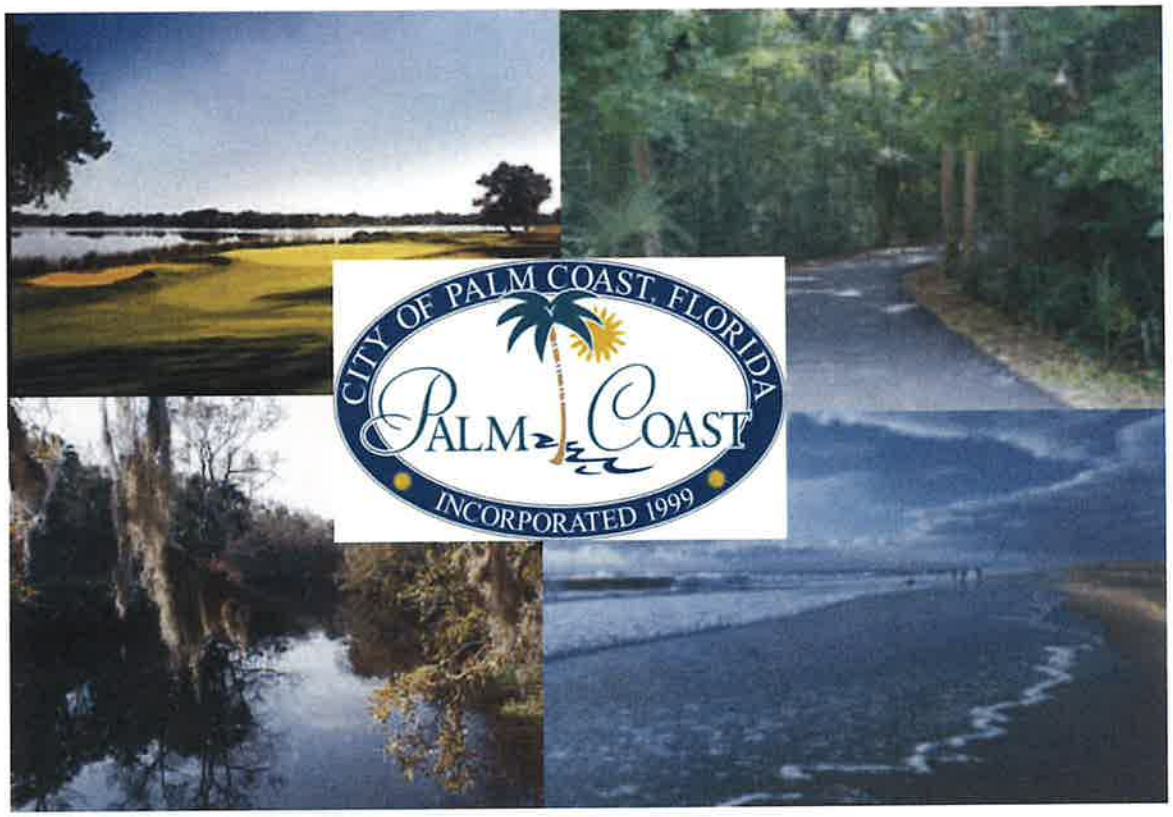
STANDARD CONSTRUCTION DETAILS



City of Palm Coast
160 Lake Avenue
Palm Coast, FL 32164

JULY 2022

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Standards & Specifications for Water and Wastewater Construction

Issue Date: July 13, 2022

INTRODUCTION

JURISDICTION

This MANUAL shall apply to all proposed water and wastewater mains to be owned, operated or maintained by the City of Palm Coast.

PURPOSE

These standards and specifications are adopted to establish minimum acceptable standards for the design and construction of water distribution/transmission facilities and wastewater collection/transmission facilities that are to be dedicated to the City of Palm Coast or facilities that interconnect to utilities owned by the City of Palm Coast. Such facilities include water mains, gravity sewer mains, wastewater force mains, wastewater pump stations, reuse mains and miscellaneous related appurtenances associated with such systems.

SCOPE

This document is grouped into five divisions:

Division 1, General Requirements, presents general requirements governing review and approval of plans and construction inspection and acceptance.

Division 2 of this document, Design Standards/Forms, includes Part 1 and 2. Part 1 contains all the criteria required for the acceptable design of water mains, gravity sewer mains, wastewater force mains and wastewater lift stations. Part 1 also contains the Pretreatment Standards for Discharge of Water and Wastes into systems owned and operated by the City of Palm Coast. Part 2 contains all the forms necessary for developers to complete and submit to the City of Palm Coast in order to complete the project and make it acceptable.

Division 3, Construction Specifications, contains detailed technical specifications governing the construction of water and wastewater facilities.

Division 4, Standard Construction Details, consists of drawings showing typical installation/ construction of water and wastewater facilities.

Division 5, List of Materials and Approved Manufacturers.

DIVISION 1

GENERAL REQUIREMENTS

Section 1

DEFINITIONS

1.1 DEFINITIONS

Except where specific definitions are used within a specific section, the following terms, phrases, words and their derivations shall have the meaning given herein when consistent with the context. Words used in the present tense include the future tense, words in the plural number include the singular number and words in the singular number include the plural number. The word "shall" is mandatory, and the word "may" is permissive.

AASHTO - American Association of State Highway and Transportation Officials. Any reference to AASHTO standards shall be taken to mean the most recently published revision unless otherwise specified.

ANSI - American National Standards Institute. Any reference to ANSI standards shall be taken to mean the most recently published revision unless otherwise specified.

ASTM - American Society for Testing Materials. Any reference to ASTM standards shall be taken to mean the most recently published revision unless otherwise specified.

AWWA - American Water Works Association. Any reference to AWWA Standards shall be taken to mean the most recently published revision unless otherwise specified.

CONTRACTOR - the person, firm, or corporation with whom the contract for work has been made by the Owner, the Developer, or THE CITY OF PALM COAST.

COUNTY - the applicable county and/or its designated representative(s).

DEVELOPER - the person, firm or corporation engaged in developing or improving real estate for use or occupancy.

DEVELOPER'S ENGINEER - an engineer or engineering firm registered with the State of Florida Department of Professional Regulation, retained by the DEVELOPER to provide professional engineering services for a project.

DIPRA - Ductile Iron Pipe Research Association.

DRAWINGS - engineering drawings prepared by an ENGINEER to show the proposed construction.

ENGINEER - an engineer or engineering firm registered with the State of Florida Department of Professional Regulation.

FDEP - the Florida Department of Environmental Protection.

FDOT - the Florida Department of Transportation.

FM - Factory Mutual.

GEOTECHNICAL/SOILS ENGINEER - a Registered Florida Engineer who provides services related to terrain evaluation and site selection, subsurface exploration and sampling, determination of soil and rock properties, foundation engineering, settlement and seepage analysis, design of earth and earth retaining structures, the design of subsurface drainage systems and the improvement of soil properties and foundation conditions, and testing and evaluation of construction materials.

MANUAL - this Standards and Specifications for Water and Wastewater Construction.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES - the United States Department of Transportation Manual on Traffic Control Devices, latest edition.

NEMA - National Electrical Manufacturers Association. Any reference to NEMA Standards shall be taken to mean the most recently published revision unless otherwise specified.

NSF - National Sanitation Test Laboratory Foundation. Any reference to NSF Standards shall be taken to mean the most recently published revision unless otherwise specified.

OSHA - the Federal Occupational Safety and Health Administration.

OWNER - the person, firm, corporation, or governmental unit holding right of possession of the real estate upon which construction is to take place.

PLANS - DRAWINGS as defined herein above.

SPECIFICATIONS - the specifications contained in Division 3 of this MANUAL.

STANDARDS - the minimum design standards contained in Division 2 of this MANUAL.

STANDARD DETAILS - the detailed drawings in Division 4 of this MANUAL related to water and wastewater materials and installation of same.

STANDARD SPECIFICATIONS - the Department of Transportation, State of Florida, Standard Specification for Road and Bridge Construction, latest edition.

TRAFFIC CONTROL AND SAFE PRACTICES MANUAL - the State of Florida Department of Transportation Manual on Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operation, latest edition.

UL - Underwriter Laboratory.

UTILITY ACCOMMODATION GUIDE - the State of Florida Department of Transportation Utility Accommodation Guide, latest edition.

WATER MAINS - water transmission mains, distribution mains, pipe, fittings, valves, hydrants, services, meters and miscellaneous related appurtenances.

WASTEWATER GRAVITY MAINS - wastewater gravity sewers, manholes, cleanouts, fittings, service laterals, and miscellaneous related appurtenances.

WASTEWATER FORCE MAINS - wastewater pressure mains, fittings, air release valves, valves and miscellaneous related appurtenances.

WASTEWATER PUMP STATIONS - pump or lift stations designed to pump wastewater from a lower elevation to a higher elevation or from one pump station to another pump station or to the treatment facility.

WORK - the labor, materials, equipment, supplies, services and other items necessary for the execution, completion and fulfillment of the contract.

Section 2

PLAN REVIEW, APPROVAL, CONSTRUCTION AND ACCEPTANCE OF WATER, REUSE AND WASTEWATER IMPROVEMENTS

2.1 PLANS AND SPECIFICATIONS

2.1.1 GENERAL

All submitted plans should be a standard size sheet (30" x 42", 24" x 36" or 11" x 17") with title block. Graphic scale(s) shall be provided on each sheet and all lettering shall be 1/8" or larger to permit photographic reproduction. Submittal of SPECIFICATIONS will only be required when special facilities outside the scope of this MANUAL are proposed. All PLAN sheets and the title page of submitted SPECIFICATIONS must be signed, sealed and dated by the DEVELOPER'S ENGINEER.

2.1.2 MASTER PLAN

The entire water, reuse and wastewater system shall be shown on a single Master Plan. The Master Plan shall indicate the general locations of all mains, manholes, valves, hydrants, services and service laterals with respect to the proposed development improvements and the existing water, reuse and wastewater systems. Main sizes shall be indicated on the Master Plan.

2.1.3 PLAN AND PROFILE

All gravity sewers and wastewater force mains shall be drawn in plan and profile. Water and reuse mains may be shown in plan view with profiles provided at all potential conflict points.

Whenever possible, on-site water, reuse and wastewater systems shall be shown on the same PLAN sheet. As a minimum, the plan and profile drawings shall include the following information:

1. General information such as north arrow, names of designer and engineer, revision block with dates, graphic scale(s) and sheet number.

2. Profile with elevations at 100-foot interval, or more frequently if required by good design practice.

3. Development layout with horizontal and vertical controls.

4. All conflicts with other utility and drainage systems.

5. All manhole locations, rim elevations and invert elevations (in and out); include manholes located outside of paved areas.

6. Pipe data including size, lengths, material, and slopes.

7. Size, type, and locations of fittings, valves, hydrants, air release valves and other related appurtenances.

8. Limits of pipe deflection.

9. Limits of special exterior coatings.

10. Limits of special bedding requirements.

11. Pipe restraint requirements.

12. Details of connection to existing systems.

13. Location(s) and general layout of wastewater pumping stations.

14. Construction notes regarding cover, horizontal and vertical control, special construction requirements, and references to standard and special details.

2.1.4 DETAILS

The PLANS shall include all applicable STANDARD CONSTRUCTION DETAILS as shown in Division 4 of this MANUAL. Special details shall be prepared by the DEVELOPER'S ENGINEER for aerial and underwater crossings of rivers, streams, canals and ditches. Other special details shall be prepared by the DEVELOPER'S ENGINEER as required.

2.1.5 SCALE

The master plan shall be prepared at a scale not to exceed 1" to 200'. Plan and profile sheets shall not exceed a scale of 1" to 50' horizontal and 1" to 5' vertical. Special details shall be of sufficiently large scale to show pertinent construction information.

2.2 SUBDIVISION RELATED WATER, REUSE AND WASTEWATER IMPROVEMENTS

2.2.1 GENERAL

This section covers all water, reuse and wastewater improvements that are dedicated to THE CITY OF PALM COAST.

2.2.2 DESIGN AND PLAN REVIEW

Design of water, reuse and wastewater improvements associated with THE CITY OF PALM COAST approved projects shall be in compliance with the DESIGN STANDARDS in Division 2, and the SPECIFICATIONS outlined in Division 3 of this MANUAL. PLANS will be reviewed and approved by THE CITY OF PALM COAST as part of the project review and approval process.

2.2.3 CONSTRUCTION INSPECTION

THE CITY OF PALM COAST shall periodically inspect all construction subject to these STANDARDS, APPROVED MATERIALS LIST and SPECIFICATIONS.

After all required improvements have been installed, the DEVELOPER'S ENGINEER shall submit certification to THE CITY OF PALM COAST that the improvements have been constructed substantially in accordance with approved PLANS and SPECIFICATIONS. Non-compliance with approved PLANS, APPROVED MATERIALS LIST or SPECIFICATIONS or evidence of faulty materials or workmanship shall be called to the attention of the DEVELOPER or DEVELOPER'S ENGINEER and if not corrected in an expeditious manner, all work on the project will be suspended and service withheld.

2.3 COMPLIANCE WITH OTHER REGULATORY REQUIREMENTS

It shall be the responsibility of the DEVELOPER to obtain and comply with all applicable Federal, State and Local regulatory requirements.

2.4 GUIDELINES FOR THE ACCEPTANCE OF NEW WATER MAINS FROM CONTRACTORS

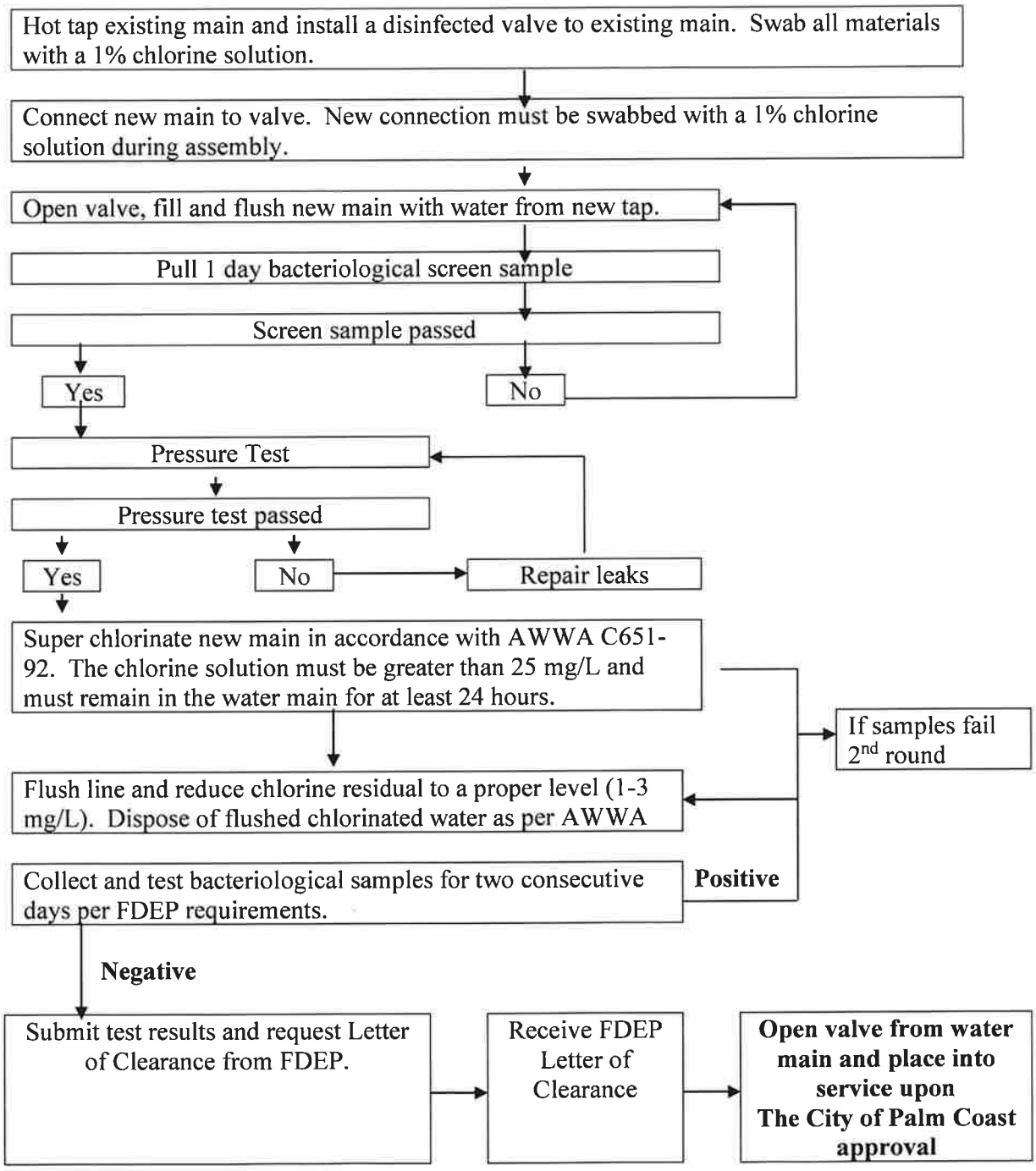
2.4.1 GENERAL

THE CITY OF PALM COAST as a purveyor of clean and high quality water is responsible to prevent or minimize the exposure of its customers to any possible risk of chemical or microbiological contaminants that may result in illness to the community.

This document, which is in a flow chart format, is based on AWWA standard policies, practices and procedures for accepting new water mains and is addressed to both internal operation personnel and outside contractors. The purpose of these guidelines is to provide a step by step procedure delineating the construction and final clearance of water main extensions.

Incorporated Reference: ANSI/AWWA C651-92

GUIDELINES FOR THE ACCEPTANCE OF NEW WATER MAINS FROM CONTRACTORS



2.4.2 PROCEDURE FOR ALL NEW WATER SYSTEMS CONNECTING TO A CITY OF PALM COAST ACTIVE WATER LINE THAT IS NOT FDEP PERMITTED

The CONTRACTOR shall collect water samples and test for possible bacterial contamination for a minimum of two (2) consecutive days. If the tests are satisfactory, the project may proceed; if the tests fail, the procedure must be started over again and continue until two (2) consecutive passing samples are obtained.

2.5 PROJECT COMPLETION AND ACCEPTANCE

2.5.1 PROJECT DOCUMENTATION

All applicable documents on the Developer Project Checklist - Completion Review shall be provided prior to project acceptance by THE CITY OF PALM COAST and service being provided.

DEVELOPER SUBMITTAL PACKAGE:

1	Electronic Record Drawings in AUTOCAD Release 14 minimum, 2000 or 2000i and 3 hard copy sets of Record Drawings.
2	Final Plat on disk (AutoCAD Release 14 min.)
3	Water: Bacteriological, pressure and leakage test results as well as any other tests deemed necessary by THE CITY OF PALM COAST.
4	Gravity Sewer: Leakage tests, TV report and results of mandrel test.
5	Force and Reuse Mains: Pressure and leakage test results.
6	Easement(s) dedicated to THE CITY OF PALM COAST (notarized and recorded with the county).
7	Contractor's Letter of Warranty for a period of one year after acceptance by THE CITY OF PALM COAST (signed and sealed by PE. or notarized).
8	Contractor's Waiver & Release of Lien (recorded with the county).
9	Developer's Engineer Letter of Certification (signed, sealed and dated).
10	Bill of Sale for water, reuse and wastewater contributed property with accurate cost records establishing the construction cost of the completed additions (a copy of related construction contracts duly certified by a notary of the State of Florida as true and correct copies of the originals required).
11	As-Built Inspection Reports: Contractor is responsible for scheduling field inspection/site visits by THE CITY OF PALM COAST.
12	Backflow Prevention Inspection Report and Testing: Contractor is responsible for scheduling field inspection by THE CITY OF PALM COAST.
13	Start-up report and O&M manual on pump/lift station: Contractor is responsible for scheduling field inspection by THE CITY OF PALM COAST.

FDEP CLEARANCE/CERTIFICATION:

14	FDEP request for certification/clearance. To be signed by THE CITY OF PALM COAST and returned when Items 1 through 12 are completed and approved.
15	FDEP approval of: Release to Place into Service-Water; Certificate of Completion; Sewer.

2.5.2 AS-BUILT OR RECORD DRAWINGS

The DEVELOPER'S ENGINEER shall submit a certified set of Record Drawings to THE CITY OF PALM COAST for acceptance of the project. The DEVELOPER'S ENGINEER shall be responsible for recording information on the approved PLANS concurrently with construction progress. Record Drawings submitted to THE CITY OF PALM COAST, as part of the project acceptance, shall comply with the following requirements:

1. As-built/Record Drawings shall be prepared using copies of the City approved set of the site development plans with the corrected information in bold print and original information marked thru and shaded down.

2. A preliminary As-built/Record Drawing set not sealed and officially representative of the final As-built set shall be used for the CITY OF PALM COAST Utility Department Substantial Inspection and Walk-thru. The construction inspector will review and comment for additions or corrections and submit the marked-up drawings to the DEVELOPER'S ENGINEER to incorporate into the final sealed set.

3. A sealed and certified As-Built/Record Drawing shall be used for the CITY OF PALM COAST Utility Department Final Inspection.

4. As-Built/Record Drawings shall be legibly marked to record actual construction.

5. As-Built/Record Drawings shall show actual location and elevations, both horizontal and vertical, of all underground and aboveground water, reuse and wastewater piping and related appurtenances. Elevations shall be identified along the centerline of pipelines by no less than one elevational shot per one hundred (100) linear feet and at any change of vertical or horizontal direction of underground length. Slopes shall be identified. All changes to piping location including horizontal and vertical locations of utilities and appurtenances shall be clearly shown and referenced to permanent surface improvements.

6. As-Built/Record Drawings shall also show actual installed pipe material, class, etc.

7. As-Built/Record Drawings shall clearly show all field changes of dimension and detail, including changes made by field order or by change order.

8. All existing structures, utilities, and features revealed during the course of construction shall be accurately located and dimensioned. Movement of such utilities or structures required by project installation shall be recorded

as as-built. This requirement shall apply whether the existing structure, utility or feature was shown on the original contract drawings or not.

9. As-Built/Record Drawings shall clearly show all details not on original contract drawings but constructed in the field. All equipment and piping relocation shall be clearly shown.

10. Location of all manholes, hydrants, valves, and valve boxes shall be shown. All valves shall be referenced from at least two permanent points. All valves will include elevations from top of operating nut.

11. Dimensions between all manholes shall be field verified and shown. The inverts and grade elevations of all manholes shall be shown.

12. For directionally drilled crossings and other "trenchless technology" installations, provide continuous plots of utility plan and profile derived from actual telemetry data used during the installation.

13. As-built vertical and horizontal measurements shall be of the same datum reference as the permitted plans, and shall be stated in the as-built measurement certification.

Each sheet of the PLANS shall be signed, sealed and dated by the DEVELOPER'S SURVEYOR as being "Record Drawings." Construction PLANS simply stamped "As-Builts" or "Record Drawings" and lacking in the above requirements will not be accepted, and will be returned to the DEVELOPER. The application to FDEP requesting certification/clearance will not be released until correct "As-Builts" have been submitted.

DIVISION 2

DESIGN STANDARDS/FORMS

Part 1

Design Standards

Section 1

THE CITY OF PALM COAST
WATER

TABLE OF DAILY FLOWS FOR VARIOUS OCCUPANCIES

Types of Establishments	
Apartments	300 gpd (1)
Banquet hall (per seat)	25 gpd
Bars and cocktail lounges	5 gpcd (2)
Bathroom (non-residential)	300 gpd
Beauty shop (per seat)	170 gpd
Boarding schools (students and staff)	75 gpd
Boarding houses	75 gpcd
Bowling alleys (toilet wastes only, per lane)	100 gpd
Country clubs, per member	25 gpcd
Day schools (with cafeteria, no gymnasium or showers)	15 gpcd
Day schools (with cafeteria, gymnasiums and showers)	25 gpcd
Day workers at office and schools	20 gpcd
Dentist, per wet chair	250 gpd
Drive-in theaters (per car space)	5 gpd
Factories (with showers)	30 gpcd
Factories (no showers)	10 gpd/100 sq. ft. (3)
Funeral home	10 gpd/100 sq. ft.
Gas stations (no car wash)	450 gpd
Hospitals (with laundry) (per bed)	250 gpd
Hospitals (no laundry) (per bed)	200 gpd
Hotels and motels (per room & unit)	125 gpd
Laundromat (per washing machine)	225 gpcd
Mobile home park (per trailer)	225 gpd
Movie theaters, auditoriums, churches (per seat)	3 gpd
Nursing homes	150 gpd/100 sq. ft.
Office buildings	17 gpd/100 sq. ft.
Public institutions (other than those listed herein)	75 gpcd
Restaurants (per seat)	50 gpd
Restaurants (take-out)	50 gpd/100 sq. ft. (350 gpd minimum)
Restaurants (Fast Food) (per seat)	35 gpd
Single-family residence	300 gpd
Townhouse residence	300 gpd
Shopping centers	17 gpd/100 sq. ft.

Stadiums, frontons, ball parks, etc. (per seat) ..... 3 gpd
Stores, without kitchen wastes ..... 5 gpd/100 sq. ft.
Speculative buildings ..... 30 gpd plus 10 gpd/100 sq. ft.
Warehouses ..... 30 gpd plus 10 gpd/1,000 sq. ft.

(1) gpd - Gallons per day
(2) gpcd - Gallons per capita per day
(3) sq. ft. – Square feet

Section 2

WATER MAINS AND APPURTENANCES

2.1 GENERAL CONSIDERATIONS

2.1.1 TYPE OF WATER MAINS

THE CITY OF PALM COAST will approve PLANS for water supply mains and extensions only when such mains are designed and constructed in accordance with the criteria set forth in this MANUAL.

2.1.2 DESIGN PERIOD

Water mains shall be designed for the estimated ultimate tributary population. Water systems shall be designed to satisfy the domestic water demand and fire protection requirements for the area.

2.1.3 LOCATION

Water mains shall be located in dedicated rights-of-way or utility easements. When installed in rights-of-way, water mains shall, in general, maintain a consistent alignment with respect to the centerline of the road. All water mains located outside of dedicated rights-of-way shall require a minimum 20-foot easement. Additional easement widths shall be provided when the pipe size or depth of cover so dictate. If a water main is located adjacent to a road right-of-way, a minimum 10-foot easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictates. Water mains shall not be placed under retention ponds, tennis courts, or other structures. Under normal conditions, water mains shall not be located along side or rear lot lines.

2.2 DESIGN BASIS

2.2.1 AVERAGE DAILY FLOW AND PEAK FLOWS

Average daily water flow shall be calculated by referencing the Water-Table of Daily Flows for Various Occupancies (Section 1). Maximum daily water flow shall be calculated as two times the average daily water flow and the peak hourly water flow shall be calculated as four times the average daily water flow.

2.2.2 FIRE FLOW REQUIREMENTS

Fire flow requirements shall be determined in accordance with the applicable local fire department codes and/or ISO standards. Where fire flow requirements exceed the anticipated available fire flow from the central water system, on-site

fire protection system or other fire department approved mitigation measures shall be utilized.

2.2.3 DESIGN CALCULATIONS

DEVELOPER'S ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all water distribution projects. Calculation shall show the water mains will have sufficient hydraulic capacity to transport peak hourly flows and the combination of maximum daily flows and fire flows while meeting the requirements of Section 2.3.1. Head losses through meters and backflow devices shall also be included in calculations.

2.3 DETAILS OF DESIGN AND CONSTRUCTION

2.3.1 PRESSURE

All water mains shall be designed in accordance with Section 2.2.3 above. The system shall be designed to maintain a minimum pressure of 20 psi at all points in the distribution system under all conditions of flow. Higher pressures may be required at commercial, industrial and high-density residential areas. The normal working pressure in the distribution system shall be approximately 55 psi. For pressures greater than 90 psi special provisions may be required. Design Friction Losses for water mains shall be as specified in Section 5.3.2.

2.3.2 DIAMETER

A minimum four (4) inch water main is required. As a minimum, six (6) inch looped systems shall be required in low-density residential projects. Where looping of mains is not practical, minimum eight (8) inch mains shall be required, unless detailed calculations are submitted to substantiate the sufficiency of a 6-inch main. In commercial, industrial, and high-density residential areas, minimum eight (8) inch looped mains shall be required. Larger size mains shall be required, if necessary, to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in Section 2.3.1.

2.3.3 FIRE HYDRANT LOCATION AND SPACING

As a minimum, fire protection shall be provided in accordance with local subdivision regulations, fire department codes and ISO standards. Your attention is directed to the Building Official for Palm Coast for infrastructure on hydrant spacing in various zoning districts.

2.3.4 DEAD ENDS

In order to provide increased reliability of service and reduce head loss, dead ends shall be minimized by making appropriate tie-ins whenever practical, as determined by THE CITY OF PALM COAST.

Where dead end mains occur, they shall be provided with a fire hydrant or with an approved flushing hydrant or blow-off for flushing purposes. Flushing devices shall be sized to provide flows with a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be directly connected to any sewer.

2.3.5 VALVES

Valves shall be provided on water mains so that sanitary hazards will be minimized during repairs. Valves shall be located at not more than 500-foot intervals in commercial, industrial and high-density residential areas and at not more than 800-foot intervals in all other areas. Appropriate valving shall also be provided at all areas where water mains intersect to ensure effective isolation of water lines for repair, maintenance or future extension.

2.3.6 SEPARATION OF WATER MAINS AND SEWERS

Refer to Division 3, Section 21, of these SPECIFICATIONS for applicable requirements. No water pipe shall pass through or come in contact with any part of a sewer system.

Extreme caution should be exercised when locating water mains at or near certain sites such as sewage treatment plants or industrial complexes. Individual septic tanks must be located and avoided.

2.3.7 SURFACE WATER CROSSINGS

THE CITY OF PALM COAST shall review and approve the PLANS on a case-by-case basis. Requirements outlined in Section 5 shall apply. All aboveground pipes shall be painted as specified in Division 3 for water mains.

2.3.8 AIR RELEASE VALVES

At high points in water mains where air can accumulate, provisions shall be made to remove the air by means of automatic air release valves. See details in STANDARD DETAILS.

2.3.9 CHAMBER DRAINAGE

Chambers, pits or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system shall not be connected directly to any storm drain or sanitary sewer, nor shall blow-offs or air relief valves be connected directly to any sewer.

2.3.10 DISINFECTION FOLLOWING REPAIR OR REPLACEMENT

Any part of THE CITY OF PALM COAST water system which has direct contact with finished water and has been out of service for repair, alteration, or replacement shall be disinfected as outlined in Division 3, Section 21, of these SPECIFICATIONS.

2.4 WATER SERVICES AND CONNECTIONS

2.4.1 Water services and connections shall conform to the applicable provisions of Division 3 and the STANDARD DETAILS. One (1) inch water services and connections to existing THE CITY OF PALM COAST systems will be made by THE CITY OF PALM COAST. Services and connections to new water systems and to existing systems larger than one (1) inch shall be made by the CONTRACTOR.

A CITY OF PALM COAST representative must be on site during any connections to existing CITY OF PALM COAST systems.

2.4.2 Florida Statutes 403.859(6) prohibits the providing of water service to new systems/line extensions other than for flushing and testing until the FDEP has issued a "Letter of Clearance." To comply with these regulations, the new connection shall not be placed into service until the "Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components into Operation" [FDEP Form 62-555.900(9)] has been approved and a "Letter of Clearance" from the FDEP has been obtained.

2.5 WATER METERING

2.5.1 GENERAL

All water service connections shall be metered. In general, the method of metering shall follow the guidelines listed below. However, the DEVELOPER'S ENGINEER must obtain approval before finalizing the design of the metering system.

2.5.2 SINGLE FAMILY, DUPLEX, AND MULTI-FAMILY SUBDIVISIONS WITHIN PUBLIC RIGHTS-OF-WAY

Each unit shall be individually metered. Single services shall be installed as indicated by the STANDARD DETAILS.

2.5.3 SINGLE FAMILY AND DUPLEX SUBDIVISIONS WITH PRIVATE STREETS

Individual meters may be permitted in accordance with Section 2.5.2 if the private streets are designed to the applicable CITY OF PALM COAST standards and easements are dedicated over the entire private street common areas. In addition, sufficient area must be available outside of paved areas to locate water mains, services, and meters.

2.5.4 COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL PROJECTS WITHOUT PRIVATE FIRE LINES

In general, each unit of each building shall be individually metered. Point of connection shall be located on site adjacent to the public right-of-way within an easement dedicated to THE CITY OF PALM COAST.

2.5.5 COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, MULTI-FAMILY WITH PRIVATE STREETS, APARTMENTS, AND CONDOMINIUM PROJECTS WITH PRIVATE FIRE LINES

In general, all such projects shall require installation of a double detector check assembly on each dedicated fire line. Where on-site fire systems contain less than 75 feet of main, a dual system (separate domestic and fire lines) may be considered. Dual systems shall require backflow prevention in accordance with THE CITY OF PALM COAST'S Backflow Prevention Policy, latest edition. Individual meters to each unit are required and will include a locking ball valve upstream of the meter, and a ball valve and dual check backflow preventer downstream of the meter.

2.5.6 SHOPPING CENTERS

In general, shopping centers shall require installation of a double detector check assembly on each dedicated fire line. Individual meters to each unit are required.

2.5.7 METER INSTALLATION

All meters will be installed by the CONTRACTOR after payment of applicable fees and charges. All meters shall be installed per the STANDARD DETAILS. In general, meters shall be located in a meter easement located adjacent to the public right-of-way.

2.5.8 METER SIZING

Size of all meters shall be approved by THE CITY OF PALM COAST. The DEVELOPER'S ENGINEER shall provide sufficient information on estimated peak flows and low flows. The DEVELOPER's ENGINEER shall include headlosses through metering devices when designing the water system.

2.6 MATERIAL, INSTALLATION AND TESTING

Applicable provisions of Division 3 and Division 4 shall apply.

2.7 LOCATION AND IDENTIFICATION

A means for locating and identifying all water mains and valves shall be provided in accordance with Division 3 and the STANDARD DETAILS.

2.8 CROSS CONNECTION CONTROL

2.8.1 GENERAL

In order to protect the public water supply system from contamination due to potential cross-connections, the DEVELOPER shall provide backflow prevention in accordance with THE CITY OF PALM COAST'S Backflow Prevention Policy, latest edition.

2.8.2 LOCATION AND INSTALLATION

In general, all backflow prevention assemblies shall be located directly following the water meter on DEVELOPER/OWNER's property adjacent to property line. Backflow prevention assemblies shall be installed aboveground to facilitate maintenance and testing. It shall be the DEVELOPER/OWNER's responsibility to pay for and install all backflow prevention assemblies.

2.8.3 INSPECTION AND TESTING

Potable backflow prevention assemblies shall be tested by a certified cross-connection control technician who will provide results of the test to THE CITY OF PALM COAST.

Dedicated fire line assemblies shall be tested by a State certified fire line contractor. Results of the test shall be forwarded to THE CITY OF PALM COAST'S Utility Department.

All backflow prevention assemblies shall be inspected and approved by THE CITY OF PALM COAST prior to project acceptance and service being provided.

Section 3

THE CITY OF PALM COAST
WASTEWATER

TABLE OF DAILY FLOWS
FOR VARIOUS OCCUPANCIES

Types of Establishments	
Apartments	196.8 gpd (1)
Banquet hall (per seat)	15 gpd
Bars and cocktail lounges	5 gpcd (2)
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 and 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. (3)
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 minimum)
Restaurants (Fast Food) (per seat)	25 gpd
Single-family residence	196.8 gpd
Townhouse residence	196.8 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.

(1) gpd - Gallons per day
(2) gpcd - Gallons per capita per day
(3) sq. ft. - Square feet

Section 4

GRAVITY SEWERS

4.1 GENERAL CONSIDERATIONS

4.1.1 TYPE OF SEWERS

THE CITY OF PALM COAST will approve PLANS for new sewer systems and extensions only when designed as separate systems in which precipitation, runoff and groundwater are excluded.

4.1.2 DESIGN PERIOD

Sewer systems shall be designed for the estimated ultimate tributary population.

4.1.3 LOCATION

Gravity sewers shall be located in dedicated rights-of-way or utility easements. Whenever possible, sewers shall be located under pavement in dedicated rights-of-way. All sewers located outside of and perpendicular to dedicated rights-of-way shall require a minimum 20-foot easement. Additional easement widths shall be provided when the pipe size or depth of cover so dictate. If a gravity sewer is located parallel to and within 5 feet of a road right-of-way, a minimum 10-foot easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictate. No gravity sewers shall be placed under wet retention ponds, buildings, or other structures. In addition, gravity sewers shall not be located along side or rear lot lines.

4.2 DESIGN BASIS

4.2.1 AVERAGE DAILY FLOW

The gravity sewer design shall be based on full ultimate development as known, or projected. Average daily wastewater flow shall be calculated by referencing the Wastewater Table of Daily Flows for Various Occupancies (Section 3).

4.2.2 PEAK DESIGN FLOW

Gravity sewers shall be designed on the basis of ultimate development maximum rates of flow, which shall be the product of selected peak factors times the accumulative average daily flow as calculated above. In general, the following minimum peak factors shall be applicable for the range of average daily flow rates.

Flow Range	Minimum Peak Factor
Flows to 100,000 GPD	4.0
100,000 GPD to 250,000 GPD	3.5
250,000 GPD to 1,000,000 GPD	3.0
Flows greater than 1,000,000 GPD	2.5

For design average daily flows above 2,000,000 GPD, peaking factors less than 2.5 may be considered if substantiated by extensive data. Under no circumstances shall peaking factors less than 2.0 be allowed.

4.2.3 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.

4.3 DETAILS OF DESIGN AND CONSTRUCTION

4.3.1 MINIMUM SIZE

No gravity sewer main conveying wastewater shall be less than eight (8) inches in diameter.

4.3.2 MINIMUM COVER

The minimum cover over gravity sewers shall be no less than 3 feet calculated from the finished grade.

4.3.3 SLOPE AND VELOCITIES

Gravity Sewer Slope

Diameter in Inches	Preferred Slopes, ft/ft	Velocity n=0.013	Min. Slope ft/ft	Velocity n=0.013
8	0.0040	2.2	0.0033	2.0
10	0.0028	2.1	0.0024	2.0
12	0.0022	2.1	0.0020	2.0
15	0.0015	2.1	0.0014	2.0
16	0.0014	2.1	0.0013	2.0
18	0.0012	2.1	0.0011	2.0
21	0.0011	2.1	0.0009	2.0
24	0.0008	2.1	Use Preferred Slope	
30	0.0008	2.4		
36	0.0008	2.7		

Minimum slope to be used only where no other engineering or economic solution is possible.

Sewers shall be laid with uniform slope between manholes.

Gravity Sewer Velocity

a) 2.0 fps minimum @ 1/2 full flow
b) 8.0 fps maximum

4.3.4 SIZE AND ALIGNMENTS

Change in sewer diameter between manholes shall not be allowed. All sewers shall be installed with straight alignments between manholes.

4.3.5 SEPARATION OF WATER MAINS & SEWERS

Refer to Division 3, Section 21, of these SPECIFICATIONS for applicable requirements. No water pipe shall pass through or come in contact with any part of a sewer system.

4.3.6 ADDITIONAL REQUIREMENTS

Main drain and backwash systems for pools and spas and storm drain systems shall not connect to the gravity sewer system.

In general, all sewer extensions for future connections shall terminate at a manhole. THE CITY OF PALM COAST may allow such extensions without a terminal manhole on a case-by-case basis subject to all of the following conditions:

1. Total sewer extension length shall be limited to 25 feet.
2. Sewer extension location at the initiating manhole shall be plugged to the satisfaction of THE CITY OF PALM COAST.
3. Such sewer extensions shall not be a part of the accepted sewer facilities. This shall be clearly delineated on the PLANS.
4. All such sewer extensions shall be inspected and accepted as part of the future construction phase.

4.4 MANHOLES

4.4.1 LOCATION

Manholes shall be installed at the end of each gravity sewer system; at all changes in grade, size or alignment; at all sewer intersections; and at distances not greater than 400 feet. Private sewer systems must be separated from THE CITY OF PALM COAST'S sewer system by a manhole located at the right-of-way line.

4.4.2 TYPE

An outside drop pipe shall be provided for a sewer entering a manhole where its invert elevation is 24-inches or more above the manhole invert.

Where the difference in elevation between the incoming sewer invert and the manhole invert is less than 24-inches, the manhole invert shall be provided with a fillet or "slide" to prevent solids deposition.

4.4.3 DIAMETER

For sewers 24-inches in diameter and smaller, the minimum inside diameter of manholes shall be 48-inches. For sewers between 24-inches and 36-inches, the minimum inside diameter shall be 60-inches. For sewers larger than 36-inches in diameter, a 72-inch inside diameter manhole shall be provided.

A minimum access of 24-inches clear opening shall be provided.

4.4.4 FLOW CHANNEL

The flow channel through manholes shall be made to conform in shape and slope to that of the sewers. Flow direction changes less than 90 degrees shall not be included in sewer alignments without special consideration. A flow line elevation drop of 0.1 foot across the width of the manhole shall be provided. Benching shall be provided which shall have a minimum slope of 2 inches per foot.

4.4.5 MATERIALS

Manholes shall be constructed of precast units as specified in Division 3. Brick manholes shall not be permitted.

4.4.6 COATINGS

The exterior of all manholes shall be coated with a minimum of 8 mils (2 coats – 4 mils each) of a water based concrete coating (ConSeal CS-55). The interior of manholes which do not receive force main flow shall be coated with a minimum of 12 mils (3 coats – 4 mils each) of a water based concrete coating (ConSeal CS-55). New manholes which receive force main flow shall incorporate an AGRU SUREGRIP LINER. The liner shall be polypropylene, minimum 79 mils thick and shall be cast as part of the manhole construction at the factory. A rubber chimney seal shall be installed between the casting ring and corbel liner. Existing manholes which receive force main flow shall be coated with SpectraShield or Sewper Coat. Refer to STANDARD DETAILS.

4.4.7 CASTINGS

Cast iron frames and covers shall be as specified in Division 3, Section 32. Gasketed or O-ring covers shall be provided where manholes are located in areas subject to ponding or flooding.

4.4.8 ACCESS

A 10-foot wide access road or easement shall be provided for all manholes which are located outside of public rights-of-way. The top eight (8) inches of the access road shall be stabilized to a Florida Bearing Value of 50 psi, and compacted to 95% of AASHTO T-180.

4.5 SERVICE CONNECTIONS

4.5.1 GENERAL

Service connection to connect the gravity sewer to the house or building being served shall be through a lateral and include miscellaneous appurtenances, all as shown on the STANDARD DETAILS.

4.5.2 SIZE AND LENGTH

Service laterals and fittings shall be a minimum of six (6) inches in diameter. All service laterals shall be less than 100 feet in length.

4.5.3 SLOPE

Service laterals shall have a minimum slope of 1.0%.

4.5.4 CONNECTION

In general, service laterals shall not be allowed to discharge directly into terminal sanitary manholes. A case-by-case exception to this requirement may be allowed if the lateral discharges at the same elevation as the manhole invert.

4.6 GREASE INTERCEPTORS (SIZING)

4.6.1 GENERAL

All Food Preparation/Service Establishments shall have outside grease interceptors sized as discussed herein. All wastewater flow from sinks, basins, and drains and all other related appurtenances associated with food preparation shall discharge into an approved grease interceptor before entering THE CITY OF PALM COAST'S system.

4.6.2 SIZING

Sizing of grease interceptors shall be based on the equations below. The minimum volume of any grease interceptor shall be 750 gallons and the maximum volume of a single interceptor shall be 1,500 gallons. When the required effective capacity of the grease interceptor is greater than 1,500 gallons, installation of grease interceptors in series is required.

1. Restaurants:

(S) x (12) (gallons per seat) x LF = Effective Grease Interceptor Capacity

(S) = Number of seats in the dining area

(LF) = Loading factor; 1.25 or 1.5 for restaurants with drive thru

2. All other establishments or facilities shall be sized on a case-by-case basis.

4.7 GREASE INTERCEPTORS (DESIGN AND CONSTRUCTION)

4.7.1 GENERAL

Grease interceptors shall be provided to prevent the discharge of oil, grease and other substances that are harmful or hazardous to the building drainage system, the public sewer, or sewage treatment plant or processes.

4.7.2 DESIGN AND CONSTRUCTION REQUIREMENTS

Grease interceptors shall be designed and constructed in accordance with the requirements of FAC 64E-6.013, the Florida Plumbing Code, Chapter 10, and THE CITY OF PALM COAST'S Standard Construction Details.

4.7.3 INSTALLATION

Installations of grease and oil pretreatment device(s) shall comply with the applicable plumbing and building codes adopted within THE CITY OF PALM COAST.

4.7.4 PLUMBING REQUIREMENTS

Service piping and fittings shall be polyvinyl chloride (PVC) and a minimum 4" diameter. Inlet piping shall enter the tank at a minimum of 2-1/2" above the liquid level line and be connected to a tee. A section of pipe shall be connected to the bottom of the inlet tee and extend 14".

Outlet pipe shall be a minimum 4" diameter and be connected to a tee. A section of pipe shall be connected to the bottom of the outlet tee and extend to within 8" of the bottom of the tank floor.

A two-way cleanout tee shall be installed on the inlet and outlet piping. The cleanouts shall be brought to grade, and when installed in paved vehicular traffic areas, shall be protected by a traffic bearing box and metal lid.

4.7.5 INTERCEPTOR ACCESS

Manholes shall be provided for maintenance and inspections. At a minimum, two manholes shall be provided—one over the inlet chamber, and one over the outlet chamber. Manholes shall have a minimum size of 24" diameter. Manhole covers should be labeled GREASE INTERCEPTOR or GREASE TRAP to identify the unit from sanitary. Manholes shall be brought to grade and when installed in paved vehicular areas shall be traffic bearing.

4.8 OIL SEPARATORS

4.8.1 GENERAL

Repair garages, car washing facilities with engine or undercarriage cleaning capability, and at factories where oily or flammable liquid wastes are produced, shall be equipped with separators into which all oil-bearing, grease-bearing, or flammable wastes shall be discharged before emptying into THE CITY OF PALM COAST'S sewer system.

4.8.2. GENERAL DESIGN REQUIREMENTS

Oil separators shall have a depth of not less than 2 feet below the invert of the discharge drain. The outlet opening of the separator shall not have less than an 18-inch water seal.

4.8.3 GARAGES AND SERVICE STATIONS

Where automobiles are serviced, greased, repaired, or washed, or where gasoline is dispensed, oil separators shall have a minimum capacity of 6 cubic feet for the first 100 square feet of area to be drained, plus 1 cubic foot for each additional 100 square feet of area to be drained into the separator.

Parking garages in which servicing, repairing, or washing is not conducted, and in which gasoline is not dispensed, shall not require a separator. Areas of commercial garages utilized only for storage of automobiles are not required to be drained through a separator.

4.9 LAUNDRIES

4.9.1 GENERAL

Commercial laundries shall be equipped with an interceptor with a wire basket or similar device, removable for cleaning, that prevents passage into the sewer system of string, rags, buttons, or other solid material ½-inch or larger in size.

4.10 MATERIALS, INSTALLATION AND TESTING

Applicable provisions of Divisions 3 and 4 shall apply.

Section 5

WASTEWATER FORCE MAINS

5.1 GENERAL CONSIDERATIONS

5.1.1 DESIGN PERIOD

Force main systems shall be designed for the estimated ultimate tributary population, except where design for the ultimate flow would conflict with standard engineering practice and design for low flow situations during the initial stages of the project.

5.1.2 LOCATION

Force mains shall be located in dedicated rights-of-way or utility easements. When installed in rights-of-way, force mains shall maintain a consistent alignment with respect to the centerline of the road. All force mains located outside of and perpendicular to dedicated rights-of-way shall require a minimum 20-foot easement. Additional easement widths shall be provided when the pipe size or depth of cover so dictate. If a force main is located parallel to and within 5 feet of a road right-of-way, a minimum 10-foot easement shall be provided. Additional easement widths shall be provided if the pipe size or depth of cover so dictates. No force main shall be placed under wet retention ponds, buildings, or under structures. In addition, force mains shall not be located along side or rear lot lines.

5.2 DESIGN BASIS

5.2.1 AVERAGE DAILY FLOW

Provisions of Section 4 shall apply.

5.2.2 PEAK DESIGN FLOW

Provisions of Section 6 shall apply.

5.2.3 DESIGN CALCULATIONS

DEVELOPER'S ENGINEER shall submit signed, sealed and dated design calculations with the PLANS for all force main projects. Calculations shall show that force mains will have sufficient hydraulic capacity to transport all design flows.

5.3 DETAILS OF DESIGN AND CONSTRUCTION

5.3.1 VELOCITY AND DIAMETER

At design pumping rates, a cleansing velocity of at least 2 feet per second should be maintained. Maximum velocity at design pumping rates should not exceed 8 feet per second for ductile iron pipe or 6 feet per second for PVC pipe. The minimum force main diameter shall be four (4) inches.

5.3.2 DESIGN FRICTION LOSSES

Friction losses through force mains shall be based on the Hazen-Williams formula. In the use of the Hazen-Williams formula, the value for "C" shall be 120 for ductile iron pipe and 130 for PVC pipe. "C" values greater than 130 shall not be allowed.

5.3.3 DESIGN PRESSURE AND RESTRAINT

The force main and fittings, including all restrained joint fittings, shall be designed to withstand pump operating pressures and pressure surges to at least 150 psi.

Where restrained joints are required, the restrained joint table in the STANDARD DETAILS shall be utilized.

5.3.4 TERMINATION

Refer to the STANDARD DETAILS for construction details of the manhole which receives force main flow.

5.3.5 AIR RELEASE VALVES

Air release valves shall be provided, as necessary, to prevent air locking. All such valves shall be clearly delineated on the force main profile of the DRAWINGS. The DEVELOPER'S ENGINEER shall submit calculations to THE CITY OF PALM COAST justifying the valve sizing. See additional requirements in Division 3.

5.3.6 VALVES

Valves shall be provided on force main systems to facilitate effective isolation of the pipe system for repairs and maintenance. On straight uninterrupted runs of force mains, valve spacing shall not exceed 2000 feet. Valves shall be provided where force mains intersect to facilitate isolation of pipe segments.

5.3.7 AERIAL CROSSINGS

STRUCTURAL SUPPORT

Support shall be provided for all joints in pipes utilized for aerial crossings. The supports shall be designed to prevent overturning and settlement and shall be designed by a professional engineer registered in Florida.

FLOOD CLEARANCE

For aerial stream crossings, the impact of flood waters, debris and boat traffic shall be considered. The Army Corps of Engineers and Coast Guard shall be contacted in order to determine if a permit is required by either agency. If a permit is required, the height of the crossing shall be determined based upon the permit requirements. If no permit is required the bottom of the pipe shall be placed no lower than 4-feet above the 100-year flood elevation.

PIPE MATERIAL AND JOINTS

Flanged joints shall be used. Pipe and flange material shall be ductile iron, minimum Class 53. All aboveground pipe shall be painted as specified in Division 3 for aboveground wastewater force mains. Use of epoxy coated steel pipe may be allowed on a case-by-case basis.

VALVES

Underground valves, with restrained joint piping, shall be provided at both ends of the crossing so that the section can be isolated for testing or repair. The valves shall be plug valves and shall be easily accessible and not subject to flooding. An air release valve shall be installed at the high point of the crossing.

GUARDS

Appropriate guards shall be installed at both ends of the crossing to prevent pipe access to the public. Refer to the STANDARD DETAILS.

PERMITS AND REQUIREMENTS OF OTHER AGENCIES

It shall be the responsibility of the DEVELOPER to obtain all applicable regulatory permits. When the Aerial Crossing is accomplished by attachment to a bridge or drainage structure, the DEVELOPER shall meet all requirements of the agencies that own or have jurisdiction over such structures.

5.3.8 UNDERWATER CROSSINGS

A minimum cover of 3 feet is required for all pipes.

PIPE MATERIAL AND COVER

For swales and ditches, a minimum cover of three feet shall be provided over the ductile iron pipe.

VALVES

Valves shall be provided, with restrained joint piping, at both ends of the crossings so that the section can be isolated for testing or repair. The valves shall be plug valves and shall be easily accessible, and not subject to flooding.

PERMITS

It shall be the responsibility of the DEVELOPER to obtain all applicable regulatory permits.

5.4 MATERIAL, INSTALLATION AND TESTING

Applicable provisions of Divisions 3 and 4 shall apply.

5.5 LOCATION AND IDENTIFICATION

A means for locating and identifying all force mains and valves shall be provided in accordance with the provisions in Division 3 of the SPECIFICATIONS and the STANDARD DETAILS.

5.6 ADDITIONAL REQUIREMENTS

While designing force main systems, consideration shall be given to future connections. If applicable, this requirement shall be reviewed with THE CITY OF PALM COAST prior to finalization of the design.

Section 6

WASTEWATER PUMP/LIFT STATIONS

6.1 GENERAL CONSIDERATIONS

The design standards outlined in this section apply to wastewater pump stations discharging 3,000 gallons per minute or less. All such pump stations shall be submersible type stations. For designing pump stations discharging more than 3,000 gallons per minute, the type of pump station and the Basis of Design shall be reviewed with THE CITY OF PALM COAST and approval obtained before proceeding with the design.

6.2 DESIGN BASIS

6.2.1 DESIGN FLOWS

Design flows shall be based upon the total ultimate development flow from all contributory areas to the pump station. The design average daily flow shall be computed as outlined in Section 4. The design pumping capability of the station shall be based upon the Peak Design Flow which shall be calculated by multiplying the design average daily flow with the applicable minimum peaking factors outlined below:

Design Average Daily Flow	Minimum Peaking Factor for Peak Design Flow
Flows to 100,000 GPD	4.0
100,000 GPD to 250,000 GPD	3.5
250,000 GPD to 1,000,000 GPD	3.0
Flows greater than 1,000,000 GPD	2.5

average daily flows above 2,000,000 GPD, peaking factors less than 2.5 may be considered if substantiated by extensive data. Under no circumstances shall peaking factors less than 2.0 be allowed.

6.2.2 NUMBER OF PUMPS

For pump stations with a peak design flow of 1,500 GPM or less, a minimum of two pump units shall be provided. Where the peak design flow exceeds 1,500 GPM, three or more units shall be provided. See Division 3, Section 36 for standby requirements.

6.2.3 PUMP AND MOTOR SELECTION

Pump stations shall be capable of pumping the peak design flow with the largest pumping unit out of service. Pumps shall be capable of meeting all system hydraulic conditions without overloading the motors. Pump system curves shall be prepared and submitted to THE CITY OF PALM COAST along with the pump station plans. Such curves shall be based upon the friction losses outlined in Section 5 of these SPECIFICATIONS. Pump system curves shall verify that the pumps are operating at peak efficiency and are suitable for the design flow application. Pump and motor selection and system curves shall reflect hydraulic conditions in cases where receiving force main systems are interconnected to additional pumping stations.

6.2.4 DESIGN CALCULATIONS

DEVELOPER'S ENGINEER shall submit to THE CITY OF PALM COAST, signed, sealed and dated design calculations for all wastewater pump stations. Calculations shall include pump system curves with copies of manufacturer's pump curves, hydraulic analysis of force main system, operating cycle calculations with wet well sizing, and buoyancy calculations.

6.3 DETAILS OF DESIGN AND CONSTRUCTION

6.3.1 FLOODING

Wastewater pumping station structures and electrical and mechanical equipment shall be designed to withstand a 100-year flood. Wastewater pumping stations should remain fully operational and accessible during a 100-year flood. Regulations of Local, State and Federal agencies regarding flood plain obstructions shall be met.

6.3.2 ACCESSIBILITY

The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. A concrete access road to the pumping station shall be provided in accordance with local regulations and the STANDARD DETAILS. The facility shall not be located in road rights-of-way.

6.3.3 BUOYANCY

Buoyancy of the pump station structures shall be considered and adequate provisions shall be made for protection.

6.3.4 PUMP REQUIREMENTS

Submersible wastewater pump stations shall comply with the requirements in Division 3. Only approved pumps listed in these SPECIFICATIONS shall be allowed. Submersible pumps and motors shall be designed specifically for raw sewage use. Submersible pumps shall be readily removable and replaceable without dewatering the wet well or disconnecting any piping in the wet well.

Pumps shall be capable of handling raw sewage and passing spheres of at least three (3) inches in diameter. Pump suction and discharge openings shall be at least four (4) inches in diameter.

6.3.5 WET WELL REQUIREMENTS

Wet well shall be a minimum 6 foot diameter and shall have a minimum 4.5 foot depth below the lowest invert. Additional depth shall be provided based on station design and cycle time.

Pumping levels shall be set to provide a minimum capacity between operational water levels sufficient to allow a minimum of five (5) minutes between successive starts of the pumps.

Pump-off water levels shall provide adequate submergence to preclude pump inlet vortexing, or air binding. Operational maximum water levels shall not exceed the invert elevation of the influent pipe.

The wet well floor shall have a minimum slope of 1 to 1 to the hopper bottom. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the pump inlet.

No interior ladders shall be permitted in the wet well.

6.3.6 PUMP STATION WATER SYSTEM

All wastewater pump stations shall be provided with a water system with adequate capacity and pressure for station wash down and other requirements. All potable water supply to the pump station shall be protected by a reduced pressure zone backflow preventer assembly and be equipped with a meter.

6.3.7 ELECTRICAL EQUIPMENT, POWER SUPPLY AND POWER CORDS

Requirements in Division 3 shall apply.

6.3.8 CONTROLS

Requirements in Division 3 shall apply.

6.3.9 SITE SIZING AND EASEMENT REQUIREMENTS

Pump station sites shall be sized as delineated on the "Pumping Station Site Plan" in the STANDARD DETAILS. The DEVELOPER shall dedicate the pump station site by Warranty Deed to THE CITY OF PALM COAST. In general, the site for the access road shall also be dedicated to THE CITY OF PALM COAST by Warranty Deed. An exception to this requirement may be allowed on a case-by-case basis in the form of an ingress/egress easement for the access road.

6.3.10 SITE FENCING

Fencing at the pump station site perimeter shall comply with the technical criteria established in Division 3 and according to the STANDARD DETAILS. All pump station sites shall be fenced in accordance with local regulations.

6.4 EMERGENCY OPERATION

All pump stations shall be provided with emergency power receptacles as specified in Division 3 of the SPECIFICATIONS and as shown on the STANDARD DETAILS.

Section 7

PRETREATMENT STANDARDS FOR DISCHARGE OF WATER AND WASTES INTO CITY OF PALM COAST'S SEWER SYSTEM

7.1 SCOPE

This section establishes procedures, defines responsibilities, and sets standards and limitations on the discharge of waters and wastes into the sewer system.

7.2 PURPOSE

The purpose of this section is to protect THE CITY OF PALM COAST'S sanitary sewer system, treatment works, and ultimately, the environment from adverse impacts created by toxic or high strength wastes from commercial and industrial establishments.

7.3 GENERAL PROVISIONS

The policy is hereby established that the provisions of this section will be enforced to the fullest extent possible. These requirements are in accord with the Federal Water Pollution Control Act amendments of 1972, pretreatment standards as specified in 40 CFR, 403.5 (a) and (b), and Chapter 62-625 of the State of Florida Department of Environmental Protection which must be complied with by all applicable industries. The standards set forth are minimum requirements to ensure the general health and welfare of the public and the surrounding environment.

7.4 DEFINITIONS

As used herein, the following terms shall have the meanings stated:

(1) **Act:** The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 U.S.C. 1251, et. seq.

(2) **Authorized representative of industrial user:** An authorized representative of an industrial user may be:

(a) A principal executive officer of at least the level of vice president, if the industrial user is a corporation;

(b) A general partner or proprietor if the industrial user is a partnership or proprietorship, respectively;

(c) A duly authorized representative is responsible for the overall operation of the facilities from which the indirect charge originates.

(3) **B.O.D.:** The abbreviation for biochemical oxygen demand or the quantity of oxygen used in the biochemical oxidation of organic matter in a specified time (five (5) days) at a specified temperature (twenty (20) degrees centigrade) and under specified conditions (standard laboratory) expressed in milligrams per liter.

(4) **Bypass:** The intentional diversion of wastewater streams from any portion of an industrial user's treatment facility.

(5) **Chemical oxygen demand:** A measure of the oxygen equivalent of that portion of the organic matter in a sample that is susceptible to oxidation by a strong chemical oxidant.

(6) **Collection system:** The system of sanitary sewers to be operated by THE CITY OF PALM COAST or sanitary sewers connected to THE CITY OF PALM COAST'S system collecting wastewater from point sources.

(7) **Discharge:** The introduction of pollutants into a WWF from any nondomestic source regulated under Chapter 403, F.S.

(8) **Domestic wastewater:** Wastewater derived principally from dwellings, commercial buildings, institutions, and industry resulting from household or toilet wastes resulting from human occupancy.

(9) **Establishment:** A public or private institution in which certain functions are performed.

(10) **Garbage:** Solid waste from domestic and commercial preparation, cooking, and dispensing of food, and from handling, storage, and sale of produce.

(11) **Industrial and commercial waste pretreatment agreement:** A contractual agreement in fulfillment of U.S. Environmental Protection Agency pretreatment program requirements wherein the industrial or commercial user agrees to comply with specific conditions set forth in the agreement and in return THE CITY OF PALM COAST agrees to provide wastewater treatment service pursuant to this section.

(12) Industrial or commercial waste: The liquid wastes from industrial, commercial, or institutional processes as distinct from domestic or sanitary sewage.

(13) Industrially classified user: A non-residential, non-governmental user whose liquid wastes are, in part, made up of flows related to industrial processes rather than being composed of flows resulting from human occupancy; and whose industrial process flows contain toxic pollutants which interfere, have the potential to interfere, are incompatible, or would reduce the utilization of the sludge or treated effluent, or which have any other adverse affects on the treatment works.

(14) Interference: A discharge which alone or in conjunction with a discharge or discharges from other sources, both:

(a) inhibits or disrupts the treatment plant processes or operations, or its wastewater residuals processes, use or disposal;
(b) is a cause of a violation of any requirement of the treatment plant's permit, or prevents use or disposal of domestic wastewater residuals in compliance with local regulations or rules of FDEP and Chapter 403, F.S.

(15) mg/l (milligrams per liter): The strength or concentration of a constituent in a solution; also expressed as parts per million.

(16) Natural Outlet: Any outlet into a watercourse, pond, ditch, lake, or other body of surface or groundwater.

(17) National Pollution Discharge Elimination System or NPDES Permit: A permit issued pursuant to Section 402 of the act (33 U.S.C. 1342).

(18) National Categorical Pretreatment Standard or Pretreatment Standard: Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with Section 307(b) and (c) of the act (33 U.S.C. 1317) which applies to a specific category of industrial users and which appears in 40 CFR Chapter 1, Subchapter N, Parts 405-471, incorporated herein by reference.

(19) New Source:

(a) Any building, structure, facility or installation from which there is or may be a discharge, the construction of which commenced after the publication of proposed pretreatment standards under section 307(c) of the CWA which will be applicable to such source if such

standards are thereafter promulgated in accordance with that section, provided that

1. The building, structure, facility or installation is constructed at a site at which no other source is located,

2. The building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source, or

3. The production or wastewater generating processes of the building, structure, facility or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant, and the extent to which the new facility is engaged in the same general type of activity as the existing source shall be considered;

(b) Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility or installation meeting the criteria of (a) 2. or (a) 3. above but otherwise alters, replaces, or adds to existing process or production equipment; or

(c) Construction of a new source, as defined in this section, has commenced if the owner or operator has:

1. Begun, or caused to begin as part of a continuous on-site construction program.

   (a) any placement, assembly, or installation of facilities or equipment

   (b) Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment, or

2. Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified

without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under Chapter 62-625, F.A.C.

(20) **Pass-through:** A discharge which exits the WWF into waters of the State or of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirements of the WWF's permit (including an increase in the magnitude or duration of a violation).

(21) **Person:** Any individual, establishment, firm, company, association, society, corporation, or group.

(22) **pH:** The logarithm of the reciprocal of the hydrogen ion activity, expressed in units.

(23) **Pretreatment:** The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a WWF. The reduction or alteration may be obtained by physical, chemical or biological processes, process changes or by other means, except as prohibited by Rule 62-625.410(5), F.A.C. Appropriate pretreatment technology includes control equipment, such as equalization tanks or facilities for protection against surges or slug discharges that might interfere with or otherwise be incompatible with the WWF. However, where wastewater from a regulated process is mixed in an equalization facility with unregulated wastewater or with wastewater from another regulated process, the effluent from the equalization facility must meet an adjusted pretreatment limit calculated in accordance with Rule 62-625.410(6), F.A.C.

(24) **Pretreatment Program:** A program administered by a public utility that meets the criteria established in Rule 62-625.500, F.A.C.

(25) **Pretreatment Requirement:** Any substantive or procedural requirement related to pretreatment, other than a pretreatment standard, imposed on an industrial user.

(26) **Pretreatment Standard:** Any regulation containing pollutant discharge limits promulgated by the FDEP under Chapter 403, F.S., which applies to industrial users. This term includes prohibitive discharge limits established in Rule 62-625.400, F.A.C.

(27) **Properly shredded garbage:** The wastes from the preparation, cooking, and dispensing of foods, that have been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in sewers with no particle greater than one-half inch (1.27 centimeters) in any direction.

(28) **Public Utility:** Any state, county or municipality owning, managing, controlling or operating a domestic WWF, or proposing to construct a domestic WWF that provides or proposes to provide wastewater service.

(29) **Removal:** A reduction in the amount of a pollutant in the WWF's effluent or alteration of the nature of a pollutant during treatment at the WWF. The reduction or alteration can be obtained by physical, chemical or biological means and may be the result of specifically designed WWF capabilities or may be incidental to the operation of the treatment system. Removal as used in this section shall not mean dilution of a pollutant in the WWF.

(30) **Sanitary sewage:** The household and toilet wastes resulting from human occupancy.

(31) **Sanitary sewer:** Pipe or conduit which carries sewage and to which storm, surface, and ground waters are not intentionally admitted.

(32) **Sewage:** A combination of water-carried wastes from residences, business buildings, institutions, and industrial establishments, together with such ground, surface, and storm-waters as may be present.

(33) **Sewage works:** All facilities for collection, pumping, treatment, and disposing of waste water.

(34) **Shall** is mandatory; "may" is permissive.

(35) **Significant Industrial User** means, except as provided in (c) below, the following:

(a) All industrial users subject to categorical pretreatment standards under Rule 62-625.410, F.A.C., and 40 CFR Chapter I, Subchapter N which has been adopted by reference in Chapter 62-660, F.A.C., and

(b) Any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater to the WWF (excluding domestic wastewater, noncontact cooling and boiler

blowdown wastewater); contributes a process waste stream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the treatment plant; or is designated as such by the control authority on the basis that the industrial user has a reasonable potential for adversely affecting the WWF's operation or for violating any pretreatment standard or requirement in accordance with Rule 62-625.500(2)(e), F.A.C.

(c) Upon a finding that an industrial user meeting the criteria in (b) above has no reasonable potential for adversely affecting the WWF's operation or for violating any pretreatment standard or requirement, the control authority may at any time, on its own initiative or in response to a petition received from an industrial user, and in accordance with Rule 62-625.500(2)(e), F.A.C., determine that such industrial user is not a significant industrial user.

(36) **Significant Noncompliance:** Any violation of pretreatment requirements (limits, sampling, analysis, reporting and meeting compliance schedules) as defined in 40 CFR 123.45.

(37) **Slug Discharge:** Any discharge of a nonroutine, episodic nature.

(38) **Treatment Plant:** That portion of a WWF which is designed to provide treatment (including recycling and reclamation) of domestic and industrial wastewater.

(39) **Upset:** An exceptional incident in which there is unintentional and temporary noncompliance with categorical pretreatment standards because of factors beyond the reasonable control of the industrial user.

(40) **Wastewater Facility or WWF:** Any or all of the following: the collection/transmission system, the treatment plant, and the reuse or disposal system.

7.5 PRETREATMENT STANDARDS: PROHIBITED DISCHARGES

(1) General Prohibition:

(a) An industrial user shall not introduce into a WWF any pollutant which causes pass-through or interference. These general prohibitions and the specific prohibitions in (2) below apply to each industrial user introducing pollutants into a WWF whether or not the industrial user is subject to other

pretreatment standards, or any national, State, or local pretreatment requirements.

(2) Specific Prohibitions: The following pollutants shall not be introduced into a WWF:

(a) Pollutants which create a fire or explosion hazard in the WWF;

(b) Pollutants which will cause corrosive structural damage to the WWF, but in no case discharges with pH lower than 5.0, unless the WWF is specifically designed to accommodate such discharges;

(c) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the WWF resulting in interference;

(d) Any pollutant, including oxygen demanding pollutants, released in a discharge at a flow rate or pollutant concentration which will cause interference with the WWF;

(e) Heat in amounts which will inhibit biological activity in the WWF resulting in interference, but in no case heat in such quantities that result in the discharge from the treatment plant having a temperature that exceeds 40°C (104°F) unless the FDEP, upon request of the control authority, approves alternate temperature limits in accordance with Rule 62-302.520, F.A.C.;

(f) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass-through;

(g) Pollutants which result in the presence of toxic gases, vapors, or fumes within the WWF in a quantity that will cause acute worker health and safety problems; or

(h) Any trucked or hauled pollutants, except at discharge points designated by the control authority.

7.6 PROHIBITION AGAINST DILUTION AS TREATMENT

Except where expressly authorized to do so by an applicable pretreatment standard or requirement, no industrial user shall ever increase the use of process water or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with a pretreatment standard or requirement.

7.7 ADMISSION OF INDUSTRIAL AND COMMERCIAL WASTE

(1) The economy and desirability of the combined treatment of industrial and commercial wastes and sanitary sewage is recognized. However, not all types and quantities of industrial and commercial wastes can be so treated. It shall be the policy to admit the types and quantities of industrial and commercial wastes that are not harmful or damaging to the structures, processes, or operation of the treatment works or are not specifically prohibited. It is also recognized that to provide this service, additional facilities and/or treatment are required, and the cost of such must be borne by the user receiving the benefits.

(2) In order to identify the point sources, all users of the treatment works who are now discharging industrial or commercial wastes to the sewers shall, upon request of the Utility, fill in and file within ninety (90) days, a questionnaire which shall furnish pertinent data, inclusive of quantity of flow and an analysis of the water discharged to the treatment facility. Further, any person desiring to make a new connection to the wastewater system for the purpose of discharging industrial or commercial wastes to the sewers shall fill in and file with the Utility an industrial and commercial waste questionnaire as outlined for existing users.

(3) Sample and analysis shall be a twenty-four hour composite sample, collected so as to be a representative sample of the actual quality of wastes. Exceptions to this are samples to be analyzed for grease and oil, phenols, cyanide and pH. These are to be collected as grab samples. Samples for analysis may be collected by the user or his representative. Analysis shall be performed by a laboratory certified by the State of Florida for environmental analyses, using the laboratory methods for the examination of wastewater as set forth in 40 CFR Part 135.

(4) If it is necessary due to the size or complexity of the waste disposal problem of an establishment, an extension of time may be granted, provided it can be shown that it is impractical to meet the schedule imposed in this section. A request for extension must be submitted in writing to the Utility.

(5) Any new or existing establishment discharging industrial or commercial wastes into the sewer system shall construct and maintain at its expense a suitable control manhole, or manholes downstream from any treatment, storage, or other approved works, to facilitate observation, measurement, and sampling of all wastes, including all domestic sewage from the establishment. The control manhole or manholes shall be constructed at suitable and satisfactory locations and built in a manner approved by the Utility. If any establishment wishes to meter its waste discharge into the sewer system to verify end product water retention or other uses of metered flow, they may install a flow-metering device as approved by the Utility. The control manhole shall be accessible to Utility personnel at all times for sampling.

(6) Where in the opinion of the Utility the potential exists for contamination of ground water surrounding any new or existing establishment, the Utility may require to be installed at the owner's expense one or more observation/monitoring wells. The well or wells shall be constructed at suitable and satisfactory locations and installed in a manner approved by the Utility. The monitor well or wells shall be accessible to Utility personnel at all times for sampling.

(7) All authorized Utility employees shall be permitted to enter upon all properties for the purpose of inspection, observation, measurement, sampling, and testing and shall have the authority to inspect and copy records in accordance with provisions of this article.

(8) Approval is required for the admission of commercial or industrial wastes into the sewers having:

(a) A five-day twenty-degrees BOD greater than three hundred (300) mg/l or,

(b) A suspended solids content greater than three hundred (300) mg/l or,

(c) A chemical oxygen demand greater than four hundred (400) mg/l or,

(d) A Total Nitrogen content greater than thirty (30) mg/l or,

(e) A Total Phosphorus content greater than ten (10) mg/l.

The user shall provide chemical analyses of discharge according to a schedule to be established by the Utility and continued discharge shall be subject to approval by the Utility.

7.8 INDUSTRIAL AND COMMERCIAL WASTE DISCHARGE AGREEMENTS REQUIRED

(1) A non-transferable discharge agreement will be required for each industrial, commercial, or other type of business which is identified as having other than domestic wastes or waste from sanitary conveniences. The purpose of these agreements is to control the contribution to the treatment works by each industrial user to ensure compliance with applicable pretreatment standards and requirements. These agreements shall stipulate monitoring and reporting requirements for each user as well as applicable discharge limitations.

(2) Required Technology: A compliance schedule shall be developed by each industrial user for the installation of technology required to meet applicable pretreatment standards. The Utility shall require the submission of notes and self

monitoring reports from industrial users as are necessary to assess and assure compliance with applicable pretreatment standards.

(3) Signatory and Certification Requirements

(a) Industrial and Commercial Waste Discharge Agreements, Baseline Monitoring Reports (BMR's), Final Compliance Reports and Periodic Reports on continued compliance must be signed by a duly authorized representative of the industrial user.

(b) All agreements and reports must contain the following certification statement and be signed by an authorized representative of the industrial user. "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

(4) Confidential information: In accordance with Florida's Public Records, Law, Chapter 119, Florida Statutes (1989), and amendments thereto, information and data on a user obtained from reports, questionnaires, permit applications, permits and monitoring programs and from inspections shall be available to the public or other government agency without restriction unless the user, prior to submitting the information, specifically requests and is able to demonstrate to the satisfaction of the Utility that the release of such information, processes or methods of production entitled to protection as trade secrets of the user. When requested by the person, claiming that portions of a report might disclose trade secrets or secret processes, those portions shall be submitted by the user, on forms and in a manner acceptable to the Utility, to the Environmental Protection Agency pursuant to the confidentiality provisions contained within 40 CFR Section 403.14. The Utility will thereafter request said information from the Environmental Protection Agency and therefore maintain its confidentiality. The information will thereafter not be made available to the public and only be used for matters related to this article which may include judicial review of enforcement proceedings by a governmental agency involving the person furnishing the report. Wastewater constituents and characteristics will not be recognized as confidential information.

7.9 REPORTING REQUIREMENTS

(1) **Baseline Monitoring Reports:** Within 180 days after the effective date of a categorical pretreatment standard, or 180 days after the final administrative decision on a category determination under 40 CFR 403.G(a)(4), whichever is later, existing significant industrial users subject to such categorical pretreatment standards and currently discharging to or scheduled to discharge to the sewage system shall be required to submit to the Utility a report which contains the information listed in subparagraphs 9(1)(d through h) below. At least ninety (90) days prior to commencement of their discharge, new sources, including existing users which have changed their operation or processes so as to become new sources, shall be required to submit to the Utility a report which contains the information listed in subparagraphs 9(1)(a through h). A new source shall also be required to report the method of pretreatment it intends to use to meet applicable pretreatment standards. A new source shall also give estimates of its anticipated flow and quantity of pollutants discharged.

The information required by this section includes:

(a) **Identifying Information:** The user shall submit the name and address of the facility including the name of the operator and owners;

(b) **Permits:** The user shall submit a list of any environmental control permits held by or for the facility.

(c) **Description of Operations:** The user shall submit a brief description of the nature, average rate of production, and standard industrial classifications of the operation(s) carried out by such industrial user. This description should include a schematic process diagram which indicates points of discharge to the system from the regulation processes.

(d) **Flow Measurement:** The user shall submit information showing the measured average daily and maximum daily flow, in gallons per day, to the system from regulated process streams and other streams as necessary to allow use of the combined wastestream formula set out in 40 CFR 403.6(e).

(e) **Measurement of Pollutants**

(1) The industrial user shall identify the categorical pretreatment standards applicable to each regulated process;

(2) In addition, the industrial user shall submit the results of sampling and analysis identifying the nature and concentration (and/or mass,

where required by the standard or Utility) of regulated pollutants in the discharge from each regulated process. Instantaneous, daily maximum and long term average concentrations (or mass, where required) shall be reported. The sample shall be representative of daily operation and shall be performed in accordance with procedures set out in 40 CFR Part 136.

(3) Grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organics. All other pollutants will be measured by composite samples obtained through flow proportional sampling techniques. If flow proportional composite sampling is infeasible, samples may be obtained through time proportional sampling techniques or through four (4) grab samples if the user proves such a sample will be representative of the discharge.

(f) **Special Certification:** A statement, reviewed by an authorized representative of the industrial user and certified to by a qualified professional, indicating whether pretreatment standards are being met on a consistent basis, and, if not, whether additional operation and maintenance (O&M) and/or additional pretreatment is required in order to meet the pretreatment standards and requirements; and

(g) **Compliance Schedule:** If additional pretreatment and/or O&M will be required to meet the pretreatment standards, the shortest compliance schedule will be established by which the industrial user will provide such additional pretreatment and/or O&M. The completion date in this schedule shall not be later than the compliance date established for the applicable pretreatment standard. A compliance schedule pursuant to this section must meet the requirements set out in Section 10 of this article.

(h) All baseline monitoring reports must be signed and certified in accordance with Section 8(3).

(2) **Compliance Deadline Reports:** Within ninety (90) days following the date for final compliance with applicable categorical pretreatment standards, or in the case of a new source, following commencement of the introduction of wastewater into the wastewater system, and industrial user subject to such pretreatment standards and requirements shall submit to the Utility a report containing the information described in Section 9(1)(e and f). For industrial users subject to equivalent mass or concentration limits established in accordance with the procedures in 40 CFR 403.G(c), this report shall contain a reasonable measure of the user's long term production rate. For all other industrial users subject to categorical pretreatment standards expressed in terms of allowable pollutant discharge per unit of

production (or other measure of operation), this report shall include the user's actual production during the appropriate sampling period. All compliance reports must be signed and certified in accordance with Section 8(3).

(3) **Periodic Compliance Reports:** Any significant industrial user subject to a pretreatment standard shall, at a frequency determined by the Utility but in no case less than twice per year, submit a report indicating the nature and concentration of pollutants in the effluent which are limited by such pretreatment standards and the measured or estimated average and maximum daily flows for the reporting period. All periodic compliance reports must be signed and certified in accordance with Section 8(3).

(a) All wastewater samples must be representative of the user's discharge. Wastewater monitoring and flow measurement facilities shall be properly operated, kept clean, and maintained in good working order at all time. The failure of an industrial user to keep its monitoring facility in good working order shall not be grounds for the industrial user to claim that sample results are unrepresentative of its discharge.

(b) In the event an industrial user's monitoring results indicates a violation has occurred, the industrial user must immediately notify the Utility and resample its discharge. The industrial user must report the results of the repeated sampling within thirty (30) days of discovering the first violation.

(4) **Notice of Changed Conditions:** Each industrial user is required to notify the Utility of any planned significant changes to the industrial user's operations or pretreatment systems which might alter the nature, quality or volume of its wastewater.

(a) The Utility may require the industrial user to submit such information as may be deemed necessary to evaluate the changed condition, and may require the modification of the Pretreatment Agreement under Section 10(1) if necessary.

(b) No industrial user shall implement the planned changed condition(s) until and unless the Utility has responded to the industrial user's notice.

(c) For purposes of this requirement, flow increases of ten percent (10%) or greater and the discharge of any previously unreported pollutant shall be deemed significant.

(5) **Notice of Potential Problems:** All categorical and non-categorical industrial users shall notify the Utility immediately of all discharges that could cause

problems to the wastewater system, including any slug loadings. Each industrial user shall provide protection from accidental or intentional discharges of prohibited materials or other substances regulated by this article. Facilities to prevent the discharge of prohibited materials shall be provided and maintained at the owner's or user's own cost and expense. Detailed plans showing facilities and operating procedures to provide this protection shall be submitted to the Utility for review and shall be approved by the Utility before construction of the facility. Review and approval of such plans and operating procedures shall not relieve the industrial user from the responsibility to modify the user's facility as necessary to meet the requirements of this article.

(a) No industrial user which commences contribution to the system shall be permitted to introduce pollutants into the system until accidental discharge procedures have been approved by the Utility.

(b) In the case of an accidental or other discharge which may cause potential problems for the wastewater system, it is the responsibility of the user to immediately telephone and notify the Utility of the incident. This notification shall include the location of discharge, type of waste, concentration and volume, if known, and corrective actions taken by the user.

(c) Within five (5) days following an accidental discharge, the user shall, unless waived by the Utility, submit a detailed written report describing the cause(s) of the discharge and the measure to be taken by the user to prevent similar future occurrences. Such notification shall not relieve the user of any expense, loss, damage, or other liability which may be incurred as a result of damage to the system, nature resources, or any other damage to person or property; nor shall such notification relieve the user of any fines, civil penalties, or other liability which may be imposed by this article.

(d) Failure to notify the Utility of potential problem discharges shall be deemed a separate violation of this article.

