound minimum tensile strength, and suitable for a temperature range from minus 50 to 350 degrees F. Provide ties in specified colors when used for color coding.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification Work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by Code.
- B. Underground Electrical Line Identification: During trench backfilling for exterior nonconcrete encased underground power, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where multiple lines installed in a common trench, do not exceed an overall width of 16 inches; install a single line marker.
- C. Install line marker for underground wiring, both direct buried and in raceway.
- D. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the Project secondary electrical system following OWNER's method of phase identification or as follows:

<u>Phase</u>	<u>480/277 Volts</u>
A	Yellow
B	Brown
C	Orange
Neutral	White
Ground	Green

1. 208 Volt, 3-Phase Power:
 - a. Black.
 - b. Red.
 - c. Blue.
 2. Motor Leads, Control Cabinet/MCC:
 - a. Black, numbered L1-T1, etc.
 3. Control Wiring:
 - a. Red Control circuit wiring that is de-energized when the main disconnect is opened.
 - b. Yellow Control circuit wiring that remains energized when the main disconnect is opened.
 - c. Blue DC.
 - d. Green Ground.
- E. Use conductors with color factory applied entire length of conductors except as follows:
1. The following field applied color coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
 - a. Apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last 2 laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
 - b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply 3 ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.

- F. Power Circuit Identification: Securely fasten identifying metal tags of aluminum wraparound marker bands to cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-pound test monofilament line or one-piece self-locking nylon cable ties.
- G. Install wire/cable designation tape markers at termination points, splices, or junctions in each circuit. Circuit designations shall be as indicated on Drawings.

END OF SECTION

SECTION 16080

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.
- B. Include short circuit, power flow, protective coordination, and equipment evaluation. Run Preliminary study prior to ordering electric equipment.

1.02 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and equipment evaluation reports.
 - 3. Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.
 - a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Engineer for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Coordination Study Specialist and Field Adjusting Agency.
- B. Product Certificates: For overcurrent protective device coordination study software, certifying compliance with IEEE 399.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For the overcurrent protective devices to include in emergency, operation, and maintenance manuals.
 - 1. Include the following:
 - a. The following parts from the Protective Device Coordination Study Report:
 - 1) One-line diagram.
 - 2) Protective device coordination study.
 - 3) Time-current coordination curves.
 - b. Power system data.

1.05 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Coordination Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Coordination Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 COMPUTER SOFTWARE DEVELOPERS

- A. Software Developers: Subject to compliance with requirements, provide software by the following:
 - 1. SKM Systems Analysis, Inc.
 - 2. Equal product approved by Engineer.
- B. Comply with IEEE 242 and IEEE 399.
- C. Analytical features of device coordination study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.
- D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

2.02 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Cable size and lengths.
 - 3. Transformer kilovolt ampere (kVA), voltage ratings and impedances.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study:
 - 1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.

- b. Calculated fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. Equivalent impedance.
2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
- a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. Calculated asymmetrical fault currents:
 - 1) Based on fault-point X/R ratio.
 - 2) Based on calculated symmetrical value multiplied by 1.6.
 - 3) Based on calculated symmetrical value multiplied by 2.7.
3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
- a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.
 - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

F. Protective Device Coordination Study:

- 1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
 - a. Phase and Ground Relays:

- 1) Device tag.
 - 2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
 - 3) Recommendations on improved relaying systems, if applicable.
- b. Circuit Breakers:
- 1) Adjustable pickups and time delays (long time, short time, ground).
 - 2) Adjustable time-current characteristic.
 - 3) Adjustable instantaneous pickup.
 - 4) Recommendations on improved trip systems, if applicable.
- c. Fuses: Show current rating, voltage, and class.
- G. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
 2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
 3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
 4. Plot the following listed characteristic curves, as applicable:
 - a. Power utility's overcurrent protective device.
 - b. Low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 - c. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
 - d. Transformer full-load current, magnetizing inrush current.
 - e. Ground-fault protective devices.

- f. The largest feeder circuit breaker in each motor-control center and panelboard.
- 5. Provide adequate time margins between device characteristics such that selective operation is achieved.
- 6. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.
 - 1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.02 PROTECTIVE DEVICE COORDINATION STUDY

- A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- B. Comply with IEEE 399 for general study procedures.
- C. The study shall be based on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied is indicated on Drawings.
- E. Begin analysis at the service, extending down to the system overcurrent protective devices as follows:
 - 1. To normal system low-voltage load buses where fault current is 10 kA or less.
 - 2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. The calculations shall include the ac fault-current decay from induction motors. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.

1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and single line-to-ground fault at each of the following:
1. Electric utility's supply termination point.
 2. Switchgear.
 3. Low-voltage switchgear.
 4. Standby generators and automatic transfer switches.
- I. Protective Device Evaluation:
1. Evaluate equipment and protective devices and compare to short-circuit ratings.
 2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.

3.03 POWER SYSTEM DATA

- A. Obtain all data necessary for the conduct of the overcurrent protective device study.
1. Verify completeness of data supplied in the one-line diagram on Drawings. Call discrepancies to the attention of Engineer.
 2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
 3. Coordinate with electrical utility as required to acquire information.
- B. Gather and tabulate the following input data to support coordination study. The list below is a guide.
1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Electrical power utility impedance at the service.
 3. Power sources and ties.
 4. Short-circuit current at each system bus, three phase and line-to-ground.
 5. Full-load current of all loads.

6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
9. Maximum demands from service meters.
10. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
11. Motor horsepower and NEMA MG 1 code letter designation.
12. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
13. Field verify/collect data of existing protective devices required for overcurrent protection device study.
14. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
 - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Ratings, types, and settings of utility company's overcurrent protective devices.
 - c. Special overcurrent protective device settings or types stipulated by utility company.
 - d. Time-current-characteristic curves of devices indicated to be coordinated.
 - e. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - f. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
 - g. Panelboards, switchboards, motor-control center ampacity, and SCCR in amperes rms symmetrical.

3.04 FIELD ADJUSTING

- A. Adjust relay and protective device settings according to the recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.
- B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.
- C. Testing and adjusting shall be by a full-time employee of the Field Adjusting Agency, who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.

3.05 DEMONSTRATION

- A. Engage the Coordination Study Specialist to train Owner's maintenance personnel in the following:
 - 1. Acquaint personnel in the fundamentals of operating the power system in normal and emergency modes.
 - 2. Hand-out and explain the objectives of the coordination study, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting the time-current coordination curves.
 - 3. Adjust, operate, and maintain overcurrent protective device settings.

END OF SECTION

SECTION 16120

WIRES AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Low-Voltage Wire and Cable.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings covering the items included under this Section. Include Shop Drawings of wires, cables, connectors, splice kits, and termination assemblies.
- B. Reports of field tests prepared.

1.03 QUALITY ASSURANCE

- A. UL Compliance: Provide components which are listed and labeled by UL. For cables intended for use in air handling space comply with applicable requirements of UL Standard 710, "Test Method for Fire and Smoke characteristics of cables used in Air Handling Spaces."
- B. IEEE Compliance: Provide components which comply with the following standard.
 - 1. Standard 82, Test procedures for Impulse Voltage Tests on Insulated Conductors.
- C. Labeling: Handwritten labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or typewritten onto adhesive labels. The font shall be at least 1/8 inch in height, block characters, and legible. The text shall be of a color contrasting with the label such that it may be easily read. If labeling tape is utilized, the font color shall contrast with the background. Patch panels shall exhibit workstation numbers or some type of location identifier, in sequential order, for all workstations or devices attached. Each Network cable segment shall be labeled at each end with its respective identifier.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Low-Voltage Wire and Cable:
 - a. American Insulated Wire Corp.
 - b. General Cable.
 - c. The Okonite Co.
 - d. Southwire Co.
2. Connectors for Low-Voltage Wires and Cable Conductors:
 - a. AMP.
 - b. O-Z/Gedney Co.
 - c. Square D Company.
 - d. 3M Company.

2.02 LOW-VOLTAGE WIRES AND CABLES

- A. Conductors: Provide stranded conductors conforming to ASTM Standards for concentric stranding, Class B. Construction of wire and cable shall be single conductor (1/c) unless multiconductor cable is shown by notation in form (x/c) where x indicates the number of separate insulated conductors per cable.
- B. Conductor Material: Copper. Minimum size power wire shall be No. 12 AWG.
- C. Insulation: Provide THHN/THWN insulation for power conductors used in single- and 3-phase circuits with more than 120 volts to ground.
 1. Provide RHW, THHN/THWN, insulation for grounding conductors installed in raceways.
 2. Provide THHN/THWN insulation for control conductors.

2.03 CONNECTORS FOR LOW-VOLTAGE WIRES AND CABLES

- A. Provide UL listed factory fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types, and classes for applications and services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Prior to energizing, check installed 480 volt, 3-phase power circuits and higher wires and cables with a 1,000-volt megohm meter to determine insulation resistance levels to assure requirements are fulfilled. Minimum acceptable megohm meter reading is 100 megohms held at a constant value for 15 seconds. A certified copy of megohm meter tests shall be submitted to ENGINEER. Test reports shall include ambient temperature and humidity at time of testing. Notify ENGINEER 48 hours prior to test with schedule.

END OF SECTION

SECTION 16130

RACEWAYS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Raceways for electrical wiring. Types of raceways in this Section include the following:
 - 1. Liquidtight flexible conduit.
 - 2. Rigid aluminum conduit.
 - 3. Rigid nonmetallic conduit.
 - 4. Conduit bodies.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
 - 1. Product data for the following products:
 - a. Conduit.
 - b. Conduit bodies.

1.03 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
 - 2. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in Work include:

1. Conduit:
 - a. Allied Tube.
 - b. Carlon.
 - c. General Electric Co.
 - d. Republic Steel.
 - e. Robroy Industries.
 - f. Steelduct Co.
 - g. Triangle Conduit.
 - h. Wheatland Tube.
 - i. Youngstown Sheet and Tube.

2. Liquidtight Conduit:
 - a. Anamet, Inc.
 - b. Carlon.
 - c. Electric-Flex.
 - d. Thomas and Betts.

3. Conduit Bodies:
 - a. Adalet-PLM.
 - b. American Electric.
 - c. Appleton Electric Co.
 - d. Carlon.
 - e. Crouse-Hinds Division, Cooper Industries, Inc.
 - f. Delta Industrial Products.
 - g. Killark Electric Mfg. Co.
 - h. Kraloy Products Co.
 - i. O-Z/Gedney Co.
 - j. Perma-Cote Industries.
 - k. Robroy Industries.
 - l. Spring City Electrical Mfg. Co.

4. Conduit Thread Paint:
 - a. CRC Chemicals, USA.
 - b. Sherwin Williams.
 - c. ZRC Chemical Products Co.

2.02 METAL CONDUIT AND TUBING

- A. Rigid Aluminum Conduit: ANSI C 80.5.
- B. Liquidtight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

2.03 NONMETALLIC CONDUIT AND DUCTS

- A. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.
- B. PVC Conduit and Tubing Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

2.04 CONDUIT BODIES

- A. Provide matching gasketed covers secured with corrosion-resistant screws. Use cast covers in NEMA 4 areas and stamped steel covers in NEMA 1 and 12 areas. Use nonmetallic covers in NEMA 4X areas and threaded.
- B. Metallic Conduit and Tubing: Use metallic conduit bodies as follows:
 1. Rigid Aluminum Conduit: Use cast aluminum conduit bodies with, aluminum enamel or lacquer finish, and threaded hubs.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16135

CABINETS, BOXES, AND FITTINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other Sections. Types of products specified in this Section include:
1. Outlet and device boxes.
 2. Pull and junction boxes.
 3. Bushings.
 4. Locknuts.
 5. Conduit hubs.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:
1. Shop Drawings for boxes, enclosures, and cabinets that are to be shop-fabricated, (nonstock items). For shop-fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.
 2. Product data for boxes, fittings, cabinets, and enclosures.
- B. Contract Closeout: Submit in accordance with Section 01700.

1.03 QUALITY ASSURANCE

- A. Codes and Standards:
1. UL Listing and Labeling: Items provided under this section shall be listed and labeled by UL.
 2. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
1. Outlet Boxes, Concealed Conduit System:
 - a. Adalet-PLM Div., Scott Fetzer Co.
 - b. Appleton Electric, Emerson Electric Co.
 - c. Bell Electric, Square D Company
 - d. Eagle Electric Mfg. Co., Inc.
 - e. Midland-Ross Corp.
 - f. OZ/Gedney, General Signal Co.
 - g. Pass and Seymour, Inc.
 - h. RACO Div., Harvey Hubbell, Inc.
 - i. Thomas & Betts Co.
 2. Outlet Boxes, Exposed Conduit System:
 - a. Appleton Electric, Type JB, GS, or SHE.
 - b. Crouse Hinds, Type GS or GRF.
 - c. Or acceptable equal.
 3. Device Boxes, Concealed Conduit Systems:
 - a. Adalet-PLM Div., Scott Fetzer Co.
 - b. Appleton Electric; Emerson Electric Co.
 - c. Bell Electric, Square D Company.
 - d. Eagle Electric Mfg. Co., Inc.
 - e. Midland-Ross Corp.
 - f. OZ/Gedney, General Signal Co.
 - g. Pass and Seymour, Inc.
 - h. RACO Div., Harvey Hubbell, Inc.
 - i. Thomas & Betts Co
 4. Device Boxes, Exposed Conduit System:
 - a. Appleton Electric, Type FS/FD.
 - b. Crouse Hinds, Type FS/FD.
 - c. Or acceptable equal.
 5. Junction and Pull Boxes, Concealed System:
 - a. Adalet-PLM Div., Scott Fetzer Co.
 - b. Appleton Electric, Emerson Electric Co.
 - c. Arrow-Hart Div., Crouse-Hinds Co.
 - d. Bell Electric, Square D Company.

- e. GTE Corporation.
 - f. Keystone Columbia, Inc.
 - g. OZ/Gedney Co.; General Signal Co.
 - h. Spring City Electrical Mfg. Co.
6. Junction and Pull Boxes, Exposed Conduit System:
- a. Appleton Electric, Type FS/FD.
 - b. Crouse Hinds, Type FS/FD.
 - c. Or acceptable equal.
7. Bushings, Knockout Closures, Locknuts, and Connectors:
- a. Adalet-PLM Div., Scott Fetzer Co.
 - b. AMP, Inc.
 - c. Arrow-Hart Div., Crouse-Hinds Co.
 - d. Appleton Electric Co., Emerson Electric Co.
 - e. Bell Electric; Square D Co.
 - f. Midland-Ross Corp.
 - g. Midwest Electric, Cooper Industries, Inc.
 - h. OZ/Gedney Co., General Signal Co.
 - i. RACO Div., Harvey Hubbell, Inc.
 - j. Thomas & Betts Co., Inc.

2.02 CABINETS, BOXES, AND FITTINGS - GENERAL

- A. Outlet Boxes: Suitable for the conduit system installation as follows:
- 1. Exposed Conduit: Provide cast or malleable iron, zinc, electroplated outlet boxes finished with aluminum lacquer or enamel. Provide cast metal covers with neoprene gaskets for NEMA 4 areas and stamped steel covers for NEMA 12 and undesignated areas.
 - a. Exception: Provide non-metallic outlet boxes for NEMA 4X areas.
 - 2. Concealed Conduit: Provide galvanized coated flat-rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct outlet boxes with mounting holes and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding. Provide cast metal outlet boxes for exterior outlets.
- B. Device Boxes: Suitable for the conduit system as follows:
- 1. Exposed Conduit: Provide cast aluminum. Provide exterior mounting lugs on device boxes.

2. Concealed Conduit: Provide galvanized coated flat-rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding. Provide cast metal device boxes for exterior devices.
- C. Junction and Pull Boxes: Suitable for the conduit system installation as follows:
1. Exposed Conduit: For pull and junction boxes 50 cubic inches and smaller, provide cast or malleable iron, zinc electroplated boxes finished with aluminum lacquer or enamel. Provide exterior mounting lugs and cast covers with neoprene gaskets. For pull and junction boxes larger than 50 cubic inches provide watertight sheet metal boxes. Grind exposed edges smooth or roll edges to prevent scuffing of wire during installation. Provide code-gauge sheet steel construction for boxes smaller than 1,000 cubic inches. Provide 0.10-inch steel construction, hot-dip galvanized after fabrication for boxes larger than 1,000 cubic inches. Secure box covers using No. 8 or larger machine screws spaced at intervals not exceeding 6 inches. Provide a continuous neoprene or rubber gasket cemented to the box cover where it contacts the box body.
 2. Concealed Conduit: Provide galvanized code-gauge sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers.
- D. Bushings, Knockout Closures, and Locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications. Provide watertight hubs on conduits terminated at sheet steel enclosures in NEMA 4 areas.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16230

STANDBY DIESEL GENERATOR SETS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Extent of diesel generator set work as indicated by Drawings and Schedules, and is hereby defined to include, but not by way of limitation:
1. Diesel engine.
 2. Electrical generator.
 3. Engine starting system, including batteries, battery charger, instrument control panel, exterior protective enclosure, paralleling controller(s), remote generator control panel, sub-base fuel tanks and all appurtenances, jacket heaters, surge protection, enclosure lights, remote annunciator panel, leak detection and remote annunciator, exhaust silencer, spare parts and accessories.
 4. Fuel for test and startup and full fuel tank upon notice of substantial completion.
 5. Automatic transfer switches in accordance with Section 16238 Transfer Switches. Refer to plan riser for required ATS termination sections.
 6. Generator paralleling and control equipment.
 7. Aluminum access platform, stairs, foundations and landing per plan layout. Provide engineered plans by a State of Florida Registered Professional Structural Engineer. Refer to attached geotechnical report.
 8. Generator/fuel tank concrete base. Provide engineered plans by a State of Florida Registered Professional Structural Engineer. Refer to attached geotechnical report.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Division 1, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
1. Product Data: Submit manufacturer's data on diesel engine-driven generator sets and components.
 - a. Generator dimensions.
 - b. Generator weight.
 - c. Generator rating.

- d. Alternator rating.
 - e. Generator Starting System Data:
 - 1) Battery size and ratings.
 - 2) Charging system capacity.
 - 3) Battery heater data.
 - 4) Battery warranty.
 - f. Generator Control Panel Data:
 - 1) Layout.
 - 2) Wiring diagrams.
 - 3) Control interconnection.
 - 4) Instrumentation.
 - g. Exhaust System Data:
 - 1) Muffler size.
 - 2) Decibel reduction curve.
 - 3) Fuel system data.
 - h. Cooling System Data:
 - 1) Radiator capacity.
 - 2) Cooling reduction capacity.
 - i. Enclosure Data:
 - 1) Materials.
 - 2) Size.
 - 3) Assembly/disassembly instructions.
 - 4) Door locations.
 - 5) Noise reduction.
 - j. Warranty data.
 - k. Accessory and miscellaneous equipment.
2. Wiring Diagrams: Submit wiring diagrams for diesel engine-driven generator units showing connections to electrical power panels, feeders, and ancillary equipment. Differentiate between portions of wiring that are manufacturer installed and portions that are field installed.
3. Agreement to Maintain: Prior to time of final acceptance, Installer shall submit four (4) copies of an agreement for continued service and maintenance of diesel engine-driven generator sets for Owner's possible acceptance. Offer terms and conditions for furnishing parts and providing continued testing and servicing, including replacement of

materials and equipment in the one (1) year service agreement, with the option for renewal by the Owner.

4. Certifications: Provide diesel engine-driven generator sets certified test record of the following final production testing:
 - a. Single-step load pickup.
 - b. Transient and steady-state governing.
 - c. Safety shutdown device testing.
 - d. Voltage regulation.
 - e. Rated power.
 - f. Maximum power.
5. Vendor or Contractor shall submit signed and sealed plans for aluminum access platform, stairs and landing.
6. Vendor shall submit signed and sealed wind load drawings and calculations for generator enclosures.
7. Vendor shall submit signed and sealed structural drawings and calculations for generator and access platform foundations.

1.03 QUALITY ASSURANCE

A. Codes and Standards:

1. NFPA Compliance: Comply with applicable requirements of NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines".
2. UL Compliance: UL 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors," UL 2200, "Standard for Safety for Stationary Engine Generator Assemblies," rated 600 volts or less.
3. ANSI/NEMA Compliance: Comply with applicable requirements of ANSI/NEMA MG1, "Motors and Generators," and MG2, "Safety and Use of Electric Motors and Generators."
4. IEEE Compliance: Comply with applicable portions of IEEE Standard 446, "IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications."

- #### B. Warranty: Submit in accordance with requirements of Division 1, warranties covering the items included under this Section.

1.04 FUEL STORAGE REGISTRATION

- A. Contractor shall register the fuel storage tank system in accordance with Florida Administration Code, Chapter 62-761.400 and pay all applicable registration fees.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
 - 1. Standby Diesel Generator Sets:
 - a. Cummins.
 - b. Caterpillar.
 - c. Generac.

2.02 GENERATOR SETS

- A. Except as otherwise indicated, provide new diesel engine-driven generator sets, and auxiliary equipment as indicated by published product information, and as required for a complete installation. Generator sets shall be rated to continuously power the total accumulated load and starting load at 104 degrees F ambient temperature and at altitude where installed. Start signal shall be via 2-wire solid contact. Its functions shall not be built into genset package.
- B. Starting System: Provide engine-generator unit with 24-volt, negative ground, starting system including positive engagement solenoid shift-starting motor, batteries, and 35-ampere, or greater, automatic battery charging alternator with solid-state voltage regulator. Mount batteries in a plastic- or epoxy-coated metal platform near the starter but not on the generator and coat battery terminals with an anti-oxidant. Generator sets shall have a battery rated either 220 ampere-hours or 900 amperes cold cranking, and 430 minutes reserve capacity. Batteries shall have a 12-month full warranty and 60-month prorated warranty. Provide battery heaters to maintain temperature of batteries.
- C. Battery Charger: Provide a solid-state, current limiting, float-type battery charger with 5-ampere minimum capacity. Charger shall operate from 120-volt AC single phase, 60 hertz power and shall automatically keep batteries at full charge. Equip charger with ammeter and voltmeter.
- D. Alternator: Provide a single bearing brushless, self-excited alternator with inherently regulated rotating rectifier exciter system or a revolving field design with a temperature compensated solid-state voltage regulator. Connect the alternator housing directly to the engine flywheel housing. Couple the alternator rotor directly to engine flywheel with a semi-flexible steel disk coupling.

1. Provide windings with Class F insulation with epoxy impregnation and fungus-resistant coating. Temperature rise shall be as defined in NEMA Standard MG1-22.40.
 2. The alternator shall be capable of starting load with 35 percent maximum instantaneous voltage dip. Recovery to stable equation within plus or minus 5 percent of rated voltage shall occur within 3 seconds.
 3. Refer to plans for KW and voltage rating. Size for 0.8 power factor.
- E. Engine Cooling Radiator: Provide a complete engine cooling system equipped with a radiator and blower type fan sized to maintain safe operation, 190 degrees F engine outlet water temperature at 104 degrees F maximum ambient temperature. The engine cooling system shall be filled with a solution of 50 percent ethylene glycol. On indoor mounted units, radiator shall be equipped with a duct adapter flange. An air duct with flexible connecting sections shall be provided between radiator duct flange and exhaust damper.
- F. Control Panel: Provide engine-generator unit with engine oil-pressure and water-temperature indicators, reset circuit breaker, static voltage regulator, voltage-adjusting rheostat, voltmeter, ammeter with phase selector switch with an OFF position, and with running time indicator and frequency meters. Select circuitry of plug-in design capable of quick replacement, and capable of accepting a plug-in device which allows maintenance to test control panel performance without operating the engine.
1. Provide a cranking limiter to open starting circuit in 45 to 90 seconds if engine has not started within that time or after a series of 3 or more cranking intervals separated by 2 or more rest periods.
 2. Provide engine safety devices to shut unit down on high engine temperature, low oil pressure, overspeed, and overcrank. Provide, for each of these conditions, an alarm light and an unpowered, normally open contact for remote use. Provide an audible alarm with silence switch which is activated by any alarm condition.
 3. Provide a relay with 2 normally open and 2 normally closed contacts rated 5A at 120 volts AC and which is energized when unit is running. Wire these contacts to terminal strips for remote use.
 4. Provide a RUN-OFF-AUTO switch. In AUTO position unit shall start when a remote contact closes and stop when contact opens. In RUN position unit shall start and run until OFF position is selected.
 5. Mount control panel on unit such that it is isolated from generator set vibration.

2.03 PERMANENT ENGINE-GENERATOR SET ACCESSORIES

- A. Enclosure: Engine generator set shall be enclosed in heavy gauge, reinforced aluminum, weather-protective, sound-attenuating housing, which allows ample air flow around unit for proper operation. Provide removable panels on each side, complete with lockable doors. A hinged and lockable door shall be provided over instrument panel.

1. When this enclosure is specified for an outdoor permanent unit, the temperature specifications for unit shall be -20 degrees F to 120 degrees F with ambient air at radiator intake being 104 degrees F maximum.
 2. Enclosure shall be HVHZ rated per Florida Building Code and currently enforced wind loading requirements.
 3. Vendor or Contractor shall furnish signed and sealed equipment tie down details for each generator structure.
 4. Vendor shall submit signed and sealed wind load drawings and calculations for generator enclosures, generator concrete foundations, Generator paralleling controller mount and sunshade, and access platform and foundations.
- B. Parallel Controller
1. Provide a generator control panel in NEMA-4X stainless steel enclosure to allow manual and automatic paralleling of generators.
 2. Provide Ethernet/Modbus communication port for SCADA interface. Provide all necessary Input and Output for generator control and alarm.
- C. Sound Attenuation: Enclosure shall have foam insulated panels to attenuate sound and include sound attenuating features that direct radiant cooling air in a route to minimize ambient noise when generator is running. Enclosure shall reduce noise to less than 65 dB at 21 feet at all audible octaves. Provide externally mounted 90 degree inlet and outlet air attenuation baffles.
- D. Coolant Heater: Provide an engine coolant heater, 240 volt single phase, with thermostatic controls to maintain engine coolant at proper temperature.
- E. Inlet and Exhaust Systems: Silencers and exhaust ducting to silencers shall be self-supporting when assembled. Provide all necessary supporting members for ductwork between silencer and outlet. The unit shall be complete with raincap. All exhaust duct shall be Schedule 10 steel pipe, minimum. Inlet silencer and filter to be self-supporting. Silencers and associated connections shall be contained within the sound attenuating enclosure.
1. Provide bellows sections, inlet and outlet flexible section as shown on Drawings. Design of exhaust silencer and stack including all ducting shown shall have a pressure drop not exceeding 5 inches of water.
 2. Provide a silencer which meets sound standards of a critical area. Silencer shall provide no more than 65 dB at 7 meters at frequencies of 125 hertz to 8 kilohertz. A curve shall be submitted with Shop Drawings showing attenuation (input to output) in dB versus frequency. Curve shall be on manufacturer's standard data sheet or from an independent test lab. A spiral or bellows-type flexible section of pipe shall be installed in the exhaust line between the muffler and engine manifold connection. An insulated thimble section shall be provided where exhaust line passes through roof or wall.

Exhaust lines shall be pitched and a condensation trap provided at non-draining low points in line.

- F. Circuit Breaker: At a minimum, a generator power circuit breaker shall be installed as a manual load circuit interrupter and an automatic overload and short circuit protection device. Alternate means of protection shall be submitted for approval prior to bid. Breaker may be used for paralleling control or a separate contactor shall be provided and manufacturer's option. If breaker is used, it shall be rated for routine mechanical operation.
 - 1. The circuit breaker shall be a solid-state trip type. Solid-state trip shall include Long-time, Short-time, and Instantaneous. Breaker shall provide ground fault indication.
 - 2. Trip settings for all breakers shall be selected for the rating of the generator power circuit as indicated on Drawings or on Schedule.
 - 3. Breaker shall be 100% rated
- G. Fuel Tank
 - 1. Provide double wall steel sub-base tanks with full monitor panel, floats, alarms, vents, and all accessories.
 - 2. Size for 5 days of operation at 75% average operating capacity. Include sufficient fuel for lubrication and cooling in storage capacity calculations.
 - 3. Provide all fuel for complete setup and testing and at the substantial completion provide a full tank.

2.04 FUNCTIONAL DESCRIPTIONS

A. General Requirements:

- 1. Standby Generator Control
 - a. General Description of the System: The standby generator system shall be comprised of two (2) new 750kW generators. The two (2) generators shall be paralleled in order to provide standby power to the Bethune Point Water Reclamation Facility.
 - b. Automatic Control: Upon a loss of power the generators will start. The first generator to reach the set frequency and voltage shall power the distribution bus and become the lead generator. The other generator shall synchronize to the lead generator. The generators shall automatically be paralleled by the vendor provided paralleling equipment.
 - c. Generators shall not operate in parallel with utility power at any time. Transfer between standby and utility power shall utilize open transition.

PART 3 - EXECUTION

3.01 INSTALLATION OF DIESEL ENGINE-DRIVEN GENERATOR SETS

- A. Install diesel engine-driven generator units as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that engine-generator units fulfill requirements. Comply with NFPA and NEMA standards pertaining to installation of engine-generator sets and accessories.
- B. Coordinate with other work, including raceways, electrical boxes and fittings, fuel tanks, piping, and accessories, as necessary to interface installation of engine generator equipment work with other work.
- C. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B, and the National Electrical Code.
- D. Install units on steel spring type vibration isolators fastened to an inertia base in accordance with manufacturer's instructions.

3.02 GROUNDING

- A. Provide equipment grounding connections for diesel engine-driven generator units as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to ensure permanent and effective grounding.

3.03 FIELD QUALITY CONTROL

- A. Start-up Testing:
 - 1. Engage local equipment manufacturer's representative to perform start-up and building load tests upon completion of installation, with Engineer in attendance; provide certified test record. Tests are to include the following:
 - a. Check fuel, lubricating oil, and antifreeze in liquid-cooled models for conformity to manufacturer's recommendations under environmental conditions present.
 - b. Test prior to cranking engine for proper operation, accessories that normally function while the set is in a standby mode. Accessories include: engine heaters, battery charger, generator strip heater, and remote annunciator.
 - c. Check, during start-up test mode, for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage, and phase rotation.

- d. Test, by means of simulated power outage, automatic start-up by remote-automatic starting, transfer of load, and automatic shutdown. Prior to this test, adjust for proper system coordination, transfer switch timers. Monitor throughout the test, engine temperature, oil pressure, battery charge level, generator voltage, amperes, and frequency.
- e. Load Bank Testing
 - 1) Provide on-site load bank testing of each individual generator set.
 - 2) Test shall be performed at full rated load (kW) for a minimum of four continuous hours.
 - 3) Owner/Engineer shall have the option of witnessing on-site load testing. Provide a minimum of 14 days notice to Owner/Engineer prior to testing.
 - 4) Record the followings values every 15 minutes and submit results for Engineer review and approval: Time, voltage, frequency, oil pressure, oil temperature, coolant temperature and load (kW).
 - 5) After individual testing, test generators operating in parallel at full rated load (kW) for four continuous hours. Record the following values for each generator every 15 minutes and submit results for Engineer review and approval: Time, voltage, frequency, oil pressure, oil temperature, coolant temperature and load (kW).
- f. Upon completion of installation, demonstrate capability and compliance of system with requirements. Where possible, correct malfunctioning units at Site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting. Initial testing and retesting to be at no cost to Owner.
- g. Upon substantial completion, fill fuel tanks to rated capacity.

3.04 PERSONNEL TRAINING

- A. Building Operating Personnel Training: Train Owner's building personnel in procedures for starting-up, testing, and operating diesel engine-driven generator sets and control system. In addition, train Owner's personnel in periodic maintenance of batteries.

END OF SECTION

SECTION 16238

TRANSFER SWITCHES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Types of transfer switches required for the Project and include the following:
 - 1. Automatic transfer ATS-1 and ATS -2.
 - 2. ATS-2 3000 Amp load side and line side (generator and utility) termination sections with lugs as shown on plan set. Provide UL listed load side termination sections. Refer to plan set for anticipated layout and configuration. No additional compensation will be provided for failure of contractor, vendor, or manufacturer to fully understand and comply with the plan layout for cable termination provisions and UL (or equivalent) listed gear.

1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:
 - 1. Product Data: Submit manufacturer's data and installation instructions for electrical power transfer switches.
 - 2. Wiring Diagrams: Submit wiring diagrams for electrical transfer switches, and associated control diagrams showing connections to prime and alternate power sources, electrical load, and equipment components. Differentiate between portions of wiring that are manufacturer installed and portions that are field installed.
 - 3. ATS-2 load side termination section.

1.03 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. UL Compliance: Comply with applicable requirements of UL 1008, "Automatic Transfer Switches," and UL 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide transfer switches and components which are UL listed and labeled.
 - 2. NEMA Compliance: Comply with applicable requirements of NEMA Standards Pub/Nos. ICS 2, "Industrial Control Devices, Controllers and Assemblies," ICS 6 and 250, pertaining to transfer switches.

3. NFPA Compliance: Comply with applicable requirements of NFPA 99, "Standard for Health Care Facilities," and NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures," pertaining to transfer switches.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
 1. Automatic Transfer Switches:
 - a. Automatic Switch Co. (ASCO).
 - b. Caterpillar, Inc.
 - c. Russelectric, Inc.
 - d. Zenith Controls, Inc.
 - e. Lakeshore Electric

2.02 AUTOMATIC TRANSFER SWITCHES

- A. Automatic Transfer Switch: UL listed and 600 volt-rated with amperage rating shown on Drawings and shall be the mechanically held, electrically operated type rated for continuous duty in an unventilated N-4X stainless steel enclosure. Provide additional enclosures or lug terminations to comply with the extraordinary number of terminations from generators and existing load switchgear, REFER TO PLAN SET FOR DETAILS.
- B. Switch shall be double throw, with an off position, having electrically operated normal-emergency positions inherently interlocked mechanically, and with main contacts mechanically attached to a common shaft. Main contacts shall be silver alloy wiping-action type. They shall be protected by arcing contacts. No outside sources of power shall be necessary for system operation under any condition.
- C. Switch and Relay Contacts, Coils, Springs, and Control Elements: Removable from front of transfer switch without removal of the switch panels from enclosure and without disconnection of drive linkages or power conductors. Sensing and control relays shall be continuous duty industrial control type with 600 volt, 10 amp rated contacts.
- D. Upon drop in normal voltage of 83-85 percent of rated voltage, and after an override delay of 3 seconds nominal, switch shall start generator and transfer the load to emergency source, provided emergency source voltage and frequency are 90 percent of rated or higher. Delay shall be adjustable in the field.
- E. Upon return of normal source voltage for 5 seconds nominal, to 92-95 percent of rated, switch shall retransfer load to normal source after a minimum transfer time or if the emergency source fails. Provide a 5- to 60-second adjustable time delay to maintain transfer switch in the "Off" position during transfer to either source. Delays shall be adjustable in the field.

- F. Sensing relays shall operate without contact chatter or false response when voltage is slowly varied to dropout and pickup levels.
- G. Four auxiliary contacts shall be provided: Two for transfer switch position indicating use, and two auxiliary contacts, one N.O. and one N.C. to operate after completion of the 3-second override delay for starting generator. All auxiliary contacts shall be 600 volt, 10 amp continuous rating.
- H. Accessory devices shall be provided as follows:
 - 1. Time delay to override harmless power dips and outages. (Inverse time characteristic with voltage.)
 - 2. Test switch.
 - 3. Auxiliary contacts (as specified herein).
 - 4. Selector relay (as specified herein).
 - 5. Lockout relay (sensitive to voltage and frequency).
 - 6. Full phase protection with nominal 75-80 percent dropout and 92-95 percent pickup on phase relay.
 - 7. Adjustable time delay on retransfer to normal source. Minimum retransfer of 2 minutes and maximum of 25 minutes. Built-in circuitry to nullify the retransfer time delay if the emergency source fails and the normal source is available.
 - 8. Adjustable (10-20 minutes) time delay for running generator unloaded after transfer for cool down.
 - 9. Adjustable time delay or delays (5 to 60 seconds) for holding transfer switch in the "Off" position when switching from standby source to normal and normal source to standby.
 - 10. Engine starting contact.
 - 11. Exerciser to exercise generator for 30 minutes every 168 hours. A selector switch shall permit generator to be exercised with or without load. How often the generator is exercised, and the duration of the exercise shall be adjustable.
 - 12. NEMA 4X stainless steel enclosed, 480 volt, 3phase 3 wire+G, 3000 amp, silver plated copper bus, and all lugs for termination as indicated in plan set.
- I. Automatic Transfer Switch shall provide the following signals for control and monitoring via open protocol Ethernet communications:
 - 1. Monitor Points

- a. Switch Position (Normal / Open / Emergency)
 - b. Normal Source Available
 - c. Emergency Source Available
 - d. Test Status
 - e. Exercise Status
 - f. Time Delay Operating
 - g. Timer In Progress Values (P, T, U, W, DT, DW, T3, W3, A6)
 - h. Load Shed Status
 - i. Switch Not In Auto
 - j. Network Address
 - k. Normal and Emergency Voltages
 - l. Normal and Emergency Frequency
 - m. Time In Emergency
 - n. Number of Transfers
2. Control Points
- a. Remote Test
 - b. Remote Test Mode (Load / No Load / Fast)
 - c. Switch In Test or Exercise (Load / No Load)
 - d. Timer Bypass
 - e. Timer Setting Values (P, T, U, W, DT, DW, T3, W3, A6)
 - f. Load Shed
 - g. Normal and Emergency Voltage Pickup and Dropout Values
 - h. Normal and Emergency Frequency Pickup and Dropout Values
 - i. Aux, Aux 2
 - j. Inhibit Transfer to Emergency or Normal

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16270

TRANSFORMERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Types of transformers specified, and include the following:

1. Dry-type transformers.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:

1. Product Data: Submit manufacturer's technical product data, including rated kVA, frequency, primary and secondary voltages, percent taps, polarity, impedance and average temperature rise above 40 degrees C ambient temperature, sound level in decibels, and standard published data.
2. Submit manufacturer's Drawings indicating dimensions and weight loadings for transformer installations.
3. Wiring Diagrams: Submit wiring diagrams for power distribution transformers.

B. Contract Closeout: Submit in accordance with Section 01700.

1.03 QUALITY ASSURANCE

A. Codes and Standards:

1. NEMA Compliance: Comply with NEMA Standard Pub/Nos. ST 20, "Dry-Type Transformers for General Applications," TR 1, and TR 27.
2. UL Compliance: Comply with applicable portions of ANSI/UL 506, "Safety Standard for Specialty Transformers. Provide power/distribution transformers and components which are UL listed and labeled.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
1. Cutler-Hammer.
 2. Siemens
 3. General Electric Company.
 4. Square D Company.

2.02 POWER/DISTRIBUTION TRANSFORMERS

- A. Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation.
- B. Dry-Type Distribution Transformers (75 kVA or less): Provide factory assembled, general purpose, air cooled, dry-type distribution transformers where shown; of sizes, characteristics, and rated capacities indicated, single-phase, 60 hertz, 10 kV BIL, 4.0 percent impedance with 480-volts connection primary and 240/120 volts secondary connected. Provide primary winding with 4 taps; 2 to 2-1/2 percent increments above and below full-rated voltage for de-energized tap-changing operation. Insulate with Class 150 or 220 degree C insulation and rate for continuous operation at kVA, and limit transformer temperature rise to maximum of 115 or 150 degrees C, respectively. Provide terminal enclosure, with cover, to accommodate primary and secondary coil wiring connections and electrical supply raceway terminal connector. Equip terminal leads with connectors installed. Limit terminal compartment temperature to 75 degrees C when transformer is operating continuously at rated load with ambient temperature of 40 degrees C. Provide wiring connectors suitable for copper or aluminum wiring. Cushion-mount transformers with external vibration isolation supports; sound-level ratings not to exceed 45 db as determined in accordance with ANSI/NEMA standards. Electrically ground core and coils to transformer enclosure by means of flexible metal grounding strap. Provide transformers with fully enclosed sheet steel enclosures. Apply manufacturer's standard light gray indoor enamel over cleaned and phosphatized steel enclosure. Provide transformers suitable for wall mounting.
- C. Finishes: Coat interior and exterior surfaces of transformer, including bolted joints, with manufacturer's standard color baked-on enamel.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16280

SURGE PROTECTION DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Surge Protection Devices (SPD) for use on 120 volt and 480 volt, alternating current systems, and motor switchgear mounted applications.

1.02 REFERENCES

- A. Underwriters Laboratories Inc. (UL):
 - 1. 1449 - High Performance Suppression System.
 - 2. 1283 - High Frequency Extended Range Power Filter.

- B. American National Standards Institute (ANSI):

- 1. C62.45-91 - Category C Surge.

1.03 SUBMITTALS

- A. Shop Drawings: Include component layout and wiring terminations.
- B. Product data.
- C. Manufacturer's installation instructions.
- D. Operating and maintenance data.
- E. Warranties.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of transient voltage surge suppressor systems for minimum 5 years with satisfactory performance record.
- B. Regulatory Requirements: UL rating of Surge Protection Device shall meet or exceed UL rating of panelboard, motor control center, or other equipment in which SPD is installed. UL rating of equipment in which suppressor is installed shall not be affected by suppressor.

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate with and furnish suppressors to switchgear manufacturer prior to shipment of equipment to site.

1.06 WARRANTY

- A. Warrant to correct defective products for minimum 15 years in accordance with manufacturer's standard warranty.

PART 2 - PRODUCTS

2.01 SURGE PROTECTION DEVICE

- A. Ratings: 120/208 and 277/480 volt grounded wye.
- B. Manufacturers: One of the following or equal:
 - 1. Surge Suppression Inc.
 - 2. Current Technology
 - 3. Ditek Corp.
 - 4. Emerson Network Power
- C. Components:
 - 1. Fused disconnect for remote mounted units, breaker for integral mounted units.
 - 2. Status indicating pilot lights.
 - 3. Dry contacts.
- D. Characteristics:
 - 1. Single Pulse Surge Current Capacity per Phase: 200,000 amperes.
 - 2. Capacity Per Protection Modes:
 - a. L-N Mode: 100,000 amperes.
 - b. L-G Mode: 100,000 amperes.N-G Mode: 100,000 amperes.
 - c. L-L Mode: 100,000 amperes.

3. Surge Life Cycle: 1.2 by 50 micro-seconds 20 kilovolt open circuit voltage, 8/20 micro-second waveform 10 kiloamperes short circuit current Category C3 Bi-wave in accordance with ANSI C62.41 and C62.45.
4. Suppression and Filter Technology: Manufacturer's standard.
5. Continuous Operating Voltage: Minimum 115 percent of nominal.
6. Suppression Voltage In Protective Modes: As follows when tested in accordance with UL 1449:
 - a. For 480 volt systems:
 - 1) L-N: 1200
 - b. For 208 volt systems:
 - 1) L-N: 800
7. Minimum American Wire Gauge Copper in Surge or Noise Suppression Path: Number 6.
8. Field Replaceable Fusing: Current limiting, protecting each pole.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install suppressors in accordance with manufacturer's instructions.

END OF SECTION

SECTION 16410

CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:
 - 1. Product data for each type of product specified.
- B. Operation and Maintenance Manuals: Submit in accordance with requirements of Sections 01730: Operating and Maintenance Data for items included under this Section, including circuits and motor disconnects.

1.02 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Electrical Component Standards: Provide components which are listed and labeled by UL. Comply with UL Standard 98 and NEMA Standard KS 1.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which shall be incorporated in Work include:
 - 1. Allen-Bradley.
 - 2. Square D Company.
 - 3. Cutler Hammer
 - 4. General Electric

2.02 CIRCUIT AND MOTOR DISCONNECT SWITCHES

- A. Provide NEMA 4, 4X, 7, 9, or 12 enclosure to match the rating of the area in which switch is installed. For motor and motor starter disconnects through 100 horsepower, provide units with horsepower ratings suitable to loads. For motor and motor starter disconnects above 100 horsepower, clearly label switch, "DO NOT OPEN UNDER LOAD."

- B. Fusible Switches: (Heavy-duty) switches, with fuses of classes and current ratings indicated. See Section "Fuses" for specifications. Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses.
- C. Circuit Breaker Switches: Where individual circuit breakers are required, provide factory-assembled, molded-case circuit breakers with permanent instantaneous magnetic and thermal trips in each pole, and with fault-current limiting protection, ampere ratings as indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Provide push-to-trip feature for testing and exercising circuit breaker trip mechanism. Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40 degrees C. Provide with AL/CU-rated mechanical screw type removable connector lugs.
- D. Non-fusible Disconnects: (Heavy-duty) switches of classes and current ratings as indicated.
- E. Switches for Classified (Hazardous) Locations: Heavy-duty switches with UL labels and listings for hazardous location classifications in which installed.

2.03 ACCESSORIES

- A. Special Enclosure Material: Provide special enclosure material as follows for switches indicated:
 - 1. Stainless Steel for NEMA 4 and outdoor switches.
 - 2. Molded fiberglass-reinforced plastic for NEMA 4X switches.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16440

PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the following:

1. Lighting panelboards.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01340, Shop Drawings and Submittals, covering the items included under this Section. Shop Drawing submittals shall include:

1. Manufacturer's product data on panelboards and enclosures.

B. Contract Closeout: Submit in accordance with Section 01700.

1.03 QUALITY ASSURANCE

A. Codes and Standards:

1. UL Compliance: Comply with applicable requirements of UL 67, "Electric Panelboards," and UL's 50, 869, 486A, 486B, and 1053 pertaining to panelboards, accessories, and enclosures. Provide panelboard units which are UL listed and labeled.
2. NEMA Compliance: Comply with NEMA Standards Pub/No. 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)," Pub/No. PB 1, "Panelboards," and Pub/No. PB 1.1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less."
3. Federal Specification Compliance: Comply with FS W-P-115, "Power Distribution Panel," pertaining to panelboards and accessories.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which shall be incorporated in Work include:

1. Square D Company.

2. General Electric

3. Cutler Hammer

2.02 PANELBOARDS

- A. Except as otherwise indicated, provide panelboards, enclosures, and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials; with design and construction in accordance with published product information. Equip with proper number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL, and established industry standards for those applications indicated.
- B. Lighting Panelboards: Provide dead-front safety type lighting and appliance panelboards as indicated, with switching and protective devices in quantities, ratings, and types shown; with anti-turn solderless pressure type lug connectors approved for use with copper conductors. Construct unit for connecting feeders at top of panel; equip with copper bus bars, full-sized neutral bar with bolt-in type heavy-duty, quick-make quick-break, single pole circuit breakers, and toggle handles that indicate when tripped. Provide suitable lugs on neutral bus for each outgoing feeder required and provide bare uninsulated grounding bars suitable for bolting to enclosures. Select enclosures fabricated by same manufacturer as panelboards, which mate and match properly with panelboards. Panelboards and circuit breakers shall be braced for 10,000 rms symmetrical amperes fault current unless otherwise indicated.
- C. Panelboard Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code gauge, minimum 16-gauge thickness. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable trim clamps and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed piano door hinges and door swings as indicated. Equip with interior circuit directory frame and card with clear plastic covering. Provide baked gray enamel finish over a rust-inhibitor coating. Design enclosures for recessed or surface mounting as indicated. Provide enclosures which are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards to be enclosed.
- D. Molded-Case Circuit Breakers: Provide factory assembled, molded-case circuit breakers of frame sizes, characteristics, and ratings, including rms symmetrical interrupting ratings indicated. Select breakers with permanent thermal and instantaneous magnetic trip, and with fault-current limiting protection, ampere ratings as indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make quick-break action and positive handle trip indication. Construct breakers for mounting and operating in any physical position, and operating in an ambient temperature of 40 degrees C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.
- E. Accessories: Provide panelboard accessories and devices including, but not necessarily limited to, ground-fault protection units or circuit breaker locking hardware as indicated.
- F. Spares: In each panelboard provide 8 installed, single pole, 20A spare circuit breakers unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION OF PANELBOARDS

- A. Type out panelboard's circuit directory card upon completion of installation Work.

END OF SECTION

SECTION 16441

LOW-VOLTAGE SWITCHBOARD

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide a 480 volt, 3 phase, 3 wire, electrical distribution rated Switchboard, outdoor type NEMA 4X stainless steel free-standing, non-walk-in style construction with fixed position circuit breakers and integral surge protection device (SPD) with fail lights and overcurrent protection.

1.02 REFERENCES

- A. NEMA:
 - 1. NEMA PB-2
- B. Underwriter's Laboratories (UL):
 - 1. UL 891

1.03 SUBMITTALS

- A. Submit shop drawings and manufacturers' product data.
- B. Manufacturer's certified shop drawings including outlines, schematics and wiring diagrams, coordination curves, maintenance data, operating instructions and parts list with list of recommended spare parts.
 - 1. Master drawing index
 - 2. Front view and plan view of the assembly
 - 3. Three-line diagram
 - 4. Schematic diagram
 - 5. Nameplate schedule
 - 6. Component list
 - 7. Conduit space locations within the assembly
 - 8. Assembly ratings including:

9. Short-circuit rating
10. Major component ratings including:
 11. Voltage
 12. Continuous current rating
 13. Interrupting ratings
 14. Cable terminal sizes
 15. Product data sheets
 16. Master drawing index
 17. Front view and plan view of the assembly
 18. Three-line diagram
 19. Schematic diagram
 20. Nameplate schedule
 21. Component list
 22. Conduit space locations within the assembly
 23. Assembly ratings including:
 24. Busway connection

1.04 QUALITY ASSURANCE

- A. Ensure that conduit size and wire quantity, size, and type are suitable for the equipment supplied. Review the proper installation of each type of device with the equipment supplier prior to installation.

1.05 DELIVERY AND STORAGE

- A. Shipping:
 1. Ship equipment, and materials, except where partial disassembly is required by transportation regulations or for protection, complete with identification and quantity of items.
 2. Provide heavy plastic envelope directly over switchboard to protect against dust, dirt, and moisture. Provide lifting angles outside of envelope.

- B. Storage:
 - 1. Store and safeguard equipment and material.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Square D.
- B. Or acceptable Equal.

2.02 SWITCHBOARD EQUIPMENT:

- A. Rating:
 - 1. Voltage rating shall be as indicated on the drawings. The entire assembly shall be suitable for 600 volts maximum ac service.
 - 2. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current of 100,000 amperes symmetrical at rated voltage.
 - 3. The bus system shall have a minimum ANSI short-circuit withstand rating of 100,000 amperes symmetrical tested in accordance with ANSI C37.20.1 and UL1558.
 - 4. All circuit breakers shall have a minimum symmetrical interrupting capacity of 85,000 amperes. To ensure a fully selective system, all circuit breakers shall have 30 cycle short-time withstand ratings equal to their symmetrical interrupting ratings through 85,000 amperes, regardless of whether equipped with instantaneous trip protection or not.
- B. Structure:
 - 1. Fully enclosed Switchboard, dead front, free standing, front accessibility.
 - 2. NEMA 4X stainless steel exterior with painted carbon steel frame-work of UL gauge formed steel and channels and secured together to support all cover plates, bussing and component devices during shipment and installation. Formed removable N-4X closure plates on the front, rear and sides. Closure plates shall be single tool, screw removable.
 - a. Cable termination suitable for cable entry from below.
 - b. Line and load side terminals fitted with two hole compression-type lugs.
 - c. Silver plated copper ground bus 1/4-inch x 2 inch (6 mm x 50 mm) extended and tied through to all adjoining sections.

C. Breakers:

1. The circuit breaker shall be 100% rated with LSIG settings.
2. Provide circuit breakers as indicated on the one-line diagram.
3. Breakers shall be air-insulated, manually operated insulated case, fixed position with charging handle, open/close pushbuttons and trip indication.
4. Provide 120 VAC shunt trip coil and terminal blocks for E-stop.

D. Enclosure - General Requirements:

1. Switchboard shall be completely self-supporting structure of the required number of vertical sections bolted together to form one metal-enclosed switchboard 90 inch (2.29 m) high.
2. Sides, top and rear covers shall be code gauge steel, bolted to the switchboard structure.
3. The frame structure members shall be die-formed, 12-gage steel bolted together and reinforced at corners with rugged gussets internal and external to the structure members.
4. The switchboard shall be completely front accessible for all installation and maintenance activities.
5. The switchboard and devices are fully rated at short circuit rating of 85,000 rms symmetrical Amperes.
6. Main breaker shall be individually mounted.
7. All buses are tin plated copper, supported with high impact, non-tracking insulating material, and braced to withstand mechanical forces exerted during short circuit conditions. All bus connections shall utilize silver plated bus bar surfaces.
8. The current density of the bus shall be determined from UL-891 heat rise testing and shall be rated for 1000 amperes per square inch cross-section.
9. A silver copper, 1/4-inch x 2 inch (6 mm x 50 mm) ground bus shall furnished and secured to structure.
10. A-B-C type bus arrangement (left-to-right, top-to-bottom, front-to-rear) is to be used throughout to assure convenient and safe testing and maintenance.
11. All vertical sections comprising the switchboard are rear-aligned.

12. All steel surfaces shall be chemically cleaned and pre-treated with an iron-phosphate pre-treatment or equivalent process, providing a bond between paint and metal surfaces to help prevent the entrance of moisture and formation of rust under the paint. The switchboard exterior shall be finished with ANSI-61 light gray paint. Provide touch-up paint for coatings nicks and scratches after installation and testing.

2.03 WIRING:

- A. Conductors: Copper; size as required by load, except that no control wire is smaller than 14 AWG. Use insulation that is flame retardant, and moisture and heat resistant.
- B. Cables and conductors: Bundled and tie wrapped securely in wireways furnished.
- C. Identify internal wiring at terminations by T&B wire markers or equivalent.
- D. All spare auxiliary contacts shall be wired to terminal blocks.
- E. Terminal Blocks:
 1. Rated 600 volt for power with current rating as required by loads.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Install equipment in accordance with manufacturer's printed instructions and as indicated and specified. Install equipment on channels set flush with floor or on concrete bases. Interconnect equipment as a complete operating system.

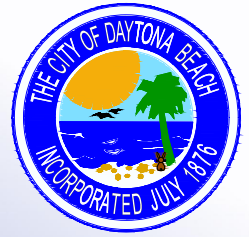
END OF SECTION



APPENDIX A

U *DAYTONA BEACH* UTILITIES DEPARTMENT

STANDARD DETAILS



2019-2020

POTABLE WATER

RECLAIMED WATER

SANITARY SEWER

STORMWATER

THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT
125 BASIN ST., STE. 100
DAYTONA BEACH, FL 32114

THE CITY OF DAYTONA BEACH

UTILITIES DEPARTMENT

STANDARD DETAILS



We are furnishing the information transmitted herewith under the following understanding: In accepting and utilizing the accompanying data, the recipient, his employer, and any other person or entity who comes into possession of such drawings or data; agree to waive all claims against the City of Daytona Beach (hereafter called the City) resulting in any way from changes or reuse of such drawings and data, agree to the fullest extent permitted by law, to indemnify and hold harmless the City from any damage, liability or cost, including reasonable attorneys' fees and costs and expenses of defense, arising from any use of the data, acknowledge and agree that the City reserves the right to revise such drawings and data without notice, acknowledge that the City makes no warranties either express or implied, of fitness for any particular purpose including any warranty as to readability or compatibility with your hardware or software or against deterioration, acknowledge and agree that, while the City makes an effort to ensure its data is virus-free, the City shall not be held liable for any harm resulting from the installation or utilization of the data, and agree to use best efforts to verify the data to ascertain the accuracy and completeness of the data.

THE CITY OF DAYTONA BEACH
WATER UTILITIES DEPARTMENT
125 BASIN ST. STE 100
DAYTONA BEACH, FL 32114

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POTABLE WATER CONSTRUCTION & DESIGN STANDARDS

UPDATED ITEMS ARE HIGHLIGHTED.

1. THE CITY'S UTILITIES DEPARTMENT SHALL BE GIVEN A MINIMUM OF 3 BUSINESS DAYS ADVANCE NOTICE (NOT INCLUDING HOLIDAYS OR WEEKENDS) PRIOR TO BEGINNING ANY POTABLE WATER SYSTEM CONSTRUCTION.
2. A PERMIT SHALL BE REQUIRED PRIOR TO ENGAGING IN ANY DEWATERING OR CONSTRUCTION ACTIVITY THAT CHANGES THE IMPERVIOUS AREA OF LAND. DEWATERING ACTIVITIES INCLUDE THE REMOVAL OF GROUND WATER FROM A CONSTRUCTION SITE, ENCLOSED VAULT, COFFERDAM, OR TRENCHES, ALLOWING CONSTRUCTION OR MAINTENANCE IN A DRY ENVIRONMENT. SITE SPECIFIC DEWATERING PERMITS SHALL REQUIRE PAYMENT OF A PER ACRE FEE BASED ON THE SIZE OF THE DEVELOPMENT. GENERAL PURPOSE PERMITS SHALL REQUIRE AN ANNUAL FEE BASED ON A BIENNIAL SCHEDULE OF DEWATERING ACTIVITIES DISCHARGING DIRECTLY INTO THE CITY'S MS4 CONVEYANCE SYSTEM. DEWATERING PERMIT APPLICATIONS CAN BE FOUND AT <https://www.codb.us/index.aspx?nid=262>. FEES ARE SUBJECT TO ARTICLE 7, SECTION 7.2 OF THE LAND DEVELOPMENT CODE AND MUST BE SUBMITTED WITH THE PERMIT APPLICATION TO THE CITY OF DAYTONA BEACH STORM WATER COORDINATOR AT 125 BASIN STREET, SUITE 100, DAYTONA BEACH, FLORIDA 32114 PRIOR TO ANY USE OF THE CITY'S MS4 CONVEYANCE SYSTEM. FAILURE TO COMPLY WILL RESULT IN IMMEDIATE TERMINATION OF ACCESS TO THE CITY'S MS4 SYSTEM.
3. ALL WORK PERFORMED ON POTABLE WATER FACILITIES OWNED OR PROPOSED TO BE OWNED BY THE CITY SHALL BE CONSTRUCTED BY AN UNDERGROUND UTILITY CONTRACTOR OR GENERAL CONTRACTOR LICENSED IN THE STATE OF FLORIDA AND REGISTERED WITH THE CITY.
4. UPON CONSTRUCTION COMPLETION AND ACCEPTANCE OF THE SYSTEM, IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ENSURE THAT THE SYSTEM IS PROPERLY CERTIFIED AND ACCEPTED BY THE DEPARTMENT OF HEALTH, AND THAT AS-BUILT DRAWINGS MEETING THE CITY'S REQUIREMENTS ARE PROVIDED TO THE CITY AND ACCEPTED PRIOR TO ANY USE OF THE SYSTEM.
5. THE WATER DISTRIBUTION SYSTEM SHALL BE DESIGNED TO COMPLY WITH THE CITY'S FIRE (WATER) FLOW CODE.
6. EACH WATER SERVICE TERMINATION SHALL BE MARKED WITH 2" X 4" PRESSURE TREATED LUMBER EXTENDING 4' ABOVE GRADE DIRECTLY IN FRONT OF THE METER BOX WITH 2' OF ENDOTRACE POLY-TUBE OR APPROVED EQUAL COILED AND CAPPED WITH AN ELSTER HYDROSERT CAP INSIDE EACH METER BOX.
7. ALL WATER SERVICES SHALL BE MARKED WITH A "/\" SAW CUT INTO THE CURB.
8. ALL WATER VALVES SHALL BE MARKED WITH AN "X" SAW CUT INTO THE CURB.
9. ALL TAPPING OF MAINS (12" OR SMALLER) SHALL BE PERFORMED BY CITY PERSONNEL. SCHEDULING OF THESE CONNECTIONS REQUIRES A MINIMUM OF 3 BUSINESS DAYS ADVANCE NOTICE AND SHALL BE COORDINATED WITH THE CITY INSPECTOR.
10. THE PLANS SHALL INCLUDE RIGHT OF WAY LINES AND STATIONING AND OFFSETS FROM THE CENTER LINE OF CONSTRUCTION.
11. DEWATERING ACTIVITIES SHALL KEEP THE GROUNDWATER ELEVATION A MINIMUM OF 6 INCHES BELOW THE WATER MAIN BEING INSTALLED.
12. ALL WATER MAINS SHALL BE INSTALLED ON A FIRM UNYIELDING FOUNDATION WITH ALL UNSUITABLE MATERIAL (MUCK, ROCK, COQUINA, ETC.) REMOVED AND REPLACED WITH CLEAN GRANULAR MATERIAL.
13. TRENCHES SHALL BE BACKFILLED WITH MATERIAL ACCEPTABLE TO THE CITY WITH A MINIMUM COMPACTION OF 98% IN PAVED AREAS AND 95% IN UNPAVED AREAS IN ACCORDANCE WITH AASHTO T-180 MODIFIED PROCTOR TEST.



POTABLE WATER CONSTRUCTION & DESIGN STANDARDS (CONT'D)

14. WHERE POTABLE WATER AND SANITARY SEWER MAINS CROSS WITH LESS THAN TWELVE (12) INCHES OF VERTICAL CLEARANCE OR WHERE THE SEWER MAIN IS ABOVE THE WATER MAIN, MEDIATION MUST BE REVIEWED AND APPROVED BY FDEP.
15. WATER MAINS SHALL BE CONSTRUCTED A MINIMUM OF 4 FEET BEHIND THE BACK OF CURB OR THE EDGE OF ROADWAY PAVEMENT, WHICHEVER IS GREATER, AS MEASURED FROM OUTSIDE WALL OF THE WATER MAIN.
16. 3 INCH METALIZED PIPE LOCATION TAPE SHALL BE LOCATED 15 INCHES TO 24 INCHES BELOW FINISHED GRADE OR AS SPECIFIED BY THE MANUFACTURER FOR ALL WATER LINES. BLUE TRACER WIRE SHALL BE ATTACHED TO ALL PIPES. WIRE RUNS SHALL BE CONNECTED WITH SILICONE FILLED WIRE CONNECTORS. SERVICES SHALL BE CONNECTED TO THE MAIN WIRE WITH SILICONE FILLED WIRE CONNECTORS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE AND TEST FOR CONTINUITY (SEE CITY SPECIFICATION #15049 TRACER WIRE AND ALARMING TAPE). TRACER WIRE SHALL BE TESTED FOR CONTINUITY UNDER THE SUPERVISION OF A CITY REPRESENTATIVE AFTER INSTALLATION. IF A METER BOX IS NOT WITHIN 200 FEET OF A VALVE AND VALVE BOX AN ADDITIONAL VALVE BOX FOR TRACER WIRE IS REQUIRED.
17. SINGLE RESIDENTIAL WATER SERVICES SHALL BE A MINIMUM 1-INCH ENDOT, ENDOTRACE OR APPROVED EQUAL POLY-TUBE (MEETING THE SPECIFICATIONS OF NSF-14, AND AWWA C901.)
18. ALL WATER MAINS SHALL BE NSF-APPROVED FOR POTABLE WATER USE AND HAVE A MINIMUM COVER OF 36-INCHES.
19. WATER MAINS LESS THAN 18" MAY USE POLYVINYL CHLORIDE (PVC) C900, OR C905, SHALL MEET AWWA REQUIREMENTS AND HAVE A MINIMUM DIMENSION RATIO (DR-18) PRESSURE CLASS 150. WATER MAINS 18" AND LARGER SHALL BE DUCTILE IRON PIPE (D.I.P.), CLASS 350, CEMENT LINED. ALL NON-DUCTILE IRON PIPE HORIZONTAL DIRECTIONAL DRILL WATER MAINS SHALL HAVE A MINIMUM WORKING PRESSURE OF 160 PSI. THE CITY MAY REQUIRE A HIGHER PRESSURE RATING BASED ON SITE CONDITIONS. INSIDE DIAMETER OF NON D.I.P. HORIZONTAL DIRECTIONAL DRILL PIPE SHALL MATCH THE INSIDE DIAMETER OF CONNECTING PIPES. ALL GASKETS SHALL BE LUBRICATED BEFORE INSTALLATION.
20. DIRECTIONAL DRILLS SHALL HAVE FUSED MJ ADAPTERS.
21. ALL POTABLE WATER MAINS SHALL USE THRUST RESTRAINT AS CALCULATED BY A PROGRAM AVAILABLE AT EBAA.COM
22. ALL FITTINGS, VALVES, ETC. SHALL BE DUCTILE IRON (MJ OR FLANGED) AND SHALL BE RESTRAINED.
23. ALL RESTRAINED PIPE BELL JOINTS SHALL USE BELL RESTRAINTS OR GRIPPER TYPE GASKETS CAN BE USED FOR DUCTILE IRON PIPE JOINTS.
24. WATER VALVES SHALL BE INSTALLED AT ALL STREET INTERSECTIONS AND AT A MAXIMUM SPACING OF 750 FEET. SPACING OF VALVES ON PRIMARY TRANSMISSION MAINS WILL BE DETERMINED BY THE CITY.
25. VALVES SHALL BE INSTALLED ON ALL LEGS OF WATER MAIN TEES EXCEPT ONE.
26. ALL FITTINGS SHALL MEET MINIMUM RESTRAINT REQUIREMENTS PER ANSI/AWWA/EBAA, AND ALL PRESSURE PIPES UNDER THE ROADWAYS SHALL BE RESTRAINED.
27. METER LENGTHS REQUIRED FOR WATER METERS INSTALLATION ARE AS FOLLOWS:
 3/4" TO 2" METER REQUIRES 6', 4" METER REQUIRES 12', 6" AND 8" METER REQUIRES 14',
 AND A 10" METER REQUIRES 20'.



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POTABLE WATER CONSTRUCTION & DESIGN STANDARDS (CONT'D)

28. ALL WATER VALVE BOXES SHALL BE ADJUSTED, INCLUDING DEBRIS CAP, AND CONCRETE COLLAR TO FINISHED GRADE. VALVE BOX LIDS SHALL BE PAINTED BLUE TO MAKE THEM CLEARLY VISIBLE.
29. UPON FINAL ACCEPTANCE OF NEW WATER SYSTEMS, WATER VALVES SHALL BE COMPLETELY OPENED BY CITY UTILITIES PERSONNEL. THE CONTRACTOR SHALL NOT OPERATE ANY EXISTING VALVES WITHOUT A CITY REPRESENTATIVE PRESENT.
30. ALL VALVES 2 INCHES AND SMALLER SHALL BE CURB STOPS. VALVES LARGER THAN 2 INCHES SHALL BE GATE VALVES.
31. A MINIMUM OF ONE FIRE HYDRANT SHALL BE LOCATED AT EVERY INTERSECTION. OTHER FIRE HYDRANTS SHALL BE LOCATED TO PRODUCE A MAXIMUM 500 FOOT RADIUS OF COVERAGE. ALL FIRE HYDRANTS SHALL BE INSTALLED IN EASILY ACCESSIBLE LOCATIONS FOR FIRE PERSONNEL. THE PRIMARY HYDRANT PORT SHALL FACE THE STREET.
32. THE CONTRACTOR SHALL PIG ALL PIPES 6 INCHES OR LARGER IN DIAMETER. LAUNCHING AND EXTRACTION POINTS SHALL BE DETERMINED BY THE CONTRACTOR AND CITY REPRESENTATIVE.
33. FOR PIPE FLUSHING, PIGGING, TESTING, AND TIE-IN CONNECTIONS, THE CITY RESERVES THE RIGHT TO REQUIRE WORK TO BE PERFORMED DURING PERIODS OF LOW FLOW (MIDNIGHT TO 8 A.M.) THE CONTRACTOR SHALL COORDINATE WITH THE CITY REPRESENTATIVE AND WATER PLANT OPERATIONS TO SCHEDULE THE DATE AND TIME FOR THESE ACTIVITIES.
34. THE CITY RESERVES THE RIGHT TO PERFORM THE SAMPLING AND ANALYSIS FOR BACTERIOLOGICAL CLEARANCE OF THE WATER MAIN. ANY RETESTING WILL BE AT THE CONTRACTORS EXPENSE.
35. POTABLE WATER LINES SHALL NOT BE USED OR PLACED INTO SERVICE UNTIL CLEARANCE IS ACCEPTED BY VOLUSIA COUNTY HEALTH DEPARTMENT AND THE CITY OF DAYTONA BEACH.
36. BACKFLOW PREVENTERS (BFP) SHALL BE PLACED ON ALL POTABLE AND FIRE LINES SERVING COMMERCIAL AND RESIDENTIAL PROPERTIES. THE TYPE OF BACKFLOW PREVENTERS REQUIRED ARE AS FOLLOWS:
 - POTABLE WATER SERVICE; REDUCED PRESSURE ZONE (RPZ)(BFP)
 - FIRE LINE SERVICING A FIRE SPRINKLER SYSTEM AND/OR PRIVATE FIRE HYDRANT; DOUBLE CHECK VALVE ASSEMBLY
 - FIRE LINE; DOUBLE CHECK VALVE ASSEMBLY

IN CASES WHERE A WATER LINE SERVES BOTH DOMESTIC AND FIRE SERVICES, A REDUCED PRESSURE ZONE BFP IS REQUIRED.
37. ALL JACK & BORES REQUIRED FOR COMMERCIAL DEVELOPMENT SHALL BE PERFORMED AT THE SOLE COST OF THE OWNER\DEVELOPER.
38. ALL C-900 DR-18 PVC PIPE REQUIREMENTS REFERENCE TO THE C-900 STANDARDS.
39. CHLORINATED WATER MUST BE DECHLORINATED PRIOR TO DISCHARGE INTO ANY JURISDICTIONAL WETLAND OR WATER BODY PER AWWA STANDARD, ANSI/AWWA C655.



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POTABLE WATER CONSTRUCTION & DESIGN STANDARDS

TESTING REQUIREMENTS:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TRENCH COMPACTION TESTS AT POINTS 12 INCHES ABOVE THE PIPE AND AT 12-INCH VERTICAL INTERVALS TO FINISHED GRADE AT A MAXIMUM HORIZONTAL SPACING OF 300 FEET.
2. ON ALL PROJECTS OTHER THAN THOSE INITIATED BY THE CITY THE CONTRACTOR SHALL EMPLOY AN INDEPENDENT TESTING LABORATORY AT HIS OWN EXPENSE TO INSURE THAT COMPACTION OF ALL FILL MATERIAL IS COMPLETED PROPERLY. ON ALL CITY PROJECTS THE TESTING WILL BE DONE IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. IDENTIFICATION OF TEST LOCATIONS SHALL BE CLEARLY INDICATED ON TEST REPORTS. TEST RESULTS SHALL BE FORWARDED PROMPTLY TO THE CITY'S INSPECTOR.
3. ALL POTABLE WATER MAINS SHALL BE FLUSHED, DISINFECTED, PRESSURE TESTED AND BACTERIOLOGICALLY CLEARED FOR SERVICE WHEN APPROPRIATE IN ACCORDANCE WITH THE LATEST AWWA STANDARDS AND THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION REQUIREMENTS. THE CONTRACTOR SHALL NOTIFY THE CITY'S DESIGNATED INSPECTOR WHO SHALL COORDINATE WITH CITY PERSONNEL AT THE WATER TREATMENT PLANT AT LEAST 3 BUSINESS DAYS PRIOR TO BEGINNING FLUSHING THE MAINS BEFORE PRESSURE TESTING. THE CITY MAY REQUIRE WORK TO BE PERFORMED DURING PERIODS OF LOW FLOW (MIDNIGHT TO 8 AM). THE DATE AND TIME SCHEDULE FOR FLUSHING AND PIGGING MUST BE APPROVED BY THE WATER PLANT OPERATIONS. NO HOSE OR FIRE HYDRANT SHALL BE USED IN THE COLLECTION OF BACTERIOLOGICAL SAMPLES. THE SAMPLING TAP MUST BE DEDICATED, CLEAN, DISINFECTED AND FLUSHED PRIOR TO SAMPLING. SAMPLING TAP SHALL BE SMOOTH, UNTHREADED 1/2 INCH HOSE BIB. DISINFECTION AND SAMPLING SHALL BE SCHEDULED AT THE CITY'S CONVENIENCE.
4. PRESSURE TEST FOR TAPPING SADDLES AND VALVES FOR A MINIMUM OF 30 MINUTES AT 150 PSI OR 30 MINUTES AT MANUFACTURER'S RECOMMENDED TESTING PRESSURE.
5. WATERMANS SHALL BE PRESSURE TESTED AT 150 PSI FOR 3 HOURS. TESTING SHALL BE IN ACCORDANCE WITH AWWA C-600 AND AWWA C-605 AS APPLICABLE WITH ALLOWABLE LEAKAGE TO BE BASED ON THE TABLE BELOW.

ALLOWABLE LEAKAGE PER 1000 FT. OF PIPELINE * -GPH

AVERAGE PRESSURE TEST (PSI)	NOMINAL PIPE DIAMETER - INCHES																		AVERAGE TEST PRESSURE (PSI)
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64	
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60	9.56	10.19	450
400	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11	9.01	9.61	400
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58	8.43	8.99	350
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.32	300
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72	7.47	7.97	275
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41	7.12	7.60	250
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03	6.76	7.21	225
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73	6.37	6.80	200
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36	5.96	6.36	175
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97	5.52	5.88	150
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53	5.04	5.37	125
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05	4.50	4.80	100

* IF THE PIPELINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE ALLOWABLE LEAKAGE WILL BE THE SUM OF THE COMPUTED LEAKAGE FOR EACH SIZE.

WHERE:

$$L = \frac{SD\sqrt{P}}{133,200}$$

- L = ALLOWABLE LEAKAGE, IN GALLONS PER HOUR
- S = LENGTH OF PIPE TESTED, IN FEET
- D = NOMINAL DIAMETER OF PIPE, IN INCHES
- P = AVERAGE TEST PRESSURE DURING THE LEAKAGE TEST, IN POUNDS PER SQUARE INCH (GAUGE)





Guidelines for the Acceptance of New Water Mains from Contractors

Contact the Utilities Department at 386-671-8871 or 386-671-8827 a min. of 3 business days prior to beginning any potable water system construction. Utilities Inspector will coordinate with the City's Water Distribution Division to schedule the tap of the main. Where applicable, DOH Permit to be forwarded to the Water/Wastewater (W/WW) Inspector with the Regulatory Compliance Division.

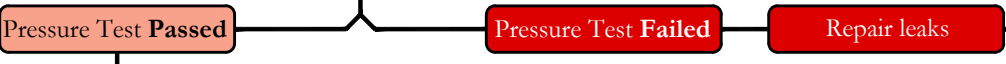
Contractor to install tapping saddle/sleeve and disinfected valve on the existing water main under inspection of the Utilities Department. All materials must be swabbed with a 5% chlorine solution.

Pressure test the tapping saddle/sleeve and valve. (Min. 30 minutes at manufacturer recommended pressure.)

City's Water Distribution Department will tap the existing main.

All mains 6" and larger (greater than 20 LF) must be **pigged and flushed** by the contractor under inspection of the water/wastewater inspectors. Contact Field Chemist between 07:30 - 14:00 hrs. Monday - Thursday excluding holidays at 386-671-8809 to schedule.

Contractor must pressure test the new main under inspection of the W/WW Inspector. (Minimum 3 hrs at 150 psi) Refer to CODB Standard Details



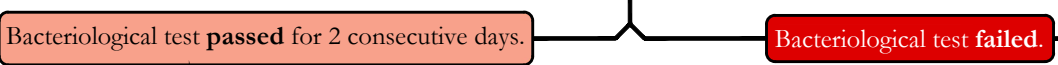
Where applicable, Submit Preliminary As-Built to Utilities Engineering. (1 AutoCAD CD and 1 Paper Copy in State Plane Coordinates NAD 83). Once preliminary as-builts are acceptable, W/WW Inspector will schedule the chlorination. **(Chlorination is scheduled Mon. thru Wed. with 48 hrs advance notice required.)**

Contractor will super chlorinate the new main in accordance with AWWA C651-05 (or most recent version). The chlorine solution must be greater than 25 mg/L (50 mg/L preferred) and must remain in the water main for at least 24 hrs with a final residual of 10 mg/L. The chlorination **must** be monitored by the W/WW Inspector. An alternative method of "slug" chlorination can be utilized. Initial chlorine dose of 100 mg/L in contact for 3 hours with a final residual of 50 mg/L.

Flush main and reduce the chlorine residual to proper level (1-3 mg/L typical, not to exceed ambient chlorine residual from the WTP). Any water discharged to receiving water bodies shall be dechlorinated per AWWA standards.