(6) **Reporting requirements for Industrial users not subject to categorical pretreatment standards:** Those industrial users not subject to categorical pretreatment standards shall report monitoring results specified in the pretreatment agreement at a frequency specified in the agreement.

(7) **Recordkeeping:** All industrial users subject to reporting requirements must retain any records of monitoring activities and results for a minimum of three years.

7.10 INDUSTRIAL AND COMMERCIAL WASTE DISCHARGE AGREEMENT RENEWAL AND ADMINISTRATION

(1) Form, contents, term of Agreement.

(a) The waste discharge Agreement shall be in a format specified by the Utility.

(b) This Agreement will contain all of the pertinent requirements and will provide the basis for the continued evaluation of the acceptability of wastes from each industrial or commercial user.

(c) The initial permit shall be effective for a period of five (5) years from date of issuance or such earlier time as such Agreement is approved by the Utility and the user and such Agreement is duly executed.

(d) The Utility reserves the right to modify any industrial and commercial waste discharge Agreement after 30 days notice to comply with changes in Local, State, or Federal regulations or in response to changes in processes or discharge conditions of said industry and thereafter terminate the Agreement if compliance is not achieved.

(2) Renewal of industrial and commercial waste discharge Agreement.

The Agreement may be renewed at the end of five (5) years pending both parties approval provided that the user has been in substantial compliance with the specified terms of the Agreement during the last year. Each renewal period shall be for five (5) years.

7.11 RIGHT OF REFUSAL

The Utility reserves the right to terminate any agreement and to refuse waste from any lot or parcel of land upon which there is located any building or activity which does not comply with this article.

The Utility reserves the right to immediately halt any discharge that is an imminent danger to the system or users of the system and seek injunctive relief.

7.12 SPECIAL RATES

(1) Discharge into the sanitary sewers of certain waters or wastes is prohibited or limited under the provisions of Section 5 of this article. A Surcharge shall be imposed upon customers discharging abnormal strength wastes. The term "abnormal strength wastes" as used herein shall refer to the degree of

concentration of permissible waste material per unit volume of sewage discharge by the customer.

(a) Abnormally high-strength waste shall be waste containing a BOD above three hundred (300) mg/l and/or suspended solids above three hundred (300) mg/l and/or a COD above four hundred (400) mg/l and/or Total Nitrogen above thirty (30) mg/l and/or Total Phosphorous (As P) greater than ten (10) mg/l.

(2) Surcharge for high-strength wastes.

(a) A surcharge will be imposed where the wastes from any lot or parcel of land upon which there is located any institutional, commercial, or industrial plant building or premises, containing an abnormally high BOD and/or suspended solids concentration and/or COD and/or Total Nitrogen and/or Total Phosphorous concentration as defined in Section 12(1).

(b) Computation: Said Surcharge in dollars shall be computed by the Utility, using the following formulas:

Surcharge for B.O.D. = (Q)(8.34)(B.O.D.-300)(.9)(SF BOD)

Surcharge for suspended solids = (Q)(8.34)(S.S. - 300)(.9)(SF SS)

Surcharge for C.O.D. = (Q)(8.34)(C.O.D. - 400)(.9)(SF COD)

Surcharge for Total Nitrogen = (Q)(8.34)(Total N-30)(.9)(SF TotalN)

Surcharge for Total Phosphorous = (Q)(8.34)(Total P-10)(.9)(SF TotalP)

Where:

- Q = The metered water used during the billing period in millions of gallons, divided by the number of days in that billing period.
- SF = Surcharge factor.
- It is understood that if the value for (B.O.D. - 300), (SS - 300), (C.O.D. - 400), (Total N-30), or (Total P-10) is less than or equal to zero that respective Surcharge shall equal zero also.

(3) Surcharge factors: The Surcharge factors shall be derived annually by the following formulas using total figures for the preceding fiscal year:

(a) Surcharge factor for B.O.D. = SF B.O.D. = total operational cost of the sewage treatment plant divided by the total pounds of B.O.D. removed.

(b) Surcharge factor for suspended solids = SF S.S. = total operational cost of the sewage treatment plant divided by the total pounds of suspended solids removed.

(c) Surcharge factor for C.O.D. = SF C.O.D. = total operational cost of the sewage treatment plant divided by the total pounds of C.O.D. removed.

(d) Surcharge factor for Total Nitrogen = SF Total N = total operational cost of the sewage treatment plant divided by the total pounds of Total Nitrogen removed.

(e) Surcharge factor for Total Phosphorous = SF Total P = total operational cost of the sewage treatment plant divided by the total pounds of Total Phosphorous removed.

(4) All users of the sewage system affected by the above described Surcharge shall be allowed ninety (90) days in which to comply with the provisions of this section. If at the end of 90 days, compliance has not been achieved, the Surcharge shall be applied for the time period beginning when the high-strength waste was first identified. The waste strength identified at the beginning of the 90 days shall be used in the Surcharge calculation.

(5) Any user of the sewage system identified as having high-strength waste must provide at least 30 consecutive days of sampling results, the average of which will be used in determining waste strength before the Surcharge will be revised. In the absence of such data, the Surcharge will be revised once each year based on Surcharge factors derived from figures for the preceding fiscal year and waste strength determined from analysis of three consecutive 24-hour composite samples collected during the year.

(6) Nothing in Section 12 of this article shall restrict the Utility from making additional adjustments in rates if it is felt by the Utility that the nature or quantity of this waste creates an additional burden on the system.

7.13 APPLICATION OF ARTICLE PROVISIONS

The use of Utility wastewater facilities by any entity shall subject that entity to the application of this article. This shall include, but not be limited to, wholesale, retail, and large agreement users.

7.14 PROTECTION FROM DAMAGE

No unauthorized person shall willfully, or negligently break, damage, destroy, uncover, deface, or tamper with any structure, appurtenance, or equipment which is part of the sewage collection system or treatment facilities.

7.15 POWER AND AUTHORITY OF INSPECTORS

(1) As a condition of connection, the user shall permit the Utility personnel bearing proper credentials and identification to enter all properties for the purposes of inspection, observation, measurement, sampling, and testing in accordance with the provisions of this article. The Utility shall have no authority to inquire into any processes including metallurgical, chemical, oil, refining, ceramic, paper or other industries beyond that point having a direct bearing on the kind and source of discharge to the sewers or water-ways or facilities for waste treatment.

(2) While performing the necessary work on private properties referred to in Section 15(1) above, duly authorized employees of the Utility shall observe all safety rules applicable to the premises established by the company and the company shall be held harmless for injury or death to the Utility employees and the Utility shall indemnify the company against loss or damage to its property by Utility employees and against liability claims and demand for personal injury or property damage asserted against the company and growing out of the gauging and sampling operation, except as such may be caused by negligence or failure of the company to maintain safe conditions.

(3) The duly authorized employees of the Utility bearing proper credentials and identification shall be permitted to enter all private properties through which the Utility holds a duly negotiated easement for the purposes of, but not limited to, inspection, observation, measurement, sampling, repair and maintenance of any portion of the sewage works lying within said easement. All entry and subsequent work, if any, on said easement shall be done in full accordance with the terms of the duly negotiated easement pertaining to the private property involved.

7.16 APPLICABILITY OF REGULATIONS

Regulations of this article shall apply to all users of the sewer facilities.

7.17 PENALTIES

(1) Any person found to be violating any provision of this article except Section 15 shall be served by THE CITY OF PALM COAST with written notice stating the nature of the violation and providing a reasonable time limit for the satisfactory

correction thereof. The offender shall, within the period of time stated in such notice, permanently cease all violations.

(2) Any person, who shall continue any violation beyond the time limit provided for in Section 17(1) above, shall be guilty of a CITY OF PALM COAST violation. THE CITY OF PALM COAST has complete authority to discontinue water and sewer service for any continuing violation.

(3) Publication in the local newspaper of significant noncompliance is required.

(4) Any person violating any of the provisions of this article shall become liable to THE CITY OF PALM COAST.

(5) Liability for any expense, loss, or damage occasioned by THE CITY OF PALM COAST by reason of such violation.

DIVISION 2

DESIGN STANDARDS/FORMS

Part 2
Forms

Return to:
City of Palm Coast Utility Dept.
2 Utility Drive
Palm Coast, FL 32137

CITY OF PALM COAST
BILL OF SALE

KNOW ALL MEN BY THESE PRESENTS:

That _____*(Developer Name)*_____, a *(Corporation, Governing Body, etc.)* organized and existing under and by virtue of the laws of the State of Florida, having its principal place of business in the City of *(City)*, and County of *(County)* in the State of Florida, party of the first part, for and in consideration of the sum of *(See Note 1)* Dollars ($_____), in lawful money (and other good and valuable considerations unto it moving) to it paid by THE CITY OF PALM COAST, of the City of Palm Coast, County of Flagler, and State of Florida, party of the second part, the sufficiency and receipt of which is hereby acknowledged by it, has granted, bargained, sold, transferred, set over and delivered, and by these presents does grant, bargain, sell, transfer, set over and deliver unto the party of the second part, *(Description of the facilities to be Dedicated)* and assigns all those certain goods and chattels, described as follows:

_____

Project Name *County* *System Connecting To:*

LIST OF MATERIALS *(See Note 2)*

Item	Description	Quantity	Unit	Unit Prices	Extended Price
1)					
2)					

TO HAVE AND TO HOLD the same unto the party of the second part, THE CITY OF PALM COAST and assigns forever.

And the party of the first part, for itself and its successors, hereby covenants to and with the party of the second part, THE CITY OF PALM COAST, and assigns that it is the lawful owner of the said goods and chattels; that they are free from all liens and encumbrances; that it has good right to sell the same as aforesaid, and that it will warrant and defend the same against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, the party of the first part has caused its corporate name to be hereunto subscribed and its corporate seal to be affixed by its officer, hereunto duly authorized, this _____ day of _____, 20____.

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

Signed, sealed and delivered in the presence of:

Witnesses:

_____ _____

_____ *(Signature)*

(Signature)

Typed Name:
Name typed:

State of Florida)
County of _____)

The foregoing instrument was acknowledged before me this _____ day of _____ 20____ by _____ who is personally known to me or has produced _____ *(Type of identification)*, as identification and who did/did not take an oath.

_____
Name typed:
Notary Public
My Commission expires:

Note 1: $10.00 typical dollar amount.
Note 2: If item is too lengthy, create an Exhibit "A". Put name of project, date. Etc. on Exhibit "A" for reference.

This document should be returned to:

City of Palm Coast Utility Department
2 Utility Drive
Palm Coast, FL 32137

CITY OF PALM COAST
UTILITY EASEMENT

KNOW ALL MEN BY THESE PRESENTS: That, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable considerations in hand paid, the sufficiency and receipt of which is hereby acknowledged, _____ a _____existing under the laws of the State of _____ (the "Grantor") does hereby grant and bestow unto The City of Palm Coast, a Florida Corporation, its successors and assigns, a perpetual and unobstructed exclusive utility easement, free and clear of any and all encumbrances, for the purposes of installation and/or repair of water and sewer lines and facilities of every type or nature.

Together with the right of access to the said easement area over the abutting and proximate property of the Grantor for the purposes set both herein.

The easement hereby granted covers that certain property which is situate and being in _____ County, Florida, more particularly described on Exhibit "A" attached hereto and made a part hereof by this reference.

Grantor hereby covenants with The City of Palm Coast that it is lawfully seized and in possession of the real property herein described and that it has good and lawful right to grant the aforesaid easement.

IN WITNESS WHEREOF, Grantor has hereunto set its hand and seal this _____day of _____, 20____.

_____, Florida _____.
(Corporate Name) *(Corporation)*

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

Signed, sealed and delivered in the presence of:

Witnesses:

_____
(Signature)
Typed Name:

_____
(Signature)
Typed Name:

State of Florida)
County of _____)

The foregoing Easement was acknowledged before me, an officer duly authorized in the State and County aforesaid, to take acknowledgements, this _____ day of _____ 20 ____ by _____, as _____ *(Title)* of _____ *(Corporation)* who is personally known to me or has produced _____ *(Type of identification)*, as identification and who did/did not take an oath.

_____
Typed Name:
Notary Public
My Commission expires:

ONE-YEAR WARRANTY

Date: _____

City of Palm Coast Utility Department
2 Utility Drive
Palm Coast, FL 32137

To Whom It May Concern:

Please consider this a letter of guarantee for work performed at:

(Project Name and System)

This guarantee consists of a one (1) year warranty on material, labor and all appurtenances of the sanitary sewer and/or water facilities presently installed on the premises. Specifically, all sanitary sewer and water facilities presently installed are guaranteed for the identical time limitation of one (1) year.

This guarantee is associated with the maintenance bond issued on _____(Date) by _____(Surety) issued in favor of The City of Palm Coast related to the project.

_____
Typed Name:
Typed Title:
Typed Company:

State of Florida)
County of _____)

The foregoing instrument was acknowledged before me this _____ day of _____, 20 ____ by _____ *(Title)* of _____ *(Corporation)* who is personally known to me or has produced _____ *(Type of identification)*, as identification and who did/did not take an oath.

_____
Typed Name:
Notary Public
My Commission expires:

This document should be returned to:

City of Palm Coast Utility Department
2 Utility Drive
Palm Coast, FL 32137

CITY OF PALM COAST
WAIVER OF LIEN

Know all men by these presents, that _____
(Company/Individual Name)

for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, in hand paid, the sufficiency and receipt whereof is hereby acknowledged, and for the benefit of The City of Palm Coast, Florida does hereby waive, release, remise and relinquish any and all right to claim any lien or liens for work done or material furnished, or any kind or class of lien whatsoever on the following described property:

Dated this _____ day of _____, 20_____.

By: _____
Typed Name:
Typed Title:
Typed Company:

Signed, sealed and delivered in the presence of:

_____
(Witness)
Typed Name:

_____
(Witness)
Typed Name:

State of Florida)
County of _____)

The foregoing instrument was acknowledged before me this _____ day of _____ 20 ____
_____ by _____ *(Title)* of _____ *(Corporation)*
who is personally known to me or has produced _____*(Type of identification)*, as identification and who did/did not take an oath.

_____
Typed Name:
Notary Public
My Commission expires:

Date: _____

City of Palm Coast Utility Department
2 Utility Drive
Palm Coast, FL 32137

RE: _____

To Whom It May Concern:

This letter is to certify that the water distribution system and the wastewater collection system for the _____ *(Project Name)* _____ has been constructed in substantial compliance with the approved plans.

_____
(Engineer's Signature)

Typed Name:
Typed Title:
Typed Company:

City of Palm Coast Utility Department
CLOSE OUT CHECKLIST

Project Number:

Project Name:

Item Received	Item Required	Description
/ /	YES	EASEMENT (S) DEDICATED TO CITY OF PALM COAST (DEV / OWNER) ***NEED ORIGINAL DOCUMENT*** PLAT FOR SUBDIVISIONS ***COPY***
/ /	YES	CONTRACTOR'S LETTER OF WARRANTY (SIGNED/SEALED/NOTORIZED) ***NEED ORIGINAL DOCUMENT***
/ /	YES	CONTRACTOR'S WAIVER AND RELEASE OF LIEN ***NEED ORIGINAL DOCUMENT***
/ /	YES	ENGINEER'S LETTER OF CERTIFICATION (SIGNED/SEALED) ***COPY OR ORIGINAL***
/ /	YES	FINAL INSPECTION REPORT (CITY OF PALM COAST UTILITY DEPARTMENT)
/ /	YES	MANDREL, LOW PRESSURE AIR, TVing, LAMPING (GRAVITY): PRESSURE TEST (FM) (CONTRACTOR)
/ /	YES	LIFT STATION START UP REPORT AND OPERATION & MAINTENANCE MANUAL (Report for Grinder Stations) (CONTRACTOR)
/ /	YES	LIFT STATION CALCULATION WITH SHOP DRAWINGS (CONTRACTOR)
/ /	YES	FDEP CLEARANCE CERTIFICATION FOR WATER SYSTEM (ENG)
/ /	YES	FDEP CLEARANCE CERTIFICATION FOR WASTEWATER SYSTEM (ENG)
/ /	YES	BACTERIOLOGICAL TESTS (WATER MAIN) (CONTRACTOR) (1 DAY SAMPLE FOR RESTUARANTS)
/ /	YES	PRESSURE TESTS (PROVIDED BY CITY INSPECTOR)
/ /	YES	BILL OF SALE – WATER (DEV / OWNER) ***NEED ORIGINAL DOCUMENT***
/ /	YES	BILL OF SALE – SEWER (DEV / OWNER) ***NEED ORIGINAL DOCUMENT***
/ /	YES	BILL OF SALE – RECLAIM (DEV / OWNER) ***NEED ORIGINAL DOCUMENT***
/ /	YES	LOCATE WIRE TEST REPORT
/ /	YES	WARRANTY DEED (PUMP STATION) / AS-BUILT BOUNDARY SURVEY REQUIRED ***NEED ORIGINAL DOCUMENT***
/ /	YES	BACKFLOW CERTIFICATION

*** ALL DOCUMENTS MUST BE SUBMITTED IN ONE PACKAGE AND APPROVED PRIOR TO SERVICE ACTIVATION***

Comments:

Engineer's Letter of Certification

Date: _____

City of Palm Coast Utility Department
2 Utility Drive
Palm Coast, FL 32137

RE: _____

To Whom It May Concern:

This letter is to certify that the water distribution system and the wastewater collection system for the ____ _____ *(Project Name)* _____ has been constructed in substantial compliance with the approved plans.

_____
(Engineer's Signature)

Typed Name:
Typed Title:
Typed Company:

DIVISION 3

CONSTRUCTION SPECIFICATIONS

Part 1

General Construction Requirements

Section 10

GENERAL

10.1 GRADES, SURVEY LINES, AND PROTECTION OF MONUMENTS

10.1.1 GRADE

Benchmarks and base line controlling points shall be established prior to beginning work. Reference marks for lines and grades as the work progresses will be located so as 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. CONTRACTOR shall remove any obstructions placed contrary to this provision.

10.1.2 SURVEYS

The CONTRACTOR shall furnish and maintain, at his own expense, stakes and other such materials, and give such assistance, including qualified helpers, for setting reference marks to the satisfaction of THE CITY OF PALM COAST and the ENGINEER. The CONTRACTOR shall check such reference marks by such means as he may deem necessary and, before using this, shall call THE CITY OF PALM COAST'S attention to any inaccuracies. The CONTRACTOR shall, at his own expense, establish all working or construction lines and grades as required from the reference marks, and shall be solely responsible for the accuracy thereof. The CONTRACTOR shall, however, be subject to the check and review of THE CITY OF PALM COAST.

10.1.3 MONUMENT PRESERVATION

Property corners and survey monuments shall be preserved using care not to disturb or destroy them. If a property corner or survey monument is disturbed or destroyed during construction, whether by accident, careless work, or required to be disturbed or destroyed by the construction work, said property corner or survey monument shall be restored by a land surveyor registered in the State of Florida. All costs for this work shall be paid for by the CONTRACTOR.

10.2 UTILITY COORDINATION

10.2.1 LOCATION OF UTILITIES

Prior to proceeding with trench excavation the CONTRACTOR shall contact all utility companies in the area to aid in locating their underground services. It shall be the CONTRACTOR'S responsibility to contact utility companies at least three (3) normal working days before starting construction. The CONTRACTOR shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground utilities may be determined.

The CONTRACTOR shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, the CONTRACTOR shall immediately notify the responsible official of the organization operating the interrupted utility. The CONTRACTOR shall lend all possible assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services.

10.2.2 DEVIATIONS OCCASIONED BY STRUCTURES OR UTILITIES

Wherever obstructions are encountered during the progress of the WORK and interfere to such an extent that an alteration in the PLANS is required, THE CITY OF PALM COAST shall have the authority to order a deviation from the line and grade. If a change in line or grade of a gravity sewer is necessary, THE CITY OF PALM COAST will require the addition of any manholes needed to maintain the integrity of the sewer system.

10.2.3 TEST PITS

Test pits for the purpose of locating underground pipeline, utilities, 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 CITY OF PALM COAST. The costs for such test pits shall be borne by the CONTRACTOR.

10.2.4 PROTECTION OF EXISTING CITY OF PALM COAST'S FACILITIES

Temporary support, adequate protection and maintenance of all underground and surface utility structures including sewers, manholes, hydrants, valves, valve covers, and miscellaneous other utility structures encountered in the progress of the WORK shall be furnished by the CONTRACTOR at his expense. Any such structures which may have been disturbed shall be restored upon completion of the WORK.

10.3 CONSTRUCTION IN EASEMENTS AND RIGHTS-OF-WAY

10.3.1 CONSTRUCTION IN EASEMENTS

In easements across private property, the CONTRACTOR shall confine all operations within the easement area and shall be responsible and liable for all damage outside of the easement area. Trees, fences, shrubbery or other type of surface improvements located in easements will require protection during construction. Precautions shall be taken by adequate sheeting or other approved method to prevent any cave-in or subsidence beyond the easement limits or damage to improvements within the easement. In general, the easement area is intended to provide reasonable access and working area for efficient operation by the CONTRACTOR. Where easement space for efficient operation is not provided, the CONTRACTOR shall be responsible for organizing his operations to perform within the restrictions shown on the PLANS.

10.3.2 CONSTRUCTION IN FLORIDA DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY

The CONTRACTOR shall conform to all requirements of the Florida Department of Transportation where construction work is in a right-of-way under the jurisdiction of the State of Florida.

10.3.3 CONSTRUCTION IN COUNTY RIGHT-OF-WAY

WORK shall be governed by the applicable county right-of-way utilization regulations.

10.4 SUSPENSION OF WORK DUE TO WEATHER

During inclement weather, all WORK which might be damaged or rendered inferior by such weather conditions shall be suspended. During suspension of the WORK from any cause, the WORK shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise.

10.5 COOPERATION WITH OTHER CONTRACTORS AND FORCES

During construction progress, it may be necessary for persons employed by THE CITY OF PALM COAST to work in or about the site. THE CITY OF PALM COAST reserves the right to access to the construction site at such times as THE CITY OF PALM COAST deems proper. The CONTRACTOR shall not impede or interfere with and shall cooperate with THE CITY OF PALM COAST for proper execution of the WORK.

10.6 SUBSURFACE EXPLORATION

The CONTRACTOR shall conduct subsurface explorations as necessary to perform the WORK.

10.7 SALVAGE

Any existing CITY OF PALM COAST owned equipment or material including, but not limited to, pumps, motors, control panels, valves, pipes, fittings, couplings, etc., which are removed or replaced as a result of construction, may be designated as salvage by THE CITY OF PALM COAST. If considered as salvage, the material shall be carefully excavated if necessary and delivered to THE CITY OF PALM COAST at a location designated by THE CITY.

10.8 SHOP DRAWINGS AND SAMPLES

The CONTRACTOR shall submit, upon request, up to eight (8) copies of the shop drawings, signed by the DEVELOPER'S ENGINEER, to THE CITY OF PALM COAST for approval. The data shown on the shop drawings shall be complete with respect to dimensions, design criteria, materials of construction and the like to enable review of the information as required.

The CONTRACTOR shall, if requested by THE CITY OF PALM COAST, furnish certificates, affidavits of compliance, test reports, or samples for any of the materials specified in this MANUAL.

Section 11

SITE PREPARATION – CLEARING AND GRUBBING

11.1 GENERAL

This Section covers clearing, grubbing, and stripping of the construction sites. The CONTRACTOR shall clear and grub all of the area within the limits of construction as shown on the PLANS and approved by THE CITY OF PALM COAST prior to the beginning of any WORK. All site work shall conform to the applicable site clearing, landscaping and tree ordinances of THE CITY OF PALM COAST.

11.2 CLEARING AND GRUBBING

11.2.1 CLEARING

The surface of the ground for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. Protect trees, shrubs, vegetative growth and fencing which are not called out for removal. Clearing operations shall be conducted so as to prevent damage to existing structures, installations and to those under construction, so as to provide for the safety of employees and others.

11.2.2 GRUBBING

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground. All depressions excavated below the original ground surface for or by the removal of such objects shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

11.2.3 STRIPPING

In areas so designated, top soil shall be stripped and stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all WORK is in place shall be disposed of by the CONTRACTOR unless directed otherwise by THE CITY OF PALM COAST.

Section 12

EXCAVATION, BACKFILL, COMPACTION, GRADING AND RESTORATION

12.1 GENERAL

This Section covers excavation, backfill, compaction, grading and restoration associated with utility trench and structural construction. All such WORK shall be performed by the CONTRACTOR concurrently with the WORK specified in these SPECIFICATIONS. The CONTRACTOR shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, compaction, grading and slope protection required to complete the WORK shown on the DRAWINGS and specified herein. The WORK shall include, but not necessarily be limited to: pump stations, manholes, vaults, conduit, pipe, roadways and paving; all backfilling, fill and required borrow; grading; disposal of surplus and unsuitable materials; and all related WORK such as sheeting, bracing and water handling.

12.2 SOIL BORINGS AND SUBSURFACE INVESTIGATIONS

Subsurface exploration and geotechnical engineering evaluation where provided is for the CONTRACTOR'S information only. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings.

The CONTRACTOR shall examine the site and undertake additional subsurface investigations including soil borings, if so desired, before commencing the WORK. THE CITY OF PALM COAST will not be responsible for presumed or existing soil conditions in the WORK area.

12.3 EXISTING UTILITIES

CONTRACTOR shall locate existing utilities in the areas of WORK. If utilities are to remain in place, the CONTRACTOR shall provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, the CONTRACTOR shall consult the owner of such piping or utility immediately for directions. Payment for damage and repair to such piping or utilities is the CONTRACTOR'S responsibility. Refer to Section 10 for utility coordination requirements.

THE CITY OF PALM COAST shall not be responsible for uncharted or incorrectly charted water and wastewater mains or other utilities. It is the CONTRACTOR'S responsibility to ensure that such facilities exist at the presumed point prior to commencing construction.

12.4 MATERIALS

12.4.1 GENERAL

Materials for use as bedding and backfill, whether insitu or borrow, shall be as described under this Section. The CONTRACTOR shall upon request by THE CITY OF PALM COAST, make an appropriate sample of this material available for testing by THE CITY or its designated representative.

12.4.2 STRUCTURAL FILL

Materials for structural fill shall be bedding rock or select common fill as specified herein or other suitable material as approved by THE CITY OF PALM COAST.

12.4.3 COMMON FILL

Common fill shall consist of material substantially free of clay, organic material, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Common fill shall not contain stones larger than 4 inches in any dimension, asphalt, broken concrete, masonry, rubble or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling. Additionally, common fill shall be no more than 12 percent by weight finer than the No. 200 mesh sieve unless finer material is approved for use in a specific location by THE CITY OF PALM COAST.

12.4.4 SELECT COMMON FILL

Select common fill shall consist of material substantially free of clay, organic material, loam, wood, trash and other objectionable material which may be compressible or which cannot be compacted properly. Select common fill shall contain no stones larger than 1-1/2 inches in largest dimension, and shall be no more than 5 percent by weight finer than the No. 200 mesh sieve.

12.4.5 BEDDING ROCK

Bedding rock shall be 3/16 inch to 1 inch washed and graded stone (FDOT #57). This stone shall be graded so that 90 to 100 percent will pass a 1 inch screen and 95 to 100 percent will be retained on a No. 8 screen. No stones larger than 1 inch in any dimension shall be accepted.

12.5 SHEETING AND BRACING IN EXCAVATIONS

12.5.1 GENERAL

If required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures and workers, existing piping and/or foundation material from disturbance, undermining or other damage, the CONTRACTOR shall construct, brace and maintain cofferdams consisting of sheeting and bracing. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

12.5.2 MISCELLANEOUS REQUIREMENTS

For trench sheeting for pipes, no sheeting shall be withdrawn if driven below mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by THE CITY OF PALM COAST. If during the progress of the WORK, THE CITY OF PALM COAST decides that additional wood sheeting shall be left in place, it may direct the CONTRACTOR to do so. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by THE CITY OF PALM COAST for an alternate method of removal. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction of other structures, utilities, existing piping or property. Unless otherwise approved or indicated in the DRAWINGS or in the SPECIFICATIONS, all sheeting and bracing shall be removed after completion of the substructure. All voids left or caused by withdrawal of sheeting shall be immediately refilled with a water and sand mixture introduced by ramming with tools specially adapted to that purpose.

The right of THE CITY OF PALM COAST to order sheeting and bracing left in place shall not be construed as creating any obligation on its part to issue such orders, and its failure to exercise its right to do so shall not relieve the CONTRACTOR from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the CONTRACTOR to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

The CONTRACTOR shall construct the cofferdams and sheeting outside the neat lines of the foundation unless otherwise to the extent he deems it desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction already performed. Any movement or bulging which may occur shall be corrected by the CONTRACTOR at his own expense so as to provide the necessary clearances and dimensions.

12.6 DEWATERING, DRAINAGE AND FLOTATION

12.6.1 GENERAL

The CONTRACTOR shall excavate, construct and place all pipelines, concrete work, fill, and bedding rock, in-the-dry. In addition, the CONTRACTOR shall not install the final 24-inches of excavation until the water level is a minimum of one foot below the proposed bottom of excavation. For purposes of these SPECIFICATIONS, "in-the-dry" is defined to be within 2% of the optimum moisture content of the soil. THE CITY OF PALM COAST reserves the right to ask the CONTRACTOR to demonstrate that the water level is a minimum of one foot below proposed bottom of excavation before allowing the construction to proceed.

Discharge from dewatering shall be disposed of in such a manner that it will not interfere with the normal drainage of the area in which the WORK is being performed, create a public nuisance, or form ponding. No flooding of streets, driveways or private property will be permitted. The operations shall not cause injury to any portion of the WORK completed, or in progress, or to the surface of streets, or to private property. The dewatering operation shall comply with the requirements of appropriate regulatory agencies. Additionally, where private property will be involved, advance permission shall be obtained by the CONTRACTOR. Engines driving dewatering pumps shall be equipped with residential type mufflers. Where feasible, electrical "drops" shall be used in lieu of portable generators.

12.6.2 ADDITIONAL REQUIREMENTS

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. The CONTRACTOR shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipelines to be built thereon have been completed.

Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at the proposed bottom of the excavation.

It is expected that wellpoints will be required for dewatering of the soils prior to final excavation for deeper in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed. Dewatering will be employed to such an extent that the structure, pipeline or fill will not be floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and negligible fines shall be removed by pumping.
The use of wrapped underdrains or "socks" for dewatering will only be considered if used a substantial distance from the edge of pavement or structures. Consult THE CITY OF PALM COAST before using such a system.

The CONTRACTOR shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.

If required during backfilling and construction, water levels shall be measured in observation wells located as directed by THE CITY OF PALM COAST.

Continuous pumping will be required as long as necessary until completion of below grade activity.

12.7 EXCAVATION

12.7.1 EXCAVATION FOR STRUCTURES

All such excavations shall conform to the elevations and dimensions shown on the DRAWINGS within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of formwork, installation of services and other construction, inspection or as shown on the DRAWINGS. In excavating for footings and foundations, care shall be exercised not to disturb the bottom of the excavation. The bottom of excavations shall be rendered firm and dry before placing any structure or concrete.

12.7.2 TRENCH EXCAVATION

Excavation for all trenches required for the installation of utility pipes shall be made to the depths indicated on the DRAWINGS and in such manner and to such widths as will give suitable room for installing 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 and in all respects acceptable to THE CITY OF PALM COAST.

Excavation shall not exceed normal trench width or depth as specified in the STANDARD DETAILS. Any excavation which exceeds the normal trench depth shall require special backfill requirements as determined by THE CITY OF PALM COAST.

Where pipes are to be installed on bedding rock, select common fill or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

Where pipes are to be installed directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated shall be done manually in such in a manner that will give a shaped bottom,

true to grade, so that pipe can be evenly supported on undisturbed material, as specified in the STANDARD DETAILS. Bell holes shall be made as required.

12.8 BEDDING AND BACKFILL

12.8.1 GENERAL

Material placed in fill areas under and around structures and pipelines shall be deposited within the lines and to the grades shown on the DRAWINGS or as directed by THE CITY OF PALM COAST, making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by THE CITY OF PALM COAST. If sufficient select common or common fill material is not available from excavation on site, the CONTRACTOR shall provide fill as may be required.

Fill shall be brought up in substantially level lifts starting in the deepest portion of the fill. The entire surface of the WORK shall be maintained free from ruts and in such condition that construction equipment can readily travel over any section.

Fill shall be placed and spread in layers by a backhoe or other approved method, unless otherwise specified. Prior to the process of placing and spreading, all materials not meeting those specified under Section 12.4 shall be removed from the fill areas. The CONTRACTOR shall assign a sufficient number of men to this WORK to insure satisfactory compliance with these requirements.

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.

All fill materials shall be placed and compacted "in-the-dry." The CONTRACTOR shall dewater excavated areas as required to perform the work and in such manner as to preserve the undisturbed state of the natural organic soils.

Prior to filling, the ground surface shall be prepared by removing vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials. CONTRACTOR shall plow strip or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with the existing surface. When existing ground surface has a density less than that specified under Section 12.9 for the particular area classification, CONTRACTOR shall break up the ground surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.

Before compaction, material shall be moistened or aerated as necessary to provide the optimum moisture content. Material which is too wet shall be spread on the fill area and permitted to dry, assisted by harrowing if necessary, until the moisture content is reduced to allowable limits. If added moisture is required, water shall be applied by

sprinkler trucks or other sprinkler systems, which will insure uniform distribution of the water over the area to be treated and give complete and accurate control of the amount of water to be used. If too much water is added, the area shall be permitted to dry before compaction is continued. The CONTRACTOR shall supply all hose, piping, valves, sprinklers, pumps, sprinkler trucks, hauling equipment and all other materials and equipment necessary to place water on the fill in the manner specified. CONTRACTOR shall compact each layer to required percentage of maximum dry density or relative dry density in accordance with Section 12.9. Backfill or fill material shall not be placed on surfaces that are muddy, frozen or contain frost or ice.

12.8.2 BEDDING AND BACKFILL FOR STRUCTURES

Bedding rock shall be used for bedding under all structures as indicated on the STANDARD DETAILS. The CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed. Structural fill shall be used as backfill against the exterior walls of the structures. Fill shall be compacted sufficiently in accordance with Section 12.9 of these SPECIFICATIONS. If compaction is by rolling or ramming, material shall be wet down as required.

Backfilling shall be carried up evenly on all walls of an individual structure. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength.

In locations where pipes pass through building walls, the CONTRACTOR shall take precautions to consolidate the fill up to an elevation of at least one (1) foot above the bottom of the pipes. Structural fill in such areas shall be placed for a distance of not less than three (3) feet either side of the center line of the pipe in level layers not exceeding eight (8) inches in depth.

The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the DRAWINGS. No soft spots or uncompacted areas will be allowed in the WORK.

Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

12.8.3 BEDDING AND BACKFILL FOR PIPES

Bedding for pipe shall be as shown on the PLANS and detailed on the STANDARD DETAILS. The CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

Backfilling over and around pipes shall begin as soon as practicable after the pipe has been installed, jointed and inspected. All backfilling shall be prosecuted expeditiously and as detailed on the STANDARD DETAILS.

Any space remaining between the pipe and sides of the trench shall be carefully backfilled and spread by hand or approved mechanical device and thoroughly compacted with a tamper as fast as placed, up to a level of one (1) foot above the top of the pipe. The filling shall be carried up evenly on both sides. Compaction shall be in accordance with the STANDARD DETAILS and Section 12.9.

The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted in uniform layers. Compaction shall be in accordance with the STANDARD DETAILS and Section 12.9.

12.9 COMPACTION

12.9.1 GENERAL

The CONTRACTOR shall control soil compaction during construction to provide the percentage of maximum density specified. The CONTRACTOR shall provide THE CITY OF PALM COAST copies of all soils testing reports prepared by a GEOTECHNICAL/SOILS ENGINEER, demonstrating compliance with these SPECIFICATIONS.

When existing trench bottom has a density less than that specified under Section 12.9.2, the CONTRACTOR shall break up the trench bottom surface, pulverize, moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.

12.9.2 PERCENTAGE OF MAXIMUM DENSITY REQUIREMENTS

Haunching material from the bottom of the pipe trench to the springline of the pipe shall be bar tamped. Fill from the springline of the pipe to one (1) foot above the pipe, shall be compacted to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180.

Non-Paved Areas: Backfill from one (1) foot above utility pipe to grade shall be compacted to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180.
Paved Areas: Backfill from one (1) foot above utility pipe to bottom of subgrade shall be compacted to a minimum density of 98% of the maximum dry density as determined by AASHTO T-180.

Fill under and around structures, and to the extent of the excavation, shall be compacted to a minimum density of 95% of the maximum dry density as determined by AASHTO T-180.

12.9.3 COMPACTION TESTS

One compaction test location shall be required for each 300 linear feet of pipe and for every 100 square feet of backfill around structures, as a minimum. THE CITY OF PALM COAST may determine that more compaction tests are required to certify the installation depending on field conditions. The locations of compaction tests within the trench shall be in conformance with the following schedule:

a. One test at an elevation of one foot above the top of the pipe.

b. One test for each two feet of backfill placed from one foot above the top of the pipe to finished grade elevation.

If based on GEOTECHNICAL/SOILS ENGINEER testing reports and inspection, fill which has been placed is below specified density, CONTRACTOR shall provide additional compaction and testing prior to commencing further construction.

12.10 GRADING

All areas within the limits of construction, including transition areas, shall be uniformly graded to produce a smooth uniform surface. Areas adjacent to structures or paved surfaces shall be graded to drain away from structures and pavement. Ponding shall be prevented. After grading, the area shall be compacted to the specified depth and percentage of maximum density.

No grading shall be done in areas where there are existing pipelines that may be uncovered or damaged, until such lines have been relocated.

12.11 MAINTENANCE

CONTRACTOR shall protect newly graded areas from traffic and erosion and keep them free of trash and debris. CONTRACTOR shall repair and reestablish grades in settled, eroded and rutted areas.

Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, CONTRACTOR shall scarify surface, reshape and compact to required density prior to further construction.

12.12 INSPECTION AND QUALITY ASSURANCE

12.12.1 INSPECTION

THE CONTRACTOR shall examine the areas and conditions under which excavating, filling and grading are to be performed, and not proceed with the WORK until unsatisfactory conditions have been corrected.

THE CONTRACTOR shall examine existing grade prior to commencement of WORK and report to THE CITY OF PALM COAST if elevations of existing grade vary from elevations shown on DRAWINGS.

12.12.2 QUALITY ASSURANCE

All work shall be performed in compliance with applicable requirements of governing authorities having jurisdiction.

The CONTRACTOR, at its expense, shall engage soil testing and inspection services for quality control testing during earthwork operations. The testing and inspection service shall be subject to the approval of THE CITY OF PALM COAST.

Quality control testing shall be performed during construction to ensure compliance with these SPECIFICATIONS. CONTRACTOR shall allow the testing service to inspect and approve fill materials and fill layers before further construction is performed. The CONTRACTOR shall give copies of all test results in a report form to THE CITY OF PALM COAST to demonstrate compliance with compaction requirements stipulated in this MANUAL.

Section 13

BORING AND JACKING

13.1 GENERAL

The installation of a casing pipe by the method of boring and jacking shall be covered by these SPECIFICATIONS. The overall work scope shall include, but not be limited to, boring and jacking pits and equipment, sheeting, steel casing pipe, spacers, coatings, location signs as required, miscellaneous appurtenances to complete the entire WORK as shown on the STANDARD DETAILS, and restoration. Applicable provisions of Division 3 shall apply concurrently with these SPECIFICATIONS. Boring and jacking operations shall be performed within the right-of-way and/or easements shown on the DRAWINGS.

13.2 PIPE MATERIAL

13.2.1 STEEL CASING

Steel casings shall conform to the requirements of ASTM A53 or AWWA C202, latest editions, for mill pipe; and ASTM A139 or AWWA C201, latest editions, for fabricated pipe, Grade "B" with minimum yield strength of 35,000 psi. The casing pipes shall have the minimum nominal diameter and wall thickness as shown on the following table:

Carrier Pipe Nominal Diameter	Casing Outside Diameter	Casing Wall Thickness (Hwy)	Casing Wall Thickness (RR)
4"	14"	.250"	.250"
6"	16"	.250"	.250"
8"	18"	.250"	.312"
10"	22"	.250"	.375"
12"	24"	.250"	.375"
14", 16"	30"	.312"	.500"
18", 20"	36"	.375"	.563"
24"	48"	.500"	.625"

The inside diameter of the casing pipe shall be a minimum of 3 inches greater than the outside diameter of the carrier pipe bell or coupling.

Field and shop welds of the casing pipes shall conform to the American Welding Society (AWS) standard specifications. Field welds shall be complete penetration, single-bevel groove type joints. The sections of steel casing shall be field welded in accordance with the applicable portions of AWWA C206 and AWS D7.0 for field welded pipe joints. Welds shall be airtight and continuous over the entire circumference of the pipe and shall not increase the outside pipe diameter by more than 3/4 inch. CONTRACTOR shall wire brush the welded joints and paint with Inertol Quick-Drying Primer 626 by Koppers Company or approved equal. After completion of jacking, CONTRACTOR shall clean the interior of the casing of all excess material.

13.2.2 CARRIER PIPE

The carrier pipe shall be restrained joint, minimum Pressure Class 350 ductile iron pipe. The carrier pipe may also be AWWA C-900 PVC pipe with restrained joints if used for raw water mains to Water Plant No. 2. Pipe shall comply with the specification outlined in Division 3, Section 20, of these SPECIFICATIONS.

13.2.3 INSPECTION

All casing pipe to be installed may be inspected at the site of manufacture for compliance with these SPECIFICATIONS by an independent laboratory selected and paid for by THE CITY OF PALM COAST. The manufacturer's cooperation shall be required in these inspections.

All casing pipe shall be subjected to a careful inspection prior to being installed. If the pipe fails to meet the specifications, it shall be removed and replaced with a satisfactory replacement at no additional expense to THE CITY OF PALM COAST.

13.3 PIPE HANDLING

Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe shall not be dropped. All pipes shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe or coatings shall be repaired to the satisfaction of THE CITY OF PALM COAST.

13.4 CONSTRUCTION REQUIREMENTS

13.4.1 WORK COORDINATION

It shall be the CONTRACTOR'S responsibility to perform the boring and jacking work in strict conformance with the requirements of the agency in whose right-of-way or easement the work is being performed. Any special requirements of the agency such as insurance, flagmen, etc., shall be strictly adhered to during the performance of WORK. The special requirements shall be performed by the CONTRACTOR at no additional cost to THE CITY OF PALM COAST.

13.4.2 DEWATERING

Dewatering through the casing during construction shall not be permitted. All dewatering methods shall be approved by THE CITY OF PALM COAST before construction work begins.

13.4.3 CARRIER PIPE SUPPORT

The carrier pipe shall be supported within the casing pipe so that the pipe bells do not rest directly on the casing. The load of the carrier pipe shall be distributed along the casing by casing spacers. Casing spacers shall be bolt on style split shells made of T-304 stainless steel. All nuts and bolts shall be stainless steel. Runners shall be made of a high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction.

13.4.4 JACKING PITS

Excavation adjacent to the roads shall be performed in a manner to adequately support the roads. Bracing, shoring, sheeting or other supports shall be installed as needed. CONTRACTOR shall install suitable reaction blocks for the jacks as required. Jacking operations shall be continuous and precautions shall be taken to avoid interruptions which might cause the casing to "freeze" in place. Upon completion of jacking operations, the reaction blocks, braces, and all other associated construction materials shall be completely removed from the site.

13.4.5 MISCELLANEOUS REQUIREMENTS

Correct line and grade shall be carefully maintained. A maximum tolerance of 0.12 foot per 100 linear feet of jacked casing is permitted. Earth within the casing shall not be removed too close to the cutting edge in order to prevent the formation of voids outside the casing. If voids are formed, they shall be satisfactorily filled with grout by pumping.

Masonry plugs using non-shrink grout shall be installed at each open end of the casing. Plugs shall be 12" thick and suitable for retaining the earth load while allowing drainage of the casing. See STANDARD DETAILS.

Section 14

PRESSURE PIPE RESTRAINT

14.1 GENERAL

Pressure pipe fittings and other items requiring restraint shall be braced with restraining assemblies as specified in this Section.

14.2 RESTRAINED JOINT CONSTRUCTION

Sections of piping requiring restrained joints shall be constructed using pipe and fittings with restrained "Locked-type" joints manufactured by the pipe and fitting manufacturer and the joints shall be capable of holding against withdrawal for line pressures of a minimum 150 psi. Mechanical joint ductile iron pipe retainer glands shall not be permitted. Any restrained joints that allow for elongation upon pressurization will not be allowed in those locations where the pipe comes out of the ground.

Restrained pipe joints that achieve restraint by incorporating cut out sections in the wall of the pipe shall have a minimum wall thickness at the point of cut out that corresponds with the minimum specified wall thickness for the remainder of the pipe.

The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.

The required lengths of restrained joint ductile iron pipe and PVC pipe shall be determined by the ENGINEER and shown in a tabular form as depicted on the "Restrained Joint Detail" in the STANDARD DETAILS.

Wherever two 45° bends are used in place of a 90° bend and the minimum length of restrained pipe required from one 45° bend extends beyond the other 45° bend, the two 45° bends will be considered as though a 90° bend were located midway between the two 45° bends.

14.3 MECHANICAL RESTRAINING DEVICES

14.3.1 GENERAL

Mechanical Restraining Devices as specified herein may be substituted for the restrained "Locked-Type" joints. The length of pipe to be restrained shall be based on the "Restrained Joint Detail" in the STANDARD DETAILS.

14.3.2 JOINT RESTRAINT DEVICE

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI A21.11 and ANSI/AWWA C153/A21.53. Twist-off nuts shall be used to insure proper actuating of the restraining devices.

The mechanical joint restraint device shall have a working pressure of at least 150 psi with a minimum safety factor of 2:1.

In addition to restraint devices for use with mechanical joints, restraint devices may also be used for "push-on" joints. Refer to "Restrained Joints" listing as shown within the Approved Materials List.

Section 15

CONNECTIONS TO PRESSURE MAINS

15.1 GENERAL

Installations of pressure connections 4" and larger shall be made in accordance with this Section. Services less than 4" shall incorporate a 4" connection, then reduce to the appropriate diameter for the service pipe at or beyond the property line.

15.2 TAPPING SLEEVES

15.2.1 GENERAL

Tapping sleeves shall be fabricated stainless steel sleeves as specified below. All pressure connections to asbestos cement pipe and all "size on size" taps shall utilize fabricated steel sleeves.

15.2.2 STAINLESS STEEL TAPPING SLEEVES

Sleeves shall be fabricated of 304L stainless steel. Outlet flange shall meet ANSI B16.1, Class 125, and in accordance with MSS-SP60. Sleeves shall be certified to ANSI/NSF 61. Gasket shall be vulcanized natural or synthetic rubber.

15.2.3 TAPPING VALVES

Tapping valves shall meet the requirements of Section 22 except that units shall be flange, with centering ring, by mechanical joint ends. Valves shall be compatible with tapping sleeves as specified above and specifically designed for pressure connection operations.

15.3 NOTIFICATION AND CONNECTION TO EXISTING MAINS

All connections to existing mains shall be made by the CONTRACTOR only after the connection procedure and his work scheduling has been reviewed and approved by THE CITY OF PALM COAST. The CONTRACTOR shall submit a written request to THE CITY OF PALM COAST a minimum of five (5) working days prior to scheduling said connections. In the request, the CONTRACTOR shall outline the following:

1. Points of connection, fittings to be used, and method of flushing and disinfection if applicable.
2. Estimated construction time for said connections.
3. Possible system pressure loss and/or shutdowns.

THE CITY OF PALM COAST shall review the submittal and inform the CONTRACTOR regarding approval or denial of their request. If the request is rejected by THE CITY OF PALM COAST, the CONTRACTOR shall resubmit his request modifying it in a manner acceptable to THE CITY OF PALM COAST.

All connections shall only be made on the agreed upon date and time. If the CONTRACTOR does not initiate and complete the connection work in the agreed upon manner, he shall be required to reschedule the said connection by following the procedure outlined above.

The CONTRACTOR shall not operate any valves in the system.

15.4 INSTALLATION

15.4.1 EXCAVATION, BACKFILL, COMPACTION AND GRADING

The applicable provisions of Section 12 shall apply.

15.4.2 CONSTRUCTION DETAILS

Sufficient length of main shall be exposed to allow for installation of the tapping sleeve and valve and the operation of the tapping machinery. The main shall be supported on concrete pedestals or bedding rock at sufficient intervals to properly carry its own weight, plus the weight of the tapping sleeve valve and machinery. Any damage to the main due to improper or insufficient supports shall be repaired at the CONTRACTOR'S expense.

The inside of the tapping sleeve and valve, the outside of the main, and the tapping machine shall be cleaned and swabbed or sprayed with a 10% liquid chlorine solution prior to beginning installation for water system pressure connections.

The tapping sleeve shall be installed a minimum of 3 feet from existing bell joints and fittings.

After the tapping sleeve has been mounted on the main, the tapping valve shall be bolted to the outlet flange, making a pressure tight connection. Prior to beginning the tapping operation, the sleeve and valve shall be pressure tested at 150 psi to ensure that no leakage will occur.

For pressure connections 12" diameter or less, the minimum diameter cut shall be 1/2" less than the nominal diameter of the pipe to be attached. For 14" through 20" installations, the minimum diameter shall be 1 1/2" less; for larger taps, the allowable minimum diameter shall be 2" to 3" less than the nominal diameter of the pipe being attached. After the tapping procedure is complete, the CONTRACTOR shall submit the coupon to THE CITY OF PALM COAST.

For pressure connections to wastewater force mains, the tapping valve shall be a resilient seat gate valve.

Adequate restrained joint fittings shall be provided to prevent movement of the installation when test pressure is applied. Provisions of Section 14 shall apply.

DIVISION 3

CONSTRUCTION SPECIFICATIONS

Part 2

Water Distribution Systems

Section 20

PIPE MATERIAL FOR WATER MAINS AND SERVICE CONNECTIONS

20.1 GENERAL

These SPECIFICATIONS cover the pipe, fittings, and accessory items used for water distribution systems.

Pipe used in water distribution systems shall be either polyvinyl chloride (PVC), ductile iron pipe (DIP), or high density polyethylene pipe (HDPE).

The CONTRACTOR shall be responsible for all materials furnished and storage of same, until the date of substantial completion. He shall replace at his expense all materials found to be defective or damaged in handling or storage. The CONTRACTOR shall, if requested by THE CITY OF PALM COAST, furnish certificates, affidavits of compliance, test reports, or samples for check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

20.2 PIPE INSPECTION AND TESTING

Requirements specified in Section 30 shall apply.

20.3 PVC PIPE

20.3.1 PVC PIPE

All PVC pipe of nominal diameter four (4) inches through sixty (60) inches shall be manufactured in accordance with AWWA Standard C900, latest edition. The PVC pipe shall be Pressure Class 150 and have a dimension ratio (DR) of 18. Pipe shall be the same O.D. as ductile iron pipe. Two (2) and three (3) inch PVC pipe shall conform to ASTM D2241. PVC pipe less than two (2) inches shall conform to ASTM D1785.

20.3.1.1 PVC pipe less than two (2) inches shall conform to ASTM D1785. Threaded pipe and fittings shall be SCH 80 and conform to ASTM D2464. Unthreaded pipe and fittings shall be SCH 40 with solvent cemented joints. Cemented joints and fittings shall comply with ASTM D2466 and D2855.

20.3.1.2 Two (2), two and one-half (2-1/2), and three (3) inch pipe shall conform to ASTM D2241. Pipe shall be furnished in 20-foot

lengths, shall have a dimension ratio of DR21, and a water pressure rating of 200 psi.

20.3.1.3 PVC pipe four (4) through sixty (60) inches shall be manufactured in accordance with AWWA C900, latest edition. The pipe shall be Pressure Class 150 and have a dimension ratio of DR18.

20.3.2 JOINTS

PVC pipe 2 inches and larger shall have integral bell and spigot push-on type joints conforming to ASTM D3139.

20.3.3 FITTINGS

Fittings used with PVC pipe shall conform to Section 20.4.

20.4 DUCTILE IRON PIPE & FITTINGS

20.4.1 DUCTILE IRON PIPE

All ductile iron pipe of nominal diameter four (4) through fifty-four (54) inches shall be designed and conform to ANSI/AWWA A21.50/C150 and ANSI/AWWA A21.51/C151. Pipe four (4) inches through twelve (12) inches shall be Pressure Class 350. Pipe larger than twelve (12) inches shall be Pressure Class 250.

20.4.2 FITTINGS

Any fittings required shall be mechanical joint ductile iron compact fittings in accordance with ANSI/AWWA A21.53/C153.

20.4.3 JOINTS

Joints for ductile iron pipe and fitting joints shall be push-on or mechanical joints conforming to ANSI/AWWA A21.11/C111. Where called for in the PLANS, restrained or flanged joints shall be provided. Flanged joints shall conform to ANSI Standard B 16.1-125 LB. Restrained joints shall conform to Section 14.

20.4.4 COATINGS AND LININGS

Where ductile iron pipe and fittings are installed below grade or installed in a casing pipe, a bituminous coating approximately 1.0 mil thick shall be applied to the exterior of the pipe in accordance with ANSI/AWWA A21.51/C151. Where ductile iron pipe and fittings are to be installed above grade, pipe, fittings and valves shall be thoroughly cleaned and given one field coat (minimum 3.0 mils dry thickness) of rust inhibitor primer. Intermediate and finished field coats of acrylic enamel shall also be applied by the CONTRACTOR. Primer and finished

field coats shall be compatible and shall be applied in accordance with the manufacturer's recommendations. Final field coat color shall be blue for finished water and green for raw water.

All ductile iron pipe and fittings shall have an interior protective lining of cement-mortar with a seal coat of asphaltic material in accordance with ANSI/AWWA A21.4/C104.

20.4.5 POLYETHYLENE ENCASEMENT

The pipe shall be polyethylene encased (8 mil) where shown on the DRAWINGS or required by THE CITY OF PALM COAST in accordance with ANSI/AWWA A21.51/C105. The bags shall be blue.

20.5 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

20.5.1 HDPE PIPE

All HDPE pipe of nominal diameter four (4) inch through sixty-three (63) inch shall conform to AWWA C906. The pipe shall have a ductile iron pipe OD, a minimum dimension ratio (DR) of 11 and Pressure Class 160 in accordance with Table 5 of AWWA C906.

20.5.2 FITTINGS

Mechanical joint ductile iron fittings shall be used with HDPE pipe with stiffener.

20.5.3 JOINTS

Sections of polyethylene pipe shall be joined by the butt fusion method and shall be in strict accordance with the pipe manufacturer's recommendations. Butt fusion shall result in a joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion will not be accepted. Extrusion welding or hot gas welding of HDPE shall not be used. Flanges, unions, grooved couplers, transition fittings, and some mechanical couplers may be used to connect HDPE pipe mechanically without butt fusion only where shown on the DRAWINGS.

Mechanical joint connections between ductile iron pipe or fittings and HDPE pipe or fittings shall use ductile iron mechanical joint glands conforming to AWWA C111 and AWWA C153. Mechanical joints shall be fully thrust restrained. Gaskets, bolts, hexagonal nuts, and rubber gaskets shall conform to AWWA C111. Follower gland shall match Class 350 "compact" fittings.

HDPE stiffeners shall be constructed of stainless steel and shall be flanged on one end to prevent over-insertion into the receiving pipe.

20.6 SERVICE PIPE, STOPS, FITTINGS, AND SERVICE SADDLES

20.6.1 SERVICE PIPE

All service lines shall be 1", 1-1/2" or 2" blue polyethylene tubing conforming to specifications in AWWA C800 and AWWA C901, DR9, Pressure Class 200.

20.6.2 STOPS

Corporation and curb stops shall be 1" or 2" brass, full port, equipped with connections for iron pipe threads (IPT) for attachment to the tapping saddle or meter assembly and pack joint coupling for connection to the polyethylene. The stops shall be in accordance with specifications in AWWA C800 and AWWA C901.

20.6.3 FITTINGS

Fittings shall be brass, cast and machined in accordance with specifications in AWWA C800 and AWWA C901, with compatible polyethylene tubing connections.

20.6.4 SERVICE SADDLES

A service saddle shall be used for all service line taps. Service saddles shall be one of the following:

1. four (4) bolt pattern with brass strap on a fusion bonded epoxy coated ductile iron body.
2. four (4) bolt pattern with stainless steel strap on a fusion bonded epoxy coated ductile iron body.
3. hinged brass strap with brass body.
4. four (4) bolt pattern with stainless steel strap on a brass body.

The threads for the corporation stops shall be iron pipe only and the sealing gaskets shall be BUNA-N rubber.

Section 21

WATER MAIN INSTALLATION, DISINFECTION AND PRESSURE TESTING

21.1 GENERAL

Pipe shall be installed in accordance with the manufacturer's specifications and instructions for the type of pipe used and applicable AWWA standards, such as C600 and C603, unless otherwise stated in these SPECIFICATIONS.

21.2 PIPE HANDLING

All types of pipe shall be handled in such manner as will prevent damage to the pipe or coating. Accidental damage to pipe shall be repaired to the satisfaction of THE CITY OF PALM COAST or be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on properly prepared ground, graded to eliminate all rock points and to provide uniform support along the full length. When being transported, the pipe shall be supported at all times in a manner which will not permit distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of THE CITY OF PALM COAST, is damaged beyond repair by the CONTRACTOR, it shall be removed from the site of the work and replaced with another unit.

Joint gaskets shall be stored in clean, dark, dry location until immediately before use.

Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and reinstalled. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by THE CITY OF PALM COAST to ensure absolute cleanliness inside the pipe.

21.3 SEPARATION OF WATER MAINS AND SEWERS

21.3.1 GENERAL

Water mains that are installed in the vicinity of pipe lines designated to carry raw wastewater or reclaimed water (wastewater effluent) shall meet the horizontal and vertical separations specified below.

21.3.2 HORIZONTAL SEPARATION

A minimum horizontal separation of six (6) feet, and preferably ten (10) feet, between the outside of pipe to outside of pipe, shall be maintained between potable water piping and domestic wastewater gravity sewer, wastewater force

main or piping conveying restricted public access reclaimed water. The minimum horizontal separation between water mains and gravity sewer mains may be reduced to three (3) feet where the bottom of the water main is installed at least six (6) inches above the top of the sewer main.

A minimum horizontal separation of at least three (3) feet between the outside of the water main and the outside of storm sewer piping or piping carrying unrestricted public access reclaimed water shall be maintained.

A minimum horizontal separation of at least three (3) feet, and preferably ten (10) feet, between the outside of the water main and the outside of a vacuum-type sanitary sewer shall be maintained.

Deviations from these requirements and other alternatives may be considered on a case-by-case basis if supported by data from the design engineer and must receive specific approval by the Department of Environmental Protection prior to implementation.

No water main shall pass through or come in contact with any part of a sanitary sewer manhole or storm sewer structure.

21.3.3 VERTICAL SEPARATION

A minimum vertical separation of six (6) inches, and preferably twelve (12) inches above the utility, outside of pipe to outside of pipe, shall be maintained between potable water piping and wastewater gravity piping, vacuum-type sanitary sewer, or stormwater piping. The vertical separation shall be a minimum of twelve (12) inches if the water main passes below the utility.

A minimum vertical separation of twelve (12) inches, outside of pipe to outside of pipe, shall be maintained between water mains and wastewater or stormwater force mains and piping conveying restricted public access reclaimed water.

Pipes shall be located so that the joints are as far as possible from each other.

Special structural support or concrete saddles may be necessary at the pipe crossing location.

It is preferable to install the potable water main above the domestic wastewater, stormwater or reclaimed water main at crossings.

Deviations from the separation requirements and other alternatives may be considered on a case-by-case basis if supported by data from the design engineer and must receive specific approval from the Department prior to implementation.

No water main shall pass through or come in contact with any part of a sanitary sewer manhole or storm sewer structure.

21.4 TRENCH PREPARATION AND PIPE BEDDING

21.4.1 TRENCH PREPARATION AND PIPE BEDDING

Applicable provisions of Section 12 shall apply. Also refer to STANDARD DETAILS, FIGURE R-3.

21.4.2 PIPE PREPARATION AND HANDLING

All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken, or otherwise defective materials are being used. CONTRACTOR shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after installation.

CONTRACTOR shall use proper implements, tools, and facilities for the safe and proper protection of the WORK. CONTRACTOR shall lower pipe into the trench in such a manner as to avoid any physical damage to the pipe and shall remove all damaged pipe from the job site. Care shall be taken not to drop or dump pipe into trenches under any circumstances.

21.4.3 TRENCH DEWATERING AND DRAINAGE CONTROL

Specifications from Section 12 shall apply. CONTRACTOR shall prevent water from entering the trench during excavation and pipe installation operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be installed in water.

21.4.4 SURVEY LINE AND GRADE

Pipe shall be installed to the lines and grades shown on the PLANS. The CONTRACTOR shall provide line and grade stakes at a 100-foot maximum spacing and at all line and/or grade change locations. CONTRACTOR shall provide Temporary Bench Marks at maximum 1,000-foot intervals. The minimum pipe depth shall be three (3) feet below the finished grade surface or three (3) feet below the elevation of the edge of pavement of the road surface, whichever is greater.

21.4.5 PIPELAYING IN TRENCH

CONTRACTOR shall prevent foreign material from entering the pipe while it is being placed in the trench. CONTRACTOR shall remove all foreign material from the pipe or joint ring before the next pipe is placed. If the pipe laying crew cannot place the pipe into the trench without getting soil into the pipe, THE CITY

OF PALM COAST may require that snugly-fitted, tightly-woven canvas bags be placed over each end before lowering the pipe. The bags shall be left in place until the connection is to be made to the adjacent pipe. During laying operations, CONTRACTOR shall keep debris, tools, clothing, or other materials out of the pipe.

21.4.6 INSTALLING PVC PIPE

All PVC pipe shall be installed in accordance with standards set forth in the UNI-BELL "Handbook of PVC Pipe Design and Construction" unless such standards conflict with this MANUAL in which case this MANUAL shall apply.

21.4.7. BEDDING AND BACKFILL FOR PIPES

Requirements specified in Section 12 shall apply.

21.5 HYDROSTATIC TESTS (DUCTILE IRON & PVC PIPE)

21.5.1 GENERAL

Hydrostatic tests shall consist of pressure test and leakage test. Hydrostatic tests shall be conducted on all newly installed pressure pipes, joints, valves and all service lines from tapped connection to the curb stops. Tests may be made on sections not exceeding 2,000 feet, or as field conditions dictate. Length of pipe to be tested shall be acceptable to THE CITY OF PALM COAST. CONTRACTOR shall furnish all necessary equipment and material, make all taps, and furnish all closure pieces in the pipe as required. THE CITY OF PALM COAST will monitor and approve a satisfactory test.

The CONTRACTOR may conduct hydrostatic tests after the trench has been partially backfilled with the joints left exposed for inspection for his informational purposes only. The hydrostatic tests for acceptance shall only be conducted after the trenches have been completely backfilled and compacted as specified. Where any section of pipe is provided with concrete thrust blocking or encasement, pressure test will not be made until at least seven days have elapsed after the thrust blocking is installed. If high-early cement is used for the concrete thrust blocking, the time may be reduced to three days if THE CITY OF PALM COAST concurs that the concrete has cured and reached adequate strength.

Hyrdostatic testing of HDPE pipe used for horizontal directional drill shall include testing of the pipe above grade, prior to being pulled into bore hole. The pressure test shall be with water at 50 PSI for a duration of one (1) hour, or 5-10 psi for one (1) hour when using air.

21.5.2 TESTING CRITERIA

All pipe sections to be pressure tested, including water mains, reuse mains and force mains, shall be subjected to a hydrostatic pressure of 150 psi. The duration of each pressure test shall be for a period of 2 hours. If during the test, the integrity of the tested line is in question, THE CITY OF PALM COAST may require a 6-hour pressure test. The basic provisions of AWWA C-600 and C-605/M23 shall be applicable.

21.5.3 PROCEDURE FOR PRESSURE TEST

Each section of pipe to be tested, as determined by THE CITY OF PALM COAST, shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, and appropriate valves installed to ensure bleeding of all air from the main. If defective pipes, fittings, valves, or hydrants are discovered in consequence of this pressure test, all such items shall be removed and replaced by the CONTRACTOR with sound material and the test shall be repeated until satisfactory results are obtained. Provisions of AWWA C600 and C605/M23, where applicable, shall apply.

21.5.4 PROCEDURE FOR LEAKAGE TEST

After completion of the pressure test, a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. Applicable provisions of AWWA C600 and C605/M23 shall apply.

For DUCTILE IRON PIPE, allowable leakage in gallons per hour shall not be greater than that determined by the formula:

$$L = \frac{SD\,(P)^{1/2}}{133{,}200}$$

Where:

L = Allowable leakage, in gallons per hour
S = Length of pipe tested, in feet
D = Nominal diameter of the pipe, in inches
P = Average test pressure during leakage test, in pounds per square inch (gauge)

For PVC PIPE, allowable leakage in gallons per hour shall not be greater than that determined by the formula:

$$L = \frac{ND\,(P)^{1/2}}{7{,}400}$$

Where:

L = Allowable leakage, in gallons per hour
N = Number of joints in the length of pipeline tested
D = Nominal diameter of the pipe, in inches
P = Average test pressure during leakage test, in pounds per square inch (gauge)

Leakage is defined as the quantity of water to be supplied in the newly installed pipe or any valved section under test, which is necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled. Should any test of pipe installed disclose leakage greater than that allowed, CONTRACTOR shall locate and replace or repair the defective joints, pipe or valve until the leakage from subsequent testing is within the specified allowance.

21.6 HYDROSTATIC TESTS (HDPE PIPE)

21.6.1. GENERAL

CONTRACTOR shall test pipelines installed under this Contract in accordance with these specifications prior to acceptance of the pipeline by the CITY OF PALM COAST. All field tests shall be made in the presence of the CITY OF PALM COAST. Except as otherwise directed, all pipelines shall be tested. All piping to operate under liquid pressure shall be tested in sections of approved length. The pressure testing of an HDPE line section shall be tested separately from the PVC and DIP line sections. Where impractical, the HDPE test section shall include only a minimum amount of PVC and ductile iron pipe within the test section. If at all possible, the PVC and DIP test sections shall be left exposed during the pressure test for visual leakage observation. For these tests, the CONTRACTOR shall furnish clean water, suitable temporary testing plugs or caps, and other necessary equipment, and all labor required. If the CONTRACTOR chooses to pressure test against an existing CITY OF PALM COAST water main / valve, the new water main must be disinfected prior to connection to the CITY OF PALM COAST line. The CITY OF PALM COAST will not be responsible for failure of the pressure test due to the existing valve leaking. All valved sections shall be hydrostatic tested to insure sealing (leak allowance) of all line valves.

Unless it has already been done, the section of pipe to be tested shall be filled with potable water and air shall be expelled from the pipe. If blow-offs or other outlets are not available at high points for releasing air, the CONTRACTOR shall provide 1-inch [minimum taps and blow-off valves (at the 12:00 position)], as necessary. The cost of constructing blow-off valves and plugging them, after a successful pressure test, shall be included in the unit price bid amount for the HDPE pipe.

21.6.2. TESTING CRITERIA

Hydrostatic testing shall consist of a 150 psig test pressure, based on the elevation of the highest point of the line or section under test. Pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the CITY OF PALM COAST. The pump, pipe connection and all necessary apparatus shall be furnished by the CONTRACTOR and shall be subject to the approval of the CITY OF PALM COAST.

Maximum duration for pressure test, including initial and final phase of the test, shall not exceed eight (8) hours. If the test is not completed due to leakage, equipment failure, etc., depressurize the test section, and then allow it to "relax" for at least eight (8) hours before bringing the test section up to test pressure again.

21.6.3. PROCEDURE FOR PRESSURE TEST

Initial Phase of Pressure Testing: First, all air must be removed from the test section. The pressure test shall be completed after the line is backfilled. If possible, all flanged or mechanical joint valves and fittings shall be left exposed for visual leak inspection. If possible all PVC and DIP test sections shall be left exposed for visual leak inspection. Initially, the pressure within the test section shall be raised to approximately 160 psi and then allowed to be idle (no additional make-up water / pressure to be injected), for approximately 3 hours. During this 3-hour period, the test section shall be allowed to stabilize and come to an equilibrium stage. No additional make-up water / pressure shall be applied to the test section during this 3-hour stabilization period unless the line pressure drops below 140 psi. In this case, make-up water / pressure shall only be applied to the test section to maintain a minimum of 140 psi (during the 3-hour stabilization period).

Final Phase of Pressure Testing: The final phase of the pressure test shall involve applying make-up water / pressure to achieve an "Initial test pressure" of 150 psi (minimum) / 155 psi (maximum). The test section is then allowed to be idle (no make-up water / pressure is added) for a period of 2 hours. After this 2-hour period, make-up water / pressure is applied and measured to re-establish the "initial test pressure." The quantity of water utilized to re-pump the line shall be measured and compared to the allowable quantities as determined by TABLE 1, shown below. If the actual make-up water quantity is equal to or less than the allowable amount, the pressure test passes. If the actual make-up water quantities are greater than the allowable amount, the pressure test fails.

TABLE 1: ALLOWABLE MAKE-UP AMOUNT (HDPE PIPE)

Nominal Pipe Size (inches)	Make-up Water Allowance (U.S. Gallons /100 ft. of Pipe) 2-Hour Test
6	0.30
8	0.50
10	0.65
12	1.15
14	1.40
16	1.65
18	2.15
20	2.75
22	3.50
24	4.40
26	5.00
28	5.55
30	6.35
32	7.15
34	8.10
36	9.00
42	11.55
48	13.50
54	15.70

In the event a section fails to pass the tests, the CONTRACTOR shall do everything necessary to locate, uncover (even to the extent of uncovering the entire section), and replace the defective pipe, valve, fitting or joint. Visible leaks shall be corrected regardless of total leakage. Lines which fail to meet these tests shall be retested as necessary until test requirements are complied with. All testing shall be performed at the CONTRACTOR'S expense.

21.6.4. TOOLS FOR LEAKAGE TESTING

During the leakage testing, the following shall apply:

1. Final testing shall be performed using the City's 4" gauge.
2. Allowable leakage shall be measured using a City-supplied meter.

21.6.5. MANDREL TESTING

Perform mandrel testing through the entire length of the installed HDPE pipe. The mandrel size shall be 80% of the inside diameter of the pipe.

For sections of newly installed HDPE pipe that are exposed above grade, Contractor shall tape the ends of the pipe to prevent foreign objects from being inserted into the pipeline.

21.6.6. PRESSURE TESTING ABOVE GRADE

Prior to the installation of HDPE pipe for all directional drills, the pipe shall be subjected to a pressure test. The test shall be for one (1) hour at fifty (50) psi when using water or five to ten (5-10) psi for one (1) hour when using air. At each welded point, apply soapy water to detect any leaks.

21.6.7. TESTS FOR NON-PRESSURE PIPING

21.6.7.1. GENERAL

Testing of non-pressure gravity flow pipe shall be accomplished by infiltration or exfiltration testing. Non-pressure piping which has a crown elevation below the groundwater table shall be tested by measuring the infiltration. Non-pressure piping which has a crown elevation above the groundwater table shall be tested by measuring the exfiltration.

21.6.7.2. INFILTRATION TESTING

The CONTRACTOR shall identify and prepare each section of piping to be tested. The designated piping shall be monitored for a minimum period of four (4) hours. Any accumulated liquid shall be measured; the line shall not be accepted until this measured quantity is less than 25 gallons per inch of diameter of pipe per mile of pipe per 24 hours. All buried leaks shall be located and repaired immediately and retested. All visible leaks must be repaired regardless of the measured leakage.

21.6.7.3. EXFILTRATION TESTING

The CONTRACTOR shall close all openings in the section of pipe to be tested. The hydrostatic water level of the pipe system shall be raised to a height equal to the maximum design submergence, but in no case less than 3 feet above the highest point in the line. The closed system shall be maintained for a minimum duration of 4 hours. Any loss of volume shall be noted. The line will not be accepted until this measured quantity is less than 25 gallons per inch of diameter of pipe per mile of pipe per 24 hours. All buried leaks shall be located and repaired as soon as possible. All visible leaks must be repaired regardless of the measured leakage.

21.6.7.4. LOW PRESSURE TESTING

If impractical to conduct the infiltration or exfiltration tests as specified, the line can be pressurized for low pressure air testing. The air test shall be made by attaching an air compressor or testing apparatus to a suitable opening. After closing all other inlets and outlets to the system, force air into the system until there is a uniform gauge pressure of 5 psi. This pressure shall be held constant without introduction of additional air for a period of at least 30 minutes.

21.6.7.5. MANDREL TESTING

Perform mandrel testing throughout the entire length of the gravity pipe system. The mandrel size shall be 95% of the inside diameter of the pipe.

21.6.7.6. MANHOLE TESTING

The allowable limits of infiltration or exfiltration of manholes shall not exceed a rate of 0.165 gallons per manhole per hour.

21.6.7.7. RE-TESTING

Should any test fail, necessary repairs shall be accomplished by the CONTRACTOR and the test repeated until within the established limits. The CONTRACTOR shall furnish the necessary labor, water and all other items required to conduct the required testing and shall perform the necessary system repairs required to comply with the specified test.

21.6.8. TESTS FOR VALVES

21.6.8.1 GENERAL

All valves shall be tested according to the following criteria:

1. Butterfly and plug valves shall be tested in accordance with AWWA C504.
2. Ball valves shall be tested in accordance with AWWA C507.
3. Gate valves shall be tested in accordance with AWWA C509 and C515.

21.7 DISINFECTION OF WATER MAINS

21.7.1 GENERAL

Before being placed in service, all new water mains shall be chlorinated in accordance with the specifications below and the procedures outlined in AWWA C651 "Standard Procedure for Disinfecting Water Mains."

21.7.2 FLUSHING

Sections of pipe to be disinfected shall first be flushed (full diameter) to remove any solids or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a blow-off valve shall be provided large enough to develop a velocity of at least 2.5 feet per second in the main.

Pressure mains four (4) inches in diameter and larger shall be cleaned during flushing using a polyurethane plug manufactured of eight (8) lb./cubic foot density blown elastomer with open cell construction. The plug ("pig") shall have a resilient surface that engages the inner surface of the main with a sliding seal. The plug shall be able to reduce itself a minimum of 35 percent of its original cross-sectional area, negotiate bends, short radius elbows, pass through tees, crosses, multiple pipe sizes and valves and shall be abrasion resistant and capable of traveling in either direction.

All taps required for chlorination or flushing purpose, or for temporary or permanent release of air shall be provided for by the CONTRACTOR as a part of the construction of water mains. After the disinfection, all such taps shall be sealed to the satisfaction of THE CITY OF PALM COAST.

21.7.3 DISINFECTION CRITERIA

Before being placed into service, all new mains, repaired portions of or extensions to existing mains shall be chlorinated so that the initial chlorine residual is not less than 100 mg/l, with a maximum of 150 mg/l, and that a chlorine residual of not less than 25 mg/l remains in the water after standing 24 hours in the pipe.

21.7.4 FORM OF APPLIED CHLORINE

Chlorine shall be applied as a mixture of water and high-test calcium or sodium hypochlorite. CONTRACTOR shall assume responsibility for safe handling of chlorine and shall meet requirements of OSHA and other regulatory agencies for safe handling of chlorine.

21.7.5 POINT OF APPLICATION

The preferred point of application of the chlorinating agent is at the beginning of the pipe line extension or any valved section of it, and through a corporation stop inserted in the pipe. The water injector for delivering the chlorinated water into the pipe should be supplied from a tap made on the new main side of the connection point, downstream of the gate valve controlling the flow into the pipeline extension. Alternate points of applications may be used when approved or directed by THE CITY OF PALM COAST.

21.7.6 OPERATION OF THE CITY OF PALM COAST VALVES

Valves shall be manipulated by THE CITY OF PALM COAST personnel so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water.

21.7.7 RETENTION PERIOD

Treated water shall be retained in the pipe at least 24 hours. After this period, the chlorine residual at pipe extremities and at other representative points shall be at least 25 mg/l.

21.7.8 CHLORINATING VALVES AND HYDRANTS

In the process of chlorinating newly installed pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.

21.7.9 FINAL FLUSHING AND TESTING

Following chlorination, all treated water shall be thoroughly flushed from the newly installed pipe at its extremity until the replacement water throughout its lengths shows a free chlorine residual not in excess of that normally carried in the system. Chlorine residual determination shall be made in accordance with Standard Methods using the DPD Colormetric Method. Refer to paragraph 21.7.11 for details on the disposal of the flushing water.

Proper chain of custody procedures must be followed and samples shall only be collected by appropriate personnel in the presence of THE CITY OF PALM COAST'S personnel.

Copies of testing results and all related correspondence with the FDEP shall be submitted to THE CITY OF PALM COAST.

The interior of pipe, fittings, valves and appurtenances used for cutting into or repairing existing mains shall be swabbed or sprayed with a one-percent hypochlorite solution before being installed.

Tapping sleeves shall be cleaned and disinfected in accordance with Section 4.7 of AWWA C651.

21.7.10 REPETITION OF FLUSHING AND TESTING

Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the CONTRACTOR until satisfactory results are obtained.

21.7.11 DISPOSAL OF HEAVILY CHLORINATED WATER

A. Passive Non-Chemical Methods

1. Discharge to Sanitary Sewers

   a. Determine location of nearest sanitary sewer system to the point of discharge.
   b. Determine capacity of sanitary sewer and wastewater treatment plant to handle additional load.
   c. Investigate potential of upset of treatment plant operations due to presence of chlorine.
   d. Obtain permission from Owner of sanitary sewer system before discharging chlorinated water.

2. Discharge to Storm Sewers

   a. Determine whether storm sewer from inlet connects/discharges to a receiving stream or waters leading to streams.
   b. Determine distance to nearest inlet; the farther the chlorinated water has to travel (over paved surfaces), the more chlorine is removed from the water.

3. Retention in Holding Tanks

   a. Determine approximate volume of discharge water so appropriate storage vessel may be utilized.
   b. Monitor chlorine concentration in holding tank; release chlorinated water when it has met regulatory discharge limits.

4. Land Application

a. Organic and inorganic impurities in soil and pavements exert a significant amount of chlorine demand and rapidly neutralize chlorine in waters.
b. Spraying chlorinated water onto soils is an effective method for neutralizing chlorine in waters.
c. Determine if water will percolate or will flow to receiving waters. If volume is sufficient to carry flow to waters, use a field test kit to determine chlorine residual and take the following action:

(1) If at or below regulatory discharge limits, allow to discharge to stream.
(2) If above regulatory limits, addition of chemical is necessary in order to reduce chlorine concentration.

B. Chemical Dechlorination

1. Chemicals used to dechlorinate water (Also refer to AWWA C651, Appendix C, or C652, Appendix B for listing)

a. Sulfur Dioxide

(1) Reacts instantaneously with free chlorine.
(2) Toxic chemical-not best suited for field applications.

b. Sodium Thiosulfate

(1) Skin, eye, nose, and throat irritant.
(2) Reacts slowly with chlorine and requires more time for dechlorination than most other dechlorination chemicals.
(3) Not toxic to aquatic species.

c. Sodium Sulfite

(1) Is available in tablet form, unlike most other dechlorinating chemicals.
(2) Effective for dechlorinating constant, low flow rate chlorinated releases.

d. Sodium Bisulfite

(1) Skin, eye, and respiratory tract irritant.

(2) Highly corrosive and caution must be used when handling.

e. Sodium Metabisulfite

(1) Eye, throat, skin, and lung irritant.

f. Calcium Thiosulfate

(1) Not toxic to aquatic species.
(2) Extremely long time required for dechlorination to occur.

g. Ascorbic Acid (Vitamin C)

(1) Eye, skin, and lung irritant.
(2) Does not scavenge dissolved oxygen.

h. Sodium Ascorbate.

(1) Does not scavenge dissolved oxygen
(2) Stable compound as solid; once mixed, degrades within a day or two.

2. Dechlorination Chemical Summary

a. Choice of Chemical Depends Upon:

(1) Nature of water release.
(2) Strength of chlorine.
(3) Volume of water release.
(4) Distance from receiving waters.

b. Use field test kit to measure chlorine strength prior to any discharge to streams, lakes, or other bodies of water.

21.7.12 CHLORINATION SEQUENCE PLAN

If the Contractor does not retain a subcontractor for the purpose of chlorinating the water main, they shall submit a sequence plan which provides details for the method, apparatus and equipment of the chlorination process. This sequence plan shall be submitted to the CITY OF PALM COAST for approval.

21.8 NOTIFICATION AND CONNECTION TO EXISTING MAINS

Sample locations shall be in compliance with the FDEP construction permit. Samples of water shall be collected from the mains by the CONTRACTOR in sterile containers and delivered to a State of Florida approved laboratory for bacteriological testing. Sampling and testing shall be continued until satisfactory results are obtained on two (2) consecutive days.

Requirements specified in Section 15 shall apply.

21.9 WATER SERVICE PIPING AND CONNECTION

Water service piping and connection shall be installed as indicated in the STANDARD DETAILS. The location of all service lines shall be as shown on the DRAWINGS. On curbed streets, the exact location for each installed service shall be marked by etching or cutting a three (3) inch minimum "W" in the concrete curb. Where no curb exists, locations shall be adequately marked by the installation of a pressure treated 4"x4", 6-feet long, 3 feet above grade, top painted blue.

21.10 WATER MAIN IDENTIFICATION

21.10.1 IDENTIFICATION TAPE FOR DUCTILE IRON AND STEEL PIPE

Identification tape shall be non-metallic and manufactured of inert polyethylene so as to be highly resistant to alkalies, acids and other destructive agents found in soil, and shall have a minimum thickness of 6 mils with a minimum tensile strength of 22 pounds per inch and a maximum adhesive factor of 40 ounces per inch. Tape width shall be 2 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.

21.10.2 IDENTIFICATION TAPE FOR POLYVINYL CHLORIDE PIPE

Identification tape shall be non-metallic and manufactured of polyethylene with a minimum thickness of 4 mils. The tape shall be highly resistant to alkalies, acids and other destructive agents found in soil. 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.

21.10.3. TAPE BACKGROUND COLORS AND IMPRINTS AS FOLLOWS:

Imprint	Background Color
"Caution Caution – Potable Water Line Buried Below"	Blue
"Caution Caution – Wastewater Force Main Buried Below"	Green
"Caution Caution – Sewer"	Green
"Caution Caution – Reuse Water Main Buried Below"	Lavender
"Caution Caution – Raw Water Main Buried Below"	White

21.10.4. LOCATE TAPE MANUFACTURERS

Identification tape shall be "TerraTape" as manufactured by Reef Industries, Inc., Houston, TX, (800) 231-6074; Seton, Branford, CT, (800) 571-2596; Pro-Line Safety products, West Chicago, IL, (800) 554-3424.

21.10.5. LOCATE WIRE FOR PIPE INSTALLED BY OPEN CUT

In addition to the warning tape, there shall be installed a 10 gage, single strand THWN solid copper-clad steel tracing wire. The wire shall be encapsulated in a 30 mil HDPE jacket, shall have a break load of 513 pounds and color coded according to the table shown in Section 21.10.3.

The locate wire shall be connected with either high split bolt connector (Granger GAUGO or equal) and shrink-wrapped to encapsulate the connection. A Proline Dryconn® waterproof connector or Copperhead DryConn Direct Bury Log may also be used.

21.10.6. LOCATE WIRE FOR PIPE INSTALLED BY DIRECTIONAL DRILL

Locate wire for directional drill pipe installation shall be a steel core, 10 gage, single strand THWN solid copper-clad steel tracing wire. The wire shall be encapsulated in a 45 mil HDPE jacket color coded according to the table shown in Section 21.10.3. Three (3) strands of wire shall be pulled back with each drill. Tracing wire break load shall be 1,150 lbs.

21.10.7. INSTALLATION

Installation of the locate tape shall be in accordance with Figure W-30. Installation of the locate wire for open cut applications shall be in accordance with Figures W-31, W-31A, and W-31B.

Section 22

VALVES, HYDRANTS AND ACCESSORIES

22.1 GENERAL

All valves and appurtenances shall be products of well-established firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these SPECIFICATIONS as applicable.

22.2 RESILIENT SEAT GATE VALVES

22.2.1 GENERAL

All gate valves forty-eight (48) inches and smaller shall be resilient seat gate valves. Such valves shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C515, latest revision, and in accordance with the following SPECIFICATIONS. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the pipe.

Valves 16-inch and larger shall be installed vertically and shall be equipped with a bevel gear operating nut. Depth to top of operating nut shall be a minimum of 30-inches.

Valves 18" and larger shall include an NRS bypass valve.

22.2.2 MATERIAL

The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. All ferrous surfaces, inside and outside, shall have a fusion-bonded epoxy coating. A 2" wrench nut shall be provided for operating the valve in a buried installation. All valves shall be tested in strict accordance with AWWA C515.

22.2.3 MISCELLANEOUS REQUIREMENTS

The valves shall be non-rising stem with the stem made of cast, forged, or rolled bronze as specified in AWWA C515. Two stem seals shall be provided and shall be of the o-ring type. The stem nut must be independent of the gate.

The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

22.3 BUTTERFLY VALVES

22.3.1 GENERAL

All shut-off valves eighteen (18) inches and larger may be butterfly valves. Butterfly valves and operators shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 150A or B.

22.3.2 MATERIAL

The valve body shall be constructed of close grain cast iron per ASTM A126, Class B or equivalent material. All retaining segments and adjusting devices shall be corrosion resistant material. Valve seats shall be a natural rubber or synthetic rubber compound. Valve seats 30 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material. Valves 24 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C504.

22.3.3 FACE-TO-FACE DIMENSION

The face-to-face dimensions of valves shall be in accordance with the above mentioned AWWA Specification for short-body valve.

22.3.4 VALVE SHAFT

The valve shaft shall be turned, ground, polished and constructed of 18-8 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one-piece unit extending full size through the valve disc and valve bearing, or it may be of a stub shaft design.

22.3.5 VALVE OPERATOR

In general, the butterfly valve operators shall conform to the requirements of AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as possible.

22.4 VALVE INSTALLATION

All valves shall be inspected upon delivery in the field to insure proper working order before installation. They shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished. All valves and appurtenances shall be installed true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of THE CITY OF PALM COAST before they are installed.

Butterfly valves shall NOT be installed directly to HDPE pipe.

Gate valves fourteen (14) inches and smaller shall be installed in a vertical position; gate valves larger than sixteen (16) inches shall be installed horizontally and shall incorporate a bevel gear operating nut.

All valves shall be provided with a standard valve box and self-centering alignment ring so arranged that no shock will be transmitted to the valve. The box shall be vertically centered over the operating nut and centering ring. The cast iron box cover shall be set flush with the road bed or finished surface.

After installation, all valves shall be subjected to the field test for piping as outlined in Section 21 of these SPECIFICATIONS. Should any defects in materials or workmanship appear during these tests, the CONTRACTOR shall correct such defects to the satisfaction of THE CITY OF PALM COAST.

Flanged joints for above grade piping shall be made with 316 stainless steel bolts, nuts and washers. An anti-seize compound shall be applied before assembly. Mechanical joints for buried piping shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts, except for stainless steel, shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint.

22.5 VALVE BOXES

All buried valves shall have cast-iron three piece valve boxes. See STANDARD DETAILS. Valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by THE CITY OF PALM COAST. The barrel shall be two-piece, screw type, having 5-1/4 inch shaft. The upper section shall have a flange at the bottom having sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have "WATER" cast into the top for all water mains.

Care shall be taken while constructing valve boxes to ensure that valve stems are vertical and the cast iron box has been placed over the stem with base bearing on compacted fill and top flush with final grade. Boxes shall have sufficient bracing to maintain alignment

during backfilling. CONTRACTOR shall remove any sand or undesirable fill from valve box prior to final inspection.

22.6 AIR RELEASE VALVES

The air release valves for use in water mains shall be installed as shown on the STANDARD DETAILS. Valves shall also be installed on all aerial crossings. Valves shall be provided with a vacuum check to prevent air from re-entering the line. The fittings shall be threaded.

22.7 FIRE HYDRANTS

22.7.1 MATERIAL

Fire hydrants shall have a 5-1/4inch valve opening and shall comply with AWWA Standard C502 for fire hydrants for water works service. Each hydrant shall have 6-inch mechanical joint ends with harnessing lugs ("dog ears") and shall open by turning to the left (counter-clockwise). Fire hydrant shall be of ample length for 3-1/2 foot depth of bury. It shall be provided with two (2) 2-1/2 inch hose nozzles and one 4-1/2 inch pumper nozzle, all having National Standard hose threads. Nozzles shall have caps attached by chains. Operating nuts shall be AWWA Standard (pentagonal, measuring 1-1/2 inch point to flat). Fire hydrants shall be equipped with "O-Ring" packing.

22.7.2 PAINTING

All iron parts of the hydrant, both inside and outside, shall be painted in accordance with AWWA C550.

The outside of the hydrant above the finished grade shall be thoroughly cleaned and thereafter painted according to the STANDARD DETAILS.

22.7.3 CONSTRUCTION DETAILS

Hydrants shall be plumb and shall be set so that the lowest hose connection is, at least, eighteen (18) inches above the surrounding finished grade. All hydrants shall be inspected in the field upon delivery to the job to insure proper operation before installation. The resetting of existing hydrants and moving and reconnecting of existing hydrants shall be handled in a manner similar to a new installation. Hydrant shall be constructed in accordance with the STANDARD DETAILS.

22.7.4 LOCATION

Fire hydrants shall be located in the general location as shown on the DRAWINGS. All hydrants shall be located no less than ten (10) feet from the

edge of pavement of the adjacent roadway and no less than five (5) feet from any physical feature which may obstruct access or view of any hydrant, unless otherwise approved by THE CITY OF PALM COAST.

DIVISION 3

CONSTRUCTION SPECIFICATIONS

Part 3

Sewage Collection, Force Mains and Pump/Lift Stations

Section 30

PIPE MATERIAL FOR GRAVITY SANITARY SEWERS

30.1 GENERAL

Pipe used in gravity sewer construction shall be polyvinyl chloride (PVC) or ductile iron pipe (DIP). Where reference is made to an ASTM, ANSI or AASHTO designation, it shall be the latest revision.

The CONTRACTOR shall be responsible for all materials furnished and stored of same, until the date of substantial completion. He shall replace at his expense all materials found to be defective or damaged in handling or storage. The CONTRACTOR shall, if requested by THE CITY OF PALM COAST, furnish certificates, affidavits of compliance, test reports, or samples for check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

30.2 PIPE MATERIALS

30.2.1 PVC GRAVITY SEWER PIPE

PVC Gravity Sewer Pipe (4"-15"), ASTM D3034, SDR 35. Uniform minimum "pipe stiffness" at five (5) percent deflection shall be 46 psi. The joints shall be integral bell and spigot elastomeric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI-Bell Plastic Pipe Association standard is UNI-B-4.

PVC Gravity Sewer Pipe (18"-27"), ASTM F679, SDR 35. Uniform minimum "pipe stiffness" at five (5) percent deflection shall be 46 psi. The joints shall be integral bell and spigot elastomeric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI-Bell Plastic Pipe Association standard is UNI-B-7.

All PVC pipe shall bear the NSF-DW seal. The minimum standard length of pipe shall be thirteen (13) feet.

30.2.2 DIP GRAVITY SEWER PIPE

Ductile iron pipe shall conform to ANSI/AWWA A21.51/C151, class thickness designed per ANSI/AWWA A21.50/C150, with push-on joints. An interior protective lining of ceramic epoxy shall be provided with a minimum dry thickness of 40 mils. Ductile iron gravity sewers, where called for by THE CITY OF PALM COAST, shall be wrapped with polyethylene film, AWWA C105. The minimum standard length of pipe shall be eighteen (18) feet.

30.2.3 PIPE MARKINGS

All pipes shall have a homing mark on the spigot end provided by the manufacturer. On field cut pipe, CONTRACTOR shall provide homing mark on the spigot end in accordance with manufacturer's recommendations.

30.3 JOINT MATERIALS

30.3.1 PVC PIPE

PVC sewer pipe joints shall be bell and spigot, flexible elastomeric seals per ASTM D3212.

30.3.2 DUCTILE IRON PIPE

Ductile iron pipe and fitting joints shall be "push-on" or mechanical joints conforming to ANSI A21.11.

30.3.3 JOINTS FOR DISSIMILAR PIPE

Joints between pipes of different materials shall be made with a PVC push-on repair sleeve.

30.4 FITTINGS

Unless otherwise specified, single wye branches shall be provided in the gravity sewer main for service lateral connections. Wyes shall be six (6) inches inside diameter installed at a 30-degree upward incline, unless otherwise approved by THE CITY OF PALM COAST. All fittings shall be of the same material as the pipe.

Plugs for stub outs shall be of the same material as the pipe, and gasketed with the same gasket material as the pipe joint, or be of a material approved by THE CITY OF PALM COAST. The plug shall be secured to withstand test pressures specified in Section 34 of these SPECIFICATIONS.

30.5 INSPECTION AND TESTING

30.5.1 GENERAL

Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant, and the class or strength classification of the pipe. The markings shall be plainly visible on the pipe barrel. Pipe which is not marked clearly is subject to rejection. All rejected pipe shall be promptly removed from the project site by the CONTRACTOR.

30.5.2 MISCELLANEOUS INSPECTION AND TESTING REQUIREMENTS

All pipe and accessories to be installed under this Contract shall be inspected and tested at the place of manufacture by the manufacturer as required by the Standard Specifications to which the material is manufactured.

Each length of pipe shall be subject to inspection and approval at the factory, point of delivery, and site of work. If requested by THE CITY OF PALM COAST, a sample of pipe to be tested shall be selected at random by THE CITY OF PALM COAST or the testing laboratory hired by THE CITY.

When the specimens tested conform to applicable standards, all pipe represented by such specimens shall be considered acceptable based on the test parameters measured. Copies of test reports shall be available before the pipe is installed in the project.

In the event that any of the test specimens fail to meet the applicable standards, all pipe represented by such tests shall be subjected to rejection. The CONTRACTOR may furnish two additional test specimens from the same shipment or delivery, for each specimen that failed and the pipe will be considered acceptable if all of these additional specimens meet the requirements of the applicable standards. All such retesting shall be at the CONTRACTOR's expense.

Pipe which has been rejected by THE CITY OF PALM COAST shall be removed from the site of the work by the CONTRACTOR and replaced with pipe which meets these SPECIFICATIONS.

Section 31

GRAVITY SANITARY SEWER PIPE LAYING, JOINTING AND MISCELLANEOUS CONSTRUCTION DETAILS

31.1 SURVEY LINE AND GRADE

The CONTRACTOR shall set Temporary Bench Marks (TBM's) at a maximum 500-foot interval. The CONTRACTOR shall constantly check line and grade of the pipe by laser beam method. In the event line and grade do not meet specified limits described hereinafter, the WORK shall be immediately stopped, THE CITY OF PALM COAST notified, and the cause remedied before proceeding with the WORK.

31.2 PIPE PREPARATION AND HANDLING

All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken, or otherwise defective materials are being used. The CONTRACTOR shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

Proper implements, tools, and facilities shall be used for the safe and proper protection of the WORK. Pipe shall be lowered into the trench in such a manner as to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped into trenches under any circumstances.

31.3 SEWER PIPE INSTALLATION

Installation of sewer pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the trench has been prepared in accordance with Section 3 of these SPECIFICATIONS. Refer to Section 31.4 for additional bedding requirements. Mud, silt, gravel and other foreign material shall be kept out of the pipe and off the jointing surface.

All pipe installed shall be retained in position so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place. All pipes shall be installed to conform to the line and grade shown on the PLANS.

Variance from established line and grade, at any point along the length of the pipe, shall not be greater than one thirty-second (1/32) of an inch per inch of pipe diameter and not to exceed one-half (1/2) inch, provided that any such variation does not result in a level or reverse sloping invert.

The sewer pipe, unless otherwise approved by THE CITY OF PALM COAST, shall be installed upgrade from point of connection on the existing sewer or from a designated

starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the open end of the pipe shall be kept tightly closed with an approved temporary plug.

All PVC pipe shall be installed in accordance with the pipe manufacturer's written recommendations as approved by THE CITY OF PALM COAST. Installation of Ductile Iron Pipe shall conform to the SPECIFICATIONS outlined in Section 21.

31.4 TRENCH PREPARATION AND PIPE BEDDING

31.4.1 TRENCH EXCAVATION, DEWATERING, BEDDING MATERIAL, BACKFILL, COMPACTION, FILL AND GRADING

Applicable provisions of Section 12 shall apply. Also refer to STANDARD DETAILS.

31.4.2 PLACEMENT OF PIPE BEDDING MATERIAL

CONTRACTOR shall hand-grade bedding to proper grade ahead of pipe laying operation. Bedding shall provide a firm, unyielding support along the entire pipe length.

If without direction from THE CITY OF PALM COAST, the trench has been excavated below the required depth for pipe bedding material placement, CONTRACTOR shall fill the excess depth with pipe bedding material to the proper grade and compacted.

CONTRACTOR shall excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

31.4.3 DEPTH OF BEDDING MATERIAL

CONTRACTOR shall provide pipe bedding material in accordance with the STANDARD DETAILS.

31.5 GRAVITY PIPE AND WATER MAIN SEPARATION

Gravity sewers that are installed in the vicinity of pipe lines designated to carry potable water shall meet the conditions set forth in Section 21.

31.6 PLUGS AND CONNECTIONS

Plugs for pipe branches, stubs or other open ends, which are not to be immediately connected, shall be made of an approved material and shall be secured in place with a joint comparable to the main line joint.

31.7 PIPE JOINTING

All pipes shall be installed to the homing mark on the spigot. THE CITY OF PALM COAST shall be given an opportunity to check all joints in this manner before backfilling.

Type of joint to be used will conform to the requirements of Section 20. All pipe and jointing for gravity sewers shall be subject to the tests specified in Section 34.

Section 32

MANHOLES

32.1 GENERAL

Manholes shall be leaktight and constructed of precast concrete units.

32.2 PRECAST CONCRETE SECTIONS

32.2.1 GENERAL

Precast manholes shall conform to specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C478, except as otherwise specified below.

32.2.2 MISCELLANEOUS REQUIREMENTS

The minimum wall thickness shall be 5 inches. Precast manholes shall be constructed with a precast monolithic base structure as shown on the STANDARD DETAILS. The minimum base thickness shall be 8 inches.

Concrete for manholes shall be Type II, 4,000 psi at 28 days. Barrel, top and base sections shall have tongue and groove joints. All jointing material shall be cold adhesive preformed plastic gaskets, conforming to FDOT Article 942-2.

The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on each precast section.

Sections shall be cured by an approved method for at least 28 days prior to painting and shall not be shipped until at least 2 days after having been painted.

Precast concrete top slabs shall be used where cover over the top of the pipe is less than 4 feet. Lift rings or non-penetrating lift holes shall be provided for handling precast manhole sections. Non-penetrating lift holes shall be filled with non-shrink grout after installation of the manhole sections.

Concrete surfaces shall have form oil, curing compounds, dust, dirt and other interfering materials removed by brush sand blasting and shall be fully cured prior to the application of any coatings.

Interior and exterior surfaces of manholes shall have a protective water-based concrete coating applied by the manhole manufacturer. Exterior surfaces shall be coated to a thickness of eight (8) mils; interior surfaces shall be coated to a thickness of twelve (12) mils. Coatings shall be applied at four (4) mils per coat,

shall be gray in color, and be equivalent to Conseal CS-55 as manufactured by Concrete Sealants, Inc.

New manholes which receive force main flow shall be lined with a two (2) mm polyethylene liner and shall follow the construction called out on the STANDARD DETAILS. Existing manholes which receive force main flow shall be coated with "SpectraShield" or "SewperCoat".

32.2.3 INSPECTION

The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by THE CITY OF PALM COAST. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places, and the sections shall be subject to rejection at any time on account of failure to meet any of the specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which have been damaged after delivery will be rejected and, if already installed, removed and replaced, entirely at the CONTRACTOR'S expense.

At the time of inspection, the sections will be carefully examined for compliance with the specified ASTM designation, and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, "scratch-strength" blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

32.3 CASTINGS

Gray iron castings for manhole frames, covers, adjustment rings and other items shall conform to the ASTM Designation A48, Class 30. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects which would impair their strength, or otherwise make them unfit for the service intended. The seating surfaces between frames and covers shall be machined to fit true. No plugging or filling will be allowed. Lifting or "pick" holes shall be provided, but shall not penetrate the cover. Casting patterns shall conform to those shown or indicated on the STANDARD DETAILS. All manhole frames and covers shall be traffic bearing to meet AASHTO H-20 loadings. Frames shall be suitable for the future addition of a cast iron ring for upward adjustment of top elevation.

32.4 CONSTRUCTION DETAILS

32.4.1 BEDDING

Base sections shall be placed on bedding rock conforming to the requirements in Section 12. The bedding rock shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast element. Refer to Section 12 for compaction requirements. Refer to the STANDARD DETAILS for additional bedding details.

32.4.2 CAST-IN-PLACE BASES

Cast-in-place bases shall be utilized only when specifically approved by THE CITY OF PALM COAST. Unless otherwise specified, cast-in-place bases shall be at least eight (8) inches in thickness and shall extend at least six (6) inches radially outside of the outside dimension of the manhole's section. Reinforcement and connection to the riser sections shall be designed by the DEVELOPER'S ENGINEER and submitted to THE CITY OF PALM COAST for approval prior to installation.

32.4.3 PRECAST MANHOLES

A precast base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment and making sure that all entering pipes can be inserted on proper grade.

Precast manhole sections shall be handled by lift rings or non-penetrating lift holes. Such holes shall be filled with non-shrink grout after installation of the manhole.

The first precast section shall be placed and carefully adjusted to true grade and alignment. All inlet pipes shall be properly installed so as to form an integral watertight unit. The sections shall be uniformly supported by the base structure, and shall not bear directly on any of the pipes. The base and first section shall be cast monolithically.

Precast sections shall be placed and aligned to provide vertical alignment with a 1/4-inch maximum tolerance per 5 feet of depth. The completed manhole shall be rigid, true to dimensions, and watertight.

32.4.4 EXCAVATION AND BACKFILLING

Requirements of Section 12 shall apply.

32.4.5 PLACING CASTINGS

Castings shall be fully bedded in mortar with precast concrete spacer rings used for adjustment between the frame and manhole. Mortar shall conform to ASTM C-270, Type M. Adjustment of frame and cover using spacer rings shall be a minimum of two (2) inches and maximum of twelve (12) inches in height.

Top of manhole castings located in pavement, shouldered areas, and sidewalks shall be set flush with grade. Top of manhole castings located outside these areas shall be placed 2" above grade, or as directed by THE CITY OF PALM COAST.

32.4.6 CHANNELS

Manhole flow channels shall be as shown on the STANDARD DETAILS, with smooth and carefully shaped bottoms, built up sides and benching constructed using cement and brick with no voids. Channels shall conform to the dimension of the adjacent pipe and provide changes in size, grade and alignment evenly. Cement shall be Portland cement Type II only.

32.4.7 PIPE CONNECTIONS

Special care shall be taken to see that the openings through which pipes enter the structure are provided with watertight connections. For ductile iron and PVC pipe, connections shall conform to ASTM C923, "Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes." For concrete pipe, connection shall be made with non-shrink non-metallic grout.

32.4.8 DROP MANHOLE CONNECTIONS

Drop manhole connections shall conform in all respects to details shown on the STANDARD DETAILS.

32.5 CLEANING

All newly constructed manholes shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind and shall be free from such accumulation at the time of final inspection.

32.6 INSPECTION FOR ACCEPTANCE

No visible leakage in the manhole or at pipe connections will be permitted. All manholes shall be inspected by THE CITY OF PALM COAST prior to acceptance. All manholes failing to meet the specification set forth in Section 32 above shall be reconstructed or replaced by the CONTRACTOR to comply with these SPECIFICATIONS. Pressure grouting of manholes for repair shall not be accepted.

Section 33

SERVICE LATERALS

33.1 GENERAL

A service lateral is a branch gravity sewer constructed from the main gravity sewer to the right-of-way line or to a point established by THE CITY OF PALM COAST.

The general requirements for construction of gravity sanitary sewers in Sections 30 and 31 of these SPECIFICATIONS shall apply for service laterals unless they are inconsistent with the provisions of this Section.

Service laterals and fittings shall be six (6) inches in diameter.

33.2 MATERIALS

33.2.1 PIPE, FITTINGS & JOINTS

Pipe, fittings and joints shall be PVC or DI pipe and shall conform to the requirement for gravity sanitary sewer construction in Section 30 of these SPECIFICATIONS.

Service laterals shall be connected to the wye, provided in the gravity sewer where such is available, utilizing approved fittings or adapters.

On existing mains where no wye is provided or available, connection shall be made by either a machine-made tap and City-approved saddle, or a precast manhole as referenced in Section 32.

33.3 CONSTRUCTION DETAILS

33.3.1 GENERAL

Service lateral connections shall conform to these SPECIFICATIONS and STANDARD DETAILS. All necessary approvals for sewer service construction shall be obtained prior to beginning the WORK.

33.3.2 EXCAVATION AND BACKFILL

Excavation and backfilling for sewer services shall conform to the requirements of Section 12 and 31, excepting that no backfill in excess of that required to hold the pipe in true alignment shall be placed prior to inspection.

33.3.3 PIPE LAYING AND JOINTING

Pipe laying and jointing, except as hereinafter provided, shall in general conform to the requirements of Section 31. During the pipe laying and jointing, the service lateral shall be kept free of any water, dirt or objectionable material.

33.3.4 LINE AND GRADE

Pipe shall be installed with a minimum grade of one foot per 100 feet. The CONTRACTOR shall establish such alignment and grade control as is necessary to properly install the sewer service. Pipe shall be installed in a straight line at a uniform grade between fittings.

33.4 TERMINATION OF SERVICE LATERALS

Service laterals shall terminate at the right-of-way line in accordance with the STANDARD DETAILS. Watertight factory made plug(s) shall be installed at the end of each service lateral.

33.5 INSPECTION

Sewer services shall meet the inspection requirements specified in Section 30.

33.6 RESTORATION, FINISHING AND CLEANUP

The CONTRACTOR shall restore all paved services, curbing, sidewalks or other surfaces to their original condition in such manner as to meet the requirements established in Division 3 of these SPECIFICATIONS. All surplus material and temporary structures shall be removed, and the entire site shall be left in a neat and clean condition. Excess spoil material, at its discretion, shall become the property of THE CITY OF PALM COAST.

33.7 LOCATION

The exact location of the termination point of each installed service lateral shall be marked by etching or cutting a three (3) inch "S" in the concrete curb. Where no curb exists, locations shall be adequately marked by the installation of a pressure treated 4"x4", 8-foot long, 3-feet above grade, top painted green.

Section 34

TESTING AND INSPECTION FOR ACCEPTANCE OF GRAVITY SANITARY SEWERS

34.1 GENERAL

All gravity sanitary sewers shall be tested for leakage and alignment, deflection and integrity prior to acceptance. All testing shall be performed by the CONTRACTOR. The CONTRACTOR shall be responsible for furnishing all necessary labor and equipment to conduct such testing. Alignment, deflection and integrity testing shall be performed by "lamping" and utilizing television inspection. A copy of the television inspection with written reports shall be submitted to the CITY. THE CITY OF PALM COAST will monitor and approve satisfactory tests.

34.2 TESTING FOR LEAKAGE

34.2.1 TYPE OF TEST

Leakage tests shall be by the low-pressure air test as described below.

34.2.2 SELECTION OF TEST SECTIONS

Each test section shall not exceed 400 feet in length and shall be tested between adjacent manholes.

34.2.3 PREPARATION AND COORDINATION FOR TESTING

The CONTRACTOR shall flush all sewers with water sufficient in volume to obtain free flow through each line. Flushing water and debris shall not enter any pump station wet well. Water will be pumped from the sewer system during flushing to an acceptable discharge location. A visual inspection shall be made and all obstructions removed.

The CONTRACTOR shall notify THE CITY OF PALM COAST, Operations Department, 72 hours prior to performing any leakage testing.

The results of all leakage tests shall be presented by the CONTRACTOR to THE CITY OF PALM COAST in neat, legible writing. These written results shall be formatted and adequately labeled so that they are easily understandable.

34.2.4 LEAKAGE TEST

Leakage testing shall be conducted in accordance with the procedure for "Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe," UNI-B-6-98, as established by the Uni-Bell PVC Pipe Association. Air test limit shall be less than or equal to .0015 cu.ft./min/sq.ft. of pipe. Passing this test shall be presumed to establish leakage test limits of 50 gallons per day per inch diameter per mile per day of sewer.

34.3 INSPECTION FOR ALIGNMENT, DEFLECTION AND INTEGRITY

Internal video inspection for the gravity sewer shall be performed by the CONTRACTOR to check for alignment and deflection. The television inspection shall also be used to check for cracked, broken or otherwise defective pipe, and overall pipe integrity.

Prior to video inspection, the CONTRACTOR shall flush all sewers with water sufficient in volume to obtain free flow through each line. Flushing water and debris shall not enter any pump station wet well. Water will be pumped from the sewer system during flushing to an acceptable discharge location. A visual inspection shall be made and all obstructions removed.

The video internal inspection will be performed in two stages. The first inspection will be within 30 days after Substantial Completion of the installed gravity sewer pipe, provided the road base is in place and the manhole rings and covers are to grade. The requirement of road base being in place shall be waived if the top of the sewer is 12 feet below the finished grade. In such cases, the video inspection shall be performed once the trench has been compacted up to the road base. The video inspection shall be performed after the inverts have been constructed. In addition, a video of the mandrel test and "lamping" shall be made and a copy furnished to THE CITY OF PALM COAST.

The second inspection of the gravity sewer pipe shall be before the end of the two-year warranty period and shall be paid for by the DEVELOPER. Notification and arrangements to conduct the testing shall be submitted to THE CITY OF PALM COAST one (1) month before the end of the two-year warranty period.

If the first or second video inspection reveals cracked, broken, or defective pipe, pipe misalignment resulting in vertical sags of one (1) inch or greater, and in the case of PVC pipe a ring deflection in excess of 5%, the CONTRACTOR shall be required to repair or replace the pipeline. Any ponding of liquid ½ inch or greater for more than two (2) joints of pipe (26 feet) shall be a cause for repair or replacement of the pipe section. If ponding occurs in more than four (4) 6-foot sections between manholes, the entire section (manhole to manhole) shall be removed and reinstalled.

Successful passage of both the leakage test and video inspection is required before acceptance by THE CITY OF PALM COAST.

Prior to repair or replacement of failed sewer pipe, the method of repair or replacement shall be submitted to THE CITY OF PALM COAST for approval. Pressure grouting of pipe or manholes shall not be considered as an acceptable method of repair.

Section 35

WASTEWATER FORCE MAINS

35.1 GENERAL

These SPECIFICATIONS cover the pipe, fittings, and accessory items used for wastewater force main systems.

Pipe used in wastewater force main systems shall be either Polyvinyl Chloride (PVC), Ductile Iron Pipe (DIP), or High Density Polyethylene Pipe (HDPE).

The CONTRACTOR shall be responsible for all materials furnished and stored of same, until the date of project completion. He shall replace at his expense all materials found to be defective or damaged in handling or storage. The CONTRACTOR shall, if requested by THE CITY OF PALM COAST, furnish certificates, affidavits of compliance, test reports, or samples for check analysis for any of the materials specified herein. All materials delivered to project site for installation are subject to random testing for compliance with the designated specifications.

35.2 PIPE INSPECTION AND TEST

Requirements specified in Section 30 shall apply.

35.3 PVC PIPE

35.3.1 PVC PIPE

All PVC pipe of nominal diameter four (4) inches through sixty (60) inches shall be manufactured in accordance with AWWA Standard C900, latest edition. The PVC pipe shall be Pressure Class 150 and have a dimension ratio (DR) of 18. Pipe shall be the same O.D. as ductile iron pipe.

35.3.2 JOINTS

PVC pipe shall have integral bell and spigot push-on type joints conforming to ASTM D3139.

35.3.3 FITTINGS

Fittings used with PVC pipe shall conform to Section 35.4.

35.4 DUCTILE IRON PIPE AND FITTINGS

35.4.1 DUCTILE IRON PIPE

All ductile iron pipe of nominal diameter four (4) through fifty-four (54) inches shall conform to ANSI/AWWA A21.51/C151. Pipe four (4) inches through twelve (12) inches shall be Pressure Class 350. Pipe larger than twelve (12) inches shall be Pressure Class 250.

35.4.2 FITTINGS

Any fittings required shall be mechanical joint ductile iron compact fittings in accordance with ANSI/AWWA A21.53/C153.

35.4.3 JOINTS

Joints for ductile iron pipe and fittings shall be push-on or mechanical joints conforming to ANSI/AWWA A21.11/C111. Where called for on the DRAWINGS, restrained or flanged joints shall be provided. Flanged joints shall conform to ANSI Standard B16.1-125 LB. Restrained joints shall conform to Section 14.

35.4.4 COATINGS AND LININGS

Where ductile iron pipe and fittings are installed below grade or installed in a casing pipe, a bituminous coating approximately 1.0 mil thick shall be applied in accordance with ANSI/AWWA A21.51/C151. Where ductile iron pipe and fittings are installed above grade, pipe, fittings and valves shall be thoroughly cleaned and given one field coat (minimum 3.0 mils dry thickness) of rust inhibitor primer. Intermediate and finished field coats of a polyamide epoxy shall also be applied by the CONTRACTOR. Primer and finished field coats shall be compatible and shall be applied in accordance with the manufacturer's recommendations. Final field coat color shall be green for force mains and lavender for reuse mains.

All ductile iron pipe and fittings shall have an interior protective lining of ceramic epoxy with a minimum dry thickness of 40 mils applied by the pipe manufacturer. Ceramic epoxy lining shall be equivalent to Protecto 401.

35.4.5 POLYETHYLENE ENCASEMENT

Pipe for force main and reuse main shall be polyethylene encased (8 mil) where shown on the DRAWINGS or required by THE CITY OF PALM COAST in accordance with ANSI/AWWA A21.51/C105. The bags shall be green for force mains and lavender for reuse mains.

35.5 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

35.5.1 HDPE PIPE

All HDPE pipe of nominal diameter four (4) inch through sixty-three (63) inch shall conform to AWWA C906. The pipe shall have a ductile iron pipe OD, a minimum dimension ratio (DR) of 11 and Pressure Class 160 in accordance with Table 5 of AWWA C906.

35.5.2 FITTINGS

Mechanical joint ductile iron fittings shall be used with HDPE pipe with stiffener.

35.5.3 JOINTS

Sections of polyethylene pipe shall be joined by the butt fusion method and shall be in strict accordance with the pipe manufacturer's recommendations. Butt fusion shall result in a joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion will not be accepted. Extrusion welding or hot gas welding of HDPE shall not be used. Flanges, unions, grooved couplers, transition fittings, and some mechanical couplers may be used to connect HDPE pipe mechanically without butt fusion only where shown on the DRAWINGS.

Mechanical joint connections between ductile iron pipe or fittings and HDPE pipe or fittings shall use ductile iron mechanical joint glands conforming to AWWA C111 and AWWA C153. Mechanical joints shall be fully thrust restrained. Gaskets, bolts, hexagonal nuts, and rubber gaskets shall conform to AWWA C111. Follower gland shall match Class 350 "compact" fittings.

HDPE stiffeners shall be constructed of stainless steel and shall be flanged on one end to prevent over-insertion into the receiving pipe.

35.5.4 MARKINGS

All HDPE pipe shall be manufactured with a continuous stripe representing the following:

- potable water main: blue
- raw water main: white
- force main: green
- reuse main: lavender

The stripe shall appear on three (3) sides of the pipe, running the entire length, and shall be ¾ inch in height.

35.6 PIPE HANDLING

Requirements specified in Section 21 shall apply.

35.7 AIR RELEASE VALVES

35.7.1 GENERAL

Wastewater force mains shall be equipped with air release valves located at all high spots within the force main/reuse main profile. Valves shall be located in an enclosure as detailed on the STANDARD DETAILS. Valves shall also be located on all aerial crossings.

The valves shall be as described below.

35.7.2 WASTEWATER AIR RELEASE VALVE

The valve body shall be steel with an epoxy coating for above grade service and reinforced nylon for vault installation. All internal parts shall be 316 stainless steel or non-metallic material.

The inlet opening shall be standard two (2) inch NPT screwed connection unless otherwise shown on the DRAWINGS. The valve shall include a flush out feature for periodic cleaning of the internal mechanism. The overall height of the valve body for vault installation shall not exceed nineteen (19) inches unless otherwise shown on the DRAWINGS.

35.8 NOTIFICATION AND CONNECTION TO EXISTING MAINS

Pressure connection to existing wastewater force mains shall comply with the requirements of Section 15.

35.9 FORCE MAIN AND REUSE MAIN IDENTIFICATION

35.9.1 IDENTIFICATION TAPE FOR DUCTILE IRON AND STEEL PIPE

Identification tape shall be manufactured of inert polyethylene so as to be highly resistant to alkalies, acids and other destructive agents found in soil, and shall have a minimum thickness of 6 mils with a minimum tensile strength of 22 pounds per inch and a maximum adhesive factor of 40 ounces per inch. Tape width shall be 2 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.

35.9.2 IDENTIFICATION TAPE FOR POLYVINYL CHLORIDE PIPE

Identification tape shall be manufactured of polyethylene with a minimum thickness of 4 mils. The tape shall be highly resistant to alkalies, acids and other destructive agents found in soil. 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.

35.9.3 TAPE BACKGROUND COLORS AND IMPRINTS AS FOLLOWS:

Imprint	Background Color
"Caution Caution – Potable Water Line Buried Below"	Blue
"Caution Caution – Wastewater Force Main Buried Below"	Green
"Caution Caution – Sewer"	Green
"Caution Caution – Reuse Water Main Buried Below"	Lavender
"Caution Caution – Raw Water Main Buried Below"	White

35.9.4 LOCATE TAPE MANUFACTURERS

Identification tape shall be "Terra Tape" as manufactured by Reef Industries, Inc., Houston, TX, 800-231-6074; Seton, Branford, CT, 800-571-2596; Pro-Line Safety Products, West Chicago, IL, 800-554-3424.

35.9.5 LOCATE WIRE FOR PIPE INSTALLED BY OPEN CUT

In addition to the warning tape, there shall be installed 10 gage, single strand THWN solid copper-clad steel tracing wire. The wire shall be encapsulated in a 30 mil HDPE jacket, shall have break load of 513 pounds and color coded according to the table in Section 35.14.3.

The locate wire shall be connected with either high-split bolt connector (Granger GAGUO or equal) and shrink wrapped to encapsulate the connection, a Proline Dryconn waterproof connector or Copperhead Direct Bury Log.

35.9.6 LOCATE WIRE FOR PIPE INSTALLED BY DIRECTIONAL DRILL

Locate wire for directional drill pipe installation shall be steel core, 10 gage, single strand THWN solid copper-clad steel tracing wire. The wire shall be encapsulated in a 45 mil HDPE jacket and color coded according to the table in Section 35.14.3. Three (3) strands of wire shall be pulled back with each drill. Tracing wire break load shall be 1,150 pounds.

35.9.7 INSTALLATION

Installation of the locate tape shall be in accordance with Figure W-30. Installation of the locate wire for open cut applications shall be in accordance with Figures W-31, W-31A, and W-31B.

Section 36

WASTEWATER PUMP/LIFT STATIONS

36.1 GENERAL

This Section includes the SPECIFICATIONS for equipment, materials, site work, fences and appurtenances for the installation of wastewater pump/lift stations.

36.2 WET WELL AND VALVE VAULT

Wet well and valve vault shall be constructed as shown on the STANDARD DETAILS and in conformance with the specifications outlined in Section 32.

36.3 ACCESS FRAMES AND COVERS

The wet well shall be furnished with an access frame and cover. Equipment furnished shall include the necessary access frames, complete with hinged and slide bar equipped dual lid covers, stainless steel upper guide holder and stainless steel level sensor cable holder. The frames shall be securely mounted above the pumps. A safety grate shall be provided with the wet well hatch. Doors shall be of aluminum checkered plate when constructed in non-traffic areas. Traffic rated galvanized steel doors and frames shall be used when the structures are built within traffic areas. The access cover and frame with stainless steel hardware shall be sized as shown on the DRAWINGS.

36.4 PUMPS AND CONTROLS

Pumps and miscellaneous accessories shall be as specified in Section 37. Controls and miscellaneous accessories shall be as specified in Section 38.

36.5 PIPING, VALVES AND ACCESSORIES

36.5.1 PIPING

Influent piping to the wet well shall meet the requirements of Sections 30 and 35 except that the influent pipe to the wet well shall be a minimum 18-foot section of epoxy-lined ductile iron pipe. All pipe inside the wet well and the valve vault shall be as shown on the STANDARD DETAILS.

36.5.2 PLUG VALVES

Plug valves shall meet the requirements of Section 35.

36.5.3 CHECK VALVES

Check valves for ductile iron pipelines shall be swing type, outside lever and weight, and shall meet the material requirements of AWWA C500. The valves shall be iron body, bronze mounted, single disc, 150 psi working water pressure, non-shock, and hydrostatically tested at 300 psi. Ends shall be 125 pound ANSI B16.1 flanges.

When there is no flow through the line the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.

Check valves shall have bronze seat and body rings, extended bronze hinge pins and stainless steel nuts on the bolts of bolted covers.

Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm for the outside lever and weight assembly. If pump shut-off head exceeds 80 feet, then an air-cushioned assembly shall be installed.

36.5.4 PRESSURE GAUGES

Pressure gauges shall be installed on each discharge pipe as indicated on the STANDARD DETAILS. Each pressure gauge shall be direct mounted and incorporate a stainless steel case and stainless steel hardware as shown on the STANDARD DETAILS. The gauge shall be liquid filled, with a 4-1/2 inch diameter dial and a clear glass crystal window. A ¼-inch stainless steel shut-off (isolation) valve shall be provided. All gauges shall be weatherproofed. The face of the dial shall be white finished aluminum with jet black graduations and figures. The face of the dial shall indicate the units of pressure measured in psi and feet of head with a 0-60 psi range.

Pressure gauges shall be installed prior to pump station start-up.

36.6 STANDBY POWER GENERATOR SYSTEM

36.6.1 GENERAL

A standby power generator system shall be installed at pump stations as required by Section 6 in Division 2 for electrical power during the loss of normal power.

New Construction: Any new development which generates flow of at least 100,000 gallons/day average daily flow (ADF), or will incorporate motors larger than 10 hp,will be required to provide a standby generator set.

Any new development which generates a flow of less than 100,000 gallons/day ADF will NOT be required to provide a standby generator set; however, if the downstream system receiving the added flow is above 100,000 gallons/day ADF, the developer will be required to upgrade the affected pump station and provide a standby generator at its site.

36.6.2 GENERATOR SET

36.6.2.1 GENERAL

The generator set shall consist of a diesel engine directly coupled to an electric generator, together with the necessary controls and accessories to provide continuous electric power and monitoring to the pump/lift station for the minimum duration of a 48-hour failure of the normal power supply.

The generator set shall conform to the latest CITY OF PALM COAST Standards and Details for standby power. A complete engine generator system shall be furnished and installed with a between-the-skids fuel tank, battery, battery charger, muffler, radiator, control panel, automatic transfer switch, sound attenuated aluminum enclosure, and all other accessories required for an operational system. All materials and parts of the generator set shall be new and unused. Each component shall be of current manufacture from a firm regularly engaged in the production of such equipment. The set shall be of a standard model in regular production at the manufacturer's place of business. Units and components offered under the SPECIFICATIONS shall be covered by the manufacturer's standard warranty on new machines.

36.6.2.2 REQUIREMENTS

The emergency generator set and accessories shall be of a type that complies with the latest edition of the National Electrical Code and all applicable state and local building codes. The generator as a complete assembly shall be UL rated.

The material and workmanship used in the manufacture of this equipment shall be of the highest quality consistent with the current standards for like equipment, and the equipment shall be manufactured in such a manner so as to conform to the latest applicable IEEE, ANSI, ISA, NEMA, and EEIA Standards.

The equipment supplier shall warrant and guarantee the entire unit to be free from defects in materials or workmanship for a period of five (5) years from the date of equipment start-up and acceptance.

The generator unit shall be as manufactured by Caterpillar, Cummins/Onan, Tradewinds or Generac.

36.6.2.3 SUBMITTALS

Submit to the Engineer for approval six (6) complete sets of installation drawings, schematics, and wiring diagrams which shall show details of installation and connections to the work of other sections, including foundation drawing showing location and size of foundation bolts for the spring type vibration isolators and brochures covering each item of equipment.

In the event that it is impossible to conform to certain details of the SPECIFICATIONS due to different manufacturing techniques, describe completely all non-conforming aspects.

The submittal data for each unit shall include, but not necessarily be limited to, the following:

Installation drawings showing plan and elevations of the complete generator unit; foundation plan; exhaust silencer; starting battery; battery charger; fuel tanks, radiator; and all other items requiring space for installation.

Engine Data:

1. Manufacturer.
2. Model.
3. Number of cylinders.
4. RPM.
5. Bore x stroke.
6. Piston speed, FPM.
7. Make and model and descriptive literature of electric governor (where required).
8. Fuel consumption rate curves at various loads.
9. Engine continuous pump drive duty rating (without fan) HP.
10. Gross engine horsepower to produce generator standby rating (including fan and all parasitic loads) HP.

Generator Data:

1. Manufacturer.
2. Model.

3. Rated KVA.
4. Rated Kw.
5. Voltage.
6. Temperature rise above 40 degree C ambient:

    a. Stator by thermometer
    b. Field by resistance
    c. Class of insulation

7. Efficiency including excitation losses and at 80 percent power factor.

    a. Full load
    b. ¾ load
    c. ½ load

Generator Unit Control Data:

1. Actual electrical diagrams including schematic diagrams, and interconnection wiring diagrams for all equipment to be provided.
2. Legends for all devices on all diagrams.
3. Sequence of operation explanations for all portions of all schematic wiring diagrams.

Generator Unit and Accessories:

1. Weight of skid mounted unit.
2. Overall length.
3. Overall width.
4. Overall height.
5. Exhaust pipe size.
6. CFM of air required for combustion and ventilation.
7. Heat rejected to jacket water and lubricating oil, Btu/hr.

36.6.2.4 TESTS

Equipment shall be completely assembled and tested at the factory prior to shipment. Certified copies of the data obtained during these tests shall be submitted to THE CITY OF PALM COAST.

Final tests shall be conducted at the site, after installation has been completed, in the presence of THE CITY OF PALM COAST'S representative. The emergency generator manufacturer shall furnish a service representative to operate the engine during the

tests, to check all details of the installation and to instruct THE CITY OF PALM COAST'S representatives in proper equipment operation.

Upon completion of the installation of the engine-generator, the Contractor and the supplier of the unit shall run a performance test on the generator set through resistive load banks. Supplier shall make the final tune-up and adjustments required to make the generator set operate properly and according to specifications.

The Contractor shall advise the Owner by letter of the scheduled date and time for the test so that a representative can be available to witness the test.

Engine-Generator supplier shall provide the manpower, load bank, and test equipment necessary to perform the following test after installation is complete. A certified test record is to be provided to the Owner / Engineer and be included in the record documents.

Contractor shall perform a four-hour test, performed in the following sequence without interruption or erratic operation, without overheating, and without activating any alarms.

1. One half hour at 50 percent of full load.
2. Three and one half hours at 100 percent load.

The generator set shall be tested and shown to start and pick up the full rated load in a single step and recover to rated voltage and frequency within 10 seconds. This 100 percent load test shall be performed from a cold start (jacket water heater temperature).

The following performance data shall be recorded at least every 30 minutes during the job site test. Also, the generator set shall be dynamically balanced, and a torsional analysis of the standard package shall be provided.

1. Alternator power output (kilowatts)
2. Voltage on each phase (volts)
3. Current on each phase (amperes)
4. Frequency (hertz)
5. Lubricating oil pressure (psig)
6. Engine coolant temperature (degrees F)
7. Lubricating oil temperature (degrees F)
8. Temperature of radiator discharge air (degrees F)
9. Temperature of radiator inlet air (degrees F)

10. Temperature of ambient air in generator set room (degrees F)
11. Continuous fuel consumption (gallons per hour)
12. Sound level (decibels "A" weighted) at eight locations selected by Owner.

The Owner's engineer or other Owner's representative shall review the job site test data and the vibration test report to verify that the generator set performs in accordance with specifications before accepting the generator set.

The Contractor shall completely fill the fuel tank before and after completion of load bank test.

36.6.2.5 RATINGS

The rating of the generator shall be as shown on the DRAWINGS. These ratings must be substantiated by the manufacturer's standard published curves. Special ratings shall not be acceptable. The set shall be capable of supplying the specified usable KW for the specified duration, including the power required for the pump start-up, without exceeding its safe operating temperature.

36.6.2.6 ENGINE

The engine shall be a liquid-cooled, four-stroke cycle, compression ignition diesel. It shall meet specifications when operating on commercial grade of distilled petroleum fuel oil. Speed shall not exceed 1800 RPM at normal full load operation. The engine shall be equipped with fuel, lube oil and intake air filters; lube oil coolers, fuel transfer pump (if necessary), fuel priming pump, and gear-driven water pump.

The engine and generator shall be torsionally compatible to prevent damage to either piece of equipment.

In addition to the standard fuel filters provided by the engine manufacturer, there should also be installed a primary fuel filter and a water separator in the fuel inlet line to the engine.
The engine governor shall be of the synchronous electronic type. Stability shall not exceed plus/minus .33 percent maximum variation at any constant load from no load to full load. Regulation shall be 5 percent maximum frequency deviation between no load steady-state and full load steady-state. The engine shall start and assume its rated load within 10 seconds, including transfer time.

Engine Instruments and Controls: A unit mounted console shall contain the following gages for proper engine surveillance and maintenance:

Lamp test switch
Panel lamps (2)
Cyclic cranking
Engine cool-down
Overcrank and starter unmesh protection
Overcrank (red lamp)
Two-wire remote start-stop control
High water temperature (red lamp)
Phase selector switch
Low oil pressure (red lamp)
Voltage adjusting rheostat
Overspeed (red lamp)
DC circuit protection
Emergency stop (red lamp)
Test-off-automatic switch
Switch-off (flashing red)
High battery volts (red lamp)
Low Fuel (red lamp)
Low battery volts (red lamp)
System ready (green lamp)

Engine Protection Devices: The following engine protection devices shall be provided, and an indicating light shall be provided for use with each device specified.

High engine temperature safety shutdown with lamp to indicate failure and alarm contact.
Low oil pressure safety shutdown with lamp to indicate failure and alarm contact.
Engine overspeed safety shutdown with lamp to indicate failure and alarm contact.
Engine failed to start (overcrank) lamp and alarm contact.
Low engine temperature lamp and alarm contact.
Low coolant level device for alarm and shutdown.
Switch-off flashing light.
System ready light.
Loss of coolant shut down.

36.6.2.7 ALTERNATOR

The alternator shall be engine driven, single bearing, synchronous type. It shall be directly connected to the engine by means of a flexible coupling for permanent self-alignment. It shall be revolving field, 4 pole, 12 lead reconnectable, brushless type employing rotor amortisseur windings to improve A.C. waveform and reduce field heating.

Exciter: The exciter shall be three phase, full wave rectified with silicon diodes mounted on a common rotor and sized for maximum motor starting. Provide a series boost option (factory mounted) to maintain 300% rated output for at least 10 seconds to allow downstream breaker tripping.

Temperature Rise: The temperature rise at rated load and power factor shall be NEMA Class F 105 degrees C and rise at 40 degrees C ambient, as defined by NEMA MG1-22-40.

Cooling: The alternator shall be direct centrifugal blower cooled and furnished with heavy duty ball bearing with prelubricated cartridge.

Instantaneous Voltage Dip: The instantaneous dip shall be less than 5 percent when 300 Skva, three load and rated power factor is applied to the alternator.

Voltage Regulation: The alternator shall be equipped with a solid state voltage regulator to maintain voltage within limits as specified below, and provide a voltage adjusting rheostat.

Stability: 1-percent of its mean value at any constant load from no load to full load.

Regulation: Plus or minus 2 percent maximum voltage deviation between no load steady-state to full load steady-state.

Frequency Stability and Regulation: The frequency stability and regulation shall be in accordance with that defined by the engine governor performance in Paragraph 36.6.2.6.

Alternator Instruments: A unit mounted console shall contain the following controls and instruments for proper alternator surveillance:

Manual reset field circuit breaker.
A.C. Voltmeter.
A.C. Ammeter.
Voltmeter-ammeter phase selector switch with "OFF" position.
Frequency meter.
Running time meter.

36.6.2.8 CONTROL PANEL

The electric set shall have a lighted unit mounted control console that is wired, tested, and shock-mounted by the manufacturer of the alternator.

The control console shall contain start-stop controls which start the engine on closing contact, and stop the engine on opening contact.

A manual selector switch providing three control positions, ON – OFF – AUTO, shall be included on the console. The ON position shall permit the engine to be started locally at the set and run loaded. The OFF position shall prevent local starting. The AUTO position shall allow for remote start/stop control from ATS.

Terminals shall be located within the console panel for REMOTE EMERGENCY STOP.

The console shall include an adjustable solid state temperature compensated cranking control circuit that shall provide a minimum of 10 seconds cranking period followed by a minimum of 7 second rest time. A sensing device shall automatically disconnect the starting circuit when the engine has started. If the engine has not started in approximately 60 seconds or 3 cranking tries, the engine starting control shall be locked out and the overcranking signal shall so indicate. No further starting attempts shall take place until the overcranking device has been manually reset.

The console shall contain alarm lights and contacts energized by the engine protection devices as specified in Paragraph 36.6.2.6.

36.6.2.9 BATTERY CHARGER

A suitable automatic voltage regulated battery charger with maximum charge rate of 10 amps, equivalent to Sens NRG, shall be provided to maintain batteries at full capacity during standby conditions.

The charger shall be suitable for 110/120 volts or 208/240 volts, AC, single phase, switch selectable. Input current shall be 10 or 20 amps and shall incorporate a 1-pole fuse, soft-start, transient suppression for input protection. The charger shall incorporate a switch selectable meter for output volts or amps, and shall include, as a minimum, the following alarms:

1. AC good
2. Float mode
3. Fast charge
4. Temp. comp. active
5. AC Fail
6. Charger Fail
7. Battery Fault

The charger shall be housed in a clear, anodized aluminum enclosure, and the entire unit shall be installed within the engine-generator set enclosure.

36.6.2.10 BATTERY

A lead acid battery shall be supplied and shall be installed in a rack that is an integral part of the electric set base. The batteries shall have sufficient capacity for cranking the engine for at least 30 seconds at firing speed in the ambient temperature between 104 degrees F and 0 degrees F and with the capacity for starting the diesel engine a minimum of four times. The batteries shall be of capacity and voltage as recommended by the engine manufacturer. All necessary intercell connecting and battery cables shall be furnished. The batteries shall be supplied dry-charged and electrolyte added shortly prior to acceptance tests.

36.6.2.11 BASE AND MOUNTING

The base-mounted fuel tank shall be bolted directly to the concrete pad. A ¼-inch neoprene pad shall be placed between the fuel tank and the slab.

36.6.2.12 UTILITY CONNECTIONS

All connections to the generator set shall be flexible.

36.6.2.13 COOLING SYSTEM

The generator set shall be equipped with an engine-mounted radiator sized to maintain safe operation at 105 degree F maximum ambient temperature. A pusher type fan shall be used directing the air flow from the engine through the radiator. An engine mounted thermostatically controlled water jacket heater shall be provided as a starting aid to insure a minimum coolant temperature of 120 degrees F in a minimum room ambient of 32 degrees F. The heater shall be 2,250 watts and suitable for operation on 120 VAC, single phase power. The heater shall be disconnected whenever the engine starts by an oil pressure switch mounted on the engine. The entire cooling system shall be filled with a solution recommended by the manufacturer.

36.6.2.14 FUEL SYSTEM

Diesel fuel storage for the generator set shall be provided by a base mounted dual-wall fuel secondary containment tank integral with the generator set and tested with air and water at 3 psi. All fuel piping shall be internal to the unit.

1. Primary tank constructed of 10 gage steel.
2. Outer tank constructed of 7 gage steel channels, 10 gage steel bottom, ends.
3. 2-inch NPT fill connection.
4. 1-1/4-inch NPT normal inner tank vent.
5. 1-1/4-inch NPT normal outer tank vent.
6. 1-inch fuel return
7. Removable fuel supply dip tube
8. Level switch connections
9. Exterior drain
10. Interior epoxy coated
11. Exterior enamel gloss black.

The volume of the base mounted tank shall be adequate to provide 48 hours of operation and with maximum height of 30 inches. The tank shall be the standard product as manufactured and supplied by the generator manufacturer.

The tank shall include an automatic continuous leak detection monitoring system to detect fuel present between the primary tank and secondary containment. The tank shall also include a fuel high-level alarm; fuel gauge (scaled for the tank volume supplied);

low level alarm; ½ inch stainless steel drain valve and fuel fill limiter.

36.6.2.15 EXHAUST SYSTEM

The generator set supplier shall provide a critical-type silencer, with flexible exhaust fittings, properly sized and installed, according to the manufacturer's recommendation. The silencer shall be mounted so that its weight is not supported by the engine.

Exhaust pipe size shall be sufficient to ensure that measured exhaust back pressure does not exceed the maximum limitations specified by the generator set manufacturer. All exhaust equipment must be rated to withstand temperatures of approximately 1,000 degrees F. The exhaust system shall include a flexible, seamless, stainless steel connection between the engine exhaust outlet and the rest of the exhaust system. The exhaust system shall be a part of the generator enclosure.

36.6.2.16 WEATHERPROOF ENCLOSURE

The complete engine-generator set shall be enclosed in a modular weatherproof sound attenuated housing. The enclosure shall be of the riveted design, with all aluminum pre-painted components and removable side and end panels. The top, end panels and side panels shall all be made from .063 aluminum panel. The unit shall have two side doors each side and a door on the generator end equipped with key locks for ease of engine maintenance. There shall be an expanded metal cover or core guard in front for the radiator and fixed louvered intake ports on the enclosure sides and rear for proper air circulation within the housing. The area of the intake louvers shall not be less than 120% of the area of the exhaust louvers. The unit shall withstand 120 mph winds.

The housing shall be equipped with all stainless steel hardware and incorporate a pitched roof to minimize rain entry.

The enclosure shall include acoustic insulation meeting UL94HF1 flammability classification. Sufficient insulation shall be provided such that the dBA rating 7 meters from the radiator end is 75 or less.

The generator control panel, including generator control, circuit breakers, meters, start-stop controls, and battery charger, shall be mounted at the side of the generator. This control shall incorporate

equipment as previously specified. Control wire connection between the starting and safety circuits shall be pre-connected before arriving at the job site. Provisions shall be made for mounting batteries and rack inside the enclosure.

Fuel filter shall be inside the base perimeter and located so spilled fuel cannot fall on hot parts of engine or generator. A cleanable primary fuel strainer shall be used to collect water and sediment between tank and main engine fuel filter.

Crankcase fumes disposal shall terminate in front of the radiator to prevent oil from collecting on the radiator core and reducing cooling capacity.

Enclosure shall be accurately dimensioned to be in compliance with the National Electric Code (NEC), National Fire Protection Association (NFPA) and all applicable fire codes for a structure and application of this type.

36.6.2.17 AUTOMATIC TRANSFER SWITCH

The switch shall be for automatic load transfer and shall be furnished by the engine-generator manufacturer to provide a coordinated power system.

Quality Assurance:

Codes and Standards: All work shall be performed in accordance with the following:

American National Standards Institute (ANSI).
Institute of Electrical and Electronics Engineers (IEEE Std. 446 and 472).
National Electric Code.
National Electrical Manufacturers Association (MG-1-1978).
NEMA Standards (ICS 1-109).
Underwriters Laboratories, Inc. (Std. UL-1008).

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work are limited to the following:

Caterpillar Tractor Company, Generator Division
Tradewinds
Onan Corporation, Electrical Products Division

Generac

Submittals:

Shop Drawings: Submit on the specified equipment and include at least the following:

Sufficient information to indicate complete compliance with specifications. Such data shall include data sheets, drawings and/or certification as necessary.

Plainly mark on all submittals any deviations from or exceptions to the Contract Documents.

Where data sheets or drawings have several items shown on lists of data, such as voltages, phases, or speeds, clearly mark the information to indicate exactly what will be supplied.

Certified Tests: Provide certified independent laboratory test data on switches to confirm the following switching abilities:

Overload and endurance at 480 volts AC, per tables 21.2 and 23.2 of UL-1008.

Temperature rise test after the overload and endurance tests to confirm the ability of the transfer switches to carry their rated current within the allowable temperature limits of the insulation in contact with current-carrying parts.

No welding of contacts. Transfer switch must be operable by the normal means after the withstand current tests.

Factory Tests: Prior to shipment, the automatic transfer switches shall be tested for proper operation of individual components and correct overall sequence of operation to ensure that the operating transfer time, voltage, frequency and time delay setting are in compliance with the Specification requirements.

The complete automatic transfer switch shall be subjected to a dielectric strength test per NEMA Standards ICS 1-109.05.

The control panel shall meet or exceed the voltage surge withstand capability in accordance with IEEE Standard

472 (ANSI C37.90a) and the impulse withstand voltage test in accordance with the proposed NEMA Standards ICS 1-109.

Operation and Maintenance Manual: When the entire job is ready for final inspection, deliver to the Engineer, one set of contract drawings marked to show all significant changes made during construction. This shall include changes in equipment ratings. Testing shall be as specified at the end of this section of the specifications.

Workmanship:

Work under this section shall be accomplished by persons skilled in performance of the required task. All work shall be done in a first-class manner in keeping with conventions of the trade. Work under this section shall be closely coordinated with work of other trades to avoid conflict and interference.

The units shall be the product of a manufacturer regularly engaged in the production of such equipment and shall be fully tested in the plant of the manufacturer.

Manufacturer's Service:

The Contractor shall furnish the services of a qualified manufacturer's representative for whatever length of time may be required to check out the installation and to make the unit operable and acceptable to the Engineer and/or Owner.

Performance:

The automatic load transfer switch ratings shall be rated a minimum 150 amperes continuous current, 10,000 amperes symmetrical withstand. Switch shall meet UL requirements for temperature rise, overload, endurance testing, dielectric withstand, and withstand current rating. Transfer time shall not exceed 6 cycles.

As a precondition for approval, the manufacturer of the automatic transfer switch shall verify that his switches are listed by Underwriters Laboratories, Inc. Standard UL-1008 with withstand and close-in values at least equal to the interrupting rating of the circuit breaker that is specified to protect the circuit.

The automatic transfer switch shall consist of a power transfer module and a control module, interconnected to provide complete automatic operation. The automatic transfer switch shall be mechanically held and electrically operated by a single-solenoid mechanism energized from the source to which the load is to be transferred. The switch shall be rated for continuous duty and be inherently double throw. The switch shall be mechanically interlocked to ensure only one of two possible positions - normal or emergency. The automatic transfer switch shall be suitable for use with emergency sources such as an engine or turbine driven generator source to another utility source.

All main contacts shall be of silver composition. They shall be of the blow-on configuration. The operating transfer time in either direction shall not exceed 1/6th of a second.

All contacts, coils, springs and control elements shall be conveniently removable from the front of the transfer switch without major disassembly or disconnection of power connectors.

The automatic transfer switch shall conform to the requirements of NEMA Standard ICS 2-447 and Underwriters Laboratories UL-1008 and shall be UL listed as follows:

> For use in emergency systems in accordance with Articles 517 and 700 of the National Electrical Code.
>
> Rated in amperes for total system transfer including control of motors, electric-discharge lamps, electric-heating and tungsten-filament lamp loads as referred to in Paragraph 30.9 of UL-1008.

The automatic transfer switch shall be rated to withstand the rms symmetrical short circuit current available at the automatic transfer switch terminals with the type of overcurrent protection, voltage and X/R.

The automatic transfer switch shall be mounted in a NEMA 4X 316 stainless steel non-ventilated wall-mounted enclosure, suitable for outdoor installation.

Operation:

Three pole switches shall be used for three phase service. Neutral conductor terminal lugs shall be provided as required for the power system.

The automatic transfer switch control panel shall utilize solid-state sensing on normal and emergency for automatic, positive operation. The following shall be provided:

For three phase switches, normal source voltage of all three phases shall be monitored line-to-line. Close differential voltage from 85% to 100% of nominal and the dropout voltage shall be adjustable from 75% to 98% of the pickup value.

The transfer to emergency will be initiated upon reduction of normal source to 85% of nominal voltage and retransfer to normal shall occur when normal source restores to 95% of nominal, provided phase and frequency are matched. Provide an in-phase monitor.

A time delay to override momentary normal source outages to delay all transfer switch and engine starting signals. The time delay shall be field adjustable from 0.5 to 6 seconds and factory set at 1 second.

A time delay on retransfer to normal source. The time delay shall be automatically bypassed if the emergency source fails and normal is available. The time delay shall be field adjustable from 0 to 30 minutes and factory set at 30 minutes.

An unloaded running time delay for emergency generator cooldown. The time delay shall be field adjustable from 0 to 5 minutes and factory set at 5 minutes.

A time delay on transfer for emergency. Initially set at zero, but field adjustable up to 5 minutes for controlled timing of load transfer to emergency, where indicated.

Independent single phase voltage and frequency sensing of the emergency source. The pickup voltage shall be adjustable from 85% to 100% of nominal. Pickup frequency shall be adjustable from 90% to 100% of

nominal. Transfer to emergency upon normal source failure when emergency source voltage is 90% or more of nominal and frequency is 95% or more of nominal.

A contact that closes when normal source fails for initiating engine starting, rated 10 amps, 32 VDC. Contacts to be gold plated for low voltage service.

A time delay relay, adjustable 0-60 seconds, to delay starting of additional motors on transfer to emergency power. Factory set at 20 seconds.

An in-phase monitor to monitor normal and emergency sources and permit transfer when phase voltages are $\pm$ 2 cycles.

A white signal light to indicate when the automatic transfer switch is connected to the normal source. A yellow signal light to indicate when the automatic transfer switch is connected to the emergency source.

Four auxiliary contacts that are closed when the automatic transfer switch is connected to normal and four auxiliary contacts that are closed when the automatic transfer switch is connected to emergency. Rated 10 amps, 480 volts, 60 Hz AC.

A test switch to momentarily simulate normal source failure.

Harnessing between transfer switch and control panel shall have built-in disconnect for routine maintenance.

Engine generator exercising timer with load. Adjustable in 15 minute increments.

Field Acceptance Tests:

After the project installation is complete, thoroughly test the automatic transfer switch to demonstrate that the system is in proper order and in accordance with the drawings and specifications. The tests shall be as recommended by the manufacturer. The costs of the tests shall be borne by the Contractor including expense incident to retests occasioned by

defects and failure of equipment to meet the specifications. Provide calibrated electrical instruments.

Make the necessary connections to the circuit for the testing instruments and place and connect the instruments and appliances necessary for the tests. Upon completion of the tests, remove the instruments and appliances and reconnect circuits in a permanent manner. Conduct the tests in the presence of the Engineer. Results are subject to the Engineer's approval. Notify the Engineer 24 hours or more in advance when any test is to take place, and do not start without the Engineer's permission.

36.7 FLOW MONITORING SYSTEM

36.7.1 GENERAL

When indicated on the DRAWINGS, a flow monitoring system capable of indicating, recording, and totalizing wastewater flows shall be provided. The system shall include magnetic flowmeter/transmitter, electronic recording receiver, and miscellaneous related accessories as specified herein. It shall be the CONTRACTOR'S responsibility to provide and install such equipment resulting in a completely operational flow monitoring system.

36.7.2 MAGNETIC FLOWMETER/TRANSMITTERS

The magnetic flowmeter shall be of the low frequency electromagnetic induction type and shall produce a DC pulsed signal directly proportional and linear to the liquid flowrate. The meter shall be designed for operation on 120 VAC +/- 10%, 60 Hz +/-5% with a power consumption of less than 20 watts for sizes through 12 inches.

The metering tubes shall be constructed of stainless steel. All magnetic flowmeters shall be designed to mount directly in the pipe between ANSI Class 150 flanges and shall consist of a flanged pipe spool piece with laying length of at least 1-1/2 times the meter diameter. Meters shall have polyurethane liners with stainless steel electrodes.

The electronics portion of the magnetic flowmeter shall include both a magnet driver to power the magnet coils and a signal converter. The signal converter shall be integrally mounted. The converter shall include a separate customer connection section to isolate the electronics compartment and protect the electronics from the environment. A separate terminal strip for power connection shall be supplied. The electronics shall be of the solid state, feedback type and utilize integrated circuitry. The input span of the signal converter shall be continuously adjustable between 0-1 and 0-31 fps for both analog and frequency

outputs. The converter shall not be affected by quadrature noise nor shall it require zero adjustment or special tools for start-up.

Input and output signals shall be fully isolated. The converter output shall be 4 to 20 mA DC into 0 to 900 ohms.

Meter shall be suitable for outdoors installation and shall be furnished complete with grounding rings and installation hardware including studs, nuts, gaskets, and flange adapter hardware.

The converter shall include an integral zero return to provide a constant zero output signal in response to an external dry contact closure.

Converter shall also include digital type switches for direct adjustment of scaling factor in engineering units along with integral calibration self-test feature to verify proper operation of the electronics.

The meter shall be hydraulically calibrated at a facility located in the United States and the calibration shall be traceable to the National Bureau of Standards. A computer printout of the actual calibration data giving indicated versus actual flows at a minimum of three (3) flow rates shall be provided with the meter. A certification letter shall accompany the computer printout of the calibration data for each meter referencing the meter's serial number. The accuracy of the metering system shall be 1% of rate from 10 to 100% of flow for maximum flow velocities of 3 to 31 feet per second.

Complete zero stability shall be an inherent characteristic of the meter system to eliminate the need to zero adjust the system with a full pipe at zero flow.

The meter housing shall be splash-proof and weather resistant design. The meter shall be capable of accidental submergence in up to 30 feet of water for up to 48 hours without damage to the electronics or interruption of the flow measurement.

36.7.3 ELECTRONIC RECORDING RECEIVER

The electronic recording receiver shall be of the solid state, null-balance, servo operated potentiometer type.

The instrument shall contain a differential amplifier, a TORQ-ER driving motor to position the pen, and a Flux Bridge contactless solid state position feedback device for balancing. The instrument shall be capable of receiving one process variable input. Inputs shall be provided with electrical isolation. The instrument shall accept an input signal of 4 to 20 mADC. Electrical zero and span adjustments shall be provided. Power requirements shall be 120 VAC +/-10%,

60 Hz. A power supply shall be provided for two-wire transmitters. Accuracy shall be +/-0.5% of span, with repeatability of +/-0.2% of span.

The receiver shall be provided with an indicating 5 inch segmental scale.

The electronic recording receiver shall be housed in a cast aluminum case suitable for panel mounting. The case shall have a gasketed door with glass window. A 12 inch circular chart shall be provided, with 7 day/rev. and chart rotation. An eight (8) digit electronic totalizing counter shall also be provided.

36.7.4 WARRANTY AND SERVICE

WARRANTY

Products shall be guaranteed to be free from defects in material and workmanship under normal use and service for a period of one (1) year after start-up.

SERVICE

Service shall be available for insitu repair of the products. Manufacturer's repair personnel shall be based in Florida to insure a reasonable response time of not more than two (2) working days.

36.8 CHAIN LINK FENCE

36.8.1 GENERAL

The CONTRACTOR shall furnish and erect the chain link fence and gate in accordance with these SPECIFICATIONS and in conformity with the lines, grades, notes and typical sections shown on the DRAWINGS and the STANDARD DETAILS.

36.8.2 MATERIALS

The fabric, posts, fastenings, fittings and other accessories for chain link fence shall meet the requirements of AASHTO M 181 with the following changes:

1. All material used in the fabrication of chain link fence shall be black vinyl coated.

The base metal of the fabric shall be a good commercial quality 9 Gauge Steel wire. The fabric shall be of uniform quality, and shall be 6 feet high with a 2-inch square mesh size.

All posts and rails shall be accordance with the following schedule:

End, corner and pull posts – 2-7/8" O.D., 5.79 pounds per linear foot.

Line posts – 2-3/8" O.D., 3.65 pounds per linear foot.

Gate frames – 1.9" O.D., 2.72 pounds per linear foot.

Gate posts – 4.0" O.D., 9.11 pounds per linear foot.

Post braces – 1.67" O.D., 2.27 pounds per linear foot.

Top rail – 1.67" O.D., 2.27 pounds per linear foot.

Tension wire shall be 7 gauge coiled spring wire tensioned along the bottom of the fabric and shall be coated similarly to the wire fabric.

Miscellaneous fittings and hardware shall be vinyl coated commercial quality or better steel malleable iron.

Post caps, designed to provide a drive fit over the top of the tubular post to exclude moisture, shall be provided.

36.8.3 INSTALLATION

POST SETTING

All posts shall be set forty-eight (48) inches deep in concrete footings, 16" diameter for line posts, gate and corner posts.

After the post has been set, aligned and plumbed, the hole shall be filled with 2,500 psi concrete. The concrete shall be thoroughly worked into the hole so as to leave no voids. The exposed surface of the concrete shall be crowned to shed water.

End, corner, pull and gate posts shall be braced to the nearest post with horizontal brace used as a compression member and a vinyl coated 3/8 inch steel truss rod and truss tightener used as a tension member. Corner posts and corner bracing shall be constructed at all changes of fence alignment of 30 degrees or more. All chain link fences shall be constructed with a top rail and bottom tension wire.

GATES

Swing gates shall be two 7 feet wide double hung gates as indicated on the STANDARD DETAILS and hinged to swing through 180 degrees from closed to

open and shall be complete with latches, locking device, stops keeper, hinges, fabric and braces. Gates shall be the same height as the fence and the gate fabric.

Gate leaves less than 8 feet wide shall have truss rods or intermediate braces and gate leaves 8 feet or more in width shall have intermediate braces and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist.

PLACING FABRIC

The fabric shall not be placed until the posts have been permanently positioned and concrete foundations have attained adequate strength. The fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making permanent attachments at intermediate points.

The fabric shall be fastened to all corner, end and pull posts by substantial and approved means. Tension for stretching the fabric shall be applied by mechanical fence stretchers.

36.9 ELECTRICAL GROUNDING SYSTEM

36.9.1 GENERAL

A grounding system shall be installed as per National Electrical Code, Local Codes and Ordinances. The DRAWINGS shall clearly show the Electrical Grounding System. An underground perimeter cable grounding system shall be installed with connections to at least the following equipment:

1. Wet Well Cover
2. Valve Vault Cover
3. Control Panels
4. Generator
5. Utility Company Transformer
6. Main Disconnect Switch
7. Fence

36.9.2 MATERIAL AND INSTALLATION

The DRAWINGS shall show details of material and installation to construct a completely functional and operational Electrical Grounding System.

36.10 INSPECTION AND TESTING

A factory representative knowledgeable in pump operation and maintenance shall inspect and supervise a test run at the pumping station covered by this MANUAL. A minimum of one (1) working day shall be provided for the inspections. Additional time made necessary by faulty or incomplete WORK or equipment malfunctions shall be provided as necessary to meet the requirements in this MANUAL at no additional cost to THE CITY OF PALM COAST. Upon satisfactory completion of the test run, the factory representative shall issue the required manufacturer's certificate.

The test run shall demonstrate that all items of this MANUAL have been met by the equipment as installed and shall include, but not be limited to, the following tests:

1. That all units have been properly installed.

2. That the units operate without overheating or overloading any parts and without objectionable vibration.

3. That there are no mechanical defects in any of the parts.

4. That the pumps can deliver at the specified head and discharge capacity.

5. That the pumps are capable of pumping the specified material.

6. That the pump controls perform satisfactorily.

Section 37

SUBMERSIBLE WASTEWATER PUMPS

37.1 GENERAL

The equipment covered by these SPECIFICATIONS is intended to be standard pumping equipment of proven ability as manufactured by a reputable firm having at least five (5) years experience in the production of such equipment. The equipment furnished shall be designed, constructed, and installed in accordance with the best practices and methods, and shall operate satisfactorily when installed as shown on the DRAWINGS.

The pump(s) shall be capable of handling raw unscreened sewage, storm water, and other similar solids-laden fluids without clogging. The discharge base and elbow shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pump(s) shall connect to the guide rail(s) base automatically and firmly, guided by the 316 stainless steel guide rail(s) extending from the top of the station to the discharge connection. Cable guide systems shall not be considered acceptable. Non-standard flange dimensions shall not be considered acceptable. Each pump shall be fitted with a 316 stainless steel grab link or grip-eye assembly of adequate strength to permit raising the pump(s) for inspection. There shall be no need for personnel to enter the wet well to remove or reinstall the pump(s). Positive sealing of the pump to the discharge elbow shall be accomplished by either a field replaceable Nitrile rubber profile gasket or metal to metal contact between the pump and discharge elbow. No portion of the pump shall bear directly on the floor of the sump. The pump with its appurtenances and cable shall be capable of continuous submergence to a depth of 65 feet.

The manufacturer of the pumps shall be Xylem (Flygt).

37.2 REQUIRED SUBMITTALS

Five (5) copies of submittals shall be provided to THE CITY OF PALM COAST and include the following:

1. Shop and erection drawings showing all important details of construction, dimensions and anchor bolt locations.

2. Descriptive literature, bulletins, and/or catalogs of the equipment.

3. Data on the characteristics and performance of each pump. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified units, which show that they meet the specified requirements for head, capacity, efficiency, NPSHR, submergence and horsepower. Curves shall be submitted on eight and one-half (8-1/2) inch by

eleven (11) inch sheets, at as large a scale as is practical. Curves shall be plotted from no flow at shut off head to maximum manufacturer recommended pump capacity. Catalog sheets showing a family of curves will not be acceptable.

4. Complete layouts, wiring diagrams, elementary or control schematics, including coordination with other electrical control devices operating in conjunction with the pump control system. Suitable outline drawings shall be furnished for approval before proceeding with manufacture of any equipment. Standard preprinted sheets or drawings simply marked to indicate applicability will not be acceptable.

5. A drawing showing the layout of the pump control panel shall be furnished. The layout shall indicate all devices mounted on the door and in the panel.

6. The weight of each pump.

7. Complete motor data shall be submitted including:

- Nameplate identification
- No-load current
- Full load current
- Full load efficiency
- Locked rotor current
- High potential test data
- Bearing inspection report

37.3 PUMP CONSTRUCTION DETAILS

37.3.1. GENERAL

Major pump components shall be of gray cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of porosity or other irregularities. All exposed nuts and bolts shall be a minimum AISI type 304 stainless steel construction. All exterior metal surfaces of the pump coming into contact with the pumped media (other than the stainless steel components) shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish.

Sealing design for the pump/motor assembly shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where a watertight seal is required shall be machined and fitted with Nitrile or Viton rubber O-rings. Sealing will be the result of controlled compression of rubber O-ring in two planes and O-ring contact of four sides without requiring a specific torque limit. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve

compression shall not be considered adequate or equal. No secondary sealing compounds shall be used.

37.3.2 SHAFT

The rotating assembly (impeller, shaft and rotor) shall be dynamically balanced such that undue vibration or other unsatisfactory characteristics will not result when the pump is in operation.

The pump shaft and motor shaft shall be an integral unit. Each shaft shall be of ASTM A479 stainless steel material and adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system.

Each pump shaft shall rotate on permanently lubricated, greased bearings. The upper bearing shall be a deep grooved ball bearing and the lower bearings shall be heavy-duty double row angular contact ball bearing. Bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. B-10 bearing life shall be a minimum of 50,000 hr at BEP.

37.3.3 IMPELLER

The impeller shall be of gray cast iron, ASTM A-48 Class 35B and shall be of the non-clogging design, dynamically balanced, capable of passing a minimum of 3" diameter spherical solids. The impeller shall have a slip fit into the motor shaft, and shall be fastened to the shaft by either a locking collet or keyway.

37.3.4 VOLUTE

The pump volute shall be single piece gray cast iron, ASTM A48, Class 35B, non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids, which may enter the impeller. Minimum discharge size shall be as specified.

37.3.5 MECHANICAL SEAL

Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary tungsten carbide seal ring and one rotating tungsten carbide seal ring. The upper, secondary seal unit, located between the lubricant chamber and motor housing, shall contain one stationary tungsten carbide seal ring and one rotating seal ring made from tungsten carbide.

Each seal interface shall be held in contact by its own spring system. The seals shall not require routine maintenance or adjustment, and shall not be dependent on the direction of rotation for proper sealing. Each pump shall be provided with a lubricant chamber for the shaft sealing system, which shall provide superior heat transfer and maximum seal cooling. The lubricant chamber shall be designed to prevent overfilling, and to provide lubricant expansion capacity. The drain and inspection plug shall have a positive anti-leak seal, and shall be easily accessible from the outside of the pump. The seal system shall be rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry.

The following seal types shall not be considered acceptable or equal: seals requiring set screws, pins, or other mechanical locking devices to hold the seal in place; conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces; cartridge type systems, any system requiring a pressure differential to seat the seal and ensure sealing.

37.4 MOTORS

37.4.1. GENERAL REQUIREMENTS

The motor housing shall be gray cast iron, ASTM A48 Class 35B and the motor shall be of the squirrel-cage induction shell type design, housed in an air-filled, water tight chamber (NEMA B type) and shall be capable of continuous submerged operation underwater to a depth of 65 feet. As a minimum the stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method, resulting in a winding fill factor of at least 95 percent. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is unacceptable. The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of handling up to 15 evenly spaced starts per hour. The service factor (as defined by NEMA) shall be a minimum of 1.10. The motor shall have a voltage tolerance of +/- 10% from nominal. A performance chart shall be provided upon request showing curves for torque, current, power factor, input kW, output HP and efficiency. This chart shall also include data on starting and no-load characteristics. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shutoff through run-out. The rotor bars and short circuit rings shall be made of cast aluminum. The motor shall be designed for continuous duty, completely submerged or unsubmerged. The explosion proof variant shall be FM approved for use in NEC Class I, Division I, Groups C & D hazardous locations.

Each phase of the motor shall contain a bi-metallic temperature monitor in the upper portion of the stator windings. These thermal switches shall be connected in series and set to open at 125°C. They shall be connected to the control panel, and used in conjunction with and supplemental to external motor overload protection.

37.4.2 HEAT SENSORS

Each motor shall incorporate a minimum of one ambient temperature compensated overheat sensing device. This protective device shall be wired into the pump controls in such a way that if excessive temperature is detected, the pump will shut down. This device shall be self-resetting.