Re-chlorination is required if the 2nd consecutive sample fails.

W/WW Inspector/CODB Lab will collect and test samples for 2 consecutive days per FDEP requirements.



Submit Final As-built Drawings 2 Paper Copies* signed and sealed by the surveyor, 1 CD with working CAD drawings and PDF's. Bacteriological Test Results and FDEP Clearance Application to the Utilities Engineering Division.

Utilities Engineering signs and delivers the FDEP clearance app. to the Health Department.*

FDEP Letter of Clearance Received.

Water Distribution Division will open valve and place water main into service.

(Paper copies are to be rolled not folded)

*Should the bacteriological samples expire prior to DOH submittal re-chlorination and re-sampling will be required at the contractor's cost using the City personnel and laboratory.

These guidelines apply to all connections to the Water Distribution system to include services (potable and irrigation) as well as dedicated fire lines.



FY: 19/20
Drawing Date: 03/15
Drawn By: KLH
Checked By: JMP
Scale: NTS
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File Name: Guidelines for ...
Page 9

WATER - TABLE OF DAILY FLOWS FOR VARIOUS OCCUPANCIES

Types of Establishments	
Apartments	300 gpd
Banquet hall (per seat)	15 gpd
Bars and cocktail lounges	5 gpcd
Bathroom (non-residential)	250 gpd
Beauty shop (per seat)	150 gpd
Boarding schools (students and staff)	50 gpd
Boarding houses	50 gpcd
Bowling alleys (toilet wastes only, per lane)	75 gpd
Country clubs, per member	15 gpcd
Day schools (with cafeteria, no gymnasium or showers)	8 gpcd
Day schools (with cafeterias, gymnasiums & showers)	20 gpcd
Day workers at office and schools	15 gpcd
Dentist, per wet chair	200 gpd
Drive-in theaters (per car space)	5 gpd
Factories (with showers)	25 gpcd
Factories (no showers)	10 gpd/100 sq. ft.
Funeral home	10 gpd/100 sq. ft.
Gas stations (no car wash)	400 gpd
Hospitals (with laundry) (per bed)	200 gpd
Hospitals (no laundry) (per bed)	150 gpd
Hotels and motels (per room & unit)	100 gpd
Laundromat (per washing machine)	200 gpcd
Mobile home park (per trailer)	200 gpd
Movie theaters, auditoriums, churches (per seat)	3 gpd
Nursing homes	125 gpd/100 sq. ft.
Office buildings	10 gpd/100 sq. ft.
Public institutions (other than those listed herein)	75 gpcd
Restaurants (per seat)	35 gpd
Restaurants (take-out)	35 gpd/100 sq. ft. (350 gpd min.)
Restaurants (Fast Food) (per seat)	25 gpd
Single-family residence	300 gpd
Townhouse residence	300 gpd
Shopping centers	10 gpd/100 sq. ft.
Stadiums, frontons, ball parks, etc. (per seat)	3 gpd
Stores, without kitchen wastes	5 gpd/100 sq. ft.
Speculative buildings	10 gpd plus 10 gpd/100 sq. ft.
Warehouses	30 gpd plus 10 gpd/1,000 sq. ft.

*** CITY WILL CONSIDER ALTERNATE FLOW RATES FOR VARIOUS ESTABLISHMENTS IF THE EOR CAN PROVIDE SUPPORTING DATA.***

WATER DESIGN BASIS

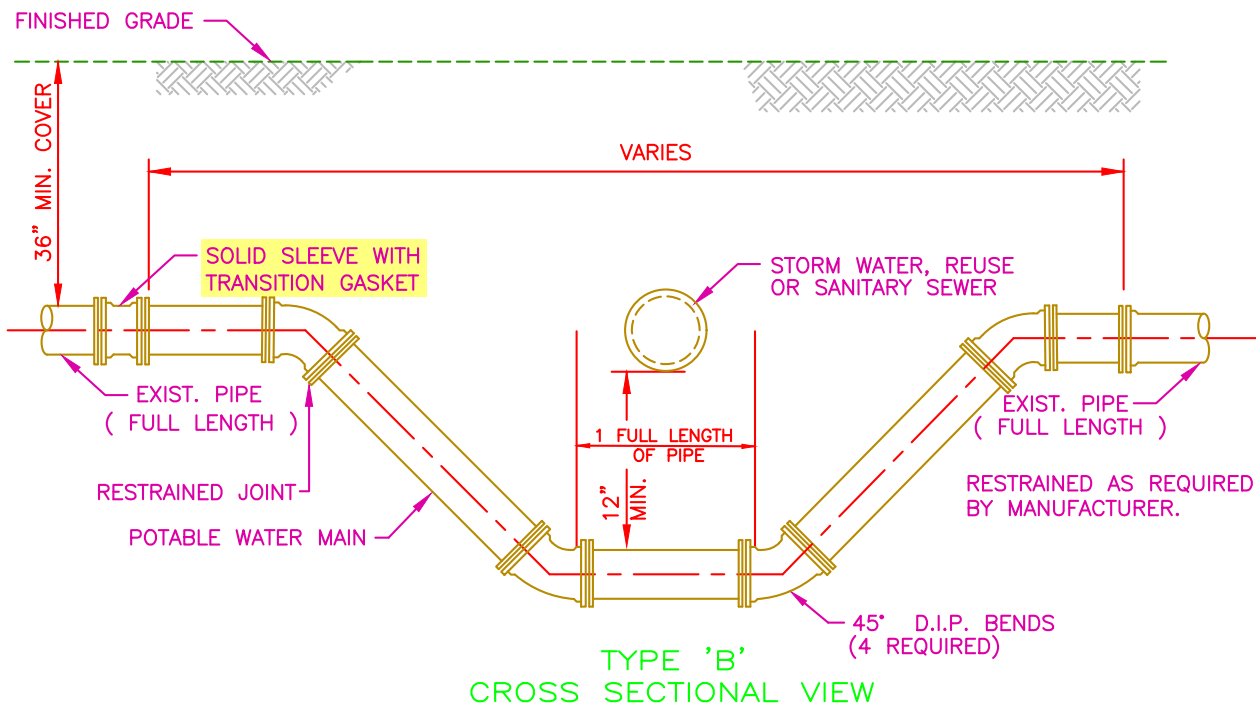
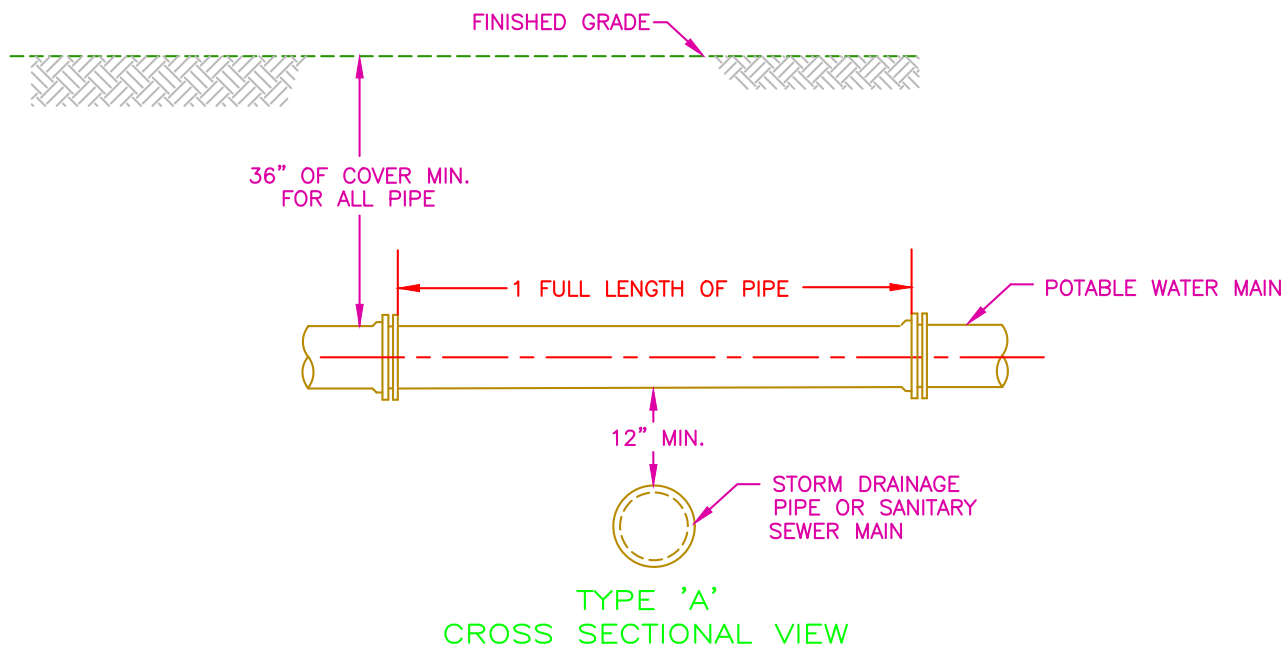
AVERAGE DAILY, MAXIMUM DAILY AND PEAK FLOWS

ENGINEER TO DETERMINE AVERAGE DAILY, MAXIMUM DAILY AND PEAK HOUR FLOWS FOR CITY REVIEW AND APPROVAL.

FIRE FLOW REQUIREMENTS

Fire flow requirements shall be determined in accordance with the applicable local fire department codes and/or ISO standards.





NOTES:

1. TYPE "A" CROSSING SHALL BE THE PREFERRED CONFIGURATION. TYPE "B" MAY BE USED ONLY UPON SPECIFIC APPROVAL.
2. ADDITIONAL RESTRAINTS MAY BE REQUIRED FOR VERTICAL BENDS.
3. LOWERING OF EXISTING WATER MAIN & FORCE MAIN BY DEFLECTION METHOD MAY BE ACCEPTABLE IF EXISTING FIELD CONDITIONS PERMIT AND APPROVAL IS RECEIVED FROM CODB.
4. LENGTH OF SECTION BASED ON MINIMUM LENGTH AS DETERMINED BY EBAA RESTRAINED JOINT MANUAL.
5. INSTALL RESTRAINED JOINTS, AS REQUIRED, FROM DEFLECTION POINT IN BOTH DIRECTIONS (20' MIN.).



FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
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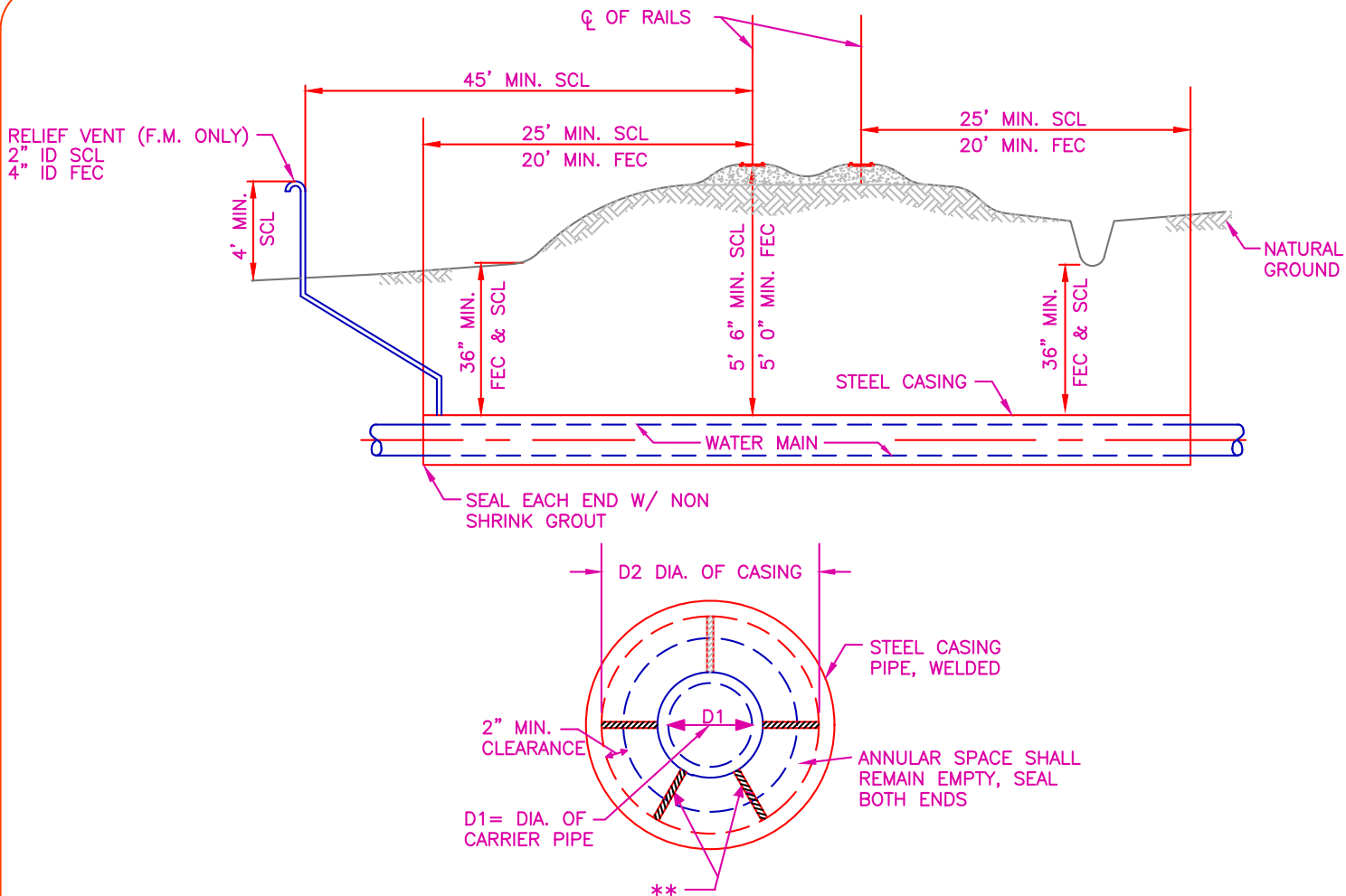
LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

Other Pipe	Horizontal Separation	Crossings (1)	Joint Spacing @ Crossings (Full Joint Centered)
Storm Sewer, Stormwater Force Main, Reclaimed Water (2)	<p style="text-align: center;">Water Main 3 ft. minimum</p>	<p style="text-align: center;">Water Main 12 inches is the minimum, except for storm sewer, then 6 inches is the minimum and 12 inches is preferred</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>
Vacuum Sanitary Sewer	<p style="text-align: center;">Water Main 10 ft. preferred 3 ft. minimum</p>	<p style="text-align: center;">Water Main 12 inches is preferred 6 inches minimum</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>
Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)	<p style="text-align: center;">Water Main 10 ft. preferred 6 ft. minimum (3)</p>	<p style="text-align: center;">12 inches is the minimum, except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>
On-Site Sewage Treatment & Disposal System	<p>10 ft. minimum</p>	<p>---</p>	<p>---</p>

- (1) Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches.
- (2) Reclaimed water regulated under Part III of Chapter 62-610, F.A.C.
- (3) 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer.
- (4) Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.

Disclaimer - This document is provided for your convenience only. Please refer to F.A.C. Rule 62-555.314 for additional construction requirements.





TYPICAL RAILROAD CROSSING

NTS

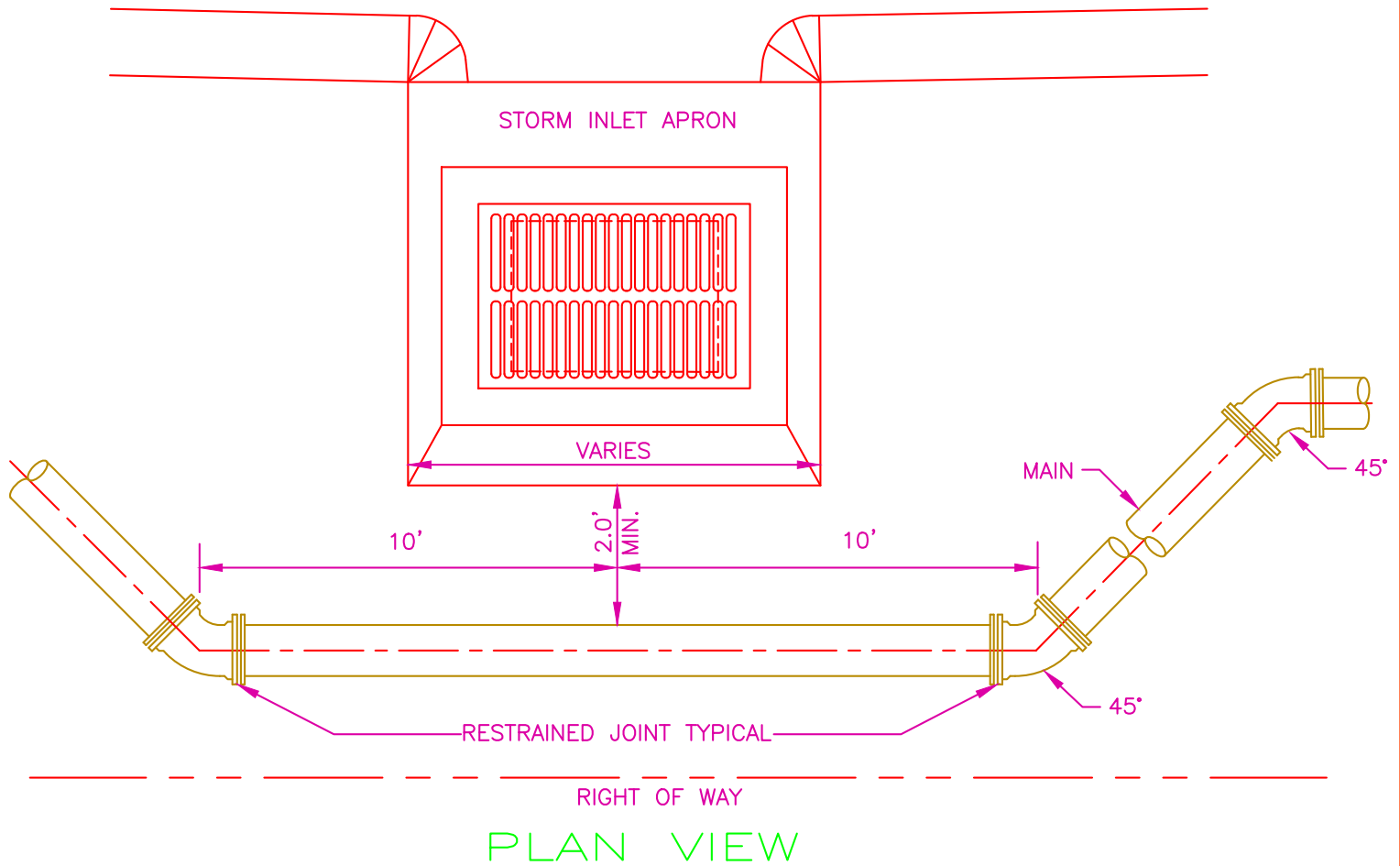
NOTE TO ENGINEER: CROSSING DETAIL SHALL BE TO SCALE AND SHOW EXISTING UTILITIES, CLEARANCES, CASING LENGTH, LOCATION OF PAVED ROAD AND LIMITS OF RIGHT-OF-WAY

CARRIER PIPE AND CASING PIPE SIZES (MIN.)														
CARRIER PIPE NOM. DIA. (D1)	4	6	8	10	12	14	16	18	20	24	30	36	42	48
CASING PIPE NOM. DIA. (D2)	14	16	18	22	24	30	30	30	36	36	48	54	60	66
WALL THICKNESS-INCHES *	PER AUTHORITY HAVING JURISDICTION													

NOTES:

1. MINIMUM COVER FOR TOP OF CASING TO R/R BASE SHALL BE 5.6' (SCL), 5.0' (FEC). MINIMUM COVER FOR TOP OF CASING ON ALL GROUND COVER SHALL BE 3.0'.
 2. ROTATION OF CARRIER PIPE INSIDE THE CASING PIPE WILL NOT BE PERMITTED. RESTRAINED MECHANICAL OR FLANGED JOINT PIPE SHALL BE USED TO HELP PREVENT SUCH ROTATION.
 3. SHOP DRAWINGS SHALL BE SUBMITTED OF CASING & CARRIER PIPE INSTALLATION FOR APPROVAL PRIOR TO FABRICATION OF PIPING, CASING, AND APPURTENANCES. CERTIFICATION OF CASING PIPE IS REQUIRED.
 4. GROUTING OF SPACE BETWEEN CASING AND CARRIER PIPE NOT REQUIRED UNLESS NEGATIVE FLOTATION EXISTS.
 5. WELDING OF CASING PIPE TO BE DONE BY CERTIFIED WELDER. ALL ENDS OF CASING PIPE SHALL BE CHAMFERED PRIOR TO ANY WELDING. SEAL END OF CASING PIPE WITH NON SHRINK GROUT.
 6. CITY INSPECTOR SHALL BE PRESENT THROUGHOUT ALL BORE AND JACK ACTIVITIES.
- * WITHIN THE CITY OF DAYTONA BEACH RIGHT OF WAY, USE CURRENT FDOT STANDARDS.
- ** SPECIALLY DESIGNED SPACERS SHALL BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. USE CASCADE CASING SPACERS OR PRE-APPROVED EQUAL.





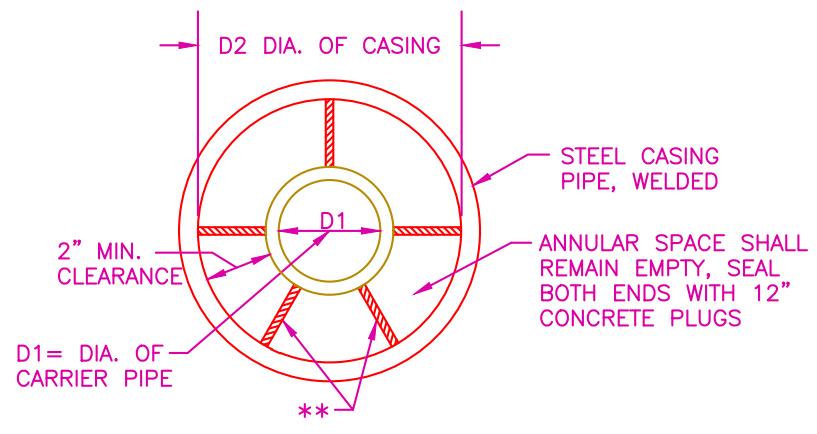
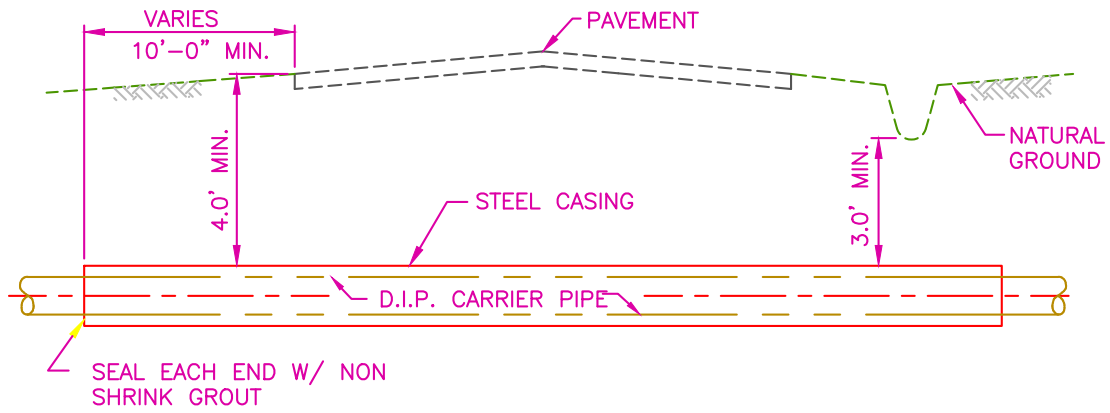
NTS

NOTES:

1. MAIN MAY PASS OVER STORM LINE IF 36" OF COVER IS PROVIDED OVER WATER MAIN.
2. PIPE MAY BE DEFLECTED AROUND DRAINAGE INLET IN ACCORDANCE WITH THE RESTRAINED JOINT GUIDELINES OF THE **EBAA**.



FY-19/20
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Checked By: JMP
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NTS

CARRIER PIPE AND CASING PIPE SIZES (MIN.)												
CARRIER PIPE NOM. DIA. (D1)	4	6	8	12	16	18	20	24	30	36	42	48
CASING PIPE NOM. DIA. (D2)	14	16	18	24	30	30	36	36	48	54	60	66
WALL THICKNESS-INCHES *	PER AUTHORITY HAVING JURISDICTION											

NOTES:

1. MINIMUM COVER FOR TOP OF CASING ON ALL CITY STREETS SHALL BE 3.0'
 2. ROTATION OF CARRIER PIPE INSIDE THE CASING PIPE WILL NOT BE PERMITTED. RESTRAINED MECHANICAL OR FLANGED JOINT PIPE SHALL BE USED TO HELP PREVENT SUCH ROTATION.
 3. SHOP DRAWINGS OF CASING & CARRIER PIPE INSTALLATION SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FABRICATION OF PIPING, CASING, AND APPURTENANCES. CERTIFICATION OF CASING PIPE IS REQUIRED.
 4. WELDING OF CASING PIPE TO BE DONE BY STATE CERTIFIED WELDER. ALL ENDS OF CASING PIPE SHALL BE CHAMFERED PRIOR TO ANY WELDING. SEAL END OF CASING PIPE WITH NON SHRINK GROUT.
 5. CITY INSPECTOR SHALL BE PRESENT THROUGHOUT ALL BORE AND JACK ACTIVITIES.
- * WITHIN VOLUSIA COUNTY RIGHT OF WAY, USE CURRENT FDOT STANDARDS.

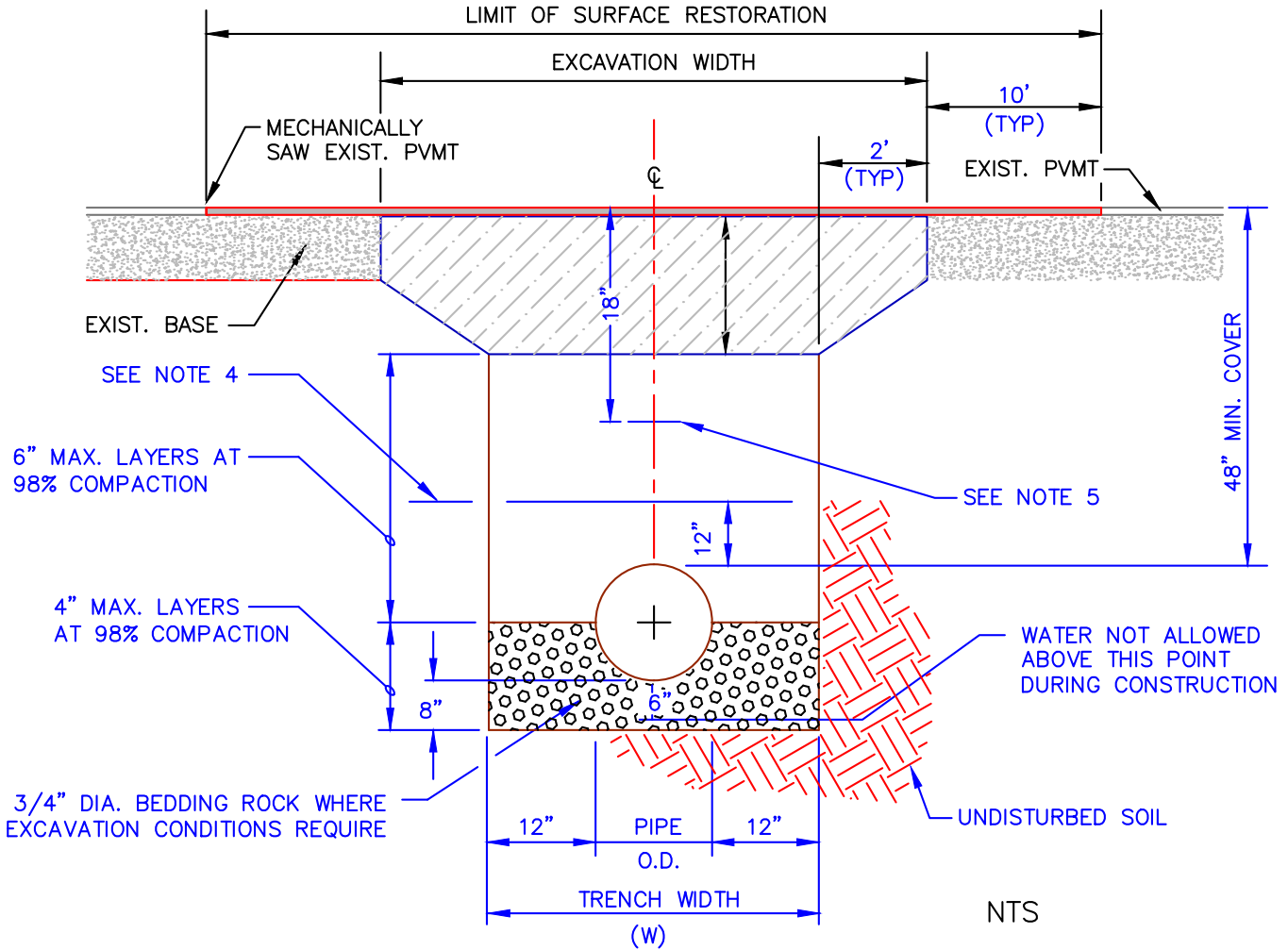
** SPECIALLY DESIGNED SPACERS SHALL BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. USE CASCADE CASING SPACERS OR APPROVED EQUAL.

NOTE TO ENGINEER: CROSSING DETAIL SHALL BE TO SCALE AND SHOW EXISTING UTILITIES, CLEARANCES, CASING LENGTH, LOCATION OF PAVED ROAD AND LIMITS OF RIGHT OF WAY



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NOTE: TO DETERMINE THE MOST CURRENT REQUIREMENTS FOR STABILIZATION MATERIAL, BASE MATERIAL, AND ASPHALT MATERIAL PATCH AND THE REPLACEMENT DIMENSIONS CONTACT CITY ENGINEER IN THE PUBLIC WORKS DEPT AT 386-671-8610.

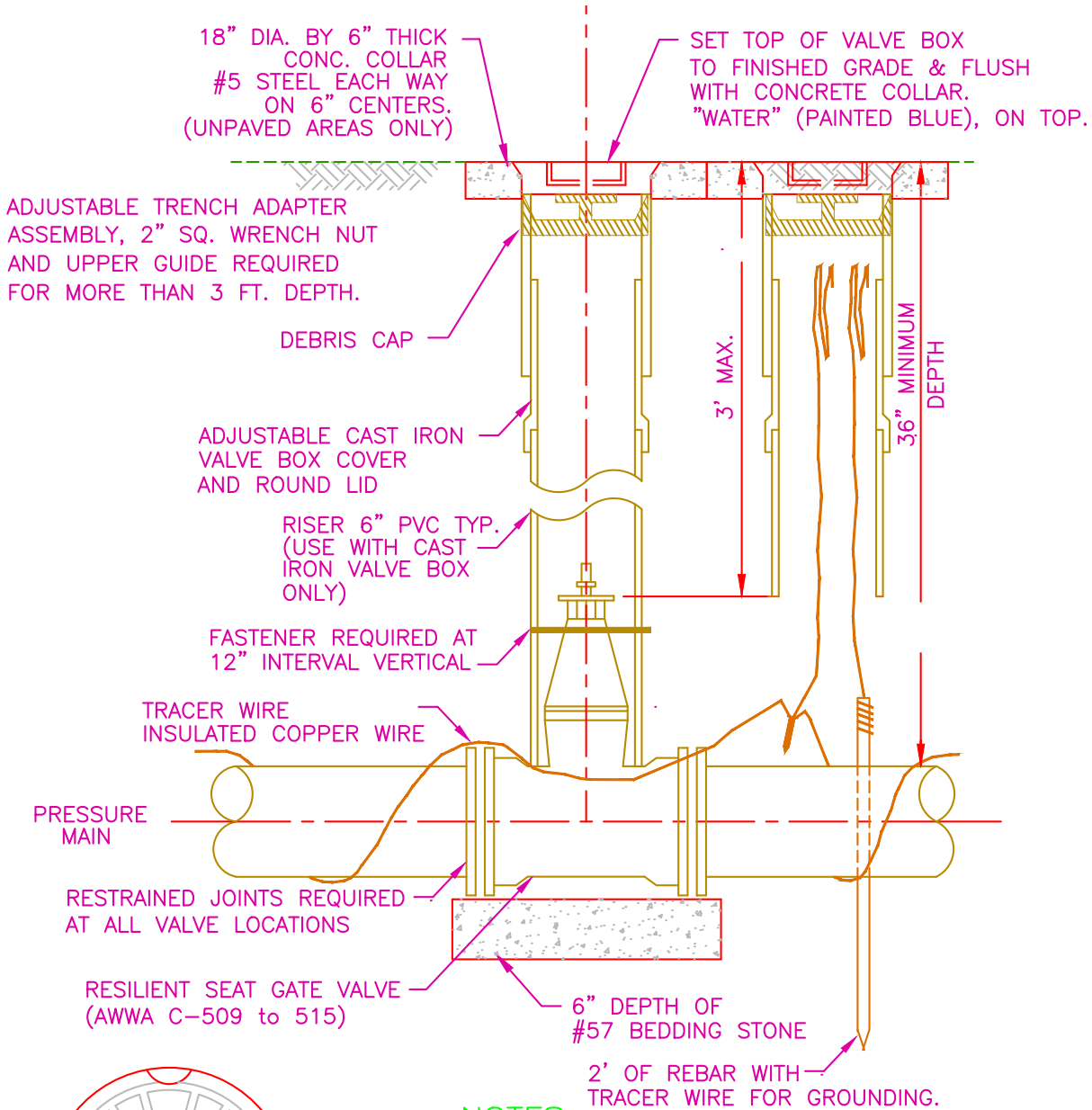


NOTES:

1. WHERE SOIL CONDITIONS CAN NOT BE MAINTAINED AS SHOWN ABOVE, PROVIDE APPROVED METHOD OF CONSTRUCTION.
2. SHEETING WILL BE REQUIRED AS DETERMINED IN THE FIELD.
3. COMPACTION PERCENTAGES SHOWN REFER TO A.A.S.H.T.O. T-180. PROVIDE COMPACTION TEST REPORTS TO CITY INSPECTOR.
4. MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LEVEL.
5. FOR PVC PIPE ONLY – INSTALL METALLIC TAPE AND UF #12 INSULATED SINGLE STRAND COPPER WIRE OVER FULL LENGTH OF PIPE.
6. THE CONTRACTOR SHALL, UNLESS OTHERWISE NOTED, RESTORE ALL STRIPING, PAVEMENT MARKINGS, DELINEATORS, SIGNAGE AND TRAFFIC SIGNAL SYSTEM COMPONENTS DISTURBED DURING CONSTRUCTION ACTIVITIES. COST OF ALL WORK AND MATERIALS WILL BE CONSIDERED INCIDENTAL TO PATCH MATERIAL ITEMS.



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NOTES:

1. SEE CODB'S APPROVED PRODUCT LIST FOR ACCEPTABLE MANUFACTURERS.
2. INSTALL RESTRAINED JOINTS, AS REQUIRED, FROM DEFLECTION POINT IN BOTH DIRECTIONS (20' MIN.)
3. IF A WATER METER BOX IS NOT WITH IN 200 FEET OF A VALVE & VALVE BOX, THEN IT REQUIRES AN ADDITIONAL VALVE BOX FOR TRACER WIRE.
4. TRACER WIRE SHALL BE A MINIMUM 12 GAUGE WITH A TENSILE STRENGTH/BREAK LOAD OF 452 LBS. SEE TRACER WIRE SPECIFICATION #15049



POTABLE WATER COVER



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Drawing Date: 01/08
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Checked By: JMP
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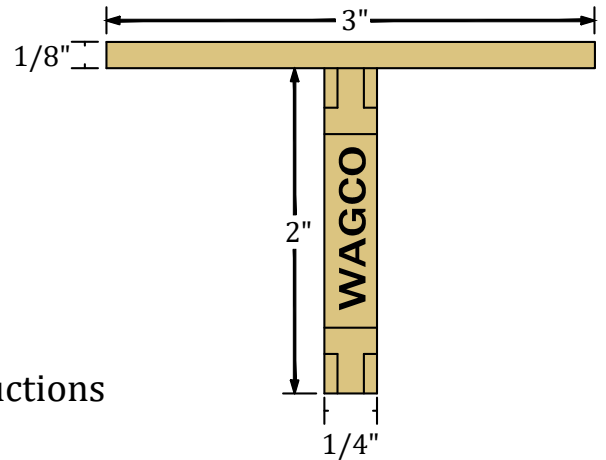
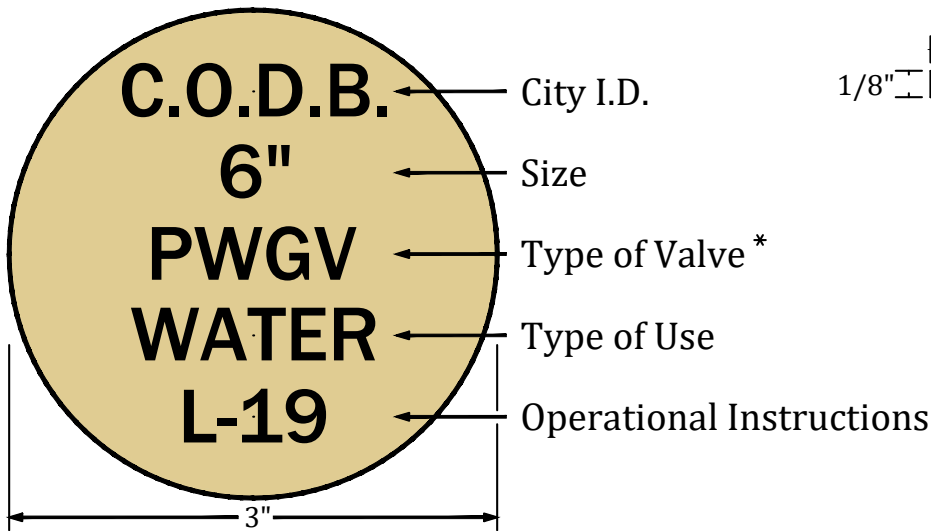
SPECIFICATIONS

ITEM: Brass ID Anti-Theft Marker

MATERIAL: SOLID CAST BRASS/Copper and Zinc Casting

DESCRIPTION: 3" Cast Brass Disc 1/8" Thick with 1/4" Brass "Theft Proof" Anchor pin.

Top surface to be engraved with 1/4" to 3/8" Capital letters.

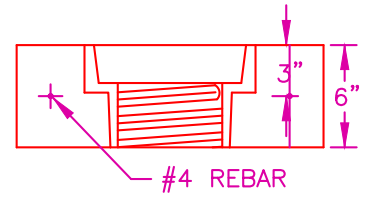


- * **PWGV** Potable Water Gate Valve
- RWGV** Reclaimed Water Gate Valve
- SSGV** Sanitary Sewer Gate Valve
- SSPV** Sanitary Sewer Plug Valve



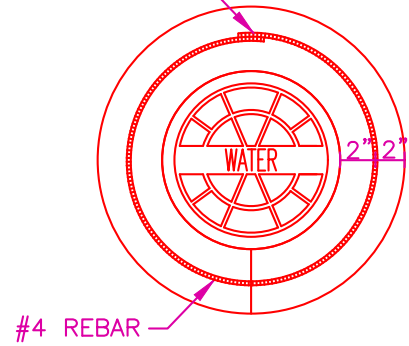
SET TOP OF VALVE BOX TO FINISHED GRADE & FLUSH WITH CONCRETE COLLAR. "WATER" (PAINTED BLUE) ON TOP

18" DIA. BY 6" THICK CONC. COLLAR

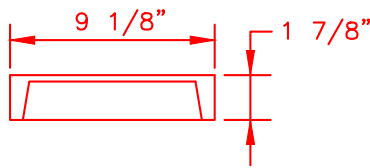


CONCRETE COLLAR

1.5" MIN. LAP & TIE

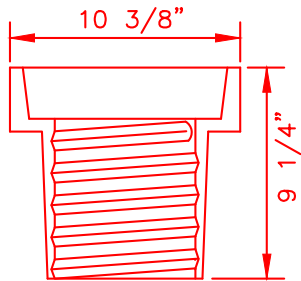


#4 REBAR

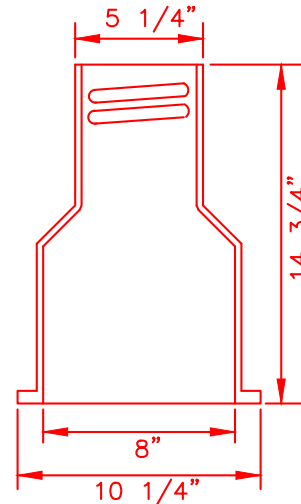


COVER

RISER 6" PVC TYP. (USE WITH CAST IRON VALVE BOX ONLY)



TOP SECTION



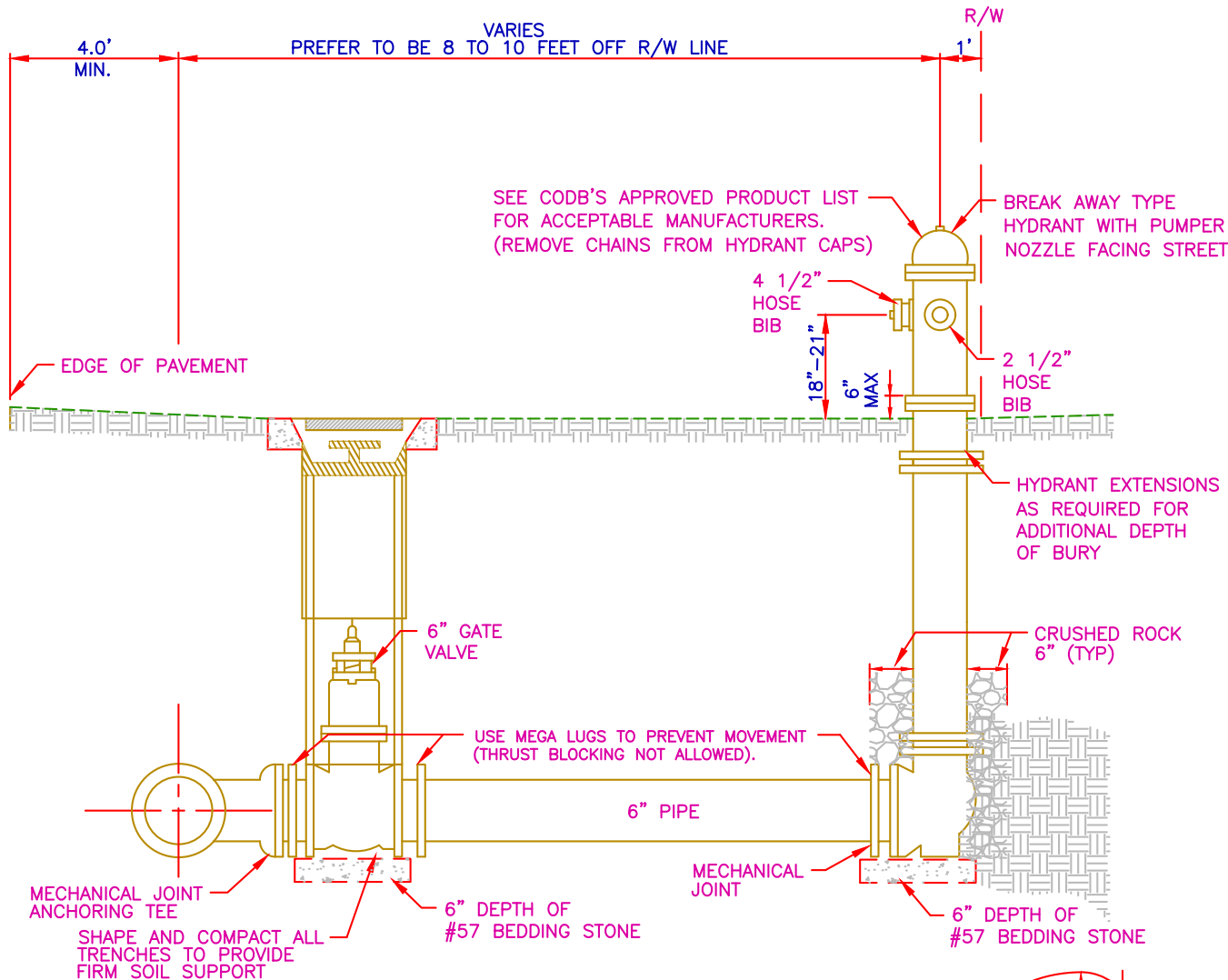
BOTTOM SECTION

NOTE:

1. WATER MAIN VALVE BOX AND COVER SHALL BE ADJUSTABLE SCREW TYPE.
2. TRACER WIRE TO BE INSTALLED ON ALL NON-METALLIC MAINS. 12 GAUGE MINIMUM SOLID COPPER TRACER WIRE W/452 LB TENSILE STRENGTH/BREAK LOAD REQUIRED.



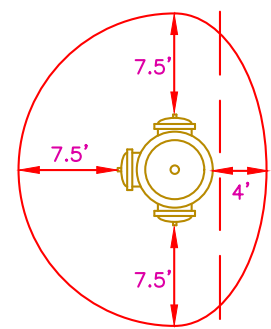
FY-19/20
Drawing Date: 11/10
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 04/17
File Name: Main Valve Box W-15
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NOTES:

1. HYDRANTS SHALL BE OF THE SELF DRAINING TYPE.
2. HYDRANTS ARE TO BE SUPPLIED FROM THE MANUFACTURER WITH A SILVER PRIMER.
3. HOSE BIBS TO BE AMERICAN STANDARD THREADS.
4. RESTRAINED JOINTS REQUIRED. THRUST BLOCKS ARE NOT PERMITTED.
5. ADJUSTABLE TRENCH ADAPTOR ASSY. REQUIRED FOR ALL VALVES GREATER THAN 3' DEEP.
6. INSTALL AT SIDE LOT LINES OR AT CORNERS OF ROADWAY RIGHT-OF-WAY INTERSECTIONS (TYPICAL).
7. INSTALL AT 500' RADIUS OF COVERAGE.
8. REFLECTIVE PAVEMENT MARKER INSTALLED 3' INTO PAVEMENT (TYPICAL).
9. FIRE HYDRANT TESTING SHALL BE FLOWED THRU THE 2 1/2" OPENINGS. TEST RESULTS SHALL BE ACTUAL, NOT ESTIMATED. FLOW TESTING SHALL BE SUBMITTED TO THE CITY AS LISTED.
 ACTUAL GPM ____
 STATIC ____ PSI
 RESIDUAL ____ PSI
 THE CITY WILL DETERMINE THE COLOR OF THE BONNET.
10. FIRE HYDRANT BODY SHALL BE PAINTED COLOR 151 OSHA YELLOW PRIOR TO ACCEPTANCE BY THE CITY.

REFLECTIVE PAVEMENT MARKER



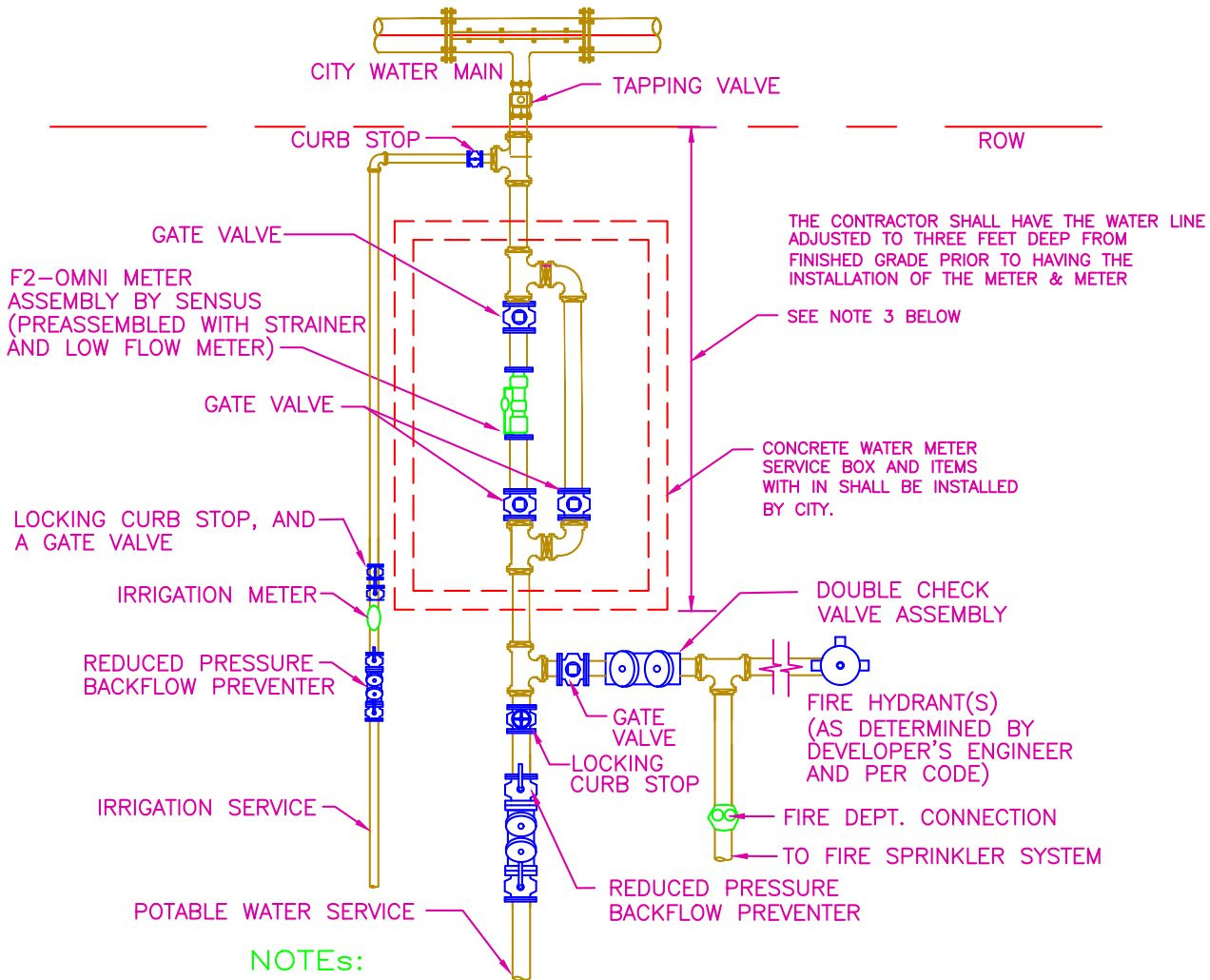
MIN. HORIZONTAL CLEARANCE REQUIRED
 PLAN VIEW OF HYDRANT LOCATION

- RED BONNET = 499 GPM OR LESS
- ORANGE BONNET = 500 - 999 GPM
- GREEN BONNET = 1000 - 1499 GPM
- BLUE BONNET = 1500 GPM OR MORE



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Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
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File Name: Fire Hydrant Assem W-16
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WATER SERVICE

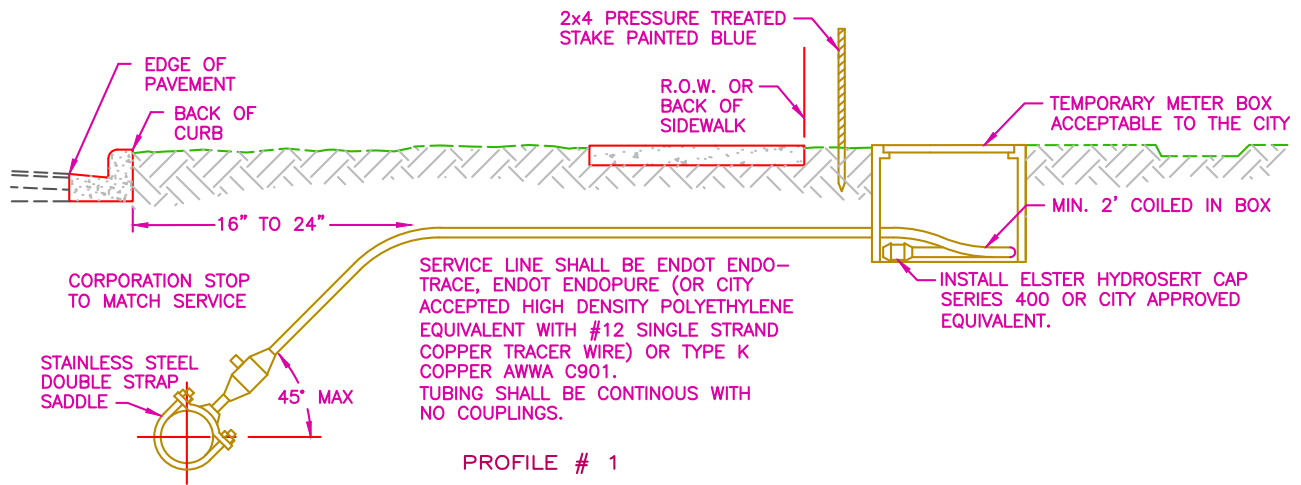


NOTES:

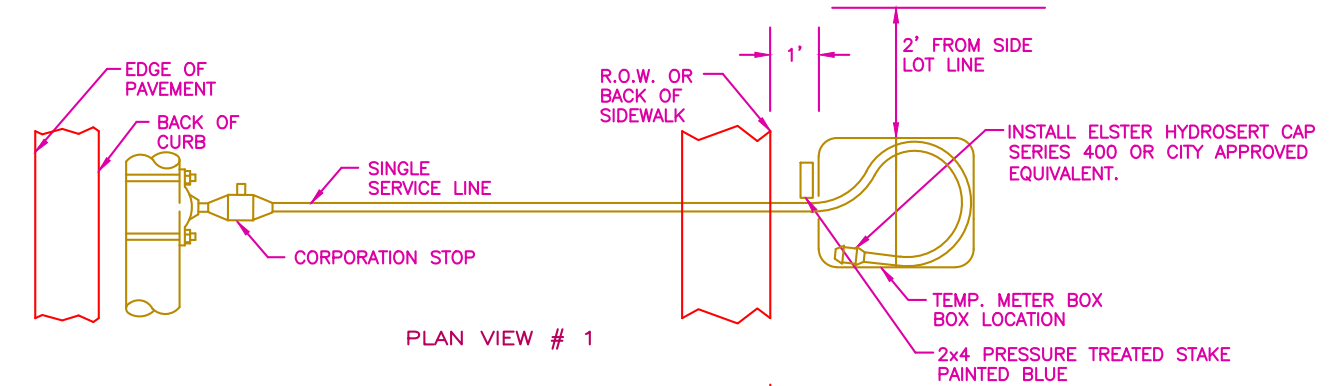
1. IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S ENGINEER TO DETERMINE THE APPROPRIATE SIZE OF THE SERVICE CONNECTION AND TO COORDINATE THE LOCATION OF THE FIRE DEPARTMENT CONNECTION W/CITY FIRE DEPARTMENT PERSONNEL.
2. CONTRACTOR IS RESPONSIBLE FOR UNCOVERING THE WATERMAIN, INSTALLING THE TAPPING SADDLE/TAPPING VALVE & BOX (ON ANY SERVICE LARGER THAN 2"), ANY RESTORATION ACTIVITIES TO FDOT, COUNTY, OR CITY STANDARDS; ASSOCIATED MOT, AND ALL WORK BEHIND THE WATER METER. THE CITY WILL TAP THE MAIN, INSTALL THE SERVICE AND SET THE METER.
3. METER LENGTHS REQUIRED FOR INSTALLATION OF WATER METER AND METER VAULT
 4" METER REQUIRES 12 FEET
 6" AND 8" METERS REQUIRE 14 FEET
 10" METER REQUIRES 20 FEET



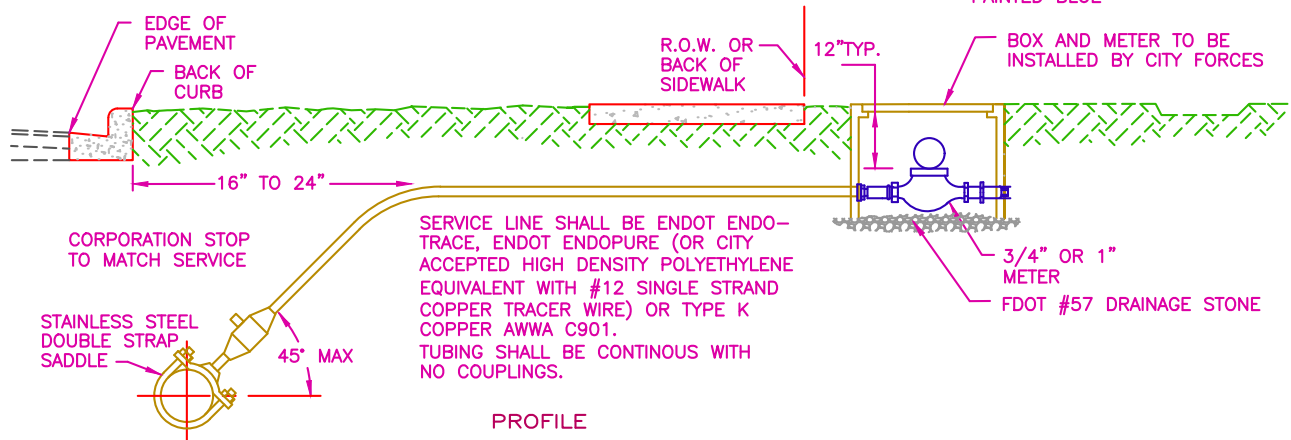
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Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 01/2019
File Name: Fire-Domestic-Irr Connect W-17
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PROFILE # 1



PLAN VIEW # 1



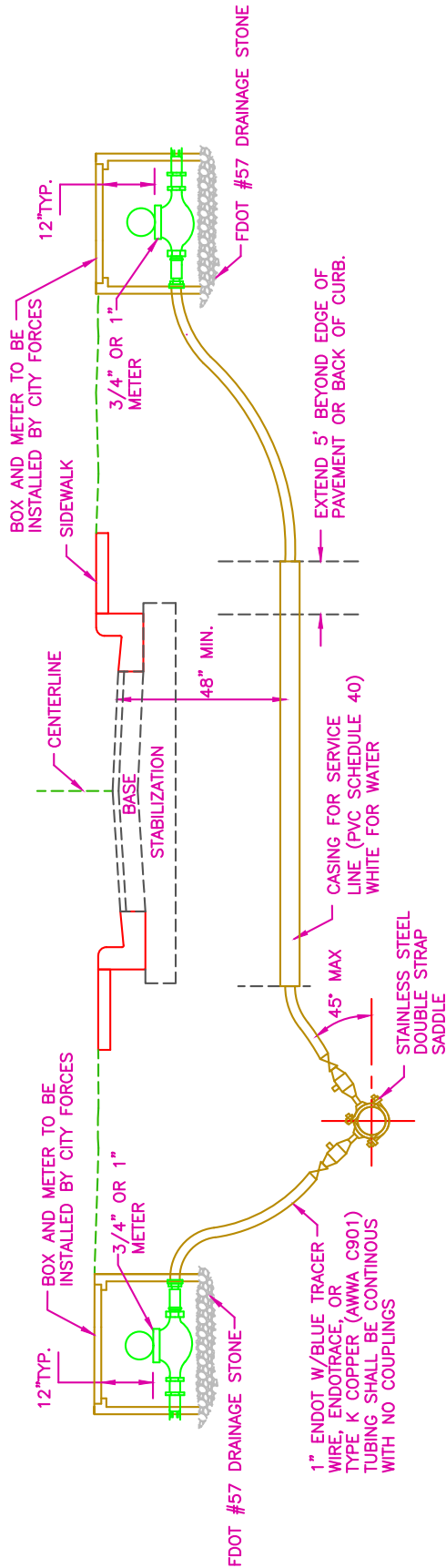
PROFILE

NOTES:

1. METER AND METER BOX SHALL BE FURNISHED BY CITY FORCES, AFTER WATER SERVICE CONNECTION HAS BEEN REQUESTED AND FEE'S HAVE BEEN PAID.
2. METER SHALL BE INSTALLED BEHIND SIDEWALK OR R.O.W. AS SHOWN.
3. BACKFLOW PREVENTION DEVICES (REDUCED PRESSURE ZONE) MAY BE REQUIRED ON WATER CONNECTIONS. THEY ARE TO BE SUPPLIED AND INSTALLED BY THE DEVELOPER/BUILDER, AT NO COST TO THE CITY. TO BE INSTALLED ON THE CUSTOMER'S SIDE OF THE METER.
4. IRRIGATION METERS REQUIRE AN APPROVED BACKFLOW PREVENTER.
5. SERVICE SADDLES SHALL BE STAINLESS STEEL STRAPS-EPOXY COATED.
6. ALL METER LOCATIONS ON COMMERCIAL SITES SHALL BE LOCATED AS SHOWN ON THE CITY APPROVED SITE PLAN AND FIELD VERIFIED HORIZONTALLY & VERTICALLY BY THE OWNER OR OWNER'S REPRESENTATIVE.
7. CONTRACTOR IS TO SUPPLY METER BOXES AS SHOWN IN PROFILE #1 AND PLAN VIEW #1 WHEN BUILDING A SUBDIVISION TYPE DEVELOPMENT, WHERE THERE WILL BE A SERVICE OR SERVICES THAT WILL NOT REQUIRE A WATER CONNECTION AS SOON AS THE WATER LINE HAS BEEN INSTALLED, PRESSURED TESTED, CHLORINATED AND CLEARED FOR USE.
8. SEE CITY SPECIFICATION NO. 15049 TRACER WIRE AND ALARM TAPE.



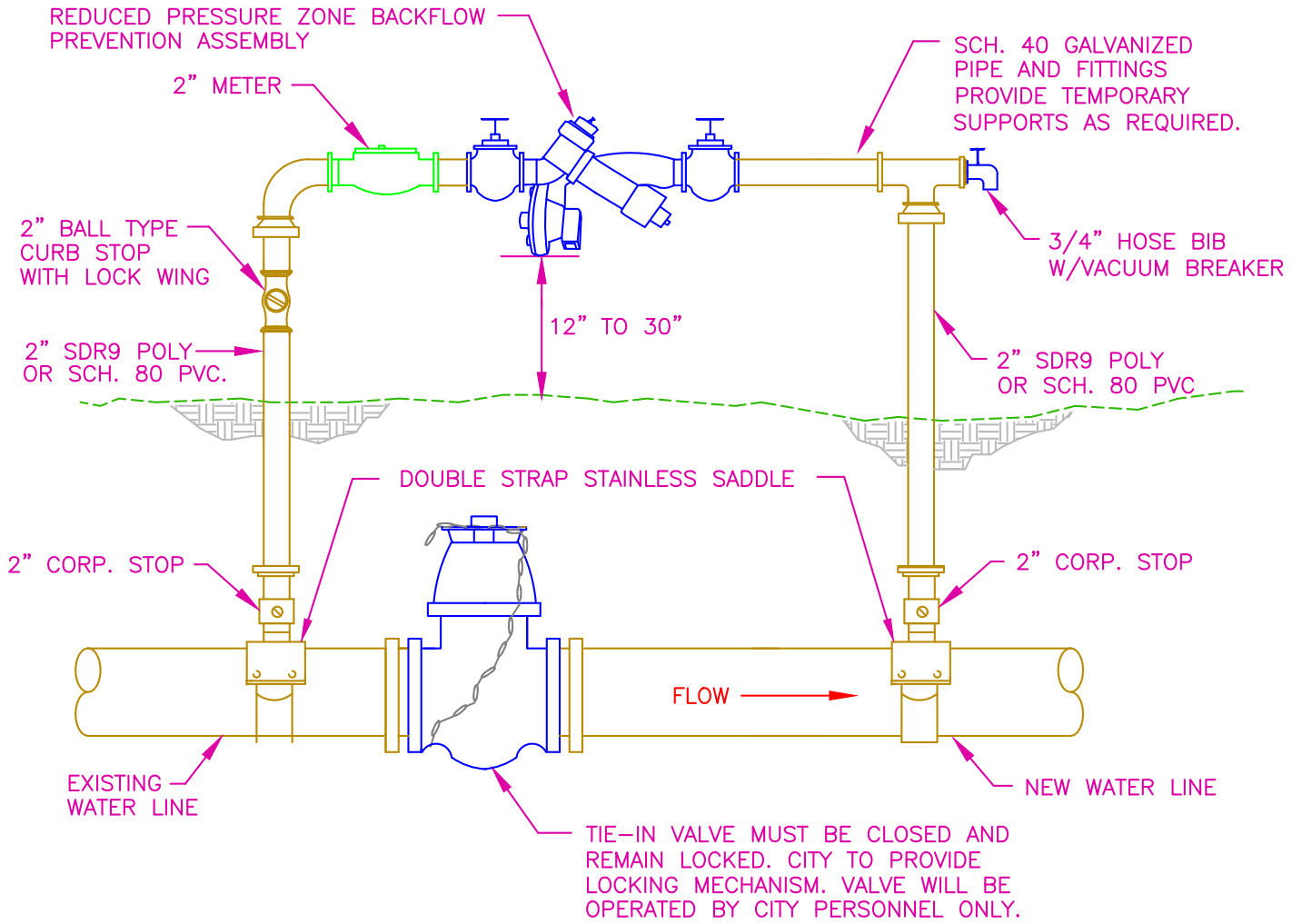
FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 01/19
File Name: Service Connect W-18
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NOTES:

1. SERVICE BOX AND METER TO BE FURNISHED BY THE CITY.
2. METER SHALL BE INSTALLED 1' BEHIND THE R/W.
3. MINIMUM SEPARATION BETWEEN CURB AND METER BOX AND BETWEEN METER BOX AND SIDEWALK.
4. CONTRACTOR TO LOCATE CURB STOP BY PLACING A STAKE (2"x4" AT 24" ABOVE GROUND) TOP PAINTED WITH THE COLOR OF THE UTILITY SERVICE AND WITH THE LOT NUMBERS IT SERVES.
5. MINIMUM RESIDENTIAL DOMESTIC METER SHALL BE 3/4".
6. ALL COMMERCIAL PROPERTY METERS MUST BE SIZED BY THE ENGINEER-OF-RECORD.
7. THE MINIMUM INSIDE CASING DIAMETER SHALL BE 2" FOR SERVICE LINES GREATER THAN 1" INSIDE DIAMETER, THE CASING SHALL BE TWICE THE SIZE OF THE SERVICE LINE OUTSIDE DIAMETER.
8. INSTALL A BLUE TRACER WIRE ALONG ALL NON-METALLIC SERVICE LINES.





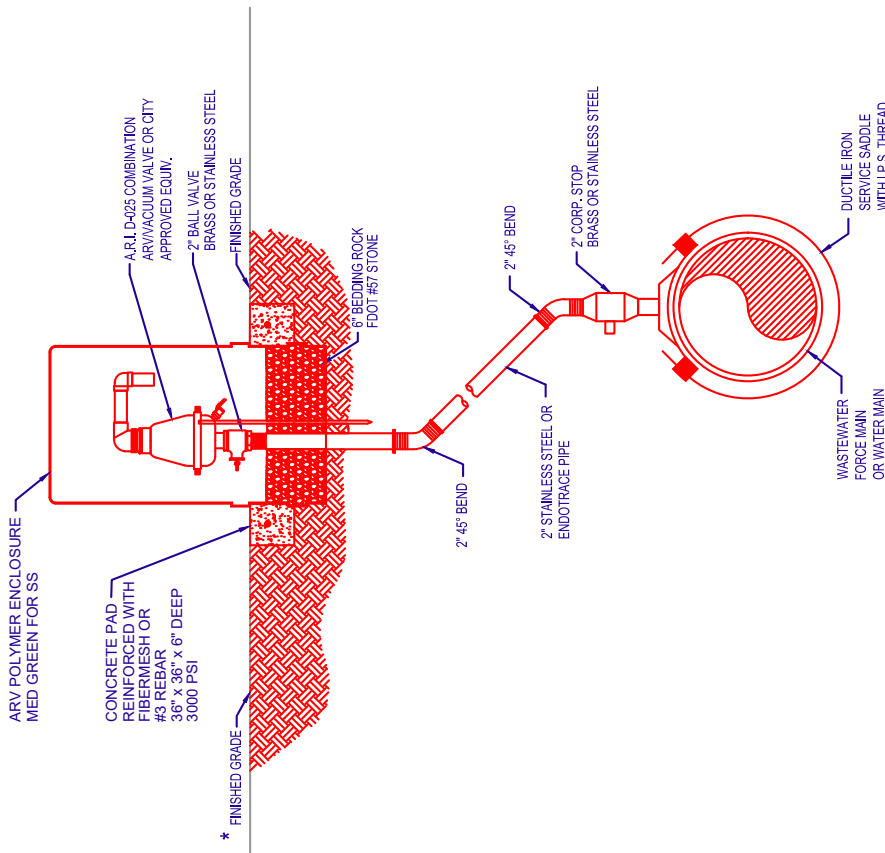
PROFILE VIEW
NTS

NOTES:

- 1. USE THIS DETAIL IF FIRE HYDRANT IS UNAVAILABLE.
- 2. PROVIDE SUPPORT, HIGH VISIBILITY CONSTRUCTION FENCING AND/OR PROTECTIVE MEASURES TO PREVENT ABOVE GROUND PIPE BEING BROKEN.
- 3. REMOVE TEMPORARY BYPASS PRIOR TO PLACING LINE IN SERVICE.



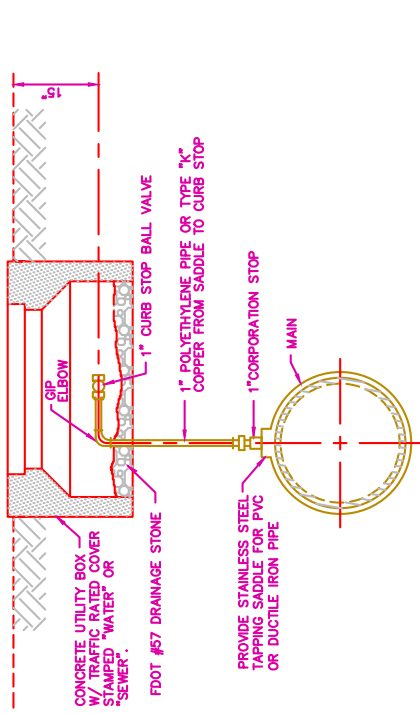
FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 01/19
File Name: Temp Fill Connect W-20
Page 24



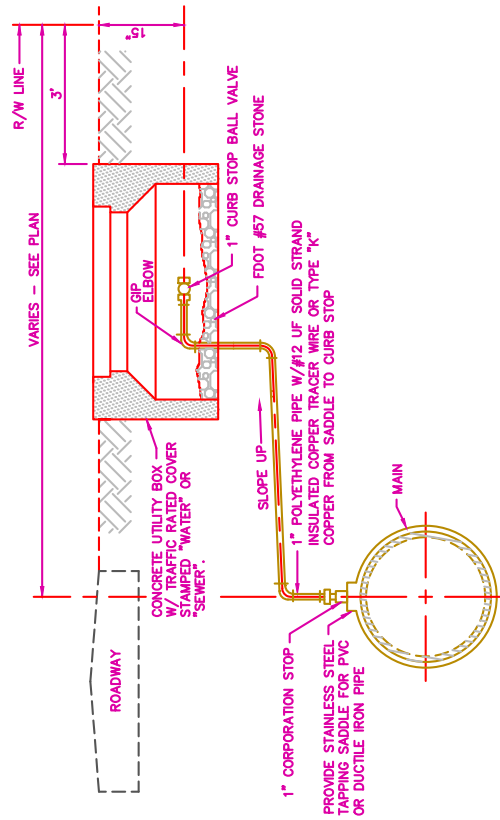
NOTES:

1. VALVES SHALL BE CENTERED IN THE BOX
2. ROCK SHALL BE COMPACTED TO A FIRM AND UNYIELDING CONDITION
3. PIPING BETWEEN THE VALVE AND MAIN SHALL BE CONFIGURED TO BEST FIT FOR THE SITE CONDITION AS APPROVED BY THE CITY
4. TOP OF BOX ON SANITARY FORCE MAIN SHALL BE CLEARLY PERMANENTLY LABELED AS SANITARY FM.
5. TOP OF ALL BOXES SHALL BE CLEARLY AND PERMANENTLY LABELED AS TO VALVE TYPE (AIR RELEASE, VACUUM, OR AIR/VAC COMBINATION).

OFFSET AIR/VAC RELEASE VALVE
NTS



TYPE 'A' CROSS SECTIONAL VIEW



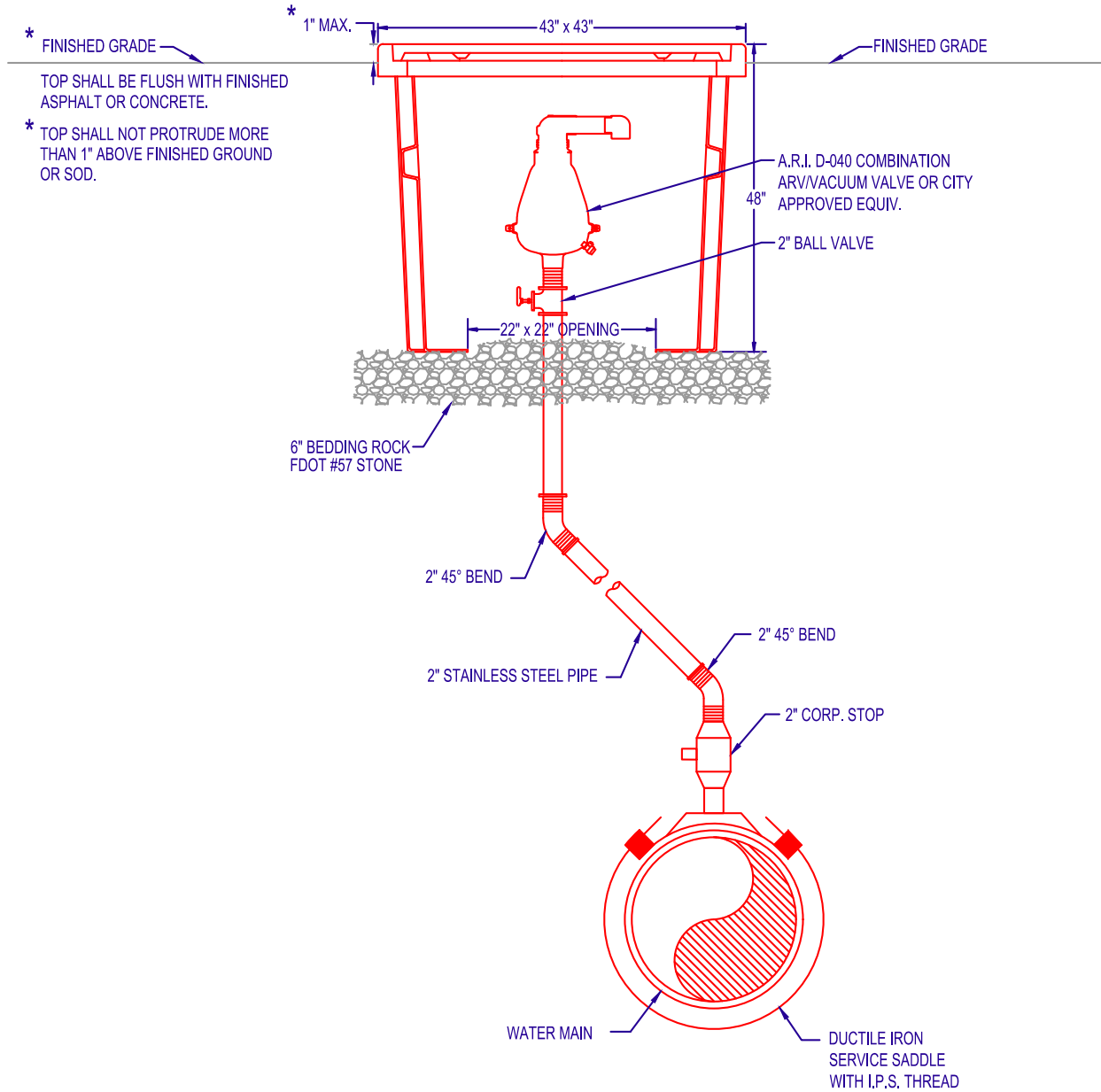
TYPE 'B' CROSS SECTIONAL VIEW

NOTES:

ACCEPTABLE MANUFACTURERS: (SEE CODD'S APPROVED PRODUCT LIST)

MANUAL AIR RELEASE VALVE DETAIL
NTS

CDR SYSTEMS GROUP
 A13-3636-48 402 BOX
 OR CITY APPROVED EQUIV.
 RATED FOR CITY ACCEPTABLE
 TRAFFIC BEARING FOR THE
 LOCATION.