37.4.3 CABLES

The power cables shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil resistant chloroprene rubber, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

The cable entry design shall not require specific torque requirements to insure a watertight seal. The cable entry shall consist of a cylindrical elastomer grommet, flanked by stainless steel washers. A cable cap incorporating a strain relief shall mount to the cable entry boss compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry. The junction chamber shall be equipped with a removable cover allowing for cable removal or voltage change without opening the motor. The junction chamber shall be sealed from the motor by means of a sealing gland or terminal board.

37.5 PUMP CONTROL SYSTEM

Refer to Section 38 for control system specifications.

37.6 INSPECTION & TESTING

A factory representative knowledgeable in pump operation and maintenance shall inspect and supervise a test run at the pumping station covered by this MANUAL. A minimum of one (1) working day shall be provided for the inspections. Additional time made necessary by faulty or incomplete WORK or equipment malfunctions shall be provided as necessary to meet the requirements in this MANUAL at no additional cost to THE CITY OF PALM COAST. Upon satisfactory completion of the test run, the factory representative shall issue the required manufacturer's certificate.

The test run shall demonstrate that all items of this MANUAL have been met by yhe equipment as installed and shall include, but not limited to, the following tests:

- That all units have been properly installed.
- That the units operate without overheating or overloading any parts and without objectionable vibration.
- That there are no mechanical defects in any of the parts.
- That the pumps can deliver at the specified head and discharge capacity.
- That the pumps are capable of pumping the specified material.
- That the pump controls perform satisfactorily.
- That the pumps are capable of pumping the specified material.
- That the pump controls perform satisfactorily.

37.7 SHOP PAINTING

Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt or other foreign matter. All pumps and motors shall be shop coated with a corrosion resistant paint proven to withstand an environment of raw wastewater. All nameplates shall be properly protected during painting.

Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to THE CITY OF PALM COAST up to the time of the final acceptance test.

37.8 HANDLING

All parts and equipment shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation. Finished surfaces of all exposed pump openings shall be protected by wooded planks, strongly built and securely bolted thereto. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

37.9 WARRANTY

The pump manufacturer shall warrant the units being supplied to THE CITY OF PALM COAST against defects in workmanship and material for a period of five (5) years or 10,000 hours.

37.10 SPARE PARTS

A spare impeller, wear ring and phase monitor for each station shall be provided.

Section 38

PUMP STATION ELECTRICAL POWER AND CONTROL SYSTEM

38.1 GENERAL

This Section specifies the electrical power and control system requirements for wastewater pump/lift stations. These requirements apply to duplex pump panels. Similar requirements shall apply when more than two pumps are involved except for the quantity of control equipment and panel size shall be increased accordingly. The manufacturer of the control panel shall provide data to indicate that the manufacturer has a minimum of 3 years experience in the construction of pump control panels.

A pump station control panel shall be provided for each wastewater pump station. The control panel shall respond to liquid level float switches as the primary pump control mechanism with a level indicating transducer to automatically monitor levels in the wet well. The control panel shall operate two (2) electrical submersible pumps at the power characteristics stipulated. The control function shall provide for the operation of the lead pump under normal conditions. If the incoming flow exceeds the pumping capacity of the lead pump, the lag pump shall automatically start to handle this increased flow. As the flow decreases, pumps shall be cut off at an elevation as shown on the DRAWINGS. Pumps shall alternate positions as lead pump at the end of each cycle. A failure of the alternator shall not disable the pumping system. The alternator shall include a safe, convenient method of manual alternation and also have provisions to prevent automatic alternation without disturbing any wiring.

The control panel shall provide for connection to THE CITY OF PALM COAST'S telemetry system for monitoring and off-site control of the pumping station. The lift station RTU shall accommodate the following local inputs and outputs:

Description	Type	Source/Destination
Wetwell Level	AI	Submersible Transducer
Pump 1 Run	DI	Motor Starter Aux.
Pump 2 Run	DI	Motor Starter Aux.
Pump 1 Fail	DI	Seal Failure Pump 2
Pump 2 Fail	DI	Seal Failure Pump 2
High Wet Well Level	D1	High Float Relay
Power Failure	--	Generated by PLC

Note: Type designations are as follows:
AI = analog input
DI = discrete input
AO = analog output
DO = discrete output

The control panel shall consist of main circuit breakers and generator circuit breaker with manual mechanical interlock, an emergency power receptacle, a circuit breaker and magnetic starter for each pump motor, and 15 ampere, 120 volt circuit breakers as required. All pump control operations shall be accomplished by liquid level float switches as the primary control mechanism. A liquid level indicating transducer/sonar shall monitor wet well level. Control switches shall provide means to operate each pump manually or automatically. When operated in the automatic mode, the control assembly shall provide means to manually select or automatically alternate the position of the "lead" and "lag" pumps after each pumping cycle. The control panel shall also provide electrical tracking provisions for the CITY'S SCADA system. The telemetry system shall be manufactured/produced by Mission.

38.2 PANEL CONSTRUCTION

The duplex pump panel shall be housed in a NEMA 4X, Type 316, 14 gauge stainless steel enclosure. Enclosure shall incorporate a three-point latch with two other fasteners and shall have provisions for padlocking the door. A dead front inner door unit for mounting controls shall be provided. All exterior hardware and hinges shall be stainless steel.

There shall be permanently affixed to the interior side of the exterior enclosure door both a nameplate and a 10" x 12" pocket for log sheet storage. The nameplate shall contain the following information: voltage, phase, rated horsepower, speed, date manufactured, pump and control panel manufacturer's name, address and telephone number, pump data, including impeller data, discharge capacity (gpm) and head (ft.), kW input, and amps at the operating point and at least two other points on the pump curve.

The control panel enclosure shall be Underwriters Laboratories (U.L.) 50 type 4X listed. Size of the panel shall be as shown on the DRAWINGS.

38.3 POWER SUPPLY AND MAIN DISCONNECT

Power supply to the control panel shall be either: 240 volt, 3 phase, 4 wire; or 480 volt, 3 phase, 4 wire. Minimum service shall be 100 AMP. Single-phase power shall not be accepted unless it is the only option. All single-phase electric applications shall require a variable frequency drive controller.

Non-fusible safety service main knife-switch type disconnects shall be installed at all stations. In all 240 and 480 volt systems, disconnects shall be installed between the meter and the control panel. LED power available indicators shall be supplied on all legs.

The disconnect box shall be 316 stainless steel.

38.4 CIRCUIT BREAKERS

38.4.1 MAIN BREAKERS

The panel shall have a manual interlock system between the normal power main breaker and the emergency breaker to ensure only one breaker is in the "on" position at a time. Both breakers shall be equal in size.

38.4.2 CIRCUIT BREAKERS

All circuit breakers shall be heavy-duty molded case breakers. The handle on the circuit breakers shall be operational through the inner door. All circuit breakers shall have an appropriate locking device to meet OSHA lock-out and tag-out rules.

38.5 MOTOR CIRCUIT PROTECTORS

Each pump motor shall be protected by a 3-pole motor circuit protector. The motor circuit protector shall be operated by a toggle-type handle and shall have a quick-make, quick-break overcenter switching mechanism that is mechanically trip-free from the handle so that the contacts cannot be held closed against a short circuit and abnormal currents which cause the motor circuit protector to trip. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the normal ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously. Motor circuit protector must be completely enclosed in a high-strength glass polyester molded case. Ampere ratings shall be clearly visible. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes. A manual push-to-trip button shall be provided for manual exercising of the trip mechanism. Each pole of these motor circuit protectors shall provide instantaneous short circuit protection by means of an adjustable magnetic-only element.

38.6 MOTOR STARTER AND SELECTOR SWITCHES

The panel shall contain two motor starters. The motor starter shall be across the line magnetic starter with individual overload protection on each power leg with reset installed through the inner door unit. Local Power Company Regulations shall govern.

Selector switches shall be installed on the face of the inner door unit. Selector switch shall be a heavy-duty oil tight "Hand-Off-Auto" three-position switch to control the operation mode of each pump motor starter.

38.7 LIGHTS AND ALARMS

38.7.1 HIGH LEVEL ALARM

An alarm horn shall be mounted on the sides of the panel to indicate a high-level alarm. A vapor-proof red strobe light shall be connected to the side of the panel but located above the panel. The light shall be connected to an aluminum conduit which shall enter the site of the control panel. Also, there shall be an alarm silence pushbutton below the alarm light and a silence relay which will silence the horn and automatically reset when these signals are restored to normal. The pushbutton shall be heavy-duty oil tight.

38.8 EMERGENCY POWER RECEPTACLE

The panel shall incorporate an externally-mounted generator receptacle of the required size. This item will be required on stations equipped with a permanent standby generator system. The receptacle model shall be as shown on the DRAWINGS.

38.9 ADDITIONAL REQUIREMENTS

38.9.1 WIRING

All power wires shall be THW or THWN 75 Degree C insulated stranded copper conductors and shall be appropriately sized for the given load application. All control circuit wire shall be type THW, Size 16, stranded type copper. All wiring within the enclosure shall be neatly routed by the use of slotted type wiring duct with snap-on type covers. Wiring on the rear of the inner door shall be neatly bundled with nylon ties and include sufficient loop across the hinges to prevent wire damage. Both ends of each conductor shall be permanently identified. Color coding of all wiring is required: RED, 24 VAC+; WHITE, Neutral; BLACK, 120 VAC+; PURPLE, 24 VDC-; YELLOW, 24 VDC+; GREEN, equipment ground.

38.9.2 TERMINAL POINTS

Terminal points of all terminal strips, relays, and components shall be permanently identified. All terminal numbers, wire numbers, and identifying nomenclature shall correspond to and be shown on electrical schematic diagrams.

38.9.3 ENGRAVED NAMEPLATES

All circuit breakers, control switches, indicator pilot lights and other control devices shall be identified with permanently affixed legend plates and lamicoid-type engraved nameplates where applicable. A black and red on white label stating "DANGER, HIGH VOLTAGE, 240 VOLTS" shall be affixed to the face of the inner door unit.

38.9.4 SURGE PROTECTOR

A surge protector shall be included and wired to protect motors and control equipment from lightning induced line surges. All surge protectors shall be U.L. approved and installed per respective power company requirements and manufacturers' specifications. Surge protectors shall be installed on the disconnect switch as shown on the DRAWINGS and within the pump control panel. Surge protection shall be manufactured by Square D; no equivalent.

38.9.5 ELAPSED TIME METERS

Elapsed time meters shall be mounted on the face of the inner door, one meter for each pump. Elapsed time meters shall be 115 volt non-reset type and shall totalize pump-running time in hours and tenths of hours to 99999.9 hours.

38.9.6 CONVENIENCE RECEPTACLE

On the face of the inner door unit, there shall be installed a 20 AMP, 120 volt, duplex convenience receptacle. It shall be provided with its own single pole, 20 AMP circuit breaker for protection. Ground fault interrupt type shall be required.

38.9.7 CONTROL TERMINAL BLOCKS

Control terminal blocks shall be of the clamp screw type, rated for 600 volts. Amperage rating shall accommodate the control circuit amperage to which it is connected, but have a minimum rating of 20 amps.

38.9.8 CONTROL POWER TRANSFORMERS

For 480-volt panels, there shall be a control power transformer with a minimum size of 500VA to provide 120VAC power for: coils for starters, 20A duplex receptacle, alarm horn, alarm light, elapsed time meters, etc. The power transformer shall be dry and properly fused on both the primary and secondary side of the transformer. The transformer shall be externally mounted on the electrical equipment rack.

The signal required by the float switches and relays shall be 24VAC. This shall be provided by a 24VAC control power transformer properly sized with a fused secondary.

38.9.9 CONTROL RELAY

The level control relays shall operate from 24VAC. They shall be enclosed, plug-in 8-pin type with octal-style screw terminal sockets and shall include a test button.

38.9.10 ELECTRICAL SCHEMATIC

There shall be permanently affixed to the interior side of the exterior enclosure door an electrical schematic diagram and a copy supplied to THE CITY OF PALM COAST'S personnel at start-up. The schematic diagram shall include the rated amperage and voltage for all components.

38.9.11 PHASE MONITOR

For all 240-volt and 480-volt, 3-phase stations, an eight-pin plug-in type phase monitor shall be provided for protection of electrical components due to phase loss, phase reversal, over and under voltage. Adequate dummy pin protection shall be provided to prevent accidental interchanging of the eight-pin phase monitor with the eight-pin alternator. Failure of the phase monitor shall activate the alarm system.

38.10 TESTING, SERVICE AND WARRANTY

38.10.1 TESTING

After fabrication in the control panel manufacturer's plant, an operational test shall be performed to check out the entire panel before delivery. Three phase source voltage to which the panel is intended shall be used for the testing.

38.10.2 SERVICE

The control panel manufacturer shall maintain a service organization in the applicable county that is available for service.

38.10.3 WARRANTY

The manufacturer shall furnish a one (1) year warranty against defects in materials and workmanship covering parts and labor on all items supplied under this Section.

DIVISION 4

STANDARD CONSTRUCTION

DETAILS

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POTABLE AND RAW WATER MAINS GENERAL NOTES

1. ALL PIPELINE MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF PALM COAST STANDARDS (JULY, 2022), CONTRACT DOCUMENTS, TECHNICAL SPECIFICATIONS AND ALL APPLICABLE LOCAL AND STATE REQUIREMENTS.

2. THE CONTRACTOR SHALL ENSURE THAT ALL REQUIRED PERMITS ARE IN HAND BEFORE COMMENCEMENT OF CONSTRUCTION.

3. ALL UTILITY OWNERS AND SUNSHINE STATE ONE CALL (800) 432–4770 MUST BE NOTIFIED SEVENTY–TWO (72) HOURS PRIOR TO STARTING CONSTRUCTION.

4. THE CONTRACTOR SHALL NOTIFY FIBEROPTICS COMPANIES SEVEN (7) WORKING DAYS PRIOR TO ANY CONSTRUCTION ACTIVITY IN THEIR AREA. EXTREME CAUTION SHALL BE USED IN AREAS WHERE FIBEROPTIC CABLE IS LOCATED ADJACENT TO CONSTRUCTION ACTIVITY.

5. ALL PIPING AND/OR APPURTENANCES CONNECTING TO ADJACENT CONSTRUCTION SHALL BE PLUGGED IF ADJACENT WORK HAS NOT BEEN COMPLETED.

6. CONTRACTOR SHALL PROVIDE TEMPORARY THRUST RESTRAINTS, BRACING, TEST PLUGS AND/OR OTHER DEVICES NECESSARY TO SUCCESSFULLY COMPLETE PRESSURE TESTING OF ALL PRESSURE PIPING SYSTEMS.

7. ALL FITTINGS FOR BURIED PIPING 4–INCH AND LARGER, SHALL BE COMPACT DUCTILE IRON MECHANICAL JOINT (D.I.M.J) BITUMEN COATED EXTERIOR, APPLIED PER ANSI/AWWA A21.53/C153 UNLESS NOTED OTHERWISE. THESE FITTINGS SHALL INCORPORATE RESTRAINING RINGS, MEGA–LUGS OR OTHER APPROVED EQUIVALENT MECHANICAL DEVICES.

8. ALL BURIED PIPING SPECIFIED FOR PRESSURE SERVICE SHALL BE PROVIDED WITH RESTRAINING DEVICES AT ALL DIRECTIONAL CHANGES, UNLESS NOTED OTHERWISE.

9. ALL PROPOSED DUCTILE IRON PIPE, FITTINGS AND RESTRAINTS WITHIN FIFTY (50) FEET OF AN EXISTING GAS MAIN SHALL BE POLYETHYLENE ENCASED.

10. ALL FASTENERS SHALL BE MANUFACTURED OF NON–CORROSIVE MATERIALS. WHEN STAINLESS STEEL IS REQUIRED, 304 S.S. SHALL BE USED FOR ALL BURIED APPLICATIONS AND 316 S.S. SHALL BE USED FOR ABOVE GROUND OR CORROSIVE ENVIRONMENTS.

11. THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE DRAWINGS HAVE BEEN DERIVED FROM EXISTING UTILITY RECORDS AND ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT LOCATION, DEPTH AND CHARACTER OF ALL UTILITIES PRIOR TO EXCAVATION IN ORDER TO PROTECT THEM DURING CONSTRUCTION.

12. WHERE MINIMUM SEPARATION BETWEEN UTILITIES IS REQUIRED, THE DISTANCE SHALL BE MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.

13. CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AT ALL INTERSECTIONS OF PROPOSED WORK AND EXISTING UTILITIES. THE EXPLORATORY EXCAVATIONS SHALL BE MADE FORTY–EIGHT (48) HOURS IN ADVANCE OF THE PROPOSED WORK. IF THERE IS A CONFLICT THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST IMMEDIATELY. INFORMATION ON THE OBSTRUCTION SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL INCLUDE: LOCATION, ELEVATION, UTILITY TYPE, MATERIAL AND SIZE.

14. LOCATIONS AND DIMENSIONS OF EXISTING RIGHTS–OF–WAY AND EASEMENTS ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY ALL THE LIMITS OF RIGHTS–OF–WAY AND EASEMENTS IN ORDER TO AVOID ENCROACHMENTS.

15. THE CONTRACTOR SHALL REPLACE SOD 3 FEET FROM ALL DISTURBED AREAS: STRUCTURES, SIDEWALKS, ROADS, AND POND IMPROVEMENT AREAS. ALL OTHER DISTURBED AREAS SHALL BE SODDED OR SEEDED AND MULCHED AS SHOWN ON THE DRAWINGS.

16. THE CONTRACTOR SHALL REPLACE, BUT NOT BE LIMITED TO, PAVING, STABILIZED EARTH, DRIVEWAYS OR ANY ITEMS DISTURBED OR DAMAGED BY THE CONSTRUCTION OR IT'S RELATED ACTIVITIES. THE CONTRACTOR SHALL REPLACE WITH EQUAL MATERIAL OR AS DIRECTED BY THE CITY OF PALM COAST.

17. THE DISPOSAL OF ANY EXCESS EARTHWORK MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

18. ALL PRACTICAL AND NECESSARY EFFORT SHALL BE TAKEN DURING CONSTRUCTION TO PREVENT UNNECESSARY TREE REMOVAL.

19. ALL ELEVATIONS SHOWN ON THESE DRAWINGS REFER TO NORTH AMERICAN VERTICAL DATUM (NAVD), 1988.

20. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE HIS WORK WITH THE WORK SCHEDULE OF ADJACENT CONTRACTORS AS WELL AS THE OPERATIONS STAFF OF THE CITY OF PALM COAST.

21. THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST 72 HOURS BEFORE COMMENCING WITH CONSTRUCTION.

22. PIPE MEASUREMENTS SHALL BE CENTER TO CENTER OF FITTINGS OR VALVES.

23. PVC PIPE LESS THAN 2–INCHES SHALL CONFORM TO ASTM D1785. THREADED PIPE AND FITTINGS SHALL BE SCH. 80 AND CONFORM TO ASTM D2464. UNTHREADED PIPE AND FITTINGS SHALL BE SCH. 40 WITH SOLVENT CEMENTED JOINTS. CEMENTED JOINTS AND FITTINGS SHALL COMPLY WITH ASTM D2466 AND D2855.

24. 2", 2 1/2" AND 3" PVC PIPE SHALL CONFORM TO ASTM D2241. PIPE SHALL BE FURNISHED IN 20–FOOT LENGTHS, SHALL HAVE DIMENSION RATIO (DR21) AND A WATER PRESSURE RATING OF 200 PSI.

25. PVC PIPE 4–INCHES THROUGH 60–INCHES SHALL CONFORM TO AWWA STANDARD C900 (DR18)

26. DUCTILE IRON PIPE SHALL CONFORM TO AWWA STANDARD C151, PRESSURE CLASS 350 FOR 4–INCH THROUGH 12–INCH DIAMETER PIPE; PRESSURE CLASS 250 FOR PIPE LARGER THAN 12–INCHES IN DIAMETER UNLESS NOTED OTHERWISE.

27. VALVES FOR POTABLE WATER MAINS SHALL BE DUCTILE IRON (D.I.) EPOXY COATED GATE VALVES OR BUTTERFLY VALVES. VALVES FOR RAW WATER MAINS SHALL BE DUCTILE IRON (D.I.) EPOXY COATED GATE VALVES ONLY. SEE SPECIFICATIONS FOR DETAILS.

28. ALL POLYETHYLENE PRESSURE PIPE AND FITTINGS 4–INCH AND LARGER SHALL CONFORM TO AWWA STANDARD C906 (DR11) PRESSURE CLASS 160 AND ASTM STANDARD D3350, D2837 PE 3408.

POTABLE AND RAW WATER MAINS GENERAL NOTES

29. ALL POLYETHYLENE PIPE FOR SERVICE TUBING SHALL CONFORM TO AWWA STANDARD C901 (DR9) PRESSURE CLASS 200 AND STANDARD D2737 PE 3408.

30. ALL PIPE AND POLYETHYLENE SERVICE TUBING SHALL BEAR THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL FOR POTABLE WATER SERVICE.

31. FITTINGS FOR BOTH PVC AND DUCTILE IRON PIPE SHALL BE DUCTILE IRON COMPACT FITTINGS CONFORMING TO THE REQUIREMENTS OF ANSI/AWWA C153/A21.53.

32. DUCTILE IRON PIPE AND FITTINGS SHALL HAVE A CEMENT MORTAR INTERIOR LINING CONFORMING TO THE REQUIREMENTS OF ANSI/AWWA A21.4/C104. DUCTILE IRON PIPE AND FITTINGS FOR RAW WATER SHALL INCORPORATE A DOUBLE LINING OF THE CEMENT MORTAR ON THE INTERIOR SURFACE.

33. PROPER BACKFLOW PREVENTION ASSEMBLIES SHALL BE PROVIDED IN ACCORDANCE WITH RULE 62-555.360, F.A.C. AND AWWA MANUAL M14, "BACKFLOW PREVENTION AND CROSS CONNECTION CONTROL" AND THE CITY OF PALM COAST "CROSS CONNECTION CONTROL MANUAL" (LATEST EDITION).

34. ALL WATER MAINS SHALL BE HYDROSTATICALLY TESTED AND DISINFECTED IN ACCORDANCE WITH AWWA STANDARDS, LATEST REVISIONS. HYDROSTATIC TESTING FOR PVC MAINS SHALL BE 150 PSI FOR MINIMUM OF 2 HOURS AND MEET AWWA STANDARD C605. DUCTILE IRON MAINS SHALL BE TESTED AT 150 PSI FOR 2 HOURS PER AWWA C600. ALL NEW MAINS SHALL BE DISINFECTED PER AWWA STANDARD C651. BACTERIOLOGICAL TESTS FOR 2 CONSECUTIVE DAYS SHALL BE APPROVED PRIOR TO PLACING SYSTEM INTO SERVICE.

35. PVC POTABLE WATER MAINS SHALL BE SOLID BLUE IN COLOR. DUCTILE IRON WATER MAINS SHALL INCORPORATE 3 BLUE STRIPES, PAINTED AT THE TOP AND SIDES OF THE PIPE, ALONG IT'S ENTIRE LENGTH.

36. PVC RAW WATER MAINS SHALL BE SOLID BLUE IN COLOR. DUCTILE IRON RAW WATER MAINS SHALL INCORPORATE 3 WHITE STRIPES, PAINTED AT THE TOP AND SIDES OF THE PIPE, ALONG IT'S ENTIRE LENGTH.

37. ALL POTABLE AND RAW WATER MAINS SHALL BE INSTALLED WITH THE MINIMUM VERTICAL/HORIZONTAL SEPARATION FROM ALL EXISTING AND/OR PROPOSED SANITARY, STORM AND REUSE WATER PIPING AS REQUIRED BY FDEP RULES. CONFLICTS BETWEEN REUSE WATER MAINS, STORM AND SANITARY SEWER SYSTEMS, FORCE MAINS AND PROPOSED POTABLE OR RAW WATER MAINS SHALL BE RESOLVED BY ADJUSTING THE PROPOSED POTABLE/RAW WATER MAIN. SEE "UTILITY SEPARATION DETAIL" AND ACCOMPANYING NOTES AS SHOWN ON STANDARD DETAIL (SD) SHEETS OF THIS PLAN SET.

38. ALL WATER MAINS SHALL HAVE AN "EARLY WARNING" PROTECTION TAPE INSTALLED CONTINUOUSLY ALONG THE ENTIRE LENGTH. THE PROTECTION TAPE SHALL BE INSTALLED DURING THE BACKFILLING 12 INCHES ABOVE AND DIRECTLY OVER THE PIPE AND BE CONTINUOUSLY MARKED WITH "CAUTION – WATER MAIN BURIED BELOW". THE TAPE SHALL BE PLASTIC, NON-METALLIC AND BE BLUE IN COLOR FOR POTABLE WATER OR WHITE FOR RAW WATER.

39. ALL WATER MAINS INSTALLED BY OPEN CUT SHALL BE CONTINUOUSLY UNDERLAIN WITH 10 GAGE SINGLE STRAND, THWN SOLID COPPER CLAD STEEL MARKING WIRE. THE WIRE SHALL INCORPORATE A 30MIL HDPE JACKET AND SHALL BE BLUE INSULATION FOR POTABLE WATER OR WHITE INSULATION FOR RAW WATER; INSTALLATION SHALL CONFORM TO THE DETAIL DRAWINGS. TRACING WIRE SHALL HAVE A BREAK LOAD OF 513 LBS.

40. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND ACCOUNTING FOR AS WELL AS RECONNECTING ALL SERVICE CONNECTIONS AFFECTED BY THE PROPOSED WATER MAIN INSTALLATION.

41. RE-USE EXISTING VALVES AND FITTINGS WHERE CONDITIONS ALLOW AND WHICH HAVE BEEN DETERMINED TO BE IN GOOD CONDITION AND IN WORKING ORDER. THE CITY OF PALM COAST WILL MAKE THE DECISION REGARDING THE INCORPORATION OF USED MATERIAL INTO THE WORK.

42. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS FOR APPROVAL TO THE CITY OF PALM COAST PRIOR TO PROCUREMENT.

43. ALL NEW WATER MAINS SHALL BE INSTALLED WITH A MINIMUM OF 3'-0" OF COVER, UNLESS NOTED OTHERWISE.

44. THE CONTRACTOR SHALL VIDEO THE ENTIRE WORK AREA PRIOR TO COMMENCEMENT OF CONSTRUCTION. ONE COPY OF THE PRE-CONSTRUCTION VIDEO SHALL BE SUBMITTED TO THE CITY OF PALM COAST.

45. IT IS THE INTENT OF THIS CONTRACT FOR THE CONTRACTOR TO MAINTAIN CONTINUOUS RESTORATION BEHIND THE UTILITY WORK ON A DAILY BASIS. NO MORE THAN FIFTY (50) LINEAR FEET OF UNRESTORED LINE WORK SHALL REMAIN AT THE END OF EACH WORK DAY.

46. THE CONTRACTOR SHALL SUBMIT TO THE CITY OF PALM COAST, A CONSTRUCTION SCHEDULE ADDRESSING THE INTERRUPTION OF SERVICE IN THE POTABLE WATER DISTRIBUTION SYSTEM. IT IS THE INTENT OF THE CONTRACT FOR THE CONTRACTOR TO FIELD INVESTIGATE ALL POSSIBLE METHODS TO ELIMINATE OR MINIMIZE INTERRUPTION OF SERVICE TO EXISTING CUSTOMERS. UNDER NO CIRCUMSTANCES SHALL THE CONSTRUCTION ACTIVITIES RESULT IN A SYSTEM PRESSURE OF LESS THAN 20 P.S.I.

47. ALL CONNECTIONS TO WATER MAINS SHALL BE MADE BY THE CONTRACTOR ONLY AFTER THE CONNECTION PROCEDURE AND HIS WORK SCHEDULE REGARDING THIS ACTIVITY ARE REVIEWED AND APPROVED BY THE CITY OF PALM COAST. THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST TO THE OWNER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO COMMENCEMENT OF CONNECTION ACTIVITIES. IN THE REQUEST, THE CONTRACTOR SHALL OUTLINE THE FOLLOWING:

A. POINTS OF CONNECTION, FITTINGS TO BE USED AND METHOD OF FLUSHING AND DISINFECTION.

B. ESTIMATED CONSTRUCTION TIME FOR SAID ACTIVITY.

C. POSSIBLE SYSTEM PRESSURE LOSS.

THE CITY OF PALM COAST SHALL REVIEW THE SUBMITTAL AND INFORM THE CONTRACTOR REGARDING APPROVAL OR DENIAL OF THEIR REQUEST. IF THEIR REQUEST IS REJECTED BY THE CITY OF PALM COAST, THE CONTRACTOR MAY RESUBMIT THEIR REQUEST MODIFYING IT TO THE SATISFACTION OF THE OWNER. ALL CONNECTIONS SHALL ONLY BE MADE ON THE AGREED UPON TIME AND DATE OR RESCHEDULE. THE CONTRACTOR SHALL NOT OPERATE ANY VALVES IN THE SYSTEM.

48. THREE (3") INCH AND LARGER BURIED UTILITY MAINS TO BE ABANDONED IN PLACE, SHALL BE CUT, PLUGGED AND FILLED WITH GROUT.

49. TWO-INCH (2") AND SMALLER METER/BACKFLOW DEVICES WILL BE SUPPLIED BY THE CITY AND INSTALLED BY THE DEVELOPER. DEVICES LARGER THEN TWO INCH SHALL BE SUPPLIED AND INSTALLED BY THE DEVELOPER.

REUSE WATER MAIN GENERAL NOTES

1. ALL PIPELINE MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF PALM COAST STANDARDS (JULY, 2022), CONTRACT DOCUMENTS, TECHNICAL SPECIFICATIONS AND ALL APPLICABLE LOCAL AND STATE REQUIREMENTS.

2. THE CONTRACTOR SHALL ENSURE THAT ALL NECESSARY PERMITS ARE IN HAND BEFORE COMMENCEMENT OF CONSTRUCTION.

3. ALL UTILITY OWNERS AND SUNSHINE STATE ONE CALL (800) 432–4770 MUST BE NOTIFIED SEVENTY–TWO (72) HOURS PRIOR TO STARTING CONSTRUCTION.

4. THE CONTRACTOR SHALL NOTIFY FIBEROPTICS COMPANIES SEVEN (7) WORKING DAYS PRIOR TO ANY CONSTRUCTION ACTIVITY IN THEIR AREA. EXTREME CAUTION SHALL BE USED IN AREAS WHERE FIBEROPTIC CABLE IS LOCATED ADJACENT TO CONSTRUCTION ACTIVITY.

5. ALL NEW REUSE WATER MAINS SHALL BE INSTALLED WITH A MINIMUM OF 3'–0" OF COVER, UNLESS NOTED OTHERWISE.

6. ALL PIPING AND/OR APPURTENANCES CONNECTING TO ADJACENT CONSTRUCTION SHALL BE PLUGGED IF ADJACENT WORK HAS NOT BEEN COMPLETED.

7. CONTRACTOR SHALL PROVIDE TEMPORARY THRUST RESTRAINT, BRACING, TEST PLUGS AND/OR OTHER DEVICES NECESSARY TO SUCCESSFULLY COMPLETE PRESSURE TESTING OF ALL PRESSURE PIPING SYSTEMS.

8. ALL FITTINGS FOR BURIED PIPING 4–INCHES AND LARGER SHALL BE COMPACT DUCTILE IRON MECHANICAL JOINT (D.I.M.J.) BITUMEN COATED EXTERIOR APPLIED PER ANSI/AWWA A21.53/C153 UNLESS OTHERWISE NOTED. THESE FITTINGS SHALL INCORPORATE RESTRAINING RINGS, MEGA–LUGS OR OTHER APPROVED EQUIVALENT MECHANICAL DEVICES.

9. ALL PROPOSED DUCTILE IRON PIPE, FITTINGS AND RESTRAINTS WITHIN FIFTY (50) FEET OF AN EXISTING GAS MAIN SHALL BE POLYETHYLENE ENCASED.

10. ALL FASTENERS SHALL BE MANUFACTURED OF NON–CORROSIVE MATERIAL. WHEN STAINLESS STEEL IS REQUIRED, 304 S.S. SHALL BE USED FOR ALL BURIED APPLICATIONS AND 316 S.S. SHALL BE USED FOR ABOVE GROUND OR CORROSIVE ENVIRONMENTS.

11. THE LOCATION OF EXISTING UTILITIES SHOWN ON THESE DRAWINGS HAVE BEEN DERIVED FROM EXISTING UTILITY RECORDS. ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT LOCATION, DEPTH AND CHARACTER OF ALL UTILITIES PRIOR TO EXCAVATION IN ORDER TO PROTECT THESE UTILITIES DURING CONSTRUCTION.

12. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AT ALL INTERSECTIONS OF PROPOSED WORK AND EXISTING UTILITIES. THE EXPLORATORY EXCAVATIONS SHALL BE MADE FORTY–EIGHT (48) HOURS IN ADVANCE OF THE PROPOSED WORK. IF THERE IS A CONFLICT THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST IMMEDIATELY. INFORMATION ON THE OBSTRUCTION SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL INCLUDE: LOCATION, ELEVATION, UTILITY TYPE, MATERIAL AND SIZE.

13. LOCATIONS AND DIMENSIONS OF EXISTING RIGHTS–OF–WAY AND EASEMENTS ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY ALL THE LIMITS OF RIGHTS–OF–WAY AND EASEMENTS IN ORDER TO AVOID ENCROACHMENTS.

14. WHERE MINIMUM SEPARATION BETWEEN UTILITIES IS REQUIRED, THE DISTANCE SHALL BE MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.

15. THE CONTRACTOR SHALL REPLACE SOD 3 FEET FROM ALL DISTURBED AREAS, STRUCTURES, SIDEWALKS, ROADS AND POND IMPROVEMENT AREAS. ALL OTHER DISTURBED AREAS SHALL BE SODDED OR SEEDED AND MULCHED AS SHOWN ON THE DRAWINGS.

16. ALL PRACTICAL AND NECESSARY EFFORT SHALL BE TAKEN DURING CONSTRUCTION TO PREVENT UNNECESSARY TREE REMOVAL.

17. THE CONTRACTOR SHALL REPLACE, BUT NOT BE LIMITED TO, PAVING, STABILIZED EARTH, DRIVEWAYS OR ANY ITEMS DISTURBED OR DAMAGED BY THE CONSTRUCTION OR IT'S RELATED ACTIVITIES. THE CONTRACTOR SHALL REPLACE WITH EQUAL MATERIAL OR AS DIRECTED BY THE CITY OF PALM COAST.

18. THE DISPOSAL OF ANY EXCESS EARTHWORK MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

19. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE HIS WORK WITH THE WORK SCHEDULE OF ADJACENT CONTRACTORS AS WELL THE STAFF OF THE CITY OF PALM COAST.

20. THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST UTILITY DEPARTMENT 72 HOURS BEFORE COMMENCING WITH CONSTRUCTION.

21. PVC PIPE LESS THAN 2–INCHES SHALL CONFORM TO ASTM D1785. THREADED PIPE AND FITTINGS SHALL BE SCH. 80 AND CONFORM TO ASTM D2464. UNTHREADED PIPE AND FITTINGS SHALL BE SCH. 40 WITH SOLVENT CEMENTED JOINTS. CEMENTED JOINTS AND FITTINGS SHALL COMPLY WITH ASTM D2466 AND D2855.

22. 2", 2 1/2" AND 3" PVC PIPE SHALL CONFORM TO ASTM D2241. PIPE SHALL BE FURNISHED IN 20–FOOT LENGTHS, SHALL HAVE DIMENSION RATIO (DR21) AND A WATER PRESSURE RATING OF 200 PSI.

REUSE WATER MAIN GENERAL NOTES

23. PVC PIPE 4–INCHES THROUGH 60–INCHES SHALL CONFORM TO AWWA STANDARD C900 (DR18).

24. DUCTILE IRON PIPE SHALL CONFORM TO AWWA STANDARD C151, PRESSURE CLASS 350 FOR 4–INCH THROUGH 12–INCH DIAMETER PIPE; PRESSURE CLASS 250 FOR PIPE LARGER THAN 12–INCHES IN DIAMETER UNLESS NOTED OTHERWISE.

25. VALVES FOR REUSE MAINS SHALL BE DUCTILE IRON, EPOXY COATED GATE VALVES OR BUTTERFLY VALVES. REFER TO SPECIFICATIONS FOR DETAILS.

26. ALL POLYETHYLENE PRESSURE PIPE AND FITTINGS 4–INCH AND LARGER SHALL CONFORM TO AWWA STANDARD C906 (DR11) PRESSURE CLASS 160 AND ASTM STANDARD D3350, D2837, PE 3408.

27. FITTINGS FOR BOTH PVC AND DUCTILE IRON PIPE SHALL BE DUCTILE IRON COMPACT FITTINGS CONFORMING TO THE REQUIREMENTS OF ANSI/AWWA C153/A21.53.

28. DUCTILE IRON PIPE AND FITTINGS SHALL HAVE A CEMENT MORTAR INTERIOR LINING CONFORMING TO THE REQUIREMENTS OF ANSI/AWWA C104/A21.4.

29. PVC REUSE MAINS SHALL BE SOLID LAVENDER IN COLOR. DUCTILE IRON PIPE FOR REUSE MAINS SHALL INCORPORATE 3 LAVENDER STRIPES, PAINTED AT THE TOP AND SIDES OF THE PIPE, ALONG IT'S ENTIRE LENGTH..

30. PIPE MEASUREMENTS SHALL BE CENTER TO CENTER OF FITTINGS OR VALVES.

31. ALL REUSE MAINS SHALL BE INSTALLED WITH THE MINIMUM VERTICAL/HORIZONTAL SEPARATION FROM ALL EXISTING AND/OR PROPOSED SANITARY, STORM AND POTABLE WATER PIPING AS REQUIRED BY FDEP RULES. CONFLICTS BETWEEN WATER MAINS, STORM AND SANITARY SEWER SYSTEMS, FORCE MAINS AND PROPOSED REUSE MAINS SHALL BE RESOLVED BY ADJUSTING THE PROPOSED REUSE MAIN AS NECESSARY. SEE "UTILITY SEPARATION DETAIL" AND ACCOMPANYING NOTES AS SHOWN ON STANDARD DETAIL (SD) SHEETS OF THE PLAN SET.

32. ALL EXCAVATIONS SHALL BE BACKFILLED AT THE END OF EACH WORK DAY.

33. ALL REUSE MAINS SHALL HAVE AN "EARLY WARNING" PROTECTION TAPE INSTALLED CONTINUOUSLY ALONG THE ENTIRE LENGTH. THE PROTECTION TAPE SHALL BE INSTALLED DURING THE BACKFILLING 12 INCHES ABOVE AND DIRECTLY OVER THE PIPE AND BE CONTINUOUSLY MARKED WITH "CAUTION – REUSE MAIN BURIED BELOW". THE TAPE SHALL BE PLASTIC, NON–METALLIC AND BE PURPLE IN COLOR.

34. ALL REUSE MAINS SHALL BE CONTINUOUSLY UNDERLAIN WITH 10 GAGE, SINGLE STRAND, THWN SOLID COPPER–CLAD STEEL TRACING WIRE. THE WIRE SHALL HAVE PURPLE INSULATION AND INSTALLATION SHALL CONFORM TO THE DETAIL DRAWINGS.

35. ALL ELEVATIONS SHOWN ON THESE DRAWINGS REFER TO NORTH AMERICAN VERTICAL DATUM (NAVD 88.)

36. ALL REUSE MAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH AWWA STANDARD C600 FOR DUCTILE IRON PIPE; C905 FOR PVC PIPE; ASTM F2164 FOR HDPE PIPE. HYDROSTATIC TESTING FOR ALL PIPE MATERIAL SHALL BE 150 PSI FOR A MINIMUM OF 2 HOURS.

37. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS FOR APPROVAL TO THE CITY OF PALM COAST PRIOR TO PROCUREMENT.

38. THE CONTRACTOR SHALL VIDEO THE ENTIRE WORK AREA PRIOR TO COMMENCEMENT OF CONSTRUCTION. ONE COPY OF THE PRE–CONSTRUCTION VIDEO SHALL BE SUBMITTED TO THE CITY OF PALM COAST.

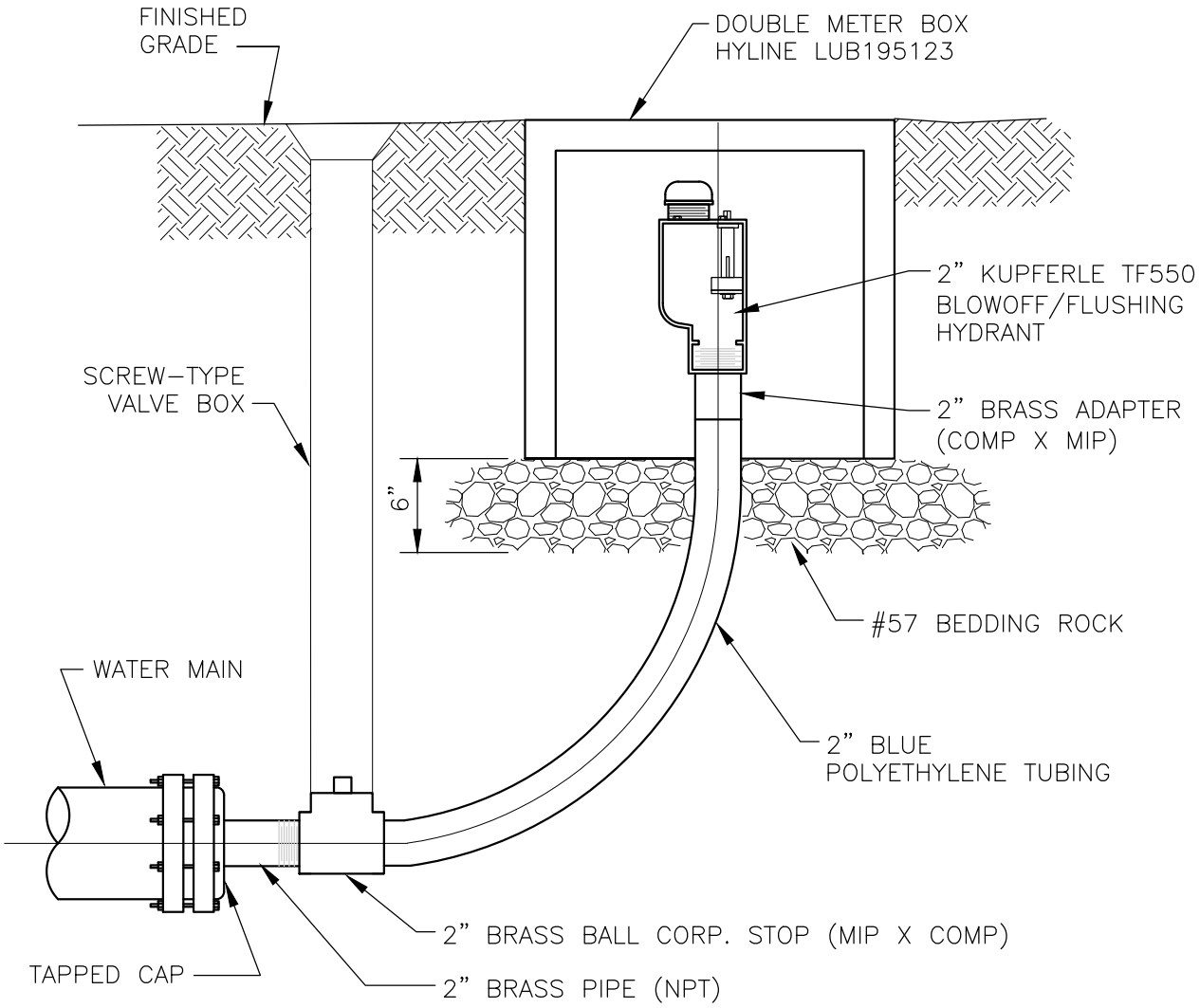
39. REUSE EXISTING VALVES AND FITTINGS WHERE CONDITIONS ALLOW AND WHICH HAVE BEEN DETERMINED TO BE IN GOOD CONDITION AND IN WORKING ORDER. THE CITY OF PALM COAST SHALL MAKE THE DECISION REGARDING THE INCORPORATION OF USED MATERIAL INTO THE WORK.

40. THE CONTRACTOR SHALL SUBMIT TO THE CITY OF PALM COAST A CONSTRUCTION SCHEDULE ADDRESSING THE INTERRUPTION OF SERVICE IN THE REUSE DISTRIBUTION SYSTEM. IT IS THE INTENT OF THE CONTRACT FOR THE CONTRACTOR TO FIELD INVESTIGATE ALL POSSIBLE METHODS TO ELIMINATE OR MINIMIZE INTERRUPTION OF SERVICE TO EXISTING CUSTOMERS. UNDER NO CIRCUMSTANCES SHALL THE CONSTRUCTION ACTIVITIES RESULT IN A SYSTEM PRESSURE OF LESS THAN 20 P.S.I..

41. ALL FLANGED COUPLING ADAPTERS SHALL HAVE A MINIMUM OF 4 – 3/4"ø STAINLESS STEEL RESTRAINING RODS EQUALLY SPACED.

42. ALL BURIED UTILITY PIPE TO BE ABANDONED IN PLACE SHALL BE CUT, PLUGGED AND FILLED WITH GROUT.

43. IT IS THE INTENT OF THIS CONTRACT FOR THE CONTRACTOR TO MAINTAIN CONTINUOUS RESTORATION BEHIND THE UTILITY WORK ON A DAILY BASIS. NO MORE THAN FIFTY (50) LINEAR FEET OF UNRESTORED LINE WORK SHALL REMAIN AT THE END OF EACH WORK DAY.



NOTES:

1. TAPPED CAP SHALL BE RESTRAINED AS PER THE RESTRAINED JOINT DETAIL (DEAD END).

2. POLYTUBING SHALL BE ENDOT "ENDOPURE" OR APPROVED EQUAL.

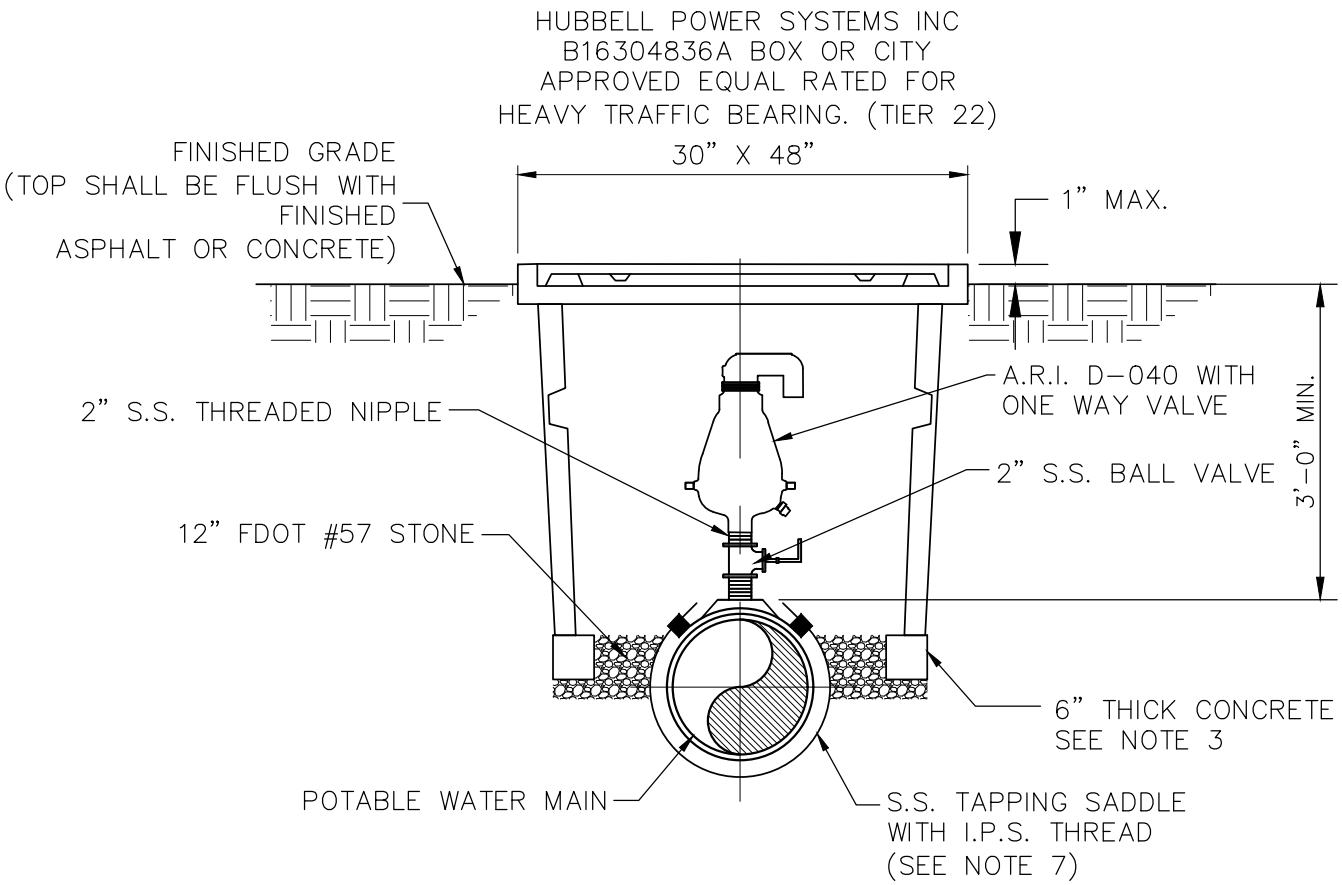
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

BLOWOFF/FLUSHING HYDRANT DETAIL

SCALE: NONE

FIG. W-5

REVISED 7/15



NOTES:

1. ABOVE DETAIL IS BASED UPON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVES SHALL BE CENTERED IN THE BOX.

3. CONCRETE SHALL BE 8" WIDE AND EXTEND THE FULL LENGTH OF THE BOX. PLACE 6"-8" OF NO. 57 STONE UNDER THE SLABS.

4. TOP OF BOX SHALL BE CLEARLY AND PERMANENTLY LABELED FOR THE APPROPRIATE UTILITY MAIN.

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 HUBBELL POWER SYSTEM GROUP, BOX #B-14-3636-48 OR CITY APPROVED EQUIVALENT RATED FOR HEAVY TRAFFIC BEARING.

7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

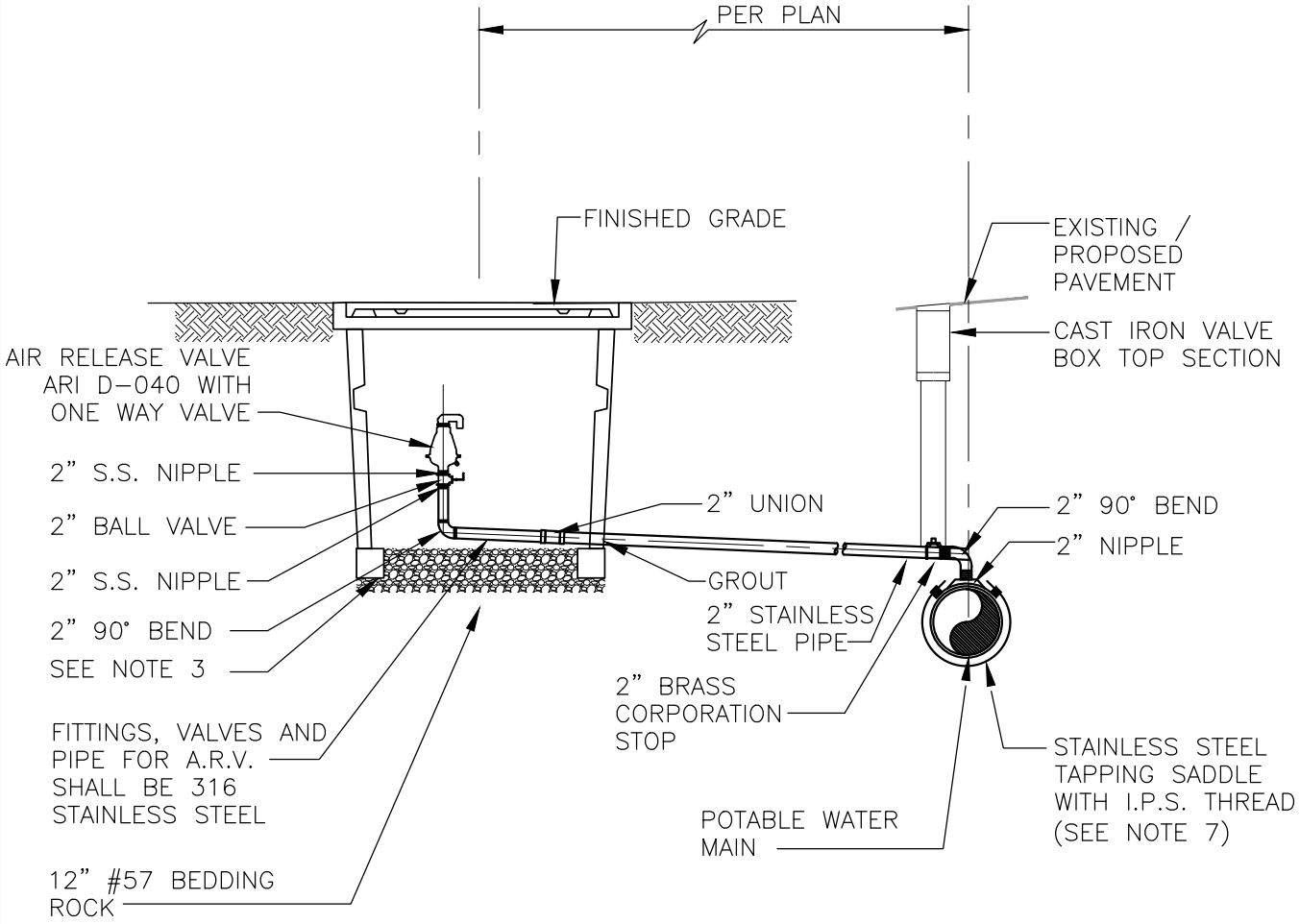
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

AIR RELEASE VALVE DETAIL FOR POTABLE WATER MAINS

SCALE: NONE

FIG. W-6

REVISED 7/18



NOTES:

1. ABOVE DETAIL IS BASED UPON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVES SHALL BE CENTERED IN THE BOX.

3. CONCRETE SHALL BE 8" WIDE AND EXTEND THE FULL LENGTH OF THE BOX. PLACE 6"-8" OF NO. 57 STONE UNDER THE SLABS.

4. TOP OF BOX SHALL BE CLEARLY AND PERMANENTLY LABELED FOR THE APPROPRIATE UTILITY MAIN.

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 HUBBELL POWER SYSTEM GROUP, BOX #B-14-3636-48 OR CITY APPROVED EQUIVALENT RATED FOR HEAVY TRAFFIC BEARING.

7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

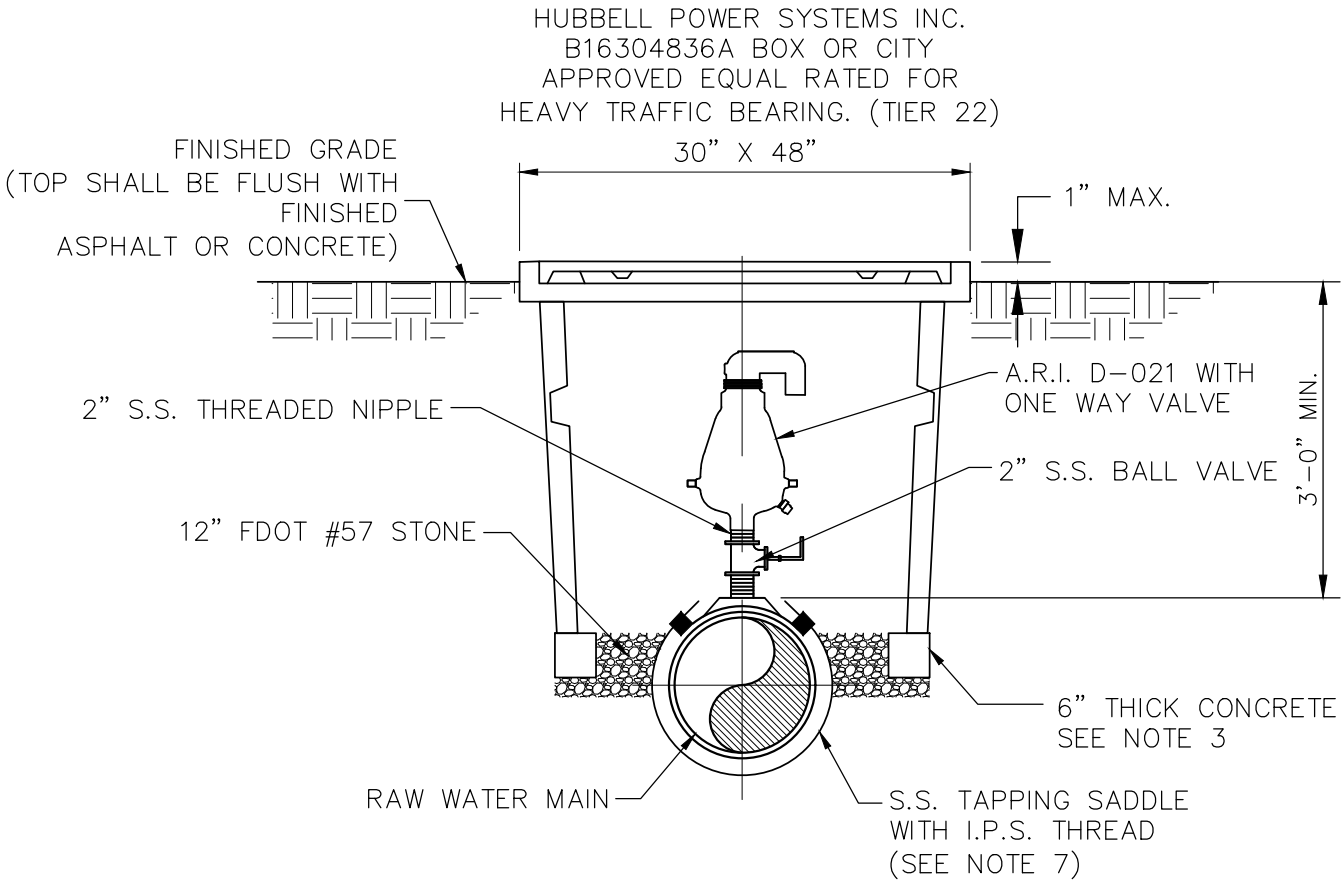
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

OFFSET AIR RELEASE VALVE DETAIL FOR POTABLE WATER MAINS

SCALE: NONE

FIG. W-6A

REVISED 7/18



NOTES:

1. ABOVE DETAIL IS BASED UPON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVES SHALL BE CENTERED IN THE BOX.

3. CONCRETE SHALL BE 8" WIDE AND EXTEND THE FULL LENGTH OF THE BOX. PLACE 6"-8" OF NO. 57 STONE UNDER THE SLABS.

4. TOP OF BOX SHALL BE CLEARLY AND PERMANENTLY LABELED FOR THE APPROPRIATE UTILITY MAIN.

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 HUBBELL POWER SYSTEM INC, BOX #B-14-3636-48 OR CITY APPROVED EQUIVALENT RATED FOR HEAVY TRAFFIC BEARING.

7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

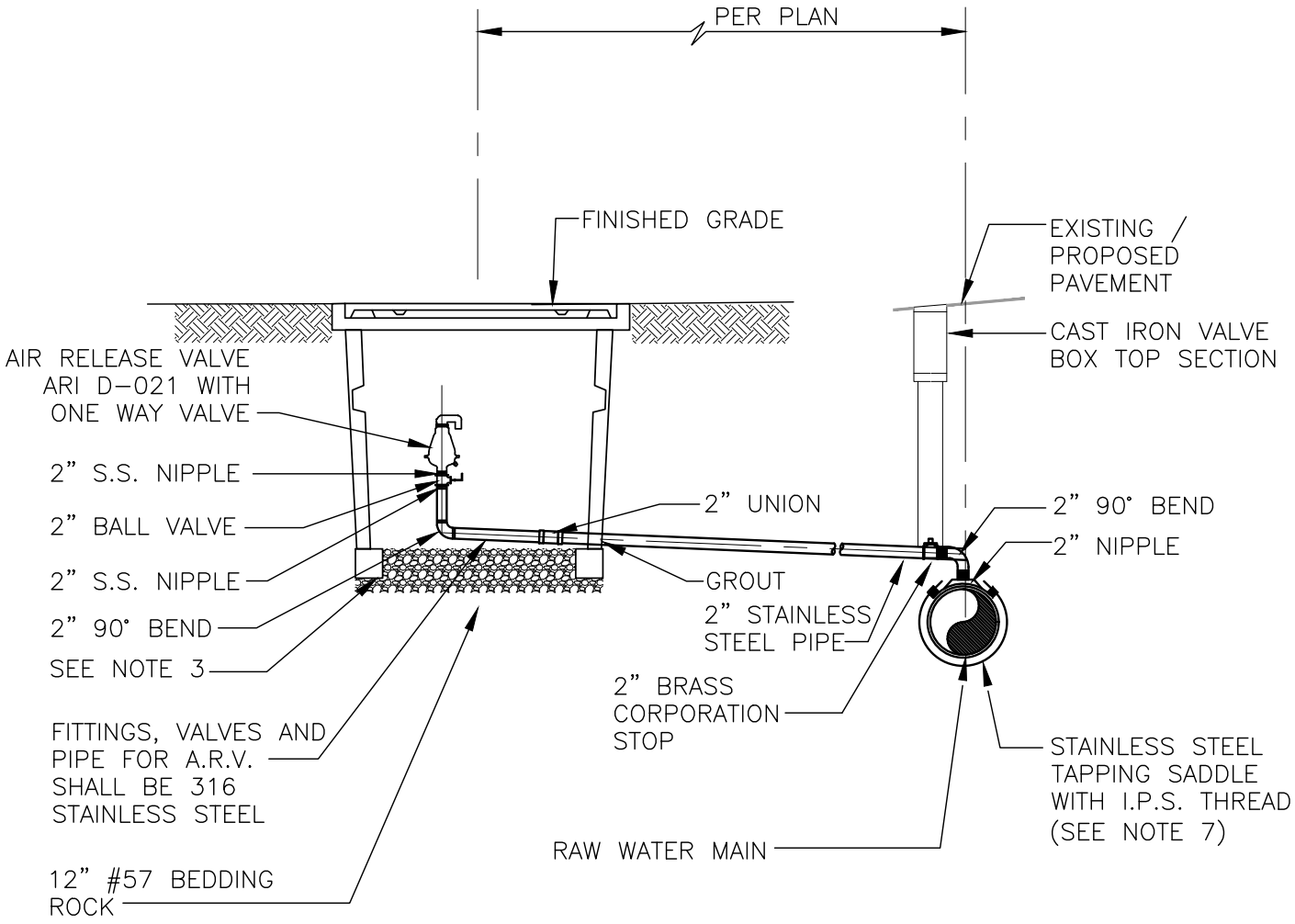
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

AIR RELEASE VALVE DETAIL FOR RAW WATER MAINS

SCALE: NONE

FIG. W-7

REVISED 7/18



NOTES:

NOTES:

1. ABOVE DETAIL IS BASED UPON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVES SHALL BE CENTERED IN THE BOX.

3. CONCRETE SHALL BE 8" WIDE AND EXTEND THE FULL LENGTH OF THE BOX. PLACE 6"-8" OF NO. 57 STONE UNDER THE SLABS.

4. TOP OF BOX SHALL BE CLEARLY AND PERMANENTLY LABELED FOR THE APPROPRIATE UTILITY MAIN.

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6. IF BOX IS TO BE PLACED IN ROAD OR ADJACENT TO THE ROAD USE A HEAVY TRAFFIC BOX HUBBELL POWER SYSTEM GROUP, BOX #B-14-3636-48 OR CITY APPROVED EQUIVALENT RATED FOR HEAVY TRAFFIC BEARING.

7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

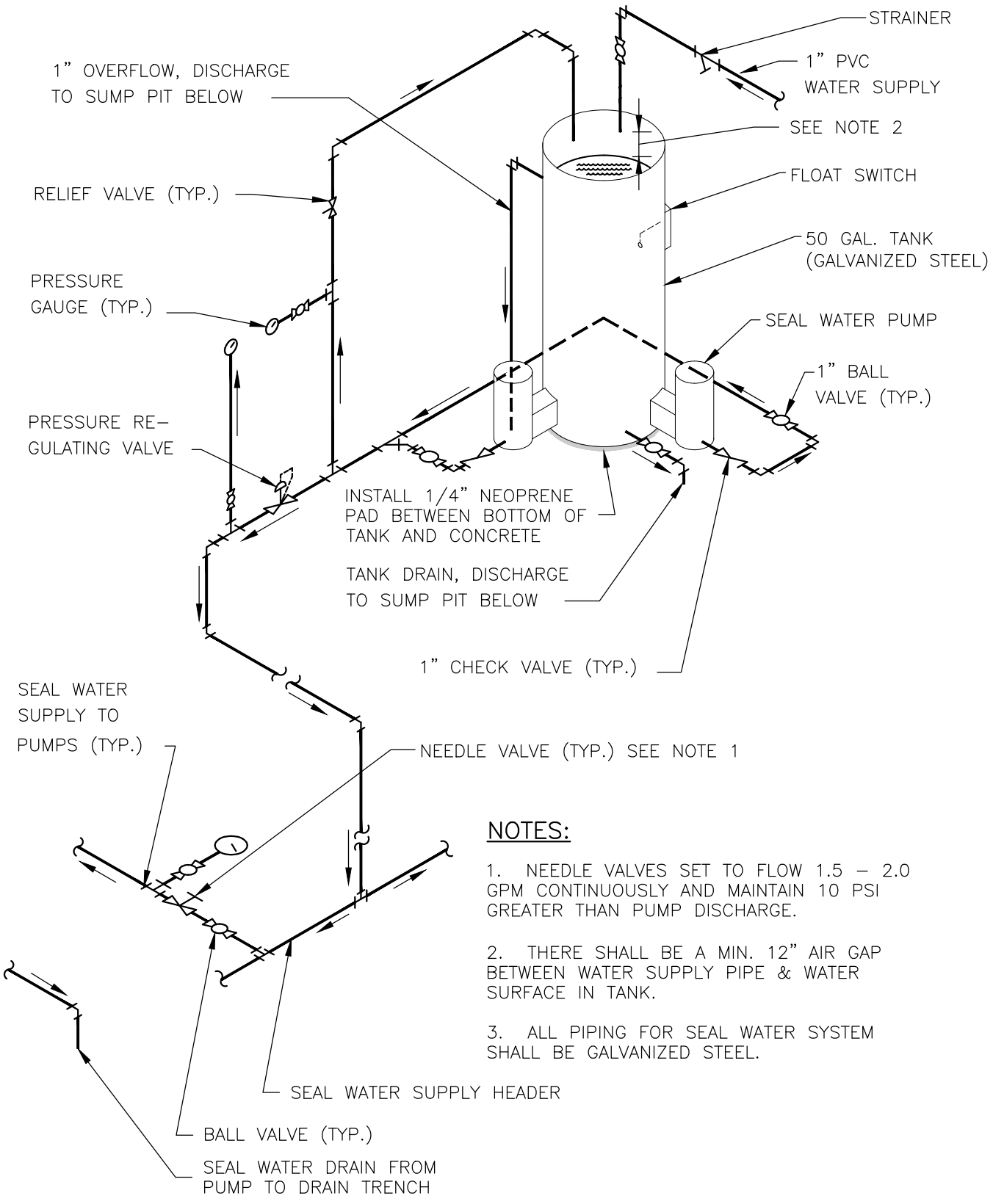
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

OFFSET AIR RELEASE VALVE FOR RAW WATER MAINS

SCALE: NONE

FIG. W-7A

REVISED 7/18



NOTES:

1. NEEDLE VALVES SET TO FLOW 1.5 – 2.0 GPM CONTINUOUSLY AND MAINTAIN 10 PSI GREATER THAN PUMP DISCHARGE.

2. THERE SHALL BE A MIN. 12" AIR GAP BETWEEN WATER SUPPLY PIPE & WATER SURFACE IN TANK.

3. ALL PIPING FOR SEAL WATER SYSTEM SHALL BE GALVANIZED STEEL.

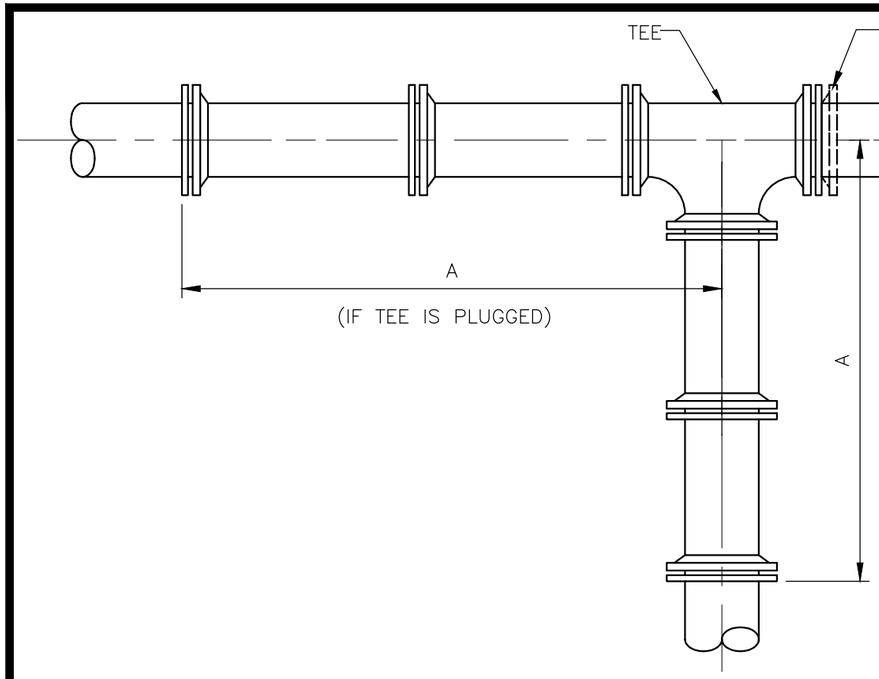
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

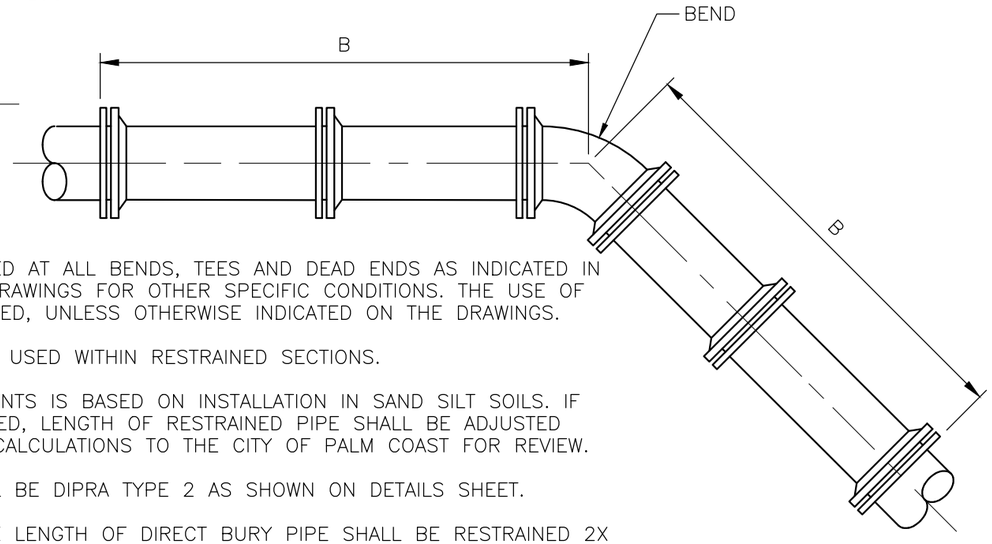
SEAL WATER SCHEMATIC DETAIL

SCALE: NONE

FIG. W-8

REVISED 7/16





NOTE:

1. RESTRAINED JOINTS SHALL BE PROVIDED AT ALL BENDS, TEES AND DEAD ENDS AS INDICATED IN THESE TABLES, OR AS SHOWN ON THE DRAWINGS FOR OTHER SPECIFIC CONDITIONS. THE USE OF CONCRETE THRUST BLOCKING IS PROHIBITED, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

2. MAXIMUM LENGTHS OF PIPE SHALL BE USED WITHIN RESTRAINED SECTIONS.

3. LENGTH OF PIPE WITH RESTRAINED JOINTS IS BASED ON INSTALLATION IN SAND SILT SOILS. IF OTHER SOIL CONDITIONS ARE ENCOUNTERED, LENGTH OF RESTRAINED PIPE SHALL BE ADJUSTED ACCORDINGLY. ENGINEER SHALL SUPPLY CALCULATIONS TO THE CITY OF PALM COAST FOR REVIEW.

4. PIPE TRENCH AND INSTALLATION SHALL BE DIPRA TYPE 2 AS SHOWN ON DETAILS SHEET.

5. AT CONNECTIONS WITH HDPE PIPE THE LENGTH OF DIRECT BURY PIPE SHALL BE RESTRAINED 2X THE LENGTH OF PIPE SHOWN IN THE DIP RESTRAINED JOINT TABLE.

6. A LAYED–DOWN CONNECTION BETWEEN HDPE AND PVC/DIP, UTILIZING A SOLID TRANSITION SLEEVE, SHALL BE CONSIDERED A ZERO (0) DEGREE BEND.

TABLES SHOW MINIMUM LENGTH OF PIPE EACH WAY FROM FITTING FOR WHICH RESTRAINT IS REQUIRED.									
TABLE APPLIES TO DUCTILE IRON PIPE FOR THE FOLLOWING CONDITIONS:									
TEST PRESSURE:	150 PSIG								
SOIL TYPE:	SAND SILT								
COVER DEPTH:	3-FT. (MIN.)								
SAFETY FACTOR:	1.5								
TRENCH TYPE:	2								
VALUES IN PARENTHESIS (X) ARE FOR PIPE ENCASED IN POLYETHYLENE.									

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

RESTRAINED JOINT DETAIL

SCALE: NONE

FIG. W–9

REVISED 8/20

DIP RESTRAINED JOINT TABLES

SCHEDULE OF LENGTHS OF RESTRAINED DIP (FT.) HORIZONTAL FITTINGS						
FITTING	90° BEND	45° BEND	22.5° BEND	11.25° BEND	0° BEND	TEE OR DEAD END
PIPE SIZE (IN.) :						
4	31 (37)	18 (18)	18 (18)	18 (18)	18 (18)	65 (93)
6	43 (51)	18 (21)	18 (18)	18 (18)	18 (18)	91 (130)
8	57 (66)	24 (28)	18 (18)	18 (18)	18 (18)	120 (171)
10	67 (78)	28 (33)	18 (18)	18 (18)	18 (18)	143 (204)
12	78 (91)	33 (38)	18 (19)	18 (18)	18 (18)	168 (240)
14	89 (103)	37 (43)	18 (21)	18 (18)	18 (18)	191 (273)
16	99 (115)	41 (48)	20 (23)	18 (18)	18 (18)	214 (306)
18	109 (126)	45 (52)	22 (25)	18 (18)	18 (18)	236 (337)
20	118 (137)	49 (57)	24 (28)	18 (18)	18 (18)	258 (368)
24	136 (158)	57 (66)	28 (32)	18 (18)	18 (18)	300 (428)
30	160 (185)	67 (77)	32 (37)	18 (18)	18 (18)	357 (510)
36	202 (233)	76 (88)	37 (42)	18 (21)	18 (18)	411 (586)
42	202 (233)	84 (97)	41 (47)	20 (23)	18 (18)	458 (655)
48	220 (253)	92 (105)	44 (51)	22 (25)	18 (18)	504 (719)

SCHEDULE OF LENGTHS OF RESTRAINED DIP (FT.)			
REDUCER			
SIZE/LENGTH			
4/47 (67)			
6/51 (72)	4/86 (123)		
8/48 (69)	6/88 (126)	4/116 (166)	
10/50 (71)	8/89 (127)	6/122 (174)	4/146 (208)
12/49 (70)	10/91 (129)	8/124 (177)	6/152 (217)
14/49 (70)	12/91 (130)	10/127 (182)	8/156 (223)
16/49 (69)	14/91 (130)	12/128 (183)	10/160 (228)
18/48 (68)	16/91 (129)	14/129 (183)	12/162 (231)
20/90 (128)	18/129 (184)	16/164 (234)	14/195 (278)
24/125 (179)	20/195 (278)	18/225 (321)	16/252 (359)
30/124 (177)	24/225 (321)	20/280 (400)	18/304 (435)
36/119 (170)	30/222 (316)	24/305 (435)	20/351 (501)
42/118 (168)	36/218 (311)	30/304 (434)	24/374 (534)

PVC PIPE RESTRAINED JOINT TABLES

SCHEDULE OF LENGTHS OF RESTRAINED PVC PIPE (FT.) HORIZONTAL FITTINGS						
FITTING	90° BEND	45° BEND	22.5° BEND	11.25° BEND	0° BEND	TEE OR DEAD END
PIPE SIZE (IN.) :						
4	30	18	18	18	18	97
6	43	18	18	18	18	137
8	55	23	18	18	18	177
10	66	28	18	18	18	214
12	77	32	18	18	18	250
14	88	37	18	18	18	286
16	98	41	20	18	18	320
18	108	45	22	18	18	354
20	117	49	24	18	18	386
24	136	57	27	18	18	448
30	161	67	32	18	18	534
36	184	76	37	19	18	614
42	204	85	41	21	18	683
48	224	93	45	23	18	751

SCHEDULE OF LENGTHS OF RESTRAINED PVC PIPE (FT.)			
REDUCER			
SIZE/LENGTH			
4 / 71			
6 / 74	4 / 127		
8 / 72	6 / 131	4 / 174	
10 / 73	8 / 132	6 / 182	4 / 217
12 / 73	10 / 135	8 / 186	6 / 227
14 / 73	12 / 136	10 / 190	8 / 233
16 / 72	14 / 136	12 / 191	10 / 239
18 / 71	16 / 135	14 / 192	12 / 242
20 / 134	18 / 192	16 / 244	14 / 290
24 / 187	20 / 290	18 / 335	16 / 376
30 / 185	24 / 335	20 / 419	18 / 455
36 / 177	30 / 330	24 / 453	20 / 522
42 / 175	36 / 324	30 / 453	24 / 557

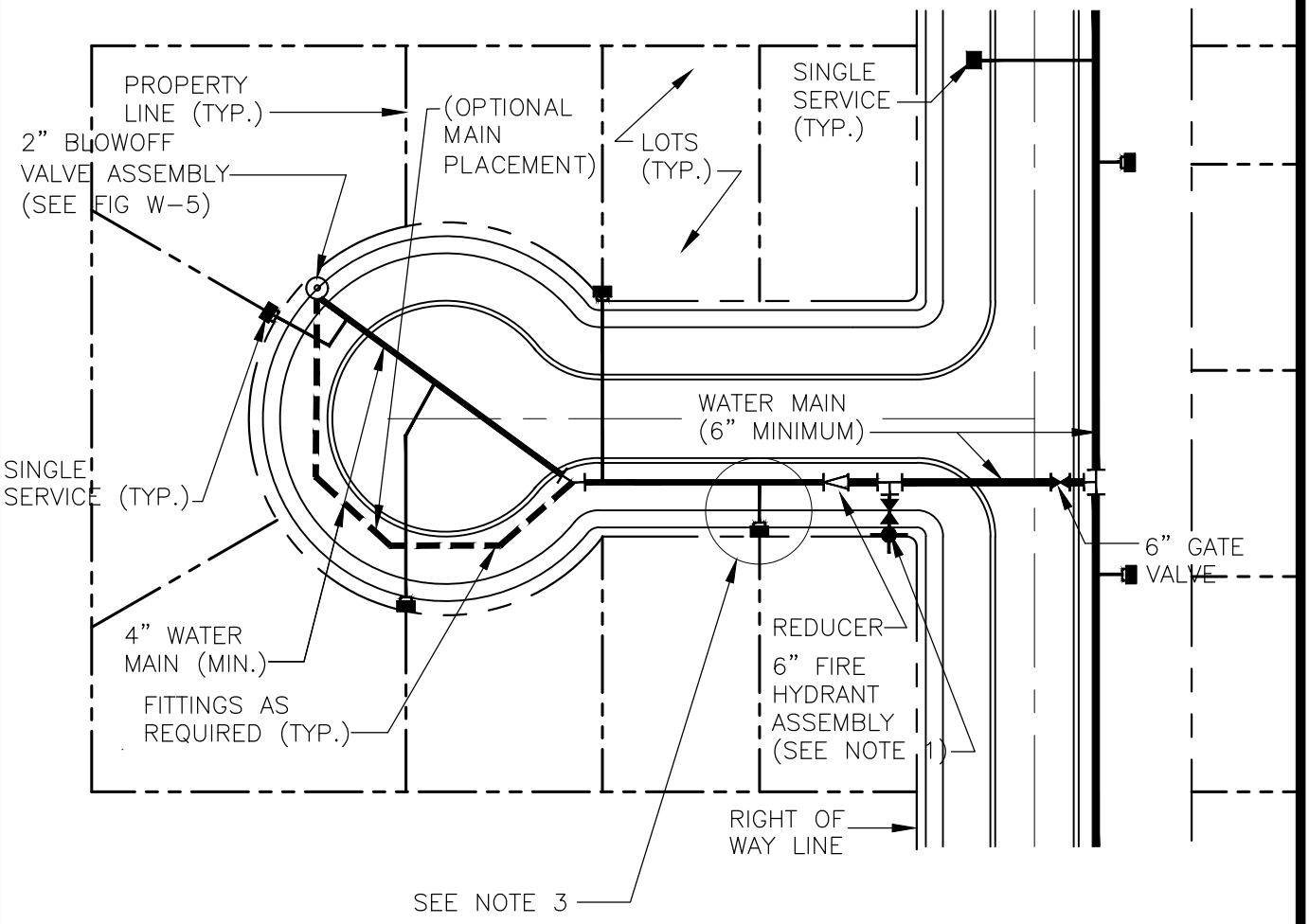
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

RESTRAINED JOINT TABLES

SCALE: NONE

FIG. W9–A

REVISED 8/20



NOTES:

1. ANCHORING TYPE 90° BEND SHALL ONLY BE USED WHERE RIGHT-OF-WAY CONSTRICTIONS WILL NOT ALLOW INSTALLATION OF A STRAIGHT ASSEMBLY.
2. MAXIMUM DEAD END LENGTH IS 2000'.
3. REFER TO WATER SERVICE DETAILS (W-11 & W-12)

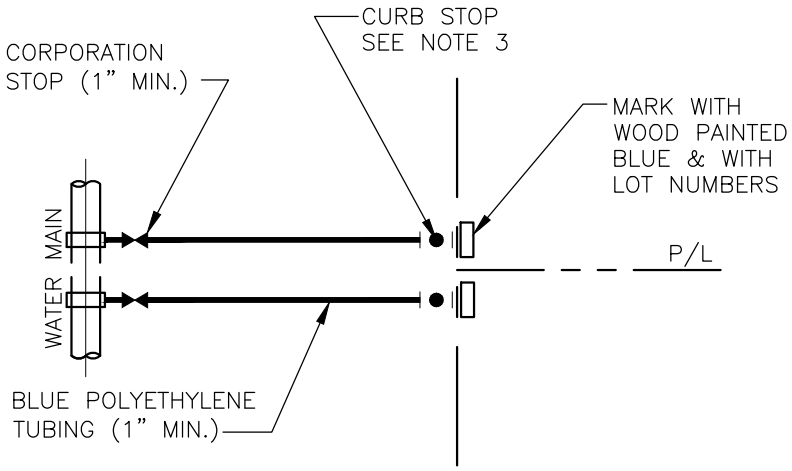
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

TYPICAL CUL-DE-SAC WATER MAIN DETAIL

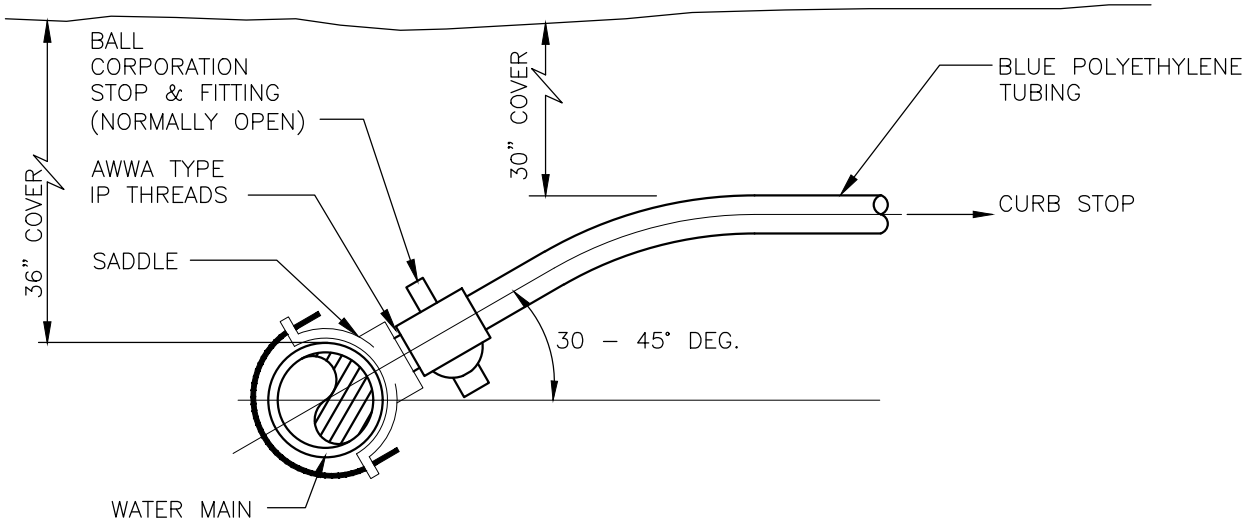
SCALE: NONE

FIG. W-10

REVISED 1/07



1" SERVICE



NOTES:

1. ALL FITTINGS SHALL BE BRASS WITH COMPRESSION/PACK JOINT TYPE CONNECTIONS.
2. NO SERVICE LINE SHALL TERMINATE UNDER A DRIVEWAY.
3. EACH SERVICE SHALL TERMINATE WITH A CURB STOP. THE SERVICES SHALL BE CLEARLY MARKED WITH A PRESSURE TREATED 4" x 4", 8–FEET LONG, 3–FOOT ABOVE GRADE WITH THE TOP PAINTED BLUE AND MARKED WITH THE LOT NUMBERS. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP AT THE EDGE OF THE POST.
4. FOR THOSE AREAS WITH CURBED STREETS, EACH SERVICE SHALL BE MARKED BY ETCHING OR CUTTING A THREE (3) INCH MINIMUM "W" IN THE CURB. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP.
5. METERS 1 INCH AND SMALLER SHALL BE INSTALLED BY CITY OF PALM COAST PERSONNEL UNLESS OTHERWISE DIRECTED BY CONSTRUCTION NOTES.
6. SERVICE TUBING SHALL BE BLUE POLYETHYLENE ENDOT "ENDOPURE" OR APPROVED EQUAL.
7. WHERE SERVICE MAIN CROSSES THE STREET, A 2" SCH 40 PVC CASING PIPE SHALL BE INSTALLED. THE CASING SHALL TERMINATE 3–FEET BEYOND EDGE OF PAVEMENT.

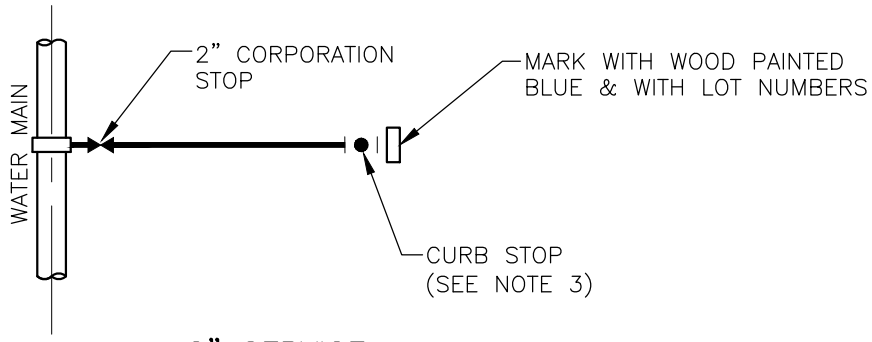
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

1" POTABLE WATER SERVICE CONNECTION DETAIL IN NON-REUSE AREAS

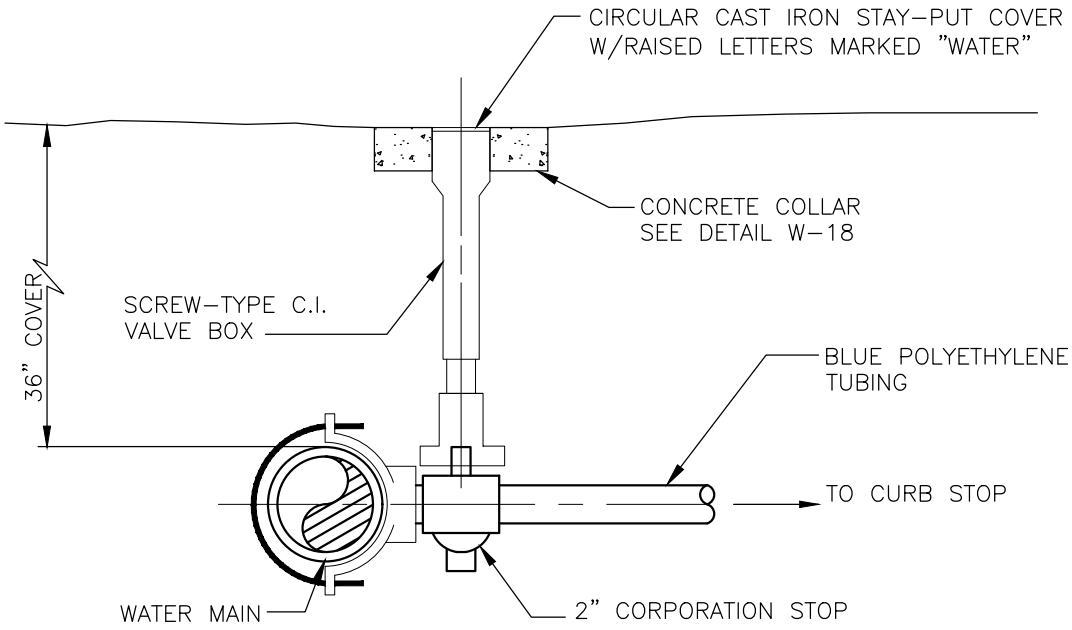
SCALE: NONE

FIG. W–11

REVISED 2/16



2" SERVICE



NOTES:

1. ALL FITTINGS SHALL BE BRASS WITH COMPRESSION/PACK JOINT TYPE CONNECTIONS.
2. NO SERVICE LINE SHALL TERMINATE UNDER A DRIVEWAY.
3. EACH SERVICE SHALL TERMINATE WITH A CURB STOP AND 45° BEND. THE SERVICES SHALL BE CLEARLY MARKED WITH A PRESSURE TREATED 4" x 4", 8-FEET LONG, 3-FOOT ABOVE GRADE WITH THE TOP PAINTED BLUE AND MARKED WITH THE LOT NUMBERS. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP AT THE EDGE OF THE POST.
4. FOR THOSE AREAS WITH CURBED STREETS, EACH SERVICE SHALL BE MARKED BY ETCHING OR CUTTING A THREE (3) INCH MINIMUM "W" IN THE CURB. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP.
5. METERS 1 INCH AND SMALLER SHALL BE INSTALLED BY CITY OF PALM COAST PERSONNEL UNLESS OTHERWISE DIRECTED BY CONSTRUCTION NOTES.
6. SERVICE TUBING SHALL BE BLUE POLYETHYLENE ENDOT "ENDOPURE" OR APPROVED EQUAL.
7. WHERE SERVICE MAIN CROSSES THE STREET, A 3" SCH 40 PVC CASING PIPE SHALL BE INSTALLED. THE CASING SHALL TERMINATE 3-FEET BEYOND EDGE OF PAVEMENT.

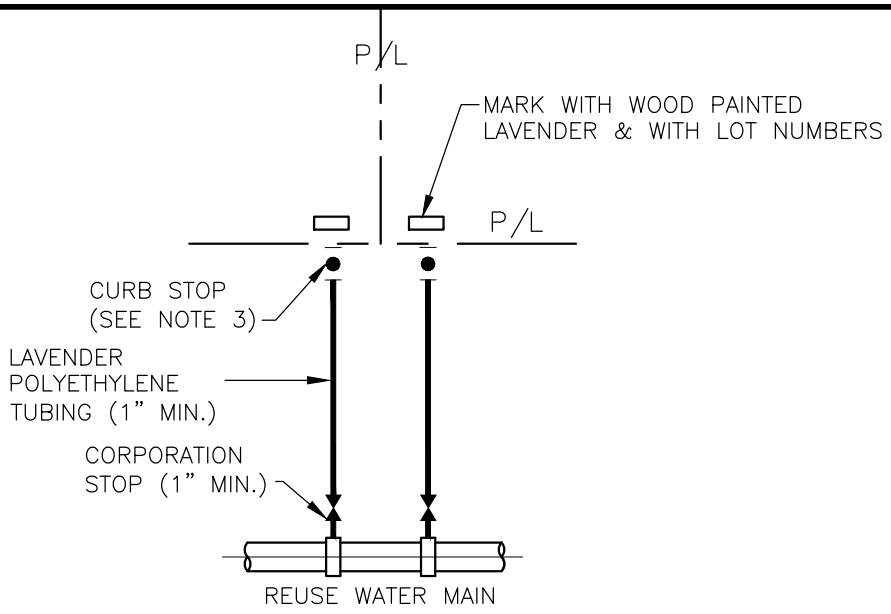
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

2" POTABLE WATER SERVICE CONNECTION DETAIL

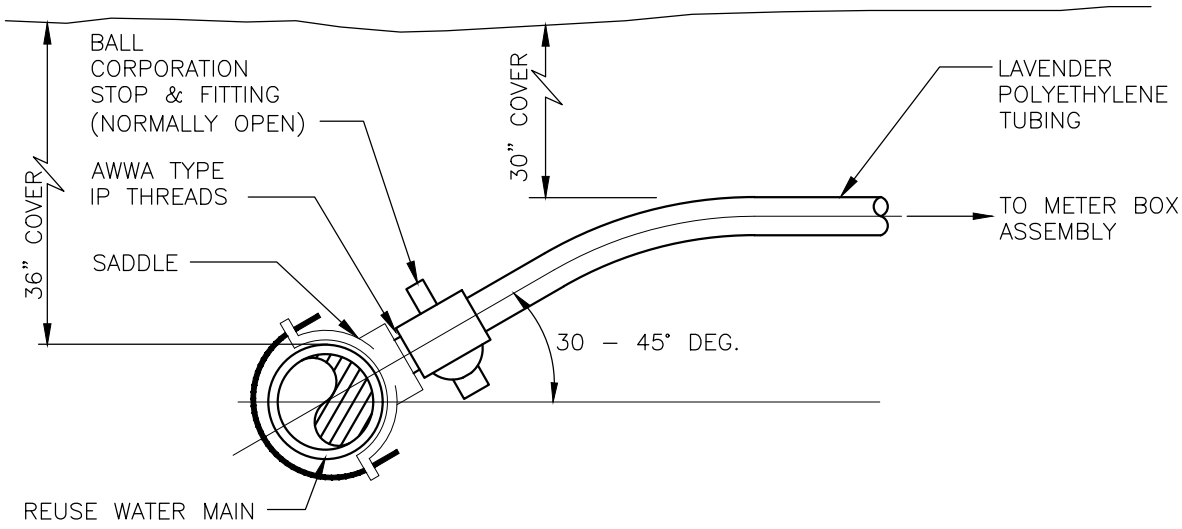
SCALE: NONE

FIG. W-12

REVISED 2/16



1" SERVICE



NOTES:

1. ALL FITTINGS SHALL BE BRASS WITH COMPRESSION/PACK JOINT TYPE CONNECTIONS.
2. NO SERVICE LINE SHALL TERMINATE UNDER A DRIVEWAY.
3. EACH SERVICE SHALL TERMINATE WITH A CURB STOP. THE SERVICES SHALL BE CLEARLY MARKED WITH A PRESSURE TREATED 4" x 4", 8–FEET LONG, 3–FOOT ABOVE GRADE WITH THE TOP PAINTED LAVENDER AND MARKED WITH THE LOT NUMBERS. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP AT THE EDGE OF THE POST.
4. FOR THOSE AREAS WITH CURBED STREETS, EACH SERVICE SHALL BE MARKED BY ETCHING OR CUTTING A THREE (3) INCH MINIMUM "R" IN THE CURB. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP.
5. METERS 1 INCH AND SMALLER SHALL BE INSTALLED BY CITY OF PALM COAST PERSONNEL UNLESS OTHERWISE DIRECTED BY CONSTRUCTION NOTES.
6. SERVICE TUBING SHALL BE LAVENDER POLYETHYLENE ENDOT "ENDOPURE" OR APPROVED EQUAL.
7. WHERE SERVICE MAIN CROSSES THE STREET, A 2" SCH 40 PVC CASING PIPE SHALL BE INSTALLED. THE CASING SHALL TERMINATE 3–FEET BEYOND EDGE OF PAVEMENT.

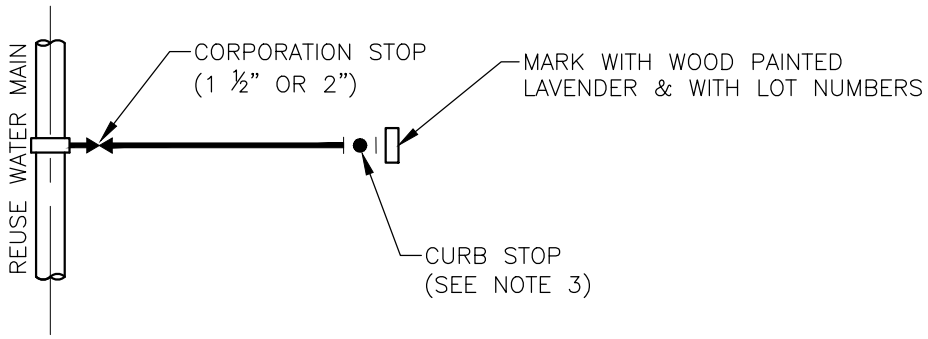
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

1" REUSE WATER SERVICE CONNECTION DETAIL

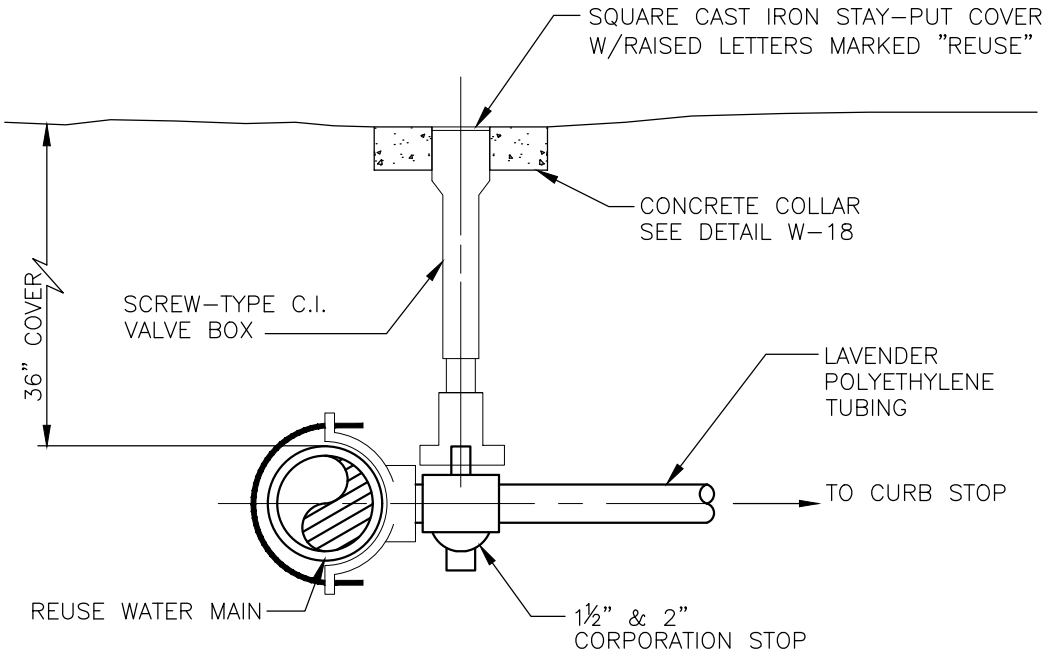
SCALE: NONE

FIG. W–13

REVISED 2/16



1½" & 2" SERVICE



NOTES:

1. ALL FITTINGS SHALL BE BRASS WITH COMPRESSION/PACK JOINT TYPE CONNECTIONS.
2. NO SERVICE LINE SHALL TERMINATE UNDER A DRIVEWAY.
3. EACH SERVICE SHALL TERMINATE WITH A CURB STOP. THE SERVICES SHALL BE CLEARLY MARKED WITH A PRESSURE TREATED 4" x 4", 8–FEET LONG, 3–FOOT ABOVE GRADE WITH THE TOP PAINTED LAVENDER AND MARKED WITH THE LOT NUMBERS. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP AT THE EDGE OF THE POST.
4. FOR THOSE AREAS WITH CURBED STREETS, EACH SERVICE SHALL BE MARKED BY ETCHING OR CUTTING A THREE (3) INCH MINIMUM "R" IN THE CURB. THE CURB STOP AND POLY TUBING SHALL BE BURIED ONE FOOT DEEP.
5. METERS 1 INCH AND SMALLER SHALL BE INSTALLED BY CITY OF PALM COAST PERSONNEL UNLESS OTHERWISE DIRECTED BY CONSTRUCTION NOTES.
6. SERVICE TUBING SHALL BE LAVENDER POLYETHYLENE ENDOT "ENDOPURE" OR APPROVED EQUAL.
7. WHERE SERVICE MAIN CROSSES THE STREET, A 3" SCH 40 PVC CASING PIPE SHALL BE INSTALLED. THE CASING SHALL TERMINATE 3–FEET BEYOND EDGE OF PAVEMENT.

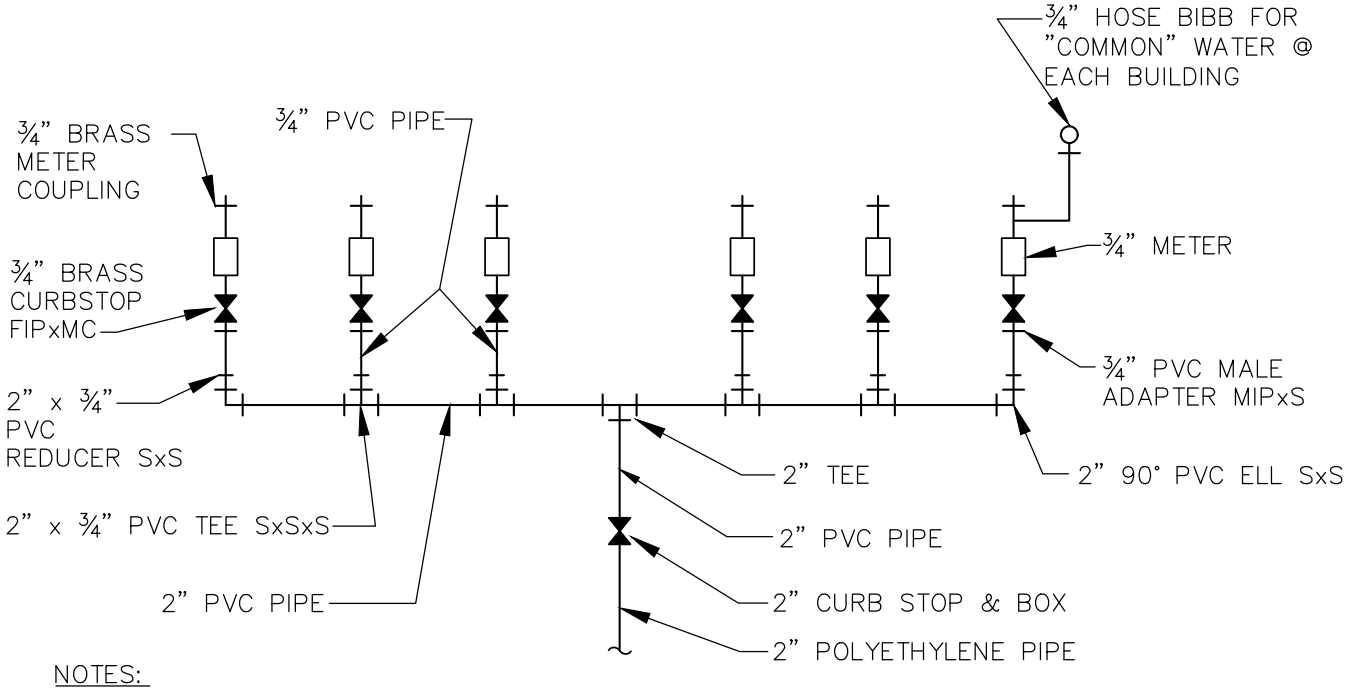
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

1½" & 2" REUSE WATER SERVICE CONNECTION DETAIL

SCALE: NONE

FIG. W–14

REVISED 2/16



NOTES:

1) SINGLE METER IN PIT MUST BE CENTERED IN METER PIT WITH EQUAL DISTANCE BETWEEN METER BODY AND INSIDE WALLS OF METER PIT.

2) TWO METERS IN METER PIT MUST BE IN A DUAL METER PIT BOX (NO EXCEPTIONS) WITH EQUAL DISTANCE BETWEEN.

3) METER BODIES AND INSIDE WALLS OF METER PIT CURB STOPS MUST BE READILY ACCESSIBLE AND NOT JAMMED AGAINST METER PIT WALL.

4) ¾" OR 1" METER COUPLING (BRASS)

5) ¾" OR 1" BRASS CURBSTOP FIP (FEMALE IRON PIPE)/ MC (METER CONNECTION) FORD PART # B13-232 W FOR 3/4" OR FORD PART #B13 344W FOR 1".

6) METER BOX SHALL BE SET 1" ABOVE FINISHED GRADE IN GRASSED AREA, HYLINE LUB195123 AND SHALL BE SET FLUSH WITHIN PAVEMENT, HYLINE CHA173018.

7) IF EACH METER SLOT IN THE METER PIT DOES NOT HAVE A METER THEN THE UTILITY DEPARTMENT WILL SUPPLY A TEMPORARY METER TO BE USED FOR CONSTRUCTION AND TESTING. THE METERS WILL BE REMOVED AFTER THE FINAL INSPECTION.

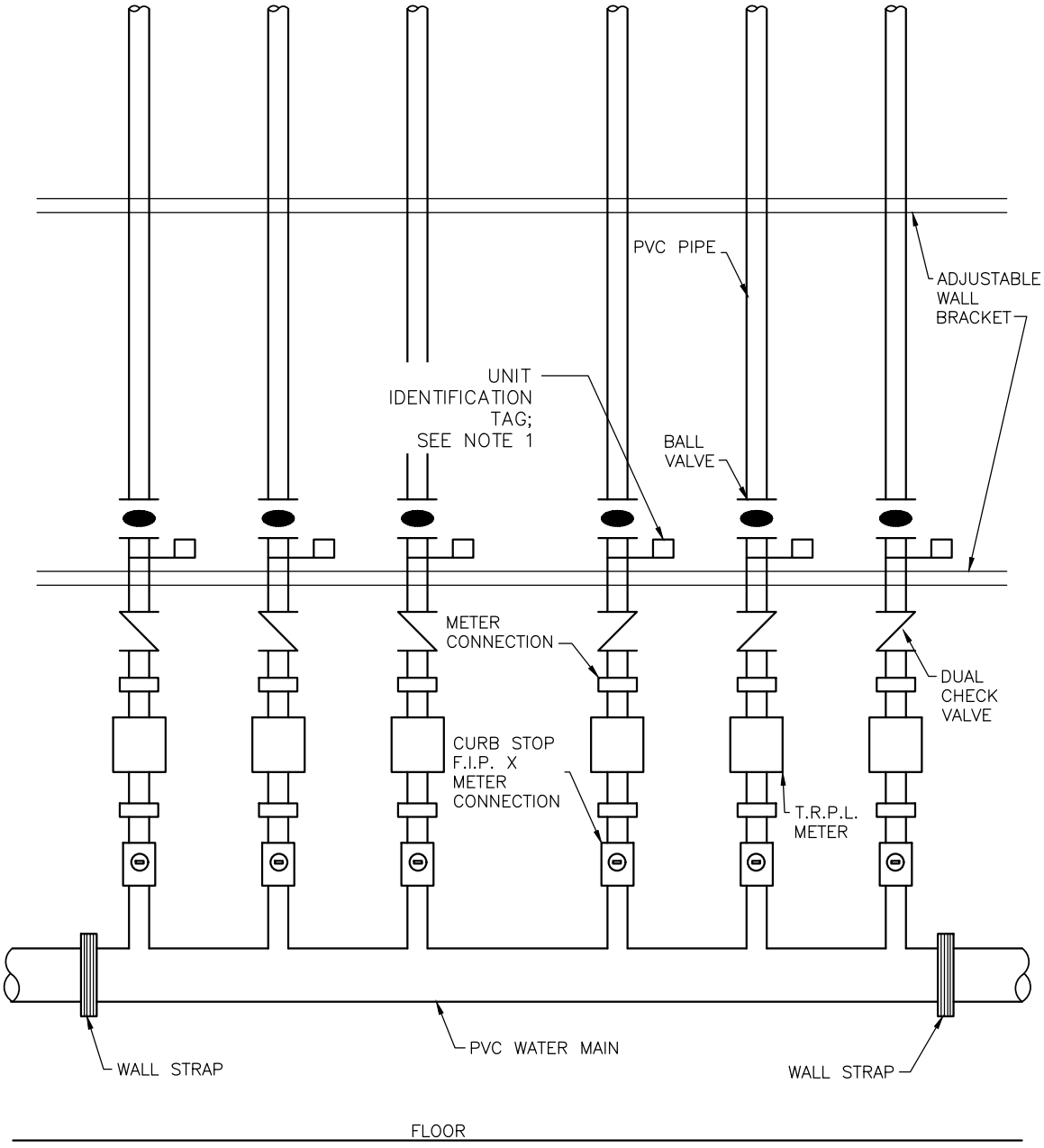
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

WATER SERVICE MANIFOLD DETAIL (BURIED)

SCALE: NONE

FIG. W-15

REVISED 7/15



NOTES:

1. WEATHER–PROOF 1"X3" TAG SHALL BE HAVE PERMANENT MARKINGS THAT CANNOT BE ERASED OR ALTERED AND SHALL BE SECURELY AFFIXED TO EACH PIPE WITH ZIP TIES.

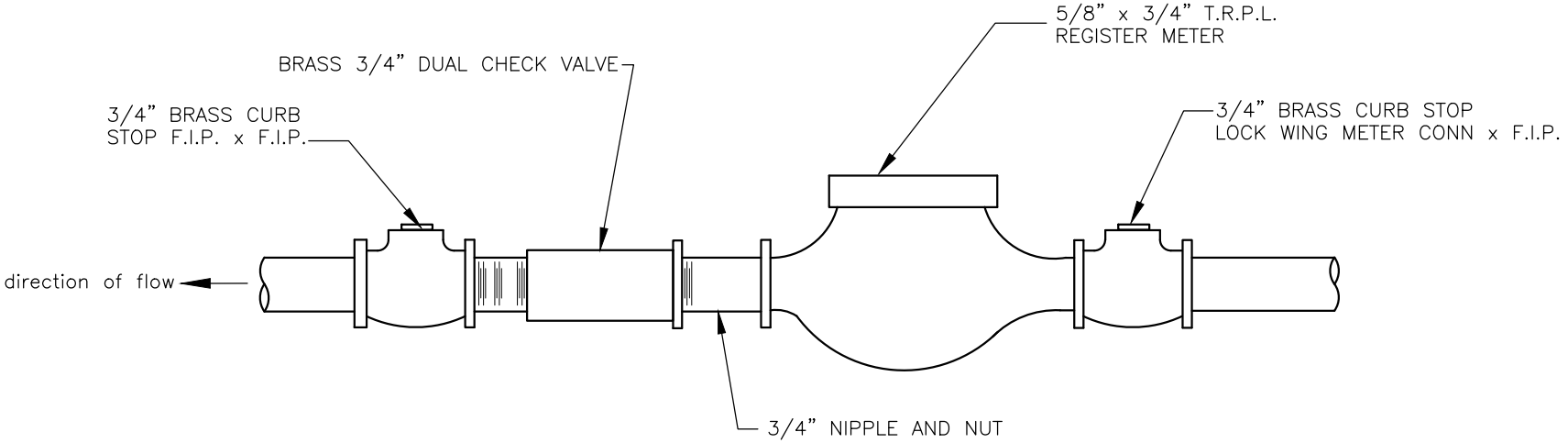
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

WATER SERVICE MANIFOLD DETAIL (METER ROOM)

SCALE: NONE

FIG. W–15A

REVISED 7/18

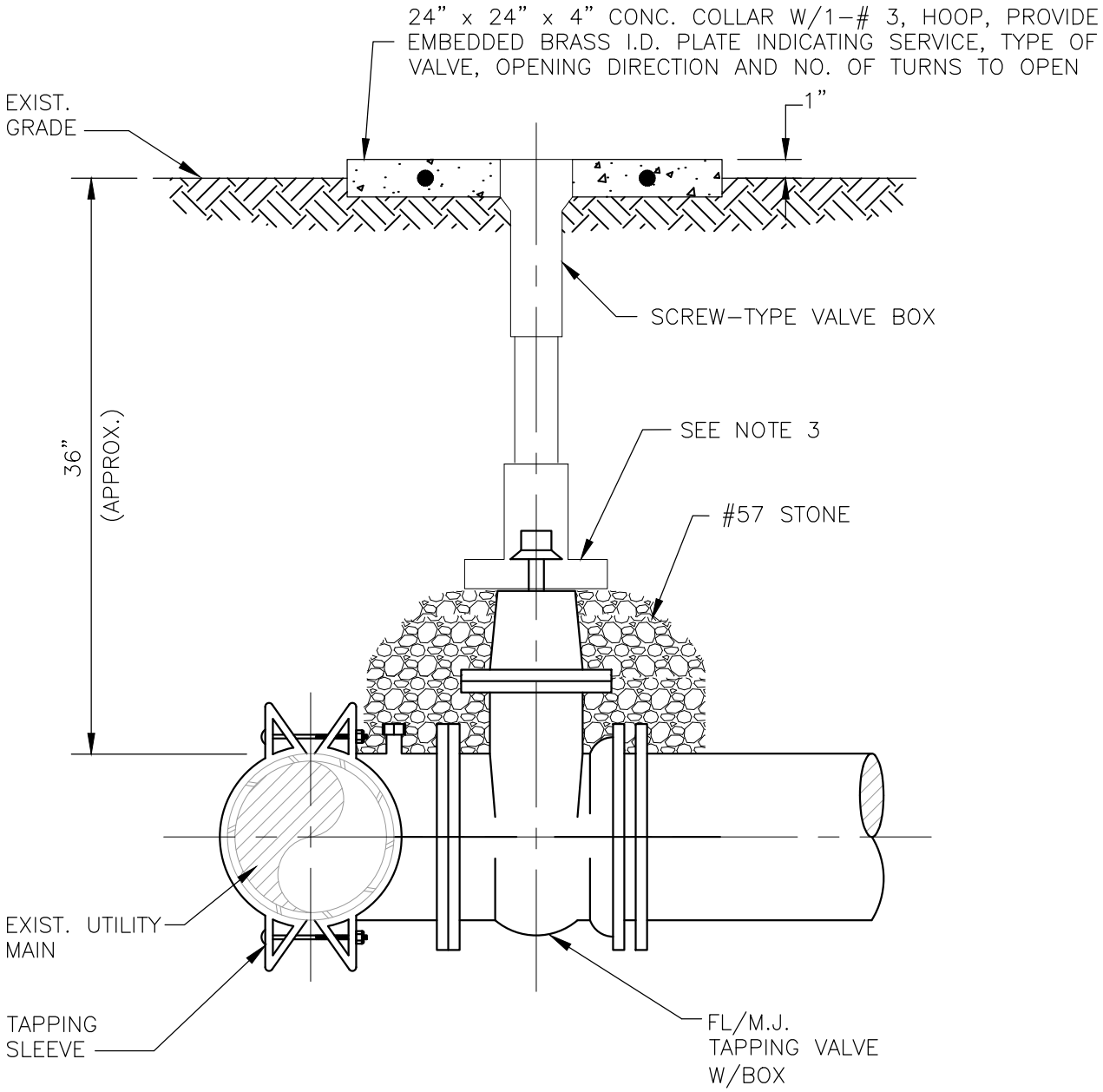


METER/CHECK VALVE DETAIL FOR MASTER BACKFLOWED COMPLEXES (METER ROOM)

SCALE: NONE

FIG. W-15B

REVISED 7/15



NOTES:

1. RESILIENT WEDGE GATE VALVE SHALL BE EPOXY COATED.
2. TAPPING SLEEVES SHALL BE STAINLESS STEEL.
3. SELF–CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.

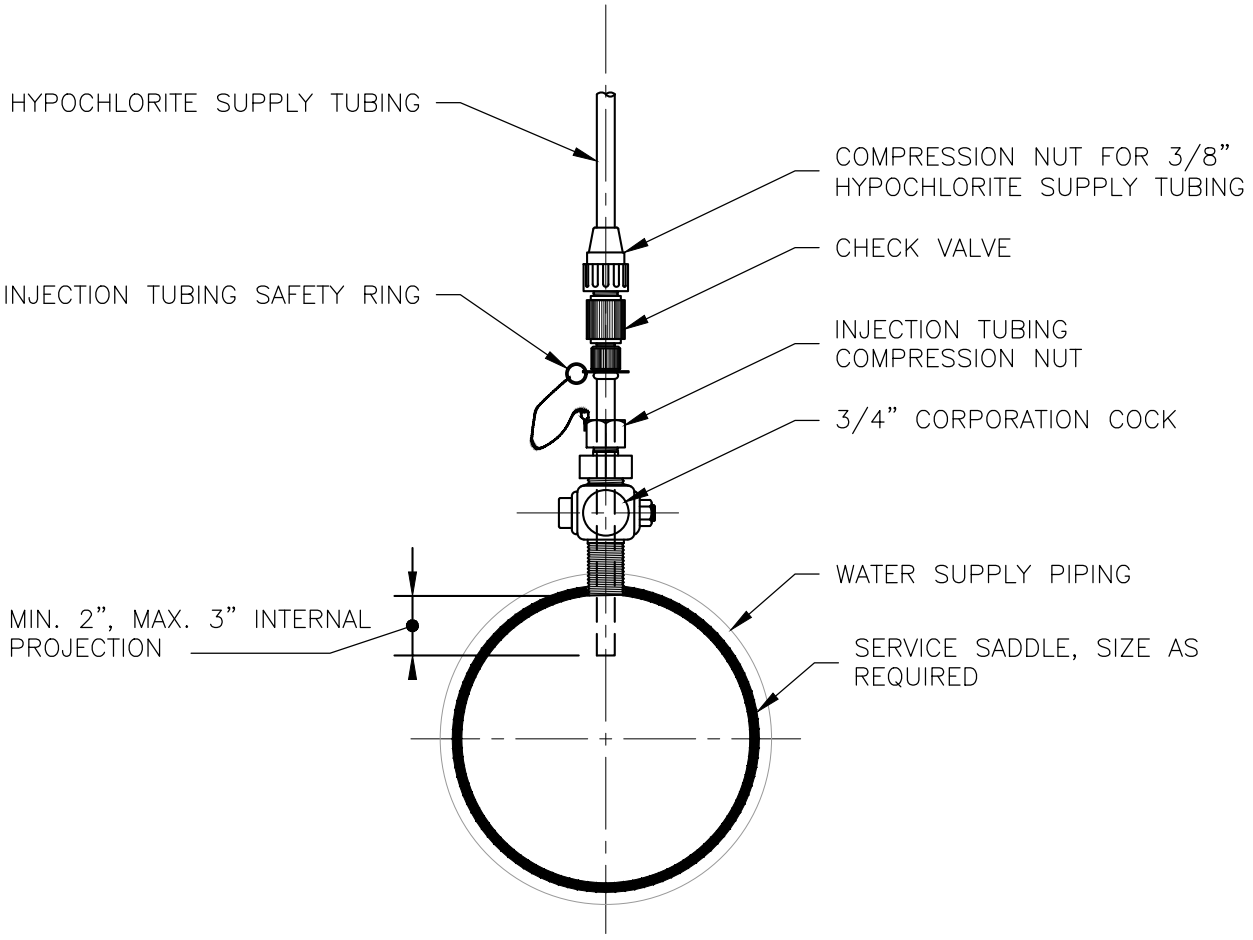
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

WET TAP DETAIL

SCALE: NONE

FIG. W–16

REVISED 1/08



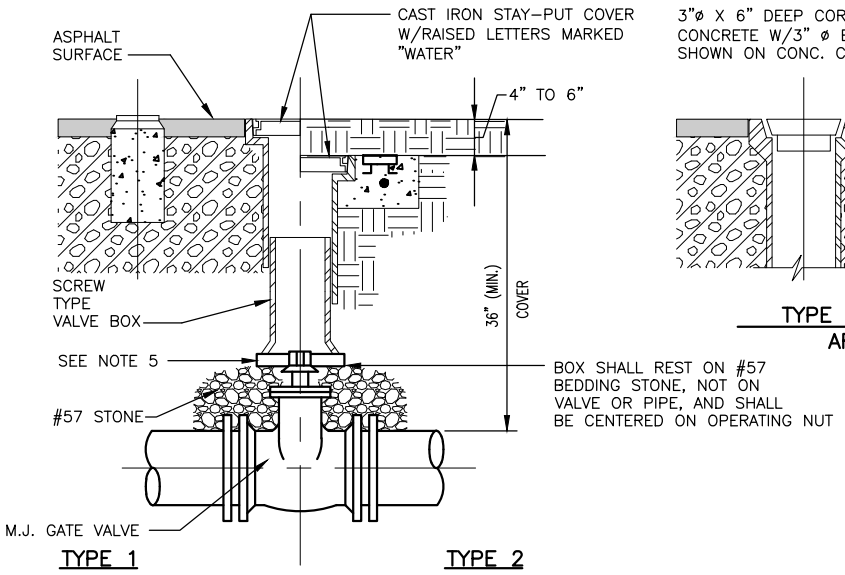
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

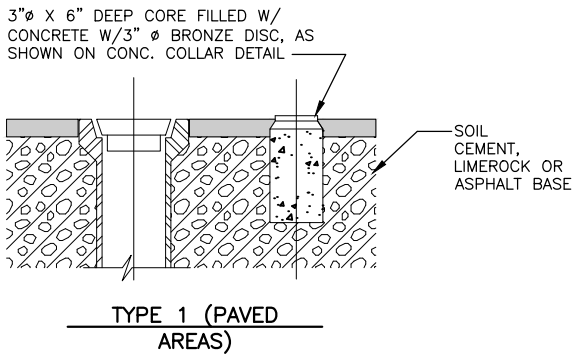
HYPOCHLORITE INJECTION DETAIL

SCALE: NONE

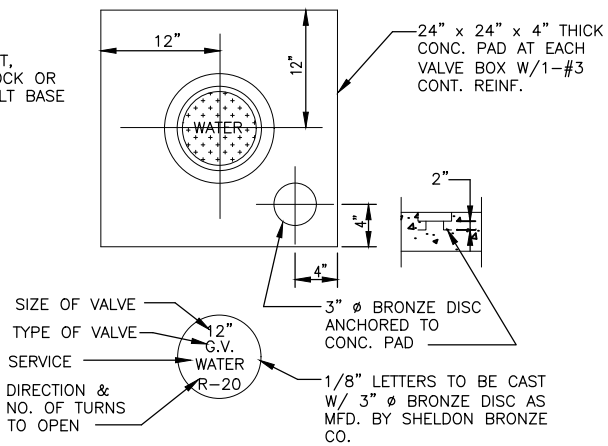
FIG. W–17

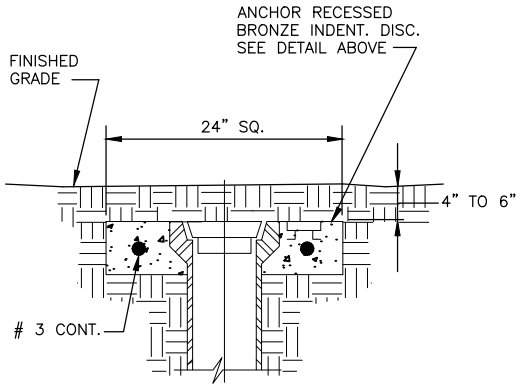
REVISED 1/07





TYPE 1 (PAVED AREAS)





TYPE 2 (NON–PAVED AREAS)

NOTES:

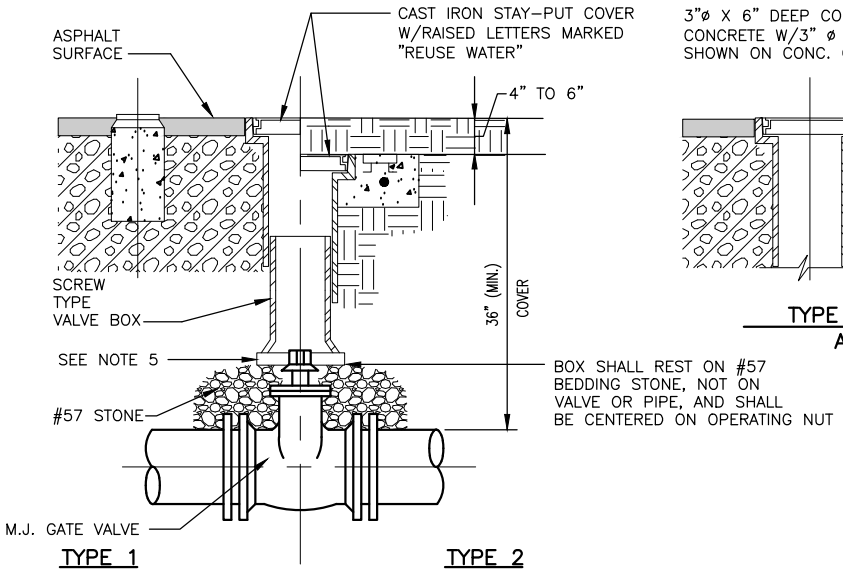
1. GATE VALVES SHALL BE DUCTILE IRON RESILIENT WEDGE TYPE, RATED AT 200 P.S.I. AND SHALL COMPLY WITH ANSI/AWWA C509.
2. WHERE AN EXTENSION IS REQUIRED, A 6" SDR 35 PVC EXTENSION SHALL BE USED ON VALVE BOX INSTALLATION.
3. VALVE COVER SHALL BE PAINTED BLUE FOR POTABLE WATER MAINS, WHITE FOR RAW WATER MAINS.
4. CONCRETE COLLAR SHALL BE CAST–IN–PLACE; PRECAST CONCRETE IS NOT ACCEPTABLE.
5. SELF CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.
6. VALVES 16" AND LARGER SHALL BE INSTALLED VERTICALLY AND SHALL BE EQUIPPED WITH A BEVEL GEAR OPERATING NUT. MINIMUM COVER OVER OPERATING NUT SHALL BE 30 INCHES.
7. VALVES 18" AND LARGER SHALL INCLUDE A NRS BYPASS VALVE.

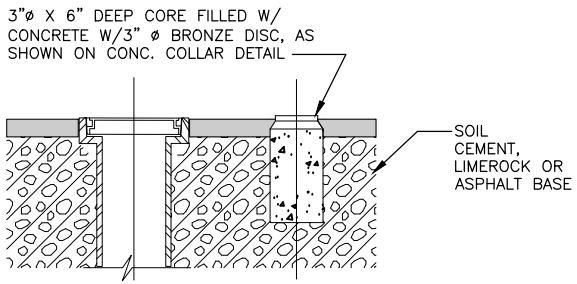
GATE VALVE & BOX DETAIL - POTABLE AND RAW WATER

SCALE: NONE

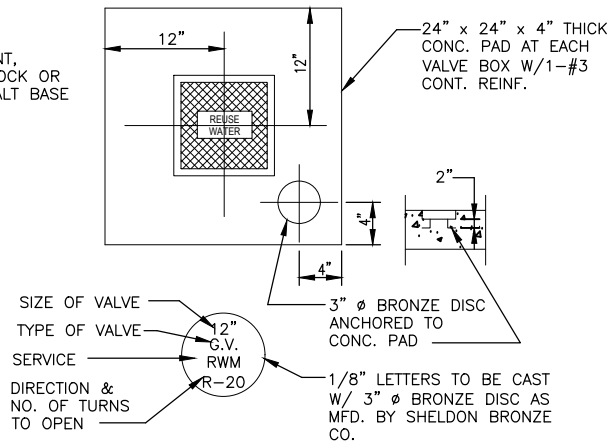
FIG. W–18

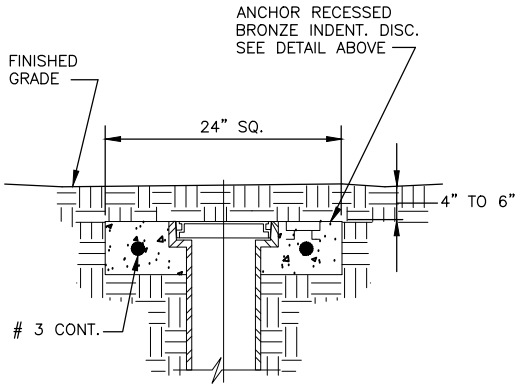
REVISED 7/22





TYPE 1 (PAVED AREAS)





TYPE 2 (NON–PAVED AREAS)

NOTES:

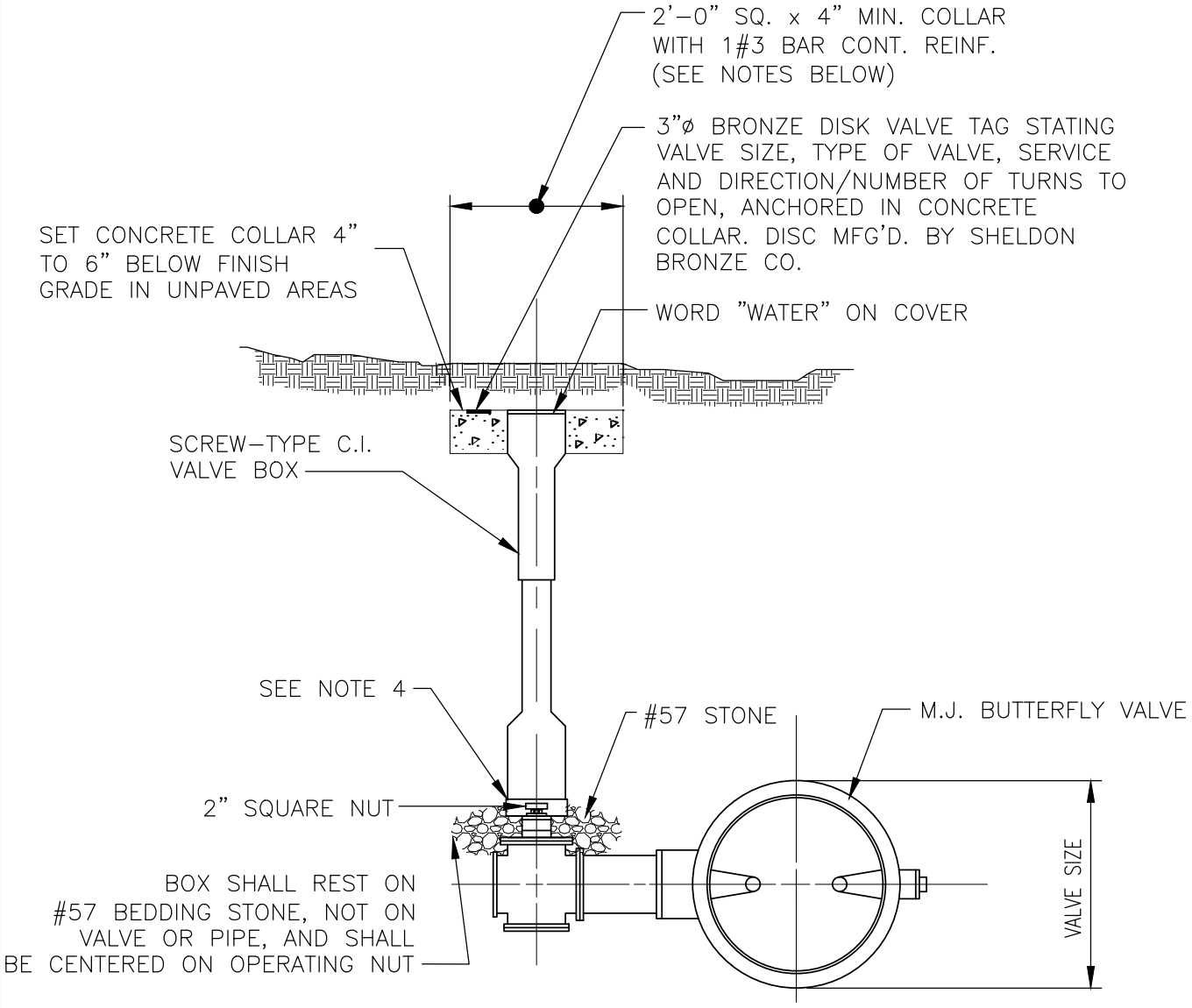
1. GATE VALVES SHALL BE DUCTILE IRON RESILIENT WEDGE TYPE, RATED AT 200 P.S.I. AND SHALL COMPLY WITH ANSI/AWWA C509.
2. WHERE AN EXTENSION IS REQUIRED, A 6" SDR 35 PVC EXTENSION SHALL BE USED ON VALVE BOX INSTALLATION.
3. VALVE COVER SHALL BE PAINTED LAVENDER FOR REUSE WATER MAINS.
4. CONCRETE COLLAR SHALL BE CAST–IN–PLACE; PRECAST CONCRETE IS NOT ACCEPTABLE.
5. SELF CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.
6. VALVES 16" AND LARGER SHALL BE INSTALLED VERTICALLY AND SHALL BE EQUIPPED WITH A BEVEL GEAR OPERATING NUT. MINIMUM COVER OVER OPERATING NUT SHALL BE 30 INCHES.
7. VALVES 18" AND LARGER SHALL INCLUDE A NRS BYPASS VALVE.

GATE VALVE & BOX DETAIL
REUSE WATER

SCALE: NONE

FIG. W–18A

REVISED 7/22



NOTES:

1. WHERE AN EXTENSION IS REQUIRED, A 6" SDR 35 PVC EXTENSION SHALL BE USED ON VALVE BOX INSTALLATION.
2. VALVE COVER SHALL BE PAINTED BLUE FOR POTABLE WATER MAINS OR LAVENDER FOR REUSE MAINS. REFER TO FIGURE W–18 AND W–18A FOR VALVE BOX DETAILS
3. CONCRETE COLLAR SHALL BE CAST–IN–PLACE; PRECAST CONCRETE IS NOT ACCEPTABLE.
4. SELF–CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.
5. BUTTERFLY VALVES SHALL NOT BE INSTALLED DIRECTLY TO HDPE PIPE.

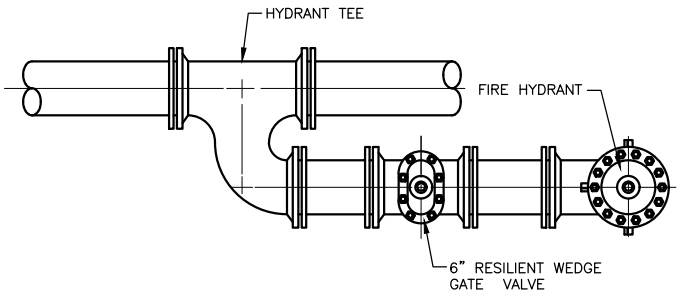
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

BUTTERFLY VALVE & BOX DETAIL

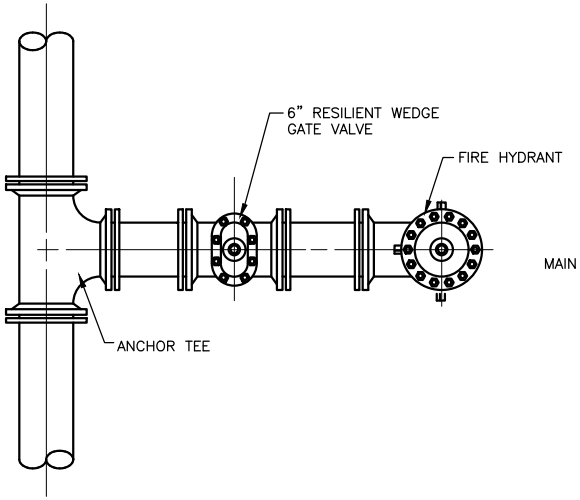
SCALE: NONE

FIG. W–19

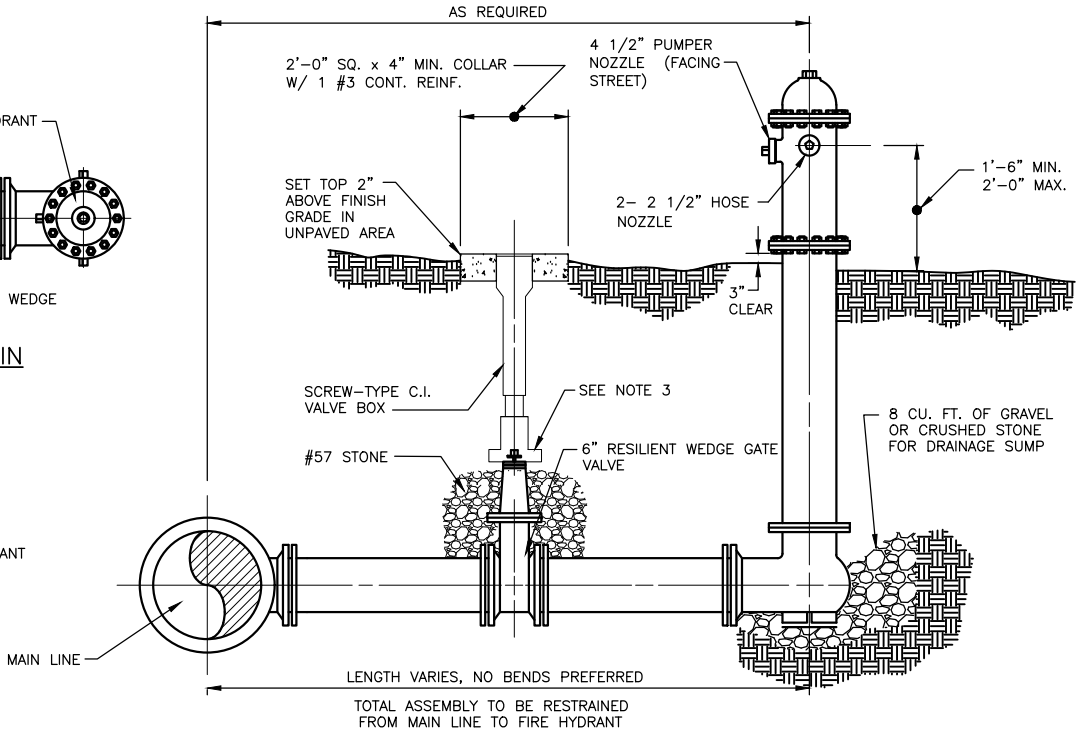
REVISED 7/11



INSTALLATION PARALLEL TO MAIN



INSTALLATION PERPENDICULAR TO MAIN



NOTES:

1. A TAPPING SLEEVE WITH VALVE AND BOX SHALL BE INSTALLED WHEN CONNECTING A PROPOSED FIRE HYDRANT TO AN EXISTING MAIN, OR RELOCATING AN EXISTING FIRE HYDRANT.

2. HYDRANTS SHALL HAVE BREAKAWAY SECTION OR REMOVABLE BARREL.

3. SELF-CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.

4. ALL ABOVE GRADE PIPING SHALL BE PAINTED AS FOLLOWS:

-SURFACE PREPARATION: POWER TOOL CLEANING (SSPC-SP3) OR BRUSH-OFF BLAST CLEANING (SSPC-SP7).

-PRIME: ACRYLIC ENAMEL, MINIMUM 3.0 MILS DFT. IF SHOP COAT IS DAMAGED, REPRIME BARE AREAS IN FIELD. IF SHOP COAT IS BITUMINOUS COATING, PRIME WITH 2 COATS OF STAIN BARRIER, 1 MIL DRY FILM THICKNESS PER COAT.

-FINISH: TWO COATS, APPLIED BY SPRAY, OF ACRYLIC ENAMEL, SAFETY BLUE (GLOSS) #225A120 ACE PRODUCT RUST STOP, MIN. 4.0 MILS DFT AND GLOSS WHITE #7792 RUST-OLEUM BRAND HOME DEPOT, MIN 4.0 MILS DFT.

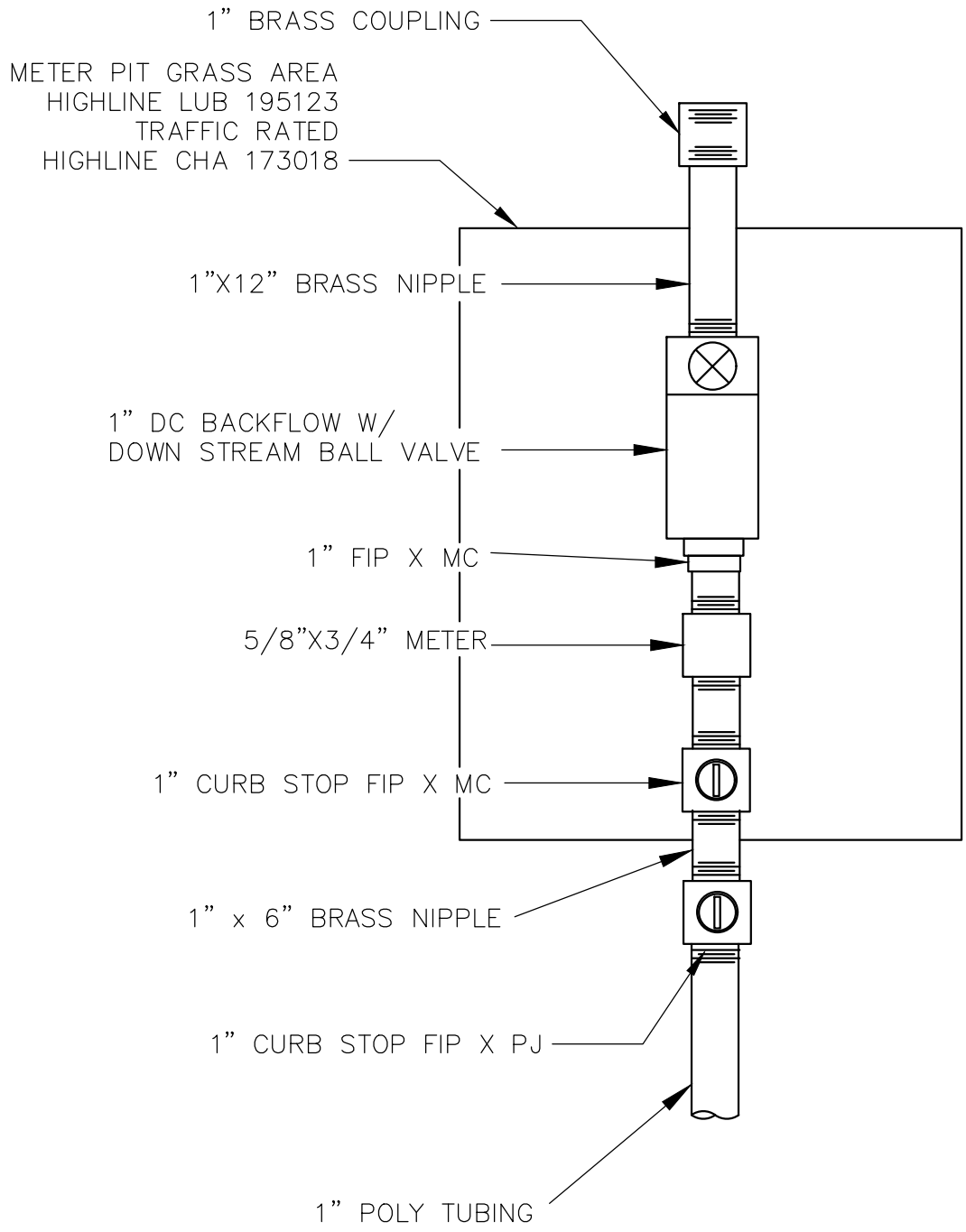
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

FIRE HYDRANT ASSEMBLY DETAIL

SCALE: NONE

FIG. W-20

REVISED 8/20



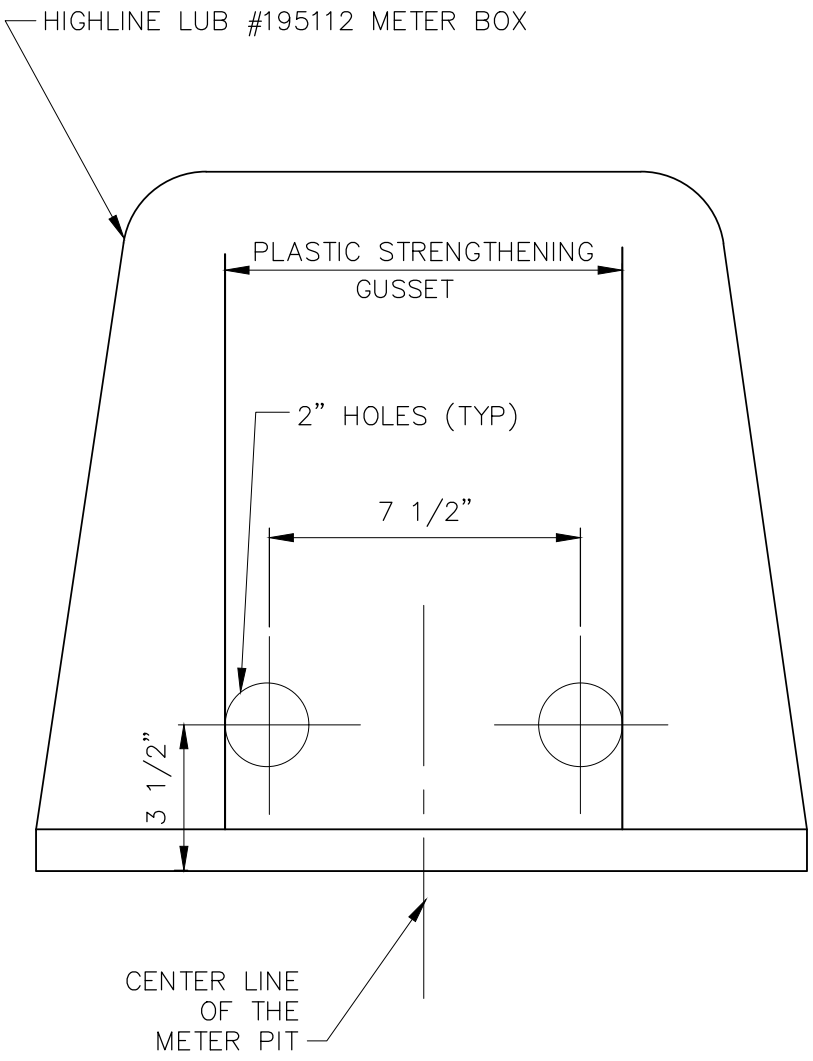
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

SINGLE METER INSTALLATION DETAIL

SCALE: NONE

FIG. W-21

REVISED 7/22



ENDVIEW

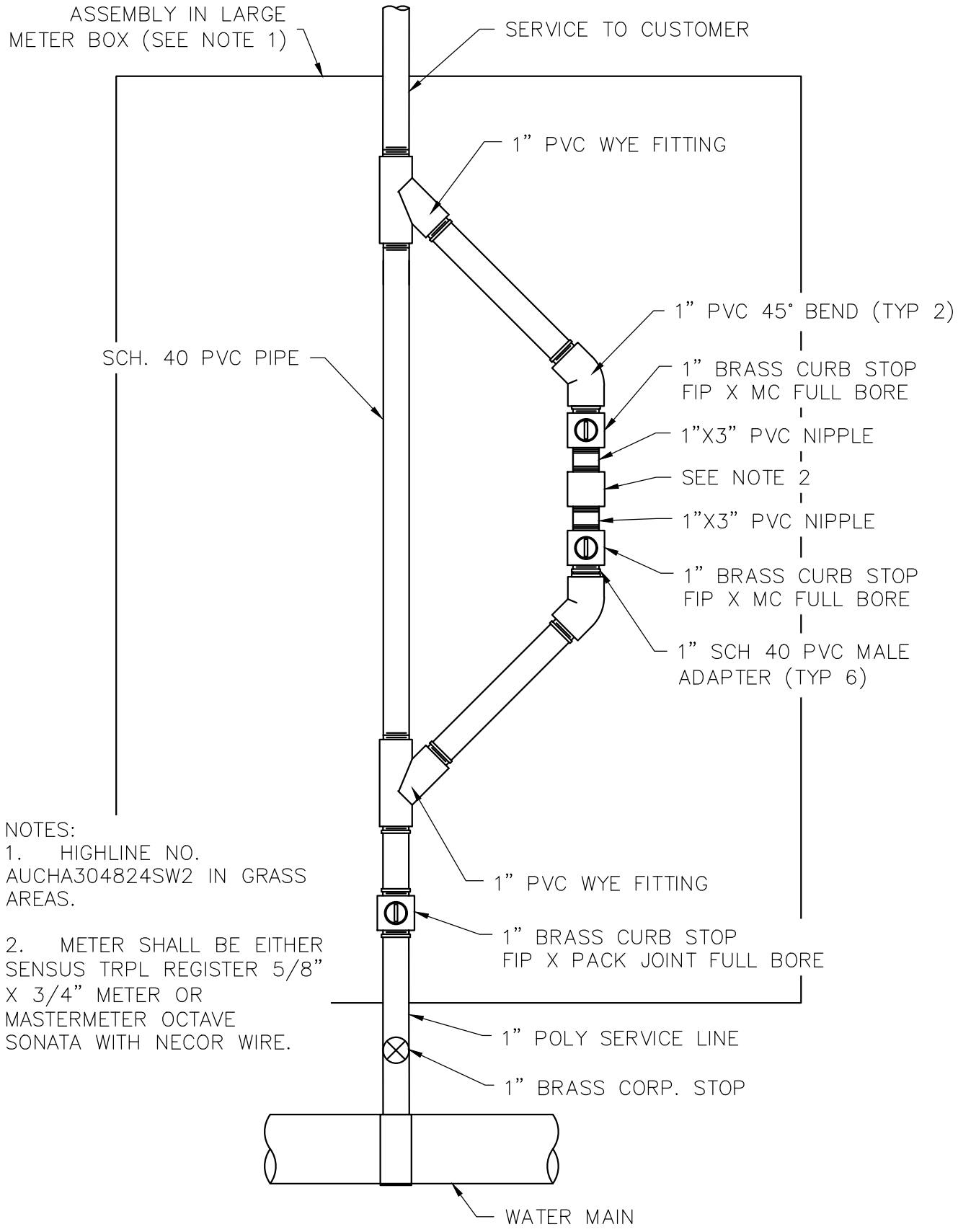
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

RESIDENTIAL METER BOX MOUSE HOLE LOCATION

SCALE: NONE

W-21A

REVISED 7/15



NOTES:

1. HIGHLINE NO. AUCHA304824SW2 IN GRASS AREAS.

2. METER SHALL BE EITHER SENSUS TRPL REGISTER 5/8" X 3/4" METER OR MASTERMETER OCTAVE SONATA WITH NECOR WIRE.

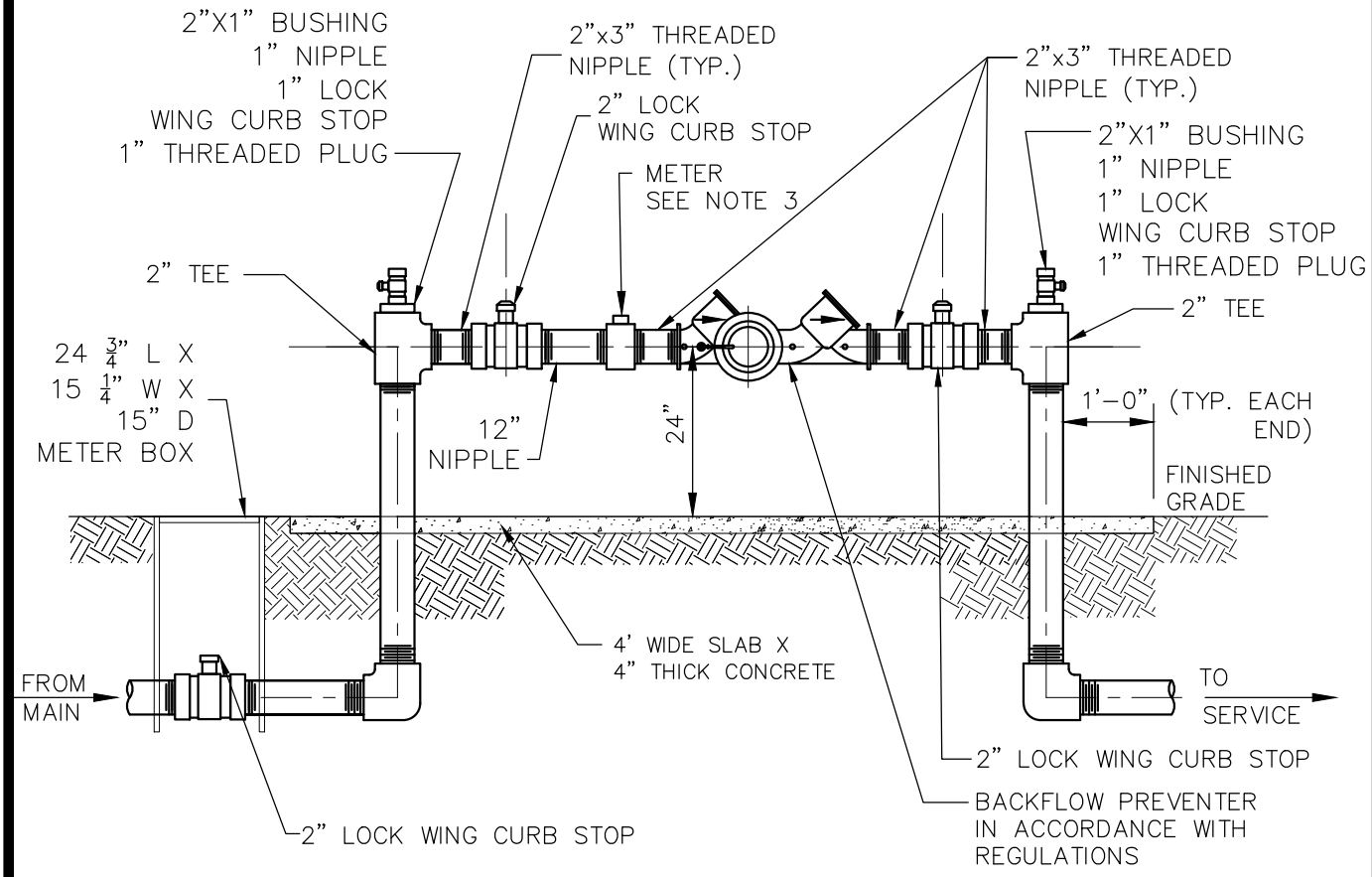
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

RESIDENTIAL FIRELINE

SCALE: NONE

FIG. W-21B

REVISED 7/22



NOTES:

1. ALL PIPE, VALVES AND FITTINGS 2" AND SMALLER SHALL BE THREADED BRASS.
2. SEE FIG. W-24 FOR A LISTING OF MANUFACTURERS AND MODEL NO'S FOR THE BACKFLOW PREVENTER.
3. METERS SHALL INCLUDE ENCODED ELECTRONIC REGISTER HEADS. 1" AND SMALLER METERS: 10 GALLON TRPL REGISTER; 1 1/2" AND LARGER METERS: 100 GALLON TRPL REGISTER.
4. SETBACK DISTANCE FOR SHRUBBERY FROM EDGE OF CONCRETE SLAB SHALL BE 3 FEET.
5. THREE FEET OF SOD SHALL BE PLACED AROUND THE PERIMETER OF SLAB.