NOTES:

1. VALVES SHALL BE CENTERED IN THE BOX
2. ROCK SHALL BE COMPACTED TO A FIRM AND UNYIELDING CONDITION
3. PIPING BETWEEN THE VALVE AND MAIN SHALL BE CONFIGURED TO BEST FIT FOR THE SITE CONDITION AS APPROVED BY THE CITY
4. TOP OF BOX ON WATER MAIN SHALL BE CLEARLY PERMANENTLY LABELED AS WATER.
5. TOP OF ALL BOXES SHALL BE CLEARLY AND PERMANANTLY LABELED AS TO VALVE TYPE (AIR RELEASE, VACUUM, OR AIR/VAC COMBINATION).
6. AIR RELEASE VALVE SHALL BE INSTALLED AFTER HIGH POINTS HAVE BEEN DETERMINED.

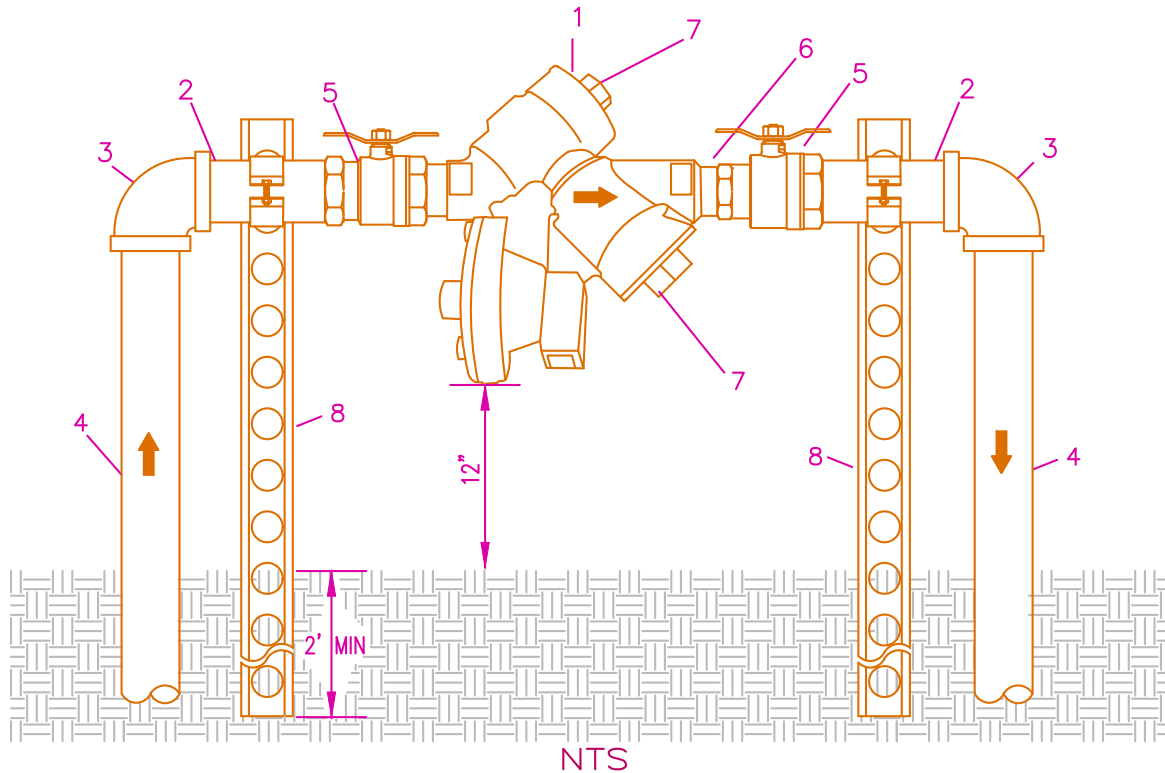
THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT



**AUTOMATIC ARV/VACUUM
 VALVE
 DETAIL
 W-22**

POINT GENERATOR REPLACEMENT
 Page 413 of 536

FY-19/20
Drawing Date: 12/10
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 01/19
File Name: Auto Vacuum Valve W-22
Page 26



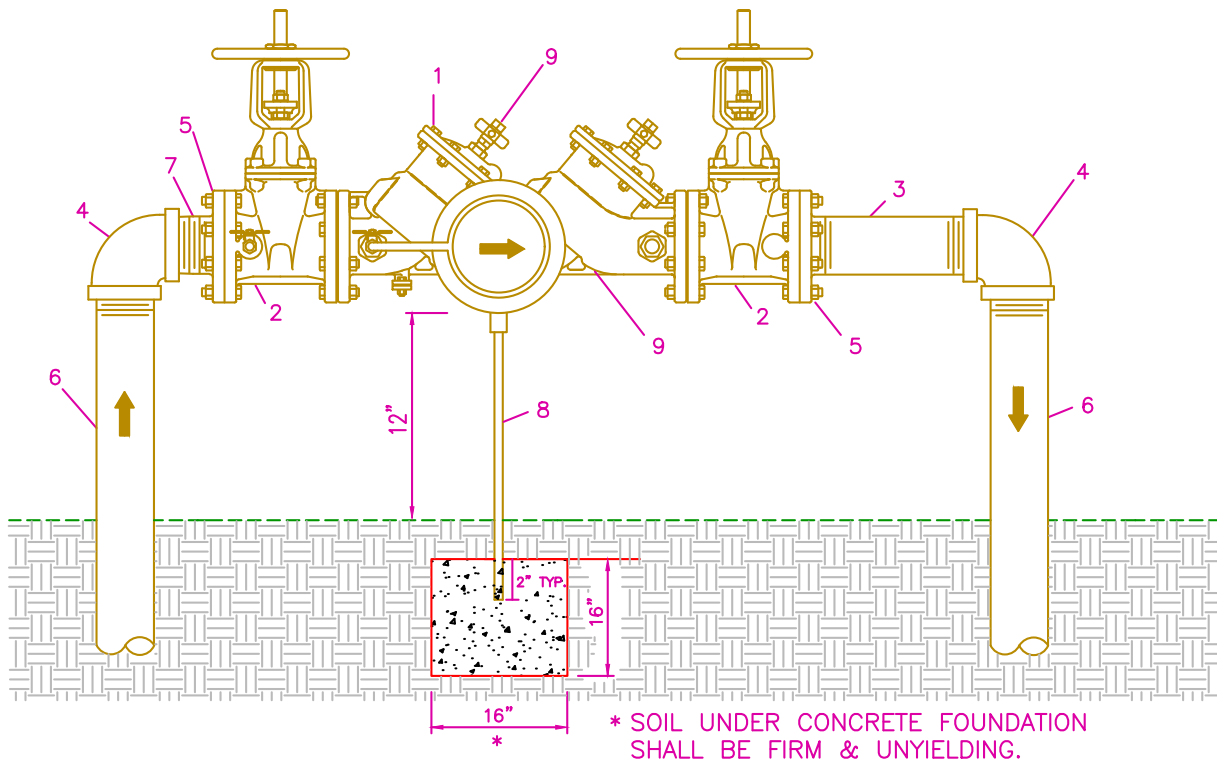
MATERIALS

ITEM	QUANT.	DESCRIPTION
1	1	BACKFLOW PREVENTER ASSEMBLY
2	2	NOM. NIPPLES – BRASS
3	2	90° ELBOWS – GALV. OR PVC (SCH 80)
4	2	VARIABLE RISER – GALV.
5	2	BALL VALVE
6	1	UNION
7	*	TEST PORTS (SEE NOTES)
8	2	SS BRACKETS W/SS CLAMPS

NOTES:

1. ACCEPTABLE MANUFACTURERS: (SEE CODB'S ACCEPTABLE PRODUCT LIST)
2. FIELD ADJUST AND CUT ITEM 4 TO THE PROPER LENGTH.
3. THE RISER & ELBOW TO BE PAINTED 136 OSHA RED FOR COMMERCIAL FIRE SERVICE, 137 OSHA BLUE FOR COMMERCIAL DOMESTIC SERVICE.
4. TEST PORTS (QUANTITY/LOCATIONS DEPENDING ON MANUFACTURER)
5. PVC PIPE REQUIRES SS BRACKETS W/SS CLAMPS





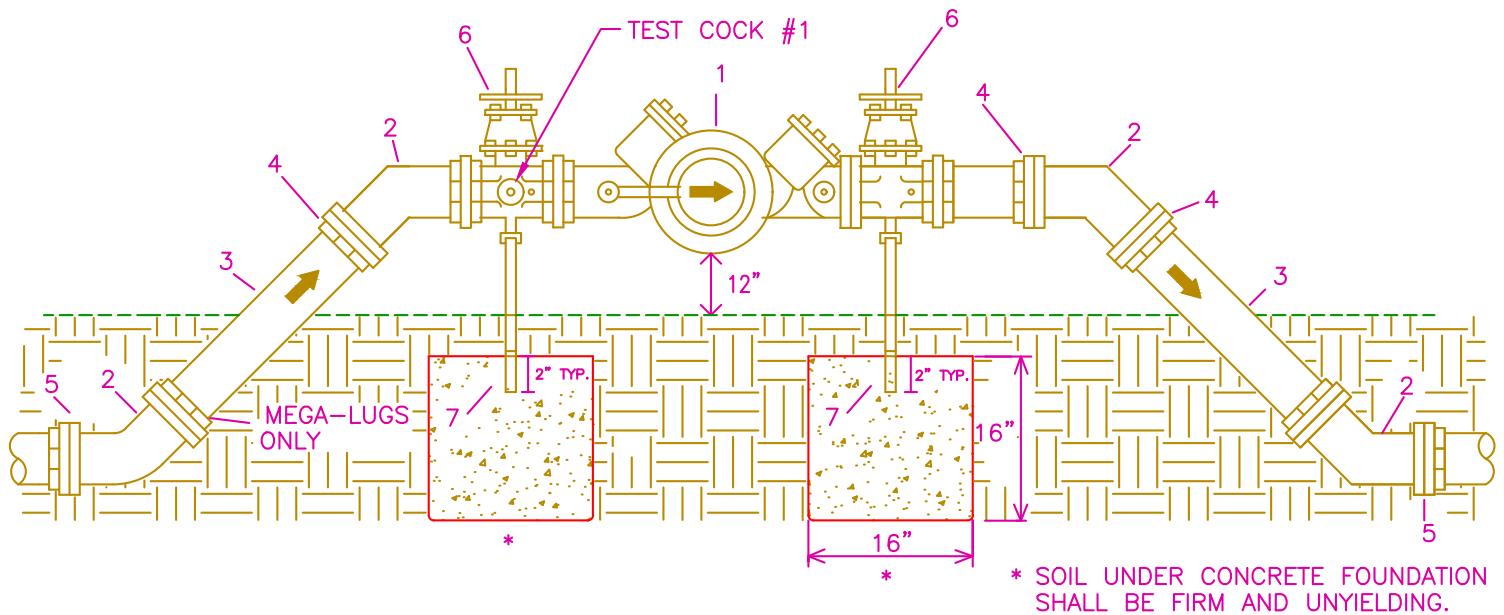
NTS

MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	VALVE, REDUCED PRESSURE BACKFLOW PREVENTER
2	2	VALVE, GATE, C.I., F-F
3	1	NIPPLE, GALV. (12" LONG) (OPT.)
4	2	ELBOW, GALV. - 90°
5	2	FLANGE, STEEL PIPE, SCREW-TYPE
6	2	RISER, GALV. (42" LONG)
7	1	NIPPLE, GALV. (6" LONG)
8	1	SEE NOTES
9	*	SEE NOTES

NOTES:

1. ACCEPTABLE MANUFACTURERS: (SEE ACCEPTABLE PRODUCTS LIST)
2. FIELD ADJUST AND CUT ITEM 6 & ITEM 8 (PIPE SUPPORT) TO THE PROPER LENGTH.
3. THE RISER & ELBOW TO BE PAINTED 136 OSHA RED FOR COMMERCIAL FIRE SERVICE, 137 OSHA BLUE FOR COMMERCIAL DOMESTIC SERVICE.
4. ITEM 8: 2" GALV. IRON PIPE/CONCRETE FOUNDATION (16"x16"x16" MIN.)
5. ITEM 9: TEST PORTS (QUANTITY/LOCATIONS DEPENDING ON MANUFACTURER)





NTS

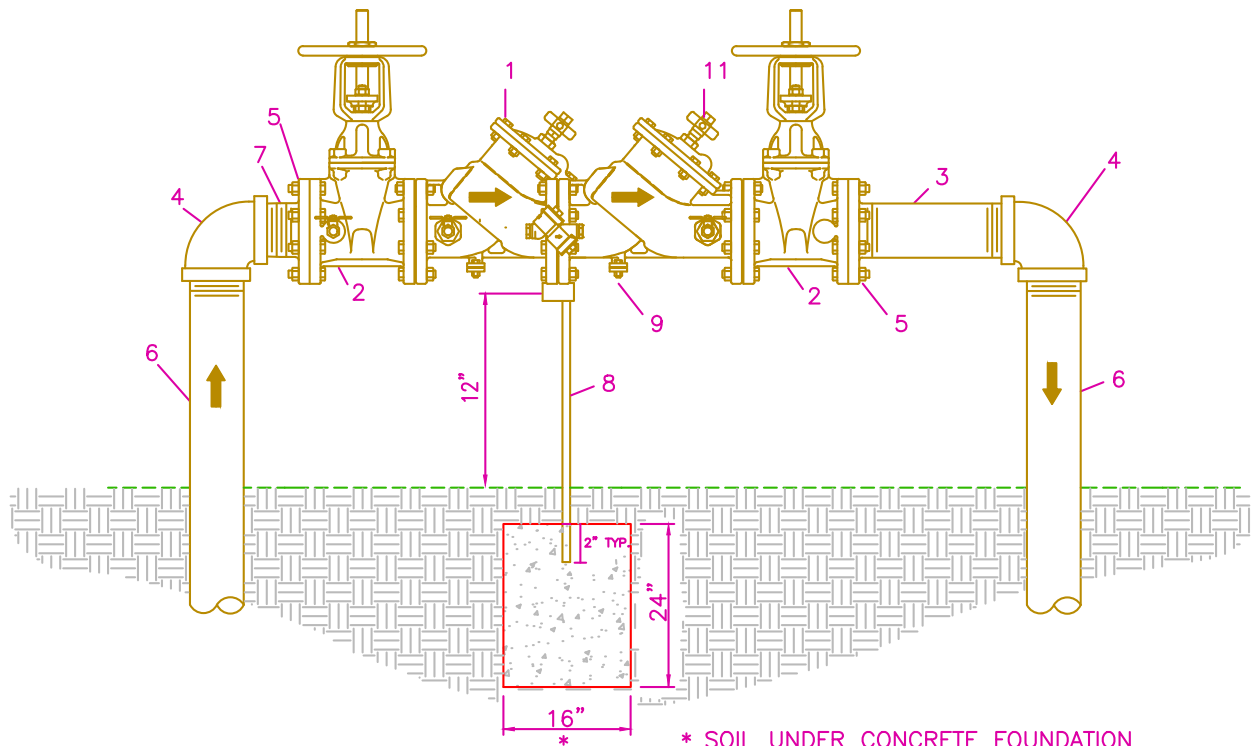
MATERIALS

ITEM	QUANT.	DESCRIPTION
1	1	VALVE, REDUCED PRESSURE PRINCIPLE
2	4	ELBOW -45°
3	2	D.I.P. RISER PIPE
4	3	ADAPTER FLANGE D.I.P.
5	2	ADAPTER FLANGE D.I.P.
6	2	VALVE, GATE, C.I., F-F
7	SEE NOTES	

NOTES:

1. ACCEPTABLE MANUFACTURERS: (SEE CODB'S ACCEPTABLE PRODUCT LIST)
2. FIELD ADJUST AND CUT ITEM 3 & ITEM 7 (PIPE SUPPORT) TO THE PROPER LENGTH.
3. THE RISER & ELBOW TO BE PAINTED 136 OSHA RED FOR COMMERCIAL FIRE SERVICE, 137 OSHA BLUE FOR COMMERCIAL DOMESTIC SERVICE.
4. 2" GALV. IRON PIPE/CONCRETE FOUNDATION (16"x16"x16" MIN.)
5. TEST PORTS (QUANTITY/LOCATIONS DEPENDING ON MANUFACTURER)





* SOIL UNDER CONCRETE FOUNDATION SHALL BE FIRM AND UNYIELDING.

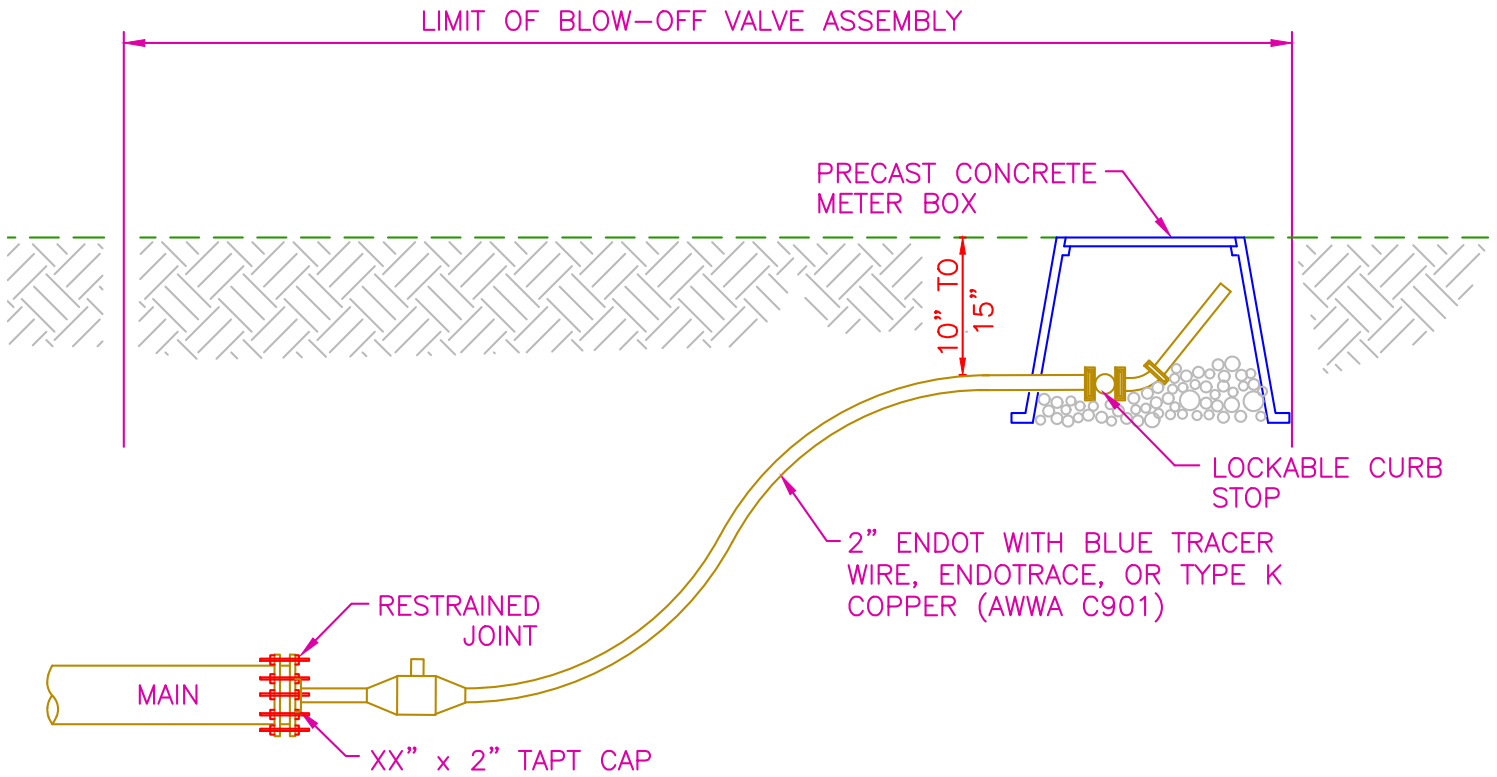
NTS

MATERIALS

ITEM	QUANT.	DESCRIPTION
1	1	VALVE, DOUBLE CHECK BACKFLOW PREVENTER
2	2	VALVE, GATE, C.I., F-F
3	1	NIPPLE (2" TO 3" GALV.) (DIP FOR ALL OTHER SIZES) (12" LONG) (OPT.)
4	2	ELBOW 90° (2" TO 3" GALV.) (DIP FOR ALL OTHER SIZES)
5	2	FLANGE, STEEL PIPE, SCREW-TYPE
6	2	RISER, (2" TO 3" GALV.) (DIP FOR ALL OTHER SIZES) (42" LONG)
7	1	NIPPLE (2" TO 3" GALV.) (DIP FOR ALL OTHER SIZES) (6" LONG)
8	1	SEE NOTES
9	*	SEE NOTES

- NOTE:
1. ACCEPTABLE MANUFACTURERS: (SEE CODB'S ACCEPTABLE PRODUCT LIST)
 2. FIELD ADJUST AND CUT ITEM 6 & ITEM 8 (PIPE SUPPORT) TO THE PROPER LENGTH.
 3. BFP 4" AND GREATER SHALL BE DIP. BELOW 4" SHALL BE GALV.
 4. THE RISER & ELBOW TO BE PAINTED 136 OSHA RED FOR COMMERCIAL FIRE SERVICE, 137 OSHA BLUE FOR COMMERCIAL DOMESTIC SERVICE.
 5. (ITEM 8) 2" GALV. IRON PIPE/CONCRETE FOUNDATION (16"x16"x24" MIN.)
 6. (ITEM 9) TEST PORTS (QUANTITY/LOCATIONS DEPENDING ON MANUFACTURER)

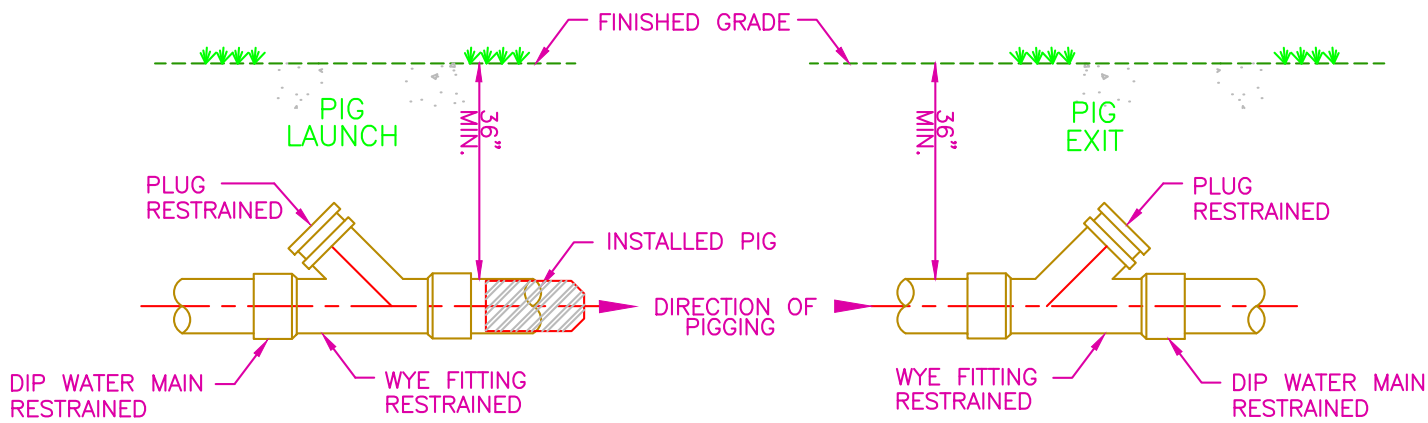




NOTE: INSTALL RESTRAINED JOINTS ON MAIN FOR MINIMUM OF 20' IN EACH DIRECTION FROM THE CORPORATION STOP.

1. ALL TEMPORARY BLOW-OFFS INSTALLED FOR SAMPLING PURPOSES MUST BE REMOVED BY CONTRACTOR.





PROFILE VIEWS
NTS



The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

Products that are submitted to the city engineering division prior to beginning project construction and are acceptable to the city may be substituted on a case by case basis for the products on the acceptable products list.

TABLE OF CONTENTS

Water Category 1 of 6: VALVES AND ACCESSORIES

- Air Release Valves
- Air Release Valves Enclosure
- Blow Off Valve
- Gate Valves General
- Gate Valves 16-inch through 48-inch
- Gate Valves 12-inch and Smaller (resilient seated only)
- Tapping Valves (resilient seated only)

Water Category 2 of 6: SERVICE MATERIALS

- Corporation Stops (ball type)
- Curb Stops Straight Valves
- CTS Polyethylene Tubing
- Service Saddles
- U Branch
- U Branch Assemblies with Angle Ball Valves

Water Category 3 of 6: PIPE MATERIALS

- Casing Spacers (all sizes)
- Casing End Seals
- Ductile Iron / Cast Iron Cement Lined
- PCCP Transmission Lines Greater than 30-inch
- C-900 (DR-18) PVC PRESSURE PIPE (PRESSURE CLASS 150)

The City of Daytona Beach Utilities Department List of Acceptable Products

Potable Water

FY-19/20

TABLE OF CONTENTS

Water Category 4 of 6: PIPE FITTINGS

Expansion Joints

Fittings C153 SSB / C110 Flange

Restrained Joints - Ductile Iron Pipe

Restrained Joints -PVC C900 (DR-18)

Tapping Sleeves

Tapping Sleeves - Fabricated Steel

Water Category 5 of 6: HYDRANTS

Approved Hydrants

Water Category 6 of 6: REDUCED PRESSURE ZONE BACKFLOW PREVENTER

Approved RPZBP, Single Service $\frac{3}{4}$ ", 1", 1 $\frac{1}{2}$ ", 2"

Approved RPZBP, Single Service 3", 4"

Approved RPZBP, Single Service 6", 8"

The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

Water Category 1 of 6: VALVES AND ACCESSORIES

Air, Vacuum or Air/Vac Combination Release Valves

- | | |
|---------|-------------------------------|
| 1. APCO | 1. 200 |
| 2. ARI | 2. ARI, D-040 / S-050 / S-010 |

Air Release Valve Enclosure

- | | |
|----------------|---------------------------------------|
| 1. Water Plus | 1. No. 30 (131632)
No. 40 (171730) |
| 2. CDR | 2. Boxes & Vaults |
| 3. GlasMasters | 3. Boxes & Vaults |

Blow Off Valve

- | | |
|-------------------------|-----------------------|
| 1. Hydro Guard | 1. Automatic Blow Off |
| 2. Kupferle Foundry Co. | 2. Series TF 550 |
| 3. Water Plus | 3. Series VB 2000 |

Gate Valves - general (resilient seat) AWWA C509 and C515

- | | |
|---------------------------|------------------|
| 1. American Flow Control | 1. C509 and C515 |
| 2. Mueller | 2. C509 and C515 |
| 3. Clow | 3. C509 and C515 |
| 4. Kennedy | 4. C509 and C515 |
| 5. US Pipe | 5. C509 and C515 |
| 6. American AVK | 6. C509 and C515 |
| 7. East Jordan Iron Works | 7. C509 and C515 |

Gate Valves 16" - 48" (resilient seated only w/side actuators)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. Clow | 2. Series F-6100 |
| 3. Mueller | 3. Series A2361 |
| 4. US Pipe | 4. Series 5460 |
| 5. Kennedy | 5. Series 4571 |
| 6. M&H | 6. Series 4067 |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

Gate Valves 12" and Smaller (resilient seated only)

- | | |
|--------------------------|-----------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. American R/D | 2. Series 2000 |
| 3. AVK | 3. Series 25 |
| 4. Clow | 4. Series F-6100 |
| 5. Kennedy | 5. Series 4571 |
| 6. M&H | 6. Series 4067 |
| 7. Mueller | 7. Series A2360, 2361 |
| 8. US Pipe | 8. Metroseal 250 |

McWane
Owned

Sample Station

- | | |
|---------------|----------------|
| 1. Water Plus | 1. Series 200A |
|---------------|----------------|

Tapping Valves (resilient seated only)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. AVK | 2. Series 25 |
| 3. Clow | 3. Series F-6114 |
| 4. Kennedy | 4. Series 4950 |
| 5. M&H | 5. Series 4751 |
| 6. Mueller | 6. T2360 & T2361 |
| 7. US Pipe | 7. Metroseal 250 |
| 8. Waterous | 8. Series 500 |

Water Category 2 of 6: SERVICE MATERIALS

Corporation Stops - Ball Type 1" & 2" (w / AWWA taper CC threads only / pack joint outlet for CTS)

- | | |
|----------------|-------------|
| 1. Ford | 1. FB1000 |
| 2. McDonald | 2. 4701B-22 |
| 3. Mueller | 3. H1500 |
| 4. Cambridge | 4. 301-AB |
| 5. James Jones | 5. J-1900W |

Curb Stops - Straight Valves (curb stop to be ball type, reduced port FIP x FIP $\frac{3}{4}$ " x

- | | |
|----------------|-------------|
| 1. Ford | 1. B11-233W |
| 2. McDonald | 2. 6101W |
| 3. Mueller | 3. B20200-R |
| 4. Cambridge | 4. 224-FF |
| 5. James Jones | 5. J-1900W |

Vaults, Meter Boxes & Lids - (all water meter box lids must be fabricated with an off-center hole that will accept an AMR transceiver unit.)

- | | |
|---------------|--|
| 1. Armorcast | 1. Commercial & Residential (concrete & composite) |
| 2. CDR | 2. Commercial & Residential (concrete & composite) |
| 3. Glasmaster | 3. Commercial & Residential (concrete & composite) |
| 3. Old Castle | 3. Commercial & Residential (concrete & composite) |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

Curb Stops - Straight Valves (ball type compression by meter, 1" & 2" CTS O.D. tubing by $\frac{5}{8}$ " x $\frac{3}{4}$ " & 2" meter)

- | | |
|----------------|---------------------------|
| 1. Ford | 1. B43-342W, BFA43-777W |
| 2. McDonald | 2. 6100MW-22 |
| 3. Mueller | 3. P24350, B24337, B24335 |
| 4. Cambridge | 4. 242-BT, 212BMF |
| 5. James Jones | 5. J-1963W, J1975W |

Curb Stops - Straight Valves (ball type compression by compression)

- | | |
|----------------|--------------------------------|
| 1. Ford | 1. B44-444W, B41-233WQ - 344WQ |
| 2. McDonald | 2. 6100W-22 |
| 3. Mueller | 3. P-25146 |
| 4. Cambridge | 4. 224-BB |
| 5. James Jones | 5. J-1949W |

Polyethylene Tubing - (blue w/ UV protection (SDR-9) 1" & 2" only)

- | | |
|----------|---------------------|
| 1. Endot | 1. Endot w/#14 wire |
| | 2. Endotrace |

Service Saddles - Epoxy or nylon-coated stainless steel 18-8 type 304 straps

- | | |
|----------------|---------------------------------------|
| 1. Smith Blair | 1. Series 393, Series 397, Series 313 |
| 2. Ford | 2. Series FC202 |
| 3. JCM | 3. Series 406 |
| 4. Mueller | 4. DR2S, DR2SOD |
| 5. Romac | 5. Series 202NS, Series 284 |
| 6. Cambridge | 6. Series 403 |
| 7. Cascade | 7. CNS2 |

U Branch (1" x $\frac{3}{4}$ " x 7 $\frac{1}{2}$ ")

- | | |
|----------------|---------------------|
| 1. Ford | 1. U-48-43, V-42 |
| 2. McDonald | 2. 08U2M, 207 Model |
| 3. Mueller | 3. P-15363 |
| 4. Cambridge | 4. 172-BM750 |
| 5. James Jones | 5. J-2613 |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

- | | |
|----------------|--------------|
| 4. Cambridge | 4. 172-BM750 |
| 5. James Jones | 5. J-2613 |

U Branch Assembly with Angle Ball Valves (1" x 3/4" x 7 1/2")

- | | |
|----------------|---------------|
| 1. Cambridge | 1. UVB-43-42W |
| 2. McDonald | 2. 09U2BW |
| 3. Mueller | 3. P-153363 |
| 4. Ford | 4. 172-BM750 |
| 5. James Jones | 5. J-2216 |

Water Category 3 of 6: PIPE MATERIALS

Casing Spacers (all sizes) Stainless steel w/ vinyl runners

- | | |
|----------------------|----------------------------|
| 1. Advanced Products | 1. Series SS |
| 2. Cascade | 2. Series CCS/ CCPS/ AZ |
| 3. BMW | 3. BMW-SS |
| 4. Power Seal | 4. Model 4810 |
| 5. PSI | 5. Series S-G-2 |
| 6. PSI-Ranger | 6. Ranger II |
| 7. RACI | 7. S/T, F/G, P/Q, M/N, E/H |

Casing End Seals

- | | |
|----------------------|-----------------------------|
| 1. Advanced Products | 1. Model AC & AW |
| 2. BMW | 2. BMW wrap around end seal |
| 3. Cascade | 3. Model CCES |
| 4. Power Seal | 4. Model 4810ES |
| 5. PSI | 5. Model C, S, & W |

Ductile Iron/ Cast Iron Cement Lined (class 350)

- | | |
|-------------|------------|
| 1. American | 4. McWane |
| 2. Clow | 5. US Pipe |
| 3. Griffin | 6. Tyton |

C-900 (DR-18) PVC PRESSURE PIPE (PRESSURE CLASS 150)(Blue Pipe)

1. North American Corp.
2. Blue Brute (C900) JM Eagle
3. Certain Teed

The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

Water Category 4 of 6: PIPE FITTINGS

Expansion Joint

1. EBAA Iron
2. Mercer
3. Metraflex
4. Proco

Fittings - C153 SSB/C110 (cement or fusion bonded epoxy lined)

- | | |
|-----------------------|------------------------------|
| 1. American | 1. Gradelock |
| 2. Assured Flow Sales | |
| 3. Griffin | |
| 4. Nappco/Sigma | |
| 5. Star | |
| 6. Union/Tyler | |
| 7. US Pipe | 7. Permafuse or cement lined |
| 8. SIP Industries | |

Restrained Joints - DIP

- | | |
|-------------------|---|
| 1. American | 1. Fast Grip Gasket |
| 2. EBAA Iron Inc. | 2. Mega-lug series 1100, series 1700 restraint, 2003 PV series RS-3800 restrainer |
| 3. Ford | 3. UFR-1400, 1300C series |
| 4. Star | 4. Star Grip series 3000, All Grip series 3600 |
| 5. US Pipe | 5. Field Loc Gasket |
| 6. Sigma | 6. One-LOK SLD (3-36") |
| 7. Mueller | 7. Aquagrip Restraint System |
| 8. Romac | 8. Grip Rings |
| 9. SIP Industries | 9. EZ- Grips |

Restrained Joints -PVC C900 (DR-18)

- | | |
|-------------------|--|
| 1. Sigma Corp. | 1. PV-LOK Series PWP for Bell Joint Restraint (CIOD) |
| 2. EBAA Iron Inc. | 2. Series 1900 |

Tapping Sleeves - Mechanical joint for all taps on cast iron, ductile iron, all taps including size on size

- | | |
|--------------------------|-------------------------------|
| 1. American Flow Control | 1. Series 2800 |
| 2. Clow | 2. Series F-5205, F-5207 |
| 3. Mueller | 3. Series H-615, H-616, H-619 |
| 4. US Pipe | 4. Series T-9 |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Potable Water

FY-19/20

Tapping Sleeves - Fabricated steel, mechanical joint, fusion bonded epoxy coated

- | | |
|----------------|---------------------------|
| 1. Smith Blair | 1. Style 622, Style 623 |
| 2. JCM | 2. Series 412, Series 414 |

Water Category 5 of 6: Hydrants

Hydrants

- | | |
|--------------------------|--|
| 1. Mueller | 1. A-423 |
| 2. Kennedy | 2. Guardian (K-81-A, K-81-D) |
| 3. American Flow Control | 3. American Darling B84B (5 1/4" only) |
| 4. Clow | 4. Medallion (5 1/4") |

Water Category 6 of 6: Reduced Pressure Zone Backflow Preventer

Approved RPZBP - Single service 3/4", 1", 1 1/2", 2"

- | | |
|--------------------|---------------------------------------|
| 1. Febco | 1. 825 Y |
| 2. Watts | 2. Model 909, Model 919, Model 2009MZ |
| 3. Conbraco/Apollo | 3. 40-200 |
| 4. Wilkins | 4. 975-375 XL |

Approved RPZBP - Single service 3", 4"

- | | |
|--------------------|-------------------|
| 1. Febco | 1. 825 Y |
| 2. Watts | 2. Model 909 OS&Y |
| 3. Conbraco/Apollo | 3. 40-200 |
| 4. Cla-Val | 4. RP-1 |
| 5. Wilkins | |

Approved RPZBP - Single service 6", 8"

- | | |
|--------------------|-------------------|
| 1. Febco | 1. 825 Y |
| 2. Watts | 2. Model 909 OS&Y |
| 3. Conbraco/Apollo | 3. 40-200 |
| 4. Cla-Val | 4. RP-1 |
| 5. Wilkins | |

RECLAIMED WATER DETAILS

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44	RW-3	DESIGN & CONSTRUCTION NOTES (PAGE 3 OF 3)
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46	RW-5	RAILROAD CROSSING
47	RW-6	IRRIGATION (SPRINKLER) SERVICE CONNECTION (PAGE 1 OF 2)
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50	RW-9	VALVE AND VALVE BOX
51	RW-10	CARSON PLASTIC VALVE BOX
52	RW-11	WATER VALVE MARKER/TAG
53	RW-12	PIG LAUNCH & RECEIVING DETAIL
54	RW-13	RECLAIMED WATER 'IN USE' SIGN
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RECLAIMED WATER CONSTRUCTION NOTES

1. THE CITY'S UTILITIES DEPARTMENT (671-8815) SHALL BE GIVEN A MINIMUM OF THREE BUSINESS DAYS NOTICE (NOT INCLUDING HOLIDAYS) PRIOR TO BEGINNING ANY RECLAIMED WATER SYSTEM CONSTRUCTION.
2. A PERMIT SHALL BE REQUIRED PRIOR TO ENGAGING IN ANY DEWATERING OR CONSTRUCTION ACTIVITY THAT CHANGES THE IMPERVIOUS AREA OF LAND. DEWATERING ACTIVITIES INCLUDE THE REMOVAL OF GROUND WATER FROM A CONSTRUCTION SITE, ENCLOSED VAULT, COFFERDAM, OR TRENCHES, ALLOWING CONSTRUCTION OR MAINTENANCE IN A DRY ENVIRONMENT. SITE SPECIFIC DEWATERING PERMITS SHALL REQUIRE PAYMENT OF A PER ACRE FEE BASED ON THE SIZE OF THE DEVELOPMENT. GENERAL PURPOSE PERMITS SHALL REQUIRE AN ANNUAL FEE BASED ON A BIENNIAL SCHEDULE OF DEWATERING ACTIVITIES DISCHARGING DIRECTLY INTO THE CITY'S MS4 CONVEYANCE SYSTEM. DEWATERING PERMIT APPLICATIONS CAN BE FOUND AT <https://www.codb.us/index.aspx?nid=262>. FEES ARE SUBJECT TO ARTICLE 7, SECTION 7.2 OF THE LAND DEVELOPMENT CODE AND MUST BE SUBMITTED WITH THE PERMIT APPLICATION TO THE CITY OF DAYTONA BEACH STORM WATER COORDINATOR AT 125 BASIN STREET, SUITE 100, DAYTONA BEACH, FLORIDA 32114 PRIOR TO ANY USE OF THE CITY'S MS4 CONVEYANCE SYSTEM. FAILURE TO COMPLY WILL RESULT IN IMMEDIATE TERMINATION OF ACCESS TO THE CITY'S MS4 SYSTEM.
3. RECLAIMED WATER SERVICE ENDINGS SHALL BE SECURED BY WIRE TO 2" X 4" PRESSURE TREATED STAKES, APPROXIMATELY 2' ABOVE GRADE OR MAY BE PLACED IN RECLAIMED WATER METER BOXES PROVIDED BY THE CONTRACTOR AT THE TIME OF FINAL SUBDIVISION INSPECTION.
4. FOR PIPE FLUSHING, PIGGING, TESTING, AND TIE-IN CONNECTIONS, THE CITY RESERVES THE RIGHT TO REQUIRE WORK TO BE PERFORMED DURING PERIODS OF LOW FLOW (MIDNIGHT TO 8 A.M.) IN ORDER TO MINIMIZE SERVICE DISRUPTION TO EXISTING CUSTOMERS. THE CONTRACTOR SHALL COORDINATE AND SCHEDULE WITH THE CITY REPRESENTATIVE THE DATE AND TIME, THAT MUST BE APPROVED BY WATER PLANT OPERATIONS.
5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SUPPLY "AS-BUILT DRAWINGS" TO THE CITY PRIOR TO ANY USE OF THE SYSTEM. **SEE CITY OF DAYTONA BEACH AS-BUILT REQUIREMENTS.**
6. ALL RECLAIMED WATER SERVICES SHALL BE MARKED ALONG THE OUTSIDE EDGE OF CURB WITH A "◇" OR BY METAL TABS SET INTO PAVEMENT. VALVES AND BLOW-OFFS FOR RECLAIMED WATER MAINS SHALL BE MARKED BY A "+" SET INTO THE PAVEMENT AND PAINTED WITH PURPLE ENAMEL.
7. RECLAIMED WATER SERVICES SHALL BE LOCATED AT SIDE LOT LINES ALTERNATING WITH POTABLE WATER SERVICE LOCATIONS. IN INSTANCES WHERE RECLAIMED WATER SERVICES MUST BE OFFSET, THE SERVICES MAY BE OFFSET FROM THE LOT LINE A MAXIMUM DISTANCE OF 2 FEET.
8. ALL RECLAIMED WATER HAND-OPERATED CONNECTIONS AND OUTLETS SHALL BE CONTAINED IN UNDER-GROUND SERVICE VAULTS AND APPROPRIATELY TAGGED OR LABELED TO WARN THE PUBLIC AND EMPLOYEES THAT THE WATER IS NOT INTENDED FOR DRINKING OR SWIMMING. ANY SIGNIFICANT IRRIGATION SITE UTILIZING RECLAIMED WATER, SUCH AS AN ATHLETIC FIELD, GOLF COURSE, PARK OR POND, IS REQUIRED TO POST A 12" x 12" RECLAIMED WATER SIGN WARNING THE PUBLIC AND EMPLOYEES THAT RECLAIMED WATER IS NOT INTENDED FOR DRINKING OR SWIMMING. THIS SIGN SHALL BE PLACED AT THE ENTRANCE TO THE SITE AND THE LOCATION OF THE PRIVATE REUSE SYSTEM. SEE 'RECLAIMED WATER IN USE' DETAIL.
9. VAULTS FOR OUTLETS SHALL BE LOCKED OR REQUIRE A SPECIAL TOOL FOR OPERATION.
10. A 75 FOOT SETBACK DISTANCE SHALL BE PROVIDED FROM PUBLIC ACCESS RECLAIMED WETTED AREAS TO PUBLIC OR PRIVATE POTABLE WATER SUPPLY WELLS.
11. LOW TRAJECTORY NOZZLES ARE REQUIRED WITHIN 100 FEET OF PUBLIC EATING, DRINKING OR BATHING FACILITIES.
12. ALL RECLAIMED WATER MAINS SHALL BE INSTALLED ON A FIRM FOUNDATION WITH ALL UNSUITABLE MATERIAL (MUCK, ROCK, COQUINA, ETC.) REMOVED AND REPLACED WITH CLEAN GRANULAR MATERIAL.
13. TRENCHES SHALL BE BACKFILLED WITH MATERIAL ACCEPTABLE TO THE CITY WITH A MINIMUM COMPACTION OF 95% IN UNPAVED AREAS AND 98% IN PAVED AREAS IN ACCORDANCE WITH AASHTO T-180.



RECLAIMED WATER CONSTRUCTION NOTES (CONT'D)

14. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TRENCH COMPACTION TESTS AT POINTS 12 INCHES ABOVE THE PIPE AND AT 12 INCHES VERTICAL INTERVALS TO FINISH GRADE AT A MAXIMUM SPACING OF EVERY 300 FEET.
15. 3" METALIZED PIPE LOCATION TAPE SHALL BE INSTALLED 15" TO 24" BELOW FINISHED GRADE OR AS SPECIFIED BY MANUFACTURER FOR ALL PVC LINES, AND A SINGLE STRAND INSULATED COPPER TRACER WIRE SHALL BE ATTACHED TO ALL PVC PIPE. WIRE RUNS SHALL BE CONNECTED WITH SILICONE FILLED WIRE CONNECTORS. EACH RUN SHALL TERMINATE AT EVERY VALVE. SEE STANDARD DETAIL "MAIN VALVE BOX" FOR INSTALLATION OF WIRE ON RISER PIPE. SERVICES SHALL BE CONNECTED TO THE MAIN WIRE WITH SILICONE FILLED CONNECTORS. IT IS THE CONTRACTOR'S RESPONSIBLY TO ENSURE CONTINUITY AND TEST FOR CONTINUITY (SEE CITY SPECIFICATIONS #15049 TRACER WIRE AND ALARMING TAPE).
16. ALL SINGLE RESIDENTIAL WATER SERVICES SHALL BE 1". SERVICES SHALL BE CTS 3408 HIGH DENSITY POLYETHYLENE TUBING RATED FOR A MINIMUM OF 200 PSI WITH SODR 9 (CTS). THE TUBING SHALL HAVE A VIRGIN HIGH DENSITY POLYETHYLENE CENTER FOR WHICH THE MANUFACTURER SHALL FURNISH A CERTIFICATE OF PURITY. THE TUBING SHALL BE PURPLE IN COLOR AND SHALL HAVE THE WORDS "RECLAIMED WATER" PERMANENTLY PRINTED ON THE OUTSIDE. THE TUBING SHALL HAVE U.V. PROTECTION AND SHALL NOT BE AFFECTED BY DIRECT SUNLIGHT. THE TUBING SHALL COMPLY WITH OR EXCEED THE APPLICABLE STANDARDS OF A.S.T.M. D1248, D3350, D2239, D2737, N.S.F.-14 AND A.W.W.A. C901 AND SHALL COME WITH A LIFETIME WARRANTY. APPROVED SIZES: 1" AND 2" DIAMETERS.
17. RECLAIMED WATER MAINS SHALL BE INSTALLED 4 FEET OFF THE BACK OF THE CURB ON THE OPPOSITE SIDE OF THE ROAD OF THE POTABLE WATER MAINS, OR AS APPROVED BY THE CITY. RECLAIMED WATER MAINS SHOULD NOT BE INSTALLED UNDER SIDEWALK.
18. ALL RECLAIMED WATER MAINS SHALL HAVE A MINIMUM COVER OF 36 INCHES. IN SPECIAL CASES WHERE IT IS IMPOSSIBLE OR INAPPROPRIATE TO PROVIDE ADEQUATE COVE, DUCTILE IRON PRESSURE CLASS 350 OR CONCRETE ENCASMENT/PROTECTIVE SLAB MAY BE USED AT THE DISCRETION OF THE UTILITIES DEPARTMENT. ALL DIP SHALL HAVE 2" PURPLE STRIPES PAINTED AT 12 O'CLOCK, 3 O'CLOCK, 6 O'CLOCK AND 9 O'CLOCK FOR THE FULL LENGTH OF PIPE. NON PAINTED RECLAIMED PIPE OR PIPES SHALL BE PAINTED WITH AN EPOXY PAINT (PANTONE PURPLE) TO CLEARLY MARK THE RECLAIM PIPE OR PIPES.
19. RECLAIMED WATER MAINS SHALL BE PURPLE PVC, DR-18 AWWA CLASS C-900 OR C-905, CL 150, OR DIP PRESSURE CLASS 350, STANDARD CEMENT LINED (PAINTED PANTONE PURPLE) UNLESS APPROVED OTHERWISE BY THE CITY. ALL HORIZONTAL DIRECTIONAL DRILLS SHALL HAVE A MINIMUM WORKING PRESSURE OF 160 PSI. THE CITY MAY REQUIRE A HIGHER PRESSURE RATING BASED ON SITE CONDITIONS. INSIDE DIAMETER OF HORIZONTAL DIRECTIONAL DRILL PIPE SHALL MATCH THE INSIDE DIAMETER OF CONNECTING PIPES. ALL GASKETS SHALL BE LUBRICATED BEFORE INSTALLATION.
20. DIRECTIONAL DRILLS SHALL HAVE FUSSED MJ ADAPTERS.
21. ALL RECLAIMED WATER MAINS SHALL USE THRUST RESTRAINT AS CALCULATED BY A PROGRAM AVAILABLE AT EBAA.COM
22. ALL FITTINGS, VALVES, ECT. SHALL BE DUCTILE IRON (MJ OR FLANGED) AND SHALL BE RESTRAINED.
23. BELL RESTRAINTS OR GRIPPER TYPE GASKETS SHALL BE USED FOR ALL RESTRAINED PIPE BELL JOINTS.
24. VALVES SHALL BE PLACED AT ALL STREET INTERSECTIONS AND AT MAXIMUM SPACINGS OF 750 FEET.
25. VALVES SHALL BE INSTALLED ON ALL LEGS EXCEPT ONE AT ALL RECLAIMED WATER MAIN TEES AND CROSSES.
26. ALL VALVES SHALL BE ADJUSTED TO FINISH GRADE AND CAPS SHALL BE PAINTED PURPLE.
27. THE CONTRACTOR IS REQUIRED TO PIG ALL RECLAIMED WATER MAINS EQUAL TO OR GREATER THAN 6" IN DIAMETER AND PRIMARY DISTRIBUTION MAINS LOCATED ON COLLECTOR AND ARTERIAL ROADWAYS. LAUNCHING AND EXTRACTION POINTS SHALL BE DETERMINED BY THE CONTRACTOR.
28. IN AREAS WHERE RECLAIMED WATER IS AVAILABLE, RECLAIMED WATER WILL BE UTILIZED IN THE PRESSURE TESTING OF NEW NON-POTABLE WATER LINES.
29. RECLAIMED WATER MAINS SHALL NOT BE PLACED IN SERVICE UNTIL A PRESSURE TEST AT 150 PSI FOR 3 HOURS HAS PASSED AND THE RESULTS ARE FORWARDED TO THE CITY.
30. THE CONTRACTOR SHALL PERFORM RECLAIMED WATER TAPS WITH A CITY REPRESENTIVE PRESENT.



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RECLAIMED WATER CONSTRUCTION NOTES (CONT'D)

31. WITH RESPECT TO TIE-IN CONNECTIONS, THE CITY RESERVES THE RIGHT TO REQUIRE CONNECTIONS TO BE PERFORMED DURING PERIODS OF LOW FLOW.
32. THE PLANS SHALL INCLUDE THE PROPOSED LOCATIONS OF ALL RECLAIMED WATER MAINS MEASURED FROM THE BACK OF CURB (EDGE OF PAVEMENT IF NO CURB EXISTS) AND THE RIGHT_OF_WAY LINE.
33. LANDSCAPE PLANS SHALL CLEARLY DEPICT THE DESIGN LOCATION OF PLANTINGS RELATIVE TO THE LOCATION OF PUBLIC UTILITIES AND STORM WATER INFRASTRUCTURE.
34. THE RECLAIMED WATER MAIN SHALL NOT BE PLACED IN SERVICE UNTIL AN APPROVED BACKFLOW PREVENTER HAS BEEN INSTALLED ON THE CUSTOMER'S POTABLE SERVICE LINE.
35. PRESSURE TESTS FOR TAPPING SADDLES AND VALVES SHALL BE A MINIMUM OF 30 MINUTES AT 150 PSI OR 30 MINUTES AT THE MANUFACTURER'S RECOMMENDED TESTING PRESSURE.
36. 3 INCH METALIZED PIPE LOCATION TAPE SHALL BE LOCATED 15 INCHES TO 24 INCHES BELOW FINISHED GRADE OR AS SPECIFIED BY THE MANUFACTURER FOR ALL WATER LINES. BLUE TRACER WIRE SHALL BE ATTACHED TO ALL PIPES. WIRE RUNS SHALL BE CONNECTED WITH SILICONE FILLED WIRE CONNECTORS. SERVICES SHALL BE CONNECTED TO THE MAIN WIRE WITH SILICONE FILLED WIRE CONNECTORS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE AND TEST FOR CONTINUITY (SEE CITY SPECIFICATION #15049 TRACER WIRE AND ALARMING TAPE). TRACER WIRE SHALL BE TESTED FOR CONTINUITY UNDER THE SUPERVISION OF A CITY REPRESENTATIVE AFTER INSTALLATION. IF A METER BOX IS NOT WITHIN 200 FEET OF A VALVE AND VALVE BOX AN ADDITIONAL VALVE BOX FOR TRACER WIRE IS REQUIRED.
37. ALL FITTINGS SHALL MEET MINIMUM RESTRAINT REQUIREMENTS PER ANSI/AWWA/EBAA, AND ALL PRESSURE PIPES UNDER THE ROADWAYS SHALL BE RESTRAINED.
38. IN AREAS WHERE RECLAIMED WATER IS NOT AVAILABLE, THE CONTRACTOR IS REQUIRED TO USE THE NECESSARY BACKFLOW PREVENTION DEVICES TO TRANSFER POTABLE WATER TO NON-POTABLE WATER LINES TO PERFORM THE REQUIRED PRESSURE TEST.
39. WHERE POTABLE WATER MAINS, RECLAIMED WATER MAINS, FORCE MAINS, SANITARY SEWER MAINS OR STORMWATER MAINS CROSS WITH LESS THAN 12 INCHES OF VERTICAL CLEARANCE OR WHERE THE SEWER OR THE RECLAIMED WATER MAIN IS ABOVE THE WATER MAIN, MEDIATION MUST BE REVIEWED AND APPROVED BY FDEP.



LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

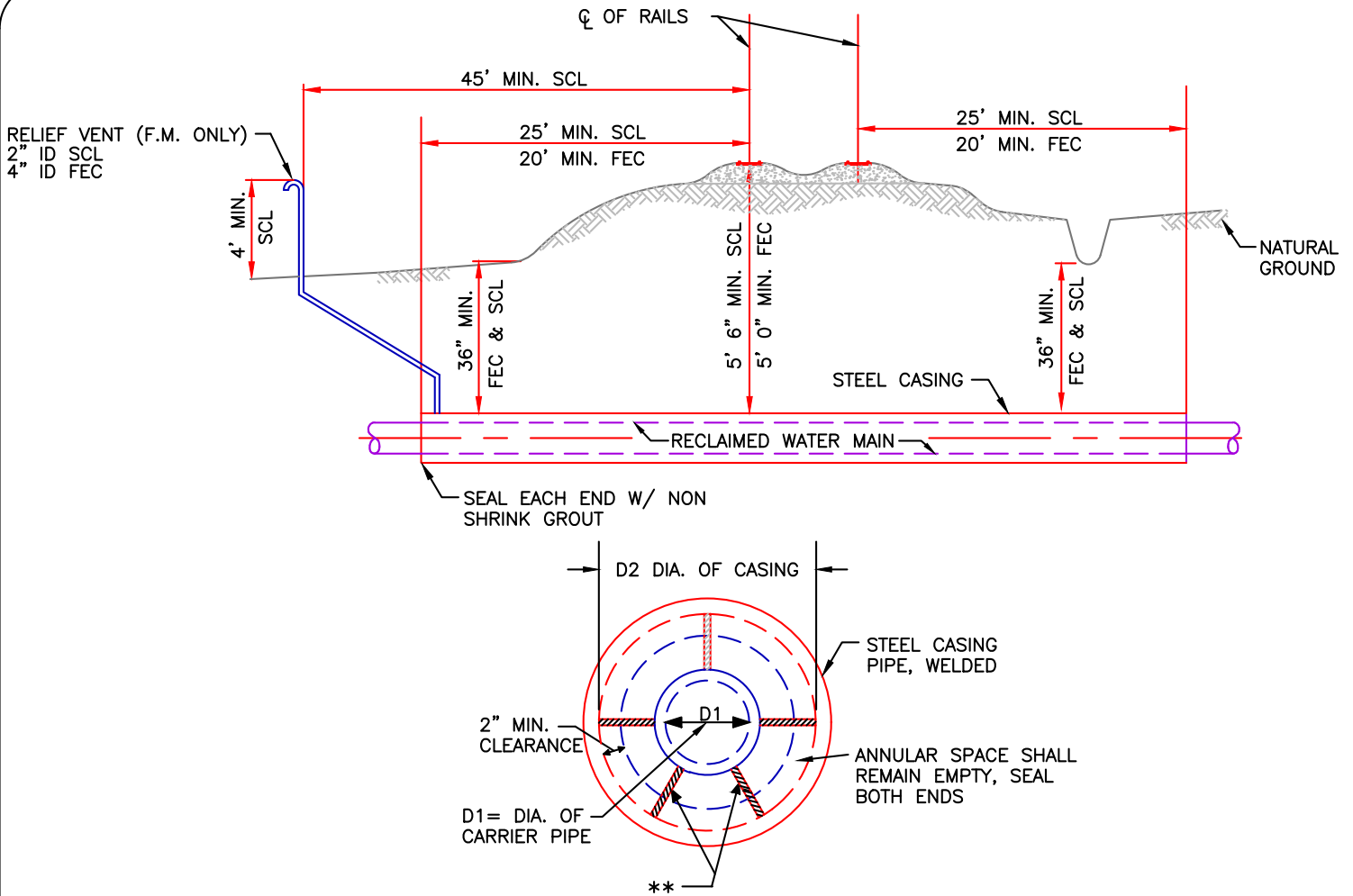
Other Pipe	Horizontal Separation	Crossings (1)	Joint Spacing @ Crossings (Full Joint Centered)
Storm Sewer, Stormwater Force Main, Reclaimed Water (2)	<p style="text-align: center;">3 ft. minimum</p>	<p style="text-align: center;">12 inches is the minimum, except for storm sewer, then 6 inches is the minimum and 12 inches is preferred</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>
Vacuum Sanitary Sewer	<p style="text-align: center;">10 ft. preferred 3 ft. minimum</p>	<p style="text-align: center;">12 inches is preferred 6 inches minimum</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>
Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)	<p style="text-align: center;">10 ft. preferred 6 ft. minimum (3)</p>	<p style="text-align: center;">12 inches is the minimum, except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>
On-Site Sewage Treatment & Disposal System	<p style="text-align: center;">10 ft. minimum</p>	<p style="text-align: center;">---</p>	<p style="text-align: center;">---</p>

- (1) Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches.
- (2) Reclaimed water regulated under Part III of Chapter 62-610, F.A.C.
- (3) 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer.
- (4) Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.

Disclaimer - This document is provided for your convenience only. Please refer to F.A.C. Rule 62-555.314 for additional construction requirements.



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TYPICAL RAILROAD CROSSING
NTS

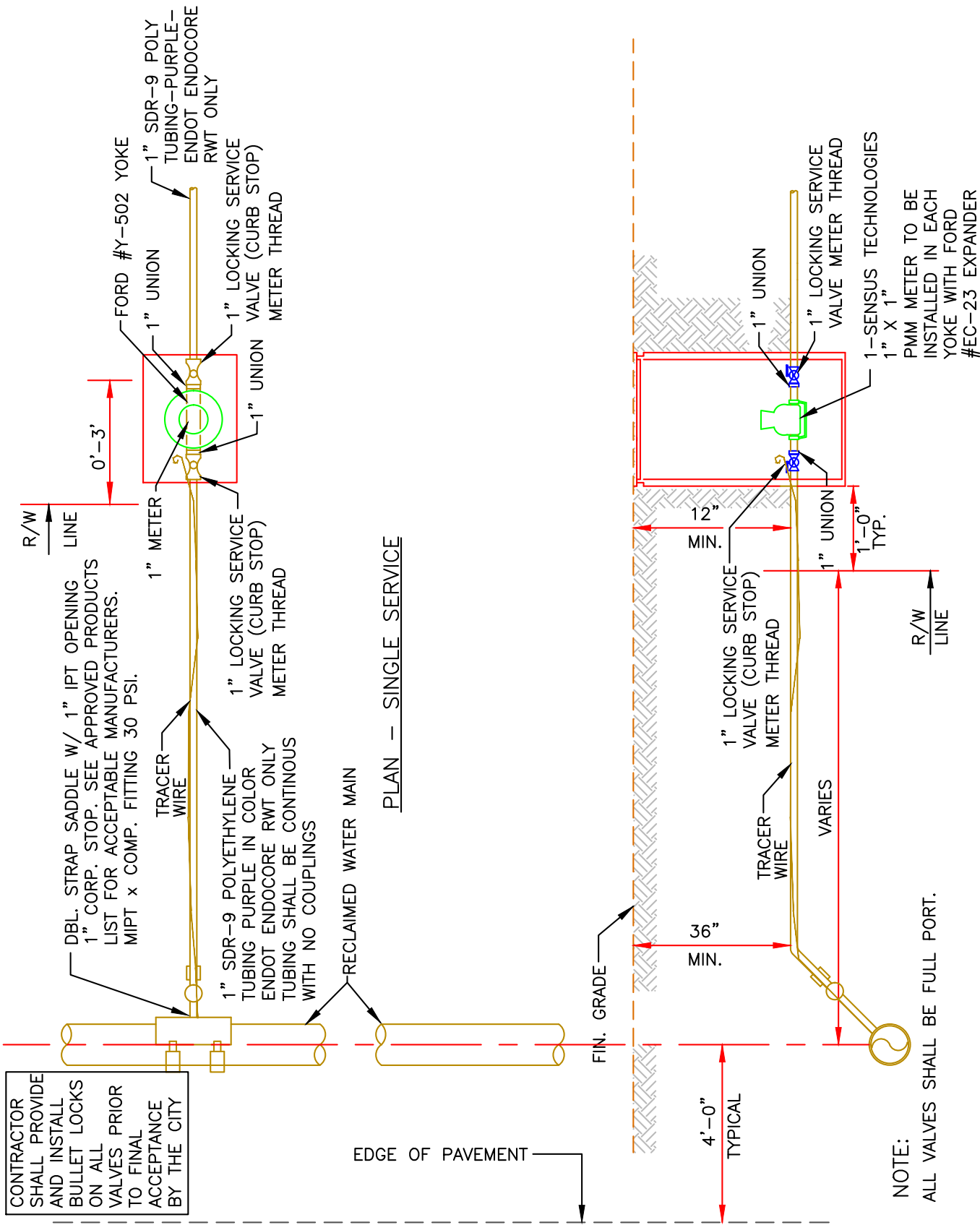
NOTE TO ENGINEER: CROSSING DETAIL SHALL BE TO SCALE AND SHOW EXISTING UTILITIES, CLEARANCES, CASING LENGTH, LOCATION OF PAVED ROAD AND LIMITS OF RIGHT-OF-WAY

CARRIER PIPE AND CASING PIPE SIZES (MIN.)														
CARRIER PIPE NOM. DIA. (D1)	4	6	8	10	12	14	16	18	20	24	30	36	42	48
CASING PIPE NOM. DIA. (D2)	14	16	18	22	24	30	30	30	36	36	48	54	60	66
WALL THICKNESS-INCHES *	PER AUTHORITY HAVING JURISDICTION													

NOTES:

- MINIMUM COVER FOR TOP OF CASING TO R/R BASE SHALL BE 5.6' (SCL), 5.0' (FEC). MINIMUM COVER FOR TOP OF CASING ON ALL GROUND COVER SHALL BE 3.0'.
 - ROTATION OF CARRIER PIPE INSIDE THE CASING PIPE WILL NOT BE PERMITTED. RESTRAINED MECHANICAL OR FLANGED JOINT PIPE SHALL BE USED TO HELP PREVENT SUCH ROTATION.
 - SHOP DRAWINGS SHALL BE SUBMITTED OF CASING & CARRIER PIPE INSTALLATION FOR APPROVAL PRIOR TO FABRICATION OF PIPING, CASING, AND APPURTENANCES. CERTIFICATION OF CASING PIPE IS REQUIRED.
 - GROUTING OF SPACE BETWEEN CASING AND CARRIER PIPE NOT REQUIRED UNLESS NEGATIVE FLOTATION EXISTS.
 - WELDING OF CASING PIPE TO BE DONE BY CERTIFIED WELDER. ALL ENDS OF CASING PIPE SHALL BE CHAMFERED PRIOR TO ANY WELDING. SEAL END OF CASING PIPE WITH NON SHRINK GROUT.
 - CITY INSPECTOR SHALL BE PRESENT THROUGHOUT ALL BORE AND JACK ACTIVITIES.
- * WITHIN THE CITY OF DAYTONA BEACH RIGHT OF WAY, USE CURRENT FDOT STANDARDS.
** SPECIALLY DESIGNED SPACERS SHALL BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. USE CASCADE CASING SPACERS OR PRE-APPROVED EQUAL.





CONTRACTOR SHALL PROVIDE AND INSTALL BULLET LOCKS ON ALL VALVES PRIOR TO FINAL ACCEPTANCE BY THE CITY

DBL. STRAP SADDLE W/ 1" IPT OPENING 1" CORP. STOP. SEE APPROVED PRODUCTS LIST FOR ACCEPTABLE MANUFACTURERS. MIPT x COMP. FITTING 30 PSI.

TRACER WIRE
1" SDR-9 POLYETHYLENE TUBING PURPLE IN COLOR ENDOT ENDOCORE RWT ONLY TUBING SHALL BE CONTINUOUS WITH NO COUPLINGS

RECLAIMED WATER MAIN

PLAN -- SINGLE SERVICE

12" MIN.

36" MIN.

1" LOCKING SERVICE VALVE (CURB STOP) METER THREAD

VARIES

1" UNION

1" UNION

1" LOCKING SERVICE VALVE METER THREAD

VARIES

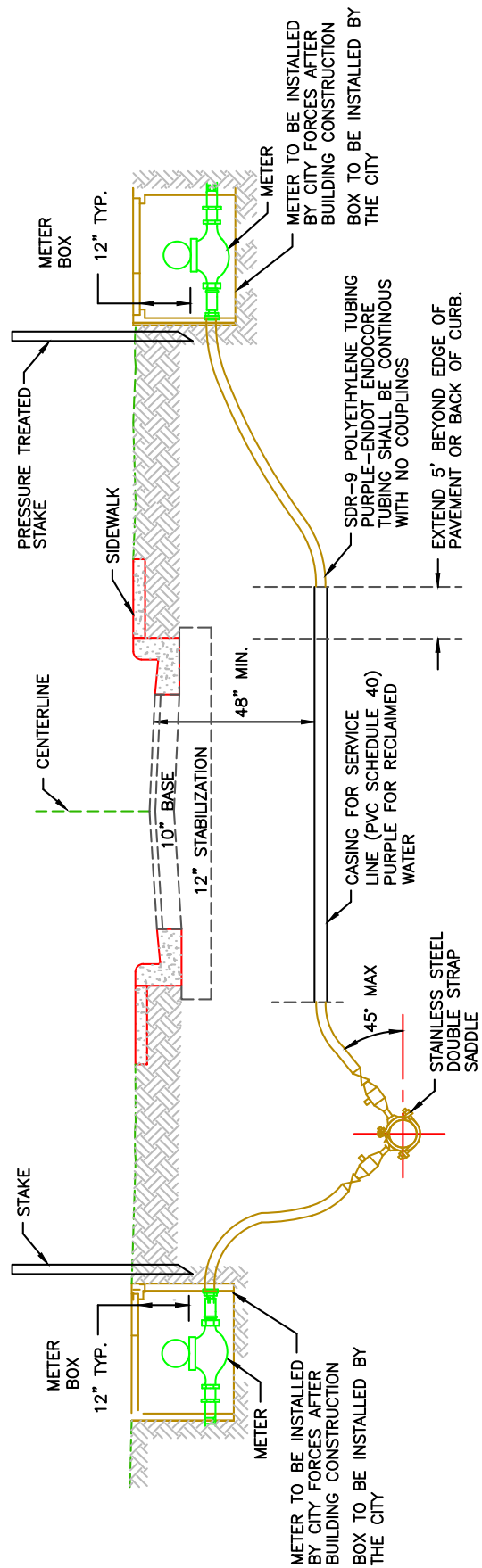
1-SENSUS TECHNOLOGIES 1" X 1" PMM METER TO BE INSTALLED IN EACH YOKE WITH FORD #EC-23 EXPANDER

NOTE:
1. ALL VALVES SHALL BE FULL PORT.

TYPICAL SECTION



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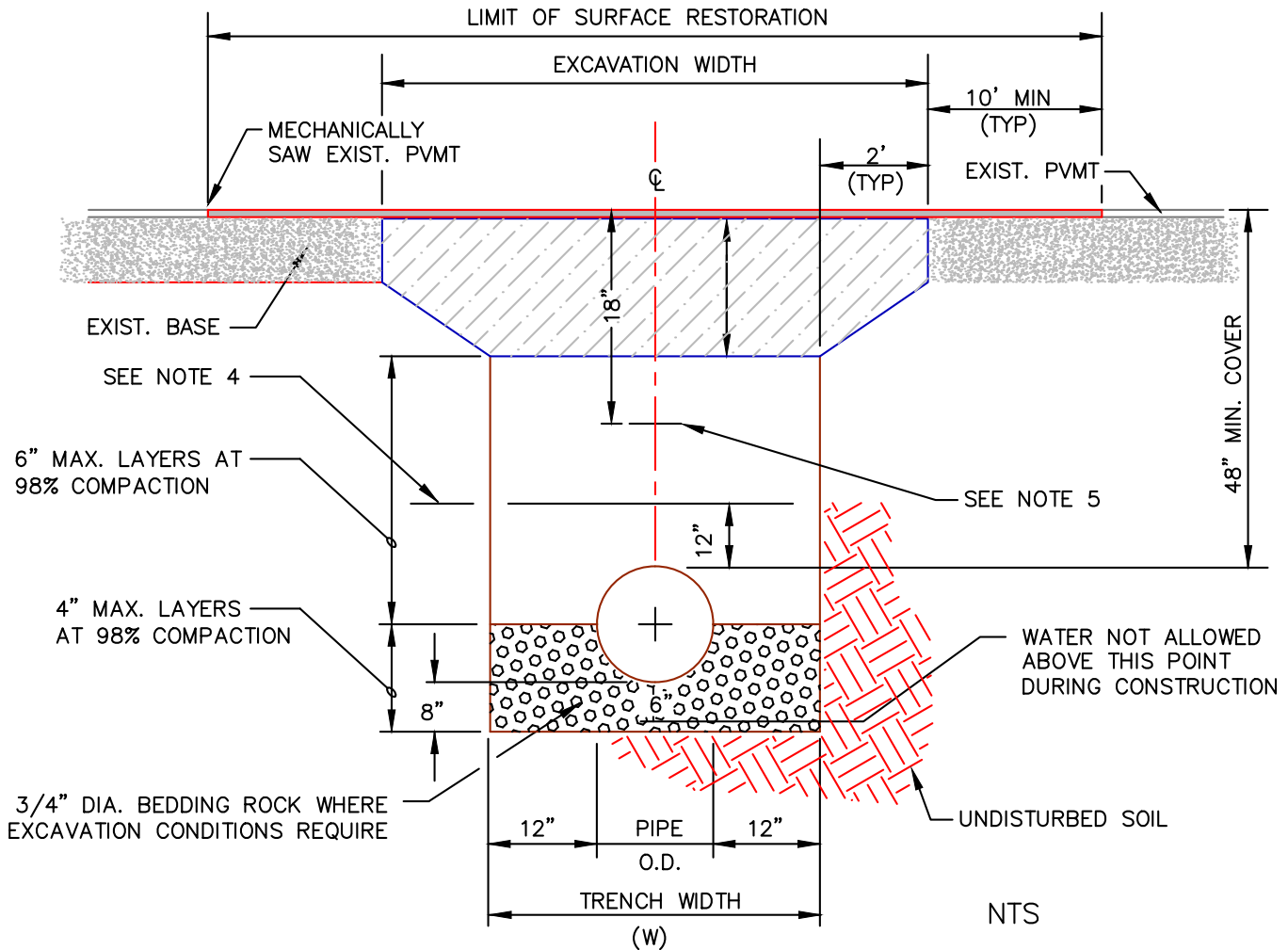
NOTES:

1. SERVICE BOX AND METER TO BE FURNISHED BY THE CITY.
2. METER SHALL BE INSTALLED ON R/W SIDE OF THE SIDEWALK.
3. MINIMUM SEPARATION BETWEEN CURB AND METER BOX AND BETWEEN METER BOX AND SIDEWALK.
4. CONTRACTOR TO LOCATE CURB STOP BY PLACING A STAKE (2"x2" SQUARE AT 24" ABOVE GROUND) TOP PAINTED WITH THE COLOR OF THE UTILITY SERVICE AND WITH THE LOT NUMBERS IT SERVES.
5. MINIMUM RESIDENTIAL METER SHALL BE 1"
6. ALL COMMERCIAL PROPRIETARY METERS MUST BE SIZED BY THE ENGINEER-OF-RECORD.
7. ALL PROPOSED LINES (WHIPS) SHALL BE PLACED IN A METER BOX WITH CURB STOP ON THE END. NO WHIPS TO BE LEFT ABOVE GROUND.



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NOTE: TO DETERMINE THE MOST CURRENT REQUIREMENTS FOR STABILIZATION MATERIAL, BASE MATERIAL, AND ASPHALT MATERIAL PATCH AND THE REPLACEMENT DIMENSIONS CONTACT CITY ENGINEER IN THE PUBLIC WORKS DEPT AT 386-671-8610.



NOTES:

1. WHERE SOIL CONDITIONS CAN NOT BE MAINTAINED AS SHOWN ABOVE, PROVIDE APPROVED METHOD OF CONSTRUCTION.
2. SHEETING WILL BE REQUIRED AS DETERMINED IN THE FIELD.
3. COMPACTION PERCENTAGES SHOWN REFER TO A.A.S.H.T.O. T-180. PROVIDE COMPACTION TEST REPORTS TO CITY INSPECTOR.
4. MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LEVEL.
5. FOR PVC PIPE ONLY – INSTALL METALLIC TAPE AND UF #12 INSULATED SINGLE STRAND COPPER WIRE OVER FULL LENGTH OF PIPE.
6. THE CONTRACTOR SHALL, UNLESS OTHERWISE NOTED, RESTORE ALL STRIPING, PAVEMENT MARKINGS, DELINEATORS, SIGNAGE AND TRAFFIC SIGNAL SYSTEM COMPONENTS DISTURBED DURING CONSTRUCTION ACTIVITIES. COST OF ALL WORK AND MATERIALS WILL BE CONSIDERED INCIDENTAL TO PATCH MATERIAL ITEMS.

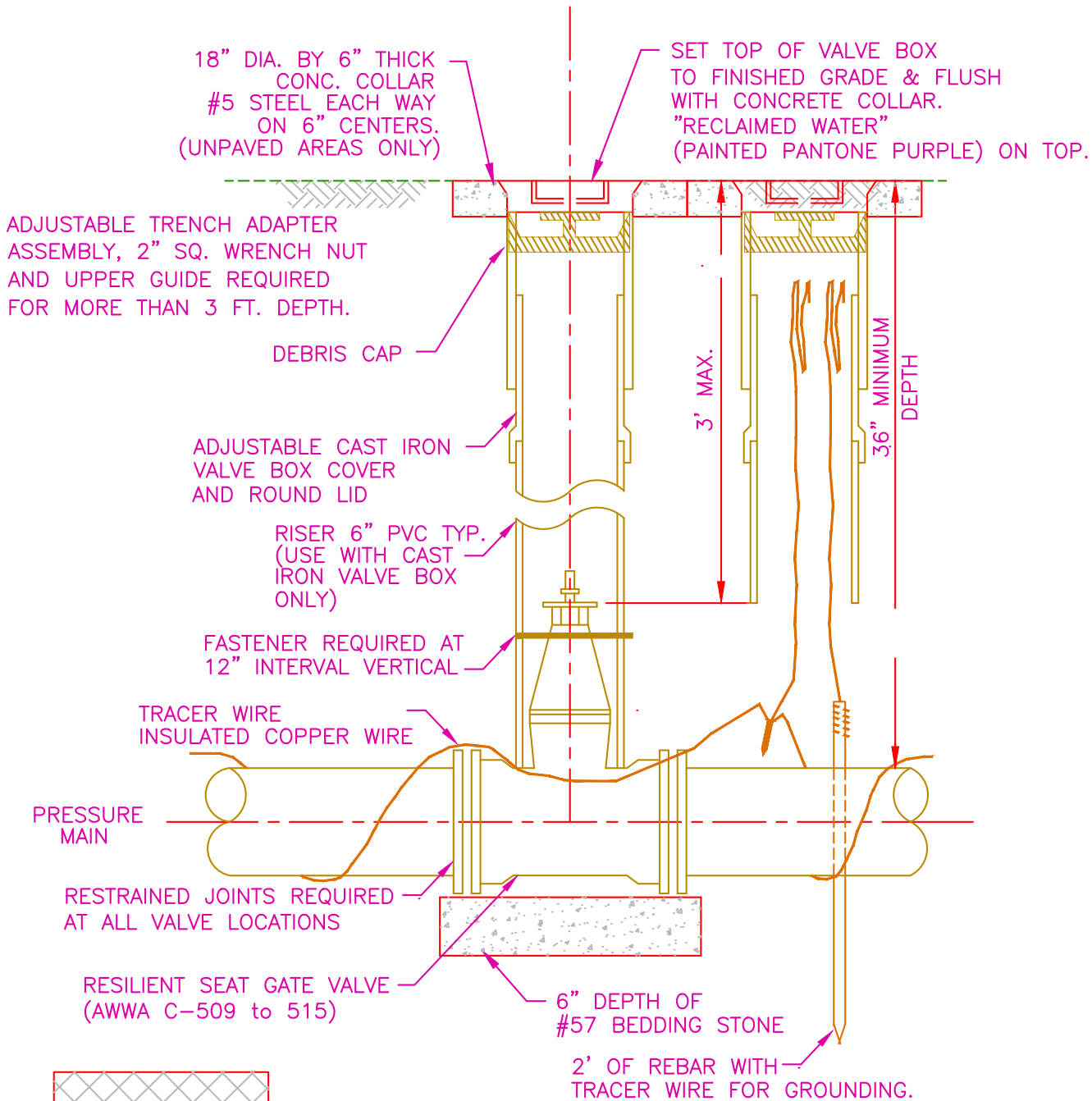
THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT



PAVEMENT CUT
AND PATCH
DETAIL
RW-8

ITB 20343-BE THINE POINT GENERATOR REPLACEMENT
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RECLAIMED WATER COVER

NOTES:

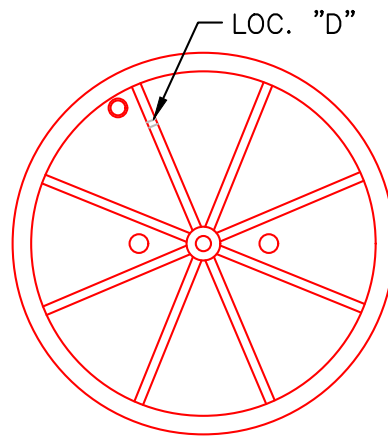
1. SEE CODB'S APPROVED PRODUCT LIST FOR ACCEPTABLE MANUFACTURERS.
2. INSTALL RESTRAINED JOINTS, AS REQUIRED, FROM DEFLECTION POINT IN BOTH DIRECTIONS (20' MIN.)
3. IF A RECLAIMED WATER METER BOX IS NOT WITH IN 200 FEET OF A VALVE & VALVE BOX, THEN IT REQUIRES AN ADDITIONAL VALVE BOX FOR TRACER WIRE.
4. TRACER WIRE SHALL BE A MINIMUM 12 GAUGE WITH A TENSILE STRENGTH/BREAK LOAD OF 452 LBS. SEE TRACER WIRE SPECIFICATION #15049



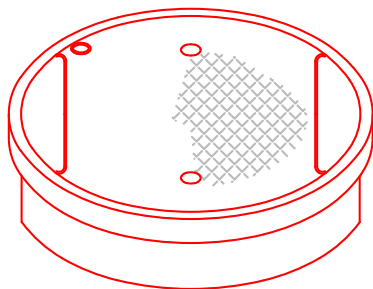
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Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
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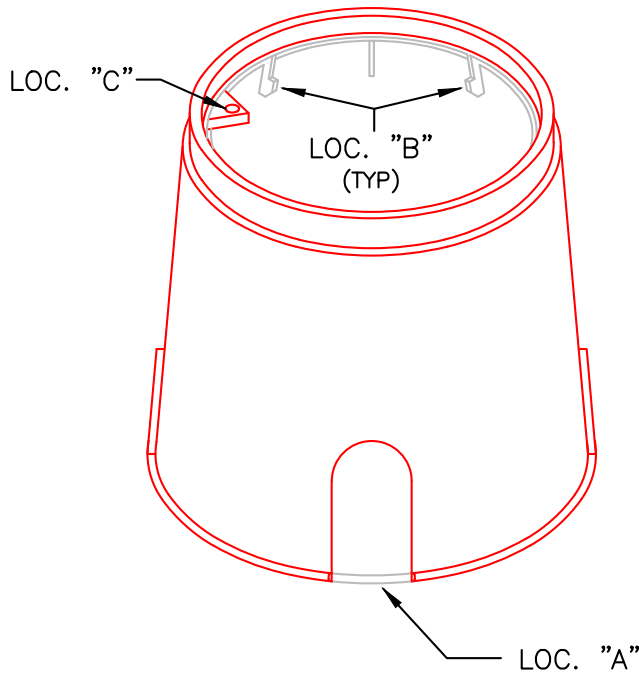
TOP OF LID



UNDERSIDE OF LID



CARSON #91012T LID, PANTONE PURPLE IN COLOR TO BE MARKED IN 1/2" RAISED LETTERS: "RECLAIMED WATER, DO NOT DRINK". THE LID SHALL HAVE TWO 1" DIAMETER FINGER HOLES. THE TWO LOCKING TABS ON THE LID ARE TO BE REMOVED. THE LID IS TO BE ATTACHED TO THE #91012 BOX AS DESCRIBED BELOW.



CARSON #91012 PLASTIC VALVE BOX PANTONE PURPLE IN COLOR. CONNECTOR STRAP AT LOCATION "A" TO BE REMOVED ALONG WITH TABS AT LOCATION "B". THE LID IS TO BE ATTACHED TO THE BOX WITH A 1/16" STRANDED STAINLESS STEEL CABLE, LOOPED AND SLEEVED THROUGH LOCATION "C" OF THE BOX AND LOCATION "D" OF THE LID TO ALLOW THE LID TO CLEAR THE BOX SIX TO SEVEN INCHES WHEN LIFTED.

NOTE: ONLY IF REQUIRED BY CITY



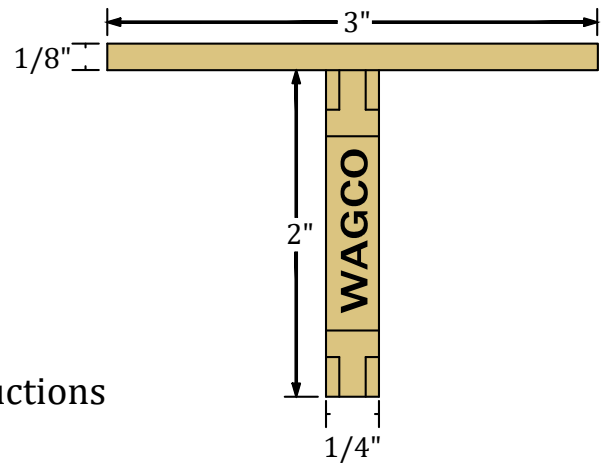
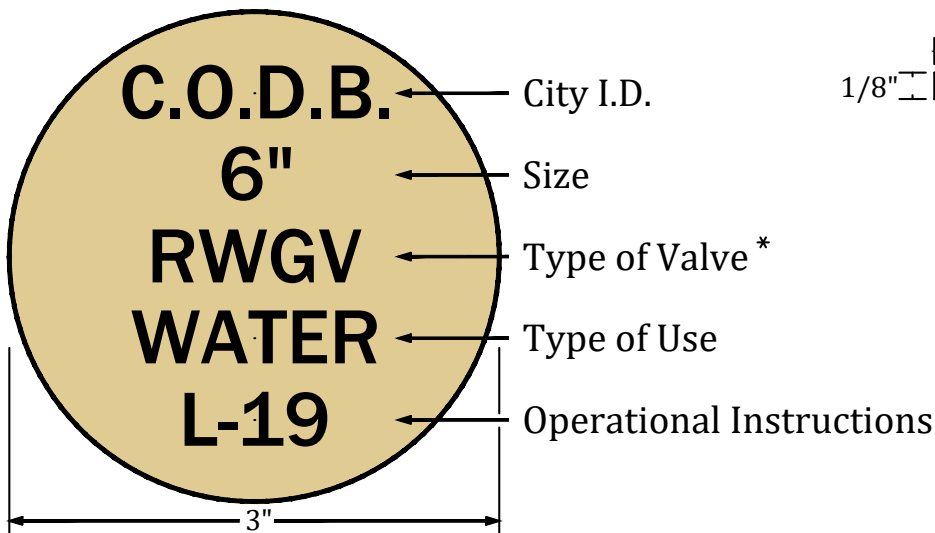
SPECIFICATIONS

ITEM: Brass ID Anti-Theft Marker

MATERIAL: SOLID CAST BRASS/Copper and Zinc Casting

DESCRIPTION: 3" Cast Brass Disc 1/8" Thick with 1/4" Brass "Theft Proof" Anchor pin.

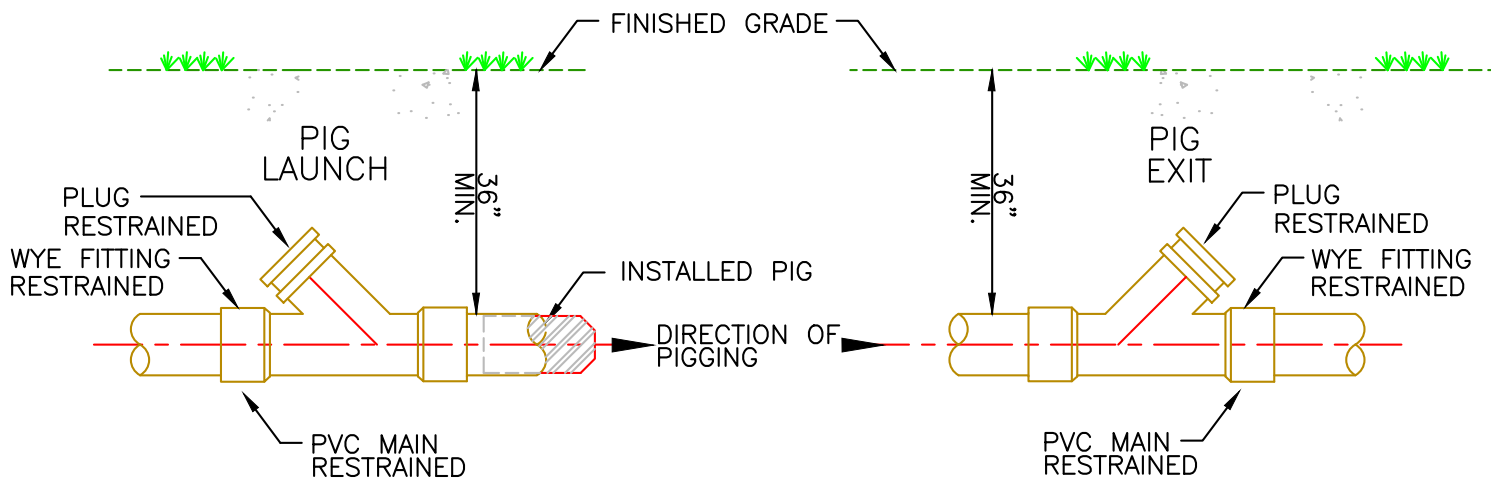
Top surface to be engraved with 1/4" to 3/8" Capital letters.



- * **PWGV** Potable Water Gate Valve
RWGV Reclaimed Water Gate Valve
SSGV Sanitary Sewer Gate Valve
SSPV Sanitary Sewer Plug Valve



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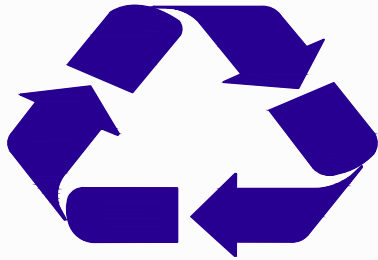
THE CITY OF DAYTONA BEACH
 UTILITIES DEPARTMENT



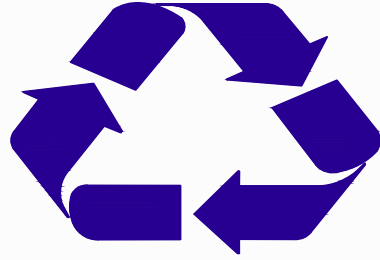
PIG LAUNCH
 AND RECEIVING
 DETAIL
 RW-12

ITB 20343-BEACHLINE POINT GENERATOR REPLACEMENT
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D.R.I.P.



RECLAIMED WATER



**Do Not Drink / No Beber
Do Not Swim / No Nadar**



12"

12"

NTS

THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT



RECLAIMED WATER
IN USE SIGN

TB 20343-0001 POINT GENERATOR REPLENISHMENT
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The City of Daytona Beach Utilities Department

List of Acceptable Products

Reclaimed Water

FY-19/20

Products that are submitted to the city engineering division prior to beginning project construction and are approved by the city may be substituted on a case by case basis for the products on the acceptable products list.

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Reclaimed Water Category 1 of 4: VALVES AND ACCESSORIES

- Air Release Valves
- Air Release Valves Enclosure
- Blow Off Valve
- Gate Valves General
- Gate Valves 16-inch through 48-inch
- Gate Valves 12-inch and Smaller (resilient seated only)
- Tapping Valves (resilient seated only)

Reclaimed Water Category 2 of 4: SERVICE MATERIALS

- Corporation Stops (ball type)
- Curb Stops Straight Valves Locking
- CTS Polyethylene Tubing
- Service Saddles

Reclaimed Water Category 3 of 4: PIPE MATERIALS

- Casing Spacers (all sizes)
- Casing End Seals
- Ductile Iron / Cast Iron Cement Lined
- PCCP Transmission Lines Greater than 30-inch
- PVC, DR-18

Reclaimed Water Category 4 of 4: PIPE FITTINGS

- Expansion Joints
- Fittings C153 SSB / C110 Flange
- Restrained Joints - Ductile Iron Pipe
- Tapping Sleeves
- Tapping Sleeves - Fabricated Steel

The City of Daytona Beach Utilities Department

List of Acceptable Products

Reclaimed Water

FY-19/20

Reclaimed Water Category 1 of 4: VALVES AND ACCESSORIES

Air, Vacuum or Air/Vac Combination Release Valves

- | | |
|------------------|-------------------------------|
| 1. APCO | 1. 200 |
| 2. ARI | 2. ARI, D-040 / S-050 / S-010 |
| 3. Crispin | 3. PL10 |
| 4. GA Industries | 4. 920 |
| 5. Val-Matic | 5. VM-38, VM-45 |

Air Release Valve Enclosure

- | | |
|----------------|---------------------------------------|
| 1. Water Plus | 1. No. 30 (131632)
No. 40 (171730) |
| 2. CDR | 2. Boxes & Vaults |
| 3. GlasMasters | 3. Boxes & Vaults |

Blow Off Valve

- | | |
|-------------------------|-----------------------|
| 1. Hydro Guard | 1. Automatic Blow Off |
| 2. Kupferle Foundry Co. | 2. Series TF 550 |
| 3. Water Plus | 3. Series VB 2000 |

Gate Valves - general (resilient seat)

AWWA C509 and C515

- | | |
|---------------------------|------------------|
| 1. American Flow Control | 1. C509 and C515 |
| 2. Mueller | 2. C509 (only) |
| 3. Clow | 3. C509 (only) |
| 4. Kennedy | 4. C509 (only) |
| 5. US Pipe | 5. C509 (only) |
| 6. American AVK | 6. C509 (only) |
| 7. East Jordan Iron Works | 7. C509 and C515 |

Gate Valves 16" - 48" (resilient seated only w/side actuators)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. Clow | 2. Series F-6100 |
| 3. Mueller | 3. Series A2361 |
| 4. US Pipe | 4. Series 5460 |
| 5. Kennedy | 5. Series 4571 |
| 6. M&H | 6. Series 4067 |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Reclaimed Water

FY-19/20

Gate Valves 12" and Smaller (resilient seated only)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. American R/D | 2. Series 2000 |
| 3. AVK | 3. Series 25 |
| 4. Clow | 4. Series F-6100 |
| 5. Kennedy | 5. Series 4571 |
| 6. M&H | 6. Series 4067 |
| 7. Mueller | 7. Series A2360 |
| 8. US Pipe | 8. Metroseal 250 |
| 9. Waterous | 9. Series 500 |

} McWane
} Owned

Tapping Valves (resilient seated only)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. AVK | 2. Series 25 |
| 3. Clow | 3. Series F-6114 |
| 4. Kennedy | 4. Series 4950 |
| 5. M&H | 5. Series 4751 |
| 6. Mueller | 6. T2360 & A2361 |
| 7. US Pipe | 7. Metroseal 250 |
| 8. Waterous | 8. Series 500 |

Reclaimed Water Category 2 of 4: SERVICE MATERIALS

Corporation Stops - Ball Type 1" & 2" (w / AWWA taper CC threads only / pack joint outlet for CTS)

- | | |
|----------------|-------------|
| 1. Ford | 1. FB1000 |
| 2. McDonald | 2. 4701B-22 |
| 3. Mueller | 3. H1500 |
| 4. Cambridge | 4. 301-AB |
| 5. James Jones | 5. J-1900W |

Locking Curb Stops - Straight Valves (curb stop to be ball type, reduced port FIP x FIP 1" x 1")

- | | |
|----------------|-------------|
| 1. Ford | 1. B11-233W |
| 2. McDonald | 2. 6101W |
| 3. Mueller | 3. B20200-R |
| 4. Cambridge | 4. 224-FF |
| 5. James Jones | 5. J-1900W |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Reclaimed Water

FY-19/20

Polyethylene Tubing - (purple w/ UV protection (SDR-9) 1" & 2" only)

1. Endot

1. Endotrace #14 wire

Service Saddles - Epoxy or nylon-coated stainless steel 18-8 type 304 straps

1. Smith Blair

1. Series 393, Series 397, Series 313

2. Ford

2. Series FC202

3. JCM

3. Series 406

4. Mueller

4. DR2S, DR2SOD

5. Romac

5. Series 202NS, Series 284

6. Cambridge

6. Series 403

7. Cascade

7. CNS2

Reclaimed Water Category 3 of 4: PIPE MATERIALS

Casing Spacers (all sizes) Stainless steel w/ vinyl runners

1. Advanced Products

1. Series SS

2. Cascade

2. Series CCS/ CCPS/ AZ

3. BMW

3. BMW-SS

4. Power Seal

4. Model 4810

5. PSI

5. Series S-G-2

6. PSI-Ranger

6. Ranger II

7. RACI

7. S/T, F/G, P/Q, M/N, E/H

Casing End Seals

1. Advanced Products

1. Model AC & AW

2. BMW

2. BMW wrap around end seal

3. Cascade

3. Model CCES

4. Power Seal

4. Model 4810ES

5. PSI

5. Model C, S, & W

The City of Daytona Beach Utilities Department

List of Acceptable Products

Reclaimed Water

FY-19/20

Ductile Iron/ Cast Iron Cement Lined (class 350)

1. American
2. Clow
3. Griffin
4. McWane
5. US Pipe

PVC, DR-18, Purple Pipe

1. Freedom
2. Diamond
3. NapCo
4. JM
5. Certa-Lok

Reclaimed Water Category 4 of 4: PIPE FITTINGS

Expansion Joint

1. EBAA Iron
2. Mercer
3. Metraflex
4. Proco

Fittings - C153 SSB/C110 (cement or fusion bonded epoxy lined)

- | | |
|-----------------------|------------------------------|
| 1. American | 1. Gradelock |
| 2. Assured Flow Sales | |
| 3. Griffin | |
| 4. Nappco/Sigma | |
| 5. Star | |
| 6. Union/Tyler | |
| 7. US Pipe | 7. Permafuse or cement lined |
| 8. SIP Industries | |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Reclaimed Water

FY-19/20

Restrained Joints - DIP

- | | |
|-------------------|---|
| 1. American | 1. Fast Grip Gasket |
| 2. EBAA Iron Inc. | 2. Mega-lug series 1100, series 1700 restraint, 2003 PV series RS-3800 restrainer |
| 3. Ford | 3. UFR-1400, 1300C series |
| 4. Star | 4. Star Grip series 3000, All Grip series 3600 |
| 5. US Pipe | 5. Field Loc Gasket |
| 6. Sigma | 6. One-LOK SLD (3-36") |
| 7. Mueller | 7. Aquagrip Restraint System |
| 8. Romac | 8. Grip Rings |
| 9. SIP Industries | 9. EZ - Grips |

Tapping Sleeves - Mechanical joint for all taps on cast iron, ductile iron, all taps including size on size

- | | |
|--------------------------|-------------------------------|
| 1. American Flow Control | 1. Series 2800 |
| 2. Clow | 2. Series F-5205, F-5207 |
| 3. Mueller | 3. Series H-615, H-616, H-619 |
| 4. US Pipe | 4. Series T-9 |
| 5. Smith Blair | 5. Style 622, Style 623 |
| 6. JCM | 6. Series 412, Series 414 |

SANITARY SEWER DETAILS

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SANITARY SEWER CONSTRUCTION & DESIGN STANDARDS

1. THE CITY'S UTILITIES DEPARTMENT SHALL BE GIVEN A MINIMUM OF 3 BUSINESS DAYS ADVANCE NOTICE (NOT INCLUDING HOLIDAYS) PRIOR TO BEGINNING ANY SANITARY SEWER CONSTRUCTION.
2. A PERMIT SHALL BE REQUIRED PRIOR TO ENGAGING IN ANY DEWATERING ACTIVITIES, OR IN ACTIVITIES, OR IN ANY CONSTRUCTION ACTIVITY THAT CHANGES THE IMPERVIOUS AREA OF LAND. DEWATERING ACTIVITIES INCLUDE THE REMOVAL OF GROUND WATER FROM A CONSTRUCTION SITE, ENCLOSED VAULT, COFFERDAM, OR TRENCHERS, ALLOWING CONSTRUCTION OR MAINTENANCE TO BE ONE IN THE DRY, OR ANY ACTIVITY WHICH CHANGES THE IMPERVIOUS AREA OF LAND. SITE SPECIFIC DEWATERING PERMITS SHALL REQUIRE PAYMENT OF A PER ACRE FEE BASED ON THE SIZE OF THE DEVELOPMENT. GENERAL PURPOSE PERMITS SHALL REQUIRE AN ANNUAL FEE BASED ON A BI-ANNUAL SCHEDULE OF DEWATERING ACTIVITIES DISCHARGING DIRECTLY INTO THE CITY'S MS4 CONVEYANCE SYSTEM. DEWATERING PERMIT APPLICATIONS CAN BE FOUND AT <https://ww.codb.us/indez.aspx?nid=262>. FEES ARE SUBJECT TO ARTICLE 7, SECTION 7.2 OF THE LAND DEVELOPMENT CODE AND MUST BE SUBMITTED WITH THE PERMIT APPLICATION TO CITY OF DAYTONA BEACH STORM WATER COORDINATOR AT 125 BASIN STREET, SUITE 100, DAYTONA BEACH, FLORIDA 32114 PRIOR TO ANY USE OF MS4. FAILURE TO COMPLY WILL RESULT IN THE IMMEDIATE TERMINATION OF ACCESS TO THE CITY'S MS4 SYSTEM.
3. UPON COMPLETION, THE CONTRACTOR SHALL PROVIDE THE CITY UTILITIES DEPARTMENT WITH A CCTV INSPECTION LOG ON DVD AND A PRINTED REPORT FOR ALL GRAVITY MAINS AND LATERALS CONSTRUCTED. ALL WORK, WITH THE EXCEPTION OF FINAL GRADE ADJUSTMENT TO MANHOLES AND BENCHES SHALL BE COMPLETED PRIOR TO COMMENCING THE CCTV INSPECTION. THE CONTRACTOR SHALL COORDINATE THE CCTV INSPECTION TIME WITH THE CITY UTILITY INSPECTOR PRIOR TO INITIATING THE WORK. FINAL PAVING SHALL NOT COMMENCE UNTIL APPROVAL IS RECEIVED FROM THE CITY UTILITY INSPECTOR.
4. SEWER LATERAL LOCATIONS SHALL BE MARKED ALONG THE OUTSIDE OF THE CURB WITH A SAW CUT "V" OR BY A METAL TAB SET INTO THE PAVEMENT.
5. THE CONTRACTOR SHALL BE REQUIRED TO PIG ALL FORCE MAINS EQUAL TO OR GREATER THAN 6" IN DIAMETER AND PRIMARY TRANSMISSION MAINS LOCATED ON COLLECTOR AND ARTERIAL ROADWAYS. LAUNCHING AND EXTRACTION POINTS SHALL BE DETERMINED BY THE CITY.
6. WITH RESPECT TO TIE-IN CONNECTIONS AND CORING OPERATIONS, THE CITY RESERVES THE RIGHT TO REQUIRE CONNECTIONS TO BE PERFORMED DURING PERIODS OF LOW FLOW (MIDNIGHT TO 6:00 A.M.) (IN ORDER TO MINIMIZE SERVICE DISRUPTION TO EXISTING CUSTOMERS.
7. ALL WORK ON SANITARY SEWER FACILITIES OWNED OR PROPOSED TO BE OWNED BY THE CITY SHALL BE PERFORMED BY AN UNDERGROUND UTILITY CONTRACTOR OR GENERAL CONTRACTOR LICENSED IN THE STATE OF FLORIDA AND REGISTERED WITH THE CITY.
8. UPON CONSTRUCTION COMPLETION AND ACCEPTANCE OF THE SYSTEM, IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ENSURE THAT THE SYSTEM IS PROPERLY CERTIFIED AND ACCEPTED BY THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION AND AS-BUILTS ARE PROVIDED TO THE CITY'S UTILITIES DEPARTMENT PRIOR TO ANY USE OF THE SYSTEM.
9. PLANS SHALL DIMENSION THE LOCATION OF ALL FORCE MAINS, VALVES, MANHOLES & LATERALS FROM THE BASELINE OF CONSTRUCTION AND FROM THE RIGHT-OF-WAY LINE.
10. LANDSCAPE PLANS SHALL CLEARLY DEPICT THE LOCATION OF PLANTINGS RELATIVE TO THE LOCATION OF PUBLIC UTILITIES AND STORM WATER INFRASTRUCTURE.
11. THE CITY'S AS-BUILT DRAWING REQUIREMENTS ARE ATTACHED TO THE BACK OF THE UTILITIES DEPARTMENT'S STANDARD DETAILS.



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SANITARY SEWER CONSTRUCTION & DESIGN STANDARDS (CONT'D)

12. ALL GRAVITY SANITARY SEWER MAINS SHALL BE A MINIMUM OF 8" DIAMETER. COMMERCIAL SERVICE LATERALS SHALL BE GREEN AND A MINIMUM OF 6" IN DIAMETER. OR LARGER. ALL SINGLE FAMILY RESIDENTIAL SERVICE LATERALS SHALL BE 6" SINGLE SERVICES WITH CLEAN OUTS INSTALLED AT PROPERTY LINES.
13. ALL GRAVITY SANITARY SEWER MAINS SHALL BE GREEN PVC SDR-26, ASTM D-3034, OR C-900 DR-18 MINIMUM PRESSURE CLASS 150. IN PLACES WHERE A MINIMUM COVER OF 4 FEET CANNOT BE MAINTAINED OR IN DEPTHS OF 10 FEET OR GREATER C-900 OR C-905 GREEN PVC DR-18, MINIMUM PRESSURE CLASS 150 SHALL BE USED.
14. FOR SINGLE FAMILY HOMES, SINGLE SIX INCH SEWER SERVICE LATERALS SHALL BE CONSTRUCTED AT EACH LOT OR UNIT AND LOCATED ON THE DOWNSTREAM SIDE OF THE LOT CENTER LINE. THESE SERVICES SHALL BE EXTENDED 4 FEET ABOVE GROUND AT THE PROPERTY LINE WITH A PVC RISER AND PLUG EASILY VISIBLE FROM THE ROAD. RUBBER SEAL FITTINGS SHALL BE USED ON ALL LINES. NO GLUED JOINTS ARE PERMITTED ON LATERALS.
15. FOR MULTI-FAMILY AND COMMERCIAL SITES, SIX INCH MINIMUM SEWER SERVICES AND CLEANOUTS SHALL BE PROVIDED AS APPROVED BY THE CITY.
16. FORCE MAINS LESS THAN 18" MAY USE PVC C900 OR C905 DR-18. FORCE MAINS 18" AND LARGER SHALL BE DUCTILE IRON PIPE (D.I.P.), CLASS 350, EPOXY LINED. ALL NON DUCTILE IRON PIPE HORIZONTAL DIRECTIONAL DRILL FORCE MAINS SHALL HAVE A MINIMUM WORKING PRESSURE OF 160 PSI. THE CITY MAY REQUIRE A HIGHER PRESSURE RATING DEPENDING ON SITE CONDITIONS. INSIDE DIAMETER OF NON D.I.P. HORIZONTAL DIRECTIONAL DRILL PIPE SHALL MATCH THE INSIDE DIAMETER OF CONNECTING PIPES. DIRECTIONAL DRILLS SHALL HAVE FUSED MJ ADAPTERS.
17. FORCE MAIN MINIMUM DEPTH OF COVER SHALL BE 48". ALL FORCE MAINS SHALL BE DISTINCTLY MARKED BY GREEN STRIPES OR COLORED GREEN.
18. ALL FITTINGS, VALVES, ECT. SHALL BE DUCTILE IRON (MJ OR FLANGED) AND RESTRAINED. ALL FORCE MAINS SHALL USE THRUST RESTRAINT AS CALCULATED BY A PROGRAM AVAILABLE AT (EBAA.COM).
19. ALL RESTRAINED PIPE BELL JOINTS SHALL USE BELL RESTRAINTS. GRIPPER TYPE GASKETS CAN BE USED FOR DUCTILE IRON PIPE JOINTS.
20. AS A GENERAL RULE, THE NUMBER OF JOINTS SHALL BE LIMITED WHENEVER POSSIBLE. IN SPECIAL CASES WHERE A POINT REPAIR TO AN 8" TO 12" PVC SEWER MAIN IS REQUIRED, THE PROPER RIGID WRAP AROUND SLEEVE MAY BE ALLOWED BY CITY SPECIAL APPROVAL.
21. ALL IN-LINE SANITARY SEWER FORCE MAIN VALVES SHALL BE PLUG VALVES UNLESS OTHERWISE NOTED. VALVES SHALL BE INSTALLED AT EACH END OF THE FORCE MAIN AND ON STUB OUTS.
22. ALL C-900 PVC PIPE REQUIREMENTS REFERENCE THE C-900 STANDARDS. DR UPGRADES FOR BURST PROTECTION MAY BE REQUIRED WHEN USING THE C-900 STANDARDS.
23. MINIMUM GRAVITY SANITARY SEWER SLOPES ARE AS FOLLOWS: 8" PIPE 0.40%, 10" PIPE 0.28%, 12" PIPE 0.22%, 15" PIPE 0.15%, OR OTHERWISE NOTED BY UTILITIES DEPT.
24. GRAVITY SANITARY SEWER LINES SHALL BE INSTALLED WHENEVER POSSIBLE UNDER PAVED AREAS WITHIN PUBLIC RIGHT-OF-WAYS. UTILITY EASEMENTS SHALL BE PROVIDED WHENEVER PUBLICLY-OWNED SEWER LINES ARE CONSTRUCTED OUTSIDE OF A PUBLIC RIGHT-OF-WAY.
25. GRAVITY SANITARY SEWER LINE CONSTRUCTION SHALL BE ACCOMPLISHED BY THE USE OF A LASER INSTRUMENT UNLESS ANOTHER METHOD IS APPROVED BY THE CITY.
26. DURING PIPE INSTALLATION DEWATER THE GROUND SUFFICIENTLY TO KEEP THE GROUNDWATER ELEVATION A MINIMUM OF 6" BELOW THE PIPE BEING INSTALLED WITHIN THE AREA OF THE TRENCH.
27. ALL PIPES SHALL BE INSTALLED ON A FIRM FOUNDATION. SOFT OR SPONGY BEDDING FOR PIPES IS NOT ACCEPTABLE. ANY UNSUITABLE MATERIAL SHALL BE REMOVED AND REPLACED WITH A DRY, COMPACTED, GRANULAR MATERIAL SATISFACTORY TO THE CITY.
28. ON ALL EXCAVATION AND BACKFILLING THE CONTRACTOR SHALL PROVIDE ADEQUATE SHEETING AND BRACING IN ORDER TO PROVIDE A SAFE WORKING ENVIRONMENT.
29. ALL TRENCHES SHALL BE BACKFILLED WITH ACCEPTABLE MATERIAL AND COMPACTED TO THE SPECIFIED MINIMUM COMPACTION (95% IN UNPAVED AREAS AND 98% IN PAVED AREAS) AND THE OPTIMUM DENSITY BASED ON THE AASHTO T-180 MODIFIED PROCTOR TEST.
30. ALL GASKETS SHALL BE LUBRICATED BEFORE INSTALLATION.



SANITARY SEWER CONSTRUCTION & DESIGN STANDARDS (CONT'D)

31. THE CONTRACTOR SHALL INSTALL A #12-GAUGE MINIMUM COPPER TRACER WIRE TAPED TO THE TOP OF THE PIPE AT INTERVALS NO GREATER THEN 4- FEET. COPPER WIRE SHALL HAVE A MIN. TENSILE STRENGTH/BREAK LOAD OF 452 LBS. AND REQUIRES APPROVAL BY THE CITY FOR THE FULL LENGTH OF ALL SEWER FORCE MAINS. THE PIPE LOCATOR TAPE SHALL BE INSTALLED BETWEEN 15" AND 24" BELOW FINISHED GRADE OR AS DIRECTED BY THE MANUFACTURER. TAPE SHALL BE COLOR CODED GREEN FOR FORCE MAINS. LOCATER WIRE SHALL TERMINATE AT A LOCATION AND IN A MANNER CONVENIENT FOR CITY LOCATER STAFF.
32. TRACER WIRE SHALL BE TESTED FOR CONTINUITY UNDER SUPERVISION OF A CITY REPRESENTATIVE AFTER INSTALLATION.
33. ALL SEWER LINES CONSTRUCTED OUTSIDE OF PUBLIC RIGHT-OF-WAYS WITHIN SIDE YARDS, BACKYARDS, AND OTHER POORLY ACCESSIBLE AREAS SHALL BE CONSTRUCTED OF GREEN C-900 PVC. ABSOLUTELY NO USE OF PLASTIC STYRENE FITTINGS SHALL BE ALLOWED.
34. ALL LOCAL COLLECTION SANITARY SEWER MANHOLES SHALL BE PRECAST WITH A MINIMUM INSIDE DIAMETER OF 4 FEET. MANHOLES OVER 6 FEET DEEP SHALL HAVE A MINIMUM 4 FT TALL PRE-CAST BOTTOM SECTION.
35. STANDARD MANHOLES SHALL BE LOCATED AT INTERVALS NOT EXCEEDING 400 FEET.
36. MANHOLE RIMS SHALL BE FLUSH WITH THE FINISH GRADE ELEVATION IN PAVED AREAS AND A MINIMUM OF 0.5 FEET AND MAXIMUM OF 1.0 FOOT ABOVE GRADE IN UNPAVED AREAS.
37. THE CONTRACTOR SHALL CONSTRUCT SANITARY SEWER MANHOLES IN SUCH A WAY THAT SEWER LINES DO NOT INTERSECT SEALED JOINTS BETWEEN SECTIONS OF THE MANHOLE.
38. INDIVIDUAL SANITARY SERVICES SHALL NOT BE CONNECTED DIRECTLY INTO MANHOLES AND MUST BE CONNECTED TO SEWER MAINS BY USE OF WYE CONNECTIONS UNLESS OTHERWISE APPROVED BY THE CITY.
39. SANITARY SEWER DROP MANHOLES SHALL ONLY BE USED UNDER SPECIAL CONDITIONS AS APPROVED BY THE CITY. DROPS LESS THAN 3.0' ARE NOT ALLOWED. INSIDE DROPS ARE NOT ALLOWED.
40. SANITARY SEWER MANHOLES WITH SEWER FORCE MAINS DISCHARGING DIRECTLY INTO THEM SHALL BE FIBERGLASS OR POLY-ETHYLENE LINED. RETRO-FITTING OF MANHOLES WITH LINERS IS REQUIRED WHEN NEW CONNECTIONS ARE MADE. FIBERGLASS SHALL BE A MINIMUM 1/2" THICK UNLESS APPROVED OTHERWISE BY THE CITY. OTHER LINING METHODS AND MATERIALS MAY BE CONSIDERED ON A CASE BY CASE BASIS. UNDER CIRCUMSTANCES WHERE HYDROGEN SULFIDE IS A SIGNIFICANT CONCERN, MANHOLES UPSTREAM AND/OR DOWNSTREAM OF THE FORCE MAIN TIE-IN MAY BE REQUIRED TO HAVE LININGS INSTALLED.
41. EZ-WRAP PLASTIC, AS MANUFACTURED BY PRESS SEAL GASKET CORPORATION, SHALL BE USED ON THE OUTSIDE OF ALL MANHOLE AND WETWELL JOINTS. APPLY ONE LAYER OF 9" WRAP CENTERED ON EACH JOINT. A CITY INSPECTOR SHALL INSPECT ALL JOINT SEALS PRIOR TO BACKFILLING OPERATIONS.
42. CONTRACTOR FOR DEVELOPMENTS WITH THE POTENTIAL TO DISCHARGE INDUSTRIAL OR COMMERCIAL WASTE INTO THE SEWER SYSTEM SHALL CONSTRUCT AND MAINTAIN AT THE OWNER'S EXPENSE A SUITABLE CONTROL MANHOLE OR MANHOLES DOWNSTREAM OF ANY TREATMENT, STORAGE, OR OTHER APPROVED WORKS, PRIOR TO THE CITY'S COLLECTION SYSTEM TO FACILITATE OBSERVATION, MEASUREMENT, AND SAMPLING OF ALL WASTE, INCLUDING ALL DOMESTIC SEWAGE FROM THE ESTABLISHMENT.
43. CONTROL MANHOLE OR MANHOLES SHALL BE CONSTRUCTED AT LOCATIONS EASILY ACCESSIBLE AT ALL TIMES TO CITY PERSONNEL FOR SAMPLING.
44. SANITARY SEWER LIFT STATIONS AND FORCE MAINS SHALL BE APPROVED BY THE CITY. LIFT STATIONS SHALL BE CONSTRUCTED WITH A MINIMUM WET WELL AS SHOWN IN THE LIFT STATION DETAIL.
45. IT SHALL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO PREPARE AND SUBMIT FLOTATION CALCULATIONS TO SIZE THE BASE OF THE WET WELL, AND ANY MANHOLES AS DEEMED NECESSARY BY THE CITY.
46. ALL FITTINGS SHALL MEET THE MINIMUM RESTRAINT REQUIREMENTS PER ANSI/AWWA/DIPRA, AND ALL PRESSURE PIPES UNDER ROADWAYS SHALL BE RESTRAINED.



SANITARY SEWER CONSTRUCTION & DESIGN STANDARDS

TESTING REQUIREMENTS:

1. THE CONTRACTOR SHALL EMPLOY AN INDEPENDENT TESTING LABORATORY AT HIS OWN EXPENSE TO INSURE COMPACTION OF ALL FILL MATERIAL IS COMPLETED PROPERLY. TESTS SHALL BE DONE ONE FOOT ABOVE THE PIPE AND AT ONE FOOT VERTICAL INTERVALS UNTIL FINAL GRADE IS REACHED. TESTS SHALL BE COMPLETED A MINIMUM FREQUENCY OF ONE SET OF TESTS EACH 300 FOOT LENGTH OF PIPING AND ONE ADDITIONAL SET OF TESTS AT EVERY MANHOLE. IDENTIFICATION OF TEST LOCATIONS SHALL BE CLEARLY INDICATED ON TEST REPORTS. TEST RESULTS SHALL BE FORWARDED PROMPTLY TO THE CITY'S DESIGNATED SITE INSPECTOR.
2. ALL TESTING REQUIRED BY THE CITY SHALL BE PAID FOR BY THE CONTRACTOR / DEVELOPER.
3. THE CITY OF DAYTONA BEACH RESERVES THE RIGHT TO REQUIRE THE DEVELOPER TO PERFORM VACUUM TESTING OF ALL SANITARY MANHOLES AND TO AIR TEST SEWER MAINS.
4. ALL PROPOSED SEWER FORCE MAINS SHALL BE FLUSHED, PRESSURE TESTED AND CLEARED FOR SERVICE IN ACCORDANCE WITH THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION REQUIREMENTS. THE CONTRACTOR SHALL NOTIFY THE CITY'S DESIGNATED SITE INSPECTOR AT LEAST 3 BUSINESS DAYS PRIOR TO BEGINNING A FULL-DIAMETER FLUSH OF THE MAINS FOR PRESSURE TESTING.
5. SANITARY SEWER FORCE MAINS SHALL BE PRESSURE TESTED TO 100 PSI FOR 2 HOURS WITH ALLOWABLE LEAKAGE BASED ON THE TABLE BELOW.

ALLOWABLE LEAKAGE PER 1000 FT. OF PIPELINE * -GPH

AVERAGE TEST PRESSURE (PSI)	NOMINAL PIPE DIAMETER - INCHES																		AVERAGE TEST PRESSURE (PSI)
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64	
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60	9.56	10.19	450
400	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11	9.01	9.61	400
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58	8.43	8.99	350
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.32	300
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72	7.47	7.97	275
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41	7.12	7.60	250
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03	6.76	7.21	225
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73	6.37	6.80	200
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36	5.96	6.36	175
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97	5.52	5.88	150
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53	5.04	5.37	125
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05	4.50	4.80	100

* IF THE PIPELINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE ALLOWABLE LEAKAGE WILL BE THE SUM OF THE COMPUTED LEAKAGE FOR EACH SIZE.

$$L = \frac{SD \sqrt{P}}{133,200}$$

WHERE:

- L = ALLOWABLE LEAKAGE, IN GALLONS PER HOUR
- S = LENGTH OF PIPE TESTED, IN FEET
- D = NOMINAL DIAMETER OF PIPE, IN INCHES
- P = AVERAGE TEST PRESSURE DURING THE LEAKAGE TEST, IN POUNDS PER SQUARE INCH (GAUGE)



Waste Water - Table of Daily Flows

Types of Establishments	
Apartments	300 gpd
Banquet hall (per seat)	15 gpd
Bars and cocktail lounges	5 gpd
Bathroom (non-residential)	250 gpd
Beauty shop (per seat)	150 gpd
Boarding schools (students and staff)	50 gpd
Boarding houses	50 gpcd
Bowling alleys (toilet wastes only, per lane)	75 gpd
Country clubs, per member	15 gpcd
Day schools (with cafeteria, no gymnasium or showers)	8 gpcd
Day schools (with cafeterias, gymnasiums & showers)	20 gpcd
Day workers at office and schools	15 gpcd
Dentist, per wet chair	200 gpd
Drive-in theaters (per car space)	5 gpd
Factories (with showers)	25 gpcd
Factories (no showers)	10 gpd/100 sq. ft.
Funeral home	10 gpd/100 sq. ft.
Gas stations (no car wash)	400 gpd
Hospitals (with laundry) (per bed)	200 gpd
Hospitals (no laundry) (per bed)	150 gpd
Hotels and motels (per room & unit)	100 gpd
Laundromat (per washing machine)	200 gpcd
Mobile home park (per trailer)	200 gpd
Movie theaters, auditoriums, churches (per seat)	3 gpd
Nursing homes	125 gpd/100 sq. ft.
Office buildings	10 gpd/100 sq. ft.
Public institutions (other than those listed herein)	75 gpcd
Restaurants (per seat)	35 gpd
Restaurants (take-out)	35 gpd/100 sq. ft. (350 gpd min.)
Restaurants (Fast Food) (per seat)	25 gpd
Single-family residence	300 gpd
Townhouse residence	300 gpd
Shopping centers	10 gpd/100 sq. ft.
Stadiums, frontons, ball parks, etc. (per seat)	3 gpd
Stores, without kitchen wastes	5 gpd/100 sq. ft.
Speculative buildings	10 gpd plus 10 gpd/100 sq. ft.
Warehouses	30 gpd plus 10 gpd/1,000 sq. ft.

*** CITY WILL CONSIDER ALTERNATE FLOW RATES FOR VARIOUS ESTABLISHMENTS IF THE EOR CAN PROVIDE SUPPORTING DOCUMENTATION.***

SEWER DESIGN BASIS

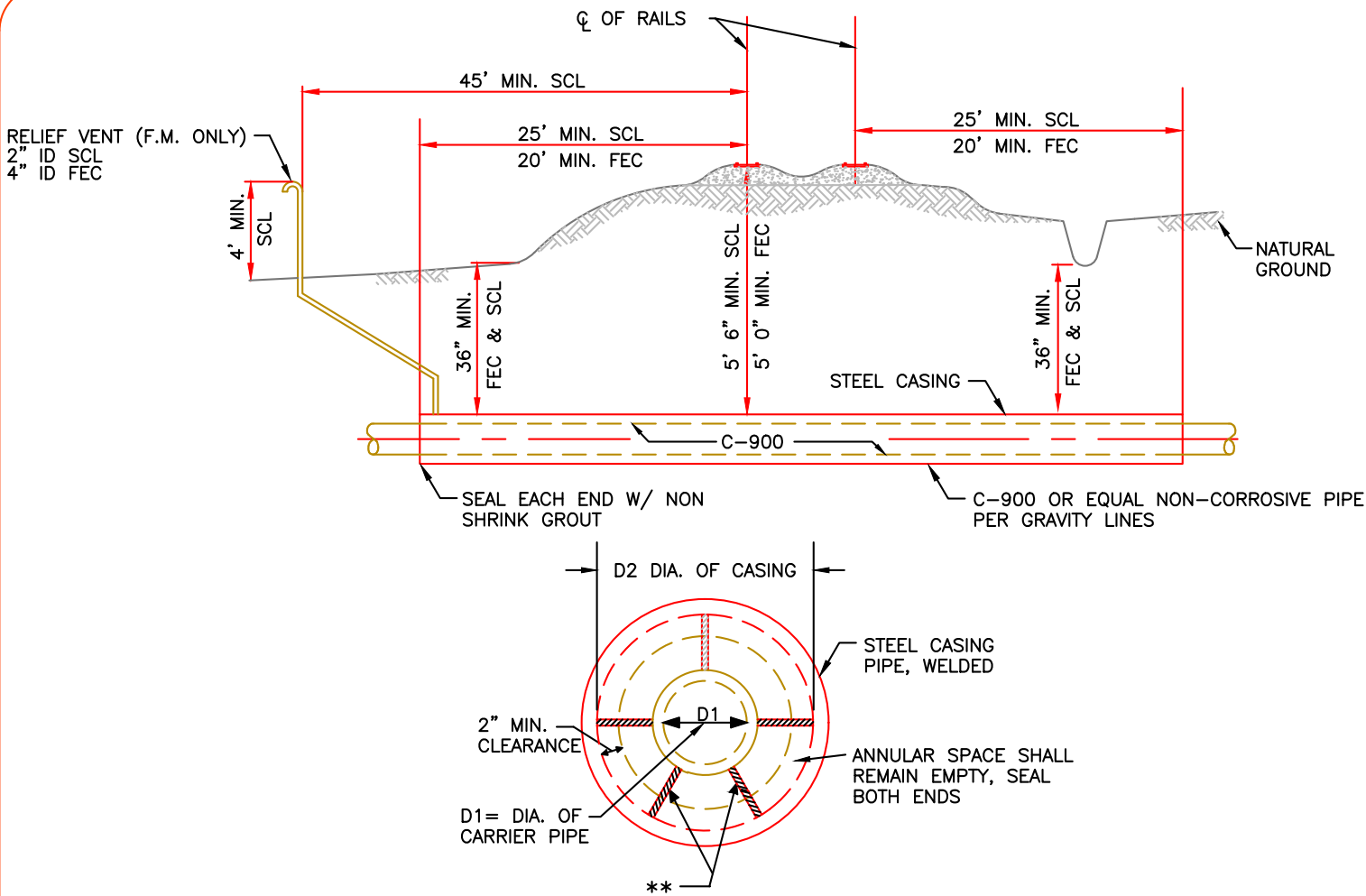
AVERAGE DAILY FLOW AND PEAK DESIGN FLOW

ENGINEER TO DETERMINE AVERAGE DAILY AND PEAK DESIGN FLOW

DESIGN CALCULATIONS

DEVELOPER'S ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all sewer projects. Calculations shall show that sewers will have sufficient hydraulic capacity to transport all design flows.





TYPICAL RAILROAD CROSSING NTS

NOTE TO ENGINEER: CROSSING DETAIL SHALL BE TO SCALE AND SHOW EXISTING UTILITIES, CLEARANCES, CASING LENGTH, LOCATION OF PAVED ROAD AND LIMITS OF RIGHT-OF-WAY

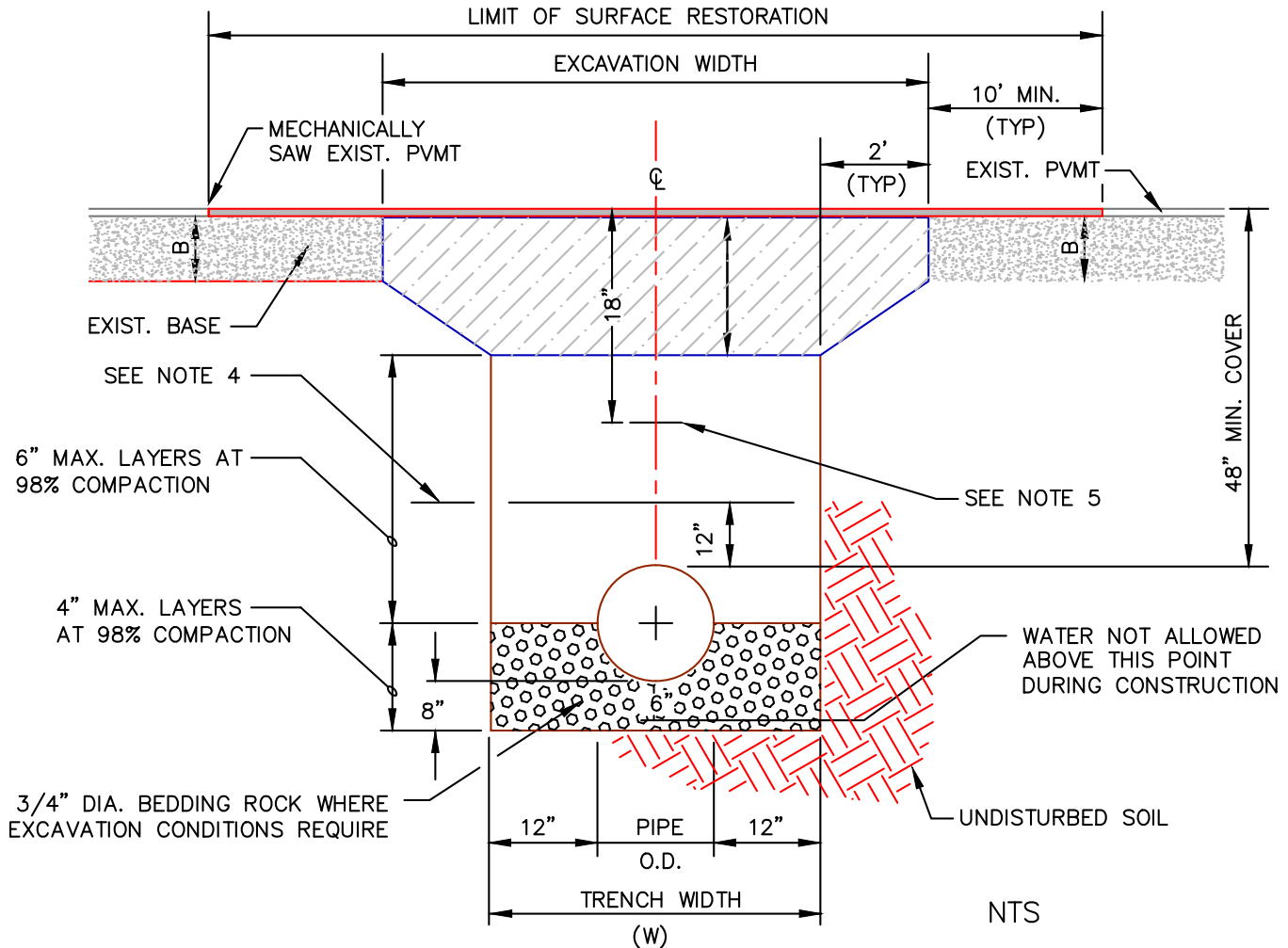
CARRIER PIPE AND CASING PIPE SIZES (MIN.)														
CARRIER PIPE NOM. DIA. (D1)	4	6	8	10	12	14	16	18	20	24	30	36	42	48
CASING PIPE NOM. DIA. (D2)	14	16	18	22	24	30	30	30	36	36	48	54	60	66
WALL THICKNESS-INCHES *	PER AUTHORITY HAVING JURISDICTION													

NOTES:

1. MINIMUM COVER FOR TOP OF CASING TO R/R BASE SHALL BE 5.6' (SCL), 5.0' (FEC). MINIMUM COVER FOR TOP OF CASING ON ALL GROUND COVER SHALL BE 3.0'.
 2. ROTATION OF CARRIER PIPE INSIDE THE CASING PIPE WILL NOT BE PERMITTED. RESTRAINED MECHANICAL OR FLANGED JOINT PIPE SHALL BE USED TO HELP PREVENT SUCH ROTATION.
 3. SHOP DRAWINGS SHALL BE SUBMITTED OF CASING & CARRIER PIPE INSTALLATION FOR APPROVAL PRIOR TO FABRICATION OF PIPING, CASING, AND APPURTENANCES. CERTIFICATION OF CASING PIPE IS REQUIRED.
 4. GROUTING OF SPACE BETWEEN CASING AND CARRIER PIPE NOT REQUIRED UNLESS NEGATIVE FLOTATION EXISTS.
 5. WELDING OF CASING PIPE TO BE DONE BY CERTIFIED WELDER. ALL ENDS OF CASING PIPE SHALL BE CHAMFERED PRIOR TO ANY WELDING. SEAL END OF CASING PIPE WITH NON SHRINK GROUT.
 6. CITY INSPECTOR SHALL BE PRESENT THROUGHOUT ALL BORE AND JACK ACTIVITIES.
- * WITHIN THE CITY OF DAYTONA BEACH RIGHT OF WAY, USE CURRENT FDOT STANDARDS.
- ** SPECIALLY DESIGNED SPACERS SHALL BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. USE CASCADE CASING SPACERS OR PRE-APPROVED EQUAL.



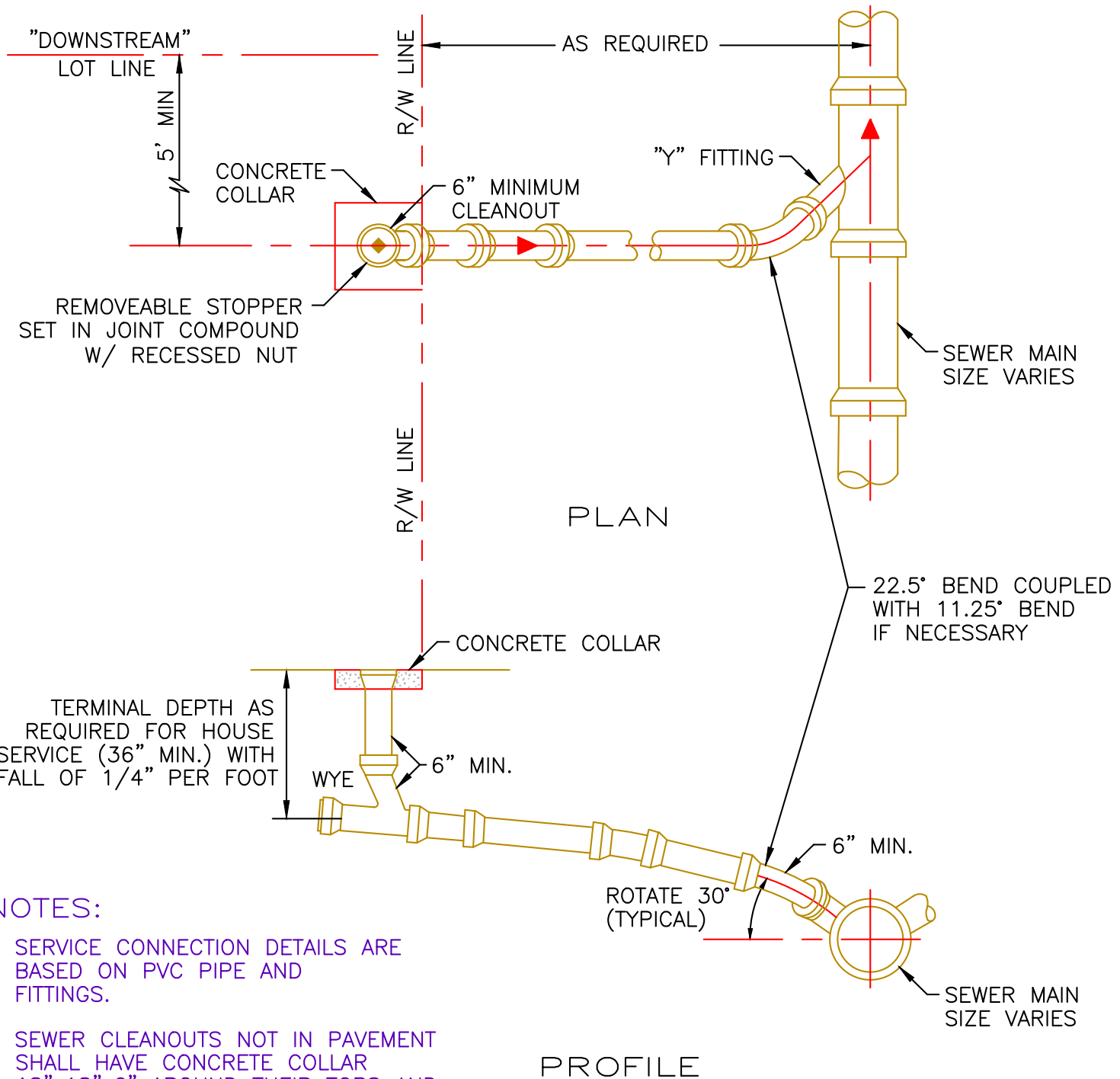
NOTE: TO DETERMINE THE MOST CURRENT REQUIREMENTS FOR STABILIZATION MATERIAL, BASE MATERIAL, AND ASPHALT MATERIAL PATCH AND THE REPLACEMENT DIMENSIONS CONTACT CITY ENGINEER IN THE PUBLIC WORKS DEPT AT 386-671-8610.



NOTES:

1. WHERE SOIL CONDITIONS CAN NOT BE MAINTAINED AS SHOWN ABOVE, PROVIDE APPROVED METHOD OF CONSTRUCTION.
2. SHEETING WILL BE REQUIRED AS DETERMINED IN THE FIELD.
3. COMPACTION PERCENTAGES SHOWN REFER TO A.A.S.H.T.O. T-180. PROVIDE COMPACTION TEST REPORTS TO CITY INSPECTOR.
4. MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LEVEL.
5. FOR PVC PIPE ONLY – INSTALL METALLIC TAPE AND UF #12 INSULATED SINGLE STRAND COPPER WIRE OVER FULL LENGTH OF PIPE.
6. THE CONTRACTOR SHALL, UNLESS OTHERWISE NOTED, RESTORE ALL STRIPING, PAVEMENT MARKINGS, DELINEATORS, SIGNAGE AND TRAFFIC SIGNAL SYSTEM COMPONENTS DISTURBED DURING CONSTRUCTION ACTIVITIES. COST OF ALL WORK AND MATERIALS WILL BE CONSIDERED INCIDENTAL TO PATCH MATERIAL ITEMS.



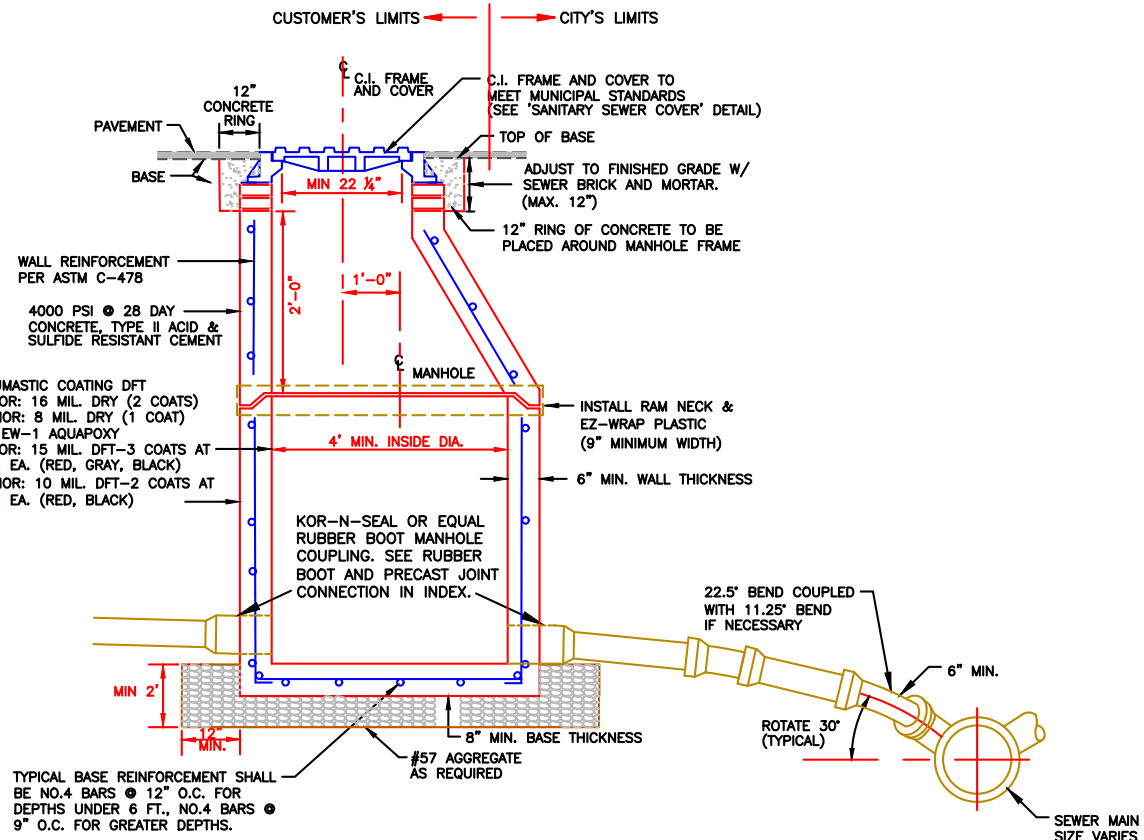
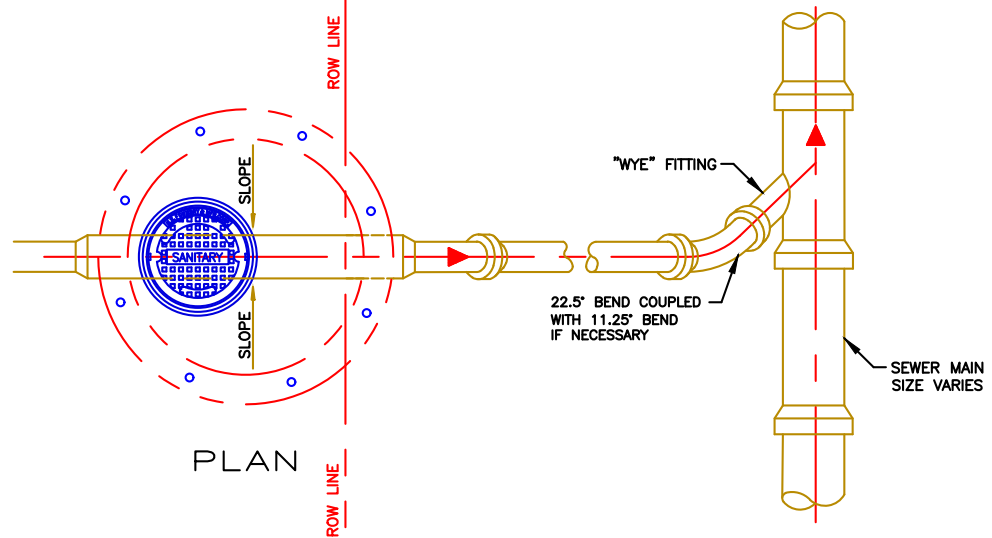


NOTES:

1. SERVICE CONNECTION DETAILS ARE BASED ON PVC PIPE AND FITTINGS.
2. SEWER CLEANOUTS NOT IN PAVEMENT SHALL HAVE CONCRETE COLLAR 18"x18"x6" AROUND THEIR TOPS AND MUST BE INSTALLED AND ADJUSTED TO FINISHED GRADE AT THE RIGHT-OF-WAY/PROPERTY LINE



FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 06/10
File Name: Residential Lateral S-8
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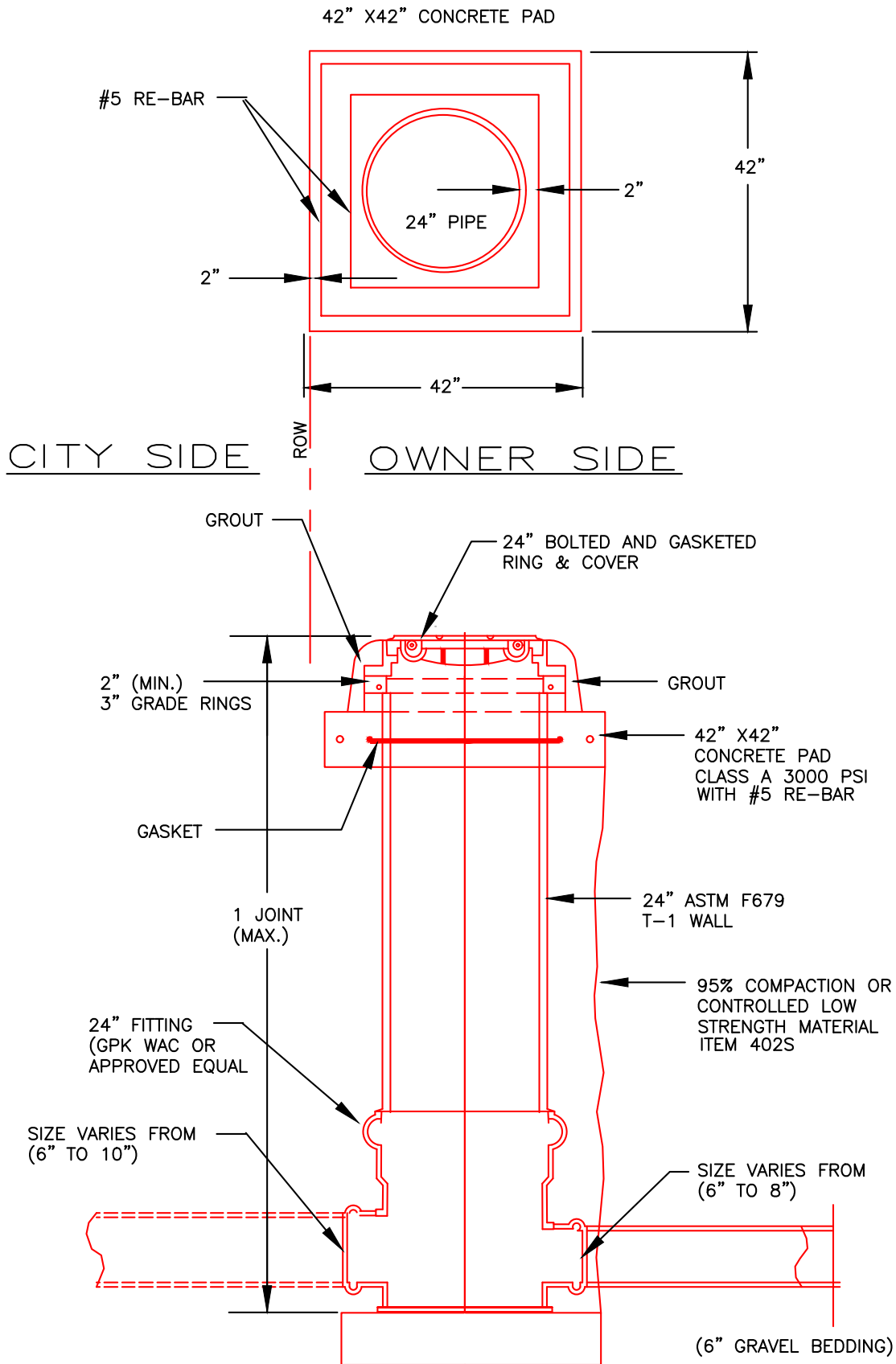
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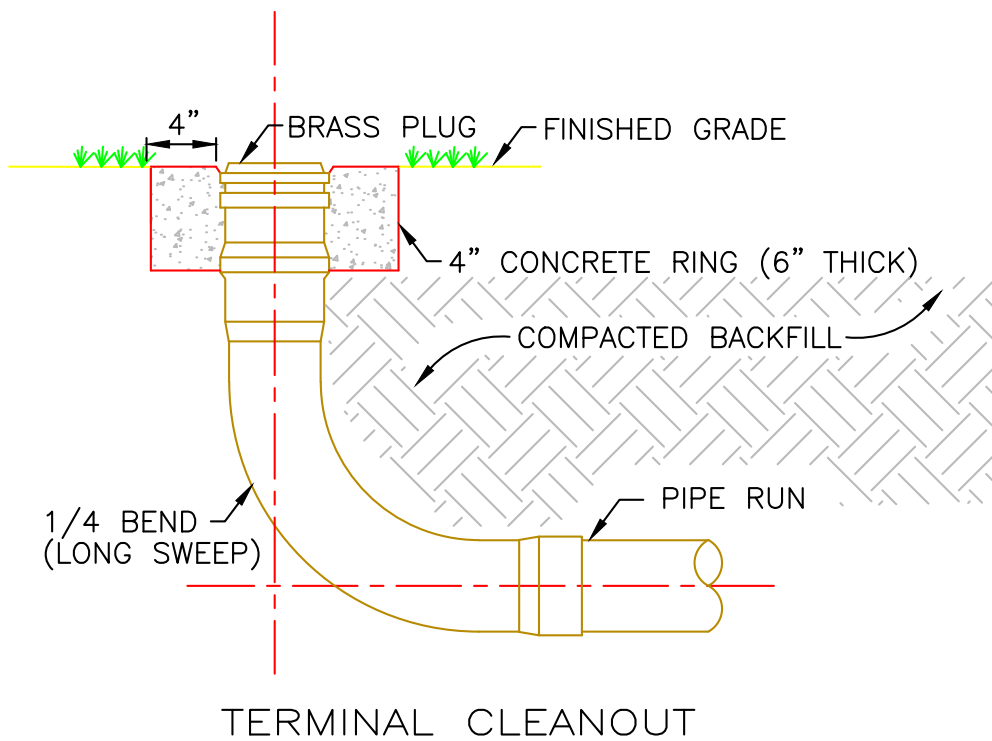
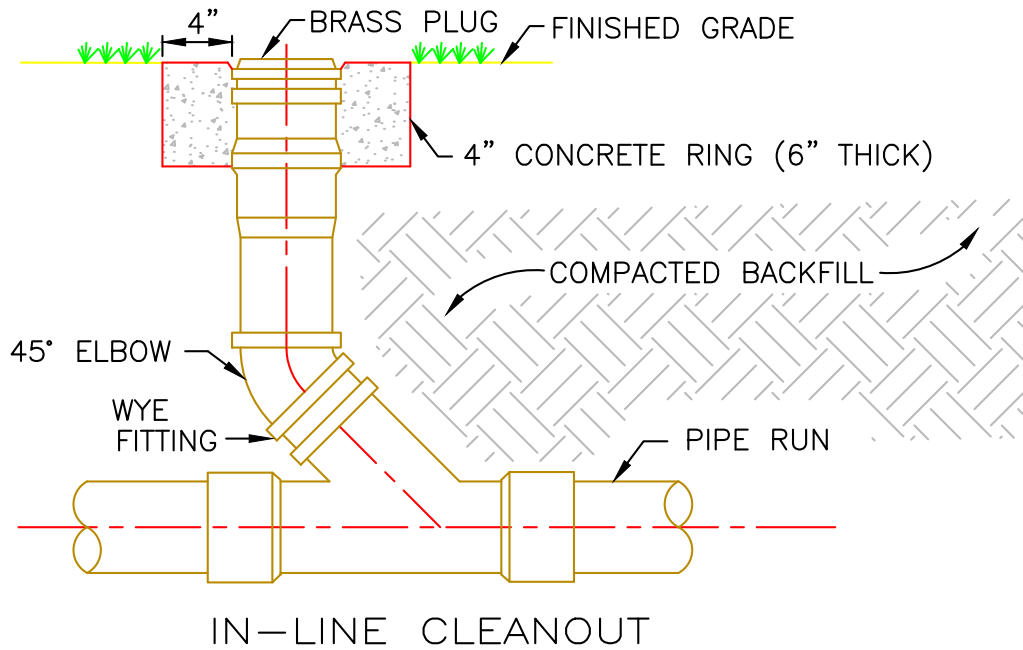
NOTES:

1. MANHOLE IS TO BE TYPE P (ALT A OR B) AND COMPLY WITH FDOT STANDARD PLANS.
2. MANHOLE HEIGHT SHALL BE THREE TIMES THE OD OF THE LATERAL BUT NO LESS THAN 18".
3. WHEN VCP (CLAY) MAIN IS ENCOUNTERED UTILIZE A PVC WYE WITH TWO PVC TO VCP COUPLINGS FOR SERVICE CONNECTION
4. ALL BENCHES AND INVERTS SHALL COMPLY TO OUR STANDARDS IN 'SANITARY SEWER MANHOLE AND GENERAL NOTES'.