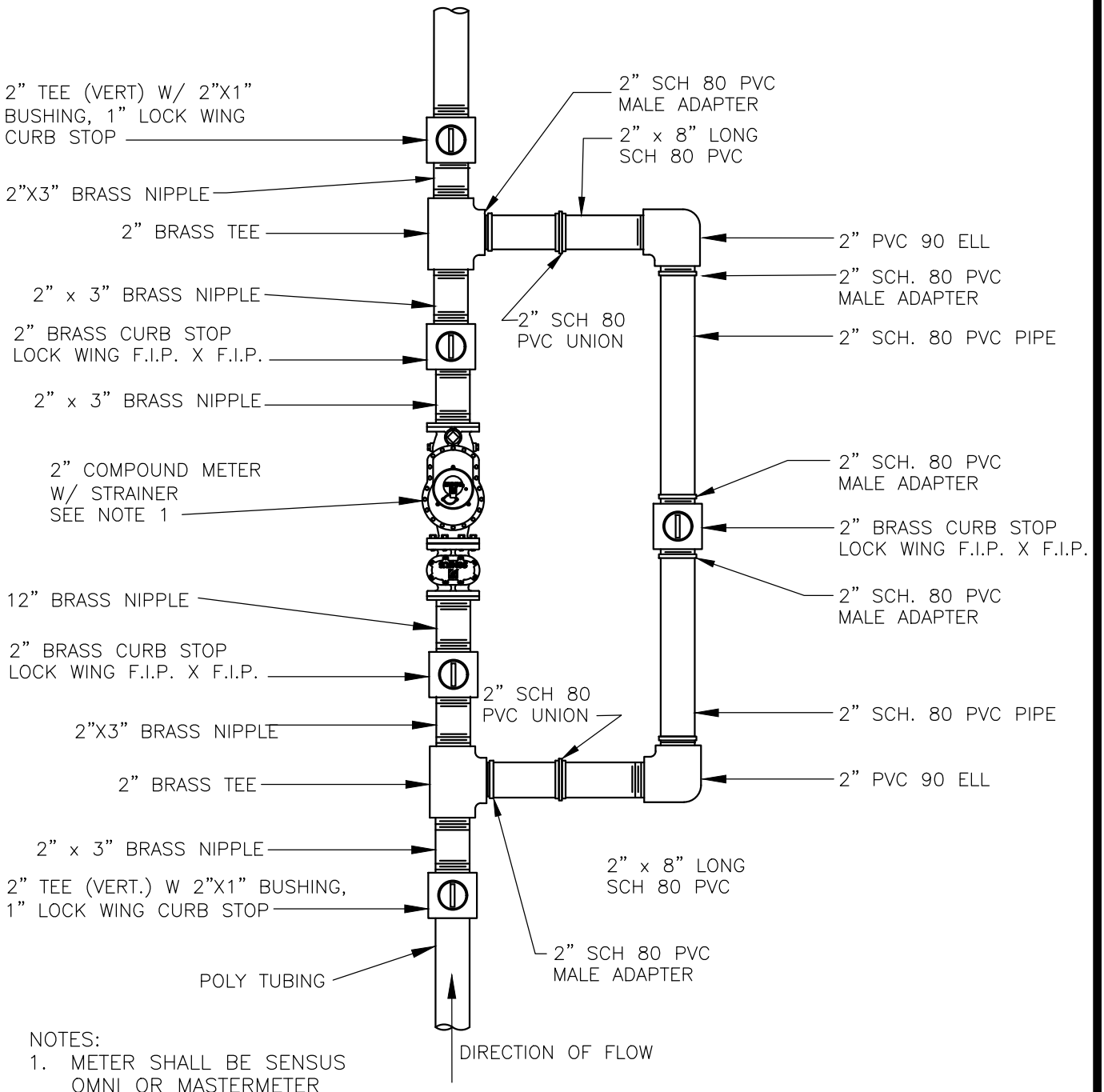
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

WATER METER / REDUCED PRESSURE BACKFLOW DEVICE DETAIL: 2-INCH SINGLE SERVICES AND SMALLER

SCALE: NONE

FIG. W-22

REVISED 2/17



NOTES:

1. METER SHALL BE SENSUS OMNI OR MASTERMETER OCTAVE W/NECOR WIRE. BOTH METERS TO INCLUDE TEST PORTS.

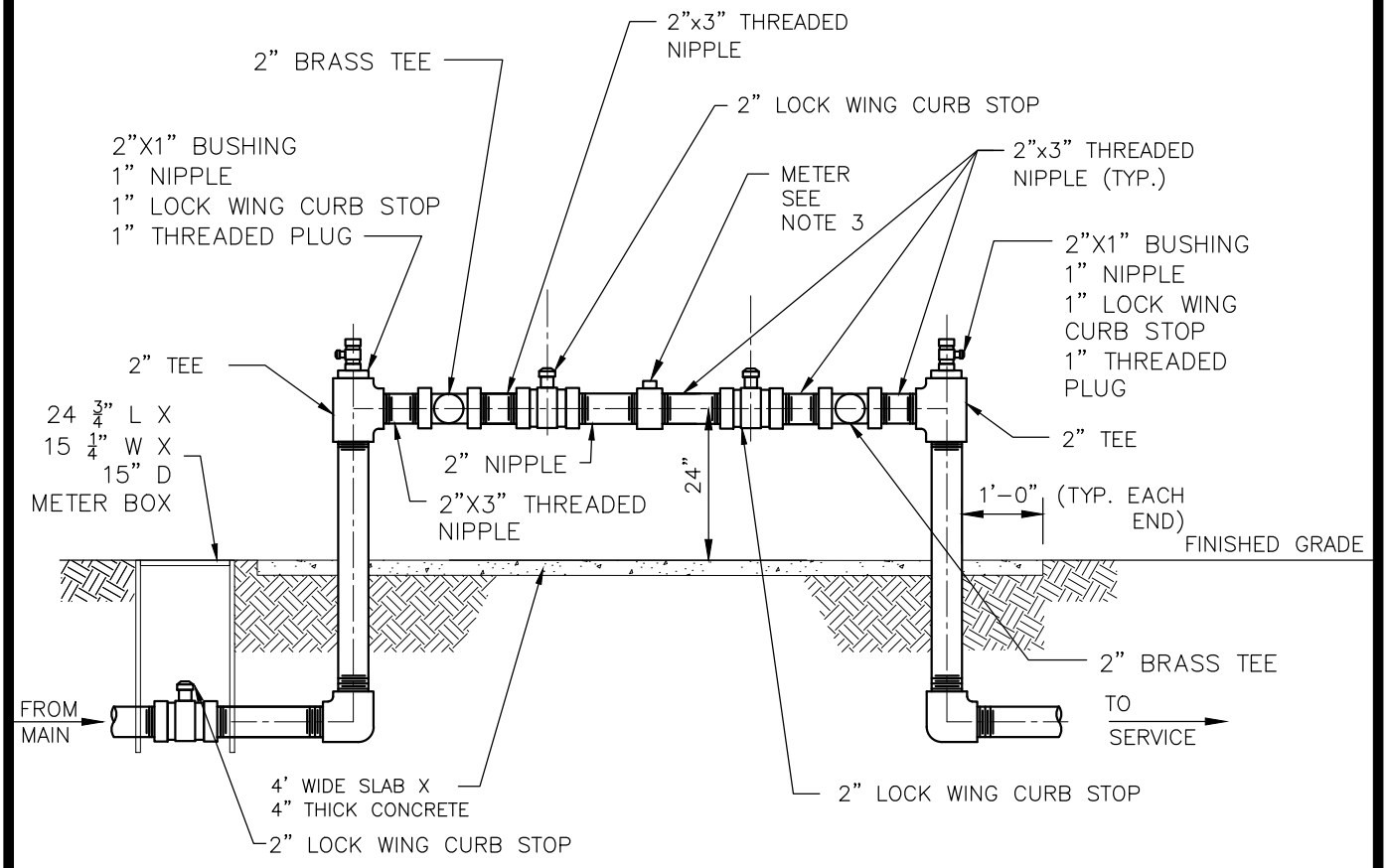
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

COMPOUND METER WITH BY-PASS ASSEMBLY AT MASTER BACKFLOWED LOCATIONS (PLAN VIEW)

SCALE: NONE

FIG. W-23

REVISED 7/22



NOTES:

1. ALL PIPE, VALVES AND FITTINGS 2" AND SMALLER SHALL BE THREADED BRASS.
2. SEE FIG. W-24 FOR A LISTING OF MANUFACTURERS AND MODEL NO'S FOR THE BACKFLOW PREVENTER.
3. METERS SHALL INCLUDE ENCODED ELECTRONIC REGISTER HEADS. 1" AND SMALLER METERS: 10 GALLON TRPL REGISTER; 1 1/2" AND LARGER METERS: 100 GALLON TRPL REGISTER.
4. SETBACK DISTANCE FOR SHRUBBERY FROM EDGE OF CONCRETE SLAB SHALL BE 3 FEET.
5. THREE FEET OF SOD SHALL BE PLACED AROUND THE PERIMETER OF SLAB.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

COMPOUND METER WITH BY-PASS ASSEMBLY AT MASTER BACKFLOWED LOCATIONS (SIDE VIEW)

SCALE: NONE

FIG. W-23A

REVISED 2/17

DOUBLE CHECK VALVE ASSEMBLIES (FOR DEDICATED FIRE MAINS)

- WATTS:
  3/4"–2": MODEL 719QTDCVE
- WILKINS:
  3/4"–2": MODEL 350 & MODEL 950XLT
  2 1/2"–10": MODEL 350, 350DA

REDUCED PRESSURE ASSEMBLIES

- WATTS:
  3/4"–2": MODEL LF919
  2 1/2"–10": MODEL 994 STAINLESS
- CONBRACO:
  2 1/2"–10": MODEL 40–200
- WILKINS:
  3/4"–2": MODEL 975XL
  2 1/2"–10": MODEL 375, 375DA

FOR RESIDENTIAL APPLICATIONS, USE THE FOLLOWING BFP'S WHEN REQUIRED TO BE INSTALLED WITHIN THE METER PIT:

- APPOLLO/CONBRACO:
  MODEL DCLF4A
- WILKINS:
  3/4"–2": MODEL 950 XLT
- WATTS:
  MODEL LF719

NOTES:

1. ALL HARDWARE, INCLUDING HANDLES, NUTS, BOLTS, WASHERS ETC. SHALL BE 316 STAINLESS STEEL OR BRASS.

2. ALL BACKFLOW PREVENTERS SHALL INCORPORATE PARTS THAT ARE CHLORAMINE RESISTANT.

3. ALL BACKFLOW PREVENTION DEVICES THAT REQUIRE A DETECTOR METER SHALL HAVE A SENSUS TRPL REGISTER METER.

4. ALL BACKFLOW ASSEMBLIES SHALL BE FLANGED; VICTAULIC COUPLING ASSEMBLIES ARE NOT ACCEPTABLE.

5. ALL BACKFLOW ASSEMBLIES SHALL BE TOP LOADING, FOR DOUBLE CHECK DEVICES ONLY.

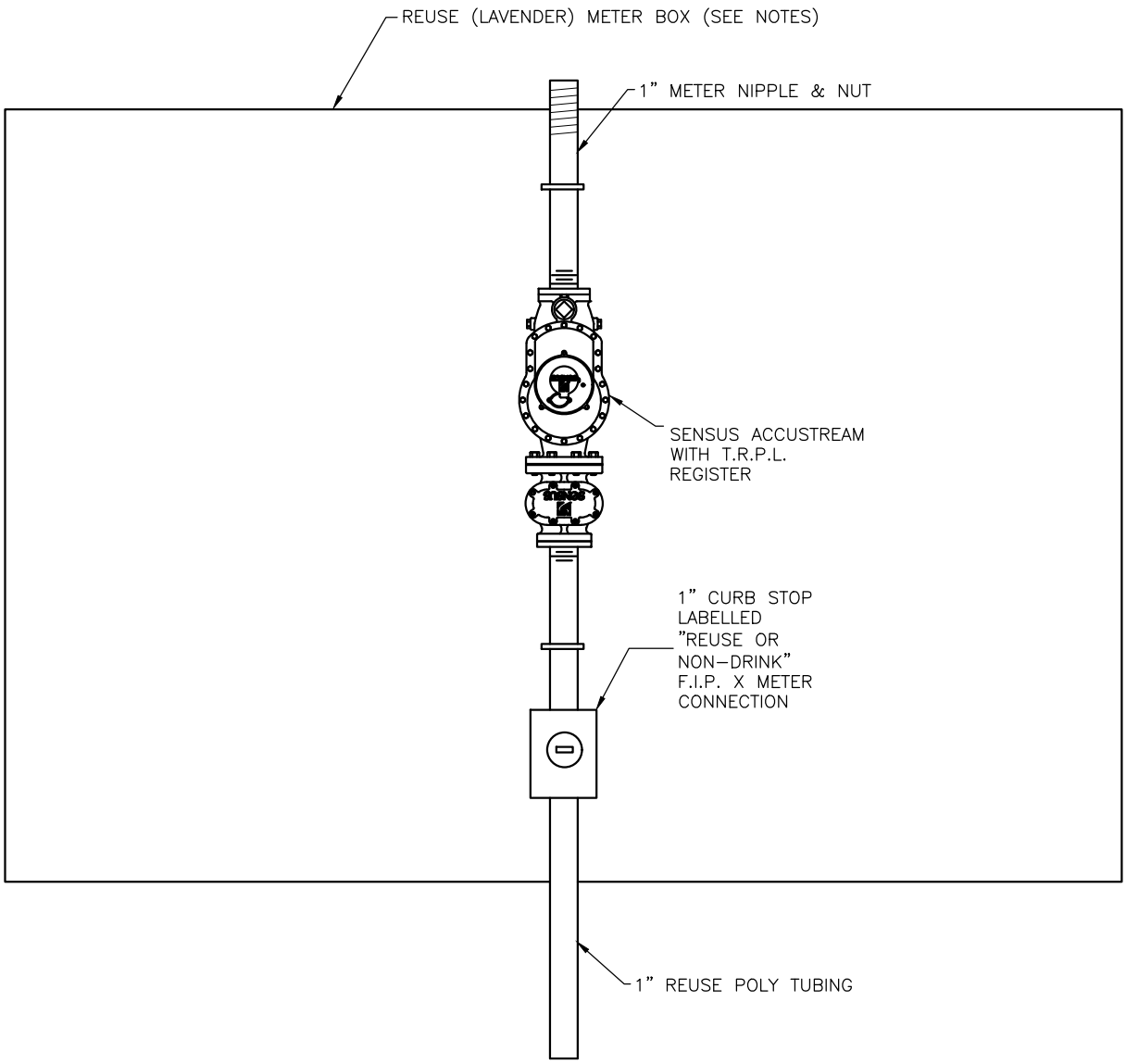
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

APPROVED BACKFLOW ASSEMBLIES

SCALE: NONE

FIG. W–24

REVISED 8/20



NOTES:

1. HIGHLINE 190122P IN GREEN AREAS
2. HIGHLINE CHA111812H IN PAVED AREAS

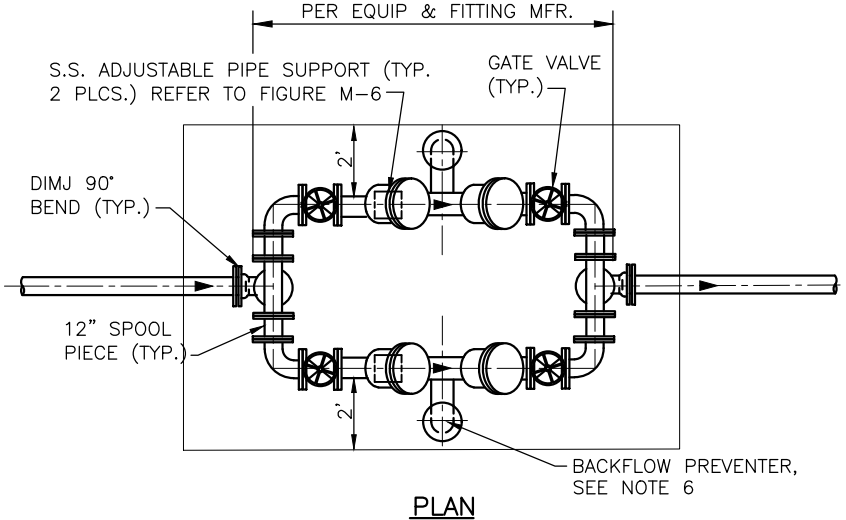
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

RESIDENTIAL REUSE METER AND METER PIT DETAIL

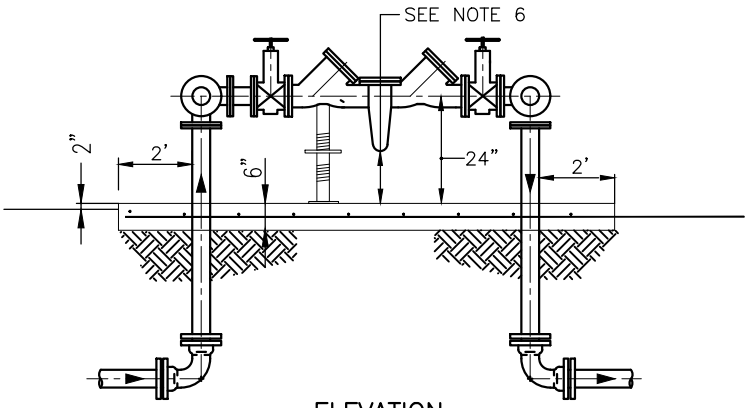
SCALE: NONE

FIG. W-24A

REVISED 07/22



PLAN



ELEVATION

NOTES:

1. NO VICTAULIC OR GROOVED COUPLINGS ARE ACCEPTABLE ON THE HORIZONTAL PORTION OF THE DEVICE. THEY CAN ONLY BE USED FOR THE ACCESS PLATE TO THE CHECK VALVES.
2. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT WEDGE TYPE WITH HAND WHEEL OPERATOR, OUTSIDE STEM & YOKE.
3. ALL ABOVE GRADE PIPING SHALL BE DUCTILE IRON WITH FLANGED ENDS, CLASS 53. ALL BELOW GRADE PIPING SHALL HAVE DIMJ FITTINGS, PRESSURE CLASS 350. ALL BELOW GRADE FITTINGS SHALL BE RESTRAINED JOINT TYPE, MEGA-LUG OR APPROVED EQUAL.
4. BYPASS PIPING SHALL BE THE SAME SIZE AS MAIN LINE PIPING.
5. BACKFLOW ASSEMBLIES MAY REQUIRE FENCE ENCLOSURE, SEE FIG. M-1, M-2, M-3, M-4 FOR DETAILS.
6. BACKFLOW PREVENTER SHALL BE DOUBLE CHECK REDUCED PRESSURE ZONE (RPZ) TYPE EXCEPT FOR A CONSECUTIVE SYSTEM. DISTANCE BETWEEN BOTTOM OF BACKFLOW PREVENTER DEVICE AND CONCRETE SLAB SHALL BE A MINIMUM OF 12".
7. CONCRETE SLAB SHALL BE 6" (MIN.) THICK; 4000 PSI, AND REINFORCED WITH COMMERCIAL GRADE FIBERMESH.
8. SETBACK DISTANCE FOR SHRUBBERY FROM EDGE OF CONCRETE SLAB SHALL BE THREE FEET. THREE FEET OF SOD SHALL BE PLACED AROUND PERIMETER OF SLAB.
9. ALL HARDWARE SHALL BE 316 STAINLESS STEEL.
10. ALL ABOVE GRADE PIPING SHALL BE PAINTED AS FOLLOWS:

-SURFACE PREPARATION: POWER TOOL CLEANING (SSPC-SP3) OR BRUSH-OFF BLAST CLEANING (SSPC-SP7)

-PRIME: ACRYLIC ENAMEL, MINIMUM 3.0 MILS DFT. IF SHOP COAT IS DAMAGED, REPRIME BARE AREAS IN FIELD. IF SHOP COAT IS BITUMINOUS COATING, PRIME WITH 2 COATS OF STAIN BARRIER, 1 MIL DRY FILM THICKNESS PER COAT.

-FINISH: TWO COATS, APPLIED BY SPRAY, OF ACRYLIC ENAMEL, SAFETY BLUE (GLOSS) #225A120 ACE PRODUCT RUST STOP, MIN. 4.0 MILS DFT AND GLOSS WHITE #7792 RUST-OLEUM BRAND HOME DEPOT, MIN 4.0 MILS DFT.

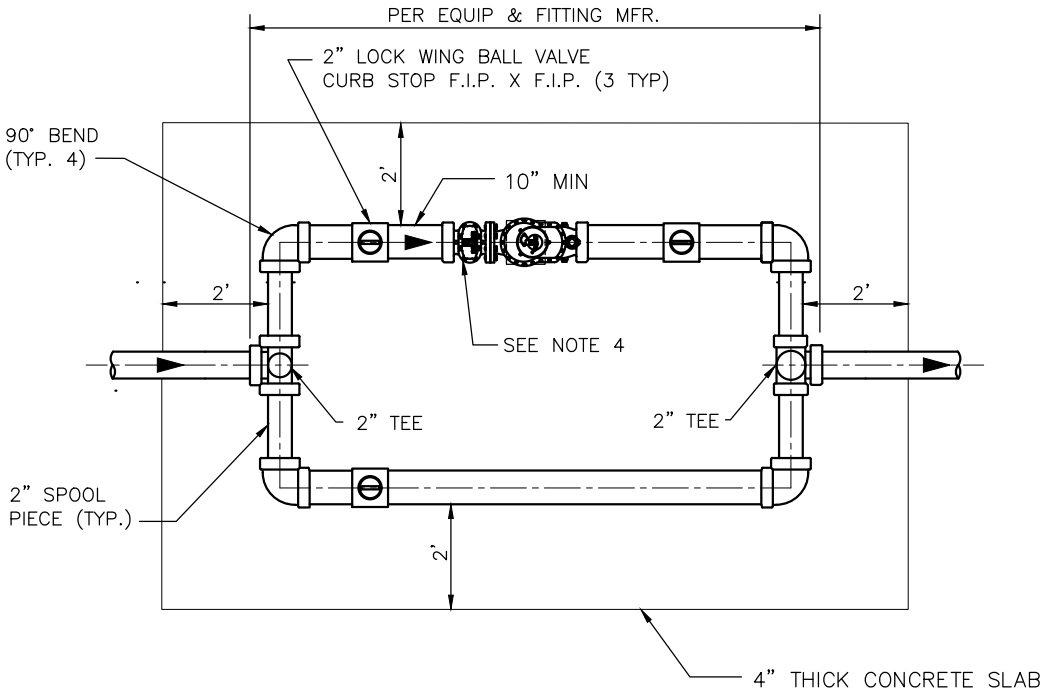
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

BACKFLOW PREVENTER DETAIL FOR MULTI-METERED FACILITIES-3 INCH 3" AND LARGER

SCALE: NONE

FIG. W-25

REVISED 8/20



NOTES:

1. ALL PIPING SHALL BE BRASS.
2. SETBACK DISTANCE FOR SHRUBBERY FROM EDGE OF CONCRETE SLAB SHALL BE 3 FEET.
3. THREE FEET OF SOD SHALL BE PLACED AROUND PERIMETER OF SLAB.
4. METER SHALL BE SENSUS OMNI OR MASTERMETER OCTAVE W/ NECOR WIRE. BOTH METERS TO INCLUDE TEST PORTS.

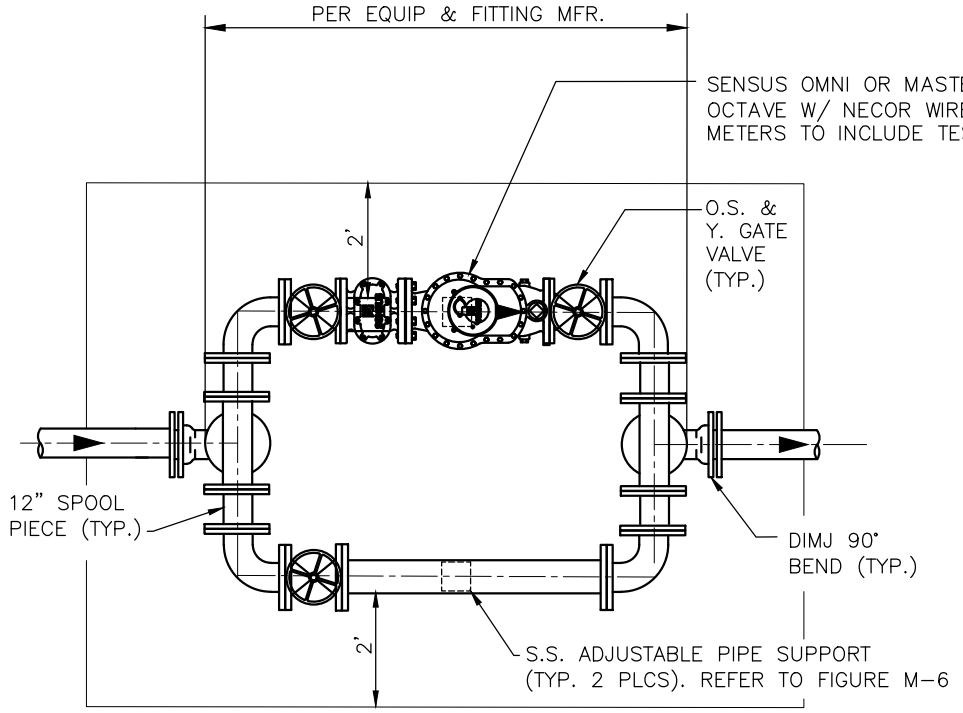
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

WATER METER IN MASTER BACKFLOWED AREA DETAIL: 2" METER WITH BYPASS

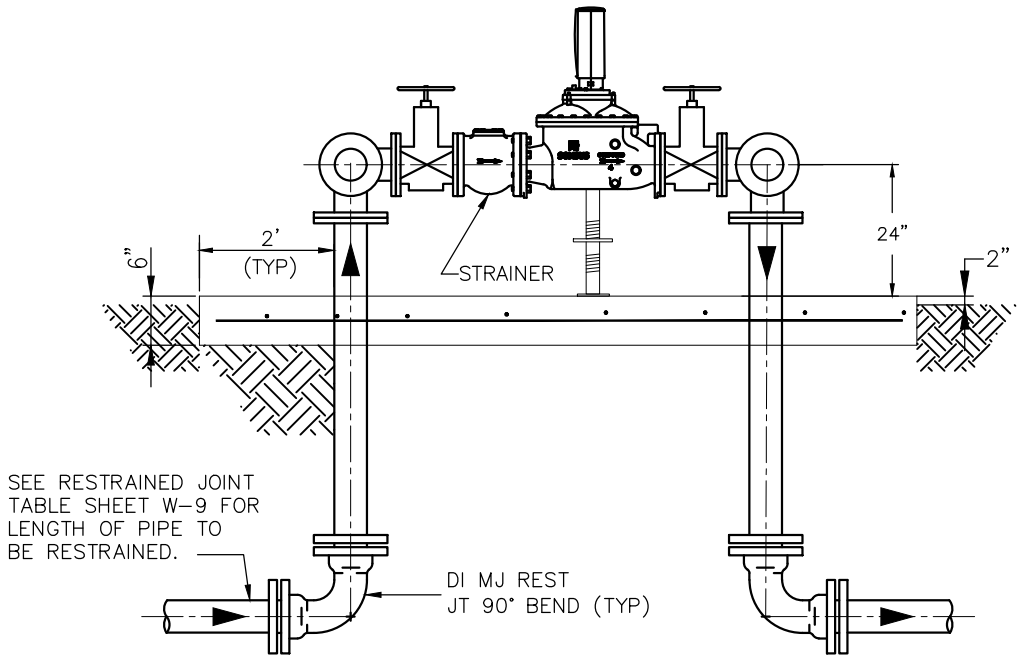
SCALE: NONE

FIG. W-25A

REVISED 7/22



PLAN



REFER TO FIGURE W-25 FOR NOTES

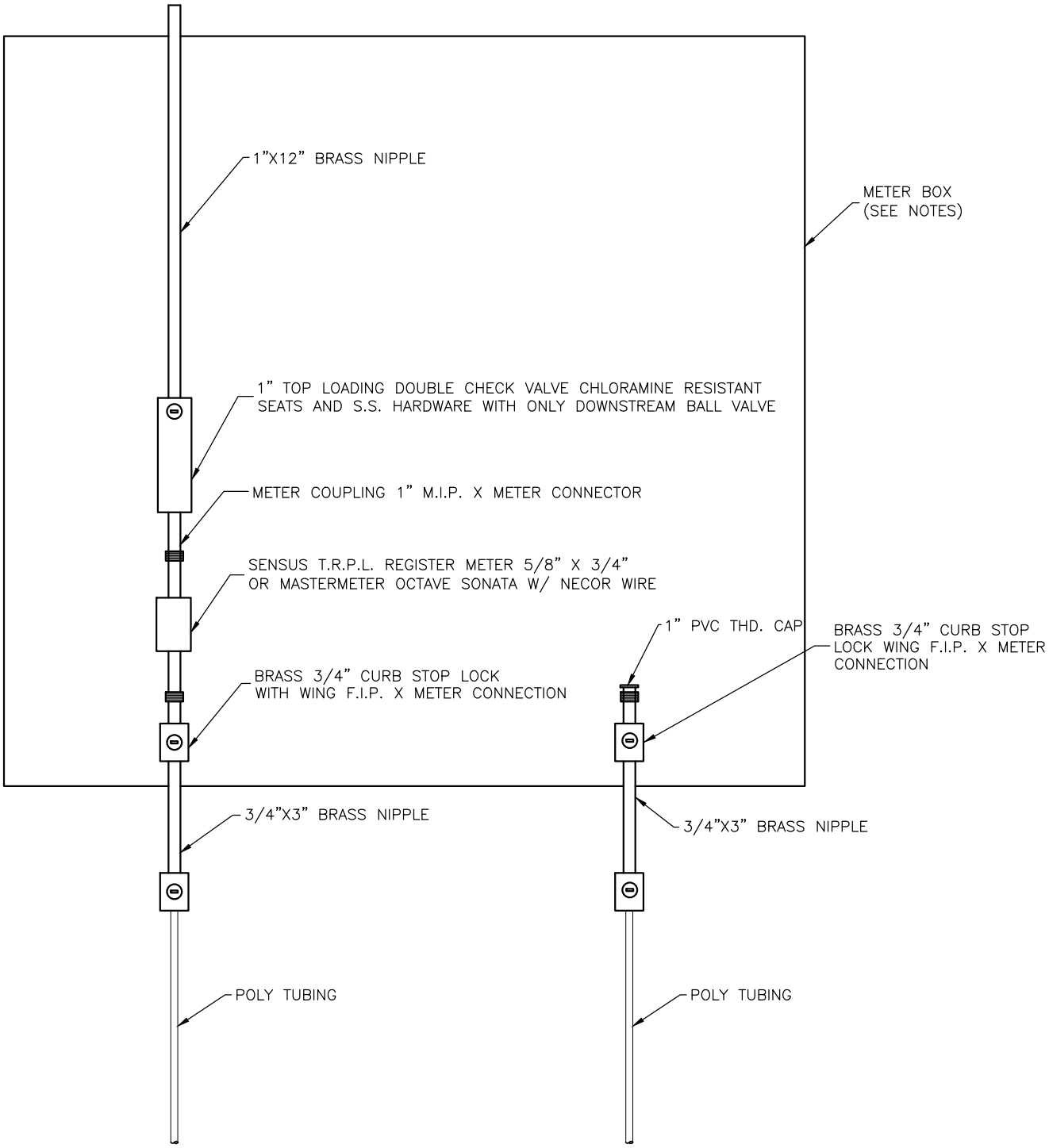
ELEVATION

WATER METER IN MASTER BACKFLOWED AREA DETAIL : 3" AND LARGER METER WITH BYPASS

SCALE: NONE

FIG. W-25B

REVISED 7/22



NOTES:

1. HIGHLINE #195123 SHALL BE USED IN GRASS AREA.
2. HIGHLINE #CHA 173018 SHALL BE USED IN PAVED AREAS

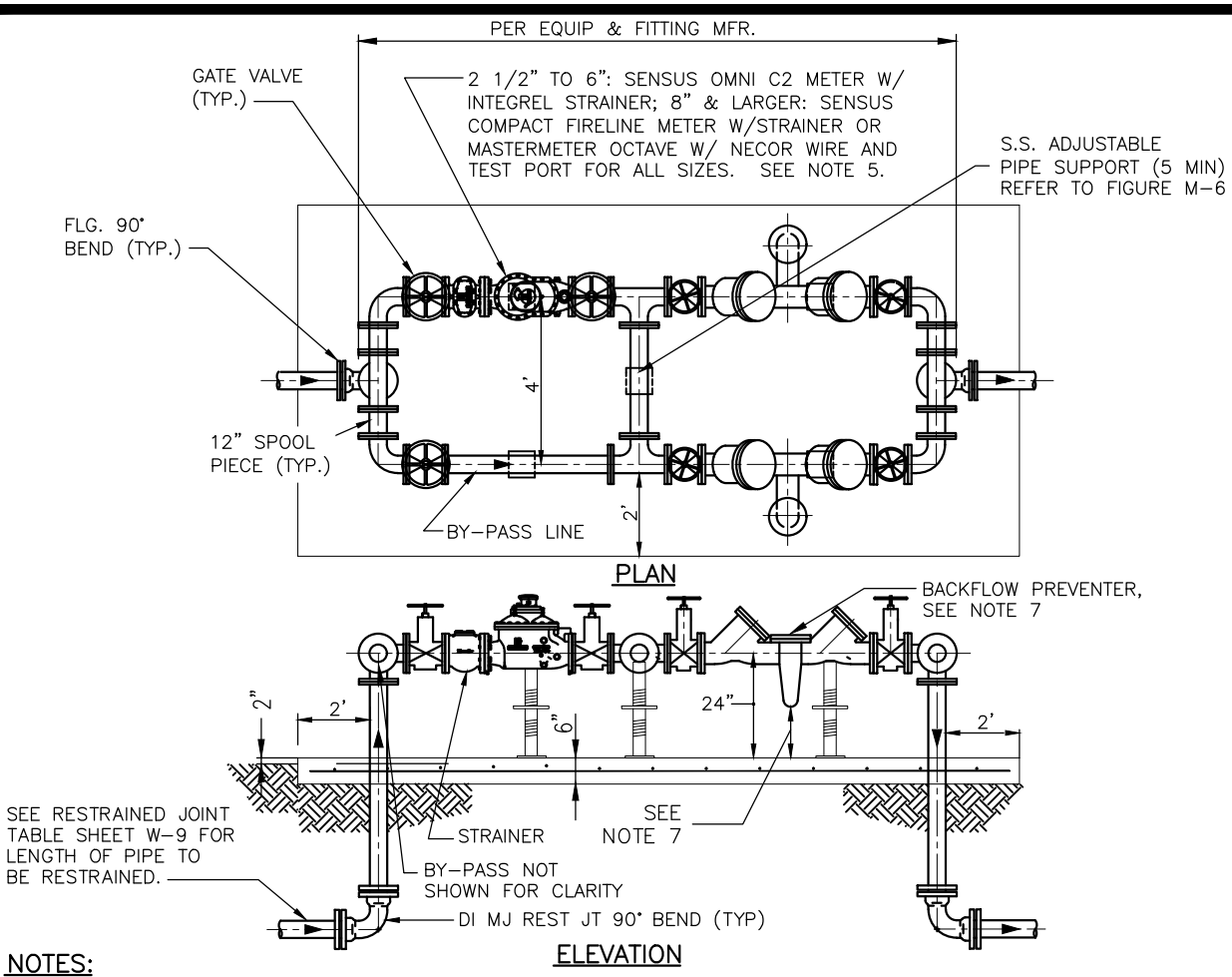
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

RESIDENTIAL METER, BACKFLOW AND METER PIT DETAIL

SCALE: NONE

FIG. W-25C

REVISED 7/22



NOTES:

1. NO VICTAULIC OR GROOVED COUPLINGS ARE ACCEPTABLE ON THE HORIZONTAL PORTION OF THE DEVICE. THEY CAN ONLY BE USED FOR THE ACCESS PLATE TO THE CHECK VALVES.

2. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT WEDGE TYPE WITH HAND WHEEL OPERATOR, OUTSIDE STEM & YOKE.

3. ALL ABOVE GRADE PIPING SHALL BE DUCTILE IRON WITH FLANGED ENDS, CLASS 53. ALL BELOW GRADE PIPING SHALL HAVE DIMJ FITTINGS, PRESSURE CLASS 350. ALL BELOW GRADE FITTINGS SHALL BE RESTRAINED JOINT TYPE, MEGA-LUG OR APPROVED EQUAL.

4. BYPASS PIPING SHALL BE THE SAME SIZE AS MAIN LINE PIPING.

5. METER ASSEMBLIES MAY REQUIRE FENCE ENCLOSURE, SEE FIG. M-1, M-2, M-3, M-4 FOR DETAILS.

6. METERS SHALL INCLUDE ENCODED ELECTRONIC REGISTER HEADS. 1" AND SMALLER METERS: 10 GALLON TRPL REGISTER. 1½" AND LARGER METERS: 100 GALLON TRPL REGISTER.

7. BACKFLOW PREVENTER SHALL BE DOUBLE CHECK REDUCED PRESSURE ZONE (RPZ) TYPE EXCEPT FOR A CONSECUTIVE SYSTEM. DISTANCE BETWEEN BOTTOM OF BACKFLOW PREVENTER DEVICE AND CONCRETE SLAB SHALL BE A MINIMUM OF 12"

8. CONCRETE SLAB SHALL BE 6" (MIN.) THICK, 4000 PSI AND REINFORCED WITH COMMERCIAL GRADE FIBERMESH.

9. SETBACK DISTANCE FOR SHRUBBERY FROM EDGE OF CONCRETE SLAB SHALL BE THREE FEET. THREE FEET OF SOD SHALL BE PLACED AROUND PERIMETER OF SLAB.

10. ALL HARDWARE SHALL BE 316 STAINLESS STEEL.

11. ALL ABOVE GRADE PIPING SHALL BE PAINTED AS FOLLOWS:

    -SURFACE PREPARATION: POWER TOOL CLEANING (SSPC-SP3) OR BRUSH-OFF BLAST CLEANING (SSPC-SP7).

    -PRIME: ACRYLIC ENAMEL, MINIMUM 3.0 MILS DFT. IF SHOP COAT IS DAMAGED, REPRIME BARE AREAS IN FIELD. IF SHOP COAT IS BITUMINOUS COATING, PRIME WITH 2 COATS OF STAIN BARRIER, 1 MIL DRY FILM THICKNESS PER COAT.

    -FINISH: TWO COATS, APPLIED BY SPRAY, OF ACRYLIC ENAMEL, SAFETY BLUE (GLOSS) #225A120 ACE PRODUCT RUST STOP, MIN. 4.0 MILS DFT AND GLOSS WHITE #7792 RUST-OLEUM BRAND HOME DEPOT, MIN 4.0 MILS DFT.

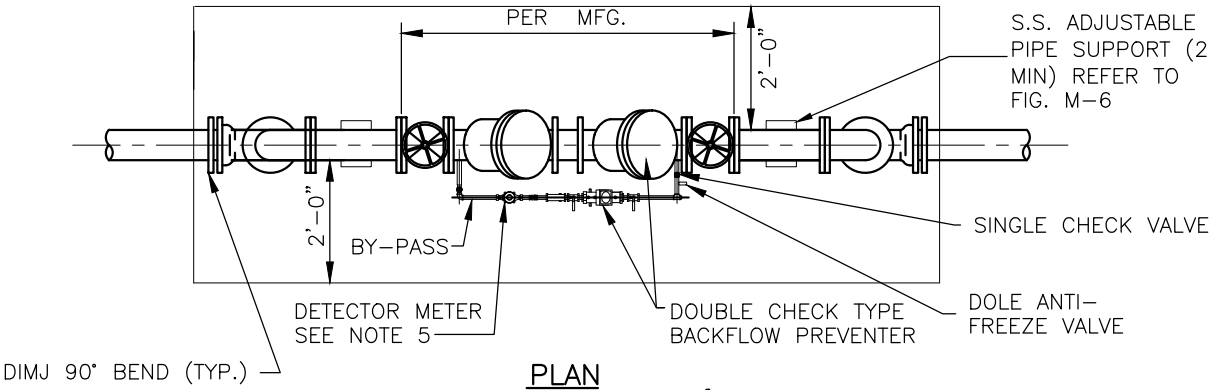
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

METER ASSEMBLY DETAIL 2.5 INCHES AND LARGER

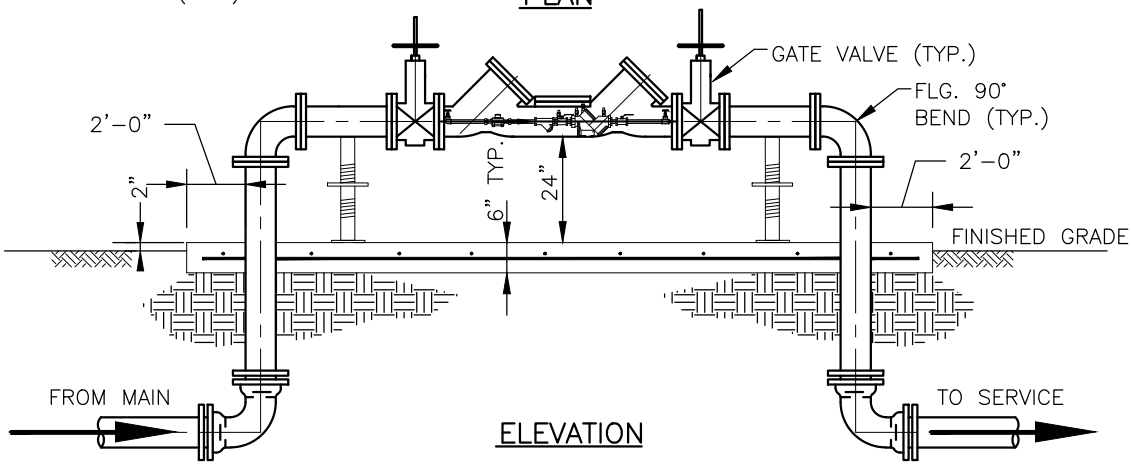
SCALE: NONE

FIG. W-26

REVISED 7/22



PLAN



ELEVATION

NOTES

1. NO VICTAULIC OR GROOVED COUPLINGS ARE ACCEPTABLE ON THE HORIZONTAL PORTION OF THE DEVICE. THEY CAN ONLY BE USED FOR THE ACCESS PLATE TO THE CHECK VALVES.

2. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT WEDGE, HAND WHEEL, OUTSIDE STEM & YOKE TYPE.

3. ALL ABOVE GRADE PIPING 3 INCHES IN DIA. & LARGER SHALL BE DUCTILE IRON WITH FLANGED ENDS, CLASS 53. ALL BELOW GRADE PIPING SHALL BE DIMJ W/ RESTRAINING TYPE DEVICES, MEGA-LUG OR APPROVED EQUAL. PIPING SMALLER THAN 3 INCHES SHALL BE BRASS.

4. ALL ASSEMBLIES SHALL HAVE A 6" (MINIMUM) THICK CONCRETE SLAB, 4000 PSI, REINFORCED WITH COMMERCIAL GRADE FIBERMESH. THE OVERALL SLAB DIMENSIONS SHALL BE DETERMINED BY THE ASSEMBLY SIZE.

5. BY-PASS LINE SHALL CONSIST OF A TOTALIZING METER AND DOUBLE CHECK TYPE BACKFLOW ASSEMBLY. SENSUS METER SHALL INCLUDE ENCODED ELECTRONIC REGISTER HEAD. 1" AND SMALLER METERS: 10 GAL. TRPL REGISTER; 1 1/2" AND LARGER METERS: 100 GAL. TRPL REGISTER. METER & PIPING SHALL BE BRASS AND MUST HAVE A DOLE (FP35 OR FP45) ANTI-FREEZE VALVE ON FARTHEST DOWNSTREAM POINT ON BYPASS LINE.

6. THE FOLLOWING PARTS SHALL BE SUPPLIED TO THE UTILITY FOR ANTI FREEZE PROTECTION: 1-1/4"X2" BRASS NIPPLE; 1-1/4 CLOSE NIPPLE; 1-1/4" TEE; 1-1/4"X1/2" THREADED COUPLER AND 1 DOLE ANTI-FREEZE VALVE.

7. DETECTION METER SHALL BE SENSUS WITH T.R.P.L. REGISTER.

8. DEPENDING ON LOCATION, A FENCE MAY BE REQUIRED AROUND ASSEMBLY FOR SAFETY

9. SETBACK DISTANCE FOR SHRUBBERY FROM EDGE OF CONCRETE SLAB SHALL BE THREE FEET. THREE FEET OF SOD SHALL BE PLACED AROUND PERIMETER OF SLAB.

10. FIRE MAIN SHALL BE IN ADDITION TO CUSTOMER SERVICE/SUPPLY MAIN.

11. ALL HARDWARE SHALL BE STAINLESS STEEL.

12 ALL ABOVE GRADE PIPING SHALL BE PAINTED AS FOLLOWS:

-SURFACE PREPARATION: POWER TOOL CLEANING (SSPC-SP3) OR BRUSH-OFF BLAST CLEANING (SSPC-SP7)

-PRIME: ACRYLIC ENAMEL, MINIMUM 3.0 MILS DFT. IF SHOP COAT IS DAMAGED, REPRIME BARE AREAS IN FIELD. IF SHOP COAT IS BITUMINOUS COATING, PRIME WITH 2 COATS OF STAIN BARRIER, 1 MIL DRY FILM THICKNESS PER COAT.

-FINISH: TWO COATS, APPLIED BY SPRAY, OF ACRYLIC ENAMEL, SAFETY BLUE (GLOSS) #225A120 ACE PRODUCT RUST STOP, MIN. 4.0 MILS DFT AND GLOSS WHITE #7792 RUST-OLEUM BRAND HOME DEPOT, MIN 4.0 MILS DFT.

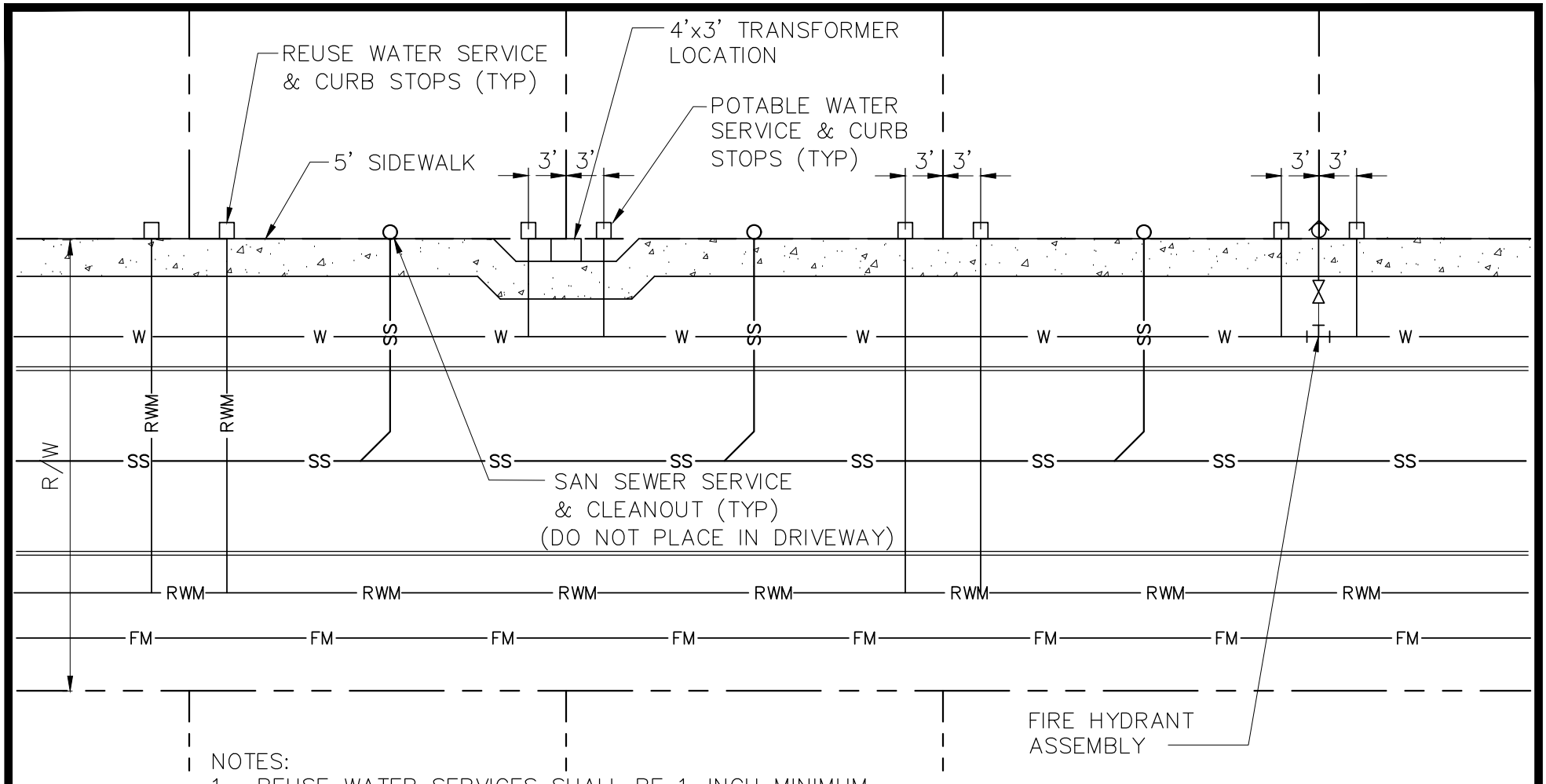
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

DEDICATED FIRE FLOW ASSEMBLY DETAIL

SCALE: NONE

FIG. W-27

REVISED 8/20



NOTES:

1. REUSE WATER SERVICES SHALL BE 1–INCH MINIMUM.
2. POTABLE WATER SERVICES SHALL BE 1–INCH MINIMUM.
3. SANITARY SEWER LATERALS SHALL BE 6–INCH.
4. SPACING OF FIRE HYDRANT ASSEMBLIES SHALL BE 500 FEET MAXIMUM.
5. FOR CUL–DE–SACS, SERVICE SPACING MAY BE REDUCED OR AS DIRECTED BY CITY INSPECTOR.

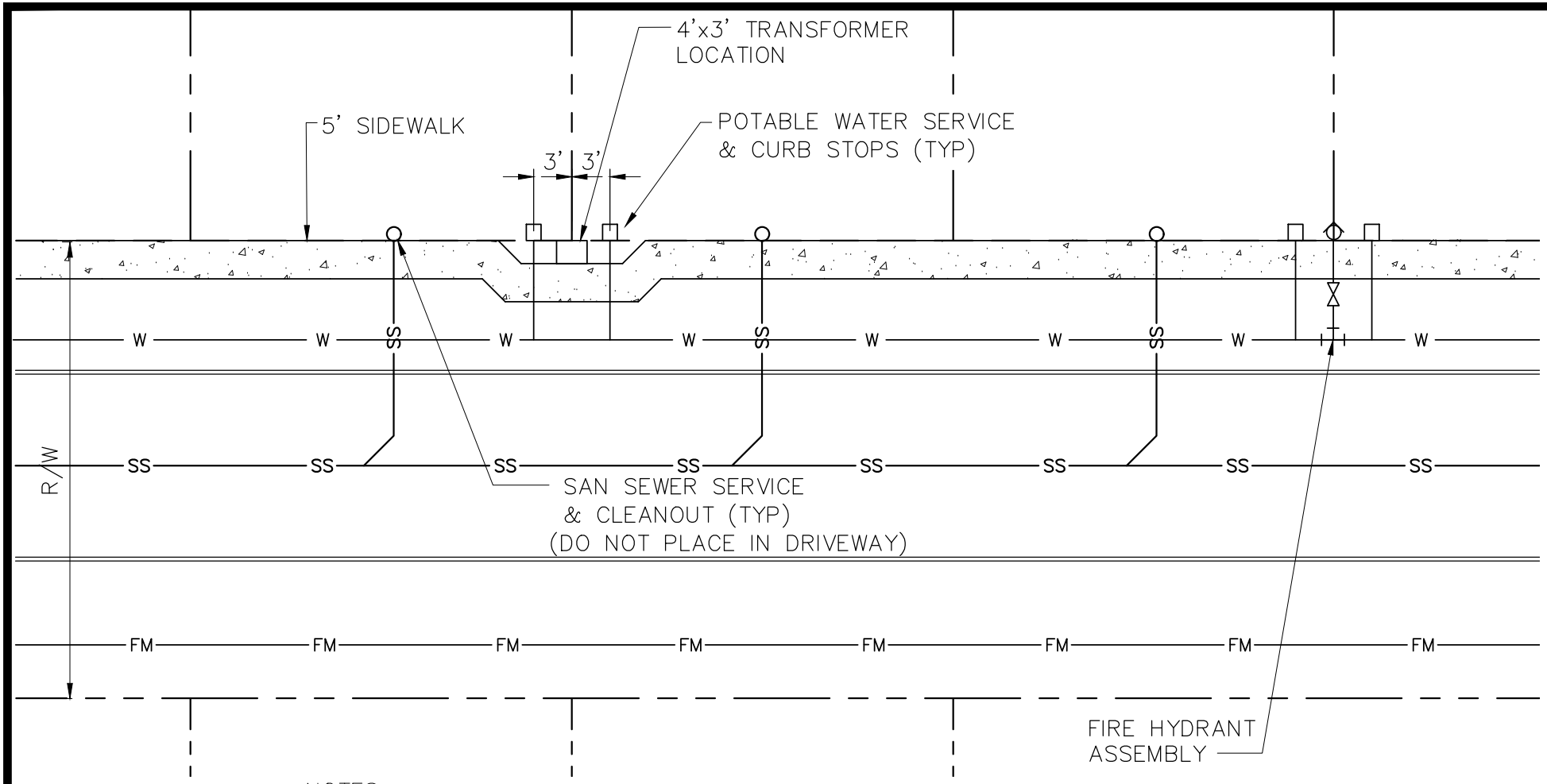
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

TYP UTILITY SERVICE LOCATION DETAIL IN RESIDENTIAL W REUSE WM DEVELOPMENTS W/REUSE WATER MAIN

SCALE: NONE

FIG. W–28

REVISED 7/18



NOTES:

1. POTABLE WATER SERVICES SHALL BE 1–INCH MINIMUM.
2. SANITARY SEWER LATERALS SHALL BE 6–INCH.
3. SPACING OF FIRE HYDRANT ASSEMBLIES SHALL BE 500 FEET MAXIMUM.
4. FOR CUL–DE–SACS, SERVICE SPACING MAY BE REDUCED OR AS DIRECTED BY CITY INSPECTOR.

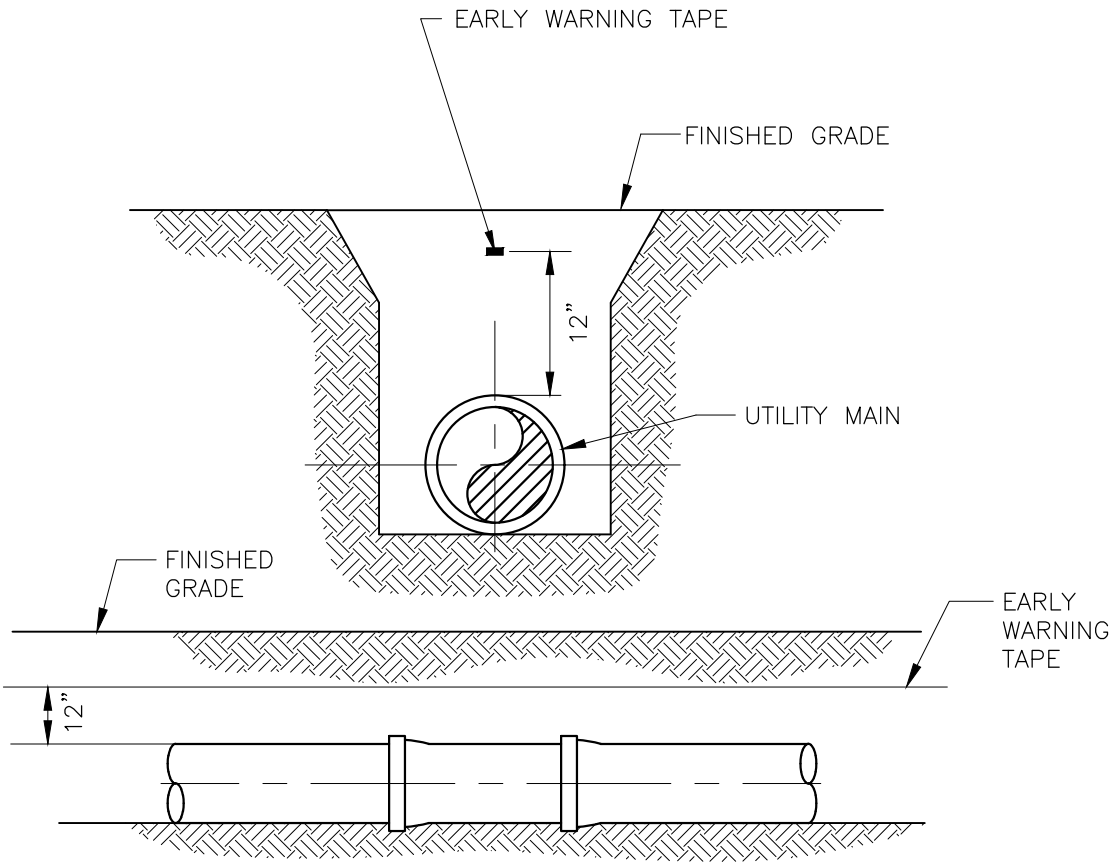
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

TYP UTILITY SERVICE LOCATION DETAIL IN RESIDENTIALWO REUSE WM DEVELOPMENTS W/O REUSE WATER MAIN

SCALE: NONE

FIG. W–29

REVISED 7/18



NOTES:

1. ALL MAINS INSTALLED BY OPEN CUT SHALL HAVE AN "EARLY WARNING" PROTECTION TAPE AND WIRE INSTALLED CONTINUOUSLY ALONG THE ALIGNMENT. TAPE SHALL BE INSTALLED DURING BACKFILLING 12" ABOVE THE PIPE AND SHALL BE CONTINUOUSLY MARKED FOR THE TYPE OF PIPE (EXAMPLE: "CAUTION, CAUTION, WATER MAIN BURIED BELOW"). THE TAPE SHALL BE PLASTIC, NON–METALLIC AND COLOR CODED AS FOLLOWS:

BLUE – POTABLE WATER, RAW WATER
GREEN – SANITARY FORCE MAIN
PURPLE – EFFLUENT REUSE

2. ALL PVC MAINS SHALL BE A SOLID COLOR AS DESCRIBED ABOVE.

3. ALL DUCTILE IRON MAINS SHALL INCORPORATE 3 STRIPES, COLOR CODED AS SHOWN ABOVE, PAINTED AT THE TOP AND SIDES OF THE PIPE, ALONG IT'S ENTIRE LENGTH.

4. ALL PVC PIPE FOR POTABLE AND RAW WATER USE SHALL BEAR THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL.

5. REFER TO SHEET FIG NOS. W–31, W–31A AND W–31B FOR LOCATE WIRE INSTALLATION DETAILS.

6. REFER TO SPECIFICATIONS FOR DETAILS OF THE EARLY WARNING TAPE.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

EARLY WARNING TAPE INSTALLATION DETAIL FOR WATER MAINS, REUSE MAINS & FORCE MAINS

SCALE: NONE

FIG. W–30

REVISED 2/16

LOCATE WIRE NOTES:

1. ALL PIPE INSTALLED BY OPEN CUT WITHIN THE CITY OF PALM COAST'S WATER, SANITARY SEWER, REUSE WATER OR RAW WATER SYSTEMS SHALL INCLUDE A 10 GAGE, SINGLE STRAND THWN SOLID COPPER CLAD STEEL TRACING WIRE WITH 30 MIL HDPE JACKET. TRACING WIRE SHALL HAVE A BREAK LOAD OF 513 LBS AND BE COLOR CODED AS FOLLOWS:

   a. WHITE: RAW WATER
   b. BLUE: POTABLE WATER
   c. LAVENDER: REUSE WATER
   d. GREEN: SANITARY SEWER FORCE MAIN AND LOW PRESSURE SEWER.

2. THE TRACING WIRE MUST BE INSTALLED DIRECTLY BELOW THE PIPE AND BROUGHT TO THE SURFACE AT EACH VALVE BOX LOCATION. WIRE SHALL EXTEND A MINIMUM OF 12" ABOVE GRADE AT EACH INTERVAL AND BE COILED AND PLACED IN A VALVE BOX.

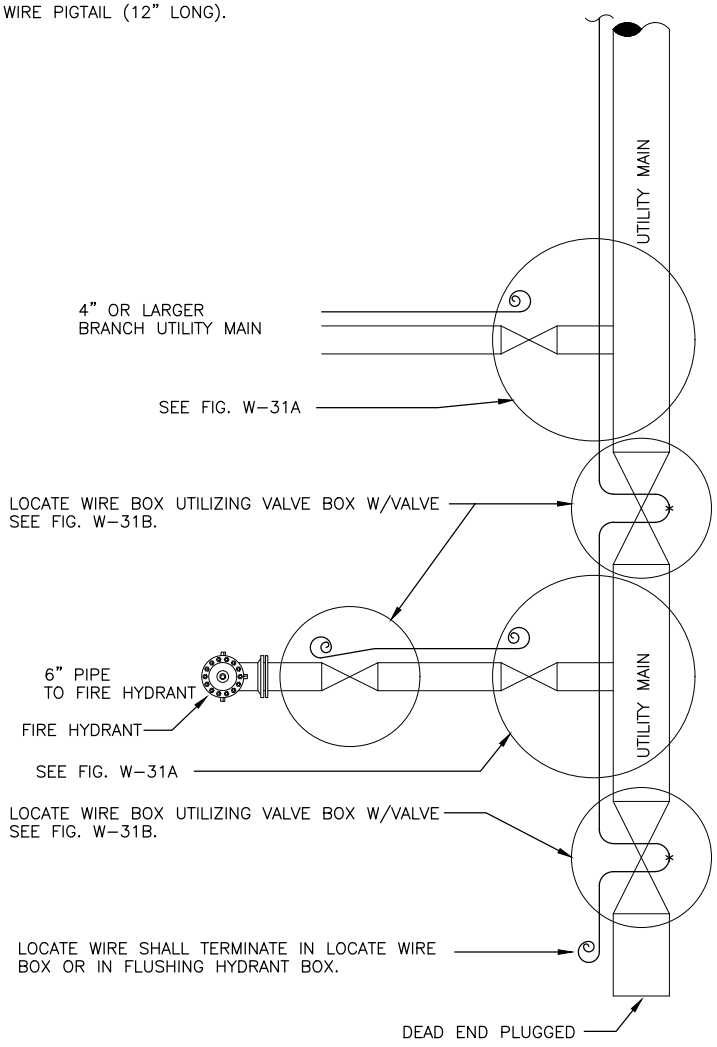
3. WIRE SHALL NOT BE FASTENED OR COILED TO VALVE OPERATING NUT OR ANY FITTING.

4. THE ENTIRE LOCATING SYSTEM SHALL BE TESTED TO DETERMINE ITS RELIABILITY. TEST SHALL BE CONDUCTED BY THE CONTRACTOR AND APPROVED BY THE CITY OF PALM COAST BEFORE ACCEPTANCE OF THE SYSTEM. WHERE INSTALLED UNDER PAVEMENT AREAS, TESTING SHALL BE DONE PRIOR TO PLACEMENT OF PAVEMENT, UNLESS APPROVED OTHERWISE BY THE CITY OF PALM COAST.

5. LOCATING WIRE SHALL TERMINATE WITHIN AN ACTIVE VALVE BOX (WITH A VALVE) SEE DETAIL SHT. W-31B.

6. "*" INDICATES THAT THE WIRES ARE CONNECTED TOGETHER.

7. "ⓒ" INDICATES A WIRE PIGTAIL (12" LONG).

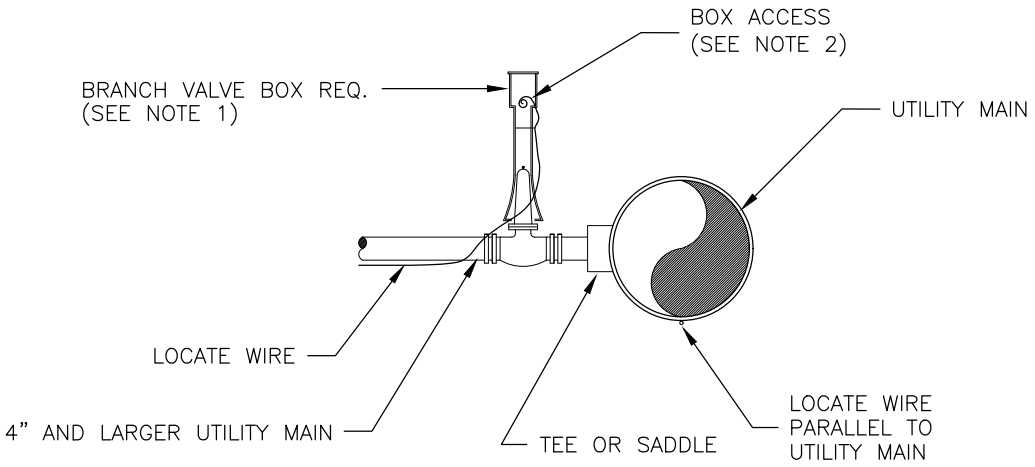


LOCATE WIRE INSTALLATION DETAIL FOR WATER MAINS, REUSE MAINS & FORCE MAINS INSTALLED BY OPEN CUT

SCALE: NONE

FIG. W-31

REVISED 7/18



BRANCH WATER MAIN

NOTES:

1. NOTE THAT THE BRANCH WIRE IS NOT CONNECTED TO THE MAIN WIRE.

2. LOCATE WIRE SHALL ENTER THE VALVE BOX THROUGH A 1"x1" V-NOTCH, CUT IN THE TOP OF A 6" DR35 SEWER RISER PIPE.

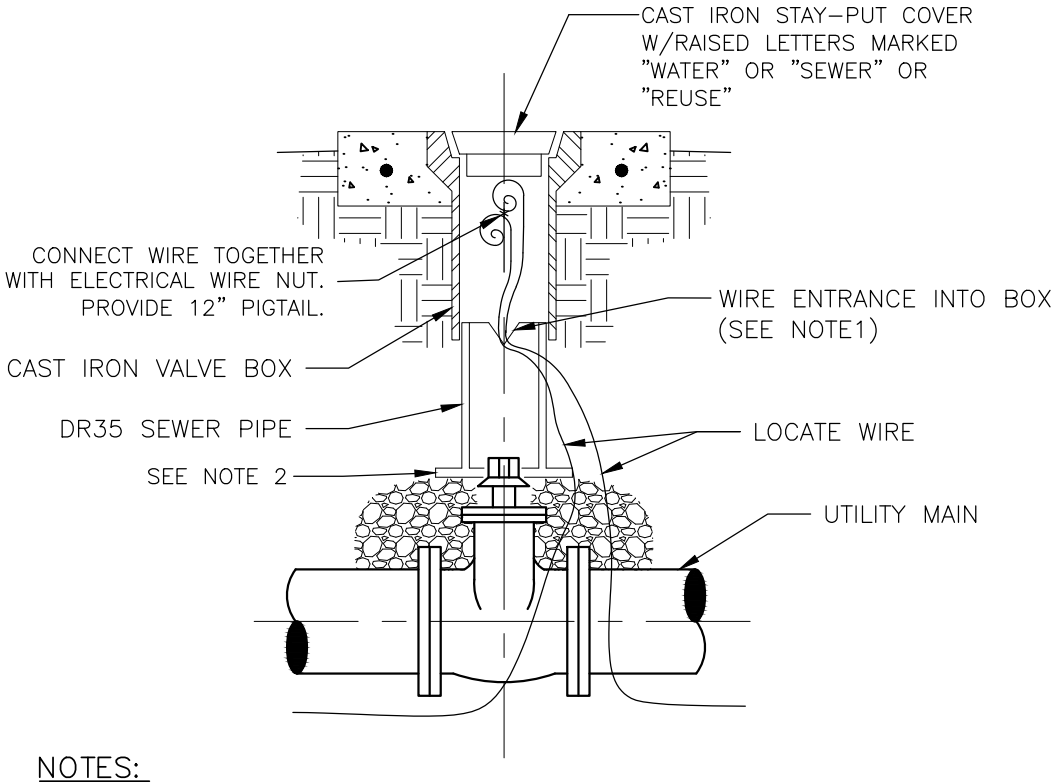
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

LOCATE WIRE FOR BRANCH MAIN DETAIL

SCALE: NONE

FIG. W-31A

REVISED 1/10



NOTES:

1. LOCATE WIRE SHALL ENTER THE VALVE BOX THROUGH A 1"x1" V–NOTCH, CUT IN THE TOP OF A 6" DR35 SEWER RISER PIPE.

2. SELF–CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

LOCATE WIRE BOX UTILIZING VALVE BOX DETAIL

SCALE: NONE

FIG. W–31B

REVISED 1/08

SANITARY GRAVITY, FORCE MAIN, REUSE MAIN, STORM SEWER, & POTABLE WATER MAIN SEPARATION NOTES & SOLUTIONS

1. HORIZONTAL SEPARATION BETWEEN UNDERGROUND WATER MAINS AND SANITARY OR STORM SEWERS, WASTEWATER OR STORMWATER FORCEMAINS, RECLAIMED WATER PIPELINES, AND ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS.
   A. NEW OR RELOCATED, UNDERGROUND WATER MAINS SHALL BE INSTALLED TO PROVIDE A HORIZONTAL DISTANCE OF AT LEAST THREE FEET BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF ANY EXISTING OR PROPOSED STORM SEWER, STORMWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
   B. NEW OR RELOCATED, UNDERGROUND WATER MAINS SHALL BE INSTALLED TO PROVIDE A HORIZONTAL DISTANCE OF AT LEAST THREE FEET, AND PREFERABLY TEN FEET, BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF ANY EXISTING OR PROPOSED VACUUM-TYPE SANITARY SEWER.
   C. NEW OR RELOCATED, UNDERGROUND WATER MAINS SHALL BE INSTALLED TO PROVIDE A HORIZONTAL DISTANCE OF AT LEAST SIX FEET, AND PREFERABLY TEN FEET, BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF ANY EXISTING OR PROPOSED GRAVITY OR PRESSURE-TYPE SANITARY SEWER, WASTEWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C. THE MINIMUM HORIZONTAL SEPARATION DISTANCE BETWEEN WATER MAINS AND GRAVITY-TYPE SANITARY SEWERS SHALL BE REDUCED TO THREE FEET WHERE THE BOTTOM OF THE WATER MAIN IS INSTALLED AT LEAST SIX INCHES ABOVE THE TOP OF THE SEWER.
   D. NEW OR RELOCATED, UNDERGROUND WATER MAINS SHALL BE INSTALLED TO PROVIDE A HORIZONTAL DISTANCE OF AT LEAST TEN FEET BETWEEN THE OUTSIDE OF THE WATER MAIN AND ALL PARTS OF ANY EXISTING OR PROPOSED "ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEM" AS DEFINED IN SECTION 381.0065(2), F.S., AND RULE 64E-6.002, F.A.C.

2. VERTICAL SEPARATION BETWEEN UNDERGROUND WATER MAINS AND SANITARY OR STORM SEWERS, WASTEWATER OR STORMWATER FORCEMAINS, AND RECLAIMED WATER PIPELINES.
   A. NEW OR RELOCATED, UNDERGROUND WATER MAINS CROSSING ANY EXISTING OR PROPOSED GRAVITY OR VACUUM-TYPE SANITARY SEWER OR STORM SEWER SHALL BE INSTALLED SO THE OUTSIDE OF THE WATER MAIN IS AT LEAST SIX INCHES, AND PREFERABLY 12 INCHES, ABOVE OR AT LEAST 12 INCHES BELOW THE OUTSIDE OF THE OTHER PIPELINE. HOWEVER, IT IS PREFERABLE TO INSTALL THE WATER MAIN ABOVE THE OTHER PIPELINE.
   B. NEW OR RELOCATED, UNDERGROUND WATER MAINS CROSSING ANY EXISTING OR PROPOSED PRESSURE-TYPE SANITARY SEWER, WASTEWATER OR STORMWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER SHALL BE INSTALLED SO THE OUTSIDE OF THE WATER MAIN IS AT LEAST 12 INCHES ABOVE OR BELOW THE OUTSIDE OF THE OTHER PIPELINE. HOWEVER, IT IS PREFERABLE TO INSTALL THE WATER MAIN ABOVE THE OTHER PIPELINE.
   C. AT THE UTILITY CROSSINGS DESCRIBED IN PARAGRAPHS A AND B ABOVE, ONE FULL LENGTH OF WATER MAIN PIPE SHALL BE CENTERED ABOVE OR BELOW THE OTHER PIPELINE SO THE WATER MAIN JOINTS WILL BE AS FAR AS POSSIBLE FROM THE OTHER PIPELINE. ALTERNATIVELY, AT SUCH CROSSINGS, THE PIPES SHALL BE ARRANGED SO THAT ALL WATER MAIN JOINTS ARE AT LEAST THREE FEET FROM ALL JOINTS IN VACUUM-TYPE SANITARY SEWERS, STORM SEWERS, STORMWATER FORCE MAINS, OR PIPELINES CONVEYING RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C., AND AT LEAST SIX FEET FROM ALL JOINTS IN GRAVITY OR PRESSURE-TYPE SANITARY SEWERS, WASTEWATER FORCE MAINS, OR PIPELINES CONVEYING RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

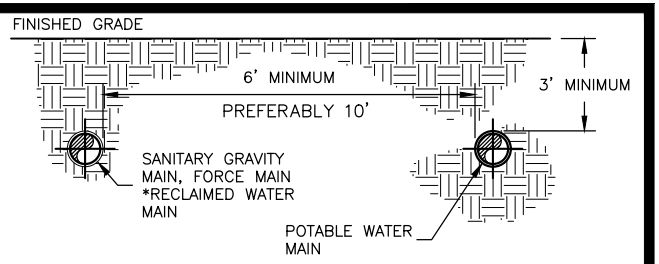
3. NEW OR RELOCATED FIRE HYDRANTS SHALL BE LOCATED SUCH THAT THE UNDERGROUND DRAIN (WEEP HOLE) IS AT LEAST:
   A. THREE FEET FROM ANY EXISTING OR PROPOSED STORM SEWER, STORM WATER FORCE MAIN, RECLAIMED WATER MAIN OR VACUUM TYPE SANITARY SEWER.
   B. SIX FEET AWAY FROM ANY EXISTING OR PROPOSED GRAVITY SANITARY SEWER AND WASTEWATER FORCE MAIN
   C. TEN FEET FROM ANY ON SITE SEWAGE TREATMENT AND DISPOSAL SYSTEM SUCH AS SEPTIC TANKS, DRAINFIELDS, AND GREASE TRAPS. ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS DO NOT INCLUDE PACKAGE SEWAGE TREATMENT FACILIITIES AND PUBLIC WASTEWATER TREATMENT FACILITIES.

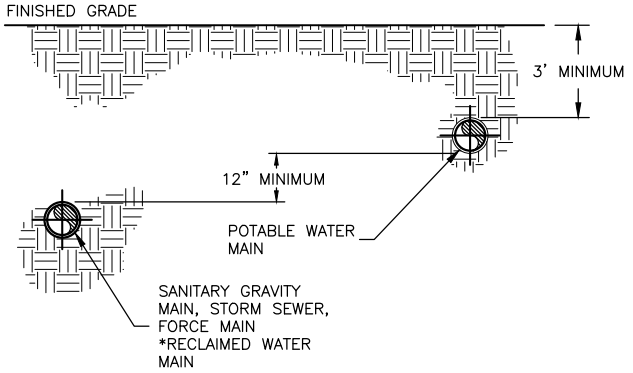
4. NO WATER MAIN SHALL PASS THROUGH, OR COME INTO CONTACT WITH, ANY PART OF A SANITARY SEWER MANHOLE.

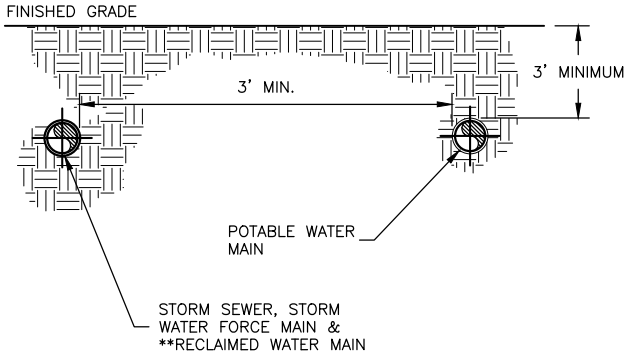
5. WATER MAINS SHALL NOT BE CONSTRUCTED OR ALTERED TO PASS THROUGH, OR COME INTO CONTACT WITH, ANY PART OF A STORM SEWER MANHOLE OR INLET STRUCTURE.

*RECLAIMED WATER MAIN NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

** RECLAIMED WATER MAIN REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C







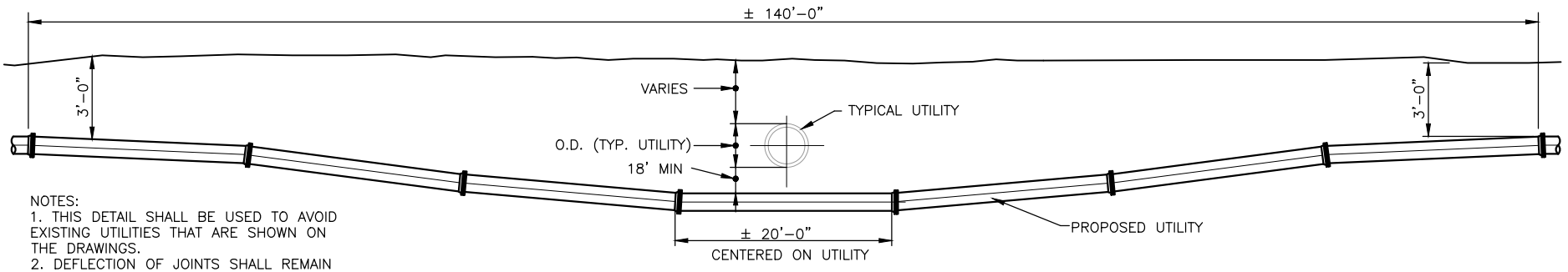
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

UTILITY SEPARATION DETAIL

SCALE: NONE

FIG. W-32

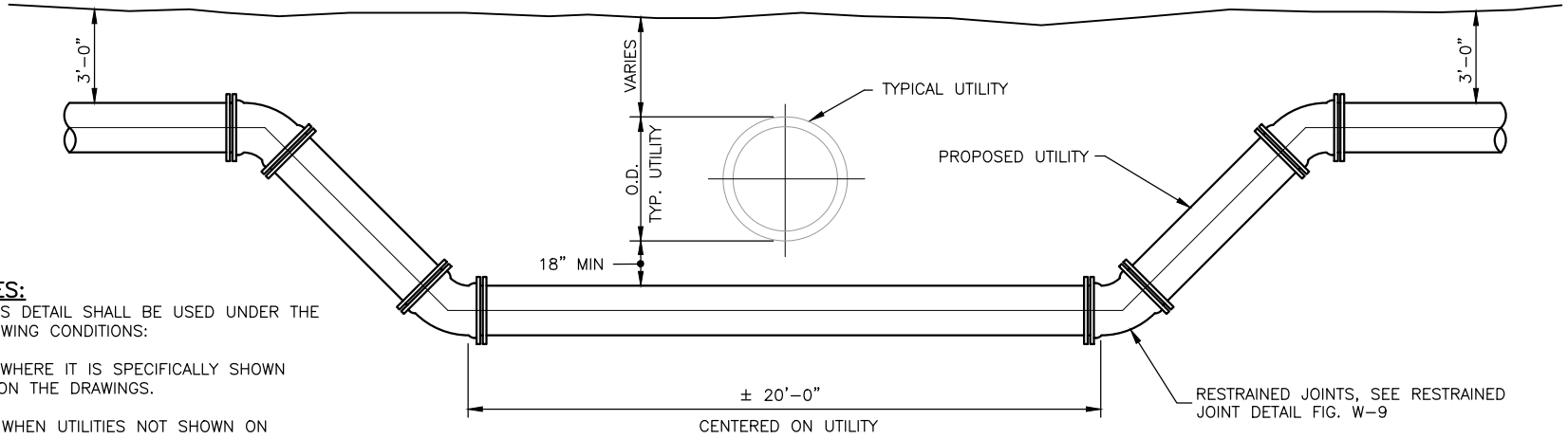
REVISED 1/07



NOTES:
1. THIS DETAIL SHALL BE USED TO AVOID EXISTING UTILITIES THAT ARE SHOWN ON THE DRAWINGS.
2. DEFLECTION OF JOINTS SHALL REMAIN WITHIN MANUFACTURER'S RECOMMENDATIONS.

TYPICAL CONFLICT RESOLUTION BY DEFLECTION

SEE NOTES



NOTES:

1. THIS DETAIL SHALL BE USED UNDER THE FOLLOWING CONDITIONS:

   A. WHERE IT IS SPECIFICALLY SHOWN ON THE DRAWINGS.

   B. WHEN UTILITIES NOT SHOWN ON THE PLAN, ARE ENCOUNTERED.

TYPICAL CONFLICT RESOLUTION BY FITTINGS

SEE NOTES

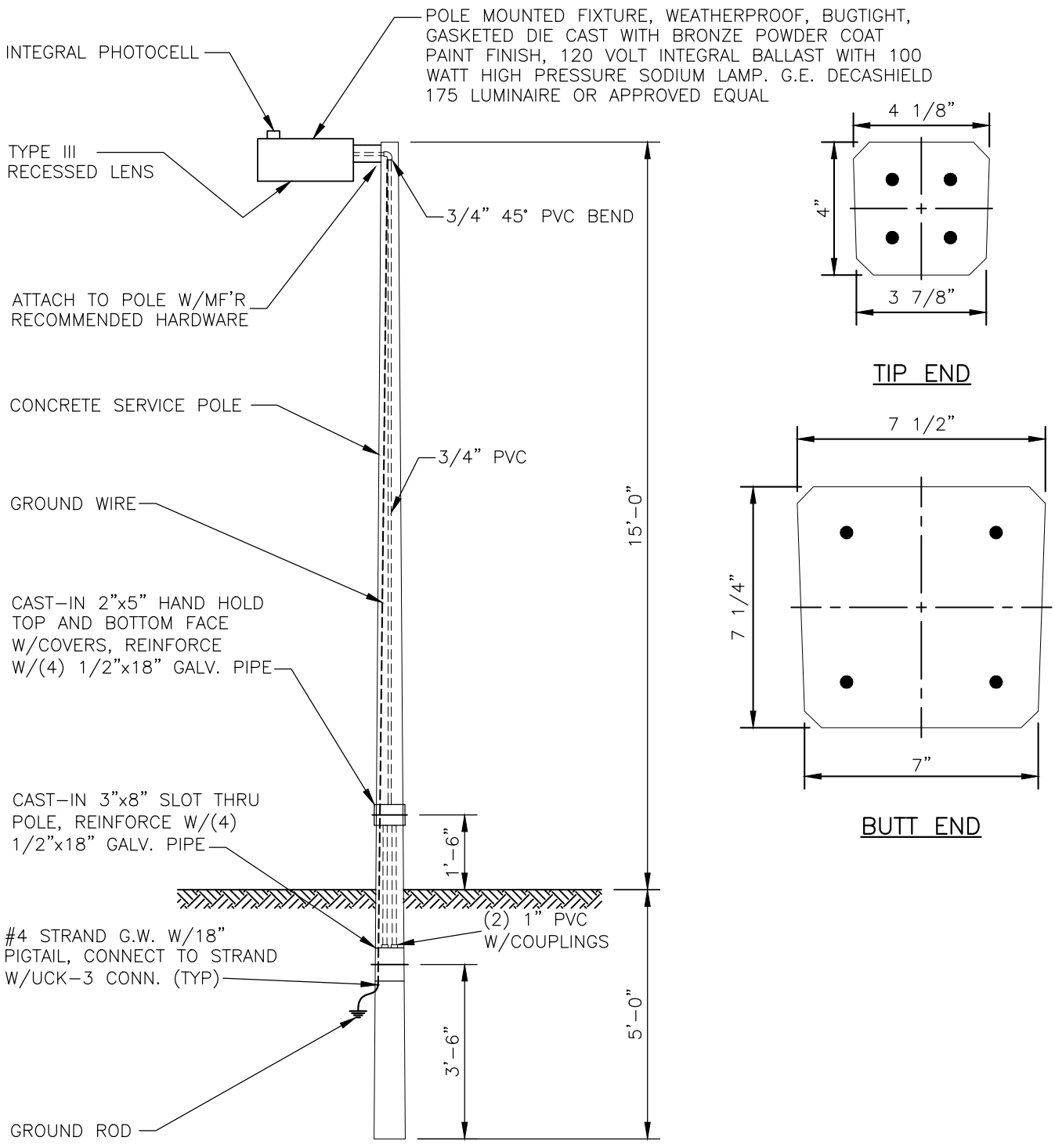
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

TYPICAL CONFLICT RESOLUTION DETAIL BY DEFLECTION OR FITTINGS

SCALE: NONE

FIG. W–33

REVISED 1/07



FIXTURE: 200 WATT LED POLE MOUNTED ON/OFF SWITCH W/WATER PROOF, BUG-TIGHT GASKETED, DIE CAST ALUMINUM W/POWDER COAT FINISH, MF'D BY KIM ARCHETYPE AR; G.E.; DECA SHIELD, OR EQUIVALENT.