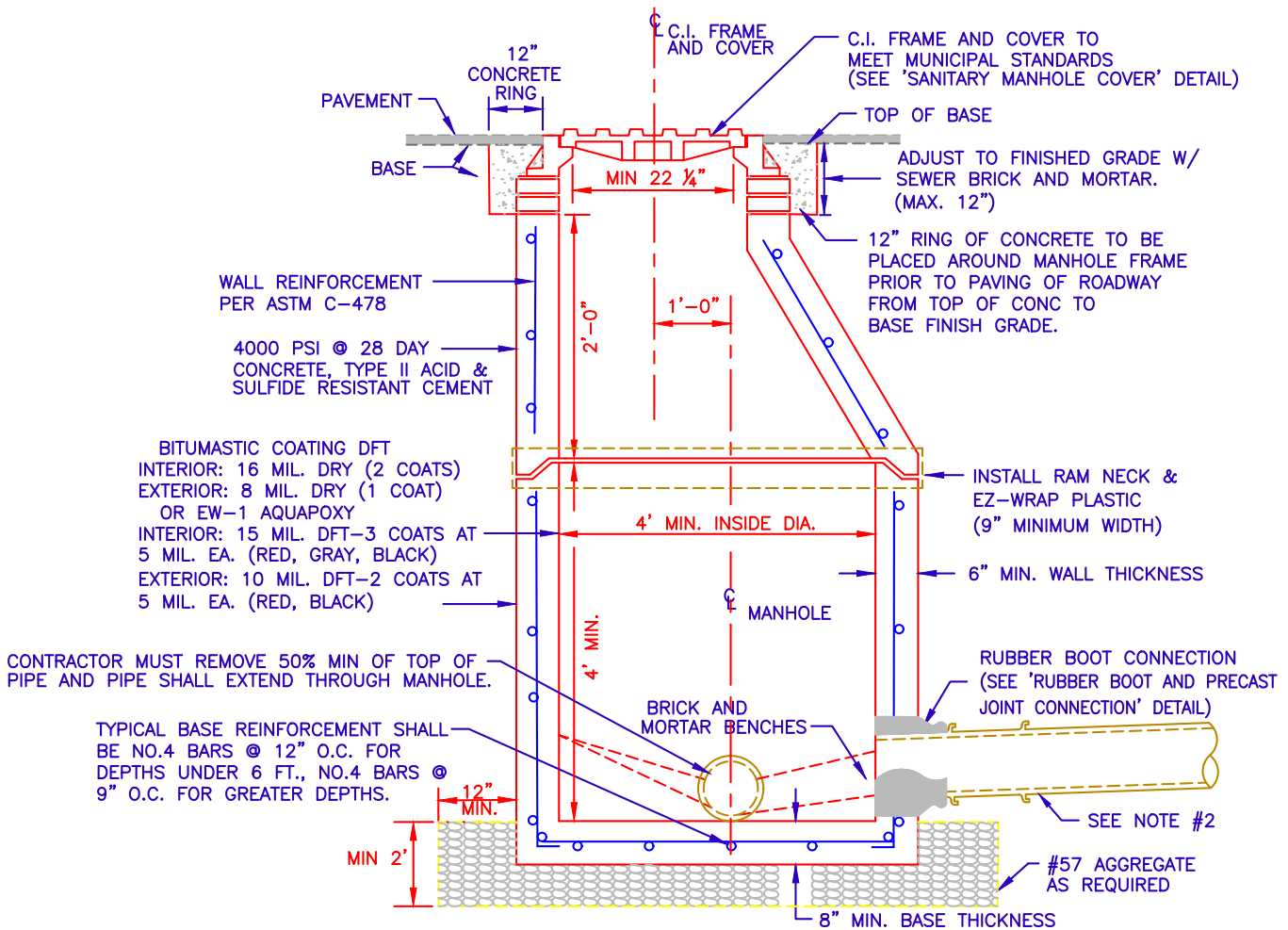
FY-19/20
Drawing Date: 11/10
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date:
File Name: Commercial Lateral S-9 A
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NOTE:
CONCRETE COLLAR REQUIRED IN UNPAVED AREAS





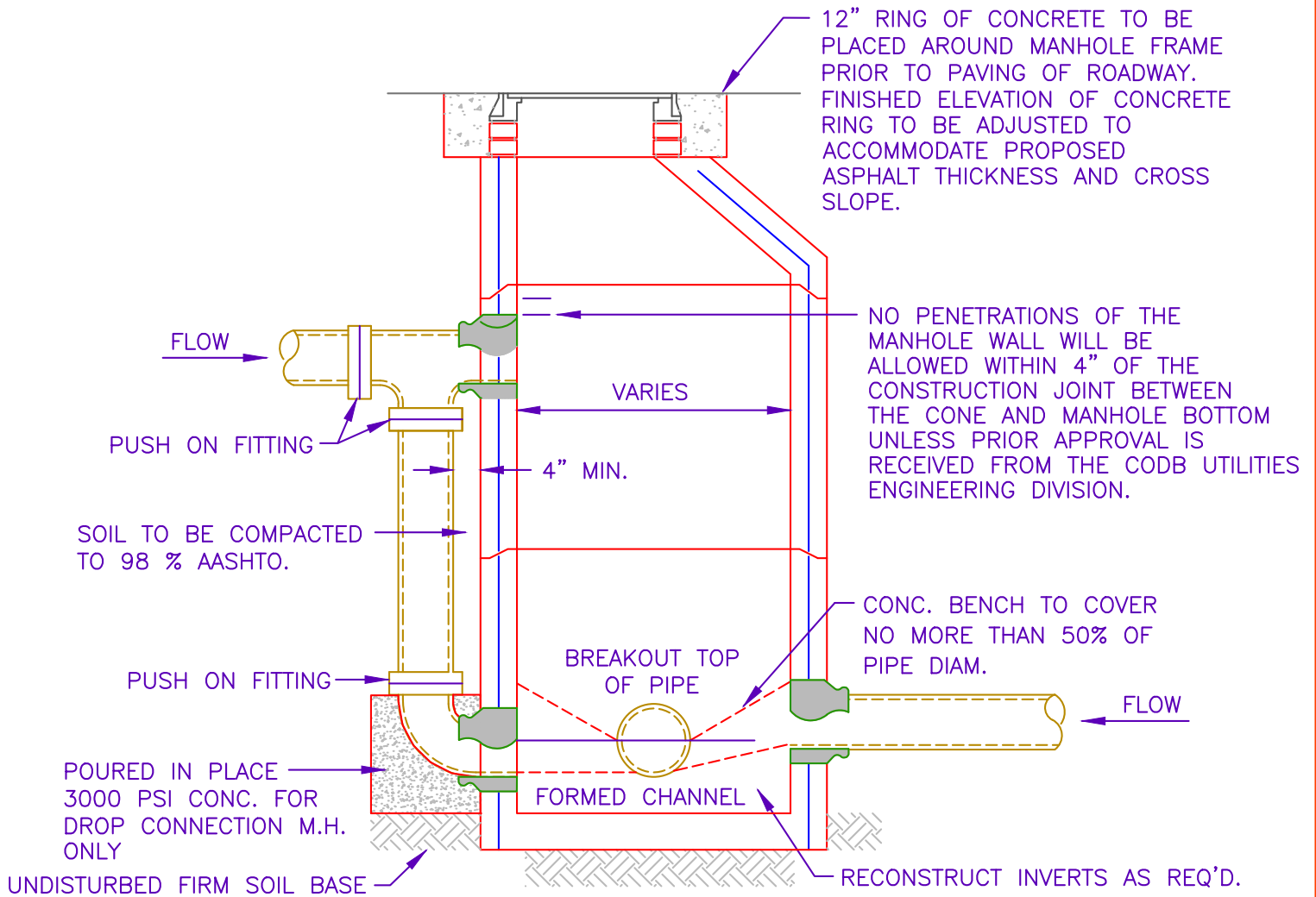
CROSS SECTIONAL VIEW

NTS

NOTES:

1. ON TRANSITIONS BETWEEN LARGER DIAMETER AND SMALLER SEWER COLLECTORS, INVERTS OF SEWERS SHALL BE MATCHED.
2. LAST 60' OF F.M. 12" PIPING ENTERING SEWER MANHOLE SHALL BE P.V.C. C-900 PLACED AT A NEGATIVE GRADE. 15" AND ABOVE SHALL BE P.V.C. C-905.
3. NON-PENETRATING PICK-HOLES IN ALL CONCRETE SECTIONS.
4. DFT = DRY FILM THICKNESS
5. 0.1' - DROP ACROSS MANHOLE TYP. (MEASURED DIA. OF CONCRETE RING)
6. MANHOLES 8' DEEP OR GREATER SHALL HAVE A MIN. 4' HIGH WALL BASE.
7. ANY PIPE ENTERING MANHOLE MUST HAVE A RUBBER BOOT CONNECTION.
8. MORTAR TO CONTAIN "HYDRATITE", OR APPROVED EQUAL, TO PREVENT SHRINKAGE.
9. SUB-GRADE BENEATH MANHOLES SHALL BE UNDISTURBED GRANULAR UNSATURATED SOIL. No. 57 AGGREGATE STONE SHALL BE USED IN WET CONDITIONS AND/OR WHERE UNSUITABLE MATERIAL IS ENCOUNTERED.
10. CONTRACTOR SHALL PROVIDE THICKER MANHOLE WALLS AND BASES AS REQUIRED TO PREVENT FLOTATION BASED ON HISTORIC HIGH GROUND WATER TABLE ELEVATIONS AS DETERMINED USING ACCEPTED ENGINEERING PRACTICES AND/OR APPROVED BY UTILITIES DEPARTMENT.
11. SHOP DRAWINGS FOR ALL STRUCTURES SHALL BE SUBMITTED TO AND APPROVED BY THE DESIGN ENGINEER PRIOR TO INSTALLATION.
12. NO IRREGULARITIES OR HONEYCOMB WILL BE ACCEPTED.
13. ENDS OF THE TOP AND BOTTOM SECTIONS OF THE MANHOLE SHALL FIT FLUSH TOGETHER.



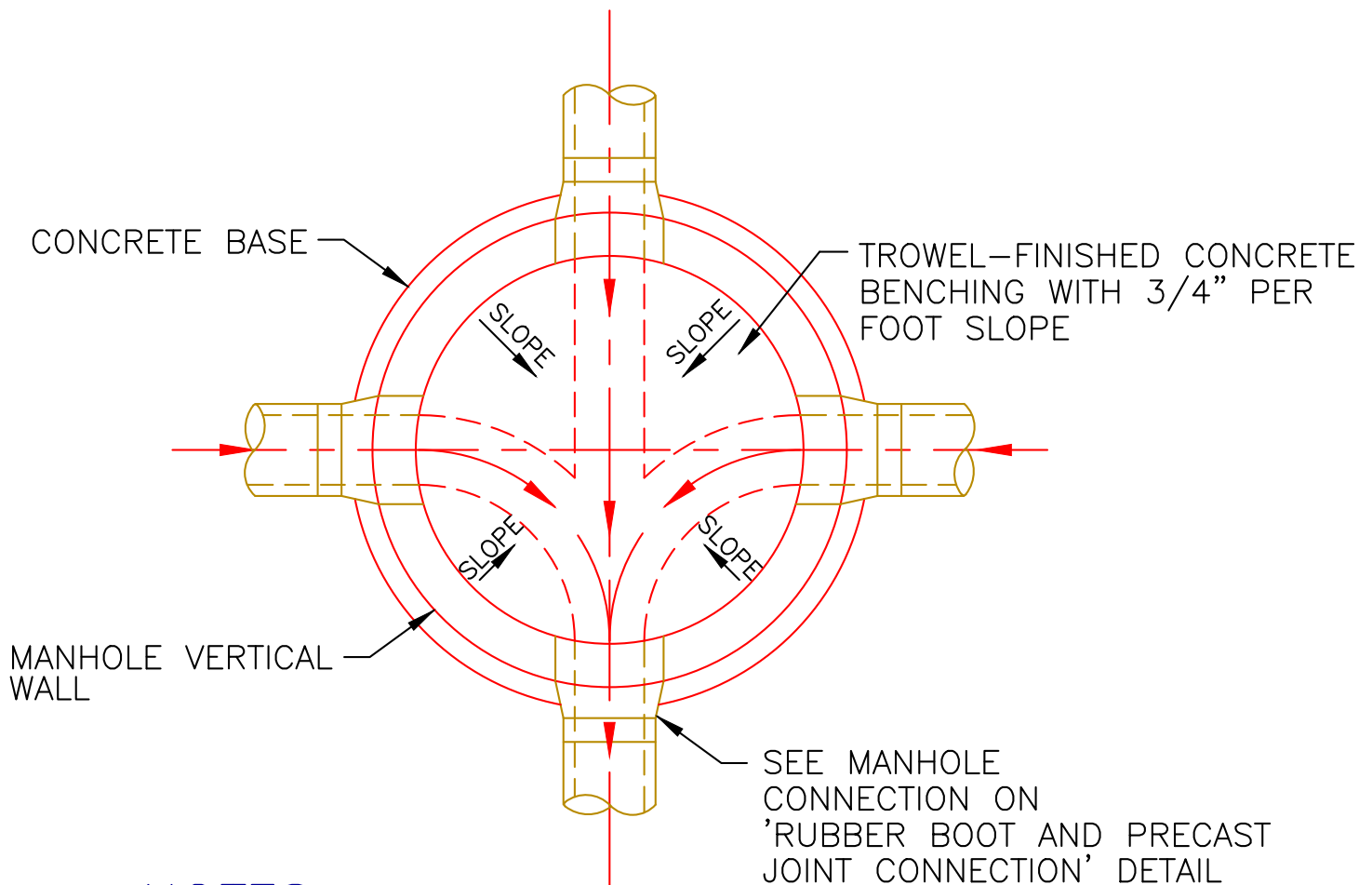


NOTE:

GENERAL NOTES ON 'SANITARY SEWER MANHOLE AND GENERAL NOTES' DETAIL APPLY HERE

1. DROPS OF MORE THAN THREE FEET SHALL REQUIRE AN OUTSIDE DROP
2. NO RISER RINGS SHALL BE USED FOR NEW CONSTRUCTION.
3. ALL CONCRETE INSIDE THE MANHOLE SHALL BE PAINTED.

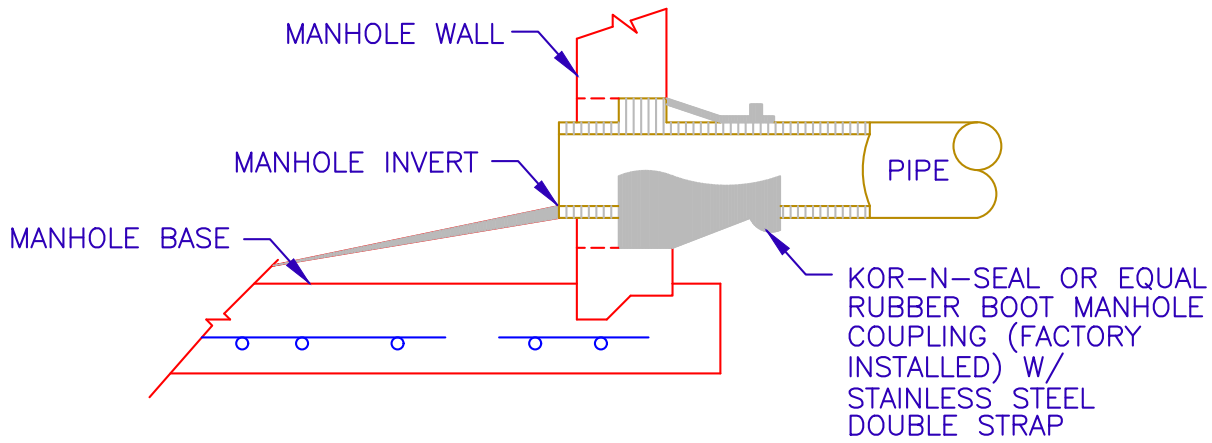




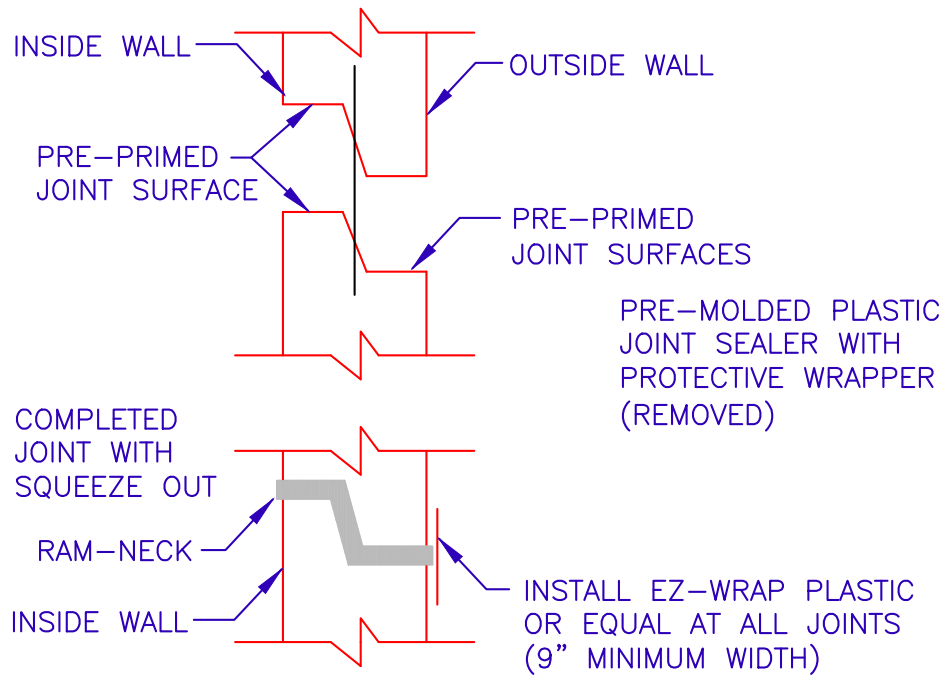
NOTES:

1. FLOW CHANNELS SHALL HAVE THE SAME SLOPES AS THE SEWERS THEY ARE CONNECTED TO. (EXCEPT THAT AT CHANGES OF DIRECTION EXCEEDING 45°, THE DROP SHALL BE 0.1' MINIMUM)
2. NO STANDING WATER WILL BE ALLOWED.
3. FORM BENCH IN MANHOLE FROM MID-LINE OF 8" PIPE TO WALL OF MANHOLE, 3/4" PER FT. OF SLOPE. FOR LARGER PIPE, CONSTRUCT FROM INSIDE CROWN OF PIPE WITH 3/4" PER FT. OF SLOPE TO WALL.
4. ALL CONCRETE INSIDE THE MANHOLE SHALL BE PAINTED.





MANHOLE PIPE CONNECTION DETAIL
FOR NEW CONNECTIONS IN EXISTING MANHOLES

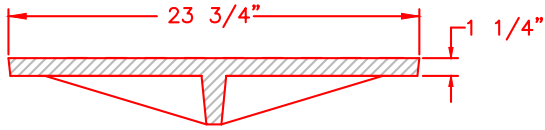


PRECAST JOINT CONNECTION

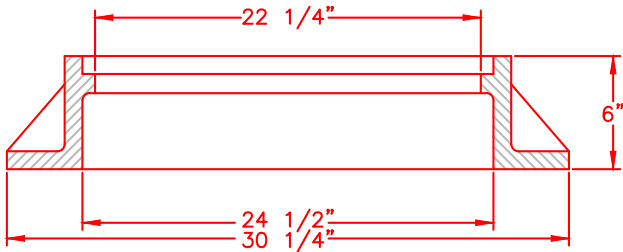
NOTES:

1. ALL NEW CONNECTIONS TO EXISTING SANITARY SEWER MANHOLES SHALL UTILIZE A CORING METHOD AND THE IN-FIELD INSTALLATION OF A RUBBER BOOT INTO THE MANHOLE.
2. BOOTS SHALL BE SNAPPED IN PLACE AND WATER TIGHT.

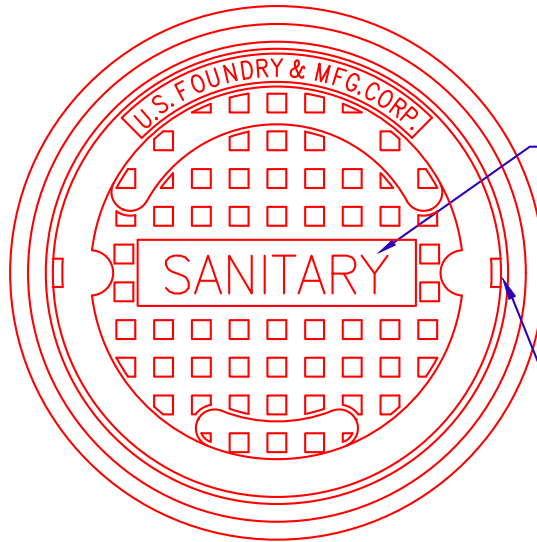




USF TYPE E MANHOLE COVER



USF 170 MANHOLE RING



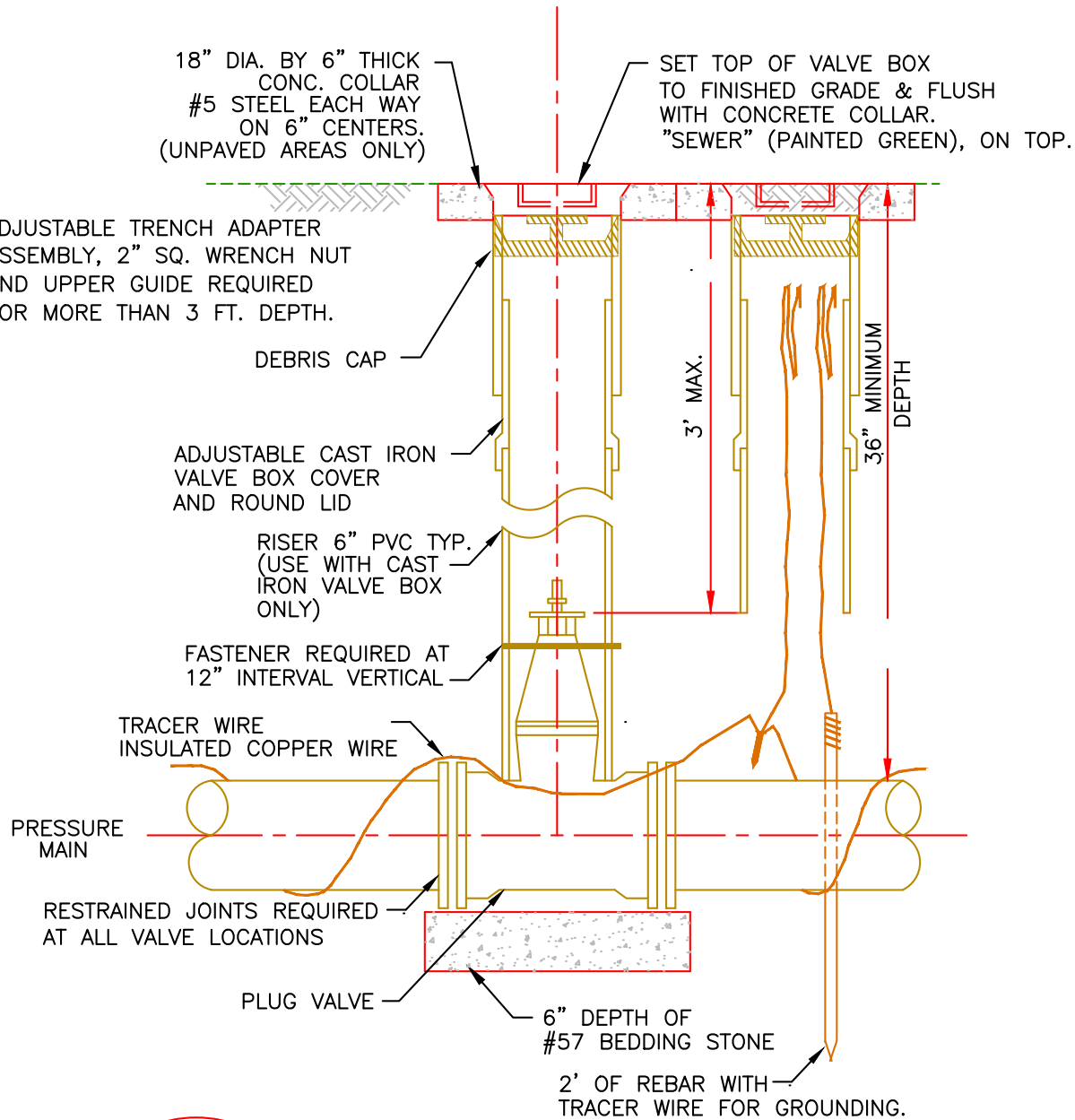
RAISED 1 1/2" LETTERS
FLUSH WITH TOP OF COVER
LABELED SANITARY

2 NON-PENETRATING
PICKHOLES

NOTES:

1. UNLESS DETAILED PLANS SHOW OTHERWISE, ALL MANHOLE RING AND COVER CASTINGS IN PAVED AREAS ARE TO BE ADJUSTED TO FINAL GRADE, SEALED AND SECURED IN PLACE WITH A CONCRETE COLLAR AFTER THE ROAD BASE IS PLACED AND JUST PRIOR TO PLACEMENT OF ASPHALT WEARING SURFACE.
2. CONCRETE COLLAR AROUND MANHOLE FRAME IS REQUIRED IN PAVED AREAS ONLY.





NOTES:

1. SEE CODB'S APPROVED PRODUCT LIST FOR ACCEPTABLE MANUFACTURERS.
2. INSTALL RESTRAINED JOINTS, AS REQUIRED, FROM DEFLECTION POINT IN BOTH DIRECTIONS (20' MIN.)
3. TRACER WIRE SHALL BE A MINIMUM 12 GAUGE WITH A TENSILE STRENGTH/BREAK LOAD OF 452 LBS. SEE TRACER WIRE SPECIFICATION #15049



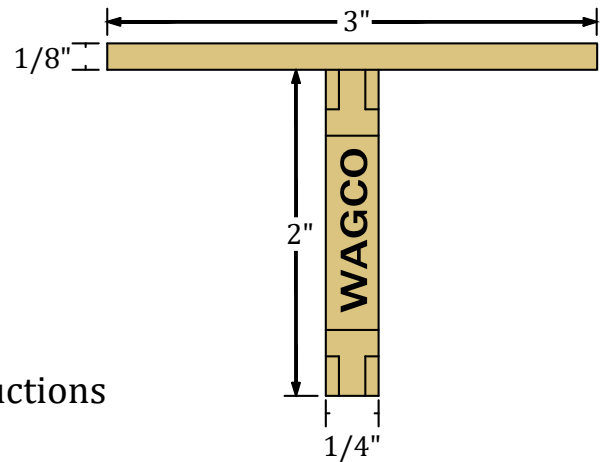
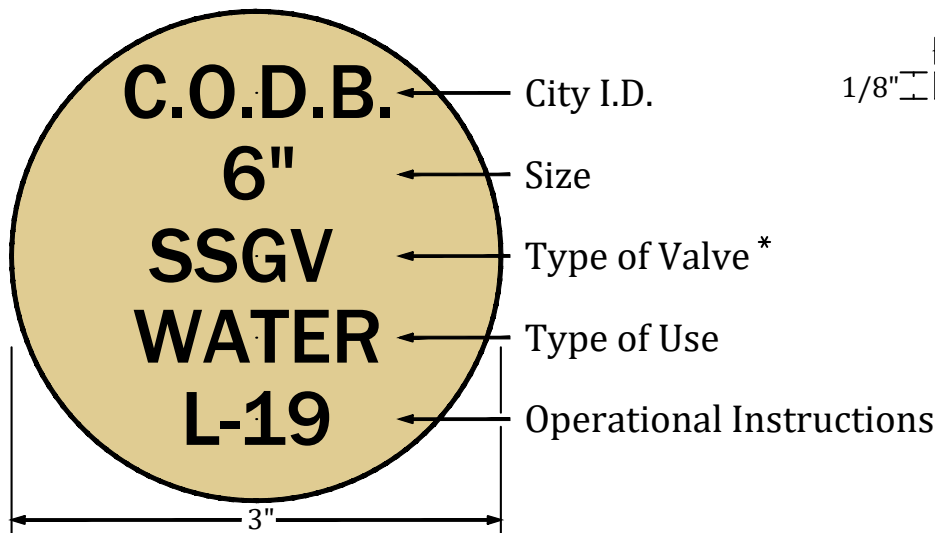
SPECIFICATIONS

ITEM: Brass ID Anti-Theft Marker

MATERIAL: SOLID CAST BRASS/Copper and Zinc Casting

DESCRIPTION: 3" Cast Brass Disc 1/8" Thick with 1/4" Brass "Theft Proof" Anchor pin.

Top surface to be engraved with 1/4" to 3/8" Capital letters.

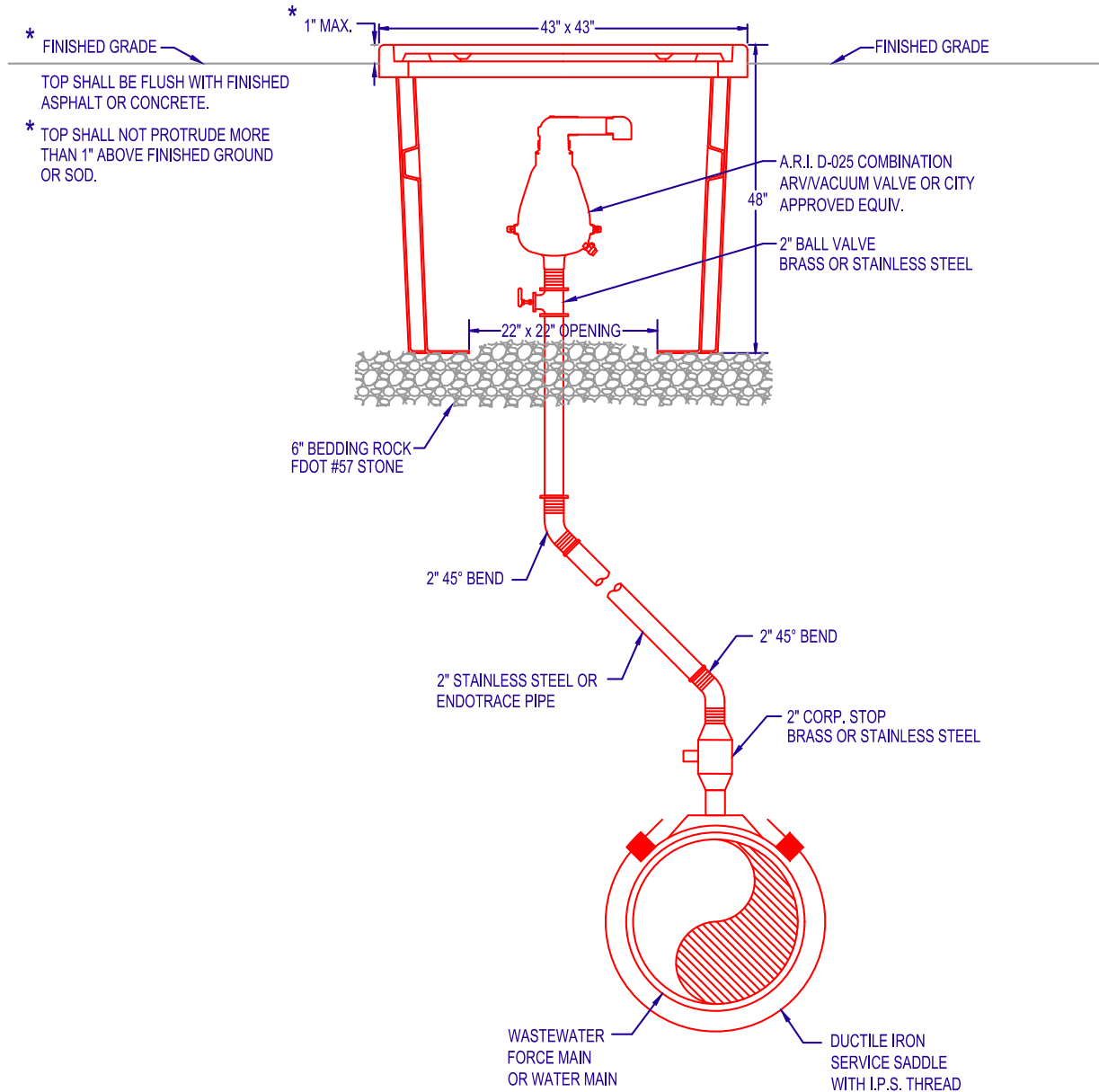


- * **PWGV** Potable Water Gate Valve
- RWGV** Reclaimed Water Gate Valve
- SSGV** Sanitary Sewer Gate Valve
- SSPV** Sanitary Sewer Plug Valve

To be used on all valves.
Embed in surface of concrete collar.



CDR SYSTEMS GROUP
 A13-3636-48 402 BOX
 OR CITY APPROVED EQUIV.
 RATED FOR LIGHT TRAFFIC
 BEARING.



* FINISHED GRADE
 TOP SHALL BE FLUSH WITH FINISHED ASPHALT OR CONCRETE.
 * TOP SHALL NOT PROTRUDE MORE THAN 1\"/>

NOTES:

1. VALVES SHALL BE CENTERED IN THE BOX
2. ROCK SHALL BE COMPACTED TO A FIRM AND UNYIELDING CONDITION
3. PIPING BETWEEN THE VALVE AND MAIN SHALL BE CONFIGURED TO BEST FIT FOR THE SITE CONDITION AS APPROVED BY THE CITY
4. TOP OF BOX ON SANITARY FORCE MAIN SHALL BE CLEARLY PERMANENTLY LABELED AS SANITARY FM.
5. TOP OF ALL BOXES SHALL BE CLEARLY AND PERMANANTLY LABELED AS TO VALVE TYPE (AIR RELEASE, VACUUM, OR AIR/VAC COMBINATION).

OFFSET AIR/VAC RELEASE VALVE
 NTS

THE CITY OF DAYTONA BEACH
 UTILITIES DEPARTMENT

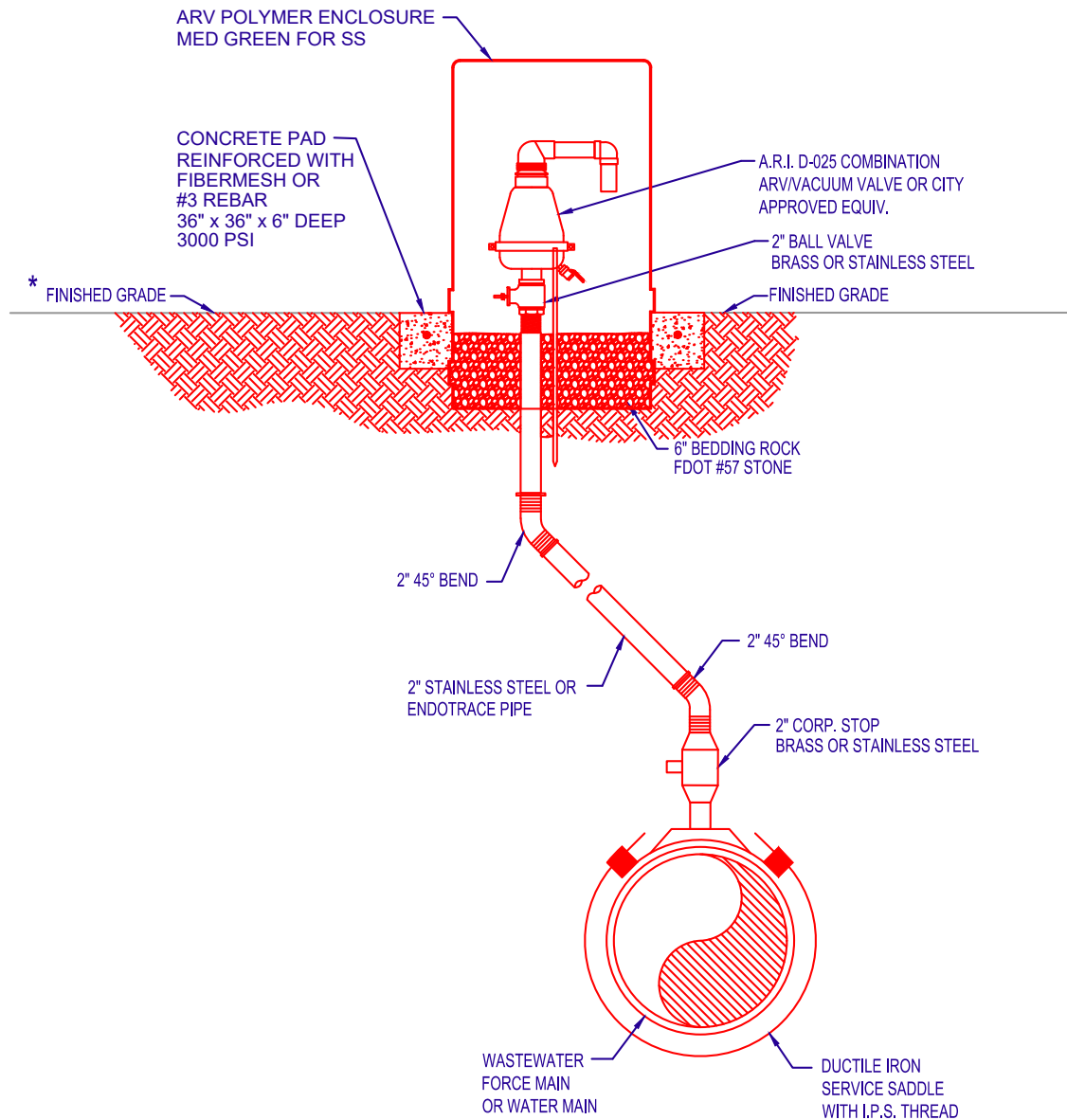


AUTOMATIC ARV/VACUUM
 VALVE DETAIL

ITB 20343-BETHUNE POINT GENERATOR REPLACEMENT
 Page 467 of 536

S-18

FY-19/20
Drawing Date: 03/10
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date:
File Name: Automatic ARV Valve S-18



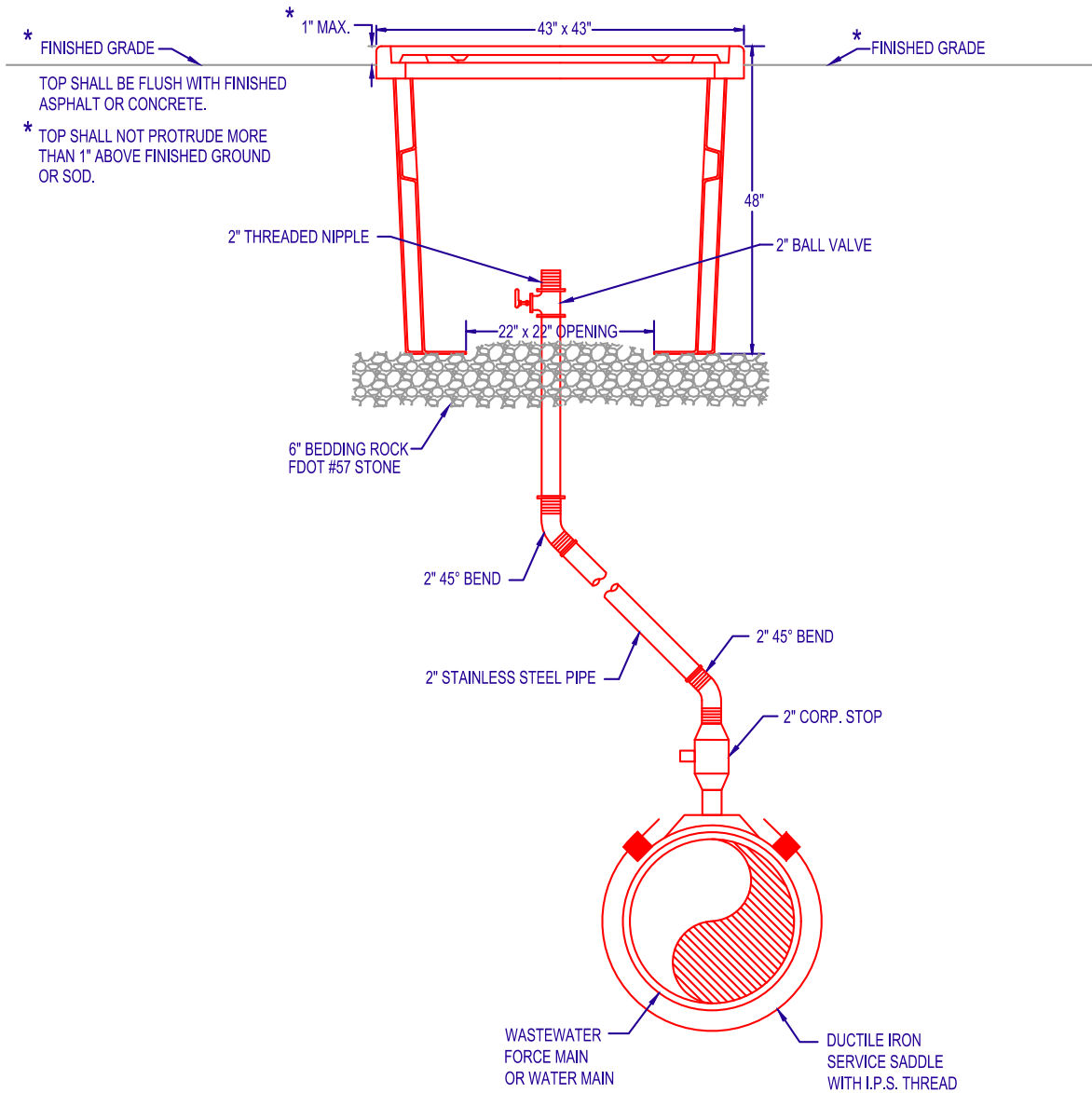
NOTES:

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3. PIPING BETWEEN THE VALVE AND MAIN SHALL BE CONFIGURED TO BEST FIT FOR THE SITE CONDITION AS APPROVED BY THE CITY
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OFFSET AIR/VAC RELEASE VALVE
NTS



CDR SYSTEMS GROUP
 B13-3636-48 402 BOX
 OR CITY APPROVED EQUIV.
 RATED FOR LIGHT TRAFFIC
 BEARING.

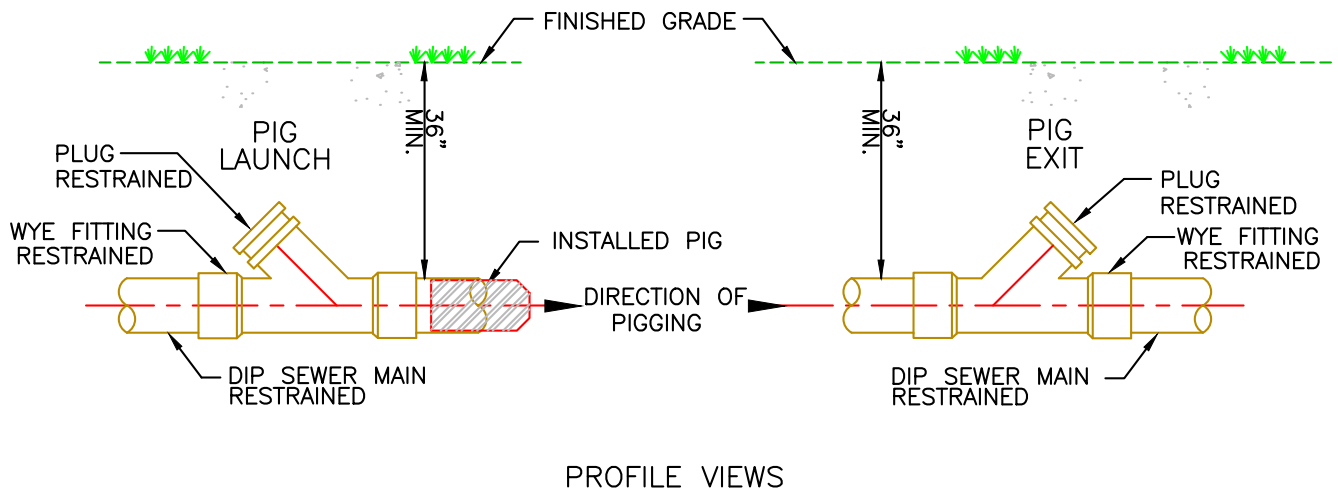


NOTES:

1. VALVES SHALL BE CENTERED IN THE BOX
2. ROCK SHALL BE COMPACTED TO A FIRM AND UNYIELDING CONDITION
3. PIPING BETWEEN THE VALVE AND MAIN SHALL BE CONFIGURED TO BEST FIT FOR THE SITE CONDITION AS APPROVED BY THE CITY
4. TOP OF BOX ON SANITARY FORCE MAIN SHALL BE CLEARLY PERMANENTLY LABELED AS SANITARY FM.
5. TOP OF ALL BOXES SHALL BE CLEARLY AND PERMANENTLY LABELED AS TO VALVE TYPE (AIR RELEASE, VACUUM, OR AIR/VAC COMBINATION).
6. IF BOX IS TO BE PLACED IN ROAD OR ADJACENT TO THE ROAD USE A HEAVY TRAFFIC BOX CDR SYSTEM GROUP, BOX # B14-3636-48 OR CITY APPROVED EQUIV. RATED FOR HEAVY TRAFFIC BEARING.

OFFSET AIR/VAC RELEASE VALVE
 NTS





GRINDER UNIT NOTES:

- COVER FOR REINFORCING BARS SHALL BE 2".
- ALL BENDS, UNLESS OTHERWISE SHOWN, SHALL BE A 90 DEGREE STANDARD HOOK AS DEFINED IN THE LATEST EDITION OF ACI 318.
- NON-SHRINK GROUT FOR ALL OPENINGS. (RAMNEK OR APPROVED EQUAL)
- WET WELL AGRU SURE GRIP LINER TO COVER ALL VERTICAL SURFACES, BOTTOM OF TOP SLAB .AGRU OPTION 1 ONLY (ALL JOINT SHALL BE SEALED BY MEANS OF THERMAL WELDING PERFORMED BY AGRU CERTIFIED WELDERS).
- HATCH COVERS MUST ALLOW FOR UNRESTRICTED VERTICAL REMOVAL OF THE PUMPS AND VALVES AND HAVE FLUSH ALUMINUM DROP HANDLE AND AN AUTOMATIC HOLD OPEN ARM WITH RELEASE HANDLE. (SEE WET WELL & VALVE VAULT HATCH DETAILS).
- FURNISH AND INSTALL GRINDER ASSEMBLY.
- WET WELL CONCRETE SHALL BE TYPE II REINFORCED CONCRETE (4,000 PSI)
- PROVIDE SS INSECT SCREEN WITH 1/4" OPENINGS ON VENT PIPE.
- PROVIDE HIGH WATER ALARM FLOAT.
- THE FLOATS AND CABLES SHALL BE CLEARLY LABELED.
- ENGINEER SHALL DESIGN SITE PLAN SHOWING EASEMENT LOCATIONS, ACCESS TO THE LIFT STATION, POWER SUPPLY ROUTE, ANTENNA LOCATION & FOUNDATION, THE INFLUENT SEWER LOCATION, WATER SUPPLY ROUTE, AND EFFLUENT FORCE MAIN ROUTE.
- GRINDER WET WELLS SHALL BE A MINIMUM OF 8 FEET DIAMETER, WITH 8" WALLS.
- THE SMART CONTROL CABINET SHALL BE NEMA 4X STAINLESS STEEL,
- THE GRINDER CONTROL CABINET SHALL HAVE A SOLID CABINET DOOR COVERING THE CONTROLS FOR PROTECTION, MAINTENANCE, AND SECURITY.
- A CAT 5 CABLE SHALL BE INSTALLED GOING FROM GRINDER CONTROL CABINET TO THE MASTER CONTROL CABINET.

GRINDER MOTOR DATA

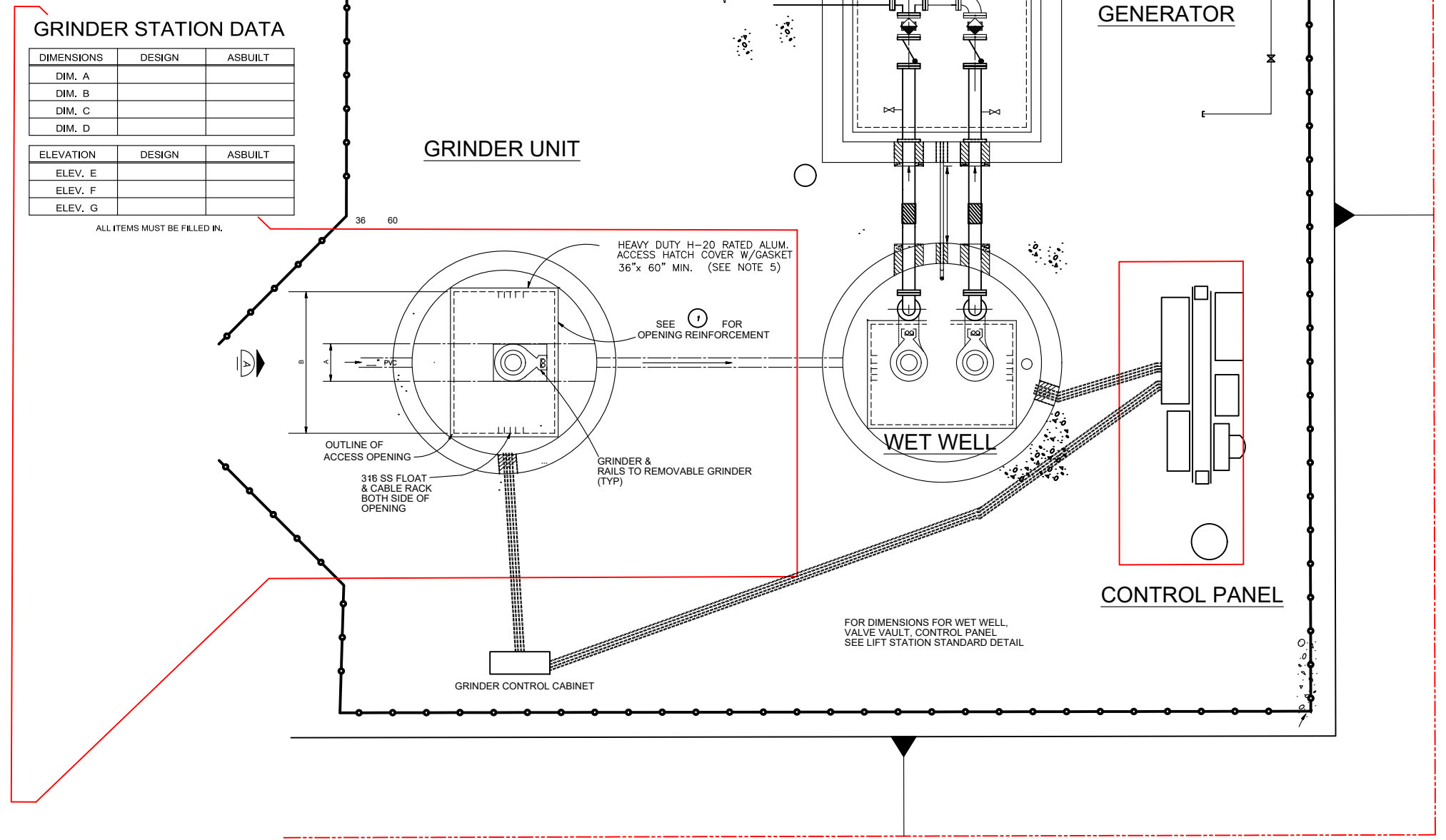
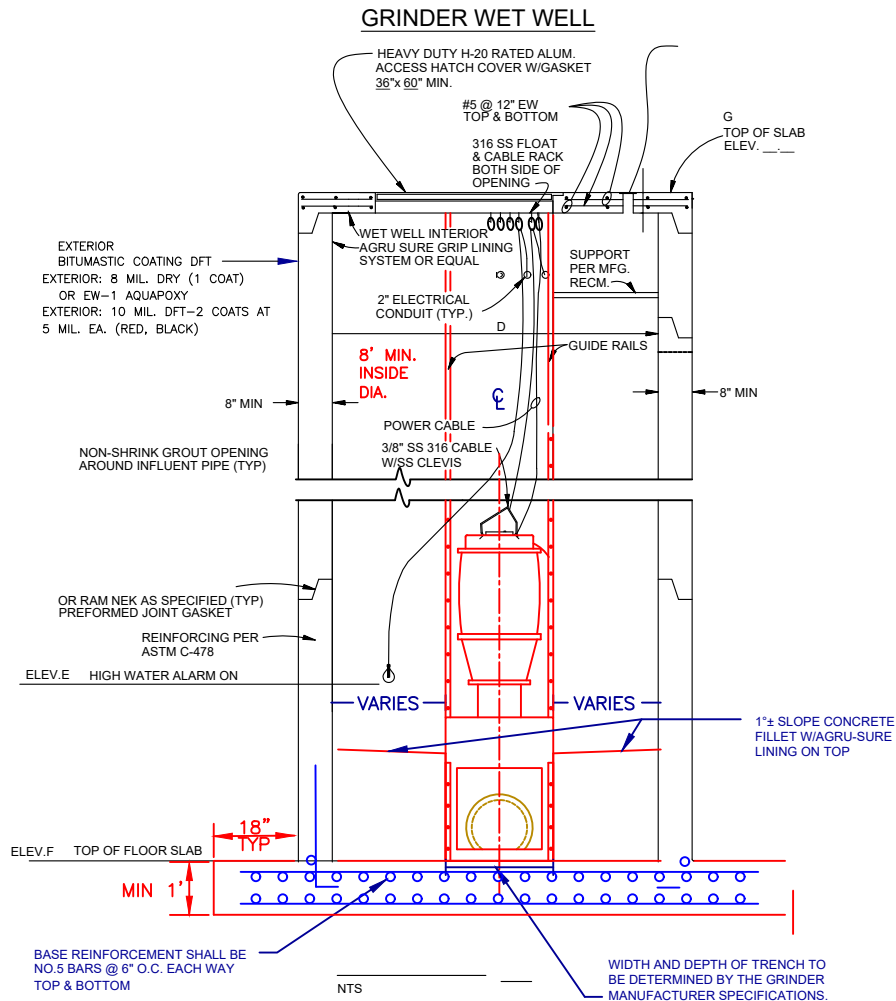
MANUFACTURER:	MODEL:
IMPELLER NO.:	NOMINAL SIZE: IN.
SPEED: RPM	DISCHARGE SIZE: IN.
VOLTAGE: v. 60 Hz.	PHASE: 3
HORSEPOWER: hp.	MIN. SOLID SIZE: IN.
OPERATING CONDITIONS SHALL BE _____ GPM, _____ FT. TDH, MIN. SHUT OFF HEAD _____ FT.	

GRINDER STATION DATA

DIMENSIONS	DESIGN	ASBUILT
DIM. A		
DIM. B		
DIM. C		
DIM. D		

ELEVATION	DESIGN	ASBUILT
ELEV. E		
ELEV. F		
ELEV. G		

ALL ITEMS MUST BE FILLED IN.



LIFT STATION DATA

DIMENSIONS	DESIGN	ASBUILT
DIM. A		
DIM. B		
DIM. C		
DIM. D		
DIM. E		
DIM. F		
DIM. G		
DIM. H		
DIM. J		
DIM. K		
DIM. L		
DIM. M		
DIM. N		
DIM. O		
DIM. P		
DIM. Q		

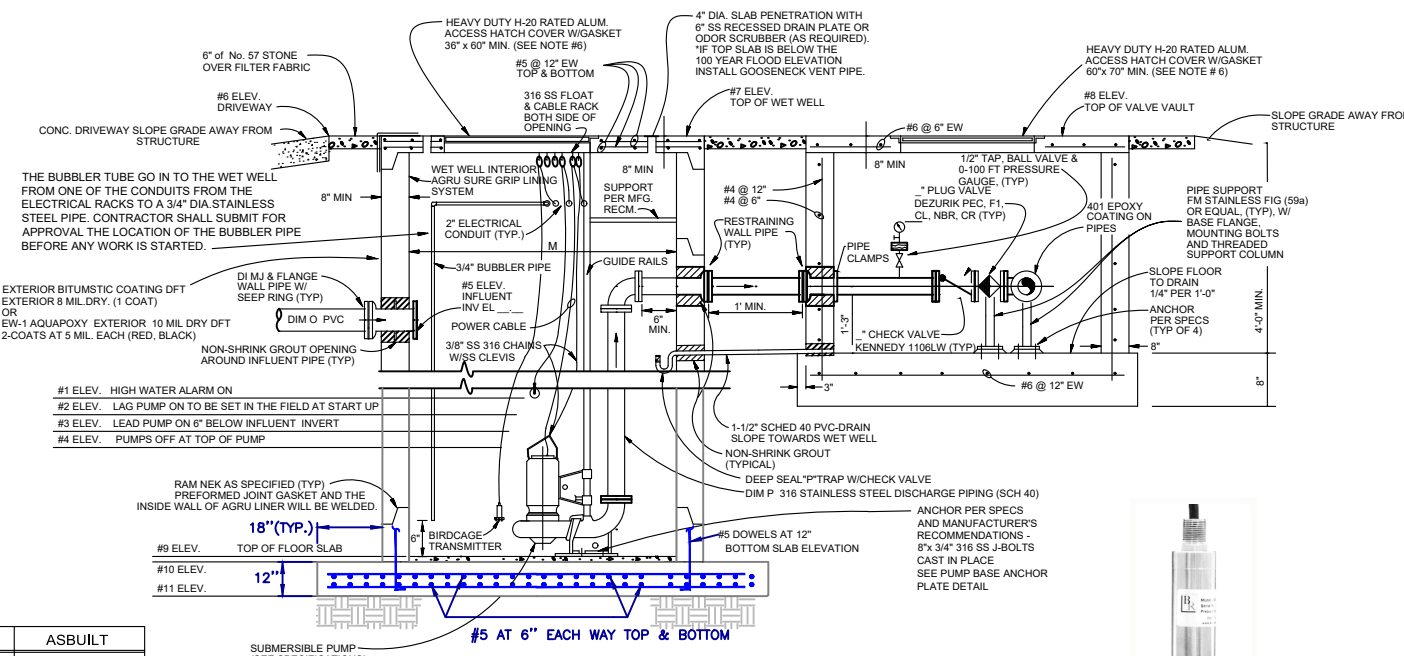
DIM O = INFLUENT PIPE DIA GOING INTO WET WELL
 DIM P = DISCHARGE PIPE DIA IN WET WELL FROM PUMP
 DIM Q = DISCHARGE PIPE DIA OUT OF VALVE VAULT

ELEVATION	DESCRIPTION	DESIGN	ASBUILT
#1 ELEV.	HIGH WATER ALARM ON		
#2 ELEV.	LAG PUMP ON		
#3 ELEV.	LEAD PUMP ON		
#4 ELEV.	PUMPS OFF AT TOP OF PUMP		
#5 ELEV.	INFLUENT PIPE INVERT		
#6 ELEV.	DRIVEWAY		
#7 ELEV.	TOP OF SLAB (WET WELL)		
#8 ELEV.	TOP OF SLAB (VALVE VAULT)		
#9 ELEV.	TOP OF FLOOR SLAB		
#10 ELEV.	BOTTOM OF FLOOR SLAB		
#11 ELEV.	BOTTOM OF WET WELL		
#12 ELEV.	BOTTOM OF TREMIE PLUG		

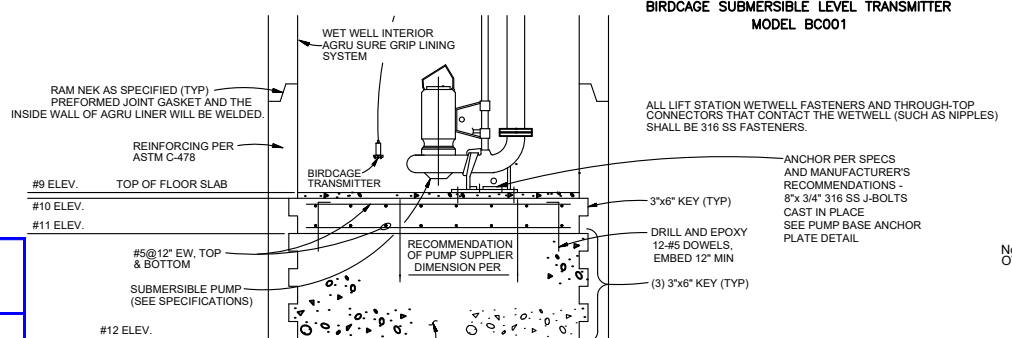
ALL ITEMS MUST BE FILLED IN.

WET WELL NOTES

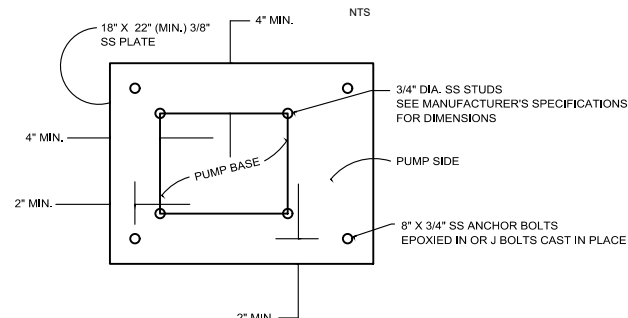
- COVER FOR REINFORCING BARS SHALL BE 2".
- ALL BENDS, UNLESS OTHERWISE SHOWN, SHALL BE A 90 DEGREE STANDARD HOOK AS DEFINED IN THE LATEST EDITION OF ACI 318.
- NON-SHRINK GROUT FOR ALL OPENINGS.
- ALL INTERNAL STAINLESS STEEL SCH. 40 IS FLANGED (RAMNEK OR APPROVED EQUAL).
- WET WELL AGRU SURE GRIP LINER TO COVER ALL VERTICAL SURFACES, BOTTOM OF TOP SLAB AGRU OPTION 1 ONLY (ALL JOINT SHALL BE SEALED BY MEANS OF THERMAL WELDING PERFORMED BY AGRU CERTIFIED WELDERS).
- HATCH COVERS MUST ALLOW FOR UNRESTRICTED VERTICAL REMOVAL OF THE PUMPS AND VALVES AND HAVE FLUSH ALUMINUM DROP HANDLE AND AN AUTOMATIC HOLD OPEN ARM WITH RELEASE HANDLE. (SEE WET WELL & VALVE BOX HATCH DETAIL SHEETS S-26 6 & 7 OF 7)
- FURNISH AND INSTALL 2 TOTALLY SUBMERSIBLE PUMPS PER PUMP DATA TABLE, FLYGT ONLY.
- ALL VALVES ARE TO BE DEZURIK AND ALL CHECK VALVES ARE TO BE KENNEDY OR EQUAL.
- WET WELL AND VALVE VAULT CONCRETE SHALL BE TYPE II REINFORCED CONCRETE (4,000 PSI).
- PROVIDE SS INSECT SCREEN WITH 1/4" OPENINGS ON VENT PIPE.
- PROVIDE HIGH LEVEL FLOAT.
- PRESSURE TRANSDUCER TO BE BLUE RIBBON BIRDCAGE SUBMERSIBLE LEVEL TRANSMITTER.
- ENGINEER SHALL DESIGN SITE PLAN SHOWING EASEMENT LOCATIONS, ACCESS TO THE LIFT STATION, POWER SUPPLY ROUTE, ANTENNA LOCATION & FOUNDATION, THE INFLUENT SEWER LOCATION, WATER SUPPLY ROUTE, AND EFFLUENT FORCE MAIN ROUTE.
- WET WELLS SHALL BE A MINIMUM OF 8 FEET DIAMETER, WITH 8" WALLS.
- A MUFFIN MONSTER OR CHOPPER PUMP MAY BE REQUIRED BY THE CITY.
- A MINIMUM 6 FEET SHALL BE MAINTAINED BETWEEN PUMP OFF AND THE LEAD PUMP ON IN THE WET WELL.
- A MINIMUM OF 6 FEET SHALL BE MAINTAINED BETWEEN LOWEST INFLUENT INVERT AND WETWELL FLOOR.



STANDARD PRE-CAST SECTION



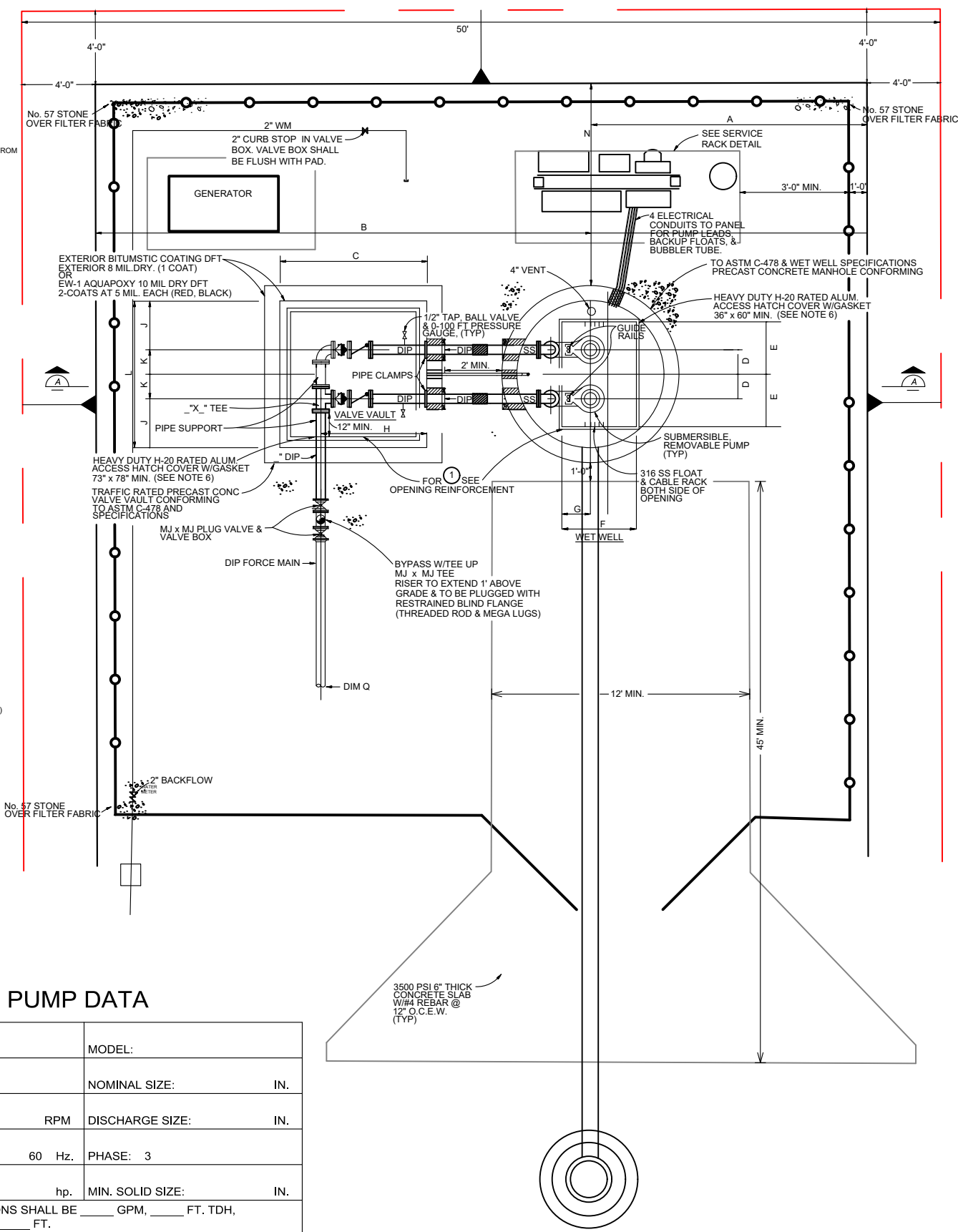
ALTERNATE WET WELL BOTTOM



PUMP BASE ANCHOR PLATE



BIRDCAGE SUBMERSIBLE LEVEL TRANSMITTER MODEL BC001



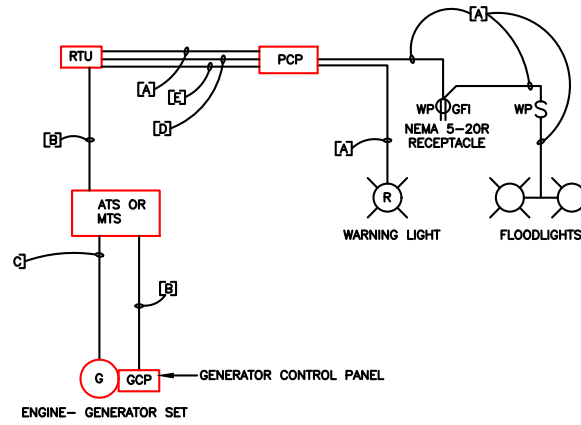
PUMP DATA

MANUFACTURER:	MODEL:
IMPELLER NO.:	NOMINAL SIZE: IN.
SPEED: RPM	DISCHARGE SIZE: IN.
VOLTAGE: v. 60 Hz.	PHASE: 3
HORSEPOWER: hp.	MIN. SOLID SIZE: IN.
OPERATING CONDITIONS SHALL BE _____ GPM, _____ FT. TDH, MIN. SHUT OFF HEAD _____ FT.	



GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST ADOPTED EDITIONS OF FLORIDA BUILDING CODE, THE NATIONAL ELECTRIC CODE, REGULATIONS AND STANDARDS OF AUTHORITIES HAVING JURISDICTION AND CITY OF DAYTONA BEACH PUBLIC UTILITIES DEPARTMENT STANDARDS.
2. PROVIDE ELECTRICAL SERVICE PANEL RACK CONFIGURED WITH ELECTRICAL DISTRIBUTION EQUIPMENT, EMERGENCY POWER AUTOMATIC TRANSFER SWITCH (ATS), REMOTE TERMINAL UNIT (RTU), AND APPURTENANCES AS SHOWN.
3. ALL CONDUCTORS SHALL BE STRANDED COPPER WITH THIN INSULATION FOR CIRCUITS UNDER 600 VOLTS.
4. FUSES, BREAKERS, CONDUITS, WIRE AND EQUIPMENT TO BE SIZED PER MANUFACTURER'S RECOMMENDATION AND/OR CODE REQUIREMENTS.
5. GENERATOR AND GENERATOR BREAKER SHALL BE SIZED TO ACCOMMODATE THE TOTAL CONNECTED LOAD. THE GENERATOR SHALL NOT EXCEED 80% OF ITS' RUNNING CAPACITY WITH ALL CONNECTED LOADS ON-LINE. ENGINEER SHALL BE RESPONSIBLE FOR THE SIZING OF THE GENERATOR. THE GENERATOR SUBMITTAL DOCUMENTS SHALL BE SIGNED AND SEALED BY A LICENSED ELECTRICAL ENGINEER, INCLUDING GENERATOR SELECTION/SIZING CALCULATIONS, INCLUDING THE COMPLIANCE TO MAXIMUM FREQUENCY AND VOLTAGE DIP LIMITS. FUEL TANK SHALL BE SIZED FOR 72 HOUR OPERATION UNDER FULL LOAD.
6. MINIMUM CONDUIT SIZE SHALL BE 3/4" ABOVE GRADE, AND 1" BELOW GRADE.
7. ELECTRICAL CONDUIT TO BE SCHEDULE 40 PVC BELOW GRADE AND ALUMINUM ABOVE GRADE.
8. ALL CONCEALED CONDUIT AND FITTINGS IN CONCRETE SHALL BE SCHEDULE 80 PVC.
9. UNDERGROUND CONDUIT SHALL BE INSTALLED A MINIMUM OF 24" BELOW FINISHED GRADE.
10. ALL CONTROL PANELS SHALL BE U.L. LABELED AND SHALL COMPLY WITH ARTICLE 409 OF THE N.E.C.
11. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR REVIEW AND APPROVAL.
12. CONCRETE PADS FOR EQUIPMENT AND POWER RACK SIZING TO BE COORDINATED AND VERIFIED BY THE CIVIL OR STRUCTURAL ENGINEER OF RECORD.
13. CONTRACTOR SHALL SUBMIT SIGNED AND SEALED WIND LOAD CALCULATIONS FROM A STRUCTURAL ENGINEER LICENSED IN THE STATE OF FLORIDA. SERVICE PANEL RACK TO BE CERTIFIED PER LATEST ADOPTED EDITION OF THE FLORIDA BUILDING CODE.
14. PROVIDE ONE 3/4" x 10' COPPER-CLAD GROUND ROD MINIMUM, AND ONE #6 BARE COPPER CONDUCTOR MINIMUM FROM GROUND ROD TO GROUND LUG OR BUS AT EACH OF THREE LOCATIONS: ENGINE-GENERATOR, PUMP STATION, AND EQUIPMENT SERVICE RACK, UNLESS SHOWN OR NOTED OTHERWISE.
15. GROUND RODS SHALL BE COPPER CLAD STEEL, 3/4" x 10', DRIVEN TO TOP OF ROD 12" BELOW GRADE. ALL GROUNDING CONDUCTORS TO BE INSTALLED 30" BELOW GRADE. ALL CONNECTIONS TO GROUND RODS SHALL UTILIZE EXOTHERMIC WELDS (ERICO "CADWELD" OR EQUAL), UNLESS OTHERWISE NOTED (BRONZE BOLTED CONNECTION IN TEST WELL). PROVIDE GROUND ROD TEST WELL WITH METAL COVER AND RAISED STAMPED LETTERING INDICATING "GROUND".
16. NO FENCE IS REQUIRED ON LIFT STATION IN RESIDENTIAL SUBDIVISIONS. ALL INDUSTRIAL AND COMMERCIAL APPLICATIONS TO BE FENCED. LANDSCAPING MAY BE USED IN LIEU OF FENCING IN RESIDENTIAL AREAS, AS APPROVED.



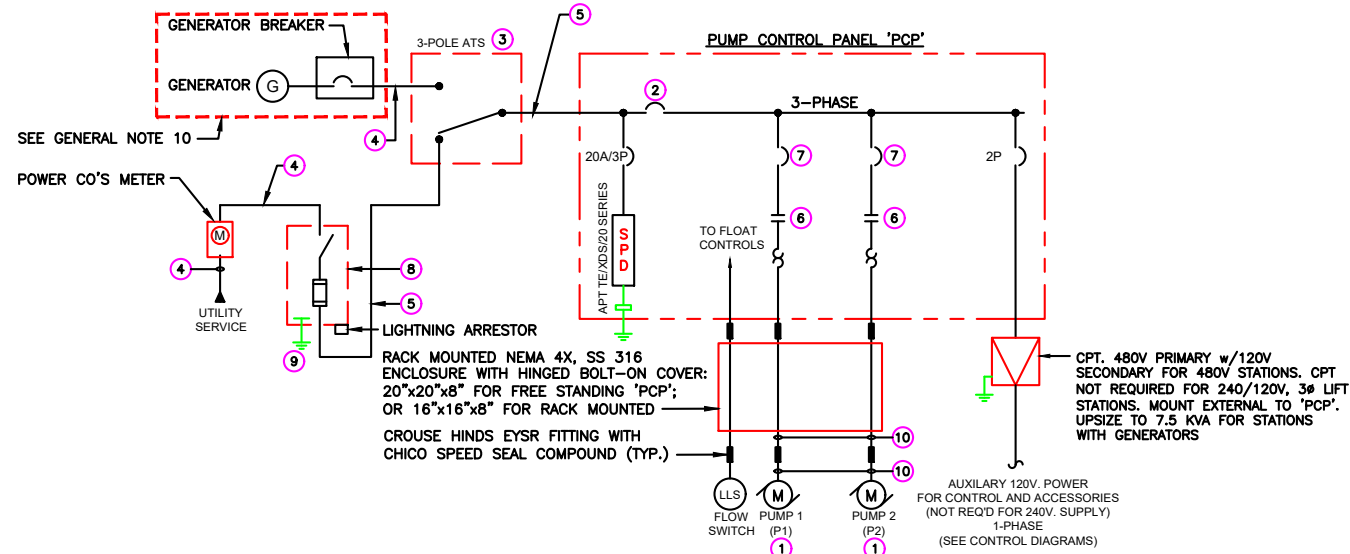
[A]=[3/4"., 2#12 & 1#12 GND.] AC POWER, 120 V.
 [B]=[3/4"., 4#14 & 1#12GND.]
 [C]=[3/4"., 2#12 & 1#12 GND. FOR BATTERY CHARGER] & [1"., 2#10 & 1#10G FOR JACKET WATER HEATER]
 [D]=[3/4"., 10#14 & 1#14GND.] STATUS SIGNALS, PCP TO RTU
 [E]=[3/4"., 2#16 TWISTED SHIELDED PAIR] ANALOG SIGNALS, PCP TO RTU

120V & SIGNAL RISER DIAGRAM

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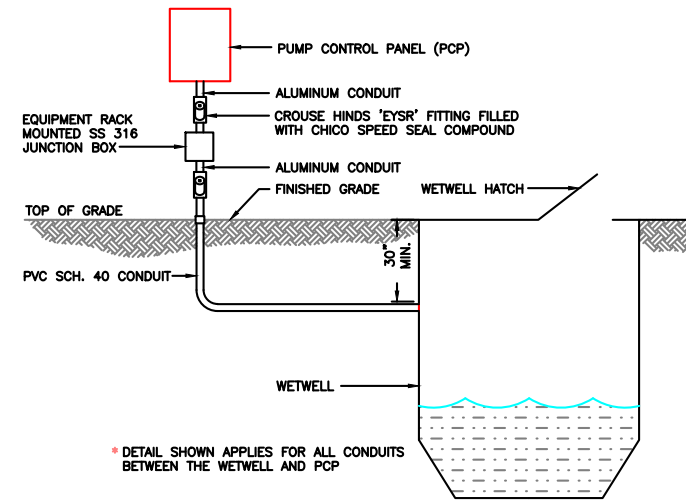
1	2	3	4	5	6	7	8	9	10	
PROPOSED VOLTAGE	PROPOSED MOTOR SIZE (HP)	PANEL MAIN BKR.	MTS OR ATS	SERVICE CONDUIT & CONDUCTORS	LOAD CONDUIT & CONDUCTORS	STARTER SIZE	MOTOR BREAKER	FUSED DISC/FUSES (SEE NOTES)	GROUND	PUMP CABLE CONDUIT SIZE
480V, 3φ, 3W	50HP ≥ 25 HP	200A,3P	200A,3P	4#3/0-2"	3#3/0 & 1#4GND-2"	3	125A,3P	200A,3P/200A	#2	PER N.E.C
480V, 3φ, 3W	10HP ≤ X < 25 HP	200A,3P	200A,3P	4#3/0-2"	3#3/0 & 1#4GND-2"	2	70A,3P	200A,3P/200A	#2	PER N.E.C
480V, 3φ, 3W	X < 10 HP	200A,3P	200A,3P	4#3/0-2"	3#3/0 & 1#4GND-2"	1	30A,3P	200A,3P/200A	#2	PER N.E.C
240V, 3φ, 3W	15HP ≤ X ≤ 20 HP	200A,3P	200A,3P	4#3/0-2"	3#3/0 & 1#4GND-2"	3	125A,3P	200A,3P/200A	#2	PER N.E.C
240V, 3φ, 3W	7.5HP ≤ X < 15 HP	100A,3P	100A,3P	4#2-1 1/2"	3#2 & 1#6GND-1 1/2"	2	80A,3P	100A,3P/100A	#6	PER N.E.C
240V, 3φ, 3W	X < 7.5 HP	100A,3P	100A,3P	4#2-1 1/2"	3#2 & 1#6GND-1 1/2"	1	50A,3P	100A,3P/100A	#6	PER N.E.C

NOTE: ALL STARTERS SHALL BE VARIABLE FREQUENCY DRIVES (VFD'S) AS MANUFACTURED BY DANFOSS. ALL VFD'S TO BE PROVIDED WITH HEAT SINKING ENCLOSURE.



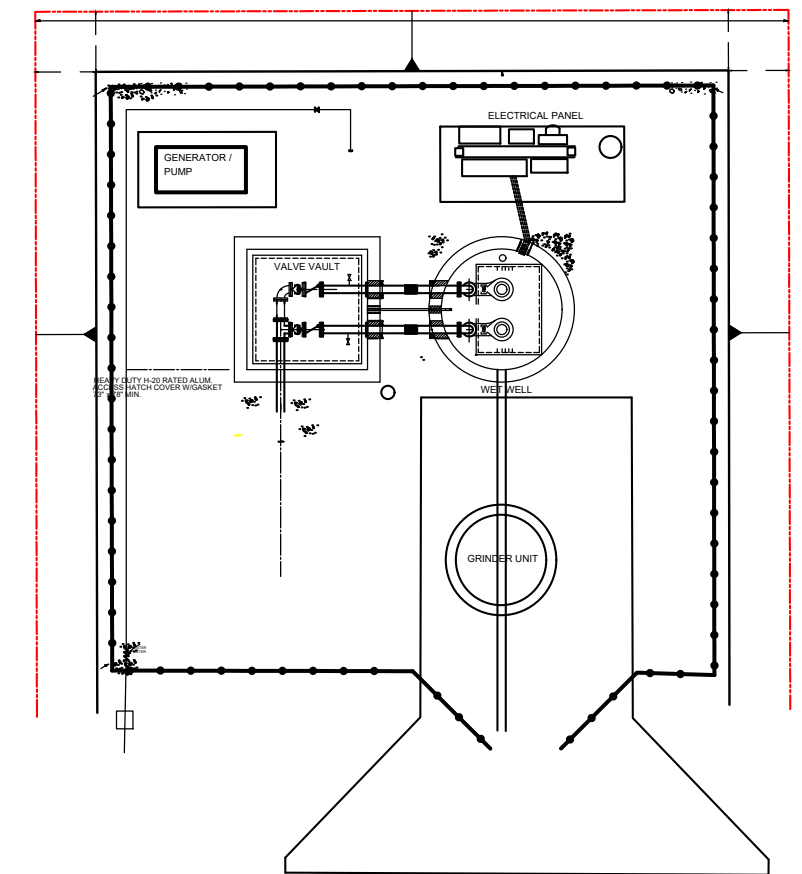
ONE LINE DIAGRAM

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CONDUIT INSTALLATION DETAIL

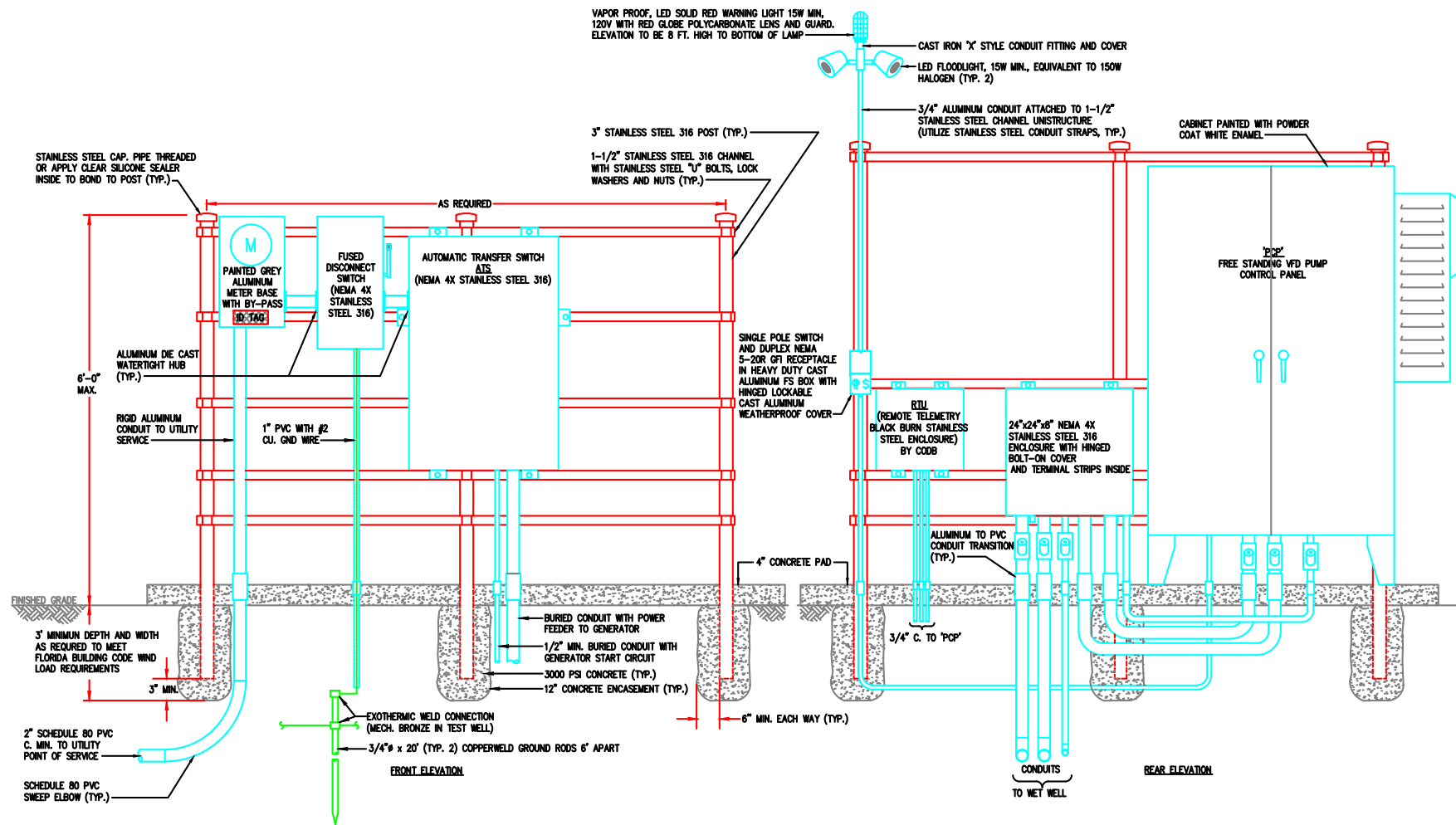
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TYPICAL SITE PLAN

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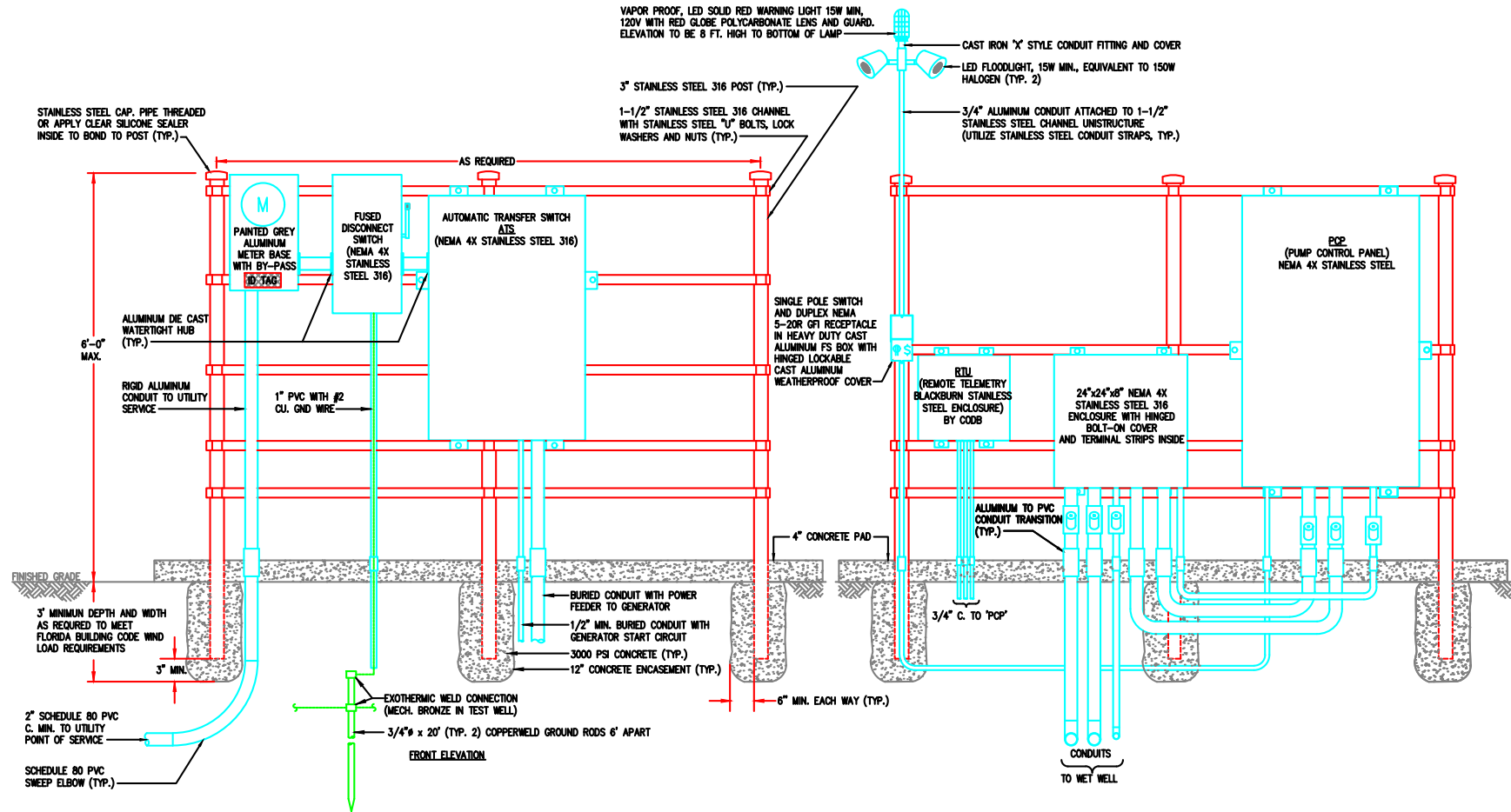
SERVICE RACK NOTES

1. PROVIDE ELECTRICAL SERVICE PANEL RACK CONFIGURED WITH ELECTRICAL DISTRIBUTION EQUIPMENT, EMERGENCY POWER AUTOMATIC TRANSFER SWITCH (ATS), REMOTE TERMINAL UNIT (RTU), AND APPURTENANCES AS SHOWN.
2. ALL MOUNTING HARDWARE SHALL BE #316 STAINLESS STEEL UTILIZING FLAT LOCK WASHERS AND NUTS.
3. ALL OUTDOOR ENCLOSURES, EXCEPT RTU, SHALL BE NEMA 4X, 316 STAINLESS STEEL, SCHEDULE 40, WEATHERPROOF.
4. THE CONTROL PANEL SHALL CONTAIN STARTERS AND OTHER DEVICES FOR THE WASTEWATER PUMPS, PRIMING PUMPS, BUBBLER SYSTEM, AND APPURTENANCES. THE PANEL SHALL ALSO PROVIDE 120 V POWER FOR THE LIGHTING, RECEPTACLE, AND OTHER MISCELLANEOUS NEEDS OF THE SITE.
5. ALL CONDUCTORS SHALL BE DUAL RATED, STRANDED COPPER WITH THHN/THWN INSULATION FOR CIRCUITS UNDER 600 VOLTS. GROUND CONDUCTORS SHALL BE SOFT DRAWN COPPER.
6. FUSES, BREAKERS, CONDUITS, WIRE AND EQUIPMENT TO BE SIZED PER MANUFACTURER'S RECOMMENDATION AND/OR CODE REQUIREMENTS.
7. GENERATOR AND GENERATOR BREAKER SHALL BE SIZED TO ACCOMMODATE THE TOTAL CONNECTED LOAD. THE GENERATOR SHALL NOT EXCEED 80% OF ITS RUNNING CAPACITY WITH ALL CONNECTED LOADS ON-LINE. ENGINEER SHALL BE RESPONSIBLE FOR THE SIZING OF THE GENERATOR. THE GENERATOR SUBMITTAL DOCUMENTS SHALL BE SIGNED AND SEALED BY A LICENSED ELECTRICAL ENGINEER, INCLUDING GENERATOR SELECTION/SIZING CALCULATIONS, INCLUDING THE COMPLIANCE TO MAXIMUM FREQUENCY AND VOLTAGE DIP LIMITS. FUEL TANK SHALL BE SIZED FOR 72 HOUR OPERATION UNDER FULL LOAD.
8. MINIMUM CONDUIT SIZE SHALL BE 3/4" ABOVE GRADE, AND 1" BELOW GRADE.
9. PUMP MOTOR CONDUIT SHALL BE SIZED TO ME 40% CONDUIT FILL CODE REQUIREMENT.
10. ELECTRICAL CONDUIT TO BE SCHEDULE 40 PVC BELOW GRADE AND ALUMINUM ABOVE GRADE.
11. ALL CONCEALED CONDUIT AND FITTINGS IN CONCRETE SHALL BE SCHEDULE 80 PVC.
12. UNDERGROUND CONDUIT SHALL BE INSTALLED A MINIMUM OF 24" BELOW FINISHED GRADE.
13. ALL CONTROL PANELS SHALL BE U.L. LABELED AND SHALL COMPLY WITH ARTICLE 409 OF THE N.E.C.
14. MOUNT BLACKBURN REMOTE TELEMETRY UNIT (RTU) ON SERVICE PANEL RACK AS SHOWN. TOP OF SCADA BOX TO BE AT 5'-6" A.F.G.
15. CONCRETE PADS FOR EQUIPMENT AND POWER RACK SIZING TO BE COORDINATED AND VERIFIED BY THE CIVIL OR STRUCTURAL ENGINEER OF RECORD.
16. CONTRACTOR SHALL SUBMIT SIGNED AND SEALED WIND LOAD CALCULATIONS FROM A STRUCTURAL ENGINEER LICENSED IN THE STATE OF FLORIDA. SERVICE PANEL RACK TO BE CERTIFIED PER LATEST ADOPTED EDITION OF THE FLORIDA BUILDING CODE.
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19. SERVICE RACK TO BE BONDED AND GROUNDED.
20. FREE STANDING PUMP CONTROL PANEL TO BE FACTORY EQUIPPED WITH WELDED GALVANIZED ATTACHMENT BRACKETS FOR RIGID INSTALLATION TO THE EQUIPMENT RACK ASSEMBLY.
21. BLACKBURN CONTROLS LS MONITOR WITH ENCLOSURE LSMON-DB-CELL-ENCL SCADAPACK 312E REMOTE TERMINAL UNIT MODEL ATBUP312-EA55-AB10 BLACKBURN CONTROLS 407-847-8848.

SERVICE RACK DETAIL WITH FREE STANDING PUMP CONTROL PANEL

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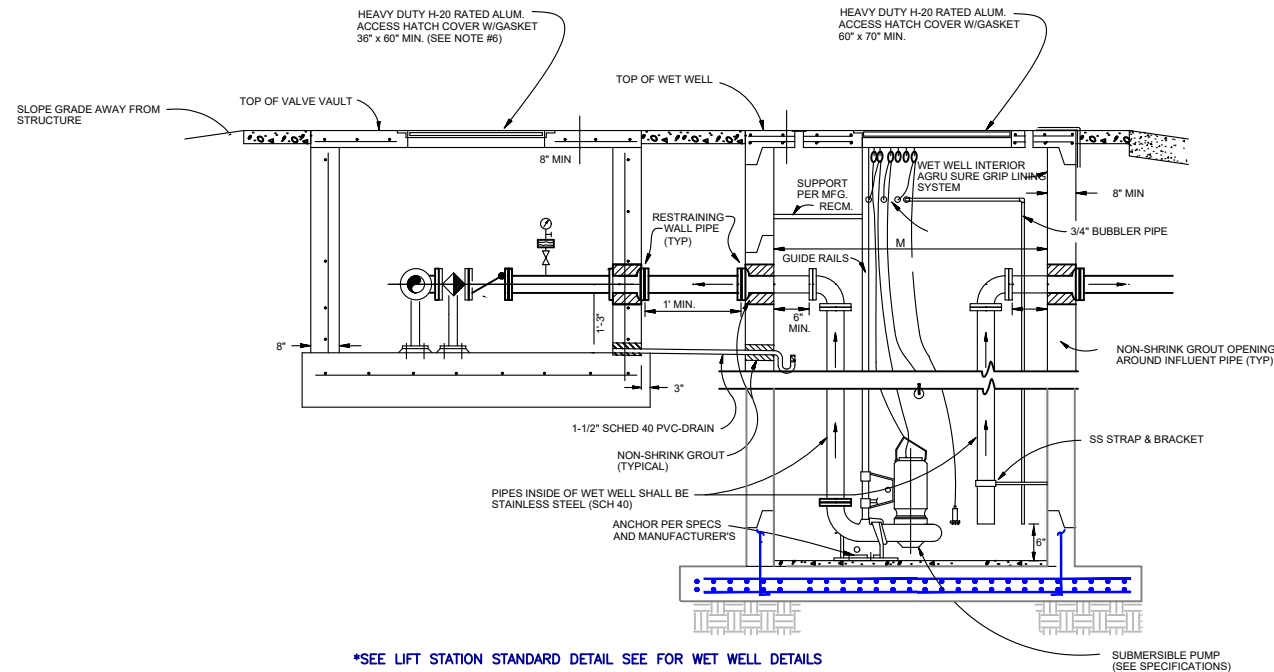
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3. ALL OUTDOOR ENCLOSURES, EXCEPT RTU, SHALL BE NEMA 4X, 316 STAINLESS STEEL, SCHEDULE 40, WEATHERPROOF.
4. THE CONTROL PANEL SHALL CONTAIN STARTERS AND OTHER DEVICES FOR THE WASTEWATER PUMPS, PRIMING PUMPS, BUBBLER SYSTEM, AND APPURTENANCES. THE PANEL SHALL ALSO PROVIDE 120 V POWER FOR THE LIGHTING, RECEPTACLE, AND OTHER MISCELLANEOUS NEEDS OF THE SITE.
5. ALL CONDUCTORS SHALL BE DUAL RATED, STRANDED COPPER WITH THHN/THWN INSULATION FOR CIRCUITS UNDER 600 VOLTS. GROUND CONDUCTORS SHALL BE SOFT DRAWN COPPER.
6. FUSES, BREAKERS, CONDUITS, WIRE AND EQUIPMENT TO BE SIZED PER MANUFACTURER'S RECOMMENDATION AND/OR CODE REQUIREMENTS.
7. GENERATOR AND GENERATOR BREAKER SHALL BE SIZED TO ACCOMMODATE THE TOTAL CONNECTED LOAD. THE GENERATOR SHALL NOT EXCEED 80% OF ITS RUNNING CAPACITY WITH ALL CONNECTED LOADS ON-LINE. ENGINEER SHALL BE RESPONSIBLE FOR THE SIZING OF THE GENERATOR. THE GENERATOR SUBMITTAL DOCUMENTS SHALL BE SIGNED AND SEALED BY A LICENSED ELECTRICAL ENGINEER, INCLUDING GENERATOR SELECTION/SIZING CALCULATIONS, INCLUDING THE COMPLIANCE TO MAXIMUM FREQUENCY AND VOLTAGE DIP LIMITS. FUEL TANK SHALL BE SIZED FOR 72 HOUR OPERATION UNDER FULL LOAD.
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9. PUMP MOTOR CONDUIT SHALL BE SIZED TO ME 40% CONDUIT FILL CODE REQUIREMENT.
10. ELECTRICAL CONDUIT TO BE SCHEDULE 40 PVC BELOW GRADE AND ALUMINUM ABOVE GRADE.
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19. SERVICE RACK TO BE BONDED AND GROUNDED.
20. BLACKBURN CONTROLS LS MONITOR WITH ENCLOSURE LS MON-DB-CELL-ENCL SCADAPACK 312E REMOTE TERMINAL UNIT MODEL #TBUP312-EA55-AB10 BLACKBURN CONTROLS 407-847-8848.

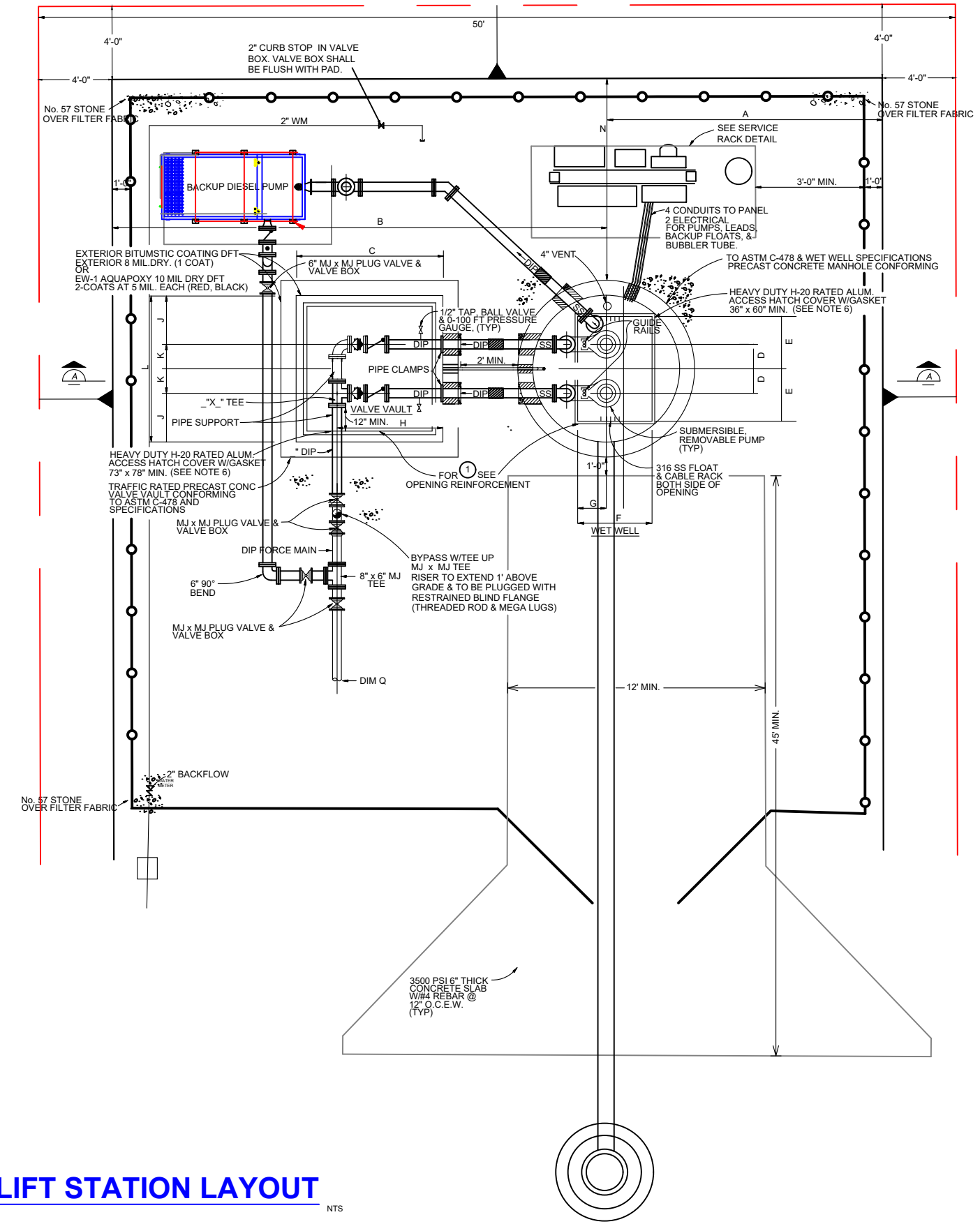
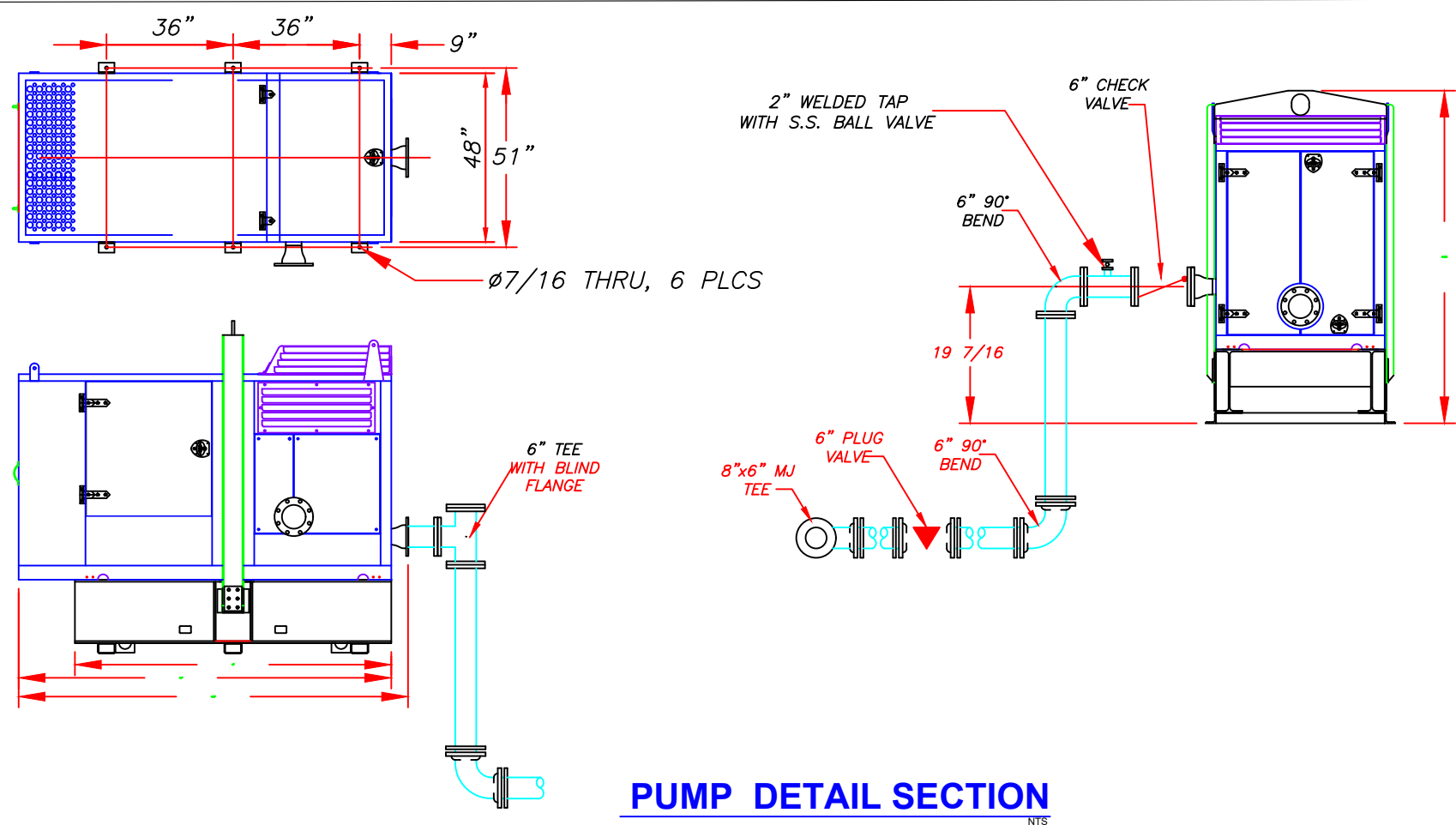
SERVICE RACK DETAIL WITH RACK MOUNTED PUMP CONTROL PANEL

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*SEE LIFT STATION STANDARD DETAIL SEE FOR WET WELL DETAILS
PUMP SUCTION PIPE DETAIL SECTION
 NTS



LIFT STATION LAYOUT
 NTS



ENGINE-GENERATOR SYSTEM

PROVIDE A COMPLETE FACTORY ASSEMBLED ENGINE-GENERATOR UNIT TO PROVIDE AUTOMATIC STANDBY ELECTRICAL POWER FOR THE PUMPING STATION. AN AUTOMATIC TRANSFER SWITCH (ATS) SHALL ALSO BE PROVIDED TO SENSE LOSS OF UTILITY POWER AND TO INITIATE AUTOMATIC START OF THE ENGINE-GENERATOR UNIT AND THE TRANSFER OF POWER FROM THE UTILITY FEED. ALSO PROVIDE DRY CONTACT ENGINE START ENABLE TO RECEIVE A RUN SIGNAL UPON HIGH WETWELL LEVEL FROM LEVEL FLOAT IN LIFT STATION.

PROVIDE COMPLETE ENGINE FUEL SYSTEM, ELECTRONIC GOVERNOR SYSTEM, ENGINE COOLING SYSTEM, ELECTRIC STARTING SYSTEM COMPLETE WITH BATTERIES AND CHARGING SYSTEM, EXHAUST SYSTEM WITH SILENCER, VIBRATION ISOLATION SYSTEM, DIGITAL (MICROPROCESSOR-BASED) ELECTRONIC CONTROLS, OUTPUT METERING (RMS VOLTAGE, CURRENT, FREQUENCY, POWER FACTOR, AND KW HOURS), SOUND-INSULATED OUTDOOR WEATHER-PROOF ENCLOSURE, AND OTHER REQUIRED APPURTENANCES, ALL OF WHICH SHALL BE MOUNTED ON A HEAVY-DUTY STEEL BASE WHICH SHALL BE FIELD MOUNTED ON A CAST IN PLACE CONCRETE FOUNDATION AS SHOWN.

THE ENGINE SHALL BE A DIESEL FUELED (ASTM D975 #2 DIESEL FUEL), RADIATOR AND FAN COOLED. MINIMUM DISPLACEMENT SHALL BE 199 CUBIC INCHES, WITH A CAST IRON BLOCK. FOR GENERATORS RATED AT 100KW OR LARGER, THE ENGINE SHALL BE 6 CYLINDER TURBO CHARGED. THE HORSEPOWER RATING OF THE ENGINE AT IT'S MINIMUM TOLERANCE LEVEL SHALL BE SUFFICIENT TO DRIVE THE ALTERNATOR AND ALL CONNECTED ACCESSORIES.

THE AC GENERATOR SHALL BE: SYNCHRONOUS, FOUR POLE, WITH 2/3 PITCH STATOR WINDINGS, REVOLVING FIELD, DRIP-PROOF CONSTRUCTION, SINGLE PRE-LUBRICATED SEALED BEARING, AIR COOLED BY A DIRECT DRIVE CENTRIFUGAL BLOWER FAN, AND DIRECTLY CONNECTED TO THE ENGINE WITH FLEXIBLE DRIVE DISC. ALL INSULATION SYSTEM COMPONENTS SHALL MEET NEMA MG1 TEMPERATURE LIMITS FOR CLASS H INSULATION SYSTEM. ACTUAL TEMPERATURE RISE MEASURED BY RESISTANCE METHOD AT FULL LOAD SHALL NOT EXCEED 105 DEGREES CENTIGRADE.

THE GENERATOR SET SHALL BE PROVIDED WITH AN OUTDOOR, ALUMINUM SOUND-ATTENUATED ENCLOSURE. THE SILENCES SHALL BE INSIDE THE ENCLOSURE. THE ENCLOSURE SHALL REDUCE THE SOUND LEVEL OF THE GENERATOR SET WHILE OPERATING AT FULL RATED LOAD TO A MAXIMUM OF 85 DBA AT ANY LOCATION 21 FT FROM THE GENERATOR SET IN A FREE FIELD ENVIRONMENT. THE ENCLOSURE PACKAGE SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE FOR ALL WIRING MATERIALS AND COMPONENT SPACING. ALL DOORS SHALL BE LOCKABLE, AND INCLUDE RETAINERS TO HOLD THE DOOR OPEN DURING SERVICE. ENCLOSURE ROOF SHALL BE CAMBERED TO PREVENT RAINWATER ACCUMULATION. OPENINGS SHALL BE SCREENED TO LIMIT ACCESS OF RODENTS INTO THE ENCLOSURE. PROVIDE CHART OF AVAILABLE COLOR SELECTIONS FOR SELECTION OF ENCLOSURE COLOR BY THE OWNER.

ALL ELECTRICAL POWER AND CONTROL INTERCONNECTIONS SHALL BE MADE WITHIN THE PERIMETER OF THE ENCLOSURE. A FACTORY-MOUNTED EXHAUST SILENCER SHALL BE INSTALLED INSIDE THE ENCLOSURE. ALL SHEET METAL SURFACES SHALL BE PRIMED FOR CORROSION PROTECTION AND FINISH PAINTED WITH THE MANUFACTURERS STANDARD COLOR USING A TWO STEP ELECTROCOATING PAINT PROCESS. THE PAINTING PROCESS SHALL RESULT IN A COATING THAT MEETS THE FOLLOWING REQUIREMENTS:

- PRIMER THICKNESS, 0.5-2.0 MILS.
- TOP COAT THICKNESS, 0.8-1.2 MILS.
- GLOSS, PER ASTM D523-89, 80% PLUS OR MINUS 5%.
- GLOSS RETENTION AFTER ONE YEAR SHALL EXCEED 50%.
- CROSSHATCH ADHESION, PER ASTM D3359-93, 4B-5B.
- IMPACT RESISTANCE, PER ASTM D2794-93, 120-160 INCH-POUNDS.
- SALT SPRAY, PER ASTM B117-90, 1000+ HOURS.
- HUMIDITY, PER ASTM D2247-92, 1000+ HOURS.

THE ENGINE-GENERATOR UNIT SHALL INCLUDE THE NECESSARY FEATURES TO MEET THE REQUIREMENTS OF NFPA 70, NFPA 110, AND IEEE 446. THE UNIT SHALL BE MANUFACTURED BY CUMMINS OR CATERPILLAR.

SIZING CALCULATIONS MUST BE SIGNED AND SEALED BY A REGISTERED ELECTRICAL ENGINEER AND MEET THE GREATER OF THE TWO CONDITIONS LISTED BELOW:

- UNDER VFD OPERATION, THE GENSET MUST BE SIZED TO HANDLE BOTH PUMPS RUNNING WITHOUT EXCEEDING 60% OF ITS RATED CAPACITY. THIS REQUIREMENT IS TO LIMIT THE HARMONIC DISTORTION.
- UNDER NON-LINEAR LOADING (OR ACROSS THE LINE), THE GENSET MUST BE SIZED TO HANDLE BOTH PUMPS RUNNING UNDER A SEQUENTIAL START WITHOUT EXCEEDING 70% OF ITS RATED CAPACITY.

OUTPUT VOLTAGES (NOTE: MATCH UTILITY VALUES):	3-PHASE, 60 HZ, 4 WIRE
RATED SPEED:	1,800 RPM
MAXIMUM DIESEL CONSUMPTION AT FULL LOAD:	ENGINEER TO SIZE. MIN. 72 HRS
VOLTAGE REGULATION, NO LOAD TO FULL LOAD:	+/- 1.0%
RANDOM VOLTAGE VARIATION:	+/- 1.0%
FREQUENCY REGULATION:	ISOCHRONOUS
RANDOM FREQUENCY VARIATION:	+/- 0.6%
OPERATE AT FULL LOAD FOR AMBIENT CONDITIONS:	100 DEG F, 40 DEG. C AT 100' MSL

- MAXIMUM VOLTAGE DIP: 20%
- MAXIMUM FREQUENCY DIP: 10%
- THE RANGE OF THE GENERATOR RATING SHALL BE SIZED NO LARGER THAN 2-2.5 TIMES THE RUNNING CONNECTED LOAD.

THE ENGINE-GENERATOR SET SHALL START ON RECEIPT OF A START SIGNAL FROM THE AUTOMATIC TRANSFER SWITCH. THE START SIGNAL SHALL BE VIA HARDWIRED CONNECTION TO THE GENERATOR SET CONTROL, AND THE UNIT SHALL COMPLETE A TIME DELAY START PERIOD AS PROGRAMMED INTO THE CONTROL START TIME; COMPLY WITH NFPA 110, LEVEL 1, TYPE 10, SYSTEM REQUIREMENTS. THE GENERATOR SET CONTROL SHALL INITIATE THE STARTING SEQUENCE WHICH SHALL INCLUDE: VERIFICATION THAT THE ENGINE IS ROTATING WHEN THE STARTER IS SIGNALED.

ENGINE START AND ACCELERATION TO START DISCONNECT SPEED (IF THE ENGINE DOES NOT START, IT SHALL COMPLETE A CYCLE CRANKING PROCESS).

IF THE ENGINE DOES NOT START IT SHALL BE SHUT DOWN AND LOCKED OUT, AND THE CONTROL SYSTEM SHALL INDICATE "FAIL TO START".

THE ENGINE SHALL ACCELERATE TO RATED SPEED AND THE ALTERNATOR TO RATED VOLTAGE. EXCITATION SHALL BE DISABLED UNTIL THE ENGINE HAS EXCEEDED PROGRAMMED IDLE SPEED, AND REGULATED TO PREVENT OVER VOLTAGE CONDITIONS AND OSCILLATION AS THE ENGINE ACCELERATES AND THE ALTERNATOR BUILDS TO RATED VOLTAGE.

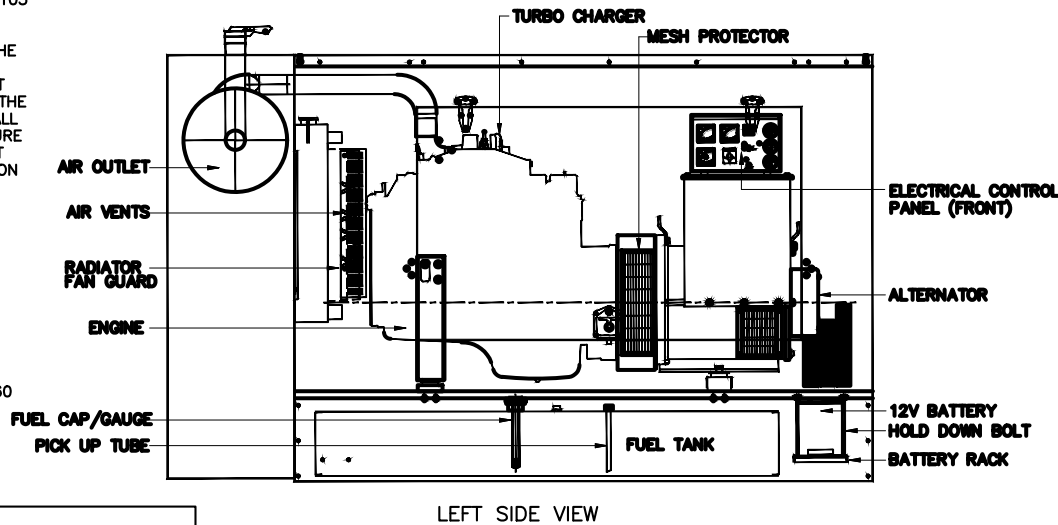
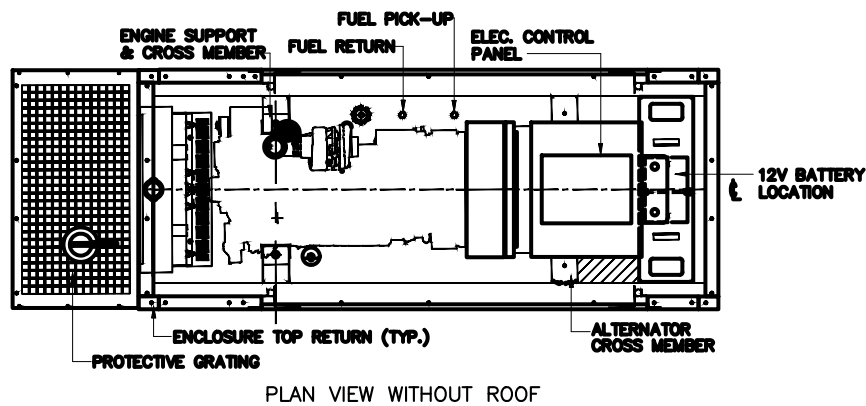
UPON REACHING RATED SPEED AND VOLTAGE, THE GENERATOR SET SHALL OPERATE AS DICTATED BY THE CONTROL SYSTEM IN ISOCHRONOUS, SYNCHRONIZE, LOADSHARE, LOAD DEMAND, OR LOAD GOVERN STATE.

WHEN ALL START SIGNALS HAVE BEEN REMOVED FROM THE GENERATOR SET, IT SHALL COMPLETE A TIME DELAY STOP SEQUENCE. THE DURATION OF THE TIME DELAY STOP PERIOD SHALL BE ADJUSTABLE BY THE OPERATOR.

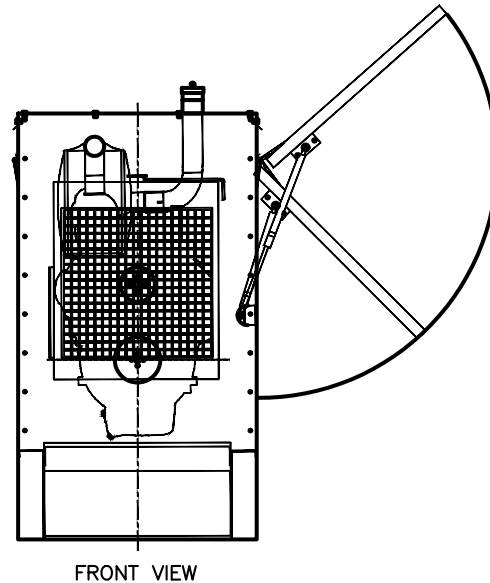
UPON COMPLETION OF THE TIME DELAY STOP PERIOD, THE GENERATOR SET CONTROL SHALL SWITCH OFF THE EXCITATION SYSTEM AND SHALL SHUT DOWN.

ANY START SIGNAL RECEIVED AFTER THE TIME STOP SEQUENCE HAS BEGUN SHALL IMMEDIATELY TERMINATE THE STOPPING SEQUENCE AND RETURN THE GENERATOR SET TO ISOCHRONOUS OPERATION.

THE GENERATOR SET AND ASSOCIATED EQUIPMENT SHALL BE WARRANTED FOR A PERIOD OF NOT LESS THAN 5 YEARS FROM THE DATE OF COMMISSIONING AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP. THE WARRANTY SHALL BE COMPREHENSIVE. NO DEDUCTIBLES SHALL BE ALLOWED FOR TRAVEL TIME, SERVICE HOURS, REPAIR PARTS COST, ETC. GENERATOR UNIT SHALL MEET THE REQUIREMENTS OF ISO 9001 AND U.L. 2200.



THE ENCLOSURE, GENERATOR AND BASE MOUNTED FUEL TANK SHALL BE CERTIFIED BY A LICENSED STRUCTURAL PROFESSIONAL ENGINEER LICENSED IN THE STATE OF FLORIDA AND TO BE DESIGNED AND RATED FOR A WIND LOAD RESISTANCE AS REQUIRED BY THE LATEST ADOPTED EDITION OF FLORIDA BUILDING CODE. PROVIDE TWO (2) ORIGINALS AND SIX (6) COPIES OF THE P.E. STAMPED CERTIFIED WIND LOAD CALCULATIONS REPORT INDICATING COMPLIANCE TO THE OWNER'S REPRESENTATIVE. THE ENCLOSURE WIND LOAD RATING SHALL BE INCLUDED ON THE MANUFACTURER'S ENCLOSURE DRAWINGS.



DIESEL STORAGE SYSTEM

PROVIDE A DIESEL STORAGE AND SUPPLY SYSTEM FOR THE ENGINE GENERATOR CONFIGURED AS SHOWN. THE SYSTEM SHALL MEET THE REQUIREMENTS OF THE DIESEL FUEL CODE, THE APPLICABLE PROVISIONS OF FLORIDA STATUTES, CHAPTER 206.874, AND FLORIDA ADMINISTRATIVE CODE, CHAPTER SF-2.001 DIESEL. FUEL TANK TO BE SIZED FOR 72 HOURS OF CONTINUOUS FUEL SUPPLY AT MAXIMUM DESIGNED LOAD AND SHALL MEET REQUIREMENTS FOR A COMPLETE INSTALLATION AS PER STATE AND LOCAL REQUIREMENTS.

THE GENERATOR SET AND ENCLOSURE SHALL BE MOUNTED AND SHIPPED TO THE JOBSITE ON THE FORMED STEEL SUB-BASE PROVIDED BY THE GENERATOR SUPPLIER. PROVISIONS FOR CRANE UNLOADING OF THE COMPLETE PACKAGE SHALL BE DESIGNED INTO THE BASE OF THE UNIT. NEOPRENE PADS SHALL BE INSTALLED BETWEEN THE FUEL TANK AND THE CONCRETE SLAB. A 500 GALLON BASE MOUNTED FUEL TANK SHALL BE ATTACHED TO THE CONCRETE SLAB WITH STAINLESS STEEL EXPANSION ANCHORS. THE BASE AND ENCLOSURE ASSEMBLY SHALL ALLOW ROOM WITHIN THE PACKAGE TO MOUNT AND MAINTAIN THE SPECIFIED BATTERY CHARGER, ENGINE STARTING BATTERIES, RACKS, AND CABLES, MAIN LINE CIRCUIT BREAKER, AND ENGINE-GENERATOR CONTROL PANEL, AND OTHER ITEMS AS SPECIFIED OR AS SHOWN ON THE DRAWINGS. THE WEIGHT OF THE ENTIRE UNIT CONSISTING OF GENERATOR SET, BASE, ENCLOSURE, AND ALL OTHER SPECIFIED ITEMS INCLUDING ALL LIQUIDS (I.E., FUEL OIL, LUBE OIL, AND COOLING WATER) SHALL BE CALCULATED BY THE MANUFACTURER. THE BASE OF THE UNIT SHALL BE DESIGNED AND MANUFACTURED AS A HEAVY DUTY, FORMED STEEL CONSTRUCTION WITH FOUR (4) POINT LIFTING PROVISION TO SUPPORT THE CALCULATED WEIGHT. DETAILS AND MANUFACTURER'S CERTIFICATION OF THE BASE CONSTRUCTION SHALL BE INCLUDED WITH THE DRAWINGS SUBMITTED FOR APPROVAL AS WELL AS ALL WEIGHT CALCULATIONS. THE UNIT SHALL BE EQUIPPED WITH A DOUBLE WALL SUB-BASE UL142 FUEL STORAGE TANK AND SHALL BE SUPPLIED WITH A LOCKABLE, EXTERIOR LOCATED FILL CAP. ALL NECESSARY FUEL AND NORMAL AND EMERGENCY VENT LINES WITH VENT CAPS FOR PROPER ENGINE PERFORMANCE SHALL BE PROVIDED AS WELL AS A MEANS TO READILY DETECT THE FUEL LEVEL IN THE TANK WITHOUT THE USE OF A MEASURING STICK, VIA HIGH AND LOW LEVEL SWITCHES. THE FUEL TANK BASE MAXIMUM LENGTH & WIDTH DIMENSIONS SHALL BE AS NOTED ON THE DRAWINGS AND BE FORMED FROM CORROSION RESISTANT STEEL OF A MINIMUM METAL THICKNESS OF 0.25-INCH (1/4-INCH) AND SHALL BE FITTED WITH LOW FUEL LEVEL INNER WALL LEAK ALARM CONTACT FOR LOCAL AND REMOTE ANNUNCIATION. THE FUEL TANK HEIGHT SHALL NOT EXCEED 24 INCHES.

AUTOMATIC TRANSFER SWITCH

PROVIDE AN AUTOMATIC TRANSFER SWITCH (ATS) AS SHOWN. THE ATS SHALL BE RATED TO CARRY 100 PERCENT OF RATED CURRENT CONTINUOUSLY IN THE ENCLOSURE SUPPLIED, IN AMBIENT TEMPERATURES OF 40 TO +60 DEGREES C, RELATIVE HUMIDITY UP TO 95% (NON CONDENSING), AND ALTITUDES UP TO 1,000 FEET. TRANSFER SWITCH EQUIPMENT SHALL HAVE FAULT CURRENT RATINGS SUITABLE FOR USE IN THE APPLICATION, AS INDICATED BY THE AVAILABLE FAULT CURRENT AT THE SITE AS PER THE ELECTRIC UTILITY. THE ATS SHALL BE A CUMMINS, ASCO 3-POLE OR APPROVED EQUAL.

THE ATS SHALL BE DOUBLE THROW, ELECTRICALLY AND MECHANICALLY INTERLOCKED, AND MECHANICALLY HELD IN THE SOURCE 1 AND SOURCE 2 POSITIONS. THE TRANSFER SWITCH SHALL BE SPECIFICALLY DESIGNED TO TRANSFER TO THE BEST AVAILABLE SOURCE IF IT INADVERTENTLY STOPS IN A NEUTRAL POSITION. THE ATS SHALL BE ELECTRICALLY INTERLOCKED IN BOTH AUTOMATIC AND MANUAL OPERATION MODES TO PERFORM THE OPERATION SEQUENCE SPECIFIED. THE POWER TRANSFER MECHANISM SHALL INCLUDE PROVISIONS FOR MANUAL OPERATION UNDER LOAD WITH THE DOOR OF THE CABINET CLOSED. ALL WIRING SHALL BE TAGGED TO MATCH THE SCHEMATIC, SHALL BE UL LISTED 105 DEGREE C, 600 VOLT RATED, AND SIZED AS REQUIRED. CIRCUIT BOARDS SHALL BE CONNECTED WIRING HARNESES BY MEANS OF LOCKING DISCONNECT PLUG(S). THE 3-POLE ATS SHALL BE PROVIDED WITH A NEUTRAL BUS AND LUGS SIZED TO CARRY 100% OF THE ATS CURRENT RATING. FIELD CONTROL CONNECTIONS SHALL BE MADE ON A COMMON TERMINAL BLOCK THAT IS CLEARLY AND PERMANENTLY LABELED.

THE ATS SHALL INCORPORATE ADJUSTABLE TIME DELAYS FOR GENERATOR SET START (ADJUSTABLE IN A RANGE FROM 0-15 SECONDS); TRANSFER (ADJUSTABLE IN A RANGE FROM 0-120 SECONDS); RETRANSFER (ADJUSTABLE IN A RANGE FROM 0-30 MINUTES); AND GENERATOR STOP (COOLDOWN; ADJUSTABLE IN A RANGE OF 0-30 MINUTES), AND SHALL BE CONFIGURABLE TO CONTROL THE OPERATION TIME FROM SOURCE TO SOURCE (PROGRAM TRANSITION OPERATION) IN OPEN TRANSITION MODE. THE CONTROL SYSTEM SHALL BE CAPABLE OF ENABLING OR DISABLING THIS FEATURE, AND ADJUSTING THE TIME PERIOD TO A SPECIFIC VALUE. A PHASE BAND MONITOR OR SIMILAR DEVICE IS NOT AN ACCEPTABLE ALTERNATE FOR THIS FEATURE.

THE ATS SHALL PROVIDE AN ISOLATED NORMALLY HELD OPEN, AND CLOSE TO START RELAY CONTACT FOR STARTING OF THE ENGINE-GENERATOR SET. OUTPUT CONTACTS SHALL BE FORM C, FOR COMPATIBILITY. THE ATS SHALL PROVIDE RELAY CONTACTS TO INDICATE THE FOLLOWING CONDITIONS: SOURCE 1 AVAILABLE, LOAD CONNECTED TO SOURCE 1, SOURCE 2 AVAILABLE, SOURCE 2 CONNECTED TO LOAD.

THE ATS ENCLOSURE SHALL BE NEMA 4X 304 STAINLESS STEEL (OR BETTER, IF SHOWN OR NOTED), UL LISTED AND SHALL PROVIDE NEC REQUIRED WIRE BEND SPACE. THE CABINET DOOR SHALL BE KEY LOCKING. SEPARATE ENCLOSURES SHALL BE THE NEMA TYPE SPECIFIED. MANUAL OPERATING HANDLES AND ALL CONTROL SWITCHES (OTHER THAN KEY OPERATED SWITCHES) SHALL BE ACCESSIBLE TO AUTHORIZED PERSONNEL ONLY BY OPENING THE KEY LOCKING CABINET DOOR.

FACTORY TESTING: THE TRANSFER SWITCH SUPPLIER SHALL PERFORM A COMPLETE OPERATIONAL TEST ON THE TRANSFER SWITCH PRIOR TO SHIPPING FROM THE FACTORY. A CERTIFIED TEST REPORT SHALL BE AVAILABLE ON REQUEST. TEST PROCESS SHALL INCLUDE CALIBRATION OF VOLTAGE SENSORS.

AFTER INSTALLATION, THE SUPPLIER SHALL CONDUCT A COMPLETE OPERATION, BASIC MAINTENANCE, AND EMERGENCY SERVICE SEMINAR FOR UP TO 10 PERSONS EMPLOYED BY THE CITY. THE SEMINAR SHALL INCLUDE INSTRUCTION ON OPERATION OF THE TRANSFER EQUIPMENT, NORMAL TESTING AND EXERCISE, ADJUSTMENTS TO THE CONTROL SYSTEM AND EMERGENCY OPERATION PROCEDURES. THE CLASS DURATION SHALL BE AT LEAST 4 HOURS IN LENGTH, AND INCLUDE PRACTICAL OPERATION WITH THE INSTALLED EQUIPMENT.

REINFORCED CONCRETE EQUIPMENT PADS

PROVIDE BUILT-UP PAD AREA FOR NEW CONCRETE FOUNDATIONS TO ELEVATIONS AS SHOWN. USE CLEAN GRANULAR FILL IN 6-INCH LIFTS. GRANULAR FILL SHALL BE CLEAN SAND WITH NO MORE THAN 10% FINES PASSING THROUGH A NO.200 SIEVE. COMPACT TO 95% RELATIVE COMPACTION PER ASTM D1557. PROVIDE TEST REPORT FROM INDEPENDENT TEST LAB SATISFACTORY TO OWNER AND ENGINEER.

COORDINATE FORM PLACEMENT WITH PIPING AND ELECTRICAL CONDUITS AS SHOWN IN THESE DRAWINGS. FORMWORK FOR SLAB SHALL BE IN ACCORDANCE WITH ACI 347, FOR PLACEMENT OF CONCRETE IN ACCORDANCE WITH ACI 304R.

REINFORCING STEEL SHALL BE DEFORMED BARS IN ACCORDANCE WITH ASTM A615, GRADE 60, PLACED ON SUPPORTS IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.

CONCRETE MIX SHALL UTILIZE TYPE II PORTLAND CEMENT WITH NATURAL AGGREGATE MEETING ASTM C150 AND ASTM C33 REQUIREMENTS RESPECTIVELY. THE MINIMUM 28-DAY STRENGTH SHALL BE 4,000 PSI. TAKE SAMPLES DURING POUR AND PROVIDE TEST CYLINDER BREAK REPORT FROM INDEPENDENT TEST LAB.

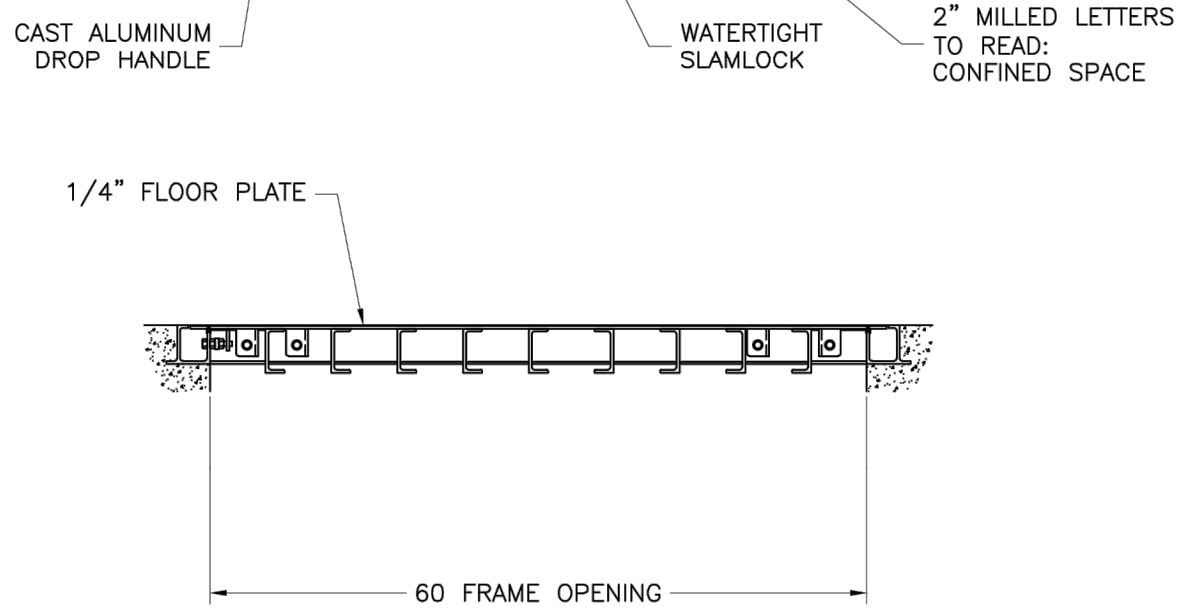
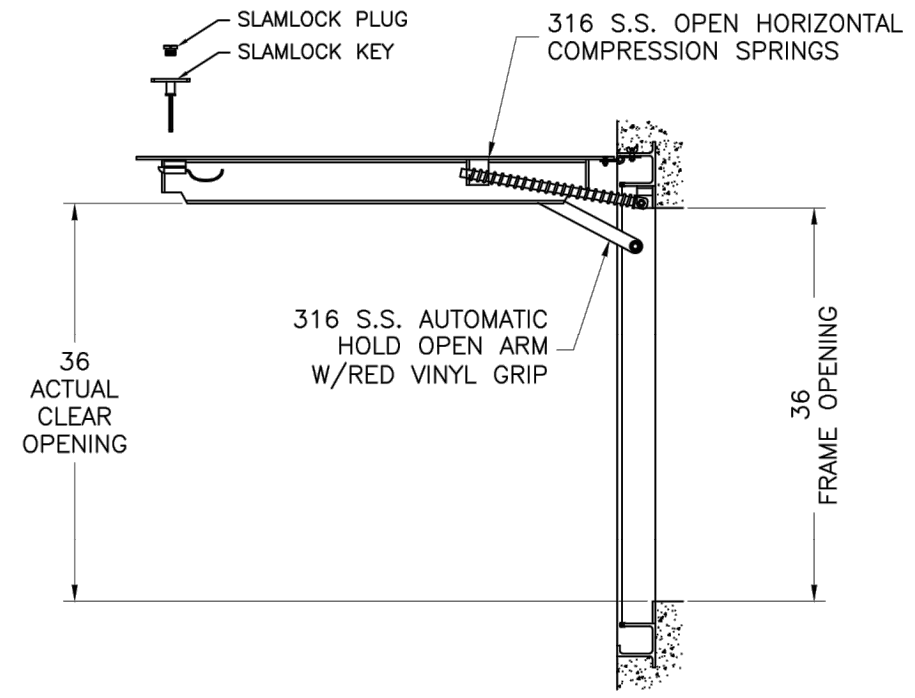
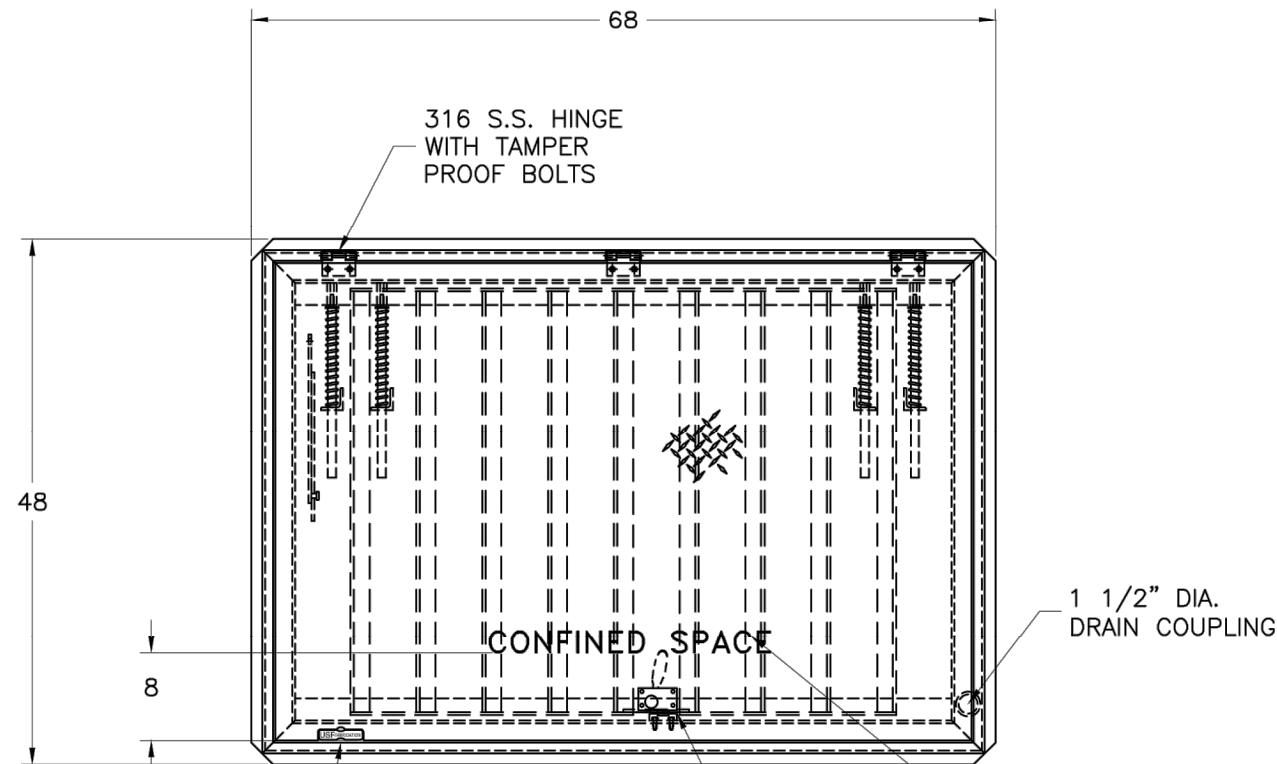
PLACE CONTROL JOINTS AS SHOWN. ROUND OFF ALL TOP EXPOSED EDGES WITH 0.25-INCH RADIUS EDGING TOOL.

PROTECT SURFACES AND WET CURE CONCRETE FOR A MINIMUM OF 7 DAYS AFTER PLACEMENT.

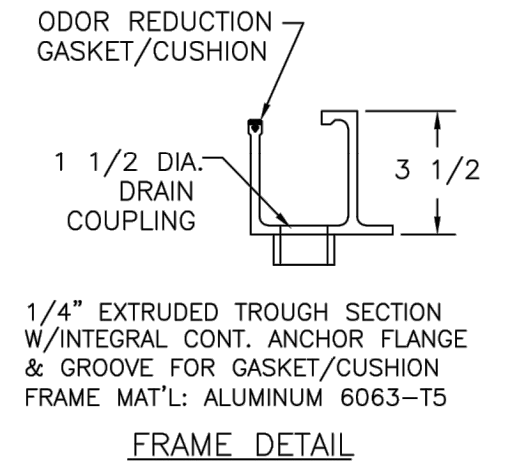
THE CONCRETE SUPPORT PAD FINISHED GRADE SHALL BE 18" ABOVE BASE FLOOD ELEVATION. FUEL TANK VENTS SHALL BE PROTECTED FROM FLOODING.



FY-19/20
Drawing Date: 01/08
Drawn By: KLH/AEZ
Checked By: JMP/AEZ
Scale: NTS
Revision Date: 06/18
File Name: S-23 5 of 7
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- SELECTED FEATURES**
1. OPEN HORIZONTAL SPRINGS
 2. SLAMLOCK
 3. MILLED LETTERING
 4. BITUMINOUS COATING
- NOTES**
1. MATERIAL: ALUMINUM
 2. FINISH: MILL
 3. LOADING: DESIGNED FOR AASHTO H20 WHEEL LOADS WITH MAX DEFL OF 1/150 OF THE SPAN
DESIGNED FOR OCCASIONAL TRAFFIC ONLY.
 4. 316 SS NUTS & BOLTS
 5. AREA OF FRAME IN CONTACT WITH CONCRETE TO BE PAINTED WITH BITUMINOUS COATING
 6. APPROX HATCH WT: 253.88 LBS



NOTE:
AS AN AUTOMATED DRAWING, THE DESIGN HAS NOT BEEN REVIEWED BY USFF ENGINEERING AND IS THEREFORE TO BE USED FOR REFERENCE ONLY. USFF RESERVES THE RIGHT TO ADJUST DIMENSIONS TO INSURE ADHERENCE TO CUSTOMER REQUIREMENTS AND PROPER OPERATION OF THE PRODUCT.

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INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M
BREAK ALL SHARP CORNERS & EDGES TO 0.01
TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL
INCHES = ± 1/16
1/16 = ± 1/32
1/32 = ± 1/64

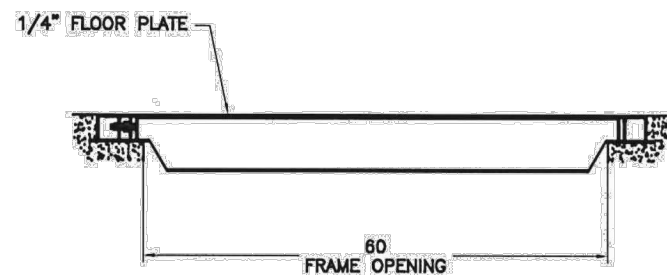
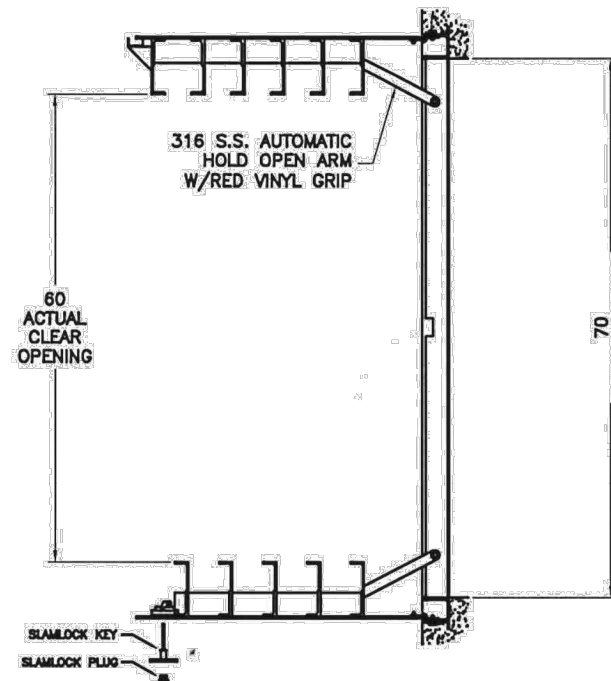
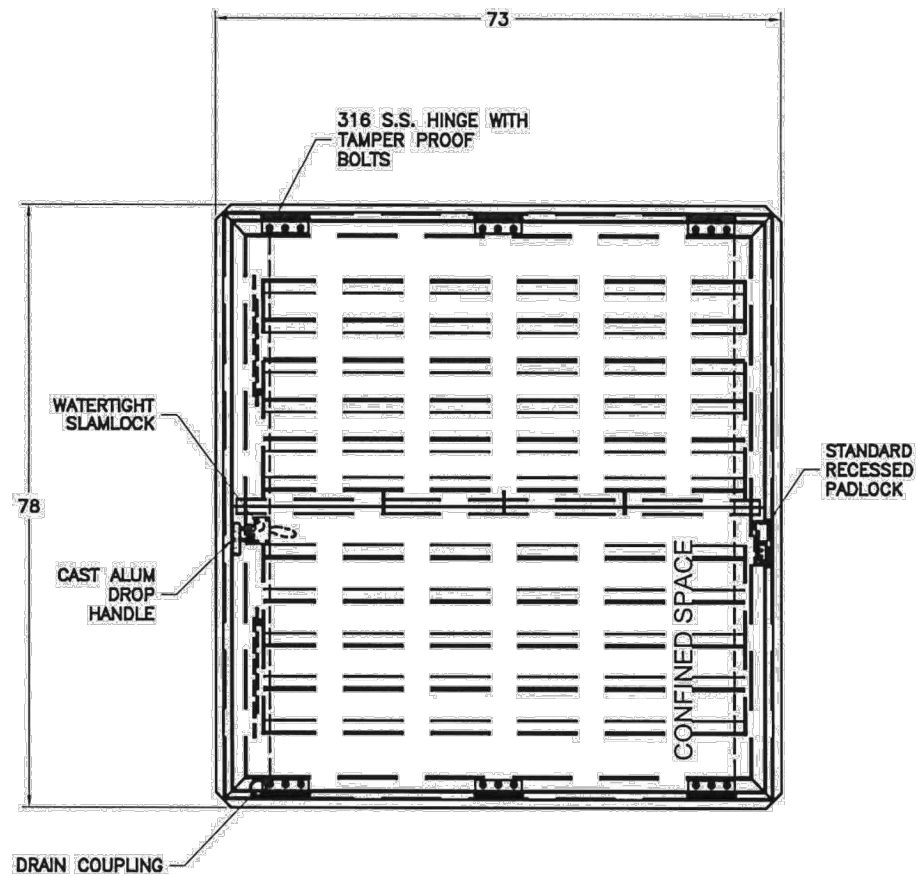
U.S.F. FABRICATION INC.
HIALEAH, FLORIDA

HATCH THS 36 X 60 ALUM

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DWN. BY: BOB	SCALE: 1:16	SHEET: 1 OF 1	DATE: 10/26/17
CHK. BY: LE	DWG.# 1000086045	SHEET SIZE: B	REV: 0





SELECTED FEATURES

1. SLAMLOCK
2. STD. RECESSED PADLOCK
3. MILLED LETTERING
4. BITUMINOUS COATING
5. 2" MILLED LETTERING

NOTES

1. MATERIAL: ALUMINUM
2. FINISH: MILL
3. LOADING: DESIGNED FOR AASHTO H20 WHEEL LOADS WITH MAX DEFL OF 1/150 OF THE SPAN
DESIGNED FOR OCCASIONAL TRAFFIC ONLY.
4. 316 SS NUTS & BOLTS
5. AREA OF FRAME IN CONTACT WITH CONCRETE TO BE PAINTED WITH BITUMINOUS COATING
6. APPROX HATCH WT: 447.65 LBS

ODOR REDUCTION GASKET/CUSHION



1/4" EXTRUDED TROUGH SECTION W/INTEGRAL CONT. ANCHOR FLANGE & GROOVE FOR GASKET/CUSHION
FRAME MAT'L: ALUMINUM 6063-T5

FRAME DETAIL

NOTE:
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INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M

BREAK ALL SHARP CORNERS & EDGES TO 0.01

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONAL

INCHES = ± 1/16
1/16 = ± 1/32
1/32 = ± 1/64

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HIALEAH, FL

HATCH THD 60 X 70 ALUM

DWN. BY: BOB	SCALE: 1:30	SHEET: 1 OF 1	DATE: 04/10/17
CHK. BY: BOB	DWG # 1000063656	SHEET SIZE: A	REV: 0



The City of Daytona Beach Utilities Department

List of Acceptable Products

Sanitary Sewer

FY 19/20

Products that are submitted to the city engineering division prior to beginning project construction and are approved by the city may be substituted on a case by case basis for the products on the acceptable products list.