POLE MF'D BY ACCORD INDUSTRIES, WINTER PARK, FL

CONCRETE VOLUME = 0.17 C.Y.
POLE WEIGHT = 680#
CONCRETE F'c = 6500 psi
ULTIMATE CAPACITY @ 2' = 1-2 kips

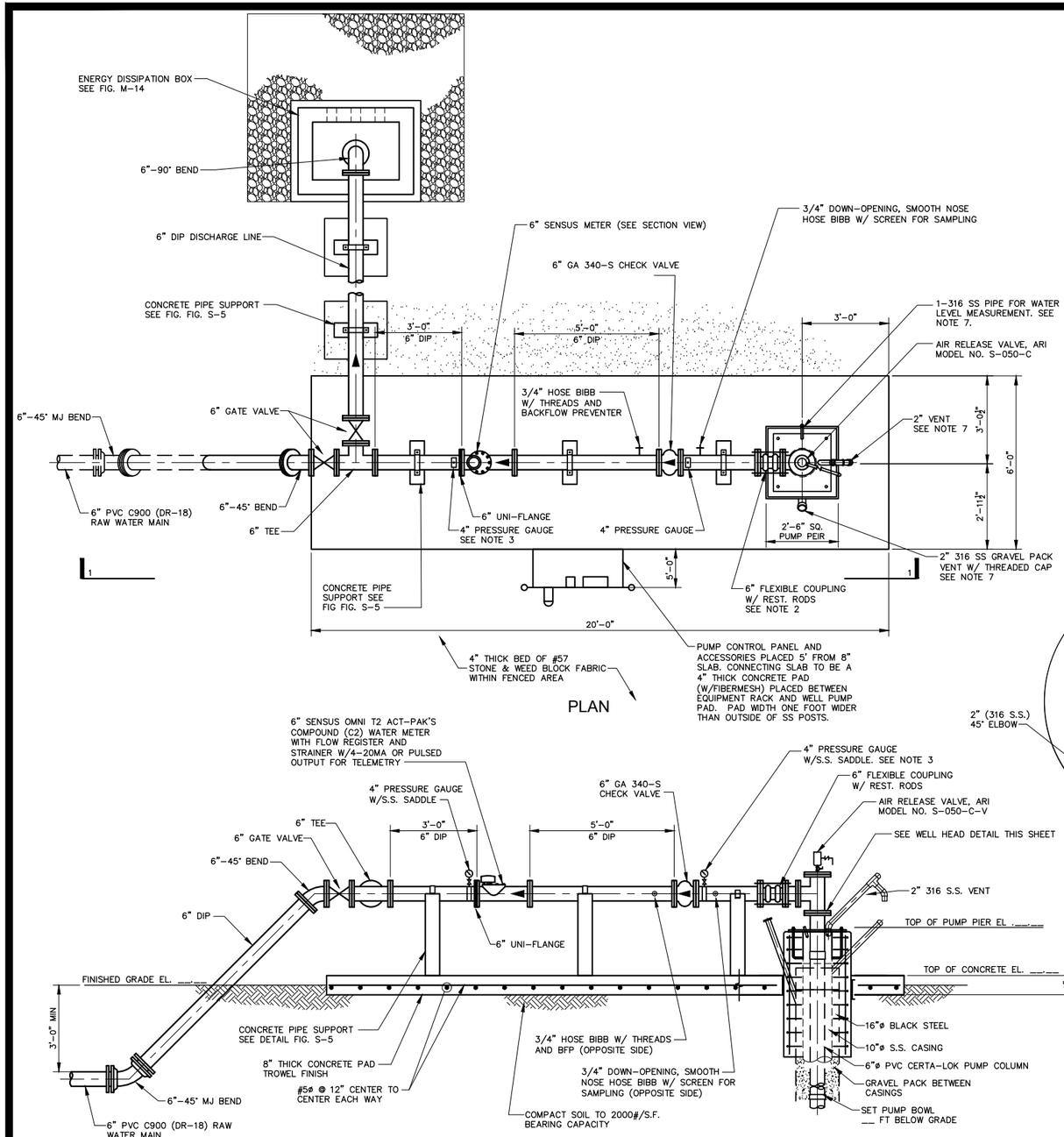
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

SERVICE POLE DETAIL

SCALE: NONE

FIG. W-34

REVISED 7/10



PLAN

1-SECTION

PAINTING NOTES:

ALL ABOVE GRADE PIPING SHALL BE PAINTED AS FOLLOWS:

SURFACE PREPARATION: SUBMERGED SURFACES, NEAR WHITE METAL BLAST ACCORDING TO SSPC-SP 10. NON-SUBMERGED SURFACES, COMMERCIAL BLAST ACCORDING TO SSPC-SP 6.

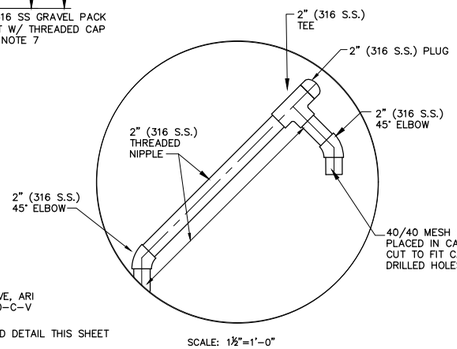
FIRST COAT: ONE COAT OF HIGH PERFORMANCE POLYAMIDE EPOXY, MINIMUM 3 MILS DFT. IF SHOP COAT IS DAMAGED, RE-PRIME BARE AREAS IN FIELD. TNEMEC 66 HI-BUILD EPOXOLINE, OR EQUAL.

SECOND COAT: ONE COAT OF HIGH PERFORMANCE POLYAMIDE EPOXY COATING, MINIMUM 4 MILS DFT – TNEMEC 66 HI-BUILD EPOXOLINE, OR EQUAL.

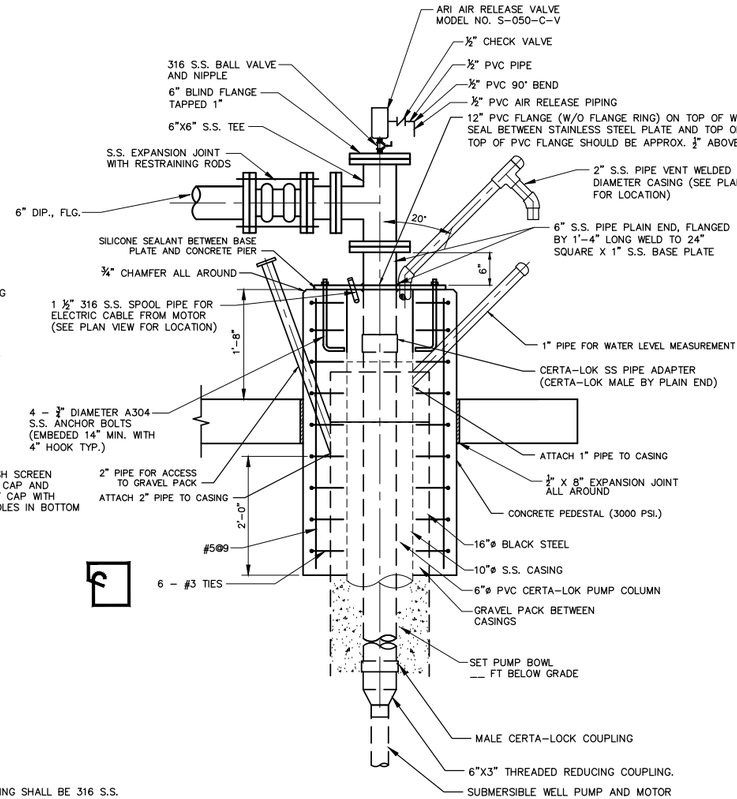
THIRD COAT: INTERIOR – SAME AS SECOND COAT. EXTERIOR EXPOSURE – ONE COAT OF SEMI-GLASS POLYURETHANE, MINIMUM 2 MILS DFT – TNEMEC 73 ENDURA – SHIELD, OR EQUAL.

FINISH COAT: COLOR SHALL BE TNEMEC "TEARDROP".

WELL PUMP:
DRIVER: SUBMERSIBLE FRANKLIN MOTOR
PUMP: GRUNDFOS
COLUMN:



SCALE: 1½"=1'-0"



WELL HEAD DETAIL

NOTES:

1. OBSERVATION VENT NOT SHOWN.
2. ALL HARDWARE FOR FLEXIBLE COUPLING SHALL BE 316 S.S.
3. S.S. PRESSURE GAUGES SHALL BE A MIN. OF 0-200 PSI.
4. ALL BOLTS, NUTS AND HARDWARE SHALL BE 316 STAINLESS STEEL.
5. SAFETY CABLE SHALL BE STAINLESS STEEL AND SHALL BE ONE LENGTH; NO SPLICES ARE ALLOWED. THE CABLE SHALL BE ATTACHED TO THE UNDERSIDE OF THE BASEPLATE TO A STAINLESS STEEL "RING" WELDED IN PLACE.
6. NEVER-SEEZ SHALL BE APPLIED TO ALL STAINLESS STEEL THREADS.
7. PIPES WITH ACCESS TO THE WELL SHALL BE EQUIPPED WITH HASPS AND LOCKS.

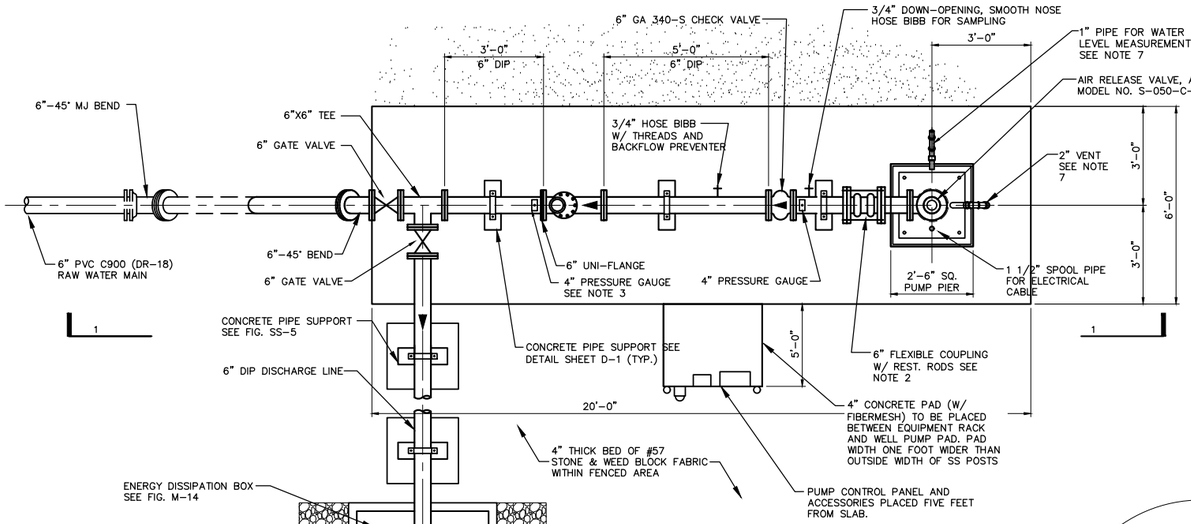
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

TYPICAL WELL WITH SUBMERSIBLE PUMP DETAIL (SHALLOW WELLS)

SCALE: NONE

FIG. W-35

REVISED 8/20



PLAN

1/2"=1'-0"

PAINTING NOTES:

ALL ABOVE GRADE PIPING SHALL BE PAINTED AS FOLLOWS:

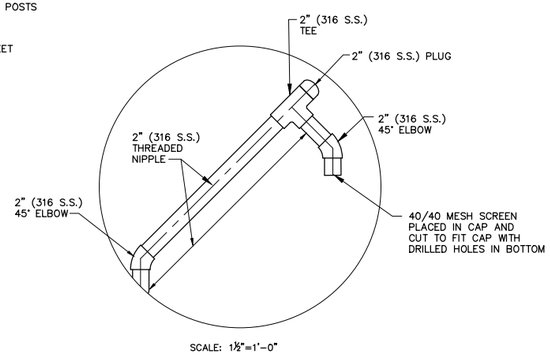
SURFACE PREPARATION: SUBMERGED SURFACES, NEAR WHITE METAL BLAST ACCORDING TO SSPC-SP 10. NON-SUBMERGED SURFACES, COMMERCIAL BLAST ACCORDING TO SSPC-SP 6.

FIRST COAT: ONE COAT OF HIGH PERFORMANCE POLYAMIDE EPOXY, MINIMUM 3 MILS DFT. IF SHOP COAT IS DAMAGED, RE-PRIME BARE AREAS IN FIELD. TNEMEC 66 HI-BUILD EPOXOLINE, OR EQUAL.

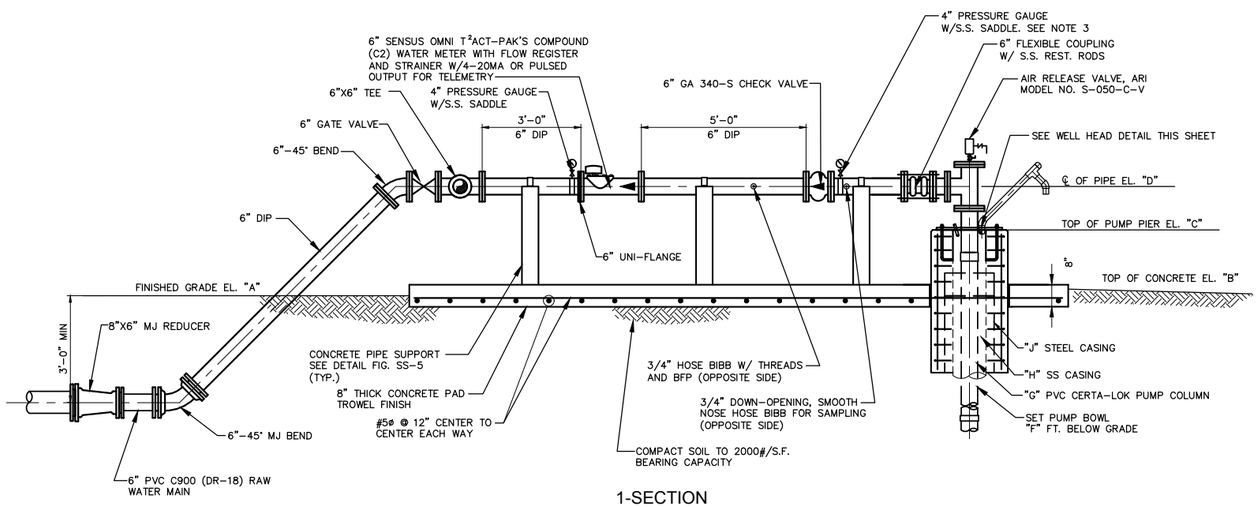
SECOND COAT: ONE COAT OF HIGH PERFORMANCE POLYAMIDE EPOXY COATING, MINIMUM 4 MILS DFT - TNEMEC 66 HI-BUILD EPOXOLINE, OR EQUAL.

THIRD COAT: INTERIOR - SAME AS SECOND COAT. EXTERIOR EXPOSURE - ONE COAT OF SEMI-GLASS POLYURETHANE, MINIMUM 2 MILS DFT - TNEMEC 73 ENDURA - SHIELD, OR EQUAL.

FINISH COAT: COLOR SHALL BE TNEMEC "TEARDROP".

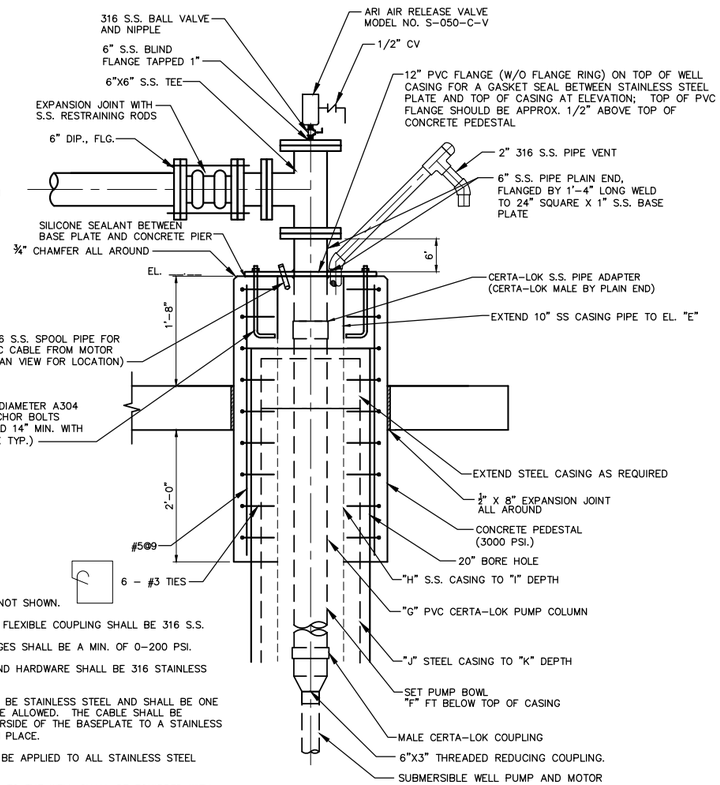


SCALE: 1½"=1'-0"



1-SECTION

1/2"=1'-0"



NOTES:

1. OBSERVATION VENT NOT SHOWN.
2. ALL HARDWARE FOR FLEXIBLE COUPLING SHALL BE 316 S.S.
3. S.S. PRESSURE GAUGES SHALL BE A MIN. OF 0-200 PSI.
4. ALL BOLTS, NUTS AND HARDWARE SHALL BE 316 STAINLESS STEEL.
5. SAFETY CABLE SHALL BE STAINLESS STEEL AND SHALL BE ONE LENGTH; NO SPLICES ARE ALLOWED. THE CABLE SHALL BE ATTACHED TO THE UNDERSIDE OF THE BASEPLATE TO A STAINLESS STEEL "RING" WELDED IN PLACE.
6. NEVER-SEEZ SHALL BE APPLIED TO ALL STAINLESS STEEL THREADS.
7. PIPES WITH ACCESS TO THE WELL SHALL BE EQUIPPED WITH HASPS AND LOCKS.

WELL HEAD DETAIL

NOT TO SCALE

TYPICAL WELL WITH SUBMERSIBLE PUMP DETAIL (DEEP WELLS)

SCALE: NONE

FIG. W-36

REVISED 6/22

FORCE MAIN AND GRAVITY SANITARY SEWER

FORCE MAIN AND SANITARY SEWER DETAILS

Sheet List Table	
Sheet Number	Sheet Title
FORCE MAIN AND SANITARY SEWER DETAILS	
FIG. SS-1	FORCE MAIN GENERAL NOTES
FIG. SS-2	FORCE MAIN GENERAL NOTES
FIG. SS-3	GRAVITY SANITARY SEWER GENERAL NOTES
FIG. SS-4	GRAVITY SANITARY SEWER GENERAL NOTES
FIG. SS-5	AIR RELEASE VALVE DETAIL FOR PEP, REUSE WATER AND FORCE MAINS
FIG. SS-5A	OFFSET AIR RELEASE VALVE DETAIL FOR PEP, REUSE WATER AND FORCE MAINS
FIG. SS-6	AIR RELEASE VALVE DETAIL FOR FORCE MAINS
FIG. SS-6A	OFFSET AIR RELEASE VALVE DETAIL FOR FORCE MAINS
FIG. SS-7	SEAL WATER SCHEMATIC DETAIL
FIG. SS-8	STANDARD MANHOLE DETAIL
FIG. SS-9	SHALLOW MANHOLE DETAIL
FIG. SS-10	EX MH WHICH RECEIVES FM FLOW DETAIL- LESS THAN 6 FEET DEEP
FIG. SS-11	PROP MH WHICH RECEIVES FM FLOW DETAIL- LESS THAN 6 FEET DEEP
FIG. SS-12	EX MH WHICH RECEIVES FM FLOW DETAIL- GREATER THAN 6 FEET DEEP
FIG. SS-13	PROP MH WHICH RECEIVES FM FLOW DETAIL- GREATER THAN 6 FEET DEEP
FIG. SS-14	DROP MANHOLE DETAIL
FIG. SS-15	MANHOLE FRAME AND COVER DETAIL
FIG. SS-16	TYPICAL SERVICE LATERAL DETAIL-SHALLOW CONNECTIONS
FIG. SS-17	TYPICAL SERVICE LATERAL DETAIL - DEEP CONNECTIONS
FIG. SS-18	SEWER CLEANOUT INSTALLATION DETAILS
FIG. SS-19	PLUG VALVE AND BOX DETAIL FOR FORCE MAIN
FIG. SS-20	FORCE MAIN WET TAP DETAIL
FIG. SS-21	PUMPING STATION SITE PLAN TYPICAL DETAIL
FIG. SS-21A	PUMPING STATION SITE PLAN TYPICAL GROUNDING DETAIL
FIG. SS-21B	GROUND ROD TEST WELL DETAIL
FIG. SS-22	LIFT STATION WASH DOWN POINT DETAIL
FIG. SS-23	TYPICAL DUPLEX PUMPING STATION DETAIL
FIG. SS-23A	ACCESS HATCH - SAFETY GRATE DETAIL
FIG. SS-24	DUPLEX PS ELEC EQUIP INSTALL FOR STA W/O STANDBY POWER (METER SIDE)
FIG. SS-24A	DUPLEX PS ELEC EQUIP INSTALL FOR STA W/ STANDBY POWER (METER SIDE)
FIG. SS-24B	DUPLEX PS ELEC EQUIP INSTALL FOR STA WITH STANDBY POWER (PANEL SIDE)

FORCE MAIN AND SANITARY SEWER DETAILS (CONT'D)

Sheet List Table	
Sheet Number	Sheet Title
FORCE MAIN AND SANITARY SEWER DETAILS	
FIG. SS-25	DUPLEX PUMP STATION CONTROL PANEL DETAIL FOR 3 PHASE POWER
FIG. SS-26	DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 1 OF 2 (FOR 3 PHASE POWER)
FIG. 26A	DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 2 OF 2 (FOR 3 PHASE POWER)
FIG. SS-27	DUPLEX PUMP STATION CONTROL PANEL DETAIL FOR SINGLE PHASE POWER
FIG. SS-28	DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 1 OF 2 (FOR SINGLE PHASE POWER)
FIG. SS-28A	DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 2 OF 2 (FOR SINGLE PHASE POWER)
FIG. 29	(RESERVED)
FIG. SS-30	SERVICE POLE DETAIL
FIG. SS-31	GREASE INTERCEPTOR DETAIL
FIG. SS-31A	GREASE INTERCEPTOR NOTES
FIG. SS-32	STANDARD PUMP STATION LANDSCAPE PLAN
FIG. SS-32A	TYPICAL LANDSCAPE DETAILS AND NOTES
FIG. SS-33	STANDARD PUMP STATION - IRRIGATION PLAN
FIG. SS-33A	TYPICAL IRRIGATION DETAILS AND NOTES

FORCE MAIN GENERAL NOTES

SHEET 1 OF 2

1. ALL PIPELINE MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF PALM COAST STANDARDS (JULY, 2022), CONTRACT DOCUMENTS, TECHNICAL SPECIFICATIONS AND ALL APPLICABLE LOCAL AND STATE REQUIREMENTS.

2. THE CONTRACTOR SHALL ENSURE THAT ALL REQUIRED PERMITS ARE IN HAND BEFORE COMMENCEMENT OF CONSTRUCTION.

3. ALL UTILITY OWNERS AND SUNSHINE STATE ONE CALL (800) 432–4770 MUST BE NOTIFIED SEVENTY–TWO (72) HOURS PRIOR TO STARTING CONSTRUCTION.

4. THE CONTRACTOR SHALL NOTIFY FIBEROPTICS COMPANIES SEVEN (7) WORKING DAYS PRIOR TO ANY CONSTRUCTION ACTIVITY IN THEIR AREA. EXTREME CAUTION SHALL BE USED IN AREAS WHERE FIBEROPTIC CABLE IS LOCATED ADJACENT TO CONSTRUCTION ACTIVITY.

5. ALL NEW FORCE MAINS SHALL BE INSTALLED WITH A MINIMUM OF 3'–0" OF COVER, UNLESS NOTED OTHERWISE.

6. ALL PIPING AND/OR APPURTENANCES CONNECTING TO ADJACENT CONSTRUCTION SHALL BE PLUGGED IF ADJACENT WORK HAS NOT BEEN COMPLETED.

7. CONTRACTOR SHALL PROVIDE TEMPORARY THRUST RESTRAINTS, BRACING, TEST PLUGS AND/OR OTHER DEVICES NECESSARY TO SUCCESSFULLY COMPLETE PRESSURE TESTING OF ALL PRESSURE PIPING SYSTEMS.

8. ALL FITTINGS FOR BURIED PIPING 4–INCHES AND LARGER SHALL BE COMPACT DUCTILE IRON MECHANICAL JOINT (D.I.M.J.) BITUMEN COATED EXTERIOR APPLIED PER ANSI/AWWA A21.53/C153 UNLESS NOTED OTHERWISE. THESE FITTINGS SHALL INCORPORATE RESTRAINING RINGS, MEGA–LUGS OR OTHER APPROVED EQUIVALENT MECHANICAL DEVICES.

9. ALL PROPOSED DUCTILE IRON PIPE, FITTINGS AND RESTRAINTS WITHIN FIFTY (50) FEET OF AN EXISTING GAS MAIN SHALL BE POLYETHYLENE ENCASED.

10. ALL BURIED PIPING SPECIFIED FOR PRESSURE SERVICE SHALL BE PROVIDED WITH RESTRAINING DEVICES AT ALL DIRECTIONAL CHANGES, UNLESS NOTED OTHERWISE.

11. ALL FASTENERS SHALL BE MANUFACTURED OF NON–CORROSIVE MATERIALS. WHEN STAINLESS STEEL IS REQUIRED, 304 S.S. SHALL BE USED FOR ALL BURIED APPLICATIONS AND 316 S.S. SHALL BE USED FOR ABOVE GROUND OR CORROSIVE ENVIRONMENTS.

12. THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE DRAWINGS HAVE BEEN DERIVED FROM EXISTING UTILITY RECORDS. ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT LOCATION, DEPTH AND CHARACTER OF ALL UTILITIES PRIOR TO EXCAVATION IN ORDER TO PROTECT THESE UTILITIES DURING CONSTRUCTION.

13. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AT ALL INTERSECTIONS OF PROPOSED WORK AND EXISTING UTILITIES. THE EXPLORATORY EXCAVATIONS SHALL BE MADE FORTY–EIGHT (48) HOURS IN ADVANCE OF THE PROPOSED WORK. IF THERE IS A CONFLICT THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST IMMEDIATELY. INFORMATION ON THE OBSTRUCTION SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL INCLUDE: LOCATION, ELEVATION, UTILITY TYPE, MATERIAL AND SIZE.

14. LOCATIONS AND DIMENSIONS OF EXISTING RIGHTS–OF–WAY AND EASEMENTS ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY ALL THE LIMITS OF RIGHTS–OF–WAY AND EASEMENTS IN ORDER TO AVOID ENCROACHMENTS.

15. THE CONTRACTOR SHALL REPLACE SOD 3 FEET FROM ALL DISTURBED AREAS; STRUCTURES, SIDEWALKS, ROADS, AND POND IMPROVEMENT AREAS. ALL OTHER DISTURBED AREAS SHALL BE SODDED OR SEEDED AND MULCHED AS SHOWN ON THE DRAWINGS.

16. THE CONTRACTOR SHALL REPLACE, BUT NOT BE LIMITED TO, PAVING, STABILIZED EARTH, DRIVEWAYS OR ANY ITEMS DISTURBED OR DAMAGED BY THE CONSTRUCTION OR IT'S RELATED ACTIVITIES. THE CONTRACTOR SHALL REPLACE WITH EQUAL MATERIAL OR AS DIRECTED BY THE CITY OF PALM COAST.

17. THE DISPOSAL OF ANY EXCESS EARTHWORK MATERIAL; CONCRETE, PIPE AND OTHER DEBRIS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

18. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE HIS WORK WITH THE WORK SCHEDULE OF ADJACENT CONTRACTORS AS WELL AS THE STAFF OF THE CITY OF PALM COAST.

19. THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST UTILITY DEPARTMENT 72 HOURS BEFORE COMMENCING WITH CONSTRUCTION.

20. WHERE MINIMUM SEPARATION BETWEEN UTILITIES IS REQUIRED, THE DISTANCE SHALL BE MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.

21. PVC PIPE LESS THAN 2–INCHES SHALL CONFORM TO ASTM D1785. THREADED PIPE AND FITTINGS SHALL BE SCH. 80 AND CONFORM TO ASTM D2464. UNTHREADED PIPE AND FITTINGS SHALL BE SCH. 40 WITH SOLVENT CEMENTED JOINTS. CEMENTED JOINTS AND FITTINGS SHALL COMPLY WITH ASTM D2466 AND D2855.

22. 2", 2 1/2" AND 3" PVC PIPE SHALL CONFORM TO ASTM D2241. PIPE SHALL BE FURNISHED IN 20–FOOT LENGTHS, SHALL HAVE DIMENSION RATIO DR21 AND A WATER PRESSURE RATING OF 200 PSI.

23. PVC PIPE 4–INCHES THROUGH 60–INCHES SHALL CONFORM TO AWWA STANDARD C900 (DR18).

24. DUCTILE IRON PIPE SHALL CONFORM TO AWWA STANDARD C151, PRESSURE CLASS 350 FOR 4–INCH THROUGH 12–INCH DIAMETER PIPE; PRESSURE CLASS 250 FOR PIPE LARGER THAN 12–INCHES IN DIAMETER UNLESS NOTED OTHERWISE. DUCTILE IRON PIPE AND FITTINGS FOR PRESSURE SERVICE SHALL HAVE AN INTERIOR LINING CONSISTING OF A MINIMUM OF 40 MILS OF A CERAMIC EPOXY COATING. REFER TO SPECIFICATIONS FOR DETAILS.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

FORCE MAIN GENERAL NOTES

SCALE: NONE

FIG. SS–1

REVISED 7/22

FORCE MAIN GENERAL NOTES

SHEET 2 OF 2

25. PVC FORCE MAINS SHALL BE SOLID GREEN IN COLOR. DUCTILE IRON FORCE MAINS SHALL INCORPORATE 3 GREEN STRIPES, PAINTED AT THE TOP AND SIDES OF THE PIPE, ALONG IT'S ENTIRE LENGTH.

26. FITTINGS FOR BOTH PVC AND DUCTILE IRON PIPE SHALL BE DUCTILE IRON CONFORMING TO ANSI/AWWA C153/A21.53, COMPACT DUCTILE IRON FITTINGS.

27. VALVES FOR FORCE MAINS SHALL BE DUCTILE IRON, EPOXY COATED PLUG VALVES. REFER TO THE SPECIFICATIONS FOR DETAILS.

28. ALL POLYETHYLENE PRESSURE PIPE AND FITTINGS 4–INCH AND LARGER SHALL CONFORM TO AWWA STANDARD C906 (DR11) PRESSURE CLASS 160 AND ASTM STANDARD D3350, D2837, PE 3408.

29. ALL FORCE MAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH AWWA STANDARD C600 FOR DUCTILE IRON PIPE; C900 FOR PVC PIPE; ASTM F2164 FOR HDPE PIPE; PP1TR–31 UNDERGROUND INSTALLATION OF POLYOLEFIN PIPING, SECTION 7. HYDROSTATIC TESTING FOR ALL PIPE MATERIAL SHALL BE 150 PSI FOR A MINIMUM OF 2 HOURS.

30. IN AREAS WHERE CONSTRUCTION ACTIVITIES RESTRICT NORMAL ACCESS TO PROPERTIES, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALTERNATE ACCESS ROUTES, WHICH ARE SUBJECT TO APPROVAL BY THE CITY OF PALM COAST.

31. ALL PRACTICAL AND NECESSARY EFFORT SHALL BE TAKEN DURING CONSTRUCTION TO PREVENT UNNECESSARY TREE REMOVAL.

32. ALL ELEVATIONS SHOWN ON THESE DRAWINGS REFER TO NORTH AMERICAN VERTICAL DATUM (NAVD) 1988.

33. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS FOR APPROVAL BY THE CITY OF PALM COAST PRIOR TO PROCUREMENT.

34. THE CONTRACTOR SHALL VIDEO THE ENTIRE WORK AREA PRIOR TO COMMENCEMENT OF CONSTRUCTION. ONE COPY OF THE PRE–CONSTRUCTION VIDEO SHALL BE SUBMITTED TO THE CITY OF PALM COAST.

35. PIPE MEASUREMENTS SHALL BE FROM CENTER TO CENTER OF FITTINGS OR VALVES, UNLESS OTHERWISE NOTED.

36. CONFLICT BETWEEN WATER MAINS, STORM AND SANITARY SEWER SYSTEMS, REUSE WATER MAINS AND PROPOSED FORCE MAINS SHALL BE RESOLVED BY ADJUSTING PROPOSED FORCE MAINS AS NECESSARY. SEE "UTILITY SEPARATION DETAIL" AND ACCOMPANYING NOTES AS SHOWN ON THE CIVIL DETAIL (CD) SHEETS OF THE PLAN SET.

37. ALL EXCAVATIONS SHALL BE BACKFILLED AT THE END OF EACH WORK DAY.

38. FOR A SCHEDULED INTERRUPTION OF FORCE MAIN FLOW, THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST 72 HOURS IN ADVANCE.

39. DURING NORMAL FORCE MAIN FLOW INTERRUPTION, THE CONTRACTOR SHALL PROVIDE UNINTERRUPTED BY–PASS FLOW AND SHALL PROVIDE ALL EQUIPMENT NECESSARY TO ACCOMPLISH THE SAME IN THE FORM OF, BUT NOT LIMITED TO THE FOLLOWING: POWER, PUMPS, PIPING, APPURTENANT VALVES AND FITTINGS AND / OR SEPTIC TANKER TRUCK PUMPING, HAULING AND DISPOSAL SERVICES.

40. ALL CONNECTIONS TO EXISTING FORCE MAINS SHALL BE MADE BY THE CONTRACTOR ONLY AFTER THE CONNECTION PROCEDURE AND HIS WORK SCHEDULE REGARDING THIS ACTIVITY ARE REVIEWED AND APPROVED BY THE CITY OF PALM COAST. THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST TO THE OWNER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO COMMENCEMENT OF CONNECTION ACTIVITIES. IN THE REQUEST, THE CONTRACTOR SHALL OUTLINE THE FOLLOWING:

A. POINTS OF CONNECTION, FITTINGS TO BE USED AND METHOD OF FLUSHING.

B. ESTIMATED CONSTRUCTION TIME FOR SAID ACTIVITY.

C. PROPOSED BYPASS METHOD. (REF. NOTES 38 & 39.)

THE CITY OF PALM COAST SHALL REVIEW THE SUBMITTAL AND SHALL INFORM THE CONTRACTOR REGARDING APPROVAL OR DENIAL OF THEIR REQUEST. IF THEIR REQUEST IS REJECTED BY THE CITY OF PALM COAST, THE CONTRACTOR MAY RESUBMIT THEIR REQUEST MODIFYING IT TO THE SATISFACTION OF THE OWNER. ALL CONNECTIONS SHALL BE MADE ONLY ON THE AGREED UPON TIME AND DATE ESTABLISHED IN THE PROCEDURE.

41. ALL FORCE MAINS SHALL HAVE AN "EARLY WARNING" PROTECTION TAPE INSTALLED CONTINUOUSLY ALONG THE ENTIRE LENGTH. THE PROTECTION TAPE SHALL BE INSTALLED DURING THE BACKFILLING 12 INCHES ABOVE AND DIRECTLY OVER THE PIPE AND BE CONTINUOUSLY MARKED WITH "CAUTION – FORCE MAIN BURIED BELOW". THE TAPE SHALL BE PLASTIC, NON–METALLIC AND BE GREEN IN COLOR.

42. ALL PVC FORCE MAINS INSTALLED BY OPEN CUT SHALL BE CONTINUOUSLY UNDERLAIN WITH 10 GAGE, SINGLE STRAND, THWN SOLID COPPER–CLAD STEEL TRACING WIRE. THE WIRE SHALL HAVE 30 MIL GREEN INSULATION HDPE JACKET AND INSTALLATION SHALL CONFORM TO THE DETAILED DRAWINGS.

43. ALL BURIED UTILITY PIPES TO BE ABANDONED IN PLACE SHALL BE CUT, PLUGGED AND FILLED WITH GROUT.

44. IT IS THE INTENT OF THIS CONTRACT FOR THE CONTRACTOR TO MAINTAIN CONTINUOUS RESTORATION BEHIND THE UTILITY WORK ON A DAILY BASIS. NO MORE THAN FIFTY (50) LINEAR FEET OF UNRESTORED LINE WORK SHALL REMAIN AT THE END OF EACH WORK DAY.

GRAVITY SANITARY SEWER GENERAL NOTES

SHEET 1 OF 2

1. ALL PIPELINE MATERIAL AND INSTALLATION SHALL CONFORM TO THE CITY OF PALM COAST STANDARDS (JULY, 2022), CONTRACT DOCUMENTS, TECHNICAL SPECIFICATIONS AND ALL APPLICABLE LOCAL AND STATE REQUIREMENTS.

2. THE CONTRACTOR SHALL ENSURE THAT ALL REQUIRED PERMITS ARE IN HAND BEFORE COMMENCEMENT OF CONSTRUCTION.

3. ALL UTILITY OWNERS AND SUNSHINE STATE ONE CALL (800) 432–4770 MUST BE NOTIFIED SEVENTY–TWO (72) HOURS PRIOR TO STARTING CONSTRUCTION.

4. THE CONTRACTOR SHALL NOTIFY FIBEROPTICS COMPANIES SEVEN (7) WORKING DAYS PRIOR TO ANY CONSTRUCTION ACTIVITY IN THEIR AREA. EXTREME CAUTION SHALL BE USED IN AREAS WHERE FIBEROPTIC CABLE IS LOCATED ADJACENT TO CONSTRUCTION ACTIVITY.

5. ALL PIPING AND/OR APPURTENANCES CONNECTING TO ADJACENT CONSTRUCTION SHALL BE PLUGGED IF ADJACENT WORK HAS NOT BEEN COMPLETED.

6. ALL PROPOSED DUCTILE IRON PIPE AND FITTINGS WITHIN FIFTY (50) FEET OF AN EXISTING GAS MAIN SHALL BE POLYETHYLENE ENCASED.

7. THE LOCATIONS OF EXISTING UTILITIES SHOWN ON THESE DRAWINGS HAVE BEEN DERIVED FROM EXISTING UTILITY RECORDS. ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT LOCATION, DEPTH AND CHARACTER OF ALL UTILITIES PRIOR TO EXCAVATION IN ORDER TO PROTECT THESE UTILITIES DURING CONSTRUCTION.

8. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AT ALL INTERSECTIONS OF PROPOSED WORK AND EXISTING UTILITIES. THE EXPLORATORY EXCAVATIONS SHALL BE MADE FORTY–EIGHT (48) HOURS IN ADVANCE OF THE PROPOSED WORK. IF THERE IS A CONFLICT THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST IMMEDIATELY. INFORMATION ON THE OBSTRUCTION SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL INCLUDE: LOCATION, ELEVATION, UTILITY TYPE, MATERIAL AND SIZE.

9. LOCATIONS AND DIMENSIONS OF EXISTING RIGHTS–OF–WAY AND EASEMENTS ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY ALL THE LIMITS OF RIGHTS–OF–WAY AND EASEMENTS IN ORDER TO AVOID ENCROACHMENTS.

10. THE CONTRACTOR SHALL REPLACE SOD 3 FEET FROM ALL DISTURBED AREAS: STRUCTURES, SIDEWALKS, ROADS, AND POND IMPROVEMENT AREAS. ALL OTHER DISTURBED AREAS SHALL BE SODDED OR SEEDED AND MULCHED AS SHOWN ON THE DRAWINGS.

11. THE CONTRACTOR SHALL REPLACE, BUT NOT BE LIMITED, TO PAVING, STABILIZED EARTH, DRIVEWAYS OR ANY ITEMS DISTURBED OR DAMAGED BY THE CONSTRUCTION OR ITS RELATED ACTIVITIES. THE CONTRACTOR SHALL REPLACE WITH EQUAL MATERIAL OR AS DIRECTED BY THE CITY OF PALM COAST.

12. THE DISPOSAL OF ANY EXCESS EARTHWORK MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

13. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE HIS WORK WITH THE WORK SCHEDULE OF ADJACENT CONTRACTORS AS WELL AS THE STAFF OF THE CITY OF PALM COAST.

14. THE CONTRACTOR SHALL NOTIFY THE CITY OF PALM COAST UTILITY DEPARTMENT 72 HOURS BEFORE COMMENCING WITH CONSTRUCTION.

15. WHERE MINIMUM SEPARATION BETWEEN UTILITIES IS REQUIRED, THE DISTANCE SHALL BE MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.

16. PVC PIPE AND FITTINGS 4–INCHES THROUGH 15–INCHES SHALL CONFORM TO ASTM D3034, SDR35 OR 26.

GRAVITY SANITARY SEWER GENERAL NOTES

SHEET 2 OF 2

17. PVC PIPE AND FITTINGS FITTINGS 18–INCHES THROUGH 27–INCHES SHALL CONFORM TO ASTM F679–T1, SDR 35.

18. PVC PIPE AND FITTINGS SHALL BE SOLID GREEN IN COLOR.

19. DUCTILE IRON PIPE FOR GRAVITY OR NON–PRESSURE SERVICE SHALL BE DESIGNED IN ACCORDANCE WITH AND CONFORMING TO THE REQUIREMENTS OF ASTM A746 FOR INSTALLATION WITH TRENCH TYPE II, OR IN ACCORDANCE WITH ANSI/AWWA C150/A21.50 AND ANSI/AWWA C151/A21.51.

20. DUCTILE IRON FITTINGS FOR USE IN GRAVITY OR NON–PRESSURE SERVICE SHALL CONFORM TO THE REQUIREMENTS OF ANSI/AWWA C153/A21.53, COMPACT DUCTILE IRON FITTINGS.

21. DUCTILE IRON PIPE AND FITTINGS FOR GRAVITY OR NON–PRESSURE SERVICE SHALL HAVE AN INTERIOR LINING CONSISTING OF A MINIMUM 40 MILS OF A CERAMIC EPOXY COATING. REFER TO SPECIFICATIONS FOR DETAILS.

22. ALL NEW SANITARY SEWER MAINS SHALL BE INSTALLED WITH A MIN. OF 3'–0" OF COVER, UNLESS OTHERWISE NOTED.

23. MATERIAL FOR GRAVITY SEWER PIPE AND FITTINGS SHALL BE AS SHOWN FOR THE FOLLOWING DEPTHS OF EXCAVATION:

A. 3' TO 4': EPOXY LINED DUCTILE IRON
B. 4' TO 12' PVC, ASTM 3034/ASTM F679, SDR 35
C. GREATER THAN 12': PVC, ASTM 3034, SDR 26 OR EPOXY–LINED DUCTILE IRON.

24. IN AREAS WHERE CONSTRUCTION ACTIVITIES RESTRICT NORMAL ACCESS TO PROPERTIES, THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALTERNATE ACCESS ROUTES WHICH ARE SUBJECT TO APPROVAL BY THE CITY OF PALM COAST.

25. ALL PRACTICAL AND NECESSARY EFFORT SHALL BE TAKEN DURING CONSTRUCTION TO PREVENT UNNECESSARY TREE REMOVAL.

26. ALL ELEVATIONS SHOWN ON THESE DRAWINGS REFER TO NORTH AMERICAN VERTICAL DATUM (NAVD) 1988.

27. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS FOR APPROVAL BY THE CITY OF PALM COAST PRIOR TO PROCUREMENT.

28. THE CONTRACTOR SHALL VIDEO THE ENTIRE WORK AREA PRIOR TO COMMENCEMENT OF CONSTRUCTION. ONE COPY OF THE PRE–CONSTRUCTION VIDEO SHALL BE SUBMITTED TO THE CITY OF PALM COAST.

29. PIPE MEASUREMENTS ON THE MAIN "TRUNK" SEWER SHALL BE FROM CENTER TO CENTER OF MANHOLES OR CLEANOUTS, UNLESS OTHERWISE NOTED.

30. PIPE MEASUREMENTS FOR SERVICE LATERALS SHALL BE FROM THE MAIN "TRUNK" SEWER TO THE PROPERTY LINE. THE DEPTH OF THE LATERAL AT THE PROPERTY LINE SHALL BE MEASURED AND RECORDED ON THE RECORD DRAWINGS.

31. TESTING OF GRAVITY SEWER SYSTEMS AND MANHOLES SHALL FOLLOW THE REQUIREMENTS FOUND WITHIN THE SPECIFICATIONS.

32. CONFLICT BETWEEN WATER MAINS, STORM AND REUSE SYSTEMS AND PROPOSED SANITARY SEWER MAINS SHALL BE RESOLVED BY ADJUSTING THE PRESSURE MAINS AS NECESSARY. SEE "UTILITY SEPARATION DETAIL" AND ACCOMPANYING NOTES AS SHOWN ON THE CIVIL DETAIL (CD) SHEETS OF THE PLAN SET.

33. ALL EXCAVATIONS SHALL BE BACKFILLED AT THE END OF EACH WORK DAY.

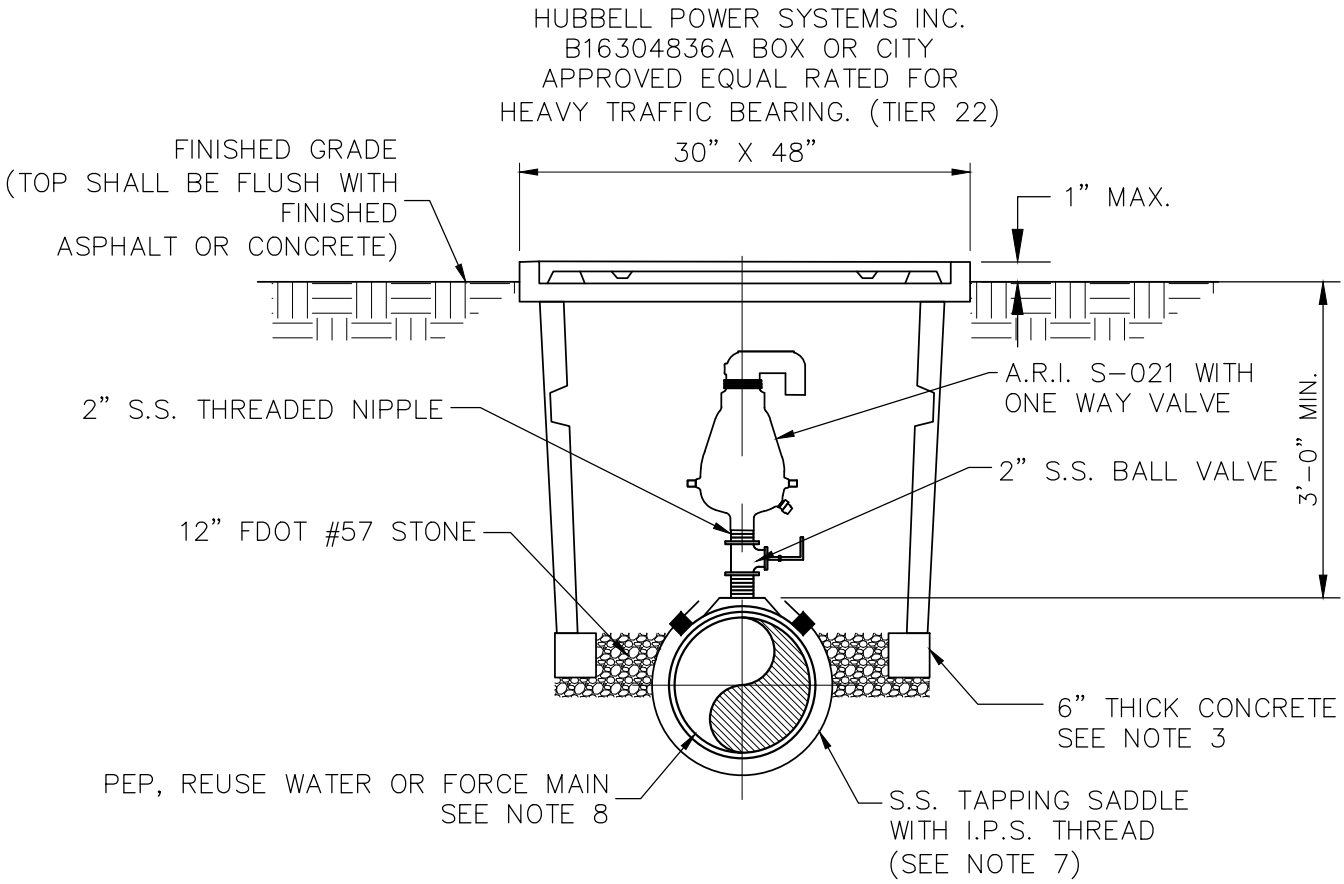
34. FOR A SCHEDULED INTERRUPTION OF SANITARY SEWER MAIN FLOW, THE CONTRACTOR SHALL PROVIDE TO THE CITY OF PALM COAST FOR REVIEW A WRITTEN SCHEDULE AS TO THE METHOD AND DURATION OF FLOW INTERRUPTION.

35. THE CITY OF PALM COAST SHALL REVIEW THE SUBMITTAL AND SHALL INFORM THE CONTRACTOR REGARDING APPROVAL OR DENIAL OF THEIR REQUEST. IF THEIR REQUEST IS REJECTED BY THE CITY OF PALM COAST, THE CONTRACTOR MAY RESUBMIT THEIR REQUEST MODIFYING IT TO THE SATISFACTION OF THE OWNER. ALL CONNECTIONS SHALL BE MADE ONLY ON THE AGREED UPON TIME AND DATE ESTABLISHED IN THE SUBMITTAL.

36. DURING NORMAL SANITARY SEWER MAIN FLOW INTERRUPTION, THE CONTRACTOR SHALL PROVIDE UNINTERRUPTED BY–PASS FLOW AND SHALL PROVIDE ALL EQUIPMENT NECESSARY TO ACCOMPLISH THE SAME IN THE FORM OF, BUT NOT LIMITED TO, THE FOLLOWING: POWER, PUMPS, PIPING, APPURTENANT VALVES AND FITTINGS AND/OR SEPTIC TANKER TRUCK PUMPING, HAULING AND DISPOSAL SERVICES.

37. ALL BURIED UTILITY PIPES TO BE ABANDONED IN PLACE SHALL BE CUT, PLUGGED AND FILLED WITH GROUT.

38. IT IS THE INTENT OF THIS CONTRACT FOR THE CONTRACTOR TO MAINTAIN CONTINUOUS RESTORATION BEHIND THE UTILITY WORK ON A DAILY BASIS. NO MORE THAN FIFTY (50) LINEAR FEET OF UNRESTORED LINE WORK SHALL REMAIN AT THE END OF EACH WORK DAY.



NOTES:

1. ABOVE DETAIL IS BASED UPON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVES SHALL BE CENTERED IN THE BOX.

3. CONCRETE SHALL BE 8" WIDE AND EXTEND THE FULL LENGTH OF THE BOX. PLACE 6"-8" OF NO. 57 STONE UNDER THE SLABS.

4. TOP OF BOX SHALL BE CLEARLY AND PERMANENTLY LABELED FOR THE APPROPRIATE UTILITY MAIN.

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 HUBBELL POWER SYSTEM GROUP, BOX #B-14-3636-48 OR CITY APPROVED EQUIVALENT RATED FOR HEAVY TRAFFIC BEARING.

7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

8. WHEN USED FOR FORCE MAIN, THIS VAULT WILL SERVE AS A COMPACT STRUCTURE TO BE USED WHEN THE VAULT IN FIG. SS-6 AND SS-6A IS NOT FEASIBILE.

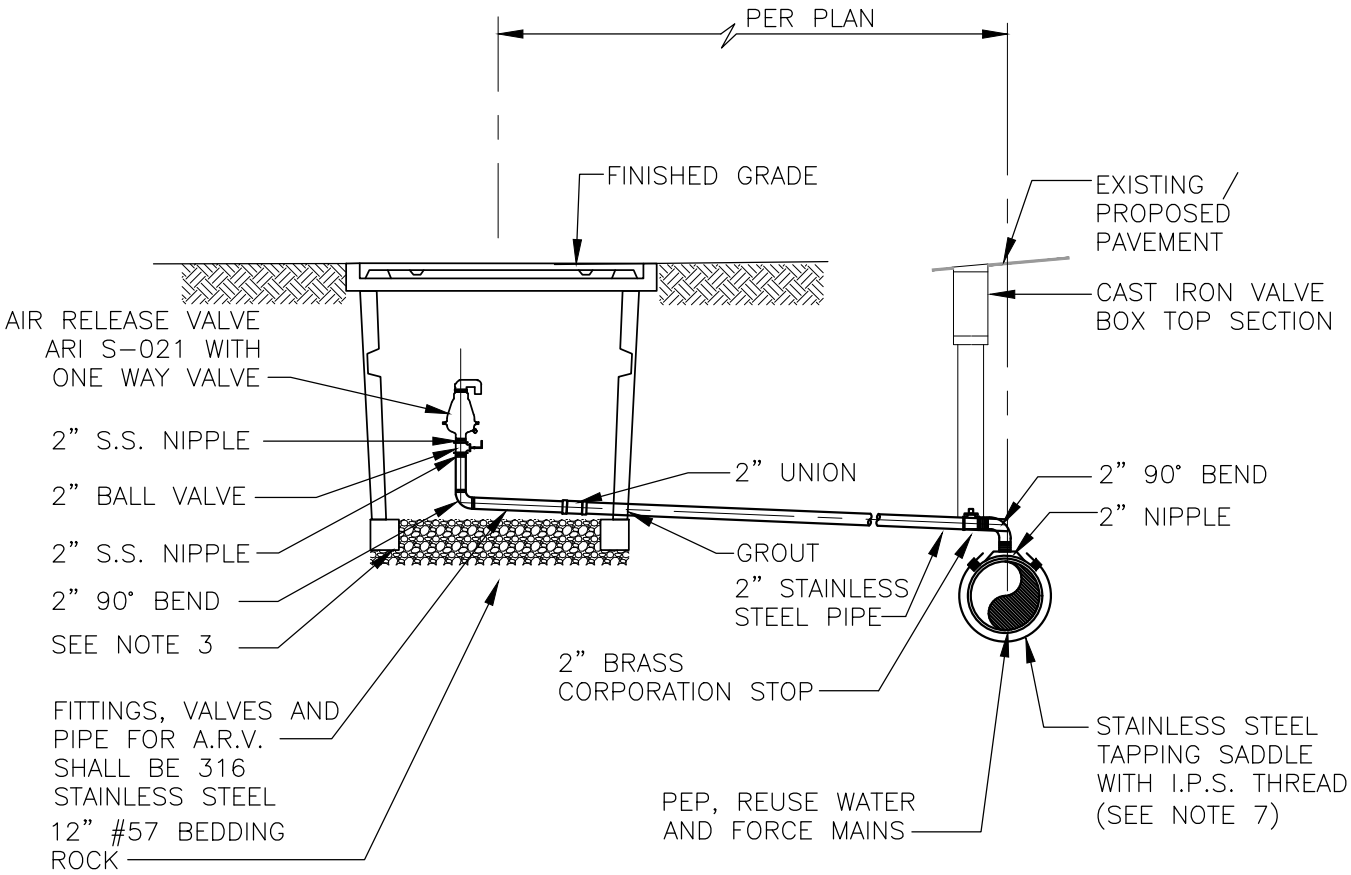
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

AIR RELEASE VALVE DETAIL FOR PEP, REUSE WATER AND FORCE MAINS

SCALE: NONE

FIG. SS-5

REVISED 7/22



NOTES:

1. ABOVE DETAIL IS BASED UPON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVES SHALL BE CENTERED IN THE BOX.

3. CONCRETE SHALL BE 8" WIDE AND EXTEND THE FULL LENGTH OF THE BOX. PLACE 6"-8" OF NO. 57 STONE UNDER THE SLABS.

4. TOP OF BOX SHALL BE CLEARLY AND PERMANENTLY LABELED FOR THE APPROPRIATE UTILITY MAIN.

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 HUBBELL POWER SYSTEM GROUP, BOX #B-14-3636-48 OR CITY APPROVED EQUIVALENT RATED FOR HEAVY TRAFFIC BEARING.

7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

8. WHEN USED FOR FORCE MAIN, THIS VAULT WILL SERVE AS A COMPACT STRUCTURE TO BE USED WHEN THE VAULT IN FIG. SS-6 AND SS-6A IS NOT FEASIBLE.

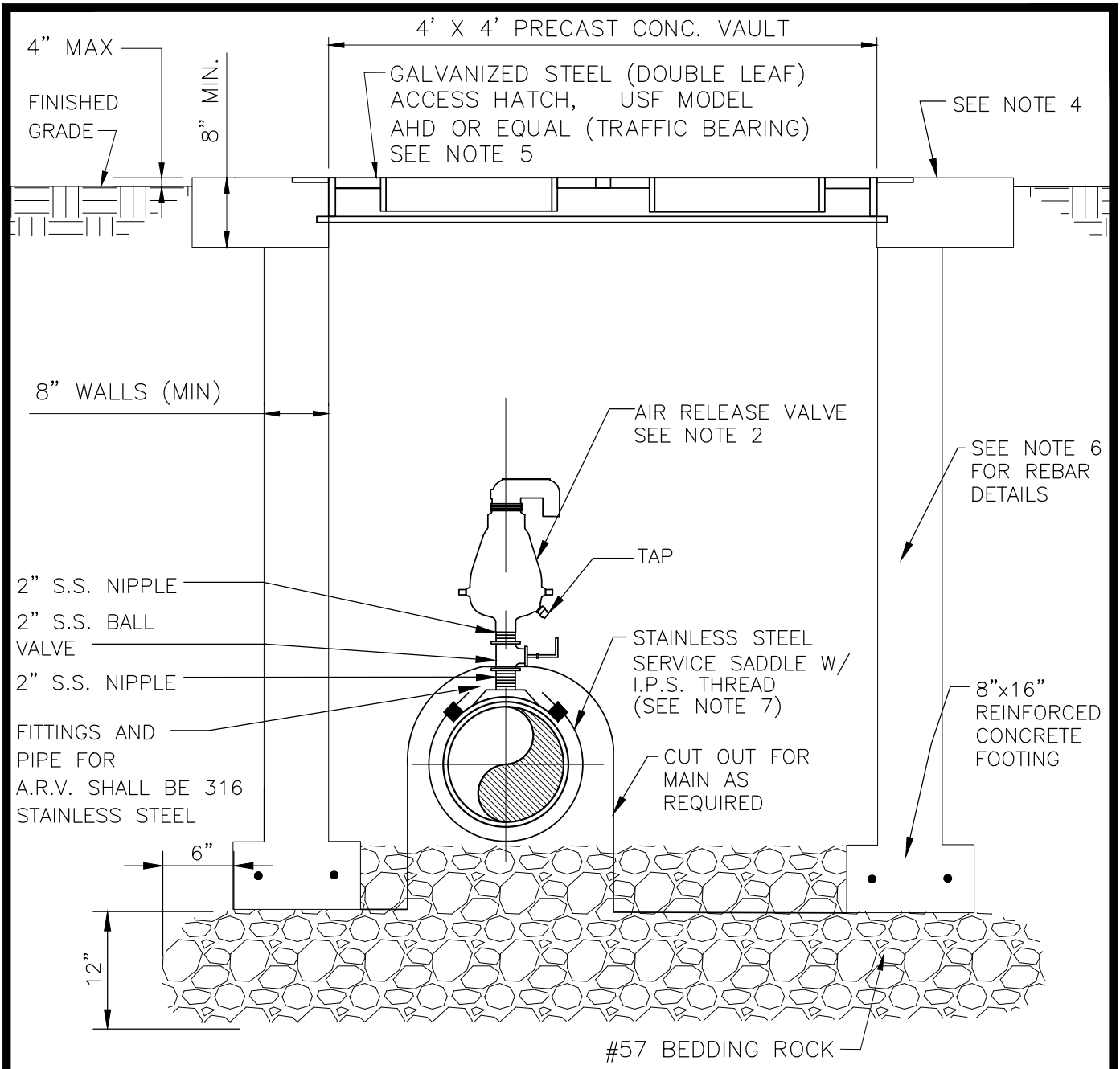
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

OFFSET AIR RELEASE VALVE DETAIL FOR PEP, REUSE WATER AND FORCE MAINS

SCALE: NONE

FIG. SS-5A

REVISED 7/22



NOTES:

1. ABOVE DETAIL IS BASED ON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.
2. THE VALVE SHALL BE ARI D-025P WITH ONE WAY VALVE.
3. THIS DETAIL TO BE USED FOR FORCE MAINS ONLY.
4. TOP SLAB SHALL BE 6'-0" X 6'-0" AND REINFORCED WITH #6 @ 6" OCEW
5. HATCH SHALL BE 4'-0" X 4'-0" AND HOT-DIPPED GALVANIZED.
6. BASE SLAB AND WALLS SHALL CONTAIN 4"X4", W4.1/W4.1 WWM & #3@ 10" OCEW.
7. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.
8. IN APPLICATIONS WHERE THE VAULT IS NOT FEASIBLE FOR INSTALLATION, REFER TO THE DETAILS SHOWN ON FIG. SS-5 AND FIG. SS-5A.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

AIR RELEASE VALVE DETAIL FOR FORCE MAINS

SCALE: NONE

FIG. SS-6

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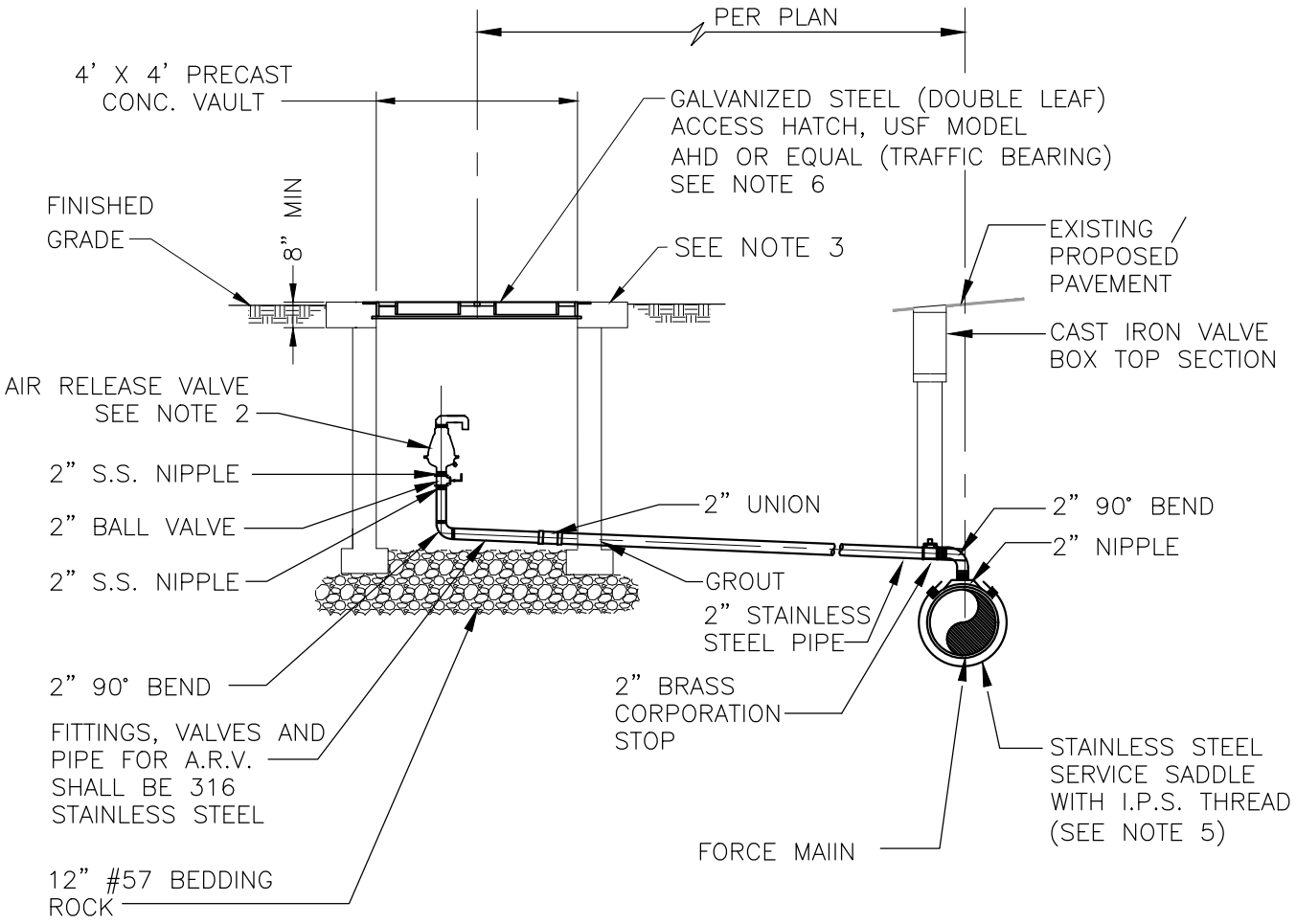


NOTES:

1. ABOVE DETAIL IS BASED ON 2" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY OF PALM COAST PRIOR TO INSTALLATION.

2. VALVE SHALL BE ARI D-025P W/ONE WAY VALVE OR APPROVED EQUIVALENT.

3. TOP SLAB SHALL BE 6'-0" x 6'-0".

4. THIS DETAIL TO BE USED FOR FORCE MAINS ONLY.

5. ALL COMPONENTS OF THE TAPPING SADDLE SHALL BE STAINLESS STEEL.

6. HATCH SHALL BE 4'-0" X 4'-0" AND HOT-DIPPED GALVANIZED.

7. IN APPLICATIONS WHERE THE VAULT IS NOT FEASIBLE FOR INSTALLATION, REFER TO THE DETAILS SHOWN ON FIG. SS-5 AND FIG. SS-5A.

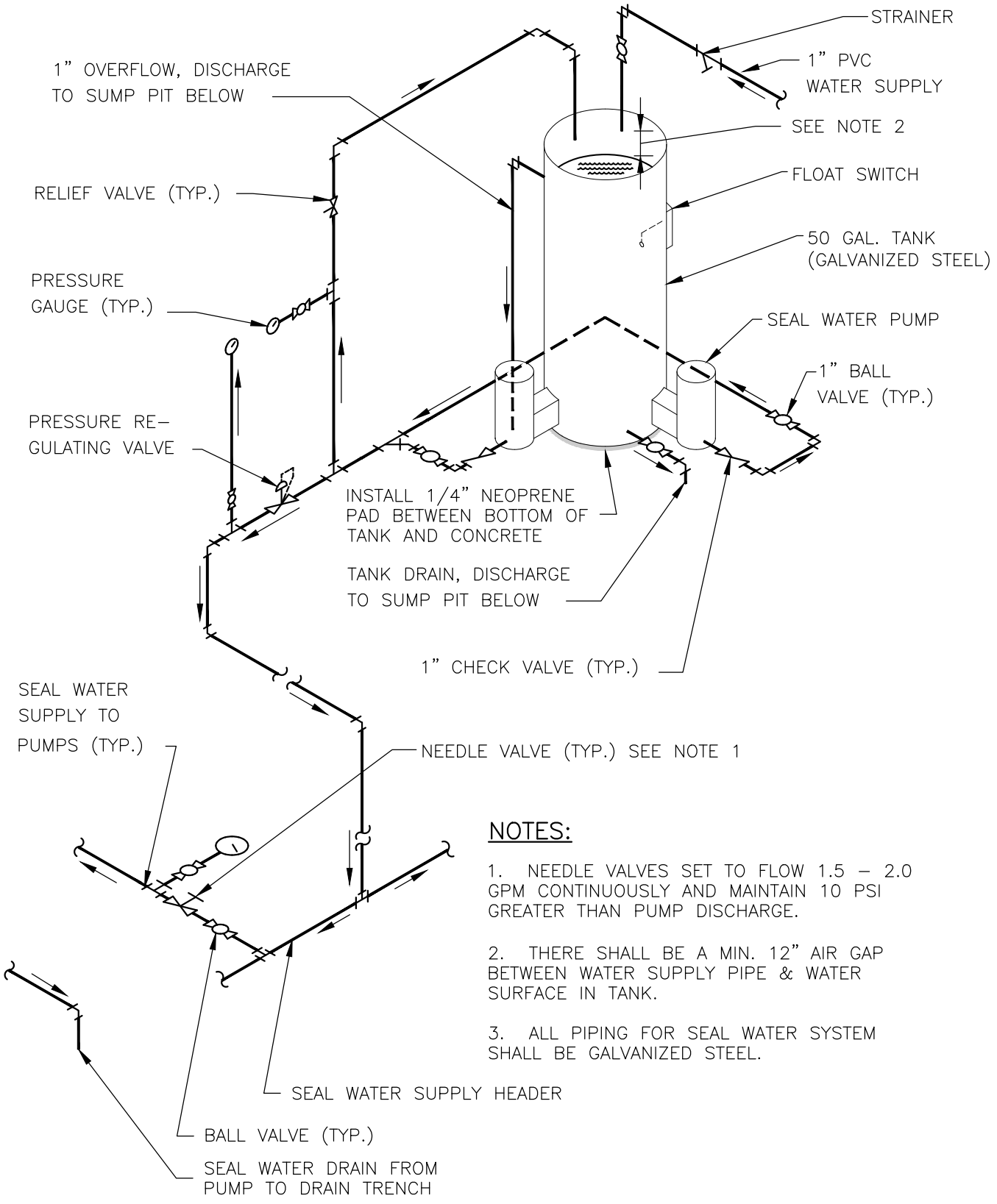
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

OFFSET AIR RELEASE VALVE DETAIL FOR FORCE MAINS

SCALE: NONE

FIG. SS-6A

REVISED 7/22



NOTES:

1. NEEDLE VALVES SET TO FLOW 1.5 – 2.0 GPM CONTINUOUSLY AND MAINTAIN 10 PSI GREATER THAN PUMP DISCHARGE.

2. THERE SHALL BE A MIN. 12" AIR GAP BETWEEN WATER SUPPLY PIPE & WATER SURFACE IN TANK.

3. ALL PIPING FOR SEAL WATER SYSTEM SHALL BE GALVANIZED STEEL.

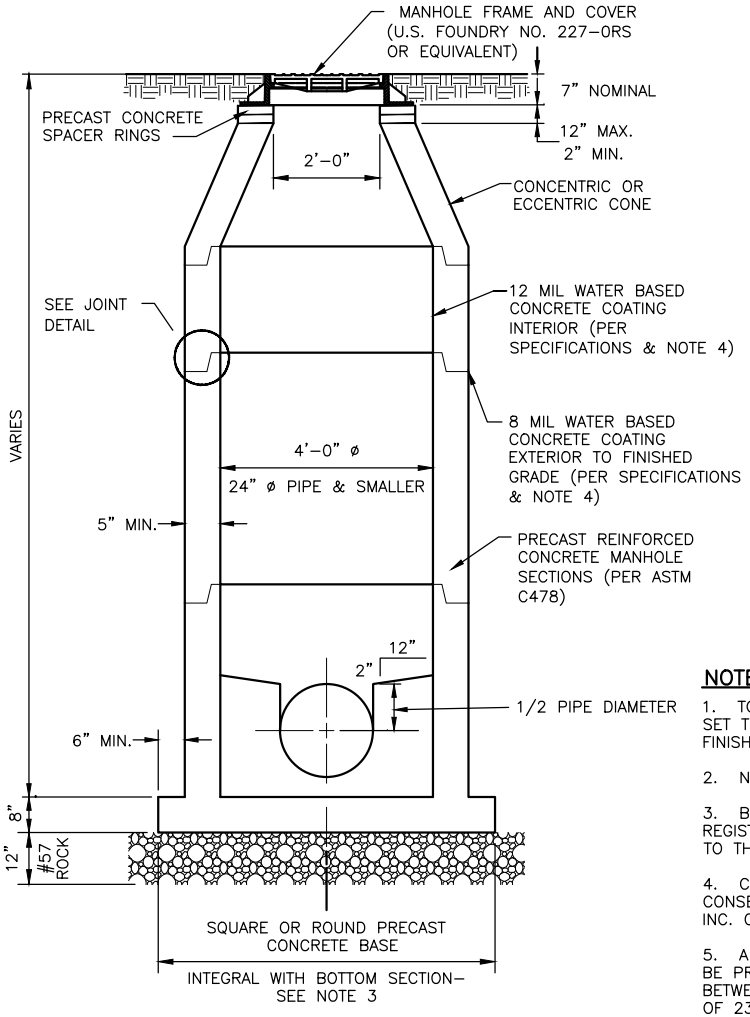
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

SEAL WATER SCHEMATIC DETAIL

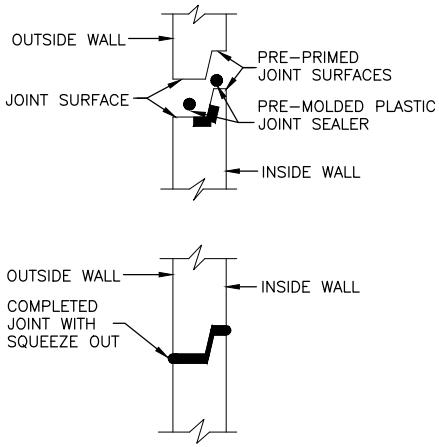
SCALE: NONE

FIG. SS–7

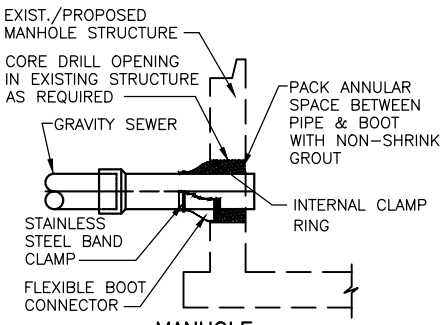
REVISED 1/07



PRECAST CONCRETE
MANHOLE (CONCENTRIC)



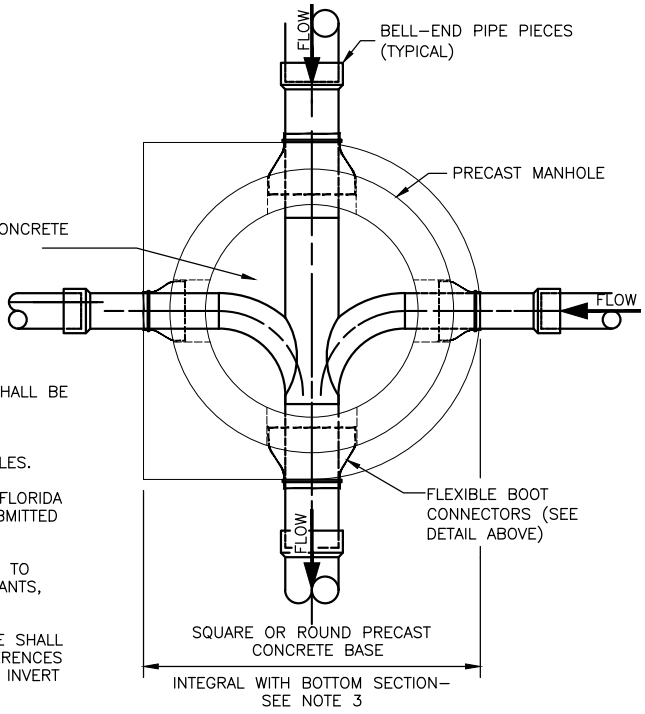
JOINT DETAIL
PRECAST SECTIONS



MANHOLE
CONNECTION DETAIL

NOTES:

1. TOPS OF MANHOLE FRAME AND COVERS SHALL BE SET TO THE FINISHED ROADWAY ELEVATION, FINISHED GRADE OR AS OTHER–WISE NOTED.
2. NO PENETRATING HOLES THROUGH MANHOLES.
3. BOTTOM SLAB SHALL BE DESIGNED BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER AND SUBMITTED TO THE CITY FOR REVIEW.
4. CONCRETE COATING SHALL BE EQUIVALENT TO CONSEAL CS–55 AS MFD. BY CONCRETE SEALANTS, INC. COATING SHALL BE GRAY.
5. A CONCRETE FILLET, SLIDE OR PVC FLUME SHALL BE PROVIDED WITHIN THE MANHOLE FOR DIFFERENCES BETWEEN THE INFLUENT SEWER AND MANHOLE INVERT OF 23 INCHES OR LESS.



TYPICAL MANHOLE PLAN

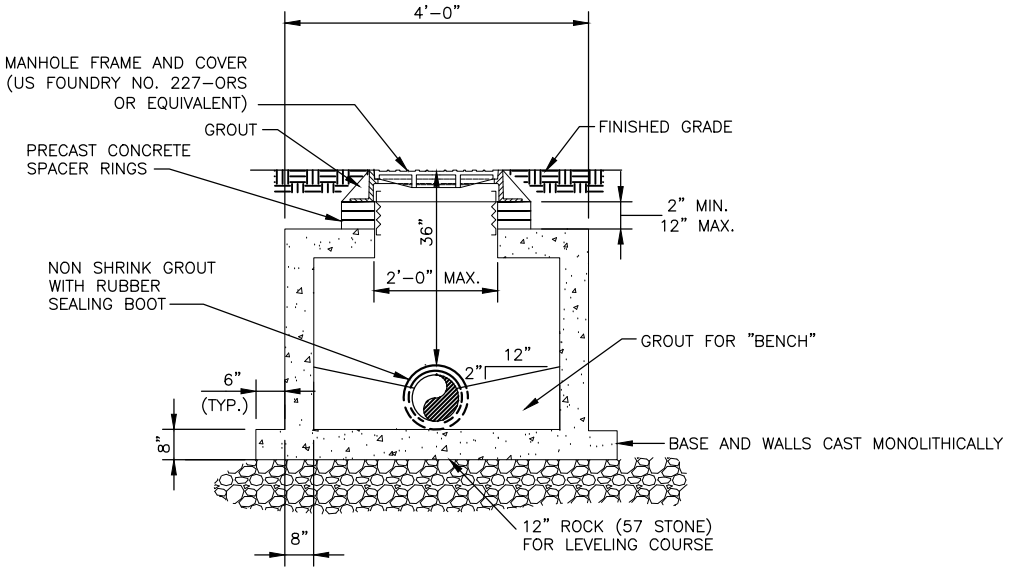
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

STANDARD MANHOLE DETAIL

SCALE: NONE

FIG. SS–8

REVISED 7/14



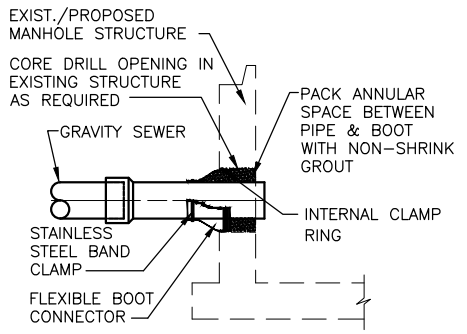
SECTION VIEW

NOTES:

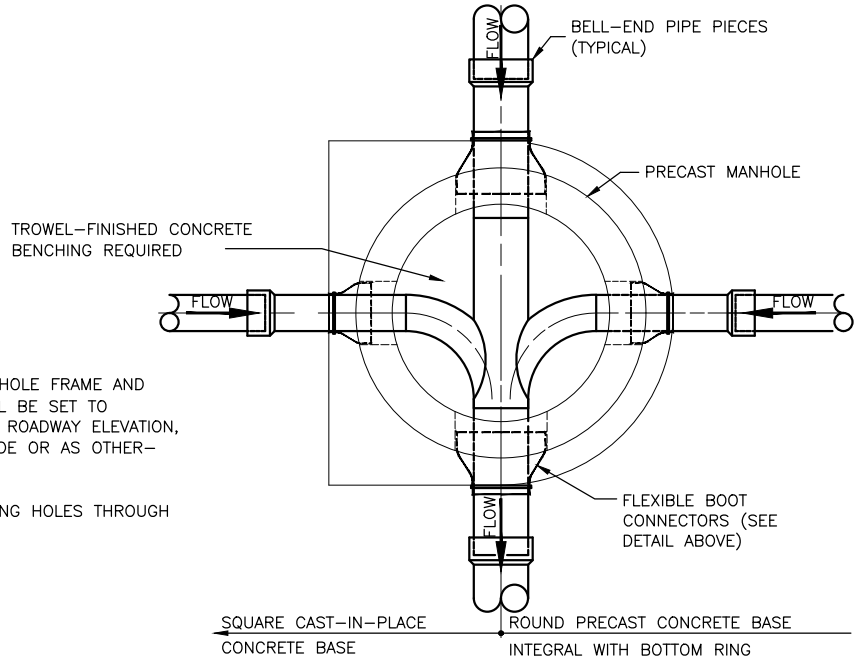
1. THE INTERIOR AND EXTERIOR OF MANHOLE SHALL BE GIVEN THREE COATS/TWO COATS (EACH COAT 4 MILS) RESPECTIVELY, OF A WATER-BASED CONCRETE COATING EQUIV. TO CONSEAL CS-55 AS MF'D BY CONCRETE SEALANTS, INC. DO NOT COAT JOINT OR PIPE OPENING SURFACES.
2. PRECAST MANHOLE SECTION TO BE MFR'D. IN ACCORDANCE WITH LATEST EDITIONS OF ASTM C478 WITH 4000 PSI CONCRETE, TYPE II CEMENT.

NOTES:

1. TOPS OF MANHOLE FRAME AND COVERS SHALL BE SET TO THE FINISHED ROADWAY ELEVATION, FINISHED GRADE OR AS OTHER-WISE NOTED.
2. NO PENETRATING HOLES THROUGH MANHOLES.