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DIP/Cast Iron Epoxy Lined (Class 350) Pipe
Casing End Seals
Casing Spacers (all sizes) Stainless Steel w/Vinyl Runners

San Sewer Category 2 of 4: VALVES AND ACCESORIES

Gate Valves - General (resilient seat)
Gate Valves - 12" and Smaller (resilient seated only)
Gate Valves 16" - 48" (resilient seated only w/side actuators)
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Blow Off Valves
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Restrained Joints Ductile Iron Pipe
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Restraint Kits
Rubber Couplings

San Sewer Category 4 of 4: MANHOLE ACCESSORIES

PVC Pipe Manhole Adaptors
Manhole Lids, Frames, and Rings
Flexible Manhole Connectors
Manhole Linings

The City of Daytona Beach Utilities Department

List of Acceptable Products

Sanitary Sewer

FY 19/20

Category 1 of 4: PIPE MATERIALS

PVC, Green Pipe

1. North American Pipe
2. Diamond
3. NapCo
4. JM Eagle
5. National
6. Certain Teed

Ductile Iron/ Cast Iron Epoxy Coated w/Protecto 401 Lining

1. American Cast Iron Pipe
2. McWane/Clow
3. Griffin
4. US Pipe
5. Tyton

Casing End Seals

- | | |
|----------------------|-----------------------------|
| 1. Advanced Products | 1. Model AC & AW |
| 2. BMW | 2. BMW wrap around end seal |
| 3. Cascade | 3. Model CCES |
| 4. Power Seal | 4. Model 4810ES |
| 5. PSI | 5. Model C, S, & W |
| 6. CCI | 6. Model ESW |

Casing Spacers (all sizes) Stainless steel w/ vinyl runners

- | | |
|----------------------|----------------------------|
| 1. Advanced Products | 1. Series SS |
| 2. Cascade | 2. Series CCS/ CCPS/ AZ |
| 3. BMW | 3. BMW-SS |
| 4. Power Seal | 4. Model 4810 |
| 5. PSI | 5. Series S-G-2 |
| 6. PSI-Ranger | 6. Ranger II |
| 7. RACI | 7. S/T, F/G, P/Q, M/N, E/H |
| 8. CCI | 8. CSS-8, CSS-12 |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Sanitary Sewer

FY 19/20

Category 2 of 4: VALVES AND ACCESSORIES

Gate Valves - General (resilient seat)

AWWA C509 and C515

- | | |
|---------------------------|------------------|
| 1. American Flow Control | 1. C509 and C515 |
| 2. Mueller | 2. C509 and C515 |
| 3. Clow | 3. C509 and C515 |
| 4. Kennedy | 4. C509 and C515 |
| 5. US Pipe | 5. C509 and C515 |
| 6. American AVK | 6. C509 (only) |
| 7. East Jordan Iron Works | 7. C509 and C515 |

Gate Valves 12" and Smaller (resilient seated only)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. American R/D | 2. Series 2000 |
| 3. AVK | 3. Series 25 |
| 4. Clow | 4. Series F-6100 |
| 5. Kennedy | 5. Series 4571 |
| 6. M&H | 6. Series 4067 |
| 7. Mueller | 7. Series A2360 |
| 8. US Pipe | 8. Metroseal 250 |

Gate Valves 16" - 48" (resilient seated only w/side actuators)

- | | |
|--------------------------|------------------|
| 1. American Flow Control | 1. Series 2500 |
| 2. Clow | 2. Series F-6100 |
| 3. Mueller | 3. Series A2361 |
| 4. US Pipe | 4. Series 5460 |
| 5. Kennedy | 5. Series 4571 |
| 6. M&H | 6. Series 4067 |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Sanitary Sewer

FY 19/20

Plug Valves (full flow only)

- | | |
|------------------|------------------------------------|
| 1. Clow | 1. Full Flow Series F-5412, F-5413 |
| 2. Dresser | 2. Series PEC |
| 3. Dezurik | 3. Permaseal Series |
| 4. Mueller/Pratt | |
| 3. Milliken | |

Blow Off Valves

- | | |
|-------------------------|------------------------------------|
| 1. Hydro Guard | 3. Series 625 (Eccentricity style) |
| 2. Kupferle Foundry Co. | 1. Automatic Blow Off |
| 3. Water Plus | 2. Series TF 550 |
| | 3. Series VB 2000 |

Air, Vacuum or Air/Vac Combination Release Valves (No DI or Cast Iron allowed)

- | | |
|----------|--|
| 1. ARI | 1. ARI, D-025 (NYLON OR STAINLESS STEEL - 316) |
| 1. H-TEC | 1. 986 |

Air Release Valve Enclosure

- | | |
|----------------|---------------------------------------|
| 1. Water Plus | 1. No. 30 (131632)
No. 40 (171730) |
| 2. CDR | 2. Boxes & Vaults |
| 2. GlasMasters | 2. Boxes & Vaults |

Valve Boxes - 5 1/4"

1. U S Foundry
2. East Jordan Iron Works
3. SIP Industries

Category 3 of 4: PIPE FITTINGS

PVC Sewer Pipe Fittings

- | | |
|-----------------------|----------------|
| 1. Multi | 1. Aqualite |
| 2. Vassallo | 2. Gask-O-Weld |
| 3. Plastic Trends | |
| 4. Harco | |
| 5. American | |
| 6. Assured Flow Sales | |
| 7. Griffin | |
| 8. Nappco/Sigma | |
| 9. Star | |
| 10. Union/Tyler | |
| 11. US Pipe | |
| 12. GPK | |
| 13. Multi Fit | |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Sanitary Sewer

FY 19/20

Expansion Joints

1. EBAA
2. Mercer
3. Metraflex
4. Proco

DIP Sewer Fittings

- | | |
|-----------------------|--|
| 1. U.S. Pipe | 1. Mechanical Joint - SSB or Full Body |
| 2. McWane | 21 - 10 |
| 3. Tyler Union | AWWA C-110 |
| 4. Star Pipe Products | A 21.53 |
| 5. American | C-153 |

Restrained Joints - DIP

- | | |
|---------------------|---|
| 1. American | 1. Fast Grip Gasket |
| 2. EBAA Iron Inc. | 2. Mega-lug series 1100, series 1700 restraint, 2003 PV series RS-3800 restrainer |
| 3. Ford | 3. UFR-1400, 1300C series |
| 4. Star | 4. Star Grip series 3000, All Grip series 3600 |
| 5. US Pipe | 5. Field Loc Gasket |
| 6. Sigma | 6. One-LOK SLD (3-36") |
| 7. Mueller | 7. Aquagrip Restraint System |
| 8. Romac | 8. Grip Rings |
| 9. U.S. Pipe/McWane | 9. Field LOC Gaskets for Tyton Joint DIP |
| 10. SIP Industries | 10. EZ -Grips |
| 11. Tyler Union | 11. TufGrip series 1000, series 1500, series 3000 (for bell joint) |

Tapping Sleeves - Mechanical joint for all taps on cast iron, ductile iron, all taps including size on size

- | | |
|--------------------------|-------------------------------|
| 1. American Flow Control | 1. Series 2800 |
| 2. Clow | 2. Series F-5205, F-5207 |
| 3. Mueller | 3. Series H-615, H-616, H-619 |
| 4. US Pipe | 4. Series T-9 |
| 5. Smith Blair | 5. Series 622 |
| 6. JCM | 6. Series 412 |

Restraint Kits

1. Star
2. Sigma
3. JCM
4. Ford
5. SIP Industries

Rubber Couplings

- | | |
|-------------|---------|
| 1. Fernco | 1. 1056 |
| 2. Pipeconx | |

The City of Daytona Beach Utilities Department

List of Acceptable Products

Sanitary Sewer

FY 19/20

Category 4 of 4: MANHOLE ACCESSORIES

PVC Pipe Manhole Adaptors

1. Harrington Corp.

1. PVC Sewer Adapter

Manhole Lids, Frames & Rings

1. U.S. Foundry

1. Series 170, 420G, 580

2. East Jordan Iron Works

1. Series 306

3. EJ USA Inc.

1. Series 1338

4. Ladtech

4. Riser ring

Flexible Manhole Connectors

1. Kor-N-Seal

Manhole Linings

1. Hanson Pipe Co.

2. GSE Studliner

3. Amerplate T-Lock

4. Agrusafe Sure Grip

STORMWATER DETAILS

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STORMWATER CONSTRUCTION NOTES

1. ALL MATERIALS, INSTALLATION AND SEDIMENT AND EROSION CONTROL FOR SUBDIVISIONS AND SITE PLANS SHALL CONFORM TO CITY STANDARDS, FDEP STANDARDS, FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (LATEST EDITION), AND FDOT DESIGN STANDARDS (LATEST EDITION).
2. A PERMIT SHALL BE REQUIRED PRIOR TO ENGAGING IN ANY DEWATERING OR CONSTRUCTION ACTIVITY THAT CHANGES THE IMPERVIOUS AREA OF LAND. DEWATERING ACTIVITIES INCLUDE THE REMOVAL OF GROUND WATER FROM A CONSTRUCTION SITE, ENCLOSED VAULT, COFFERDAM, OR TRENCHES, ALLOWING CONSTRUCTION OR MAINTENANCE IN A DRY ENVIRONMENT. SITE SPECIFIC DEWATERING PERMITS SHALL REQUIRE PAYMENT OF A PER ACRE FEE BASED ON THE SIZE OF THE DEVELOPMENT. GENERAL PURPOSE PERMITS SHALL REQUIRE AN ANNUAL FEE BASED ON A BIENNIAL SCHEDULE OF DEWATERING ACTIVITIES DISCHARGING DIRECTLY INTO THE CITY'S MS4 CONVEYANCE SYSTEM. DEWATERING PERMIT APPLICATIONS CAN BE FOUND AT <https://www.codb.us/index.aspx?nid=262>. FEES ARE SUBJECT TO ARTICLE 7, SECTION 7.2 OF THE LAND DEVELOPMENT CODE AND MUST BE SUBMITTED WITH THE PERMIT APPLICATION TO THE CITY OF DAYTONA BEACH STORM WATER COORDINATOR AT 125 BASIN STREET, SUITE 100, DAYTONA BEACH, FLORIDA 32114 PRIOR TO ANY USE OF THE CITY'S MS4 CONVEYANCE SYSTEM. FAILURE TO COMPLY WILL RESULT IN IMMEDIATE TERMINATION OF ACCESS TO THE CITY'S MS4 SYSTEM.
3. CONTRACTOR SHALL FOLLOW REQUIRED EROSION AND SEDIMENT CONTROL PRACTICES AND INCLUDE AN EROSION CONTROL PLAN FOR REVIEW AND APPROVAL BY THE CITY PRIOR TO CONSTRUCTION. ALL CONSTRUCTION ACTIVITIES SHALL CONFORM TO THE CITY'S EROSION AND SEDIMENT CONTROL NOTES DETAIL.
4. CONTRACTOR SHALL FOLLOW ALL OF THE CITY'S REQUIRED WASTE MANAGEMENT PRACTICES. ALL CONSTRUCTION, RENOVATION, AND DEMOLITION SITES ARE TO BE KEPT CLEAN AND FREE OF REFUSE, DEBRIS, AND LITTER DURING THE CONSTRUCTION, RENOVATION, OR DEMOLITION PROCESS. A CERTIFICATE OF OCCUPANCY FOR A NEWLY CONSTRUCTED OR RENOVATED BUILDING SHALL NOT BE ISSUED UNTIL ALL REFUSE AND LITTER CAUSED BY THE CONSTRUCTION OR REMODELING IS REMOVED FROM THE SITE PER THE DAYTONA BEACH CODE OF ORDINANCES CHAPTER 28 SECTION 78-5 AND 78-8.
5. ALL DEVELOPMENT PLANS SHALL BE CONSISTENT WITH THE DAYTONA BEACH LAND DEVELOPMENT CODE ARTICLE 6 DEVELOPMENT STANDARDS, SECTION 6.15,6.18 AND ARTICLE 7 SUBDIVISION AND INFRASTRUCTURE, SECTION 7.2
6. STORMWATER MAINS SHALL HAVE A MINIMUM DRAINAGE MAINTENANCE EASEMENT AND ACCESS WIDTH OF 20 FEET. THE EASEMENT WIDTH MAY BE INCREASED DEPENDING UPON THE SIZE AND DEPTH OF PIPE.
7. CONCRETE EROSION CONTROL BMP'S MUST BE PROVIDED WHERE SWALES OR CULVERTS INTERCEPT DRAINAGE DITCHES.
8. IN GENERAL, ALL RETENTION/DETENTION SITES MUST BE CONSTRUCTED AND VEGETATED PRIOR TO ANY ROAD, PARKING LOT, OR BUILDING CONSTRUCTION OR AS CURRENT PERMIT CONDITIONS DECTATE. SEWER AND WATER MAINS MAY BE INSTALLED PRIOR TO RETENTION/DETENTION SITE CONSTRUCTION IF DEWATERING IS NOT REQUIRED. BMP'S FOR EROSION AND SEDIMENT CONTROL SHALL BE IMPLEMENTED AS NECESSARY.
9. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL DEWATERING PERMITS REQUIRED (SEE NOTE 2).
10. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW AND MAINTAIN A COPY OF THE SJRWMD, NPDES, AND ALL OTHER JURISDICTIONAL PERMITS AT THE CONSTRUCTION SITE AND ABIDE BY ALL CONDITIONS OF THOSE PERMITS.

THE CITY OF DAYTONA BEACH
ENGINEERING DIVISION



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ITB 20343-0001 POINT GENERATOR REPLACEMENT
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STORMWATER CONSTRUCTION NOTES

(CONT'D)

11. LANDSCAPE PLANS SHALL CLEARLY DEPICT THE DESIGN LOCATION OF TEMPORARY AND PERMANENT PLANTINGS RELATIVE TO THE LOCATION OF PUBLIC UTILITIES AND STORMWATER INFRASTRUCTURE IN ORDER TO EVALUATE POTENTIAL CONFLICTS.
12. THE MAXIMUM PERMISSIBLE SLOPE OF ANY NEW SITE GRADING IS 1:3 (VERTICAL:HORIZONTAL). THIS LIMIT APPLIES TO ALL AREAS EXCEPT STORMWATER CONVEYANCE AND TREATMENT SYSTEMS WHICH HAVE A MAXIMUM SIDE SLOPE OF 1:4 (EXCEPT BELOW THE WATER TABLE WHERE STEEPER SLOPES ARE PERMISSIBLE).
13. ALL SWALES AND DITCHES SHALL HAVE A MAXIMUM PERMITTED FRONT (SIDE) SLOPE NOT STEEPER THAN 1:4. THE MAXIMUM PERMITTED BACK (SIDE) SLOPE, SHALL BE 1:3, PROVIDED THAT A 5' WIDE BERM IS INSTALLED. DESIGN CENTERLINE AND TOP-OF-BANK ELEVATIONS SHALL BE NOTED AT INTERVALS OF 100' AND AT SIGNIFICANT GRADE CHANGES.
14. SWALES THAT ARE NORMALLY DRY AND INTENDED FOR CONVEYANCE OF STORMWATER RUNOFF AND ARE NOT INTENDED FOR RETENTION SHALL HAVE A MINIMUM DRAINAGE MAINTENANCE EASEMENT WIDTH MEASURING 15 FEET. SWALED AREAS INTENDED FOR RETENTION SHALL PROVIDE APPROPRIATE EASEMENT AREAS FOR ACCESS AND MAINTENANCE MEASURED UPLAND FROM THE TOP OF BANK. AT A MINIMUM, THE EASEMENT SHALL MEASURE 10 FEET IN WIDTH FROM THE TOP OF THE SWALE.
15. NORMAL ROADSIDE SWALES ARE PERMITTED TO BE CONSTRUCTED TO A MAXIMUM DEPTH OF 18" BELOW THE OUTSIDE EDGE OF PAVEMENT OR CONCRETE CURB.
16. WHEN CULVERTS ARE INSTALLED TO MAINTAIN THE FLOW OF EXISTING DRAINAGE WAYS WHERE NEWLY PROPOSED ROADS WOULD OTHERWISE SEVER THE DRAINAGE RIGHT-OF-WAY, CULVERTS CROSSING RIGHT-OF-WAYS SHALL EXTEND FROM RIGHT-OF-WAY LINE TO RIGHT-OF-WAY LINE UNDER THE ROADWAY. CULVERTS SHALL BE DESIGNED TO ACCOMODATE THE FLOW FROM THE 100 YEAR - 24 HOUR STORM EVENT WITHOUT FLOODING ADJACENT PROPERTY OR SURCHARGING THE SAID ROADWAY.
17. WET POND DEPTHS SHALL BE EIGHT FEET MINIMUM TO FIFTEEN FEET MAXIMUM, MEASURED FROM THE TOP OF BANK.
18. WHEN A WET POND IS INCORPORATED WITHIN A SUBDIVISION AND IS ABUTTED BY LOTS, SUCH ABUTTING LOT LINES SHALL EXTEND INTO THE LAKE PROPORTIONATELY ENCOMPASSING ALL OF THE LAKE AREA.
19. WET POND INFLOW AND OUTLET STRUCTURES SHALL GENERALLY BE CONSTRUCTED WITH REINFORCED CONCRETE AND SHALL BE SUBJECT TO THE APPROVAL OF THE CITY. SKIMMERS FOR WET PONDS SHALL BE CONSTRUCTED SUCH THAT THE BOTTOM EXTENDS 6" BELOW THE NORMAL WATER LEVEL AND 6" ABOVE THE OVERFLOW. FOR DRY PONDS, THE SKIMMER BOTTOM SHALL BE SET 6" BELOW THE LOWEST OVERFLOW ELEVATION AND 6" ABOVE THE HIGHEST POINT OF OVERFLOW. ALL SKIMMERS SHALL BE CONSTRUCTED OF MINIMUM 1/4" THICK ALUMINUM OR FIBERGLASS ADEQUATELY SUPPORTED TO PREVENT DEFLECTION.
20. THE CITY MAY REQUEST THE DEVELOPER SUBMIT A REPORT BY A QUALIFIED HYDROLOGIST OR HYDROGEOLOGIST ON THE IMPACT THE WET POND WILL HAVE ON NEIGHBORING WATER TABLE ELEVATIONS BOTH DURING CONSTRUCTION AND AFTER LAKE COMPLETION. THE CITY MAY REQUIRE GROUNDWATER MONITORING DURING THE LAKE EXCAVATION.
21. ADEQUATE MAINTENANCE BERMS, MINIMUM 10' IN WIDTH, SHALL BE PROVIDED AROUND THE ENTIRE PERIMETER OF ALL WET PONDS AND ASSOCIATED OUTFALLS DISCHARGING INTO AND OUT OF LAKES. APPLICABLE CROSS SECTIONS SHALL BE INCLUDED ON ALL FINAL DEVELOPMENT PLANS.

THE CITY OF DAYTONA BEACH
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STORMWATER CONSTRUCTION NOTES (CONT'D)

22. DEVELOPMENT PLANS FOR ALL STORMWATER MANAGEMENT SYSTEMS SHALL CONTAIN POP-OFF DATA (OVERFLOW), BOTTOM ELEVATION, NORMAL WATER LEVELS, MEAN ANNUAL SEASONAL HIGH WATER TABLE ELEVATION, TREATMENT VOLUME AND CORRESPONDING ELEVATION, 100 YEAR HIGH WATER LEVELS, AND THE DESIGN TAILWATER ELEVATION (IF APPLICABLE).
23. ALL STORM SEWERS AND CULVERTS LOCATED IN ROADWAY RIGHT-OF-WAYS AND ROADWAY EASEMENTS SHALL BE A MINIMUM OF CLASS III O-RING REINFORCED CONCRETE PIPE. OUTSIDE OF ROADWAY EASEMENTS AND R.O.W., PIPE MAY BE MADE OF ALTERNATE MATERIALS INCLUDING:
 - A. SMOOTH INNER WALL HIGH DENSITY POLYETHYLENE (HDPE) IN ACCORDANCE WITH AASHTO M-294, AASHTO MP7, ASTM D3350 AND ASTM D2412 FOR SIZES UP TO 42" IN DIAMETER OR
 - B. PVC IN ACCORDANCE WITH THE PROVISION NOTED IN THE "SEWER DETAILS" OF THESE SPECIFICATIONS.
24. ALL STORM SEWER PIPE JOINTS LOCATED IN ROADWAY RIGHT-OF-WAYS AND ROADWAY EASEMENTS SHALL BE ENTIRELY WRAPPED WITH NON-WOVEN FILTER FABRIC WITH A MINIMUM WIDTH OF 24" AND A MINIMUM OF 24" OVERLAP. GASKETS ARE NOT PERMITTED AS AN EQUIVALENT SUBSTITUTE FOR MEETING THIS REQUIREMENT. THIS PRACTICE IS ENCOURAGED ON PRIVATE SITES. ADDITIONALLY, ALL JOINTS SHALL BE RUBBER GASKETED FOR BOTH ROUND AND ELLIPTICAL PIPE.
25. DEPTH OF COVER MEASURED TO THE TOP OF PIPE (INCLUDING THE BELL JOINT) SHALL BE A MINIMUM OF 3 FEET OVER RCP. DEVIATION FROM THIS REQUIREMENT MAY BE ALLOWED BY INCREASING THE PIPE'S STRUCTURAL STRENGTH. IF AN ALTERNATE MATERIAL IS APPROVED, DEPTH OF COVER SHALL MEET MANUFACTURER'S RECOMMENDATION.
26. ALL STORM DRAINAGE PIPES LOCATED IN ROADWAY RIGHT-OF-WAYS AND ROADWAY EASEMENTS SHALL BE A MINIMUM OF FIFTEEN INCH (15") INSIDE DIAMETER OR EQUIVALENT. STORM DRAINAGE PIPES SMALLER THAN 15" ARE PERMITTED ON PRIVATE SITE PLANS PROVIDING THAT MAINTENANCE SHALL BE PERFORMED BY THE OWNER.
27. STORMWATER FORCE MAINS WILL USE NO. 12 INSULATED SINGLE STRAND COPPER WIRE SHALL BE ATTACHED TO ALL PIPES AND TERMINATED AT THE VALVES IN ACCORDANCE WITH RECLAIM WATER VALVE AND VALVE BOX DETAIL. TRACER WIRE SHALL BE TESTED FOR CONTINUITY UNDER SUPERVISION BY CITY REPRESENTATIVE AFTER INSTALLATION.
28. STORM INLETS, MANHOLES, AND CATCH BASINS SHALL BE FDOT COMPLIANT. EITHER POURED IN PLACE OR PRECAST REINFORCED CONCRETE STRUCTURES ARE REQUIRED AT EACH CHANGE OF PIPE SIZE OR CHANGE IN PIPE DIRECTION. ALL STRUCTURES SHALL COMPLY WITH ASTM C-478 AND SHALL HAVE 6" THICK WALLS. THINNER WALLS MAY BE PERMITTED PROVIDING THE DESIGN IS IN ACCORDANCE WITH FDOT STANDARD PLANS. THIS REQUIREMENT MUST BE REFLECTED ON BOTH THE SHOP DRAWING AND AS-BUILT PLANS. STRUCTURES PLACED IN HIGH TRAFFIC AREAS SHALL BE OF TRAFFIC BEARING CONSTRUCTION IN ACCORDANCE WITH FDOT STANDARDS.
29. STORM INLETS SHALL BE SPACED IN SUCH A MANNER AS TO ACCEPT ONE HUNDRED PERCENT OF THE DESIGN STORM RUNOFF WITHOUT IMPEDING THE FLOW OF TRAFFIC. FOR ROADWAY SECTIONS WITH DESIGN SPEEDS OF 45 MPH AND LESS AND WITHOUT FULL WIDTH SHOULDERS, SPREAD RESULTING FROM A RAINFALL INTENSITY OF FOUR INCHES PER HOUR SHALL NOT EXCEED ONE-HALF OF THE TRAVEL LANE ADJACENT TO THE GUTTER. FOR SITE PLANS, INLET SPACING SHALL BE DESIGNED TO ACCEPT ONE HUNDRED PERCENT OF THE RUNOFF FROM A RAINFALL INTENSITY OF FOUR INCHES (4") PER HOUR WITHOUT RESULTING IN PONDING OF WATER AROUND THE INLET.



STORMWATER CONSTRUCTION NOTES (CONT'D)

30. FOR CONNECTIONS BETWEEN INLETS WITH PIPING 15" IN DIAMETER AND LARGER, THE MAXIMUM DISTANCES BETWEEN INLETS AND/OR CLEAN-OUT JUNCTION BOXES SHALL BE 300 FEET. CULVERTS SHALL BE SLOPED TO MAINTAIN A MINIMUM SELF-CLEANING VELOCITY OF 2.5 FEET PER SECOND USING A MANNING'S 'n' OF 0.012. SPACING FOR CLEAN-OUTS AND INLETS FOR SMALLER PIPING SHALL BE REDUCED AND EVALUATED ON A CASE BY CASE BASIS.
31. ALL STORMWATER INLETS SHALL MEET FDOT CRITERIA IN THE FDOT DESIGN STANDARD LATEST EDITION.
32. ALL GASKETS SHALL BE LUBRICATED BEFORE BEING INSTALLED.
33. ALL FITTINGS SHALL MEET THE MINIMUM RESTRAINED REQUIREMENTS PER ANSI/AWWA/DIPRA, AND ALL PRESSURE PIPES UNDER THE ROADWAY SHALL BE RESTRAINED.



EROSION & SEDIMENT CONTROL NOTES

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND MAKING AVAILABLE ONSITE, ALL REQUIRED FEDERAL, STATE, AND LOCAL PERMITS PRIOR TO COMMENCEMENT OF CONSTRUCTION. ANY POTENTIAL STORM WATER DISCHARGES TO THE CITY'S PERMITTED MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) MUST BE DESIGNATED ON THE FDEP NPDES CONSTRUCTION GENERIC PERMIT AND A COPY OF THE NOTICE OF INTENT PROVIDED TO THE CITY OF DAYTONA BEACH STORM WATER COORDINATOR. THE CONTRACTOR SHALL MAINTAIN COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL PERMITS REQUIREMENTS.
2. THE CONTRACTOR SHALL AS A MINIMUM, PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN IN ACCORDANCE WITH FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) GUIDELINES.
3. INITIAL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED AND APPROVED BY THE CITY PRIOR TO ANY LAND DISTURBING ACTIVITIES.
4. PRIOR TO AND DURING CONSTRUCTION, THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN ALL EROSIONS AND SEDIMENT CONTROL MEASURES (BEST MANAGEMENT PRACTICES) REQUIRED TO RETAIN SEDIMENT ONSITE AND TO PREVENT VIOLATIONS OF WATER QUALITY STANDARDS. IF A PROJECT SPECIFIC EROSION AND SEDIMENT CONTROL PLAN IS APPROVED AS PART OF A PERMIT, THE PRACTICES MUST BE IN ACCORDANCE WITH THE APPROVED PLAN. IF SPECIFIC SITE CONDITIONS REQUIRE ADDITIONAL MEASURES DURING ANY PHASE OF CONSTRUCTION OR OPERATION TO PREVENT EROSION OR CONTROL OF SEDIMENT, BEYOND THOSE SPECIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN, THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL BEST MANAGEMENT PRACTICES AS NECESSARY.
5. CONTRACTORS SHALL MINIMIZE DISTURBANCES OF EXISTING VEGETATION AND DRAINAGE PATTERNS TO MAXIMUM EXTENT PRACTICABLE. STABILIZATION MEASURES SHALL BE INITIATED FOR EROSION AND SEDIMENT CONTROL ON DISTURBED AREAS AS SOON AS PRACTICABLE, BUT IN NO CASE MORE THAN 7 CALENDAR DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.
6. STORM WATER RETENTION, DETENTION, STORAGE AND CONVEYANCE SYSTEMS MUST BE EXCAVATED TO ROUGH GRADE PRIOR TO BUILDING CONSTRUCTION OR PLACEMENT OF IMPERVIOUS SURFACE WITHIN THE AREA SERVED BY THOSE SYSTEMS. ADEQUATE MEASURES MUST BE TAKEN TO PREVENT SILTATION OF THESE TREATMENT SYSTEMS AND CONTROL STRUCTURES DURING CONSTRUCTION. SILTATION MUST BE REMOVED FROM THE STORM WATER SYSTEM UPON REACHING 50% CAPACITY AND IMMEDIATELY PRIOR TO FINAL GRADING AND STABILIZATION OF THE PROJECT.
7. CITY DEWATERING PERMITS SHALL BE OBTAINED AND APPROVED PRIOR TO ANY DEWATERING INTO THE CITY'S PERMITTED MS4 SYSTEM.



STORMWATER FORCE MAIN CONSTRUCTION & DESIGN STANDARDS

TESTING REQUIREMENTS:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TRENCH COMPACTION TESTS AT POINTS 12 INCHES ABOVE THE PIPE AND AT 12-INCH VERTICAL INTERVALS TO FINISHED GRADE AT A MAXIMUM HORIZONTAL SPACING OF 300 FEET.
2. ON ALL PROJECTS OTHER THAN THOSE INITIATED BY THE CITY THE CONTRACTOR SHALL EMPLOY AN INDEPENDENT TESTING LABORATORY AT HIS OWN EXPENSE TO INSURE THAT COMPACTION OF ALL FILL MATERIAL IS COMPLETED PROPERLY. ON ALL CITY PROJECTS THE TESTING WILL BE DONE IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. IDENTIFICATION OF TEST LOCATIONS SHALL BE CLEARLY INDICATED ON TEST REORTS. TEST RESULTS SHALL BE FORWARDED PROMPTLY TO THE CITY'S INSPECTOR.
3. ALL STORMWATER FORCEMAINS SHALL BE FLUSHED, PRESSURE TESTED AND CLEARED FOR SERVICE IN ACCORDANCE WITH THE LATEST AWWA STANDARDS AND THE FLORIDA DEPARTMENT OF ENVIROMENTAL PROTECTION REQUIREMENTS. THE CONTRACTOR SHALL NOTIFY THE CITY'S DESIGNATED INSPECTOR WHO SHALL COORDINATE WITH CITY PERSONNEL AT THE WATER OR WASTEWATER TREATMENT PLANT (AS APPROPRIATE) AT LEAST 2 (TWO) BUSINESS DAYS PRIOR TO BEGINNING A FULL-DIAMETER FLUSH OF THE MAINS PRIOR TO THE COMMENCEMENT OF PRESSURE TESTING (SUBJECT TO AVAILABILITY).
4. STORMWATER FORCEMAINS SHALL BE PRESSURE TESTED TO 150 PSI FOR 3 HOURS. TESTING SHALL BE IN ACCORDANCE WITH AWWA C-600 AND AWWA C-605 AS APPLICABLE, WITH ALLOWABLE LEAKAGE BASED ON THE TABLE BELOW.

ALLOWABLE LEAKAGE PER 1000 FT. OF PIPELINE * -GPH

AVERAGE TEST PRESSURE (PSI)	NOMINAL PIPE DIAMETER - INCHES																AVERAGE TEST PRESSURE (PSI)		
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54		60	64
450	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60	9.56	10.19	450
400	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11	9.01	9.61	400
350	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58	8.43	8.99	350
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.32	300
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72	7.47	7.97	275
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41	7.12	7.60	250
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03	6.76	7.21	225
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73	6.37	6.80	200
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36	5.96	6.36	175
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97	5.52	5.88	150
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53	5.04	5.37	125
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05	4.50	4.80	100

* IF THE PIPELINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE ALLOWABLE LEAKAGE WILL BE THE SUM OF THE COMPUTED LEAKAGE FOR EACH SIZE.

WHERE:

$$L = \frac{SD\sqrt{P}}{133,200}$$

- L = ALLOWABLE LEAKAGE, IN GALLONS PER HOUR
- S = LENGTH OF PIPE TESTED, IN FEET
- D = NOMINAL DIAMETER OF PIPE, IN INCHES
- P = AVERAGE TEST PRESSURE DURING THE LEAKAGE TEST, IN POUNDS PER SQUARE INCH (GAUGE)



Section 8.13

PIPE INSPECTION, EVALUATION AND REPAIR

8.13.1 Purpose

To assure consistent review of all post installation pipe inspections associated with construction projects.

8.13.2 Authority

Sections 20.23(4)(a) and 334.048, Florida Statutes (F.S.)

8.13.3 Reference

Section 430 of the FDOT Standard Specifications for Road and Bridge Construction

8.13.4 Review

The City Administrator will review all of the equipment, inspection and reporting criteria for post installation pipe inspection to ensure compliance with the Specifications, evaluate the nature and severity of any observed defects, and provide the Contractor with the Department's perspective on pipe repairs that are necessary prior to final acceptance.

8.13.5 Preconstruction Conference

City Administrator Responsibilities

The City Administrator or their delegate shall provide a comprehensive review of the equipment, inspection and reporting criteria found in Section 430 of the FDOT Standard Specification to familiarize the Contractor with all of the requirements for post installation inspection. Discussion topics should include:

- (1) Providing certification statements to the Department from the Contractor doing the work that the laser profiling and measurement technology is in compliance with the calibration criteria found on the FDOT Department's website.



- (2) Discussion of all components of the pipe inspection report to be submitted to the Department.
- (3) Providing the Department with a video report in the correct format and resolution.
- (4) Providing the Department with video images that are clear, easy to review and correctly identified with their respective project number, structure number, pipe type and size, and any notes associated with the inspection.
- (5) Ensuring that the video camera moves through all pipe runs at the speed designated in the Specifications and that all defects are documented in their entirety.

8.13.6 Report Review, Evaluation and Repair Guidance

City Administrator Responsibilities

The City Administrator or their delegate is responsible for reviewing and evaluating the laser profiling and video inspection reports as well as any proposed repair methods submitted by the Contractor. The City Administrator must ensure that each component of the pipe inspection and repair process is in compliance with the Specifications and completed before the culvert installation on a project can be accepted.

8.13.6.1 Report Review

The City Administrator is responsible for ensuring that the report submitted by the contractor meets the criteria found in Section 430 of the FDOT Standard Specifications before any defects are evaluated. If the contractor fails to submit the necessary certifications or reporting requirements, the CA is responsible for contacting the Contractor to inform them that their submittal does not meet the Specifications. The CA should be able to provide a list of deficiencies for the Contractor to review. Once any report deficiencies have been resolved, the CA can evaluate it for pipe defects.



8.13.6.2 Report Evaluation

When evaluating defects found in pipe inspection reports, the CA must consider policy previously set forth by the Department:

- (1) Cracking in concrete pipe: The Department relies on both ASTM C 76 and AASHTO LRFD Chp. 27 when evaluating cracks in concrete pipe. Cracks that are 0.01” or less and less than 12” in length should be recorded as an observation but are not candidates for repair unless there is evidence of active infiltration. Any crack exceeding the length and width tolerances must be evaluated by a Specialty Engineer as being acceptable or repaired.
- (2) Stains in pipe: Stains in concrete pipe are not considered a defect in need of repair unless the stain is associated with a crack in excess of the tolerances referenced in ASTM C 76 and AASHTO LRFD Chp. 27, active infiltration regardless of its location or size of crack, or any other defect eligible for repair. Stains in aluminized steel pipe shall be evaluated to determine the presence of damage to aluminized coating. Stains in thermoplastic pipe shall be evaluated to determine the presence of cracking.
- (3) Infiltration: The Specifications require that Storm, Cross and Gutter drains be water tight to 5 psi. If the Contractor has leaking pipe and states that the infiltration does not need to be repaired, he must demonstrate that the head pressure generated by the height of the water table exceeds that 5 psi requirement found in the Specification. If the water table head pressure does not exceed 5 psi at the top of the pipe than all infiltration must be repaired.
- (4) Joint gaps in optional pipe materials: The Specifications do not have joint gap tolerances for metal, PVC or HDPE pipes. Since there is no joint gap tolerance for these pipe types, the Contractor is not required to repair joints with gaps in them. Repair is limited to hanging gaskets, joint damage and infiltration.
- (5) Deflection: All optional pipe materials have a deflection tolerance of 5% or more of the certified actual mean diameter of the pipe. Any pipe with deflections greater than the 5% tolerance must be replaced or repaired at no cost to the Department. The only repair accepted by the Department at this time is to cut out the deflected sections and replace them using field joints.



8.13.6.3 Repair Guidance

The Department maintains the expectation that all culvert installations will produce defect free pipe that is installed in accordance with the Specifications. In the event that a defect is found in a pipe run, the first option of the Department would be to remove and replace at no cost. In situations where this is not practical, then consideration should be given to different repair remedies.

City Administrator Responsibilities: The City Administrator is responsible for reviewing proposed repair procedures submitted by the Contractor. Coordinate review of proposed repairs with the District Drainage Office to ensure hydraulic capacity is maintained. Proposed repair procedures should conform to the Pipe Repair Matrix as found on the FDOT Department's website and the policy previously set forth by the Department. Specifically:

- (1) **Use of Grout for repair:** The Department does not accept the hand application of grout for pipe repair. All proposed grout repairs must utilize pressurized injection to insure the grout completely fills the defect and any voids associated with it.
- (2) **Use of Cured in Place point repairs:** the Department does not accept cured in place point repairs at this time due to quality assurance and maintenance concerns. All point repairs proposed by the Contractor must consist of steel, aluminum, and rubber per Section 948 of the Standard specifications.

In the event that a Contractor proposes a repair method that is not found on the Pipe Repair Matrix, it must be evaluated and accepted by the City's Drainage Engineer prior to use.



Pipe Repair Matrix – Steel Reinforced Concrete Pipe

Problem Noted

1. Cracks

Acceptable Repair Methods

1. Seal cracks using pressurized injection an approved chemical grout of either acrylamide base gel, acrylic base gel, urethane base gel or urethane base flow

2. Pipe lining with materials and methods found in Section 431 of the FDOT Department’s Standards Specifications

3. Mechanical Repair Sleeve

2. Spalling

1. Spalling will be remediated by cleaning and removing any loose materials, if possible, and then applying a Portland cement grout or rapid setting mortar cement or grout or epoxy resin to the affected area.

3. Leaking Joints

1. Pipe lining with materials and methods found in Section 431 of the FDOT Department’s Standards Specifications

2. Internal Joint Seals

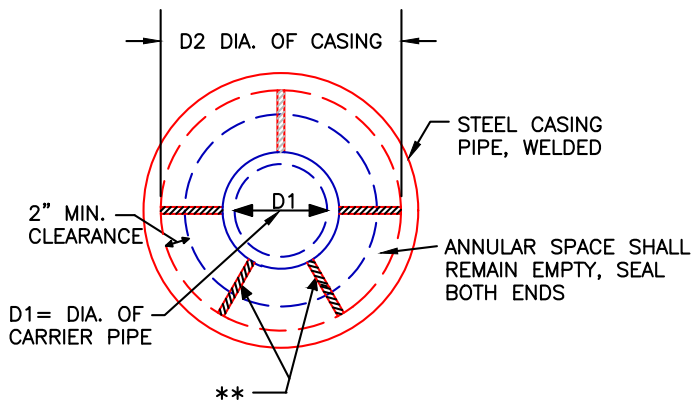
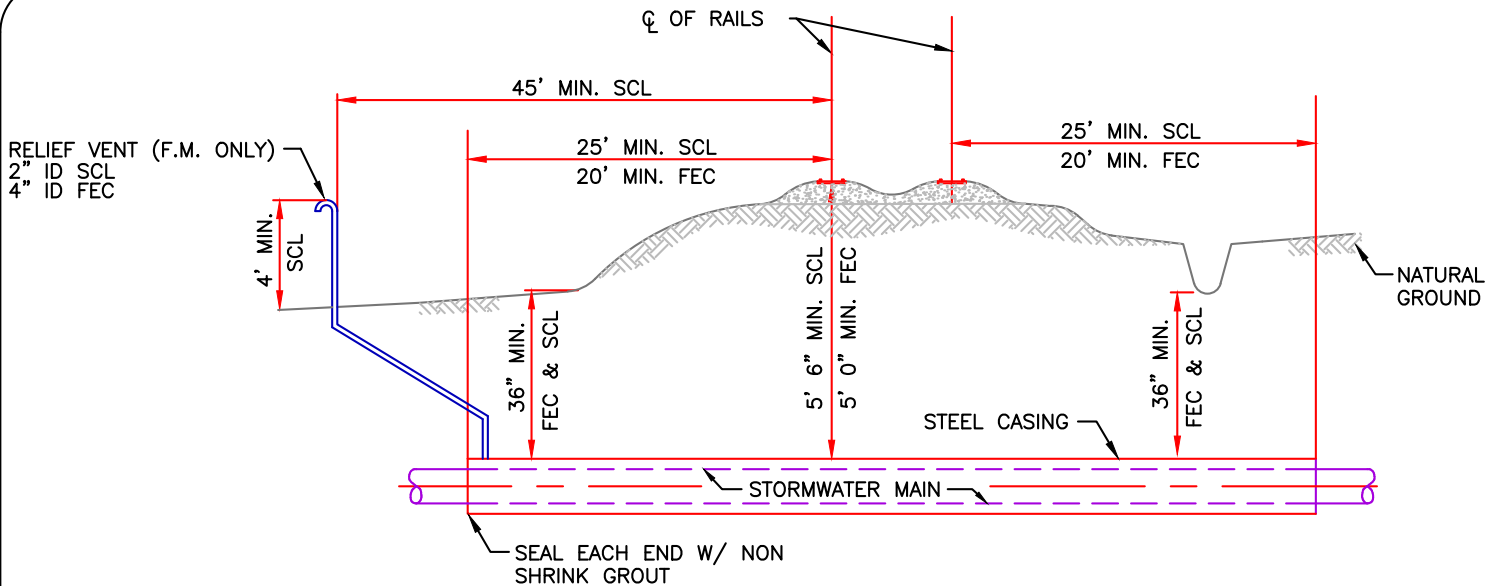
3. Pressure injection of an acceptable chemical grout

4. Concrete collars in accordance with Index 280 of the FDOT Department’s Design Standards.

5. Mechanical Repair Sleeve

*Cracks that are 0.01 inches or greater in width and 12 inches or greater in length (ASTM C76) must be repaired or assessed by a Specialty engineer who can evaluate structural integrity, environmental conditions and the design service life of the culvert (AASHTO LRFD Chp. 27).





TYPICAL RAILROAD CROSSING
NTS

NOTE TO ENGINEER: CROSSING DETAIL SHALL BE TO SCALE AND SHOW EXISTING UTILITIES, CLEARANCES, CASING LENGTH, LOCATION OF PAVED ROAD AND LIMITS OF RIGHT-OF-WAY

CARRIER PIPE AND CASING PIPE SIZES (MIN.)														
CARRIER PIPE NOM. DIA. (D1)	4	6	8	10	12	14	16	18	20	24	30	36	42	48
CASING PIPE NOM. DIA. (D2)	14	16	18	22	24	30	30	30	36	36	48	54	60	66
WALL THICKNESS-INCHES *	PER AUTHORITY HAVING JURISDICTION													

NOTES:

1. MINIMUM COVER FOR TOP OF CASING TO R/R BASE SHALL BE 5.6' (SCL), 5.0' (FEC). MINIMUM COVER FOR TOP OF CASING ON ALL GROUND COVER SHALL BE 3.0'.
 2. ROTATION OF CARRIER PIPE INSIDE THE CASING PIPE WILL NOT BE PERMITTED. RESTRAINED MECHANICAL OR FLANGED JOINT PIPE SHALL BE USED TO HELP PREVENT SUCH ROTATION.
 3. SHOP DRAWINGS SHALL BE SUBMITTED OF CASING & CARRIER PIPE INSTALLATION FOR APPROVAL PRIOR TO FABRICATION OF PIPING, CASING, AND APPURTENANCES. CERTIFICATION OF CASING PIPE IS REQUIRED.
 4. GROUTING OF SPACE BETWEEN CASING AND CARRIER PIPE NOT REQUIRED UNLESS NEGATIVE FLOTATION EXISTS.
 5. WELDING OF CASING PIPE TO BE DONE BY CERTIFIED WELDER. ALL ENDS OF CASING PIPE SHALL BE CHAMFERED PRIOR TO ANY WELDING. SEAL END OF CASING PIPE WITH NON SHRINK GROUT.
 6. CITY INSPECTOR SHALL BE PRESENT THROUGHOUT ALL BORE AND JACK ACTIVITIES.
- * WITHIN THE CITY OF DAYTONA BEACH RIGHT OF WAY, USE CURRENT FDOT STANDARDS.
** SPECIALLY DESIGNED SPACERS SHALL BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. USE CASCADE CASING SPACERS OR PRE-APPROVED EQUAL.

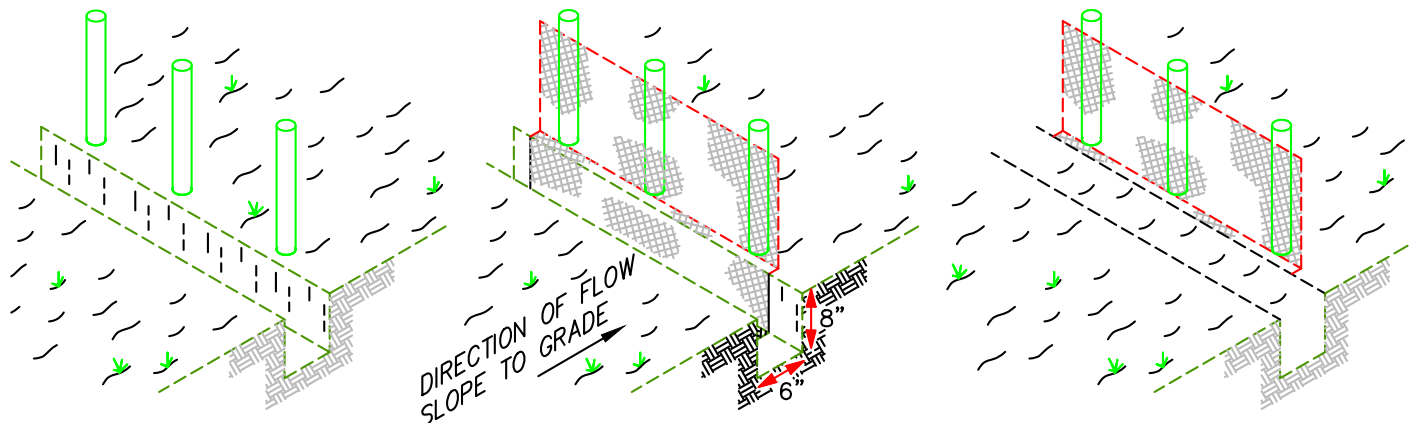
THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT



TYPICAL RAILROAD CROSSING
DETAIL
ST-12

TB 20343-BE THUNE POINT GENERATOR REPLACEMENT
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FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date:
File Name: Railroad Crossing ST-12
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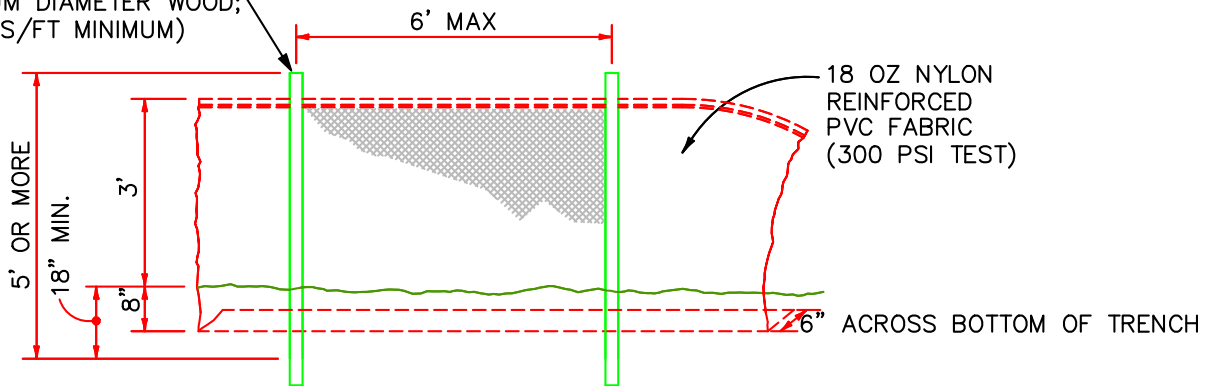


SET POST AND EXCAVATE A TRENCH

ATTACH FILTER FABRIC TO POST ALLOWING 1 FT EXTENSION INTO THE TRENCH AS SHOWN (8" DOWN TRENCH WALL AND 6" ACROSS BOTTOM).

BACKFILL AND COMPACT EXCAVATED SOIL

POST (OPTIONS: 2"x4" OR 2 1/2" MINIMUM DIAMETER WOOD; STEEL 1.33 LBS/FT MINIMUM)

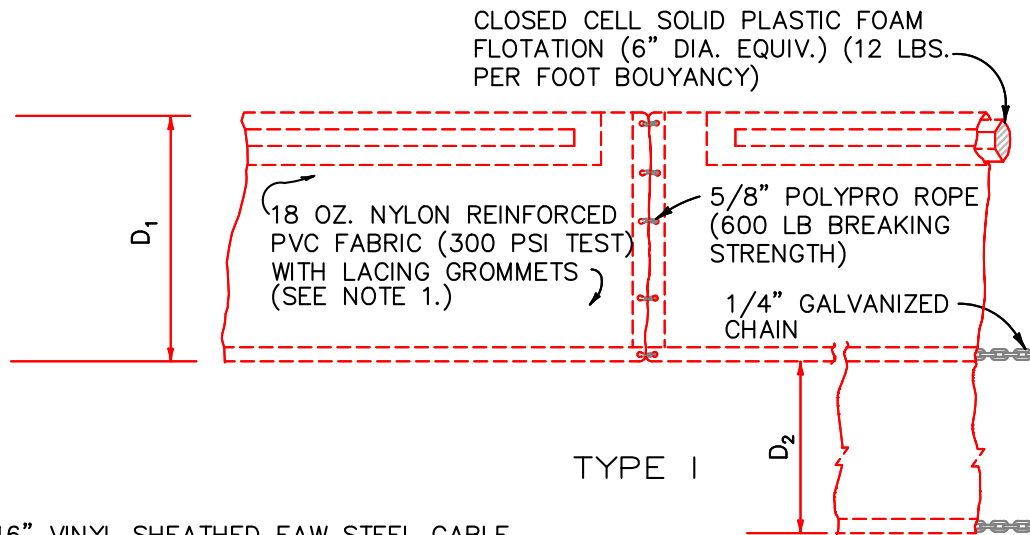


NTS

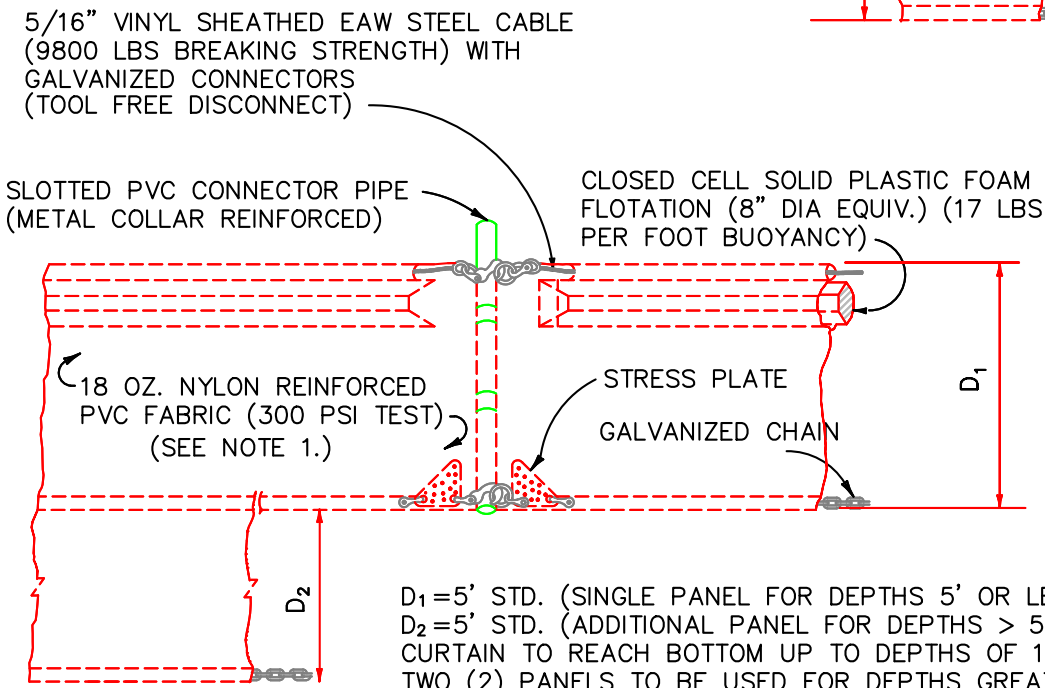
NOTES:

1. MATERIALS, CONSTRUCTION METHODS AND MAINTENANCE SHALL BE IN ACCORDANCE WITH THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS AND DESIGN STANDARDS CURRENT EDITION.
2. CONTRACTOR SHALL PROVIDE SILT FENCES, TURBIDITY BARRIERS OR APPROVED BARRIERS AT ALL STORMWATER DISCHARGE POINTS FOR EROSION CONTROL AND SEDIMENT CONTROL DURING CONSTRUCTION. DEPENDING UPON FLOW VELOCITIES AND VOLUME, REDUNDANT (MULTIPLE) PARALLEL FENCES MAY BE NEEDED.
3. CONTRACTOR SHALL ROUGH GRADE STORMWATER SWALES AND RETENTION AREAS IN COMPLIANCE WITH BEST MANAGEMENT PRACTICES PRIOR TO CONSTRUCTION OF SITE IMPROVEMENTS.
4. CONTRACTOR SHALL MEET ALL PERMIT CONDITIONS AS ESTABLISHED BY THE CITY OF DAYTONA BEACH AND ALL OTHER APPLICABLE AGENCIES, INCLUDING BUT NOT LIMITED TO COUNTY, FDOT, STATE, FEDERAL, AND THE SJRWMD.





TYPE I



TYPE II

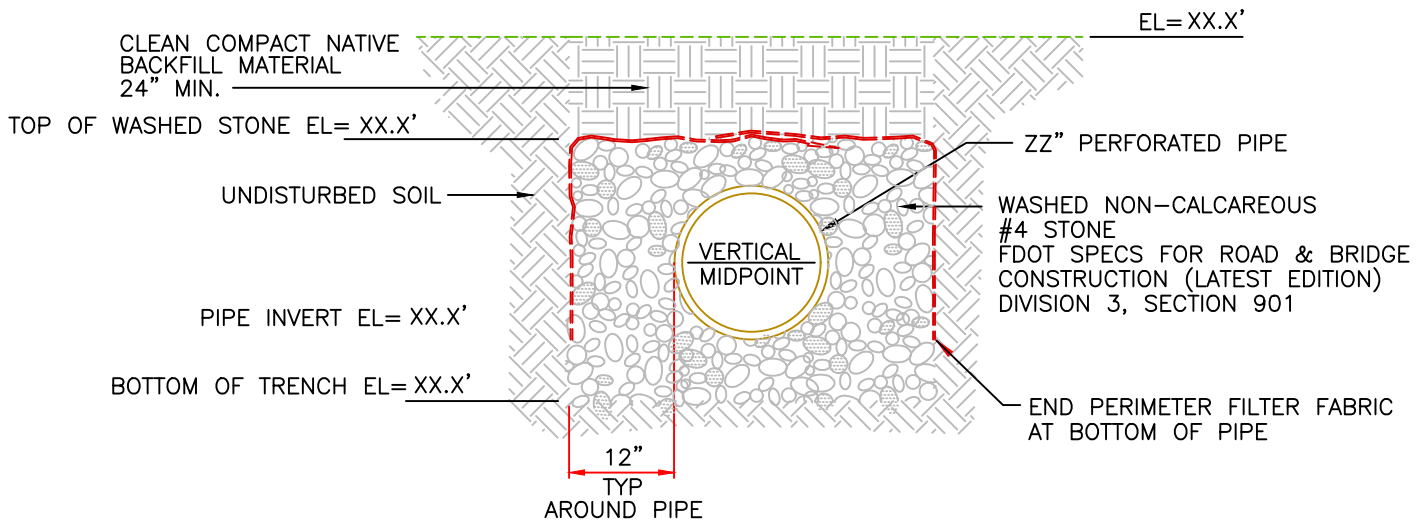
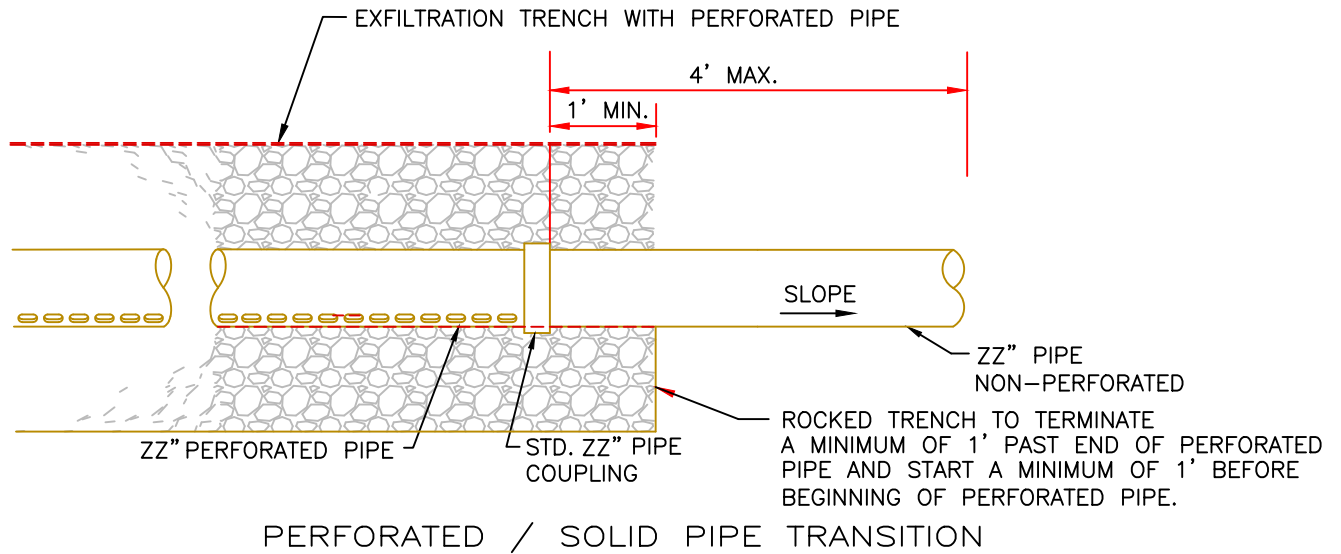
D₁ = 5' STD. (SINGLE PANEL FOR DEPTHS 5' OR LESS)
 D₂ = 5' STD. (ADDITIONAL PANEL FOR DEPTHS > 5')
 CURTAIN TO REACH BOTTOM UP TO DEPTHS OF 10 FEET.
 TWO (2) PANELS TO BE USED FOR DEPTHS GREATER THAN
 10 FEET UNLESS SPECIAL DEPTH CURTAINS SPECIFICALLY CALLED
 FOR IN THE PLANS OR AS DETERMINED BY THE ENGINEER.

NOTE:
 1. USE 18 OZ. NYLON REINFORCED PVC FABRIC FOR STANDING WATER.
 USE FILTER FABRIC FOR FLOWING WATER.

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 CITY.



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Drawn By: KLH
Checked By: JMP
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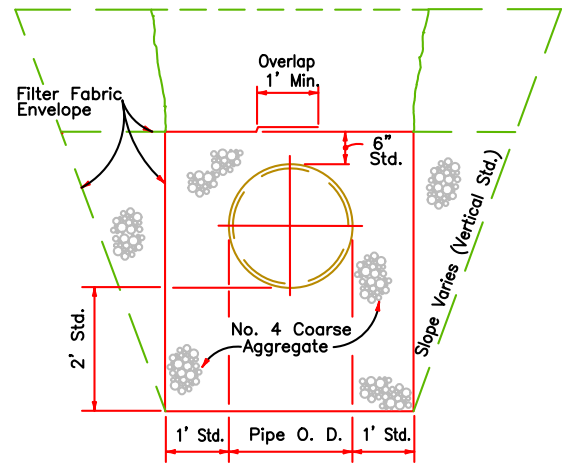
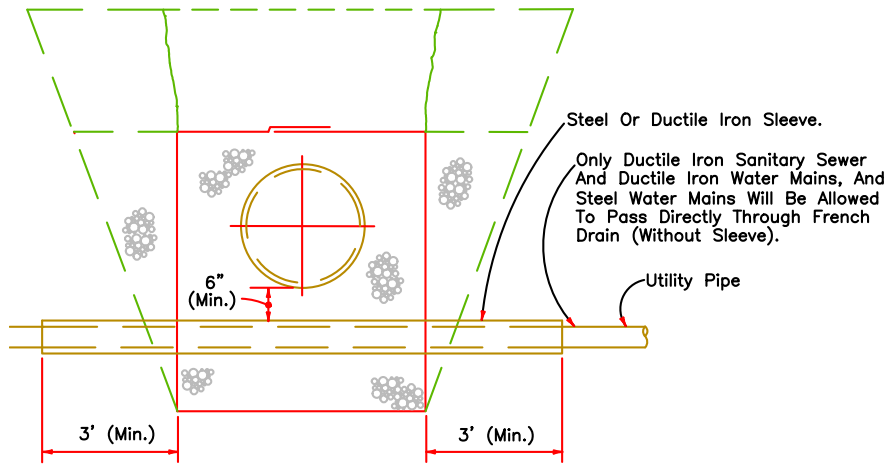
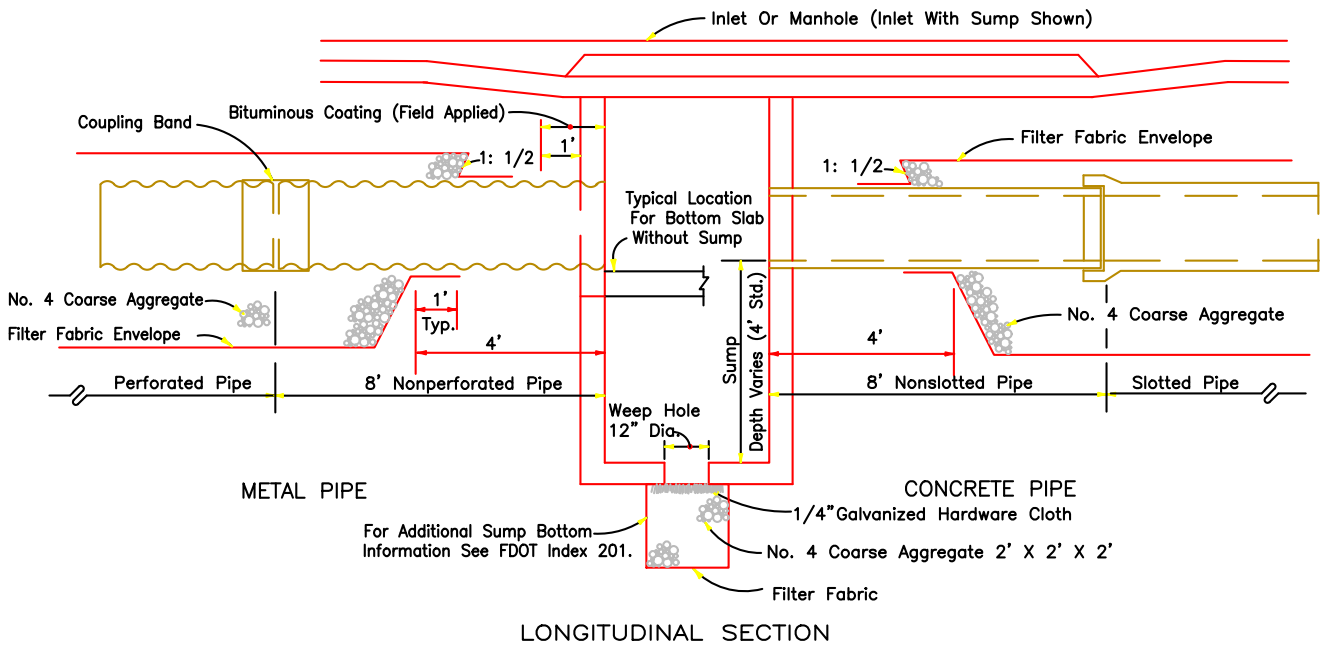
NOTE:
 SLOTTED PIPE NOT IN EXFILTRATION TRENCH TO BE WRAPPED WITH FILTER FABRIC PER FDOT SPECIFICATIONS WITH A MINIMUM 12" OVERLAP.

NARROW WIDTH OF EXFILTRATION TRENCH AS NEEDED TO INSTALL TRENCH ADJACENT TO UTILITY POLES & REMAINING TREES. NOTIFY UTILITY OWNER A MINIMUM OF 4 WORKING DAYS PRIOR TO TRENCHING ADJACENT TO UTILITY POLES OR OTHER UTILITIES REQUIRING NARROWING OF EXFILTRATION TRENCH.

IF EXFILTRATION TRENCH IS TOO NARROW OR CONSTRAINED AND IS CONSTRUCTED WITHOUT PIPE THE ENTIRE TRENCH PERIMETER WILL BE WRAPPED WITH FILTER FABRIC.

LEGEND:
 ZZ = DIAMETER PIPE
 XX.X = ELEVATION VALUE





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Drawn By: KLH
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FRENCH DRAIN SYSTEM

GENERAL NOTES

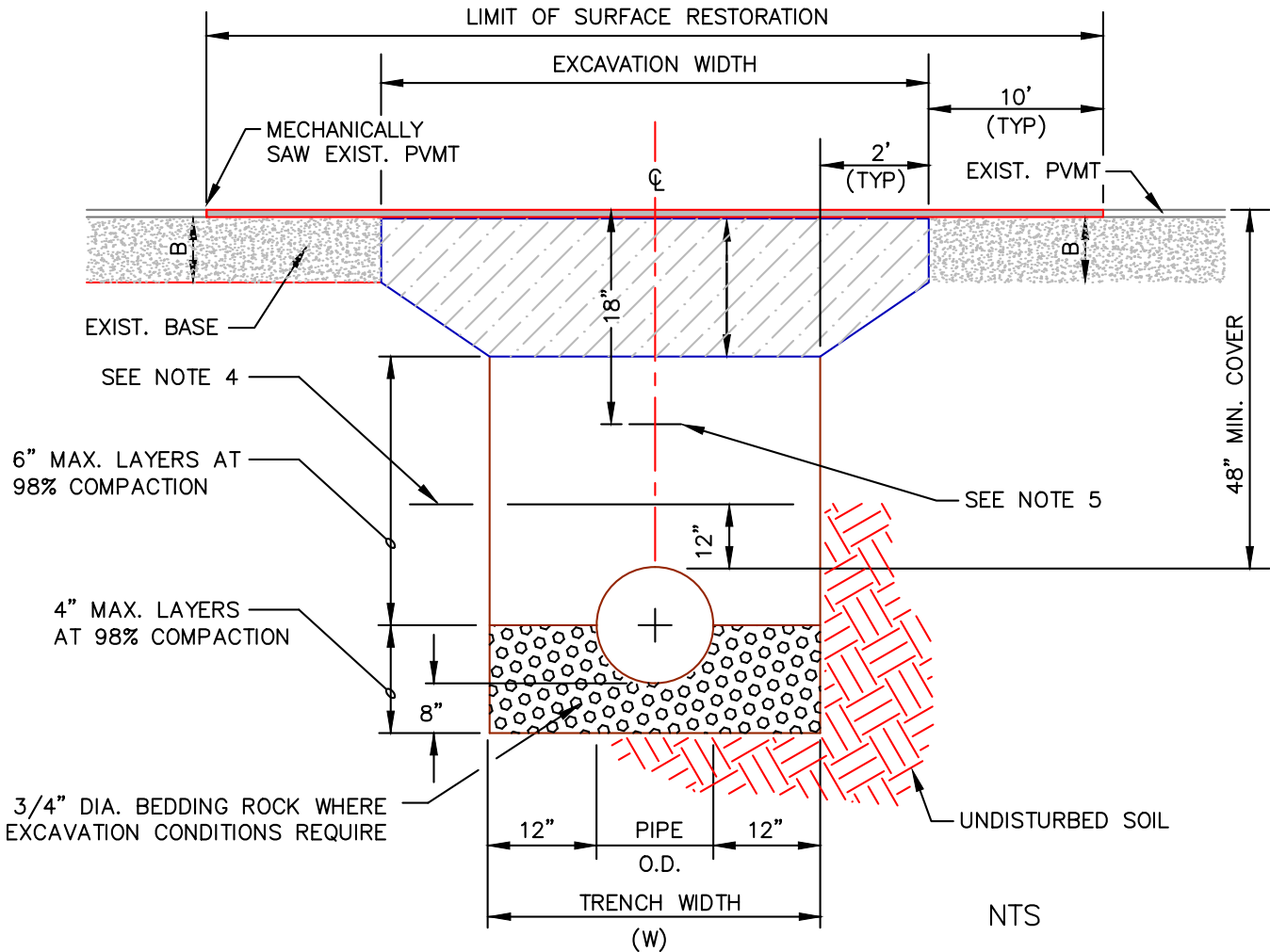
1. CONCRETE PIPE SHALL BE PLACED WITH THE SLOTS POSITIONED ON SIDES.
2. ALIGNMENT JOINTS ARE STANDARD (GASKETS NOT REQUIRED). RECORRUGATION OF METAL PIPE ENDS NOT REQUIRED.
3. PRIOR TO CONSTRUCTION BEGINNING THE CONTRACTOR MAY SUBMIT OTHER METHODS OF PROVIDING SLOTS HAVING EQUAL OR GREATER AREA OF OPENING, FOR APPROVAL BY THE ENGINEER AND CITY.
4. FILTER FABRIC SHALL BE SUBSURFACE DRAINAGE TYPE MEETING THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CURRENT EDITION. ALL FILTER FABRIC JOINTS SHALL LAP A MINIMUM OF ONE FOOT.
5. THE STANDARD CROSS SECTION SHALL BE CONSTRUCTED UNLESS OTHER SECTION(S) ARE DESCRIBED OR DETAILED IN THE PLANS.
6. FOR SUPPLEMENTAL DETAILS SEE FDOT STANDARD PLANS.
7. THE CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS TO PREVENT CONTAMINATION OF THE TRENCH WITH SAND, SILT AND FOREIGN MATERIALS.
8. THE 12" DIAMETER WEEP HOLE SHALL BE ELIMINATED, WHEN THE BOTTOM OF THE INLET IS BELOW THE NORMAL WATER TABLE, UNLESS OTHERWISE SHOWN IN THE PLANS.

DESIGN NOTES

1. PIPE INVERT SHOULD BE AT OR ABOVE THE NORMAL WATER TABLE WHENEVER POSSIBLE.
2. FRENCH DRAINS WITH MINOR DIMENSIONAL CHANGES OR OTHERWISE DIFFERENT FROM THE STANDARD CROSS-SECTION SHALL BE EITHER DESCRIBED OR DETAILED IN THE PLANS. FRENCH DRAINS WITH SIGNIFICANTLY DIFFERENT CROSS-SECTIONS SHALL BE DETAILED IN THE PLANS.



NOTE: TO DETERMINE THE MOST CURRENT REQUIREMENTS FOR STABILIZATION MATERIAL, BASE MATERIAL, AND ASPHALT MATERIAL PATCH AND THE REPLACEMENT DIMENSIONS CONTACT CITY ENGINEER IN THE PUBLIC WORKS DEPT AT 386-671-8610.



NOTES:

1. WHERE SOIL CONDITIONS CAN NOT BE MAINTAINED AS SHOWN ABOVE, PROVIDE APPROVED METHOD OF CONSTRUCTION.
2. SHEETING WILL BE REQUIRED AS DETERMINED IN THE FIELD.
3. COMPACTION PERCENTAGES SHOWN REFER TO A.A.S.H.T.O. T-180. PROVIDE COMPACTION TEST REPORTS TO CITY INSPECTOR.
4. MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LEVEL.
5. FOR PVC PIPE ONLY – INSTALL METALLIC TAPE AND UF #12 INSULATED SINGLE STRAND COPPER WIRE OVER FULL LENGTH OF PIPE.
6. THE CONTRACTOR SHALL, UNLESS OTHERWISE NOTED, RESTORE ALL STRIPING, PAVEMENT MARKINGS, DELINEATORS, SIGNAGE AND TRAFFIC SIGNAL SYSTEM COMPONENTS DISTURBED DURING CONSTRUCTION ACTIVITIES. COST OF ALL WORK AND MATERIALS WILL BE CONSIDERED INCIDENTAL TO PATCH MATERIAL ITEMS.
7. DEWATER TO KEEP WATER LEVEL AT A 6" MINIMUM BELOW PIPE BEING CONSTRUCTED.

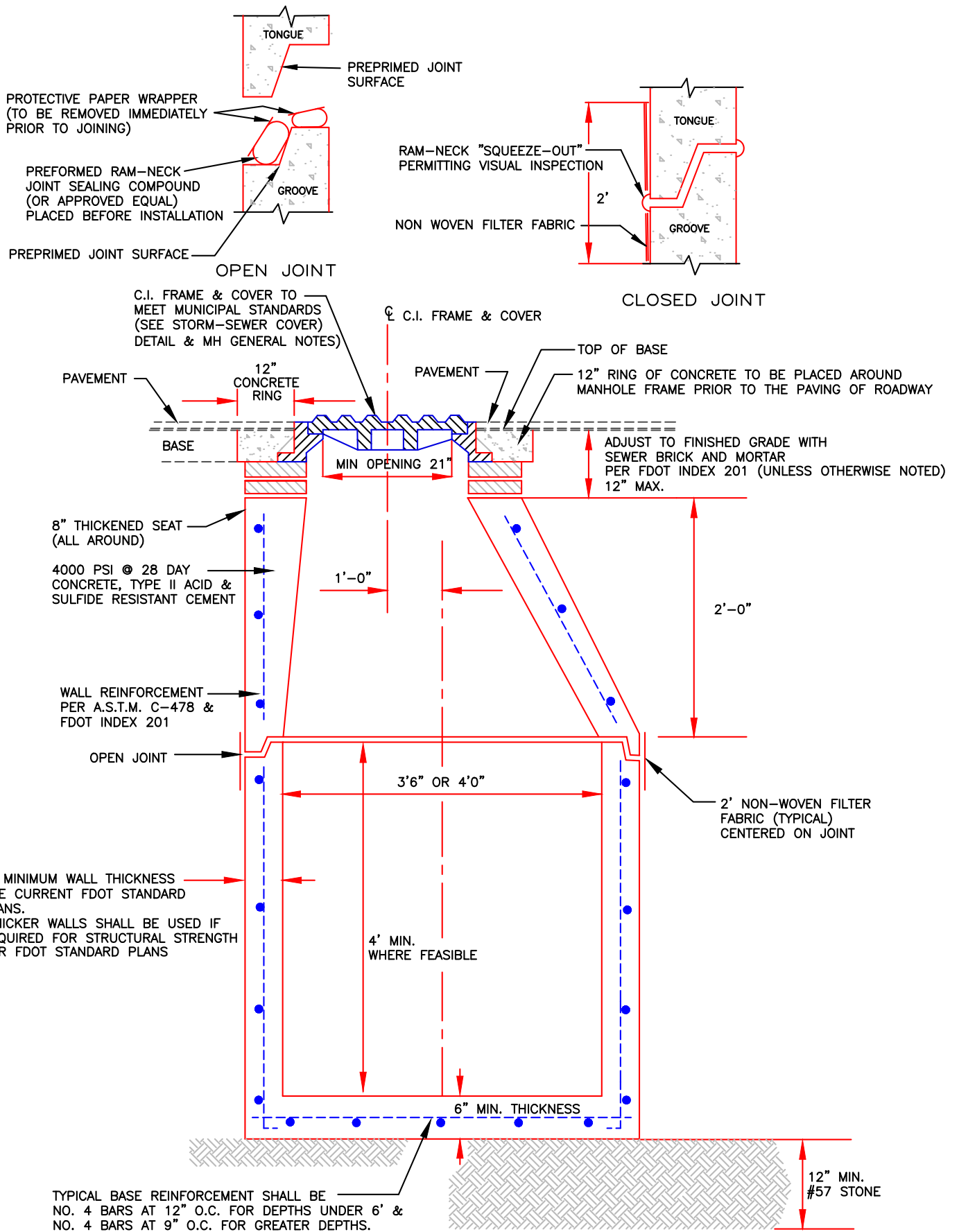
THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT



PAVEMENT CUT
AND PATCH
DETAIL
ST-18

ITB 20343 BATHING POINT GENERATOR REPLACEMENT
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FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
Revision Date: 01/19
File Name: Pavement Cut & Patch ST-18
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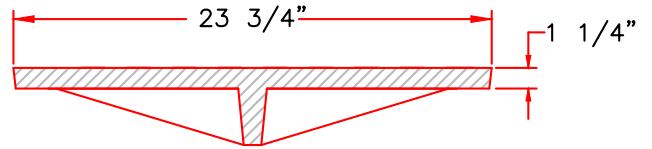
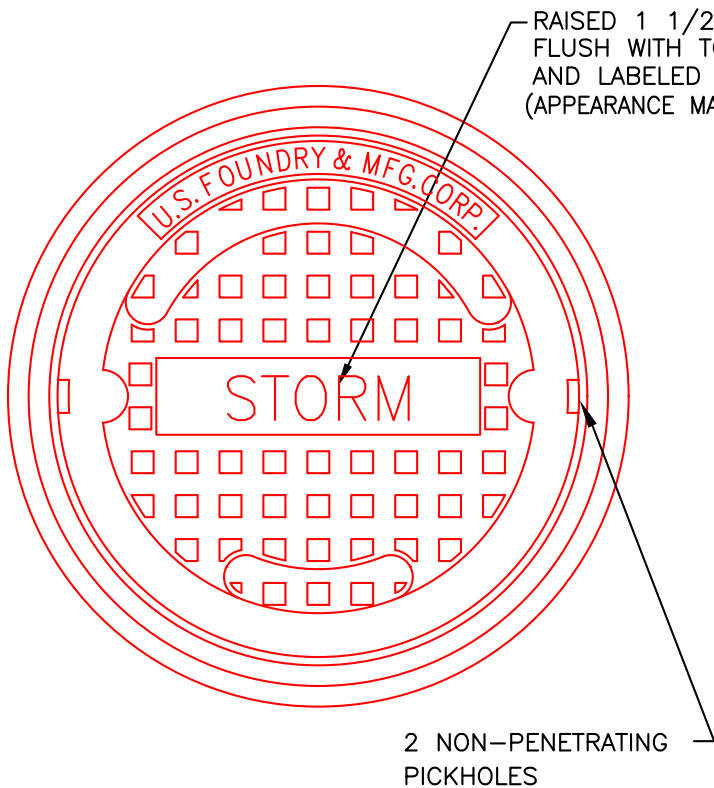
THE CITY OF DAYTONA BEACH
ENGINEERING DIVISION



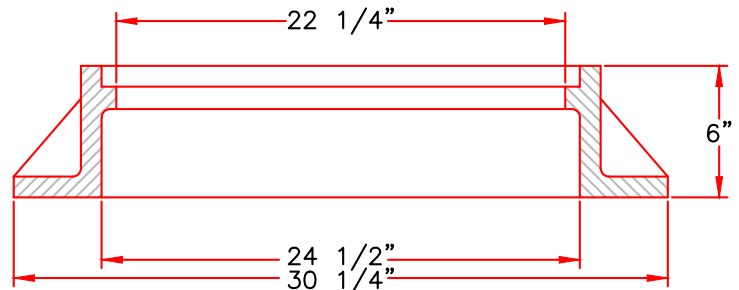
STORMWATER
MANHOLE
DETAIL
ST-19

ITB 20343-BE TBLUNE POINT GENERATOR REPLACEMENT
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FY- 19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
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File Name: Manhole ST-19
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USF TYPE E MANHOLE COVER

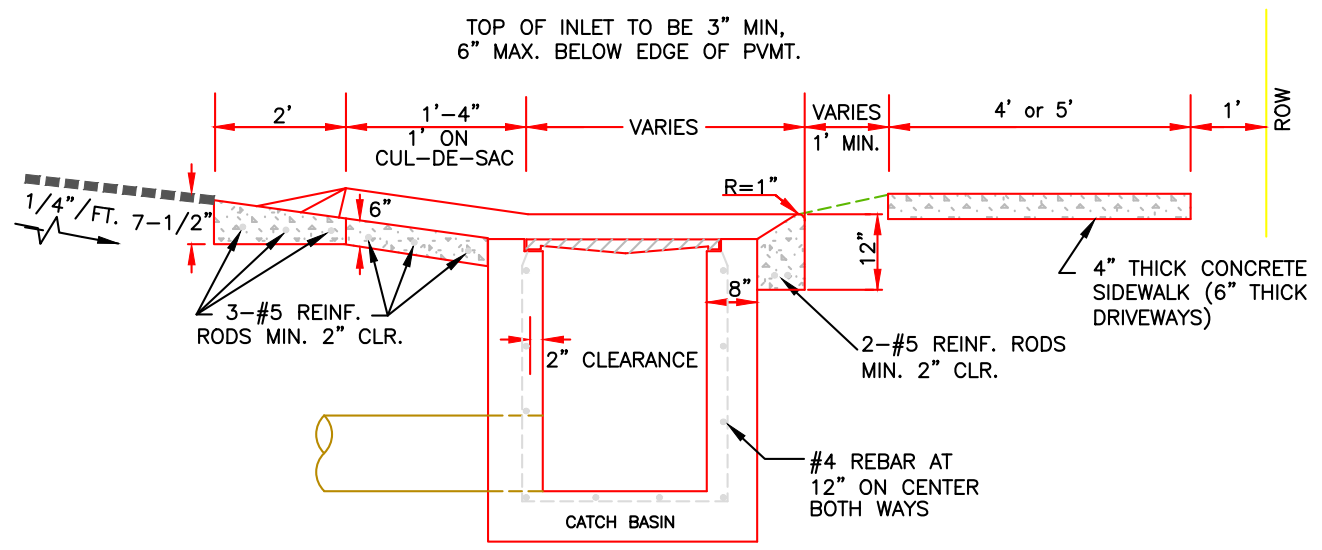
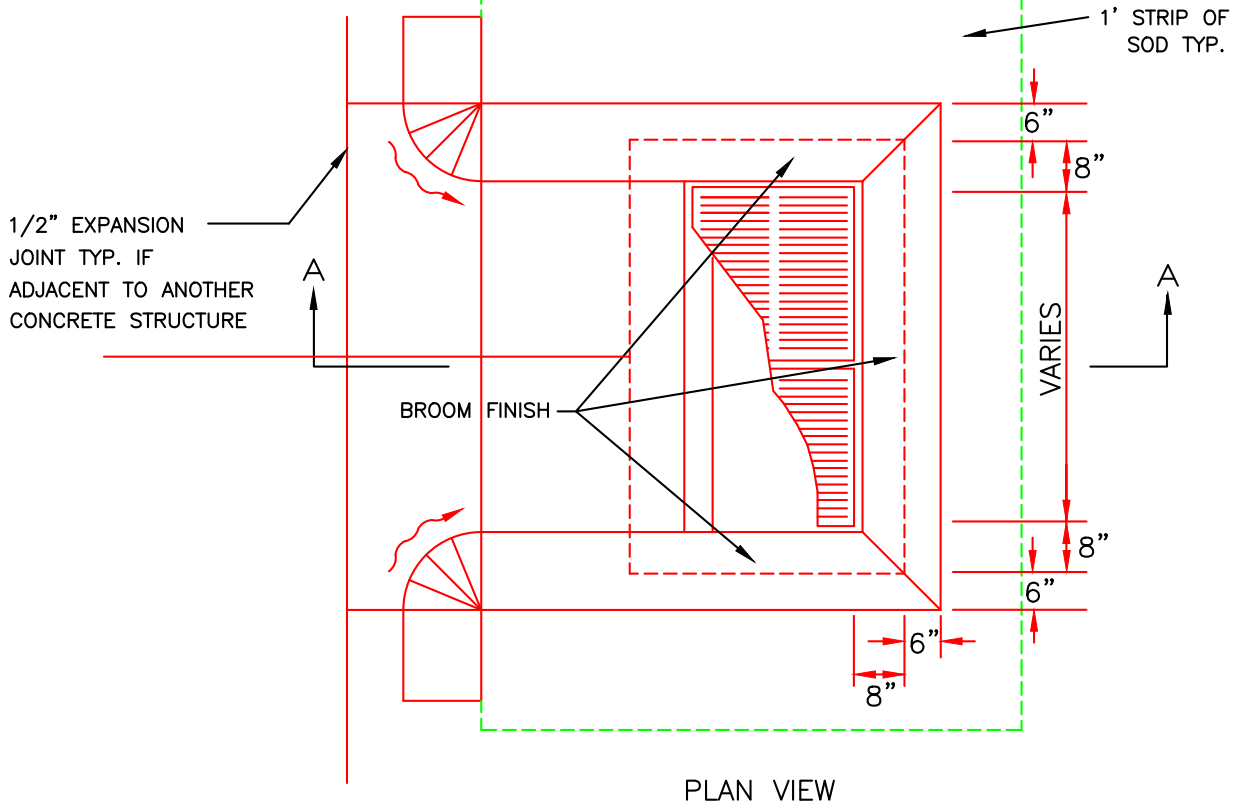


USF 170 MANHOLE RING

NOTES:

1. MORTAR TO CONTAIN "HYDRATITE", OR APPROVED EQUAL, TO PREVENT SHRINKAGE.
2. SUB-GRADE BENEATH MANHOLES SHALL BE FIRM UNDISTURBED GRANULAR UNSATURATED SOIL. No. 57 AGGREGATE STONE SHALL BE USED IN WET CONDITIONS AND/OR WHERE UNSUITABLE MATERIAL IS ENCOUNTERED.
3. UNLESS DETAILED PLANS SHOW OTHERWISE, ALL MANHOLE RING AND COVER CASTINGS IN PAVED AREAS ARE TO BE ADJUSTED TO FINAL GRADE, SEALED AND SECURED IN PLACE WITH A CONCRETE COLLAR AFTER THE ROAD BASE IS PLACED AND JUST PRIOR TO PLACEMENT OF ASPHALT WEARING SURFACE.
4. CONTRACTOR SHALL PROVIDE THICKER MANHOLE WALLS AND BASES AS REQUIRED TO PREVENT FLOTATION BASED ON HISTORIC HIGH GROUND WATER TABLE ELEVATIONS AS DETERMINED USING ACCEPTED ENGINEERING PRACTICES AND/OR APPROVED BY THE UTILITIES DEPARTMENT.
5. CONCRETE COLLAR AROUND MANHOLE FRAME IS REQUIRED IN PAVED AREAS ONLY.
6. SHOP DRAWINGS FOR ALL STRUCTURES SHALL BE SUBMITTED TO AND APPROVED BY THE DESIGN ENGINEER PRIOR TO INSTALLATION.
7. NO BUG HOLES OR HONEYCOMB WILL BE ACCEPTED.
8. ENDS OF SECTION SHALL FIT FLUSH TOGETHER
9. MANHOLES SHALL BE CLEARED OF ALL DEBRIS PRIOR TO CITY ACCEPTANCE AND SYSTEM USE.

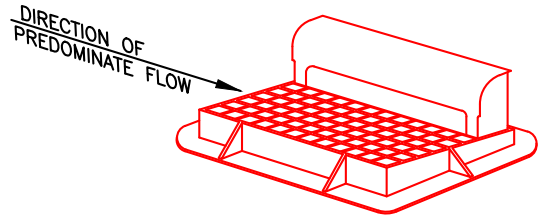
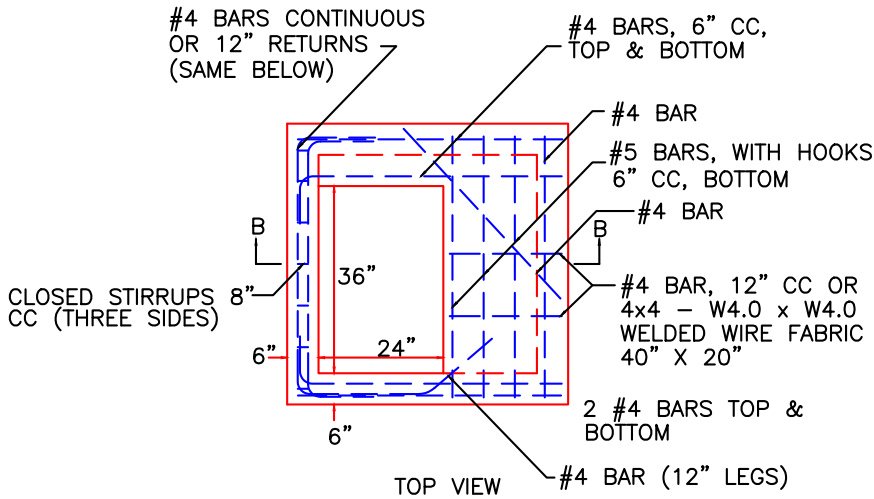




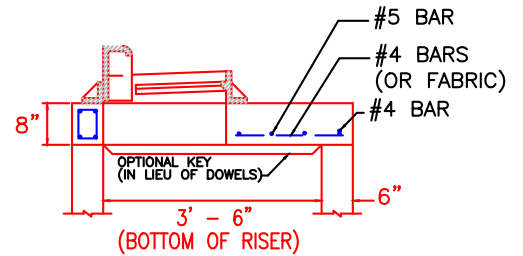
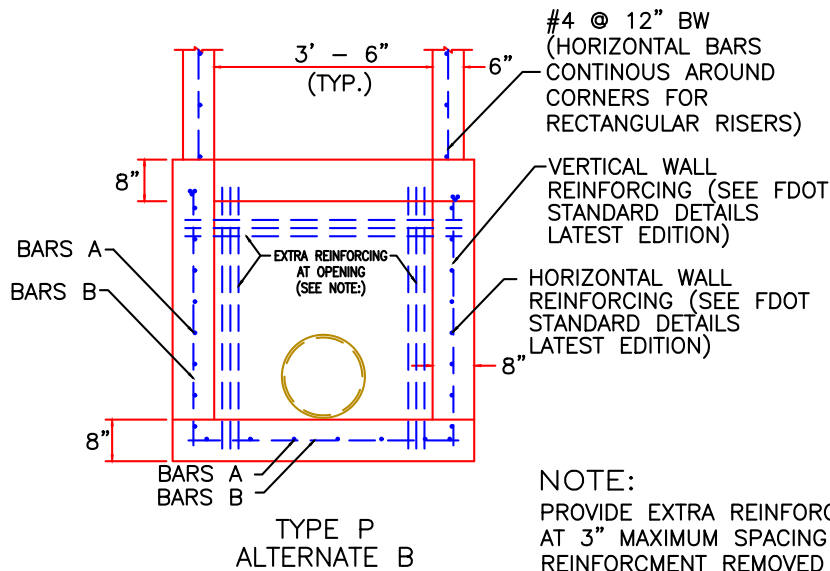
DIMENSIONS SHOWN ARE MINIMUM. FDOT STANDARD PLANS SHALL APPLY



FY-19/20
Drawing Date: 01/08
Drawn By: KLH
Checked By: JMP
Scale: NTS
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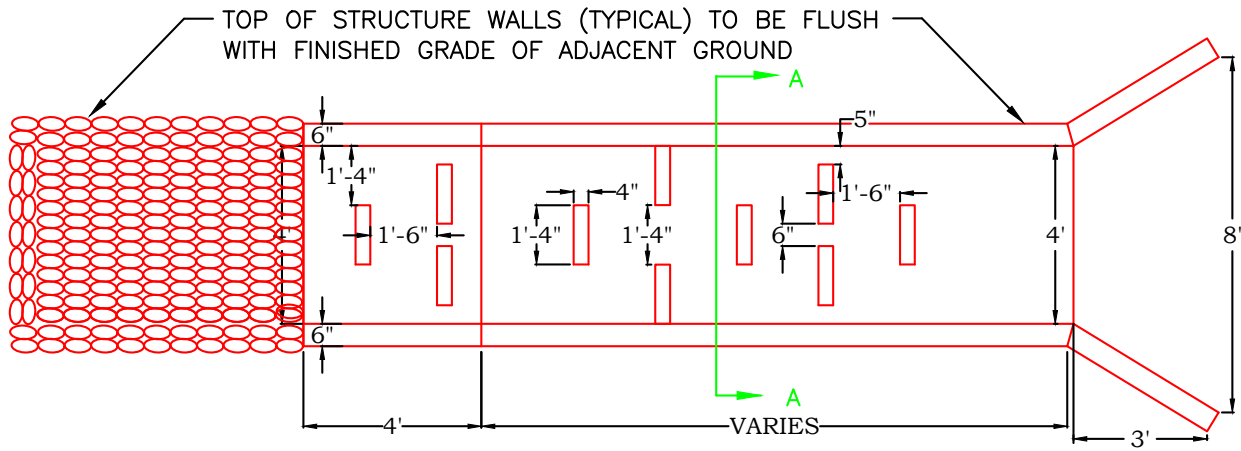
USF 5129, INLET FRAME & HOOD
USF 6176, HINGED GRATE



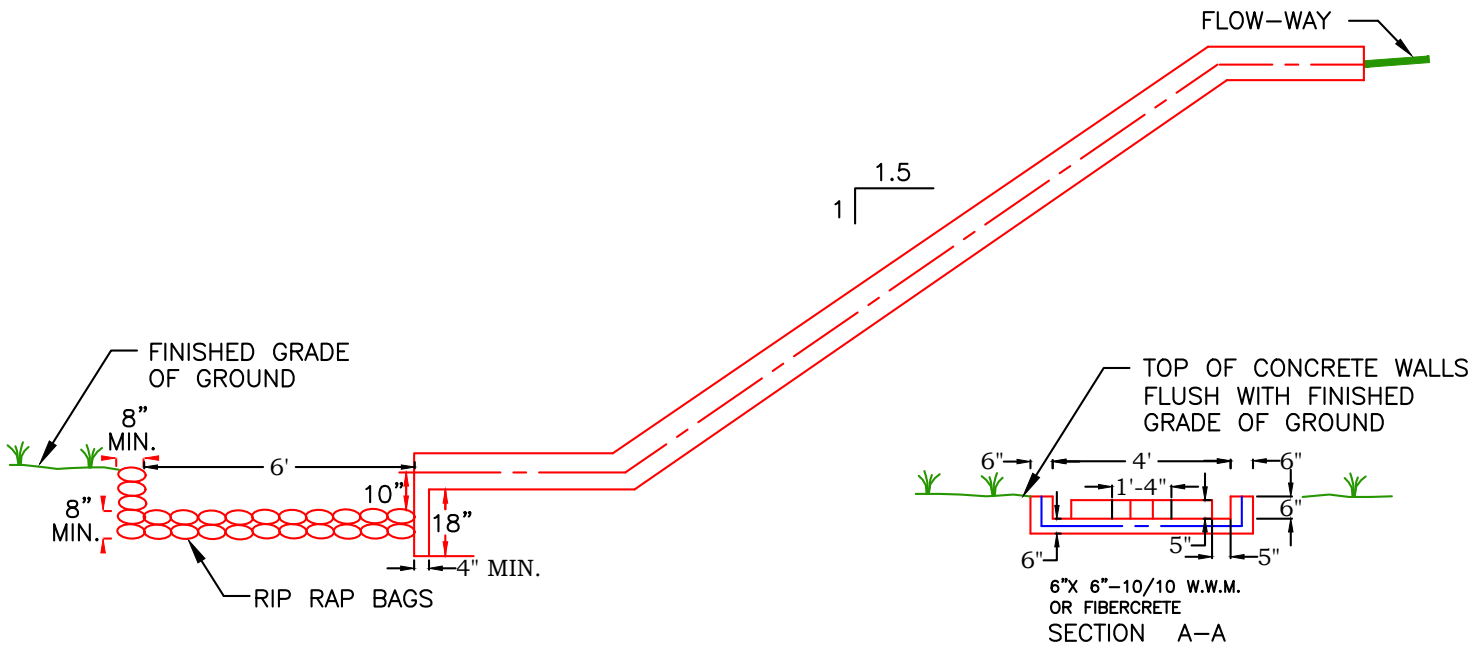
SECTION "B-B"
CURB INLET TOP
TYPE 9

NOTE:
PROVIDE EXTRA REINFORCING EACH SIDE OF EACH OPENING AT 3" MAXIMUM SPACING EQUAL TO HALF THE AREA OF VERTICAL REINFORCMENT REMOVED BY THE OPENING AND PROVIDE THE SAME AREA OF REINFORCMENT ABOVE EACH OPENING AT 3" MAXIMUM SPACING AS REMOVED BY THE OPENING.





PLAN VIEW



PROFILE VIEW

NOTES:

1. CONCRETE SPILLWAY TO BE 3500 P.S.I., 6" THICK (MIN).
2. PLACE SOD AT LEAST 5' IN BORDER WIDTH AROUND ALL STRUCTURE EDGES ABOVE STANDING WATER.

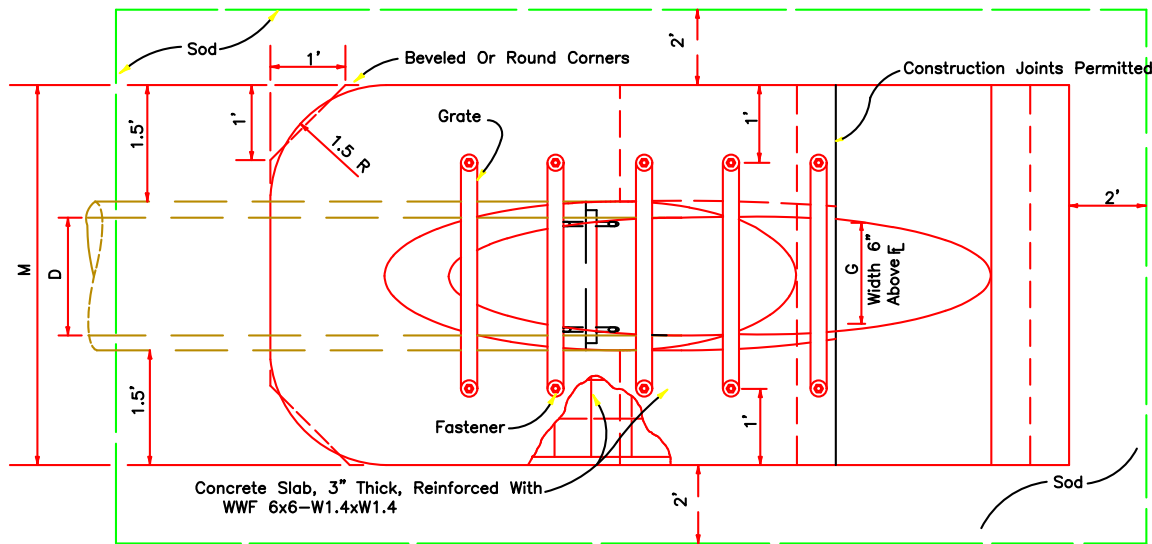


FY-19/20
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Drawn By: KLH
Checked By: JMP
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Revision Date: 01/19
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DIMENSIONS & QUANTITIES												
D	X	A	B	C	E	F	G	M				N
								Single Pipe	Double Pipe	Triple Pipe	Quad Pipe	
15"	2'-7"	2.27'	4.09'	6.36'	4.03'	8'	1.22'	4.63'	7.21'	9.79'	12.37'	1.19'
18"	2'-10"	2.36'	5.12'	7.48'	5.03'	9'	1.41'	4.92'	7.75'	10.58'	13.42'	1.21'
24"	3'-5"	2.53'	7.18' Δ	9.71'	7.03' Δ	11'	1.73'	5.50'	8.92'	12.33'	15.75'	1.25'
30"	4'-3"	2.70'	9.25'	11.95'	9.03'	13'	2.00'	6.08'	10.33'	14.58'	18.83'	1.29'
36"	5'-1"	2.87'	11.31' \diamond	14.18'	11.03' \diamond	15'	2.24'	6.67'	11.75'	16.83'	21.92'	1.33'
42"	6'-0"	3.05'	13.37'	16.42'	13.03'	17'	2.45'	7.25'	13.25'	19.25'	25.25'	1.38'
48"	6'-9"	3.22'	15.43'	18.65'	15.03'	19'	2.65'	7.83'	14.58'	21.33'	28.08'	1.42'
54"	7'-8"	3.39'	17.49'	20.88'	17.03'	21'	2.83'	8.42'	16.08'	23.75'	31.42'	1.46'
60"	8'-6"	3.56'	19.55'	23.11'	19.03'	23'	3.00'	9.00'	17.50'	26.00'	34.50'	1.50'

D	GRATE SIZES		CONCRETE (Cu. Yds.)				SODDING (Sq. Yds.)			
	Standard Weight Pipe	Extra Strong Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad Pipe
15"			0.81	1.23	1.64	2.06	8	10	11	12
18"			0.90	1.36	1.82	2.30	9	10	12	13
24"			1.08	1.67	2.27	2.91	10	12	13	15
30"		3"	1.29	2.08	2.89	3.69	12	14	15	17
36"		3"	1.47	2.50	3.50	4.46	13	15	17	20
42"			1.67	2.96	4.23	5.51	14	17	19	22
48"			1.89	3.41	4.91	6.42	15	18	21	24
54"	3"	4"	2.11	3.94	5.78	7.59	17	20	23	27
60"	3"	4"	2.37	4.54	6.69	8.85	18	22	25	29

Δ 6.42' Δ 6.25' Dimensions permitted to allow use of 8' standard pipe lengths.
 \diamond 10.40' \diamond 10.10' Dimensions permitted to allow use of 12' standard pipe lengths.
 $\Delta \diamond$ Concrete slab shall be deepened to form bridge across crown of pipe. See section below.



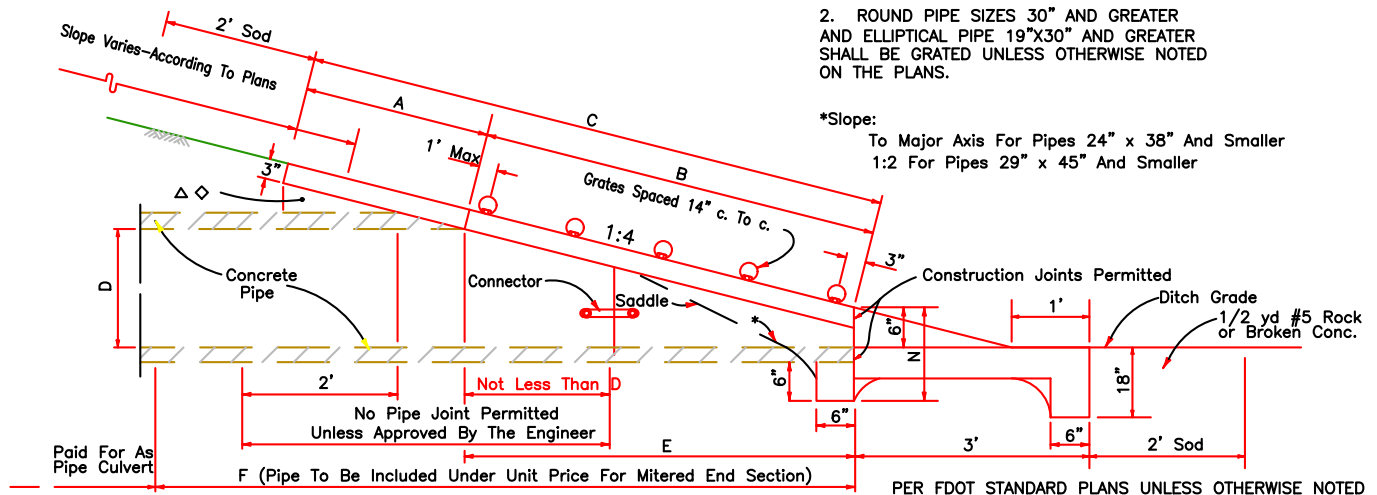
TOP-VIEW SINGLE PIPE

NOTES:

- SEE STORMWATER CONSTRUCTION NOTES DETAILS.
- ROUND PIPE SIZES 30" AND GREATER AND ELLIPTICAL PIPE 19"x30" AND GREATER SHALL BE GRATED UNLESS OTHERWISE NOTED ON THE PLANS.

*Slope:

To Major Axis For Pipes 24" x 38" And Smaller
 1:2 For Pipes 29" x 45" And Smaller

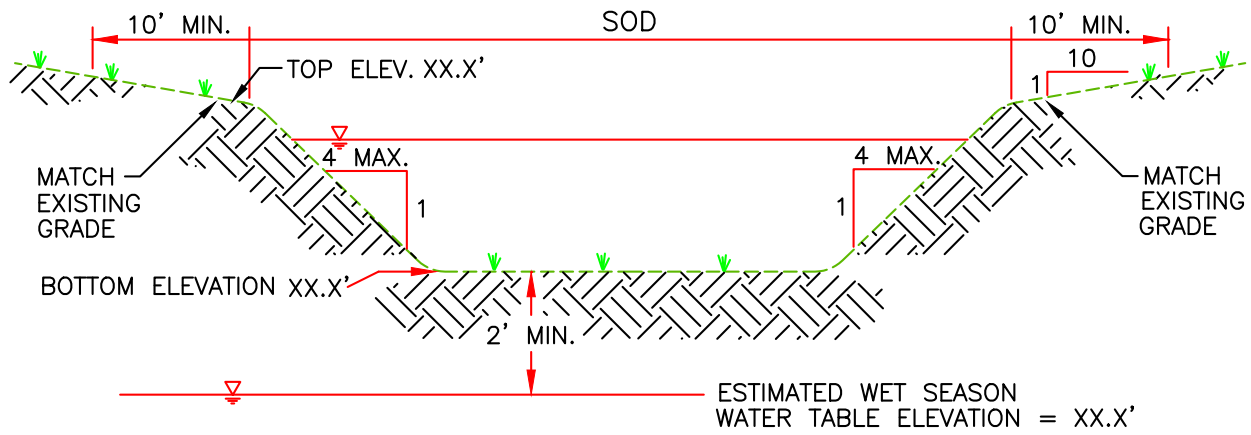


SECTION

PER FDOT STANDARD PLANS UNLESS OTHERWISE NOTED



25-YR / 24 HR
 DHW ELEVATION = XX.X'
 100-YR / 24 HR
 DHW ELEVATION = XX.X'

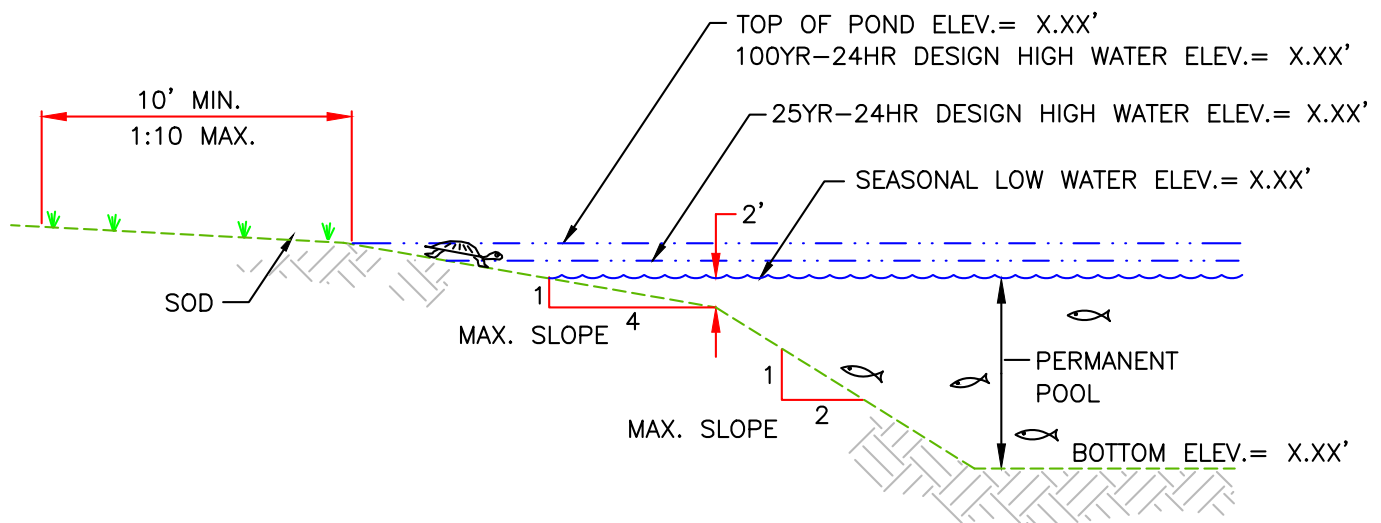


CROSS SECTIONAL VIEW

NOTES:

1. ESTIMATED WET SEASON WATER TABLE ELEVATION SHALL BE BASED UPON A SITE SPECIFIC GEOTECHNICAL SOIL BORING AND PROFESSIONAL ANALYSIS.





NOTES:

1. SOD IS TO BE PLACED TO EDGE OF WATER EXCEPT IN LITTORAL PLANTING AREAS.
2. A MINIMUM OF ONE FOOT OF FREEBOARD IS REQUIRED BETWEEN 100 YR-24 HR DESIGN HIGH WATER ELEVATION AND TOP OF BANK.
3. EXTEND LIMITS OF SODDING TO A MINIMUM OF TWO (2') BEYOND TOP OF BANK OR MATCH EXISTING GRADE, WHICHEVER IS GREATER.
4. PERMANENT POOL DEPTH & VOLUME SHALL MEET THE REQUIREMENTS OF THE SJRWMD.

NTS



Section 01720 AS-BUILTS/RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section sets forth the requirements for preparing as-built/record drawings and documents for verification of construction and archiving.

CONTRACTOR shall secure the services of a Florida licensed surveyor to collect data and prepare as-built/record drawings in accordance with City of Daytona Beach Utilities standards as follows:

1.2 REFERENCE:

- A. The preparation work shall be in accordance with this section and supplementary details in the City of Daytona Beach Utilities Department Standard Details, latest edition.

1.3 AS-BUILTS/RECORD DRAWINGS AND DOCUMENTS:

In order to ensure that the project records are maintained to the highest standards and the information can easily be added to the City's electronic records the following information is required on all As-built/Record Drawings.

- A. The intent of these details for As-built/Record Drawings are required for all public facilities constructed. Prior to construction completion these as-built/record requirements will be reviewed to be certain the Contractor's surveyor has a clear understanding of what is required for completion of this work.
1. Pavement and curb widths shall be verified and dimensioned for each street at each block (for subdivisions) and as appropriate to confirm paving limits (on site plans).
 2. All radii at intersections shall be verified and dimensioned. This information is to be clearly indicated on the as-built/record drawings.



Section 01720 AS-BUILTS/RECORD DOCUMENTS

(CONT'D)

3. Roadway elevation shall be recorded at all grade changes, 100' intervals along roadway, and other intervals as needed along all streets. Street centerline and curb invert elevations shall be recorded as noted. The as-built centerline profile of all streets shall also be shown on the plan and profile so it may be compared to the design profile grade lines. In the event that the as-built centerline longitudinal grade does not meet the City minimum standards, additional longitudinal grades of the adjacent curbing and similar roadway cross-section surveys to verify the correct cross slope, shall be required to verify that the system will function as originally designed.
4. Storm drainage structures shall be located and/or dimensioned from centerlines or lot lines as appropriate. Each structure shall be located by sub-meter GPS with Station & Offset, northerly & easterly, latitude, longitude, and elevation data.
5. Storm drainage pipe invert and inlet elevation shall be recorded and clearly denoted as As-built information. Design elevation shall be crossed out and as-built information written next to it.
6. Storm drainage pipe material, length, size shall be measured and/or verified. This information is to be clearly indicated as being as-built information.
7. All applicable topographic information pertinent to the on-site drainage system, such as ditches, swales, lakes, canals, etc. that are deemed necessary by the City to verify the functional performance of the storm system, shall be noted. Normally, recording elevation every 100 feet at the top of bank to toe of sloe will be required. Measurements shall be taken and recorded in order to accurately tie down these features to the roadway centerlines and to plat lines. Whenever possible, contour lines shall be utilized to graphically describe these topographic features.
8. Retention areas shall have their top of bank and bottom elevations recorded. Actual measurements shall be taken and dimensions recorded of the size of all retention areas. Measurements shall be done from top of bank with side slopes indicated. Separate calculations shall be submitted to indicate required and provided retention volumes.
9. Actual materials used and elevations and dimensions of overflow weir structures and skimmers shall be noted on the as-built.
10. Storm drainage swale centerlines shall be located and elevations of flow line and top of bank shall be recorded every 100 feet. side slopes shall also be indicated.



Section 01720 AS-BUILTS/RECORD DOCUMENTS (CONT'D)

11. Sanitary sewer manholes shall be verified and dimensioned from street centerlines or lot lines as appropriate. Each structure shall be located by sub-meter GPS with station & offset, northerly & easterly, latitude, longitude, and elevation data. All rim and invert elevation shall be verified and recorded. This information shall be clearly indicated as being as-built information. Design elevations shall be crossed out and as-built information written next to it.
12. For subdivisions, proposed design finish floor elevations shall appear on all subdivision lots on the appropriate plan and profile sheet as well as on the master drainage plan.
13. Sanitary sewer line lengths, sizes, material, slope, etc., shall be verified and recorded, this information is to be clearly indicated as being as-built information.
14. Sewer Laterals shall be verified and recorded at the clean out locations, stationing and offset distances shall be measured from upstream manholes towards downstream manholes. Invert information at clean out shall be provided and be located by sub-meter GPS with station & offset, northerly & easterly, latitude, longitude, and elevation data.
15. Lift station and forcemain shall be verified and dimensioned from street centerlines or lot lines as appropriate. Forcemain depth and location including valves will be provided and tied to permanent above grade features. dimensional and elevation information indicated on the approved plan shall be verified and recorded. This information shall be clearly indicated as being as-built information. Buried potable water lines and electrical service lines shall be clearly dimensioned, located and labeled. Each lift station shall be located by sub-meter GPS with station & offset, northerly & easterly, latitude, longitude and elevation data.
16. Curb cuts or metal tabs, used to mark sewer laterals, water services and water valves, shall be verified for presence and accuracy of location.
17. Potable and reclaimed water main lines shall be dimensioned off the baseline construction. Water main line material size, length and depth, placed shall be noted. Locations of valves shall also be tied to baseline construction. This information shall be clearly indicated as being as-built information.



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AS-BUILTS/RECORD DOCUMENTS

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18. Potable and reclaimed water valves, tees, bends, all services, and fire hydrants shall be located by tying them to baseline construction (Sta. & Offset). Similarly, force main valves, tees, and bends shall be located in the same manner. Stationing and offset distances shall be measured from upstream manholes to downstream manholes. All services, valves, tees, bends, and hydrants shall be located by sub-meter GPS with station & offset, northerly & easterly, latitude, longitude and elevation data.
19. For perpendicular crossings of storm water, sanitary sewer, potable water, or reclaimed water, the as-built plans shall clearly indicate which utilities are located over or under other utilities, as necessary.
20. Any special features such as, concrete flumes, lake banks, walls, fencing, etc. which are a part of the approved construction drawings should also be located and dimensioned.
21. If an approved subdivision plat or site plan shows a conservation easement, the project surveyor should provide the exact location of the specimen tree(s) from the right-of-way or property lines and proposed easement boundaries on the as-built drawing. The as-built location of these trees will help verify the sufficiency of the conservation easement prior to plat recording or certificate of occupancy.
22. When storm water, potable water, reclaimed water, or sanitary sewer improvements are located within an easement, the as-built drawing will accurately depict the location of the easement itself as well as the exact location of the improvements within the easement. This is required in order to verify that the improvements have been properly located and to ensure that future subsurface excavation to perform remedial repair can be accomplished without disturbance beyond the easement.
23. As-built drawings are to be prepared, signed and sealed by a Florida licensed surveyor. These as-built drawings shall also be signed and sealed by a Florida licensed engineer of record. Two (2) paper copy sets of as-built record drawings shall be provided, a CD with a digital copy in a compatible AutoCAD format, and PDF format.
24. Elevations shall be referenced to NAVD 1988 Data. As-built survey information shall be referenced to at least two Florida State Plane east coordinates NAD 83.



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(CONT'D)

25. Benchmark Datum utilizes monumentation from the North American Vertical Datum of 1929 with elevations adjusted to NGVD 1988 data. Any NAVD 1929 monument with the limits of construction is to be protected.

1.4 SUBMITTALS

- A. CONTRACTOR shall submit each month to CITY the Project Activity Summary that shows current construction activities and a copy of notices to agencies including the City regarding road closures; plus a record of events that will be needed in the future.
- B. CONTRACTOR shall submit to CITY as required the proposed shut-off schedule, capping, temporary service scheduling, record of notices to customers and proposed roadway closings.
- C. CONTRACTOR shall submit copies of published notices.
- D. CONTRACTOR shall submit Final as-builts for each utility included in the plans. Send the two paper copies and the AutoCAD files for pre-approval. The final submittal shall include two (2) Paper Copies of Record (rolled, not folded), a CD with the AutoCAD files, and a set of PDF files (Mylars are no longer required). When the As-Builts are delivered for clearance of water lines (two paper signed and sealed copies), they will be scheduled for chlorination. CITY will not release the drinking water bacteriological laboratory report to Volusia County Health Department until the As-built information meets CITY requirements. CONTRACTOR will have 60 days from the time that the bacteriological samples are collected to submit any correction that needed to be done to the as-built and CD to CITY. If CONTRACTOR goes past the 60 days re-chlorination will be required and pay for the bacteriological laboratory report will be required. The following are minimum detail samples of how the As-built drawing information will need to be presented.



Section 01720 AS-BUILTS/RECORD DOCUMENTS (CONT'D)

E. There are examples of how to display and label valves, fittings, and pipes on the plans. Include a location arrow going to the identified object:

Valve Example:

20" GATE VALVE
 STA. 22+23 (LT.55.0')
 LAT. = 29°12'53.009
 LONG. = 81°04'03.355"W
 N = 1,774,373.4058
 E= 634,602.7566
 TOP OF NUT ELEV. = 27.50
 GROUND ELEV. = 30.50

20" DIP WATER MAIN
 STA. 22+00 (RT.55.0')
 LAT.= 29°12'50.009"N
 LONG.= 81°04'26.355"W
 N = 1,774,373.4058
 E= 634,602.7566
 TOP OF PIPE ELEV. = 27.50
 GROUND ELEV. = 30.50

Manhole Example:

Manhole No.25
 STA. 22+23 (LT.55.0')
 LAT. = 29°12'53.009
 LONG. = 81°04'03.355"W
 N = 1,774,373.4058
 E= 634,602.7566
 RIM ELEV. = 27.50
 NORTH 15" RCP ELEV. = 8.50
 WEST 24" CMP ELEV. =7.50
 BOTTOM ELEV. = 9.30

(All Bench Marks used must be shown on the plans) Bench Mark Example:

BM#13
 STA. 20+33 (LT. 85.5')
 3/4" Iron Rod with Plastic Cap...
 N= 1,774,373.4058
 E = 634,602.7566
 LAT.= 29°04'53.355"W
 LONG. = 81°04'53.355"W
 ELEV.= 32.55



Section 01720

AS-BUILTS/RECORD DOCUMENTS

(CONT'D)

PART 2- EXECUTION

2.1 General

All drawings shall be prepared to True State Plane Coordinates. CONTRACTOR shall provide all materials, equipment, labor needed to prepare and submit accurate As-Built/Record Drawings.

- A. It is acceptable to CITY if the surveyor utilizes an after the fact approach to collecting and verifying the location and depth by vertical PVC pipes placed by the CONTRACTOR as markers for this purpose. The surveyor shall verify to the accuracy defined in Florida Statutes the As-built conditions and certify the Record Drawings.
- B. CITY shall not be considered the best source of information for valve locations that may have been lost during final grading, the surveyor or CONTRACTOR shall excavate and properly mark all valve boxes and each valve shall have a tag or color coded to define water, sewer, or reuse water valves. The use of temporary PVC pipe markers color coded is acceptable so long as cross references are provided on the Record Drawings to prevent the tops from a water valve being placed on a sewer valve.
- C. THE CONTRACTOR SHALL PROVIDE THE UTILITIES DEPARTMENT ENGINEERING DIVISION THE FINAL AS BUILT/RECORD DRAWINGS ON CD AND MYLARS. THE AS BUILT RECORD DRAWINGS SHALL BE PREPARED USING AUTOCAD FORMAT 2010 OR LATER. IN MODEL SPACE THE DRAWING SHALL BE IN FL83-EF (NAD83 FLORIDA STATE PLANES, EAST ZONE, US FOOT) STATE PLANE COORDINATES AND SHALL BE ABLE TO BE INSERTED INTO THE CITY'S OVERALL GIS SYSTEM. THE RECORD DRAWINGS SHALL ALSO BE PRINTED, SIGNED AND SEALED AS ALLOWED BY STATE OF FLORIDA REGULATIONS. A DISCLAIMER MAY BE NOTED IN A TRANSMITTAL LETTER PLUS THE SURVEYOR MAY ADD A SPECIAL NOTICE ON EACH SHEET REGARDING THE LOCATION OF THE TRUE ORIGINAL RECORD DRAWINGS OR PLACE LIMITS ON RESPONSIBILITY SHOULD SOMEONE IN THE FUTURE NEED TO MODIFY THE DRAWINGS.
- D. Identify the source markers for the survey used for Record Drawings.

END OF SECTION

THE CITY OF DAYTONA BEACH
UTILITIES DEPARTMENT



AS-BUILT DRAWING
REQUIREMENTS
(SHEET 7 OF 7)

ITB 20343-BEACH ONE POINT GENERATOR REPLACEMENT
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**SECTION 15049
TRACER WIRE AND ALARMING TAPE**

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

Furnish and install identification tape over the centerline of all buried potable water lines, wastewater force mains, gravity sewer and waste water effluent mains.

1.2 SUBMITTALS

Submit manufacture's descriptive literature, illustrations, specifications and other pertinent data.

PART 2- PRODUCTS

2.1 TRACER WIRE

- A. All pipe (HDPE, PVC and DI) 4-inches and greater installed by open cut shall have one (1) 12-gauge minimum copper tracer wire taped to the top of the pipe at intervals no greater than 4-feet. Copper wire shall have a minimum tensile strength/ break load of 452 lbs.
- B. All pipe (HDPE, PVC or DI) installed by directional bore shall have two (2) 12-gauge extra high strength (EHS) carbon steel inner core reinforcement directional drilling tracer wires taped to the top of the pipe at intervals no greater than 4-feet. The wire shall have a minimum tensile strength/break load of 1,150 lbs.
- C. The tracer wires shall have colored insulation matching the type of service provided in the main and be acceptable for direct burial.
- D. The wire shall be tied to all valves, tees and fittings.
- E. The tracer wires shall be brought up to the surface through a valve box or a 2-inch PVC pipe under direction of a City's Representative.
- F. The wires shall each be continuous throughout the project, with splices made only by methods approved by the City's Project Representative.

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- G. All splices of the wires shall be made with watertight connections, utilizing direct bury splice kits as manufactured by 3M or approved equal. Bury splice kits shall be installed in accordance with manufacturer's recommendations.
- H. Tracer wire manufacturer shall be either Copperhead Industries or Proline Safety Products.

2.2 ALARMING TAPE

- A. Identification Tape for Ductile Iron and Steel Pipe: Identification tape shall be metallic and manufactured of polyethylene so as to be highly resistant to alkalis, acids and other destructive agents found in soil, and shall have a minimum thickness of 5 mils with a minimum tensile strength of 22 pounds per inch and maximum adhesive factor of 40 ounces per inch. Tape width shall be 3 inches and shall have background color specified below, imprinted with black letters. Imprint shall be as specified below and shall repeat itself a minimum of once every 2 feet for entire length of tape.
- B. Identification Tape for Polyvinyl Chloride Pipe: Identification tape shall be metallic and manufactured of polyethylene with minimum thickness of 4mils. The width shall be 3 inches and shall have background color specified below, imprinted with black letters. Imprint shall be as specified below and shall repeat itself a minimum of once every 2 feet for entire length of tape.
- C. Tape background colors and imprints shall be as follows:

<u>Imprint</u>	<u>Background Color</u>
“Caution Caution-Potable Water Line Buried Below”	Blue
“Caution Caution-Wastewater Force Main Buried Below”	Green
“Caution Caution-Reclaimed Water Main Buried Below”	Lavender
“Caution Caution-Raw Water Main Buried Below”	White

- D. Identification tape shall be “Underground Detectable Warning Tape” as manufactured by Presco, can be purchased at Ferguson Supply 840 Jimmy Ann Drive, Daytona Beach (386) 274-4516 or approved equivalent.

PART 3-EXECUTION

3.1 INSTALLATION OF ALARMING TAPE

- A. Alarming tape shall be installed for all buried pressure mains in accordance with the manufacturer's installation instructions and specified herein.

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- B. For potable, raw, reuse water, and force mains, alarming tape shall be installed 18” below final grade.

3.2 INSTALLATION OF TRACER WIRE

- A. Contractor shall perform a 12 volt DC electrical continuity test on all wires. No more than one volt of loss per 1000 feet of mainline pipe will be acceptable. A continuity test prior to final acceptance of the pipeline shall be required. Any cuts or breaks in the wire shall be repaired by the contractor at his expense.

- B. The tracer wire shall be tested by Contractor and with the City’s Representative at the time of pressure testing. If the test fails, the Contractor is responsible for repairing the tracer wire

END OF SECTION

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APPENDIX B

**Subsurface Soil Exploration and
Geotechnical Engineering Evaluation
Proposed Generators
Bethune Point Wastewater Treatment Plant
Daytona Beach, Volusia County, Florida**



Ardaman & Associates, Inc.

CORPORATE HEADQUARTERS

8008 S. Orange Avenue, Orlando, FL 32809 - Phone: (407) 855-3860 Fax: (407) 859-8121

Branch Office Locations

Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, West Palm Beach
Louisiana: Baton Rouge, Monroe, New Orleans, Shreveport

MEMBERS:

ASTM International
American Concrete Institute
Geoprofessional Business Association
Society of American Military Engineers
American Council of Engineering Companies



Tetra Tech, Inc.
201 E. Pine Street, Suite 1000
Orlando, Florida 32801

Attention: Ms. Jennifer Ribotti, P.E.

Subject: Subsurface Soil Exploration and
Geotechnical Engineering Evaluation
Proposed Generators
Bethune Point Wastewater Treatment Plant
Daytona Beach, Volusia County, Florida

Dear Ms. Ribotti:

As requested and authorized, we have completed a shallow subsurface soil exploration for the subject project. The purposes of performing this exploration were to evaluate the general subsurface conditions within the proposed generator pad area and to provide recommendations for site preparation and foundation support. In addition, we have estimated the normal seasonal high groundwater level at the boring locations. This report documents our findings and presents our engineering recommendations.

SITE LOCATION AND SITE DESCRIPTION

The site for the proposed generators is located at the Bethune Point Wastewater Treatment Plant at 1 Shady Place in Daytona Beach, Volusia County, Florida (Section 40, Township 15 South, Range 32 East). The general site location is shown superimposed on the Daytona Beach, Florida U.S.G.S. quadrangle map presented on Figure 1.

The site for the proposed generators currently consists of a relatively flat grassy area adjacent to electrical buildings and paved parking/drive areas.

PROPOSED CONSTRUCTION AND GRADING

It is our understanding that the proposed development includes two generators each supported by pad foundations measuring approximately 31 by 9 feet in “footprint” plan dimensions. Further, we understand that each generator has a total weight of approximately 74 kips. Based on the grading plan provided by Tetra Tech on August 23, 2019, up to 1½ feet of fill is required to raise the generator pad areas to final elevation(s). If actual structure loads or fill heights exceed those provided, then the recommendations in this report may not be valid.

REVIEW OF SOIL SURVEY MAPS

Based on the 1980 Soil Survey for Volusia County, Florida, as prepared by the U.S. Department of Agriculture Soil Conservation Service, the site is located in an area mapped as the “Turnbull Variant sand” soil series. The “Turnbull Variant sand” consists of mixed sandy and shelly material dredged from the Intracoastal Waterway and placed in narrow strips along the waterway. The underlying material is organic layers and layers of clayey and sandy estuarine deposits. Areas are mostly in tidal marshes associated with the Intracoastal Waterway. The water table for the “Turnbull Variant sand” is typically at a depth of about 40 inches, or at the base of the overburden.

FIELD EXPLORATION PROGRAM

SPT Borings

The field exploration program included performing 2 Standard Penetration Test (SPT) borings. The SPT borings were advanced to a depth of 20 feet below the ground surface using the methodology outlined in ASTM D-1586. A summary of this field procedure is included in the Appendix. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory in sealed sample jars.

The groundwater level at each of the boring locations was measured during drilling. The borings were backfilled with soil cuttings upon completion.

Test Locations

The approximate locations of the borings are schematically illustrated on a site plan shown on Figure 2. These locations were determined in the field by Global Positioning System (GPS) utilizing hand-held GPS equipment and coordinates obtained from Google Earth V7.3. Boring locations should be considered accurate only to the degree implied by the method of locating used.

LABORATORY PROGRAM

Representative soil samples obtained during our field sampling operation were packaged and transferred to our laboratory for further visual examination and classification. The soil samples were visually classified in general accordance with the Unified Soil Classification System (ASTM D-2488). The resulting soil descriptions are shown on the soil boring profiles presented on Figure 2.

In addition, we conducted 1 natural moisture content test (ASTM D2216), 1 percent fines analysis (ASTM D1140), and 1 Atterberg limits test (ASTM D4318) on selected soil samples obtained from the borings. The results of these tests are presented adjacent to the sample depth on the boring profiles on Figure 2.

GENERAL SUBSURFACE CONDITIONS

General Soil Profile

The results of the field exploration and laboratory programs are graphically summarized on the soil boring profiles presented on Figure 2. The stratification of the boring profiles represents our interpretation of the field boring logs and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

The results of the borings indicate the following general soil profile:

Depth Below Ground Surface (feet)		Description
From	To	
0	10	Very loose to loose fine sand (SP), with varying quantities of silt and shell or very soft to soft clay (CH)
10	20	Loose to dense fine sand (SP) with varying amounts of shell fragments

The above soil profile is outlined in general terms only. Please refer to Figure 2 for soil profile details.

Groundwater Level

The groundwater level was measured in the boreholes during drilling. As shown on Figure 2, groundwater was encountered at depths of 2.8 and 3.0 feet below the existing ground surface on the date indicated. Fluctuation in groundwater levels should be anticipated throughout the year primarily due to seasonal variations in rainfall and other factors that may vary from the time the borings were conducted.

NORMAL SEASONAL HIGH GROUNDWATER LEVEL

The normal seasonal high groundwater level each year is the level in the August-September period at the end of the rainy season during a year of normal (average) rainfall. The water table elevations associated with a higher than normal rainfall and in the extreme case, flood, would be higher to much higher than the normal seasonal high groundwater level. The normal high water levels would more approximate the normal seasonal high groundwater levels.

The seasonal high groundwater level is affected by a number of factors. The drainage characteristics of the soils, the land surface elevation, relief points such as drainage ditches, lakes, rivers, swamp areas, etc., and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

Based on our interpretation of the site conditions using our boring logs, we estimate the normal seasonal high groundwater level at the boring locations to be approximately ½ foot above the groundwater levels measured at the time of our field exploration. Groundwater may perch temporarily at higher levels on top of the clayey fine sand and clay soil during periods of heavy and/or prolonged rainfall.

ENGINEERING EVALUATION AND RECOMMENDATIONS

General

The results of our exploration indicate that very soft clay (Stratum No. 4 on Figure 2) is present at the proposed generator locations to a depth on the order of 10 feet below the existing ground surface. The very soft clay is susceptible to greater than typical settlement under the weight of the proposed generator loads and will be extremely difficult to moisture condition and compact. For these reasons we recommend that the soft clay be overexcavated to its entirety; then replaced with select structural fill consisting of uniformly graded clean sand to fine sand with silt, free of organics and other deleterious materials, with less than 12% passing the No. 200 sieve.

We note that in lieu of removal of the deleterious clay, pile support, surcharging or other specialty foundation alternatives could be considered. The generator slabs could be supported on pile foundations that transfer the loads to suitable foundation soils beneath the shallow clay. Surcharging to pre-induce settlement beneath the proposed generator slabs could be performed to reduce the total settlement of the structures to an acceptable limit. We would be glad to discuss these options in more detail, if requested.

Assuming that clay removal and mat foundation support will be used for the proposed generators, the following are our recommendations for overall site preparation and foundation support which we feel are best suited for the proposed facility and existing soil conditions. The recommendations are made as a guide for the design engineer, parts of which should be incorporated into the project's specifications.

Removal of Clay

The clay as encountered in the borings to a depth of 10 feet (Stratum 4 as shown on the boring profiles) should be removed to its entirety below the existing ground surface in the proposed generator pad areas.

The excavated clay must not be used as fill material and should be disposed of as directed by the owner. Clay removal and backfilling operations should be monitored continuously by a representative of Ardaman & Associates to verify that all unsuitable material is removed and that backfill soils are suitable and well compacted.

We anticipate that the sandy and clayey soils can be excavated with standard earth moving equipment (e.g. backhoes). The soils at the bottom of the excavation should be disturbed as little

as possible by the excavation process. Excavation slopes and/or bracing are the responsibility of the contractor. However, at a minimum, all excavations should be sloped and/or braced to meet the requirements of the Occupational Health and Safety Administration (OSHA) latest Standards.

The excavation will extend below the groundwater table; therefore, the control of the groundwater will be required. Clay removal should be conducted "in-the-dry". The use of well points, sheet piles, etc. may be required to help control groundwater during excavation and backfilling. Regardless of the dewatering method used, we recommend that the groundwater table be maintained at least 24 inches below earthwork and compaction surfaces.

We note that where excavated soil is observed to consist of clean fine sand to fine sand with silt free of organics or other deleterious materials (with less than 12% passing the No. 200 sieve), the soil may be stockpiled separately to the deleterious clay and replaced into the excavation in accordance with the Compaction of Fill Soils section of this report.

Stripping and Grubbing

The "footprints" of the proposed generator slabs, plus a minimum margin of five feet, should be stripped of all surface vegetation, stumps, debris, organic topsoil or other deleterious materials, as encountered.

After stripping, the site should be grubbed or root-raked such that roots with a diameter greater than ½ inch, stumps, or small roots in a dense state, are completely removed. The actual depth(s) of stripping and grubbing must be determined by visual observation and judgment during the earthwork operation.

All existing foundations, slabs, asphalt, and any other underground structures should be removed from the proposed construction area. If pipes or any collapsible or leak prone utilities are not removed or completely filled (with grout or concrete), they might serve as conduits for subsurface erosion resulting in excessive settlements. Over-excavated areas resulting from the removal of underground structures and unsuitable materials should be backfilled in accordance with the fill soils section of this report. This excavation must not undermine the existing foundations. Provide shoring, bracing, and/or underpinning of existing foundations as necessary to protect from failure.

Suitable Fill Material and Compaction of Fill Soils

All fill materials should be free of organic materials, such as roots and vegetation. We recommend using fill with less than 12 percent by dry weight of material passing the U.S. Standard No. 200 sieve size. The fine sand and fine sand with silt (Strata No. 1 and 2 without roots, as shown on Figure 2) are suitable for use as fill materials and, with proper moisture control, should densify using conventional compaction methods. Soils removed from below the water table will need time to dry and to moisture condition prior to compacting.

All structural fill should be placed in level lifts not to exceed 12 inches in uncompacted thickness. Each lift should be compacted to at least 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value. The filling and compaction operations should continue in lifts until the desired elevation(s) is achieved. If hand-held compaction equipment is used, the lift thickness should be reduced to no more than 6 inches.

Foundation Support by Mat Foundation and Foundation Compaction Criteria

After the mass earthwork discussed in the previous report sections is complete, excavate the foundations to the proposed bottom of slab elevation and, thereafter, verify the in-place compaction for a depth of 2 feet below the slab bottoms. If necessary, compact the soils at the bottom of the excavations to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557) for a depth of 2 feet below the foundation bottoms. Based on the existing soil conditions and, assuming the above outlined compaction criteria is implemented, a soil bearing pressure of up to 1,500 pounds per square foot (psf) may be used in the foundation design. This bearing pressure should result in total settlement of less than 1 inch and differential settlement of less than $\frac{3}{4}$ inches.

We recommend embedding the bottom of the mat foundations at least 8 inches below adjacent grade.

For the design of the slabs, a modulus of subgrade reaction of 100 pounds per cubic inch (pci) may be used for the soils encountered in the borings and prepared as recommended herein. We note that this modulus of subgrade reaction is based on empirical correlation to the results expected from an 18-inch plate load test.

In addition, precautions should be taken during the slab construction to reduce moisture entry from the underlying subgrade soils. Moisture entry can be reduced by installing a membrane between the subgrade soils and equipment slab. Care should be exercised with placing the reinforcing steel (or mesh) and slab concrete such that the membrane is not punctured. We note that the membrane alone does not prevent moisture from occurring beneath or on top of the slab.

Dewatering

Based on the groundwater conditions encountered, the control of the groundwater will be required to achieve the necessary stripping and clay removal and subsequent construction, backfilling, and compaction requirements presented in the preceding sections. The actual method(s) of dewatering should be determined by the contractor. However, regardless of the method(s) used, we suggest drawing down the water table sufficiently, say 2 to 3 feet, below the bottom of any excavation or compaction surface to preclude “pumping” and/or compaction-related problems with the foundation soils.

QUALITY ASSURANCE

We recommend establishing a comprehensive quality assurance program to verify that all site preparation and foundation construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Ardaman & Associates.

As a minimum, an on-site engineering technician should monitor all stripping and grubbing and overexcavation of clay to verify that deleterious materials have been completely removed. In-situ density tests should be conducted during filling activities and below the foundation to verify that the required densities have been achieved. In-situ density values should be compared to laboratory Proctor moisture-density results for each of the different natural and fill soils encountered.

Also, we recommend inspecting and testing the construction materials for the foundation and other structural components.

CLOSURE

The analyses and recommendations submitted herein are based on the data obtained from the soil borings presented on Figure 2 and the assumed loading conditions. This report does not reflect any variations which may occur adjacent to or between the borings. The nature and extent of the variations between the borings may not become evident until during construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented in this report after performing on-site observations during the construction period and noting the characteristics of the variations.

In the event any changes occur in the design, nature, or location of the proposed facility, we should review the applicability of conclusions and recommendations in this report. We recommend a general review of final design and specifications by our office to verify that earthwork and foundation recommendations are properly interpreted and implemented in the design specifications. Ardaman and Associates should attend the pre-bid and preconstruction meetings to verify that the bidders/contractor understand the recommendations contained in this report.

This study is based on a relatively shallow exploration and is not intended to be an evaluation for sinkhole potential. This study does not include an evaluation of the environmental (ecological or hazardous/toxic material related) condition of the site and subsurface.

This report has been prepared for the exclusive use of Tetra Tech, Inc. in accordance with generally accepted geotechnical engineering practices for the purpose of the proposed generator pads located at the Bethune Point Wastewater Treatment Plant in Daytona Beach, Florida. No other warranty, expressed or implied, is made.

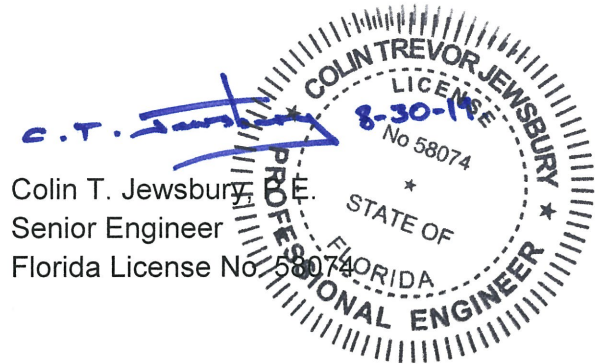
We are pleased to be of assistance to you on this phase of the project. When we may be of further service to you or should you have any questions, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.
Certificate of Authorization No. 5950

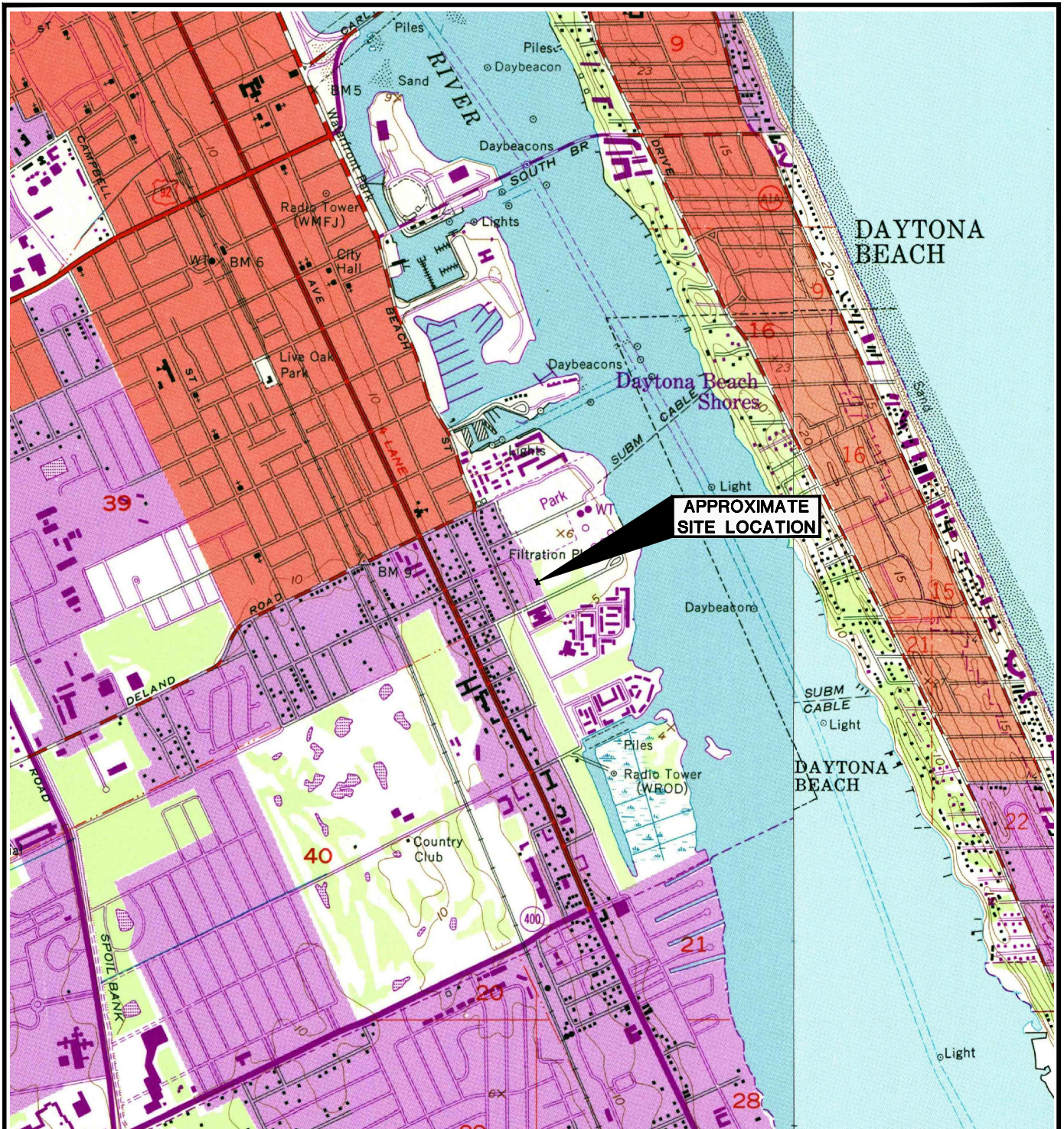


Eric C. Balog, E.I.
Assistant Project Engineer

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19-6412 TT Bethune Point WWTP Daytona (Geo 2019)

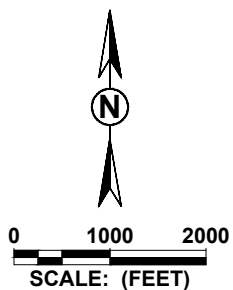


Colin T. Jewsbury,
Senior Engineer
Florida License No. 58074



SECTION 40
TOWNSHIP 15 SOUTH
RANGE 32 EAST

OBTAINED FROM U.S.G.S. QUAD MAP: DAYTONA BEACH, FLORIDA 1952
(PHOTOREVISED 1993)



SITE LOCATION MAP

Ardaman & Associates, Inc.
Geotechnical, Environmental and
Materials Consultants

**SUBSURFACE SOIL EXPLORATION
PROPOSED GENERATORS
BETHUNE POINT
WASTEWATER TREATMENT PLANT
DAYTONA BEACH, VOLUSIA COUNTY, FLORIDA**

DRAWN BY: CD	CHECKED BY:	DATE: 08/21/19
FILE NO. 19-6412	APPROVED BY:	FIGURE: 1

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LEGEND

SOIL DESCRIPTIONS

- ① FINE SAND (SP)
- ② FINE SAND WITH SILT (SP-SM)
- ③ CLAYEY FINE SAND (SC)
- ④ CLAY (CH)
- ⑤ ORGANIC TOPSOIL

COLORS

- Ⓐ LIGHT BROWN TO BROWN
- Ⓑ LIGHT GRAY TO GRAY
- Ⓒ DARK GRAY

- ⊕ TH STANDARD PENETRATION TEST (SPT) BORING LOCATION
- N STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
- NM NATURAL MOISTURE CONTENT IN PERCENT (ASTM D-2216)
- 200 PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D-1140)
- LL LIQUID LIMIT (ASTM D-4318)
- PL PLASTIC LIMIT (ASTM D-4318)
- PI PLASTICITY INDEX (ASTM D-4318)
- ← PARTIAL LOSS OF DRILLING FLUID CIRCULATION
- ▼ GROUNDWATER LEVEL MEASURED ON DATE DRILLED
- WOH SAMPLER ADVANCED BY STATIC WEIGHT OF HAMMER AND RODS ONLY

SP,SP-SM UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)
SM,SC,CH

- NOTES: 1. UPON COMPLETION OF EACH SPT BORING, THE BOREHOLE WAS BACKFILLED WITH SOIL CUTTINGS.
2. ALL SPT BORINGS WERE PERFORMED USING AN AUTOMATIC HAMMER TO THE BORING TERMINATION DEPTH. AUTOMATIC HAMMER N-VALUES MAY BE CONVERTED TO EQUIVALENT SAFETY HAMMER N-VALUES BY MULTIPLYING BY 1.24.
3. THE AERIAL PHOTOGRAPH FOR THE BORING LOCATION PLAN IS A SITE PLAN PROVIDED BY TETRA TECH, INC. ON AUGUST 5, 2019.

ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	<4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	>50

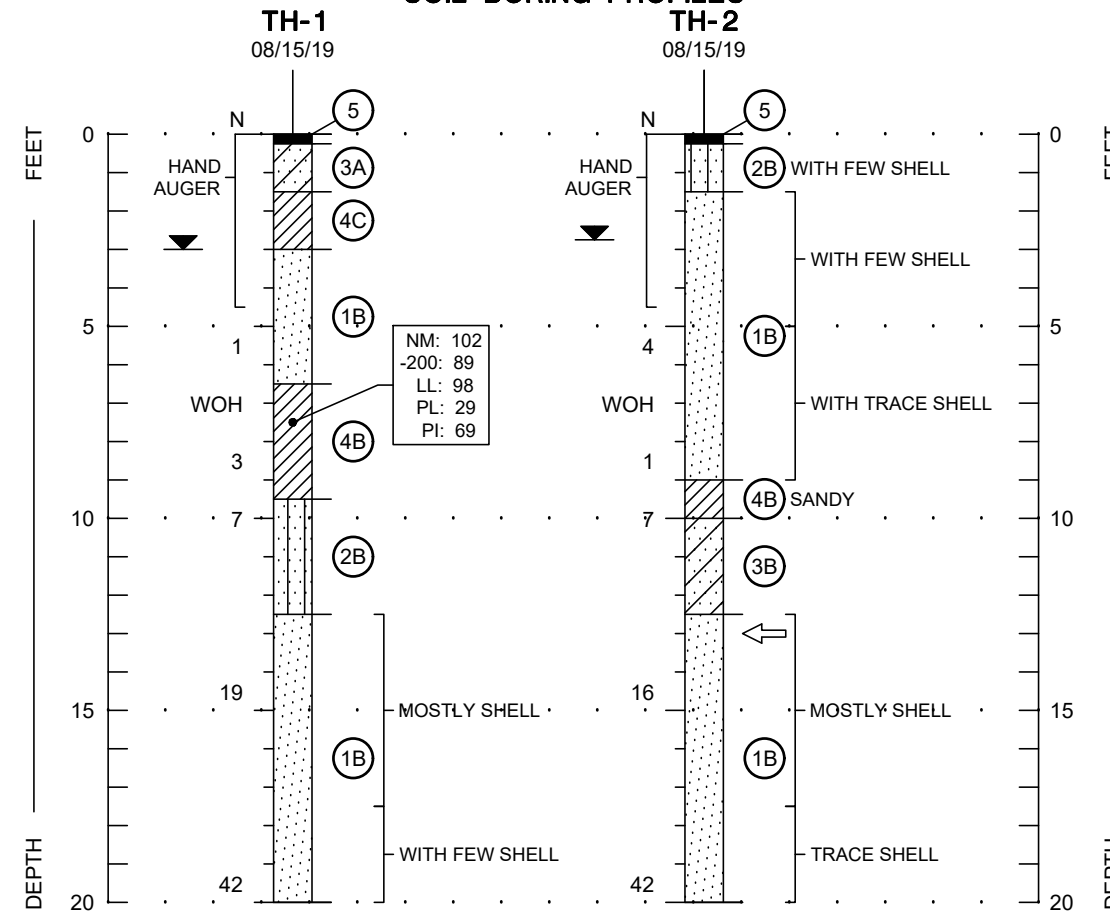
II COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	BLOW COUNT "N"
VERY SOFT	<1/4	<2
SOFT	1/4 TO 1/2	2 TO 4
MEDIUM STIFF	1/2 TO 1	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	>4	>30

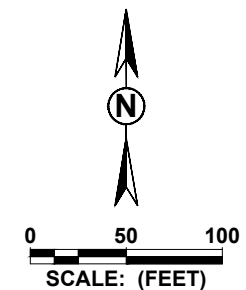
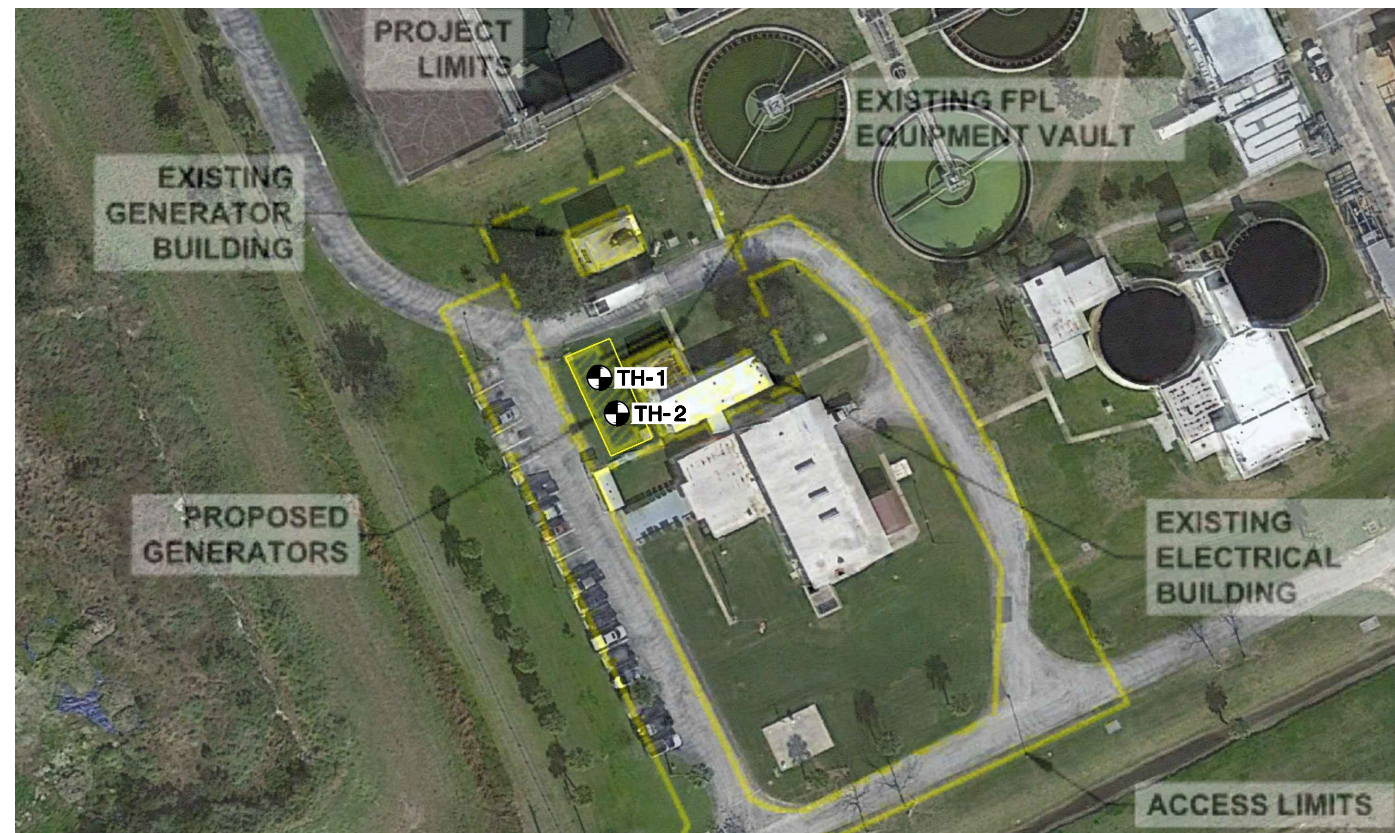
WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.

SOIL BORING PROFILES



BORING LOCATION PLAN



Ardaman & Associates, Inc. Geotechnical, Environmental and Materials Consultants		
SUBSURFACE SOIL EXPLORATION PROPOSED GENERATORS BETHUNE POINT WASTEWATER TREATMENT PLANT DAYTONA BEACH, VOLUSIA COUNTY, FLORIDA		
DRAWN BY: CD	CHECKED BY:	DATE: 08/21/19
FILE NO. 19-6412	APPROVED BY:	FIGURE: 2

APPENDIX

Standard Penetration Test Procedure

STANDARD PENETRATION TEST

The standard penetration test is a widely accepted test method of *in situ* testing of foundation soils (ASTM D 1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load.

The tests are usually performed at 5-foot intervals. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from the soils are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for 30 days prior to being discarded.