MANHOLE
CONNECTION DETAIL



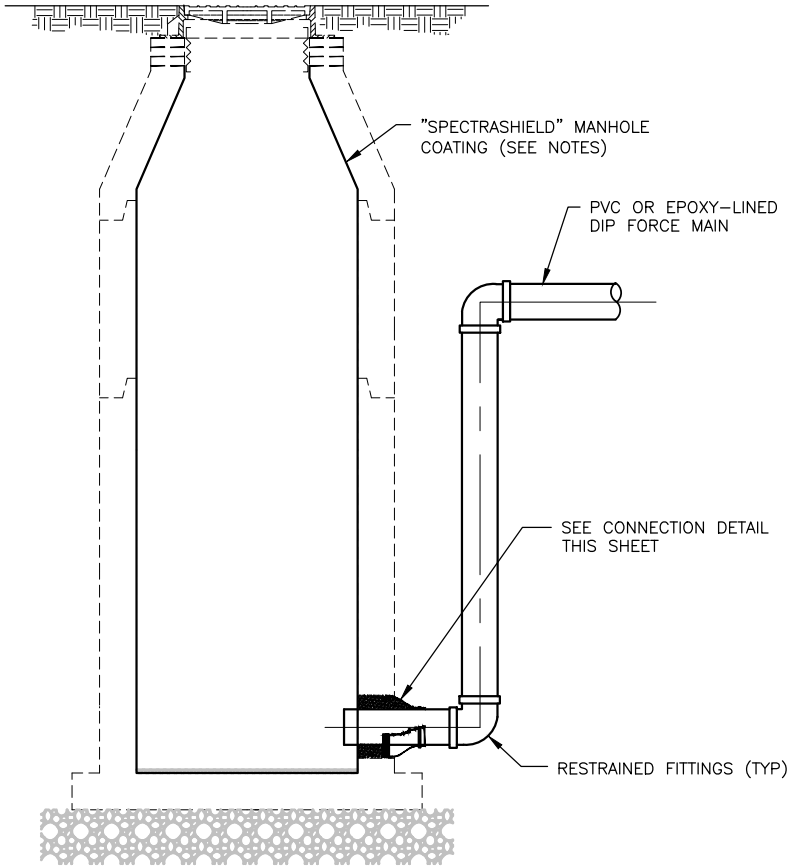
TYPICAL MANHOLE PLAN

SHALLOW MANHOLE DETAIL

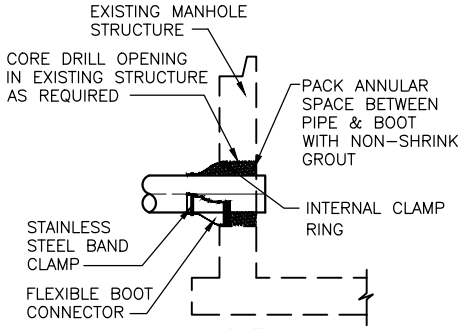
SCALE: NONE

FIG. SS-9

REVISED 7/07



EXISTING CONCRETE MANHOLE



MANHOLE CONNECTION DETAIL

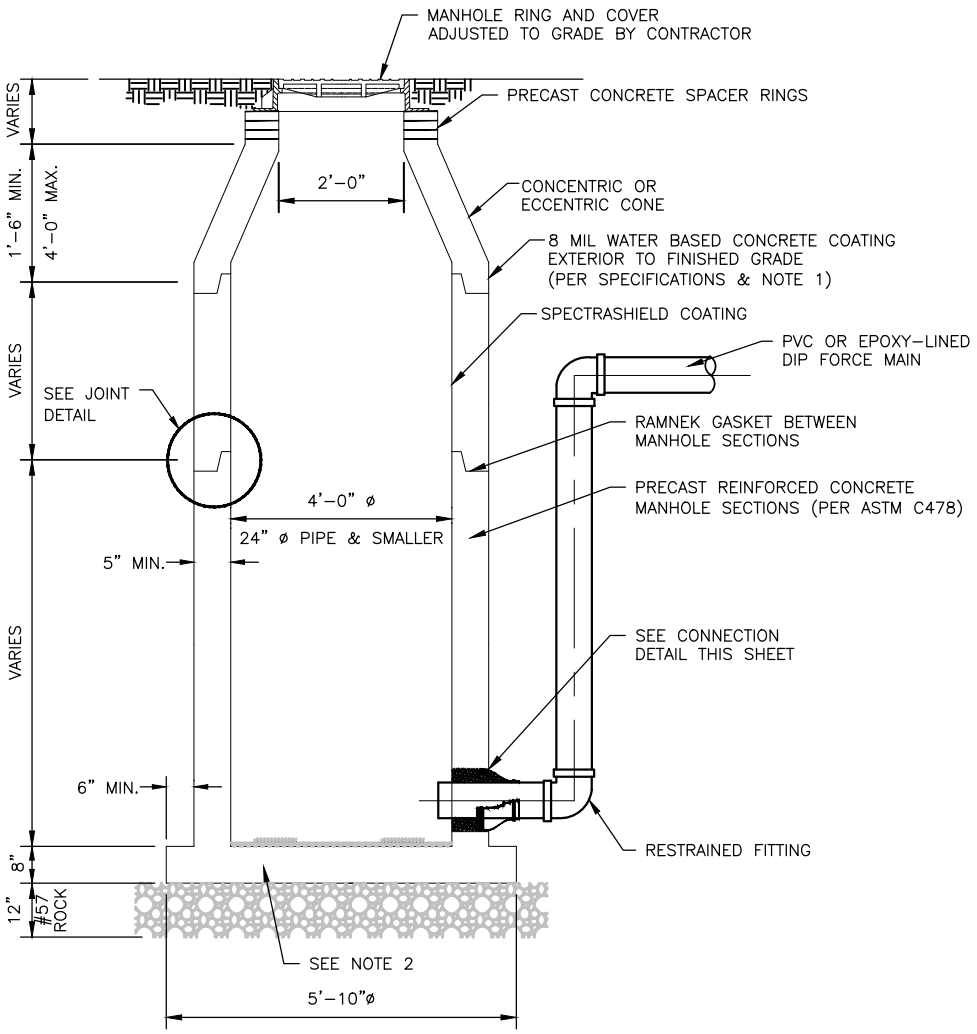
NOTE:
1. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR WALL/STRUCTURE PREPARATION.
2. APPLICATOR SHALL BE APPROVED BY THE COATING MFR.

EXISTING MANHOLE WHICH RECEIVES FORCE MAIN FLOW DETAIL LESS THAN 6' DEEP

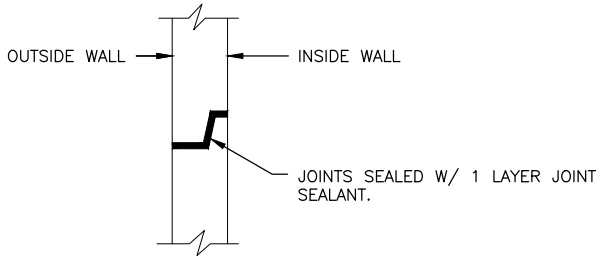
SCALE: NONE

FIG. SS-10

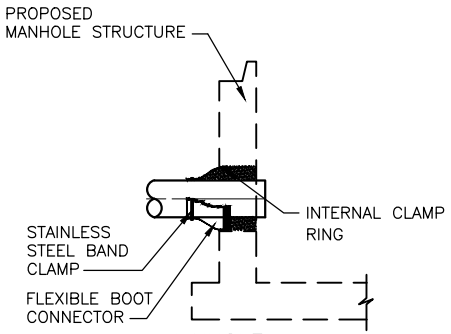
REVISED 7/14



PRECAST CONCRETE MANHOLE
(CONCENTRIC)



JOINT DETAIL



MANHOLE
CONNECTION DETAIL

NOTES:

1. CONCRETE COATING SHALL BE EQUIVALENT TO CONSEAL CS-55 AS MFD. BY CONCRETE SEALANTS, INC. COATING SHALL BE GRAY.

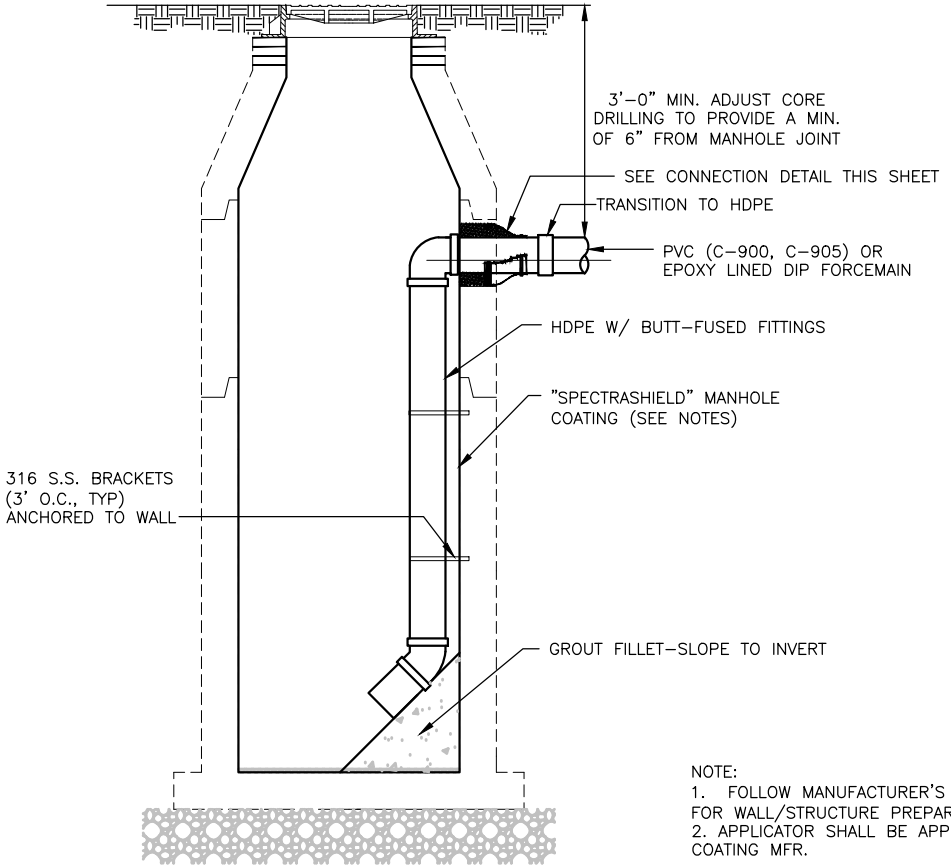
2. BOTTOM SLAB SHALL BE DESIGNED BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER AND SUBMITTED TO THE CITY FOR REVIEW.

PROPOSED MANHOLE WHICH RECEIVES FORCE MAIN FLOW DETAIL LESS THAN 6' DEEP

SCALE: NONE

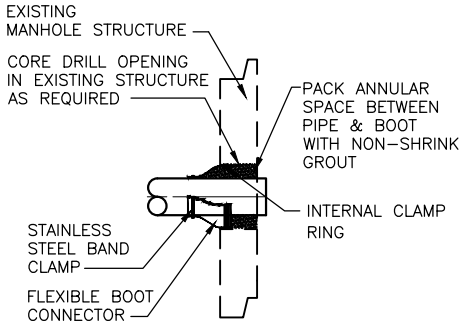
FIG. SS-11

REVISED 7/14



EXISTING CONCRETE MANHOLE

NOTE:
1. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR WALL/STRUCTURE PREPARATION.
2. APPLICATOR SHALL BE APPROVED BY THE COATING MFR.



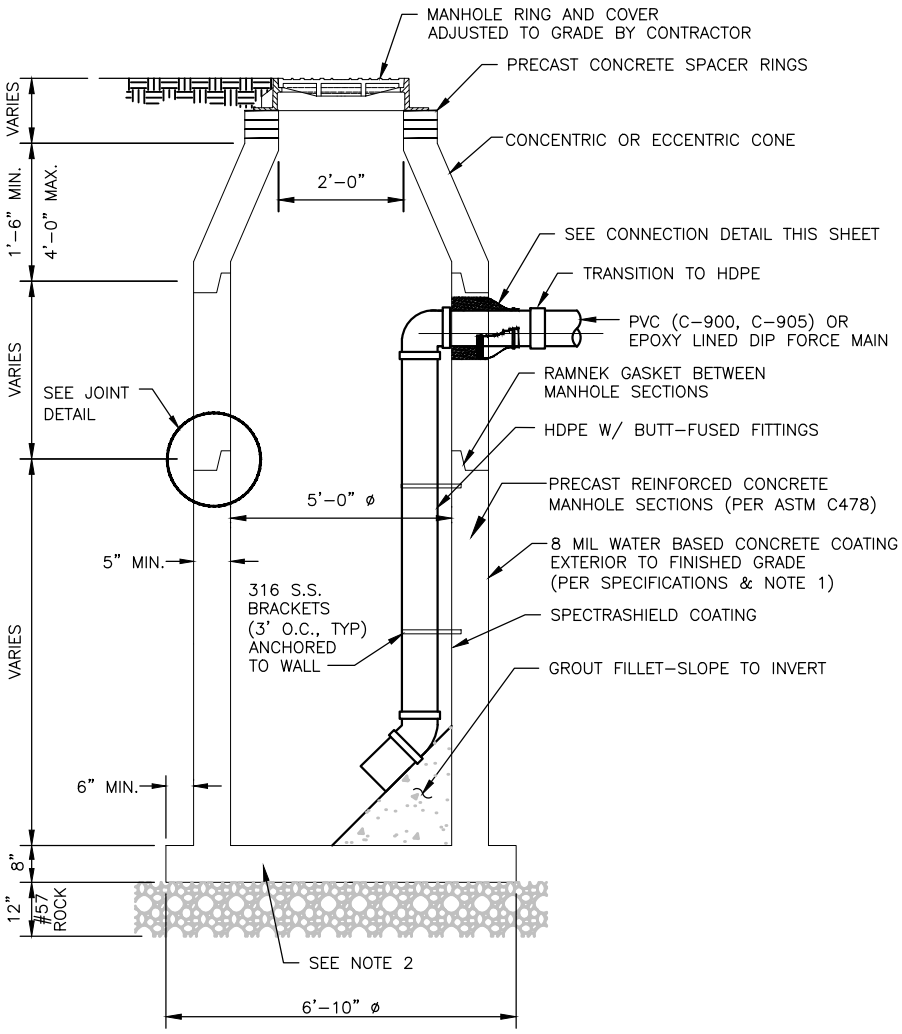
MANHOLE CONNECTION DETAIL

EXISTING MANHOLE WHICH RECEIVES FORCE MAIN FLOW DETAIL GREATER THAN 6' DEEP

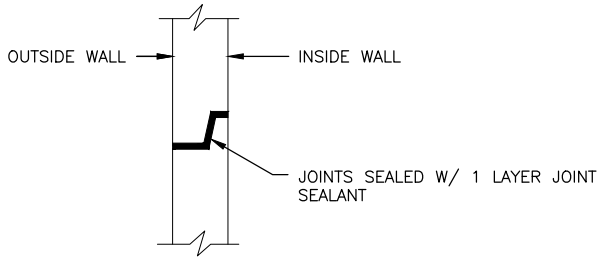
SCALE: NONE

FIG. SS-12

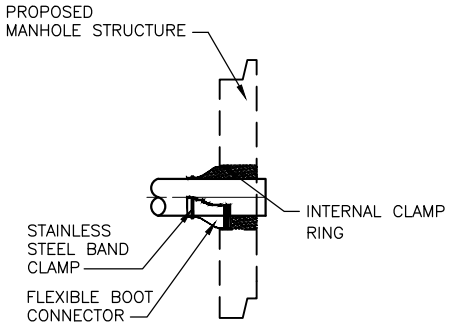
REVISED 7/14



PRECAST CONCRETE MANHOLE
(CONCENTRIC)



JOINT DETAIL



MANHOLE
CONNECTION DETAIL

NOTES:

1. CONCRETE COATING SHALL BE EQUIVALENT TO CONSEAL CS-55 AS MFD. BY CONCRETE SEALANTS, INC. COATING SHALL BE GRAY.

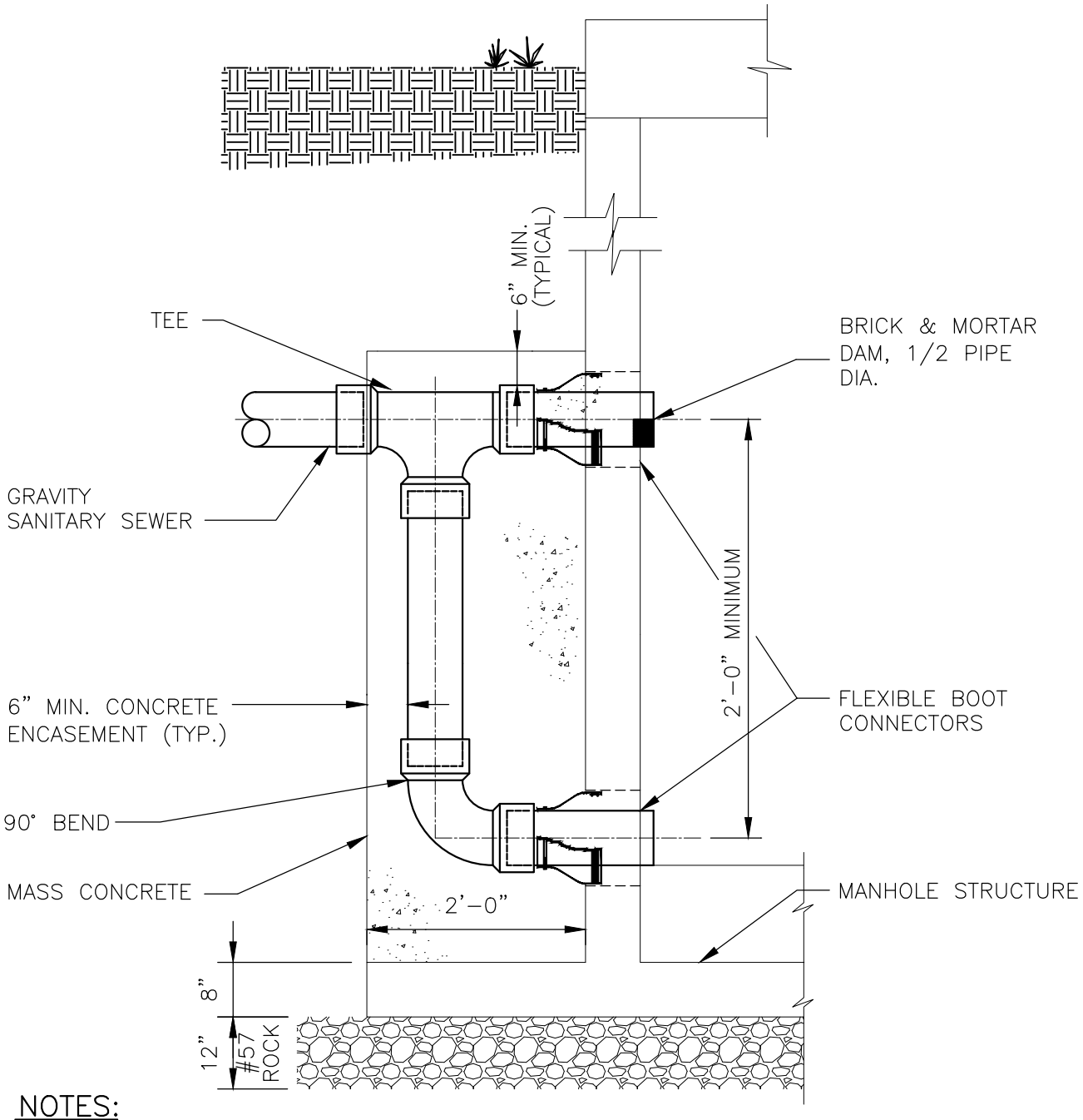
2. BOTTOM SLAB SHALL BE DESIGNED BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER AND SUBMITTED TO THE CITY FOR REVIEW.

PROPOSED MANHOLE WHICH RECEIVES FORCE MAIN FLOW DETAIL GREATER THAN 6' DEEP

SCALE: NONE

FIG. SS-13

REVISED 7/14



NOTES:

1. MASS CONCRETE ENCASEMENT SHALL BE NO LESS THAN 2500 PSI CONCRETE.
2. DROP PIPE AND FITTINGS SHALL BE OF EQUAL SIZE AND MATERIALS AS THE INFLUENT SEWER.
3. AN OUTSIDE DROP CONNECTION SHALL BE REQUIRED FOR ALL INFLUENT CONNECTIONS WHICH HAVE A DIFFERENCE OF 2'-0" OR MORE BETWEEN INVERTS.
4. DROP MANHOLE SPECIFICATIONS SHALL BE IDENTICAL TO THE STANDARD MANHOLE DETAIL.

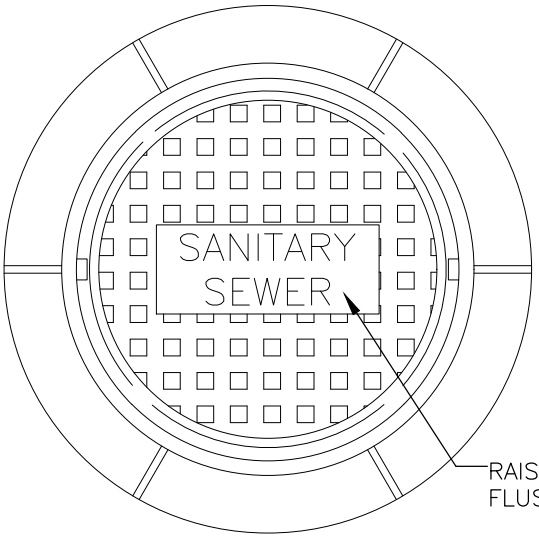
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

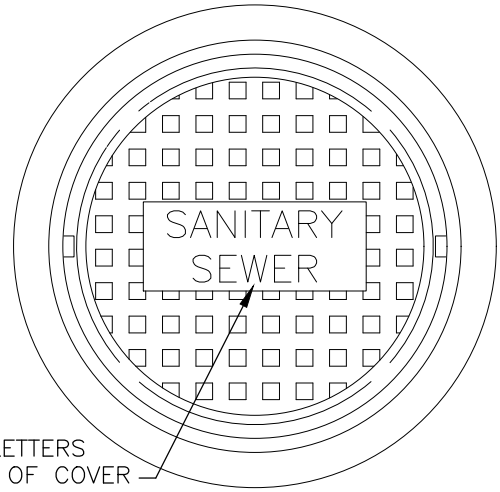
DROP MANHOLE DETAIL

SCALE: NONE

FIG. SS-14

REVISED 1/07

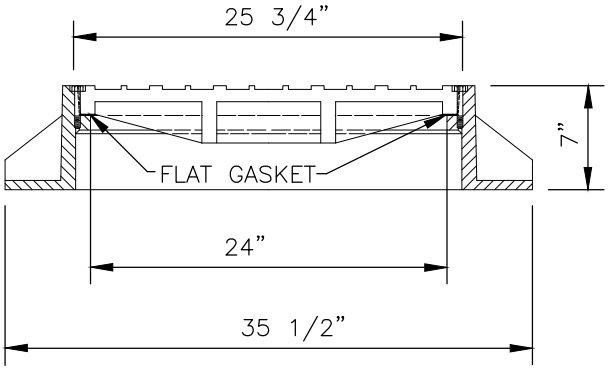


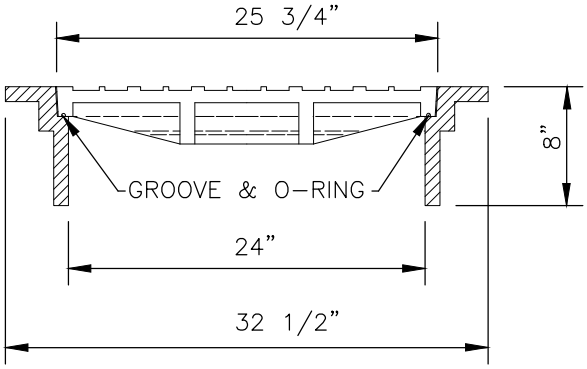


RAISED 1 1/2" LETTERS
FLUSH WITH TOP OF COVER

TYPE "A" MANHOLE FRAME AND COVER
(BUILT UP TYPE)

TYPE "B" MANHOLE FRAME AND COVER
(SLAB TYPE)





TYPE "A" SECTION

TYPE "B" SECTION

NOTES:

1. TYPE "A" & "B" NON-BOLTED WATERTIGHT RING & COVER. US FOUNDRY NO. 227-AS-ORS (TYPE "A") & U.S. FOUNDRY NO. 1295-AS-ORS (TYPE "B") OR APPROVED EQUAL.
2. MANHOLE COVERS SHALL BE LABELED AS SHOWN ABOVE.

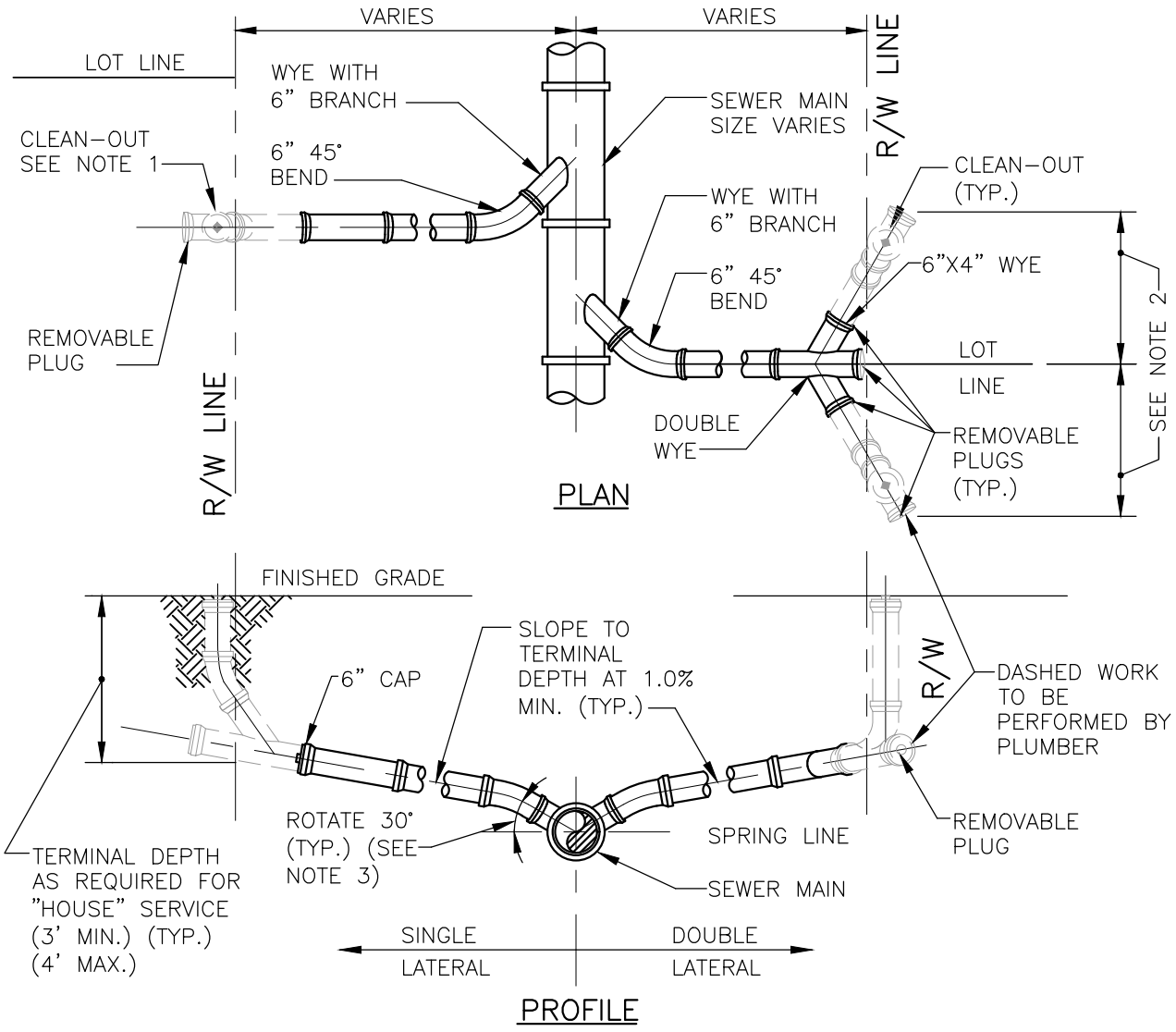
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

MANHOLE FRAME & COVER DETAIL

SCALE: NONE

FIG. SS-15

REVISED 1/07



NOTES:

1. CLEAN-OUT (SHOWN DASHED) SHALL BE INSTALLED BY THE PLUMBER TO FINAL CONFIGURATION IN ACCORDANCE WITH STANDARD PLUMBING CODE.

2. LOCATE DOUBLE LATERAL AS CLOSE TO LOT LINE AS POSSIBLE, 5' MAXIMUM.

3. INVERT OF SERVICE LATERAL SHALL NOT ENTER SEWER MAIN BELOW SPRING LINE.

4. DOUBLE SERVICE LATERAL TO BE USED ONLY WHEN BOTH BUILDING SLABS ARE NOT GREATER THAN 4-INCHES ELEVATION DIFFERENCE.

5. SERVICE LATERAL PIPING AND FITTINGS SHALL BE 6" SDR35 PVC UNLESS OTHERWISE NOTED.

6. INSTALL PRESSURE TREATED 4"x4", 8-FEET LONG, 3-FEET ABOVE GRADE, (TOP ONE-FOOT PAINTED GREEN) TO IDENTIFY LOCATION OF CLEANOUT(S) AT THE PROPERTY LINE.

7. ETCH A 3-INCH MINIMUM "S" IN THE CURB & GUTTER TO DENOTE SERVICE LOCATION.

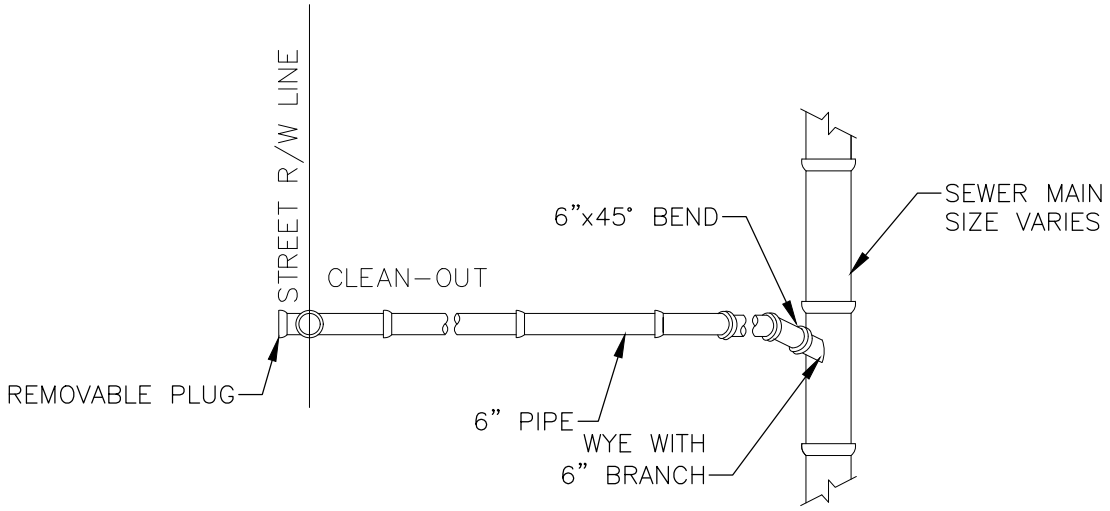
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

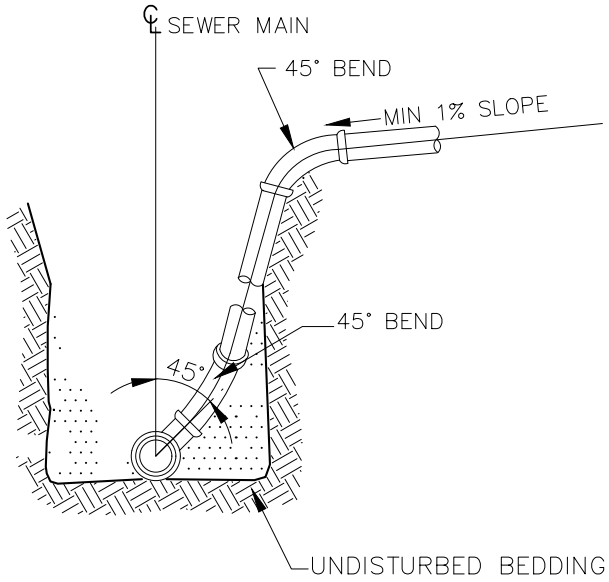
TYPICAL SERVICE LATERAL DETAIL SHALLOW CONNECTIONS

SCALE: NONE

FIG. SS-16

REVISED 2/16

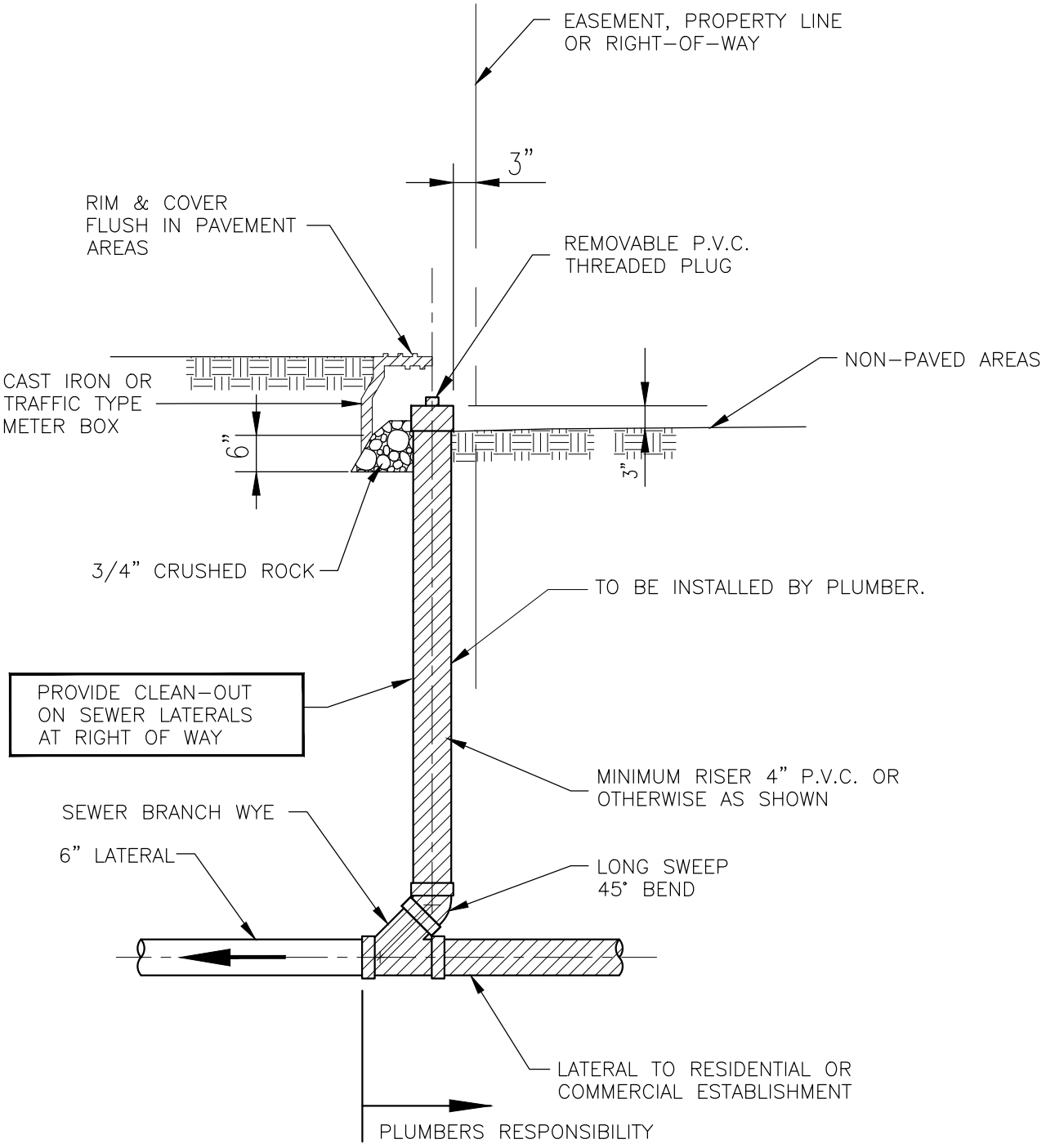




NOTES:

1. RISERS SHALL BE INSTALLED ON ALL WYES (BOTH PRESENT & FUTURE SERVICES) TO PROVIDE DEPTH AT SERVICE NOT OVER 4.0' EXCEPT WHERE OTHERWISE REQUIRED.
2. MINIMUM CUT UNDER ROADWAYS 4.0'; MINIMUM CUT AT PROPERTY LINE 3.0' OR AS REQUIRED FOR SERVICE.
3. RISERS SHALL PREFERABLY FOLLOW SLOPE OF BANK TO REQUIRED DEPTH.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999	TYPICAL SERVICE LATERAL DETAIL DEEP CONNECTIONS	SCALE: NONE FIG. SS-17 REVISED 3/09



NOTES:

1. DEPTH OF SERVICE AT PROPERTY LINE SHALL BE 3'-0" MIN. & 4'-0" MAX.

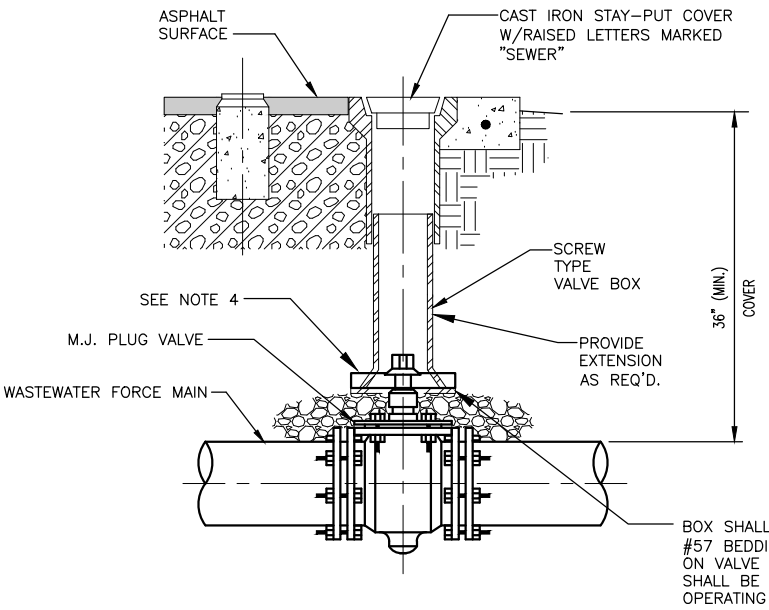
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

SEWER CLEAN OUT INSTALLATION DETAIL

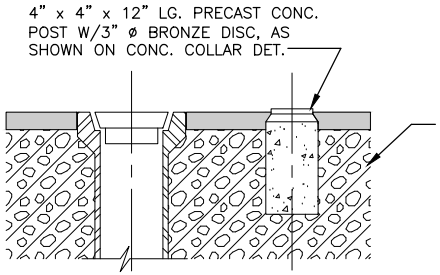
SCALE: NONE

FIG. SS-18

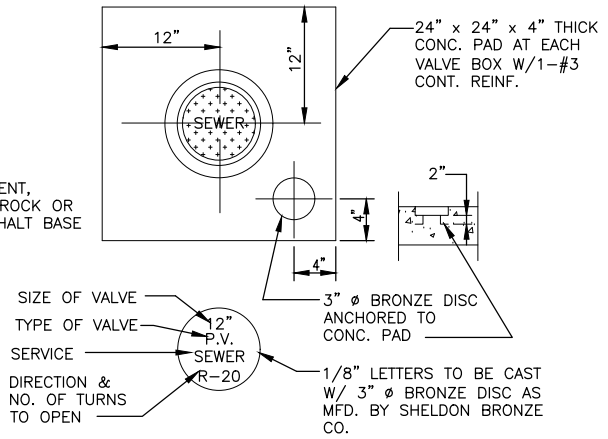
REVISED 1/07



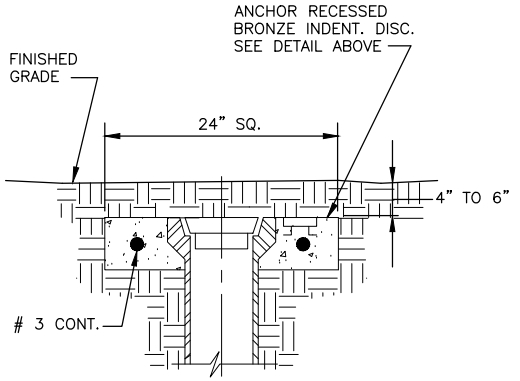
TYPE 1



TYPE 1 (PAVED AREAS)



TYPE 2



TYPE 2 (NON-PAVED AREAS)

NOTES:

1. WHERE AN EXTENSION IS REQUIRED, A 6" SDR 35 PVC EXTENSION SHALL BE USED ON VALVE BOX INSTALLATION.
2. VALVE COVER SHALL BE PAINTED FEDERAL SAFETY GREEN FOR WASTEWATER FORCE MAINS.
3. CONCRETE COLLAR SHALL BE CAST-IN-PLACE; PRECAST CONCRETE IS NOT ACCEPTABLE.
4. SELF-CENTERING ALIGNMENT RING EQUIVALENT TO AMERICAN FLOW CONTROL.
5. VALVES 6" AND SMALLER SHALL BE 1/4 TURN; VALVES 8" AND LARGER SHALL BE GEAR ACTUATED.

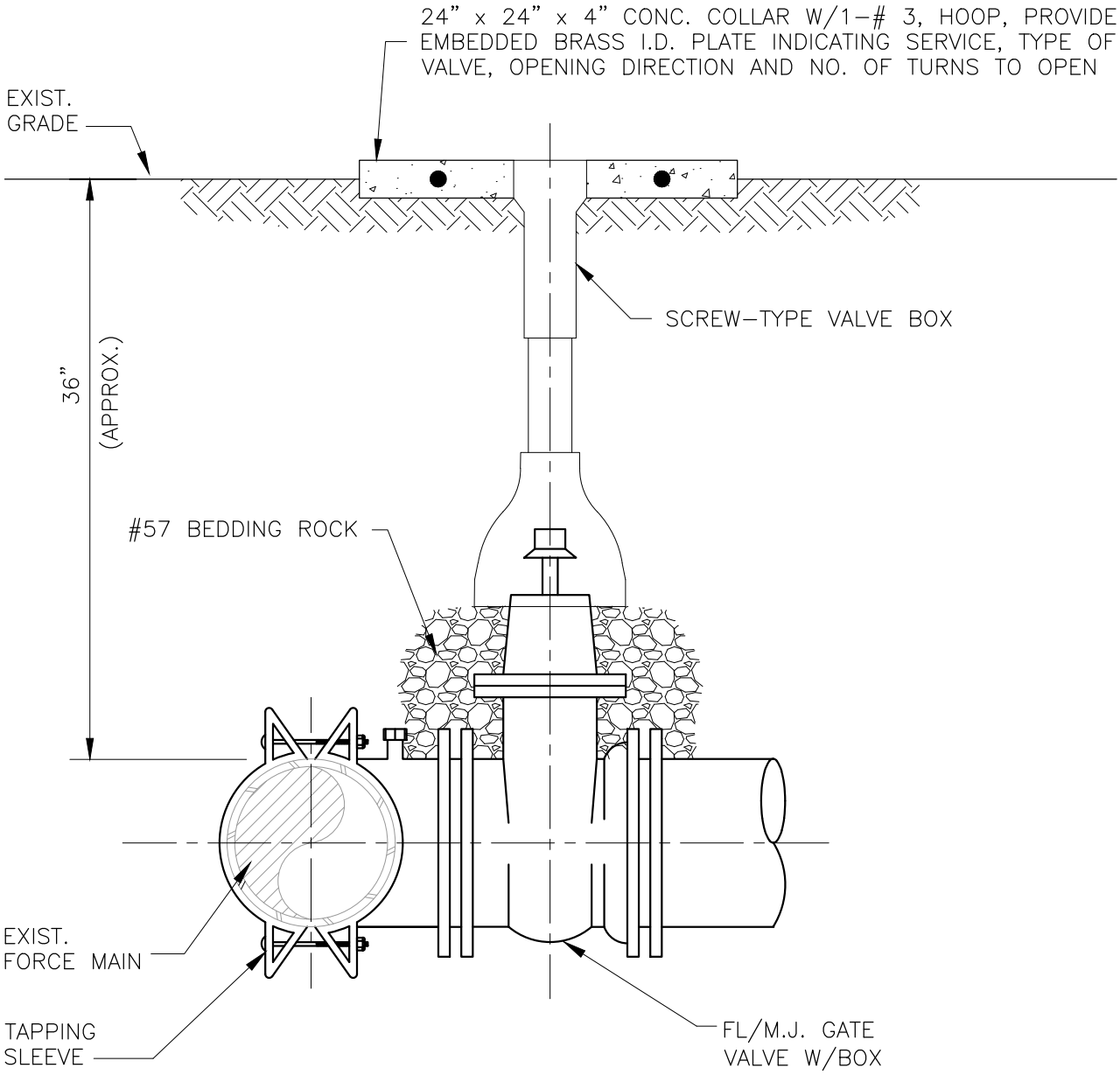
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

PLUG VALVE & BOX DETAIL FOR FORCE MAIN

SCALE: NONE

FIG. SS-19

REVISED 1/07



NOTES:

1. TAPPING VALVE SHALL BE A RESILIENT SEAT GATE VALVE, EPOXY COATED, INSIDE AND OUTSIDE.

2. TAPPING SLEEVES SHALL BE STAINLESS STEEL.

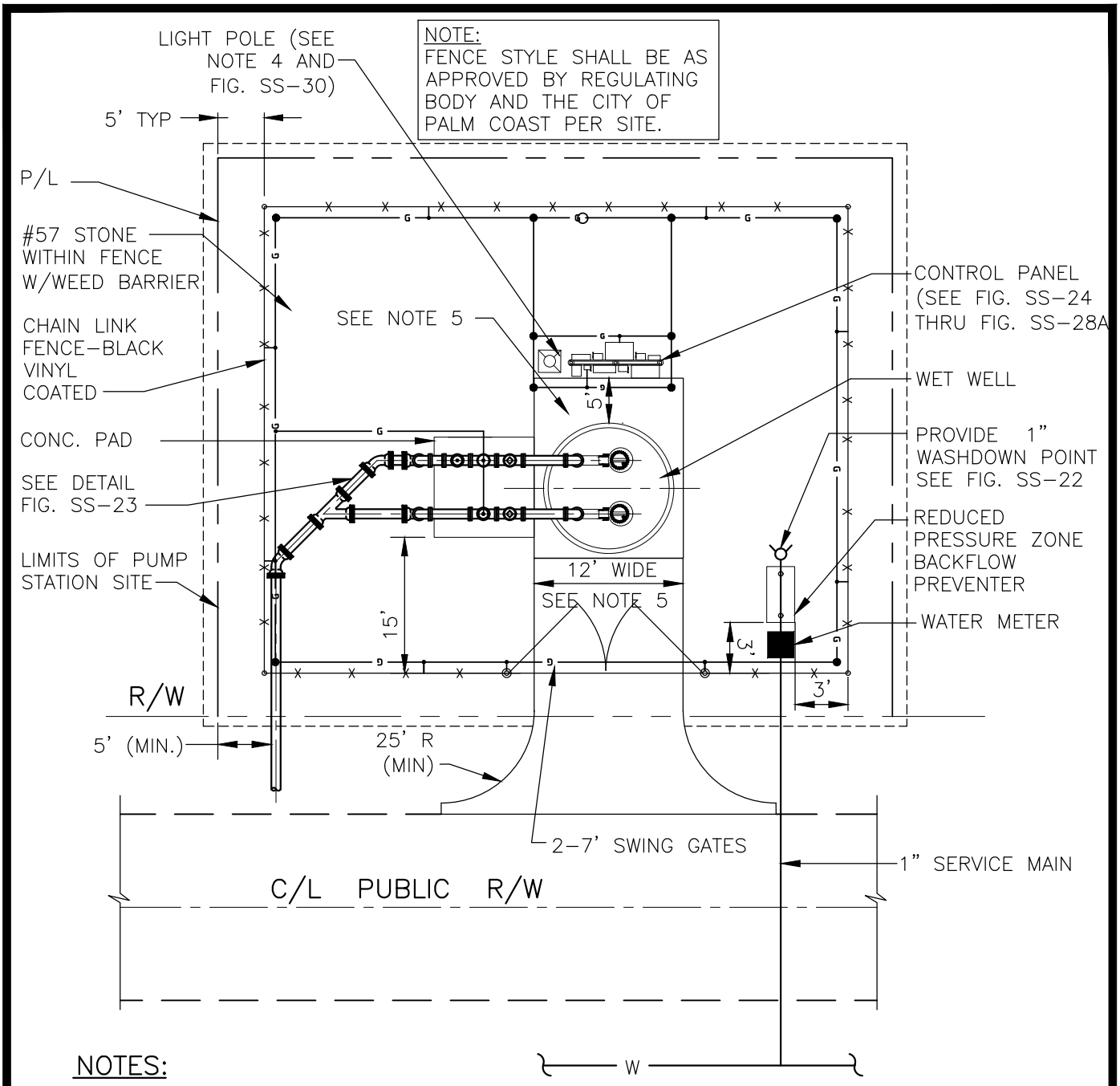
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

FORCE MAIN WET TAP DETAIL

SCALE: NONE

FIG. SS-20

REVISED 1/07



NOTES:

1. PUMP STATION SITE SHALL BE A MIN. OF 50'x50' FOR A DUPLEX STATION. SITE SHALL BE DEEDED TO THE CITY OF PALM COAST.
2. ENGINEER SHALL PROVIDE A SCALED (1" = 20' MIN.) SITE SPECIFIC DETAIL.
3. FENCE HEIGHT SHALL BE A MINIMUM OF 6 FEET ABOVE FINISHED GRADE.
4. POLE SHALL BE 12" SQUARE ALUMINUM DARK BRONZE POWDER COAT FINISH. THOMAS & BETTS "ALL-STRUCT" OR APPROVED EQUAL. SEE DETAIL SS-30. FIXTURE SHALL BE POLE MOUNTED, WEATHERPROOF, BUGTIGHT, GASKETED DIE CAST WITH BRONZE POWDER COAT PAINT FINISH, WITH 100 WATT LED LAMP. G.E. DECASHIELD 175 LUMINAIRE OR APPROVED EQUAL.
5. CONCRETE FOR DRIVEWAY UP TO WETWELL SHALL BE 6" THICK. CONCRETE AROUND WETWELL TO CONTROL PANEL SHALL BE 4" THICK. ALL CONCRETE REINFORCED WITH FIBERMESH AND INCLUDE APPROPRIATE JOINTING.

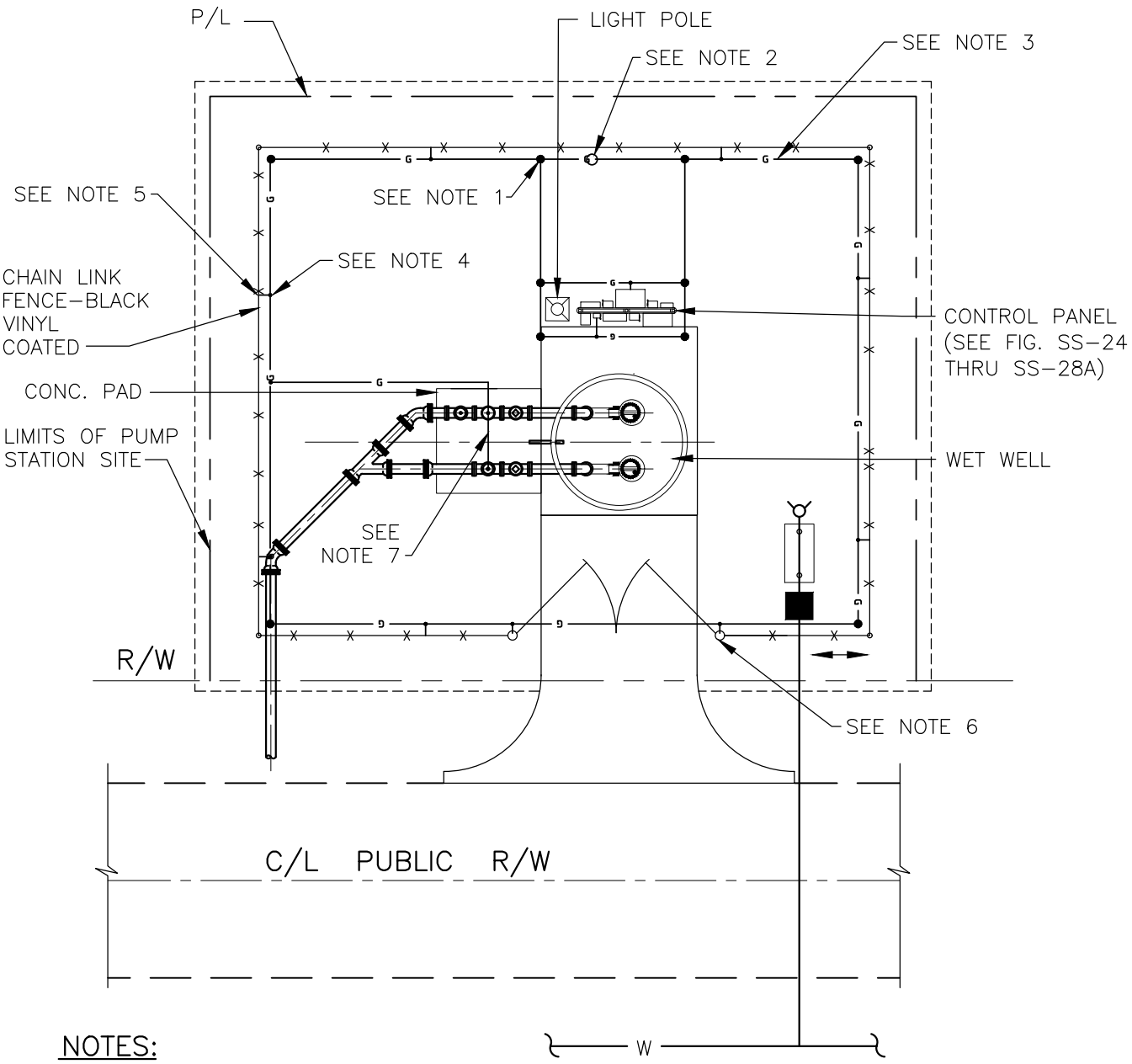
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

PUMPING STATION SITE PLAN TYPICAL DETAIL

SCALE: NONE

FIG. SS-21

REVISED 7/22



NOTES:

1. 3/4"x20' CU–CLAD SECTIONAL GROUND ROD (TYPICAL)
2. GROUND ROD TEST WELL (SEE DETAIL SHEET SS–21B)
3. #2/0 TINNED COPPER GROUND RING – 24" MIN COVER
4. EXOTHERMIC WELD CONNECTION TO GROUND RING (TYP)
5. BOND FENCE POST WITH UNIVERSAL PIPE CLAMP (HARGER PART # UPC 1.5/2 OR EQUAL) AND #2 TINNED COPPER.
6. BOND FENCE GATE WITH FLEXIBLE GATE JUMPER ASSEMBLY (HARGER PART #FGA1.5/2–2.5/32WC24 OR EQUAL)AND #2 TINNED COPPER.
7. BOND DISCHARGE PIPING WITH EXOTHERMIC WELD CONNECTION AND #2 TINNED.

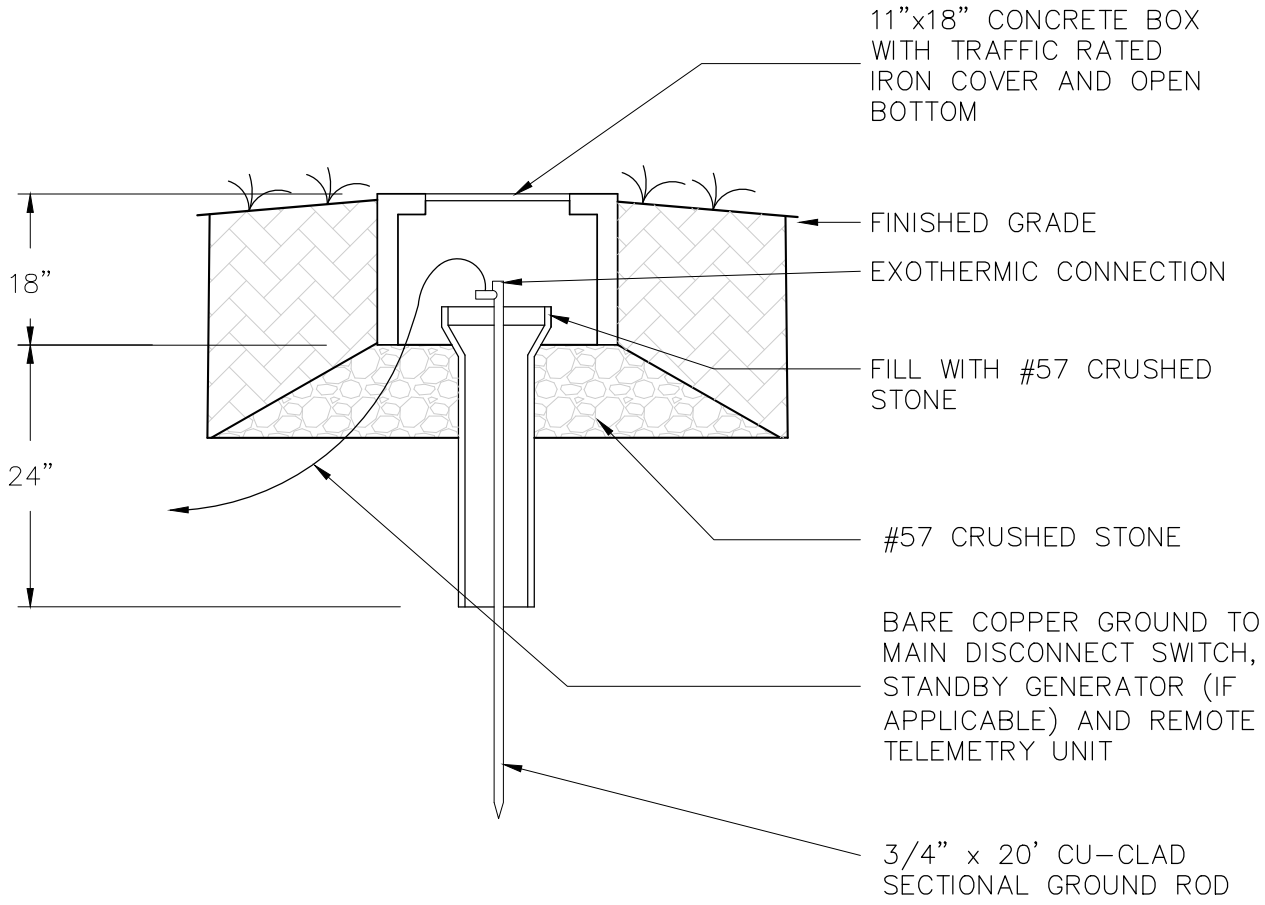
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

PUMPING STATION SITE PLAN TYPICAL GROUNDING DETAIL

SCALE: NONE

FIG. SS–21A

REVISED 6/22



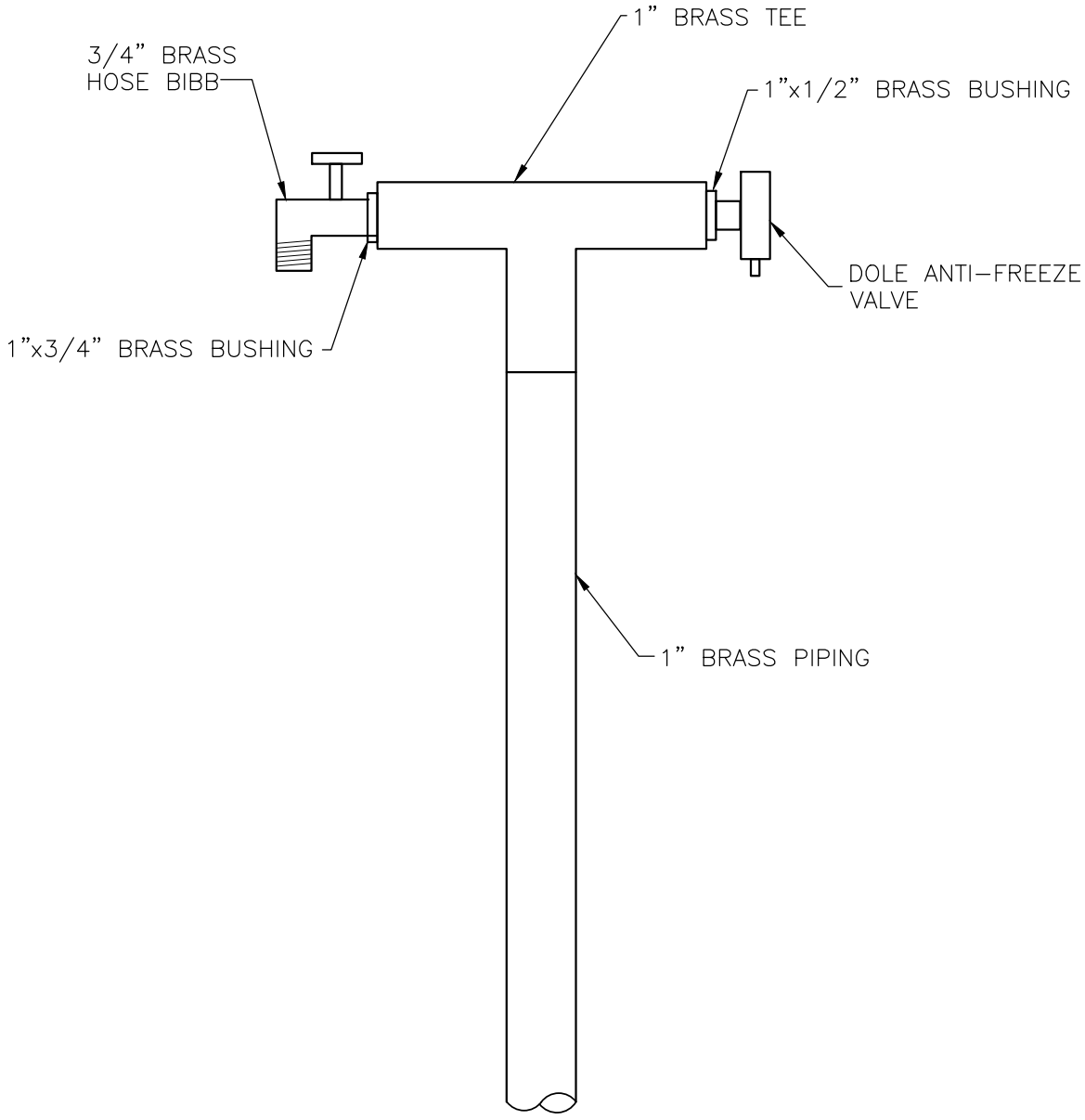
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

GROUND ROD TEST WELL DETAIL

SCALE: NONE

FIG. SS-21B

REVISED 1/10



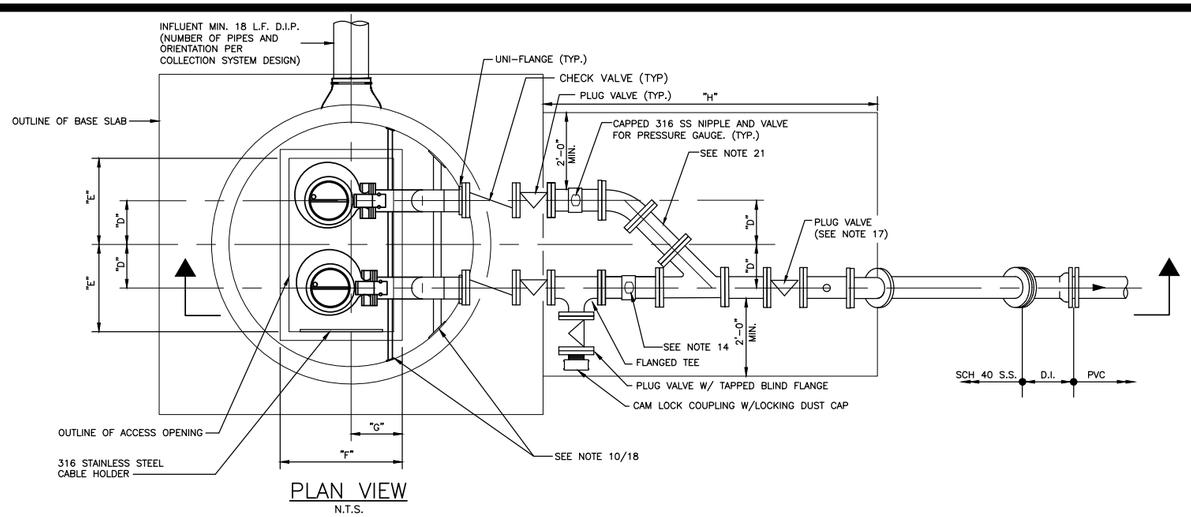
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

LIFT STATION WASH DOWN POINT DETAIL

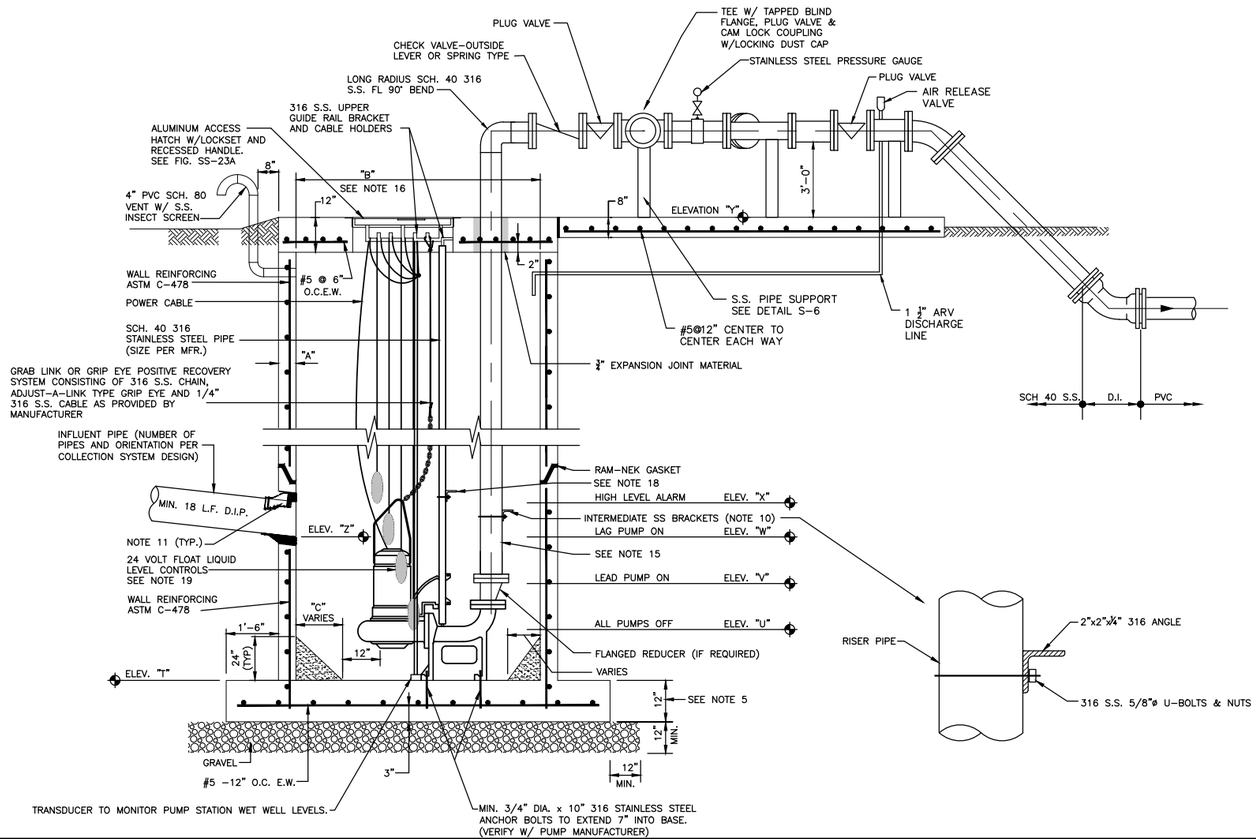
SCALE: NONE

FIG. SS-22

REVISED 7/10



PLAN VIEW
N.T.S.



GENERAL NOTES

1. ALL D.I. FITTINGS MUST BE CERAMIC EPOXY COATED INTERNALLY AND FUSION EPOXY COATED EXTERNALLY.
2. ALL EXPOSED STEEL AND DUCTILE IRON EQUIPMENT/MATERIAL ABOVE GRADE SHALL BE PAINTED AS FOLLOWS:

   -SURFACE PREPARATION: POWER TOOL CLEANING (SSPC-SP3) OR BRUSH-OFF BLAST CLEANING (SSPC-SP7).

   -PRIME: POLYAMIDE EPOXY, MINIMUM 3.0 MILS DFT. IF SHOP COAT IS DAMAGED, REPRIME BARE AREAS IN FIELD. IF SHOP COAT IS BITUMINOUS COATING, PRIME WITH 2 COATS OF STAIN BARRIER, 1 MIL DRY FILM THICKNESS PER COAT.

   -FINISH: TWO COATS OF POLYAMIDE EPOXY, BP MOBILE PAINTS, MINIMUM 4.0 MILS DFT. JOHN DEERE GREEN #310-45, OR APPROVED EQUIVALENT.
3. EXTERIOR WALLS OF WETWELL SHALL BE COATED WITH A WATER-BASED CONCRETE COATING EQUIVALENT TO CONSEAL CS-55 AS MF'D BY CONCRETE SEALANTS, INC. THE EXTERIOR OF THE STRUCTURE SHALL RECEIVE 8 MILS (2 COATS) OF THE CONCRETE COATING; COLOR SHALL BE GRAY. THE INTERIOR OF THE WETWELL SHALL INCORPORATE A 500 mils (1/2") COATING OF SPECTRASHIELD.
4. BASE AND FIRST RISER UNIT SHALL BE CAST MONOLITHIC.
5. BASE SLAB SHALL BE 12" OR GREATER BASED UPON BUOYANCY CALCULATIONS. SUBMIT CALCULATIONS AS PART OF PUMP STATION SUBMITTAL PACKAGE.
6. ARV DISCHARGE LINE AND VENT LINE WHICH ENTER OR EXIT THE WET WELL SHALL BE MADE WATERTIGHT WITH NON-SHRINK GROUT.
7. THERE SHALL BE NO VALVES OR ELECTRICAL JUNCTION BOXES IN WET WELL.
8. WET WELL COVER SHALL BE ALUMINUM WITH 316 S.S. HARDWARE AND LOCK BAR TO ACCEPT PADLOCK IN NON-TRAFFIC AREAS. H-20 RATED GALVANIZED COVERS, MFR'D BY U.S.FOUNDRY SHALL BE SUPPLIED FOR STRUCTURES WITHIN TRAVELED ROADWAYS. SIZE AS REQUIRED BY PUMP MANUFACTURER AND APPROVED BY THE CITY OF PALM COAST.
9. ALL HARDWARE IN WET WELL BE 316 STAINLESS STEEL.
10. RISER PIPE TO BE INSTALLED WITH INTERMEDIATE BRACKETS IF WET WELL DEPTH IS GREATER THAN 15 FEET. INTERMEDIATE BRACKETS SHALL BE 316 SS 2"X2"X1/4" ANGLE WELDED TO 4"X4"X1/4" 316 SS PLATE. PLATE SHALL BE ATTACHED TO WET WELL WALL WITH 3/8" 316 SS ANCHORS.
11. KOR-N-SEAL FLEXIBLE BOOT W/ 316 S.S. STRAPS WITH ANNULAR SPACE FILLED WITH NON-SHRINK GROUT.
12. OPERATING CONDITIONS SHALL BE _____ GPM AT _____ FEET TDH.
13. PUMPS SHALL BE:
    MANUFACTURER: _____; MODEL: _____; IMP: _____; DIA: _____;
    MIN. SPEED: _____ RPM; DISCHARGE SIZE: _____ IN.; VOLTAGE: _____;
    HZ.: _____; PHASE: _____; H.P.: _____;
    MIN. SOLID SIZE: _____ IN.; CURVE: _____.
14. 4" ASHCROFT MODEL 1008S S.S. PRESSURE GAUGE 0 TO 100 PSI, ASHCROFT TYPE 100 DIAPHRAGM SEAL W/ ½" INLET, S.S. TAPPING SADDLE W/ ¾" TAP BUSHED DOWN TO ½", ½" S.S. PIPE AND ½" S.S. BALL VALVE.
15. SCH 40 316 SS PIPE SHALL BE USED FOR ALL PUMP STATIONS REGARDLESS OF MOTOR SIZE.
16. 20 HP OR LARGER MOTOR WILL REQUIRE AN 8'-0" WET WELL
17. VALVE REQUIRED ONLY FOR MANIFOLD SYSTEM.
18. GUIDERAILS TO INCLUDE INTERMEDIATE 316 S.S. BRACKETS SIMILAR TO RISER SUPPORT BRACKETS, SPACED AT 10-FOOT INTERVALS.
19. FOUR (4) FLOAT PUMP OPERATION FOR PUMP OFF, LEAD PUMP ON, LAG PUMP ON HIGH LEVEL ALARM.
20. SAFETY GRATING SHALL BE INSTALLED BELOW THE WET WELL HATCHES.
21. PIPE AND FITTINGS ABOVE GRADE SHALL BE SCHEDULE 40 316 S.S.

NOTE: A SPARE IMPELLER, WEAR RING AND PHASE MONITOR FOR EACH STATION SHALL BE PROVIDED.

DIMENSIONS		ELEVATIONS	ELEV. AT DESIGN	ELEV. AT CONST.
DIM "A"	8" MIN.	ELEV. "T"		
DIM "B"	6'-0" MIN.	ELEV. "U"		
DIM "C"	*	ELEV. "V"		
DIM "D"	*	ELEV. "W"		
DIM "E"	*	ELEV. "X"		
DIM "F"	*	ELEV. "Y"		
DIM "G"	*	ELEV. "Z"	4'-6" MIN. ABOVE FLOOR	
DIM "H"	6'-0" MIN.			
* PER PUMP MANUFACTURER'S REQUIREMENT				

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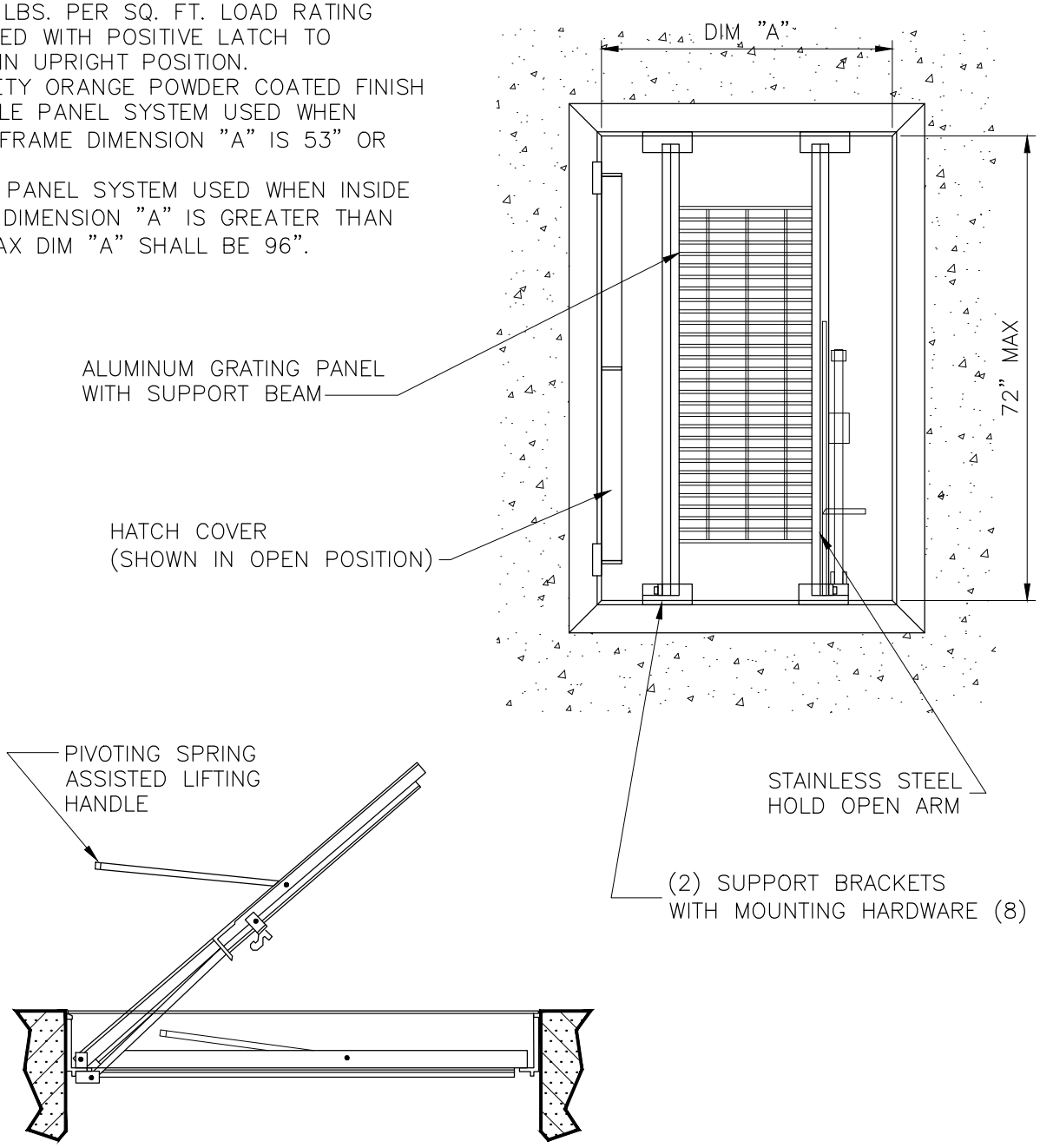
TYPICAL DUPLEX PUMPING STATION DETAIL

SCALE: NONE

FIG. SS-23

REVISED 7/22

STANDARD FEATURES:
– 1" ALUMINUM "I" BAR CONSTRUCTION
– 3" ALUMINUM "I" BAR CONSTRUCTION FOR H20 LOAD RATED DOORS.
– T–316 STAINLESS STEEL HARDWARE
– SPRING LOADED LIFTING HANDLE
– LOCKABLE WITH OWNER SUPPLIED PADLOCK
– 300 LBS. PER SQ. FT. LOAD RATING
– HINGED WITH POSITIVE LATCH TO MAINTAIN UPRIGHT POSITION.
– SAFETY ORANGE POWDER COATED FINISH
– SINGLE PANEL SYSTEM USED WHEN INSIDE FRAME DIMENSION "A" IS 53" OR LESS
– TWO PANEL SYSTEM USED WHEN INSIDE FRAME DIMENSION "A" IS GREATER THAN 53". MAX DIM "A" SHALL BE 96".



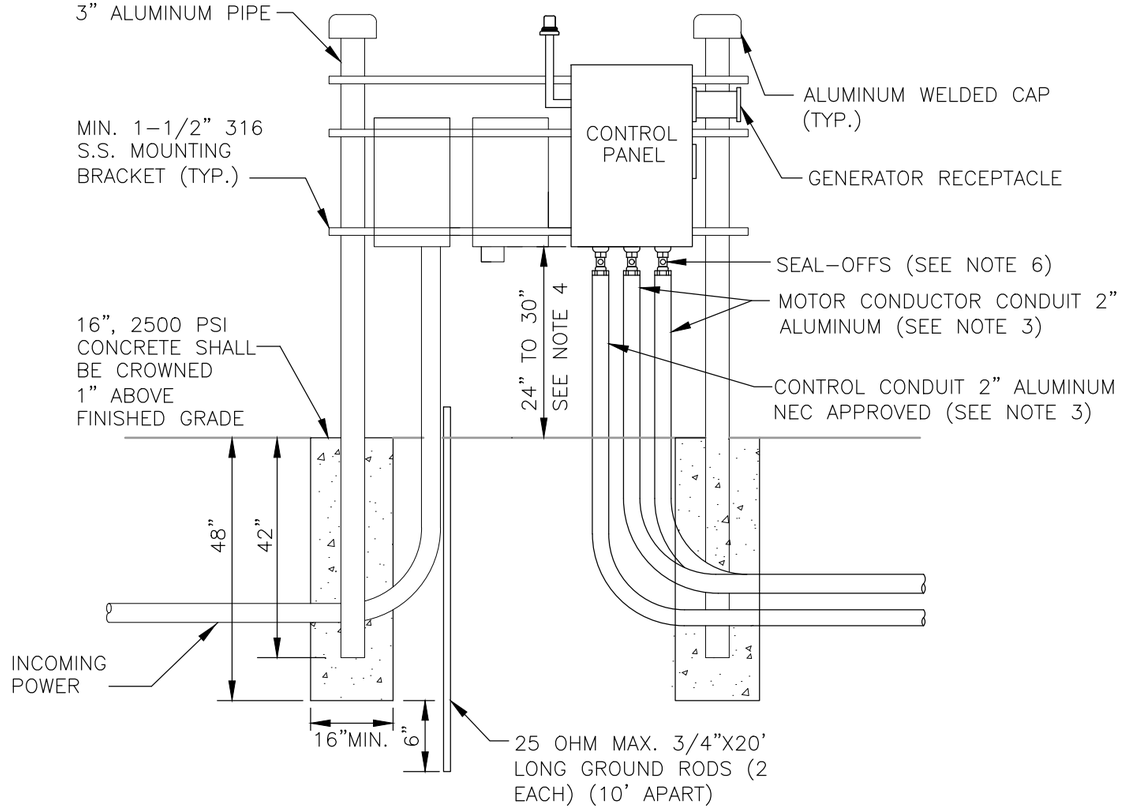
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

ACCESS HATCH / SAFETY GRATE DETAIL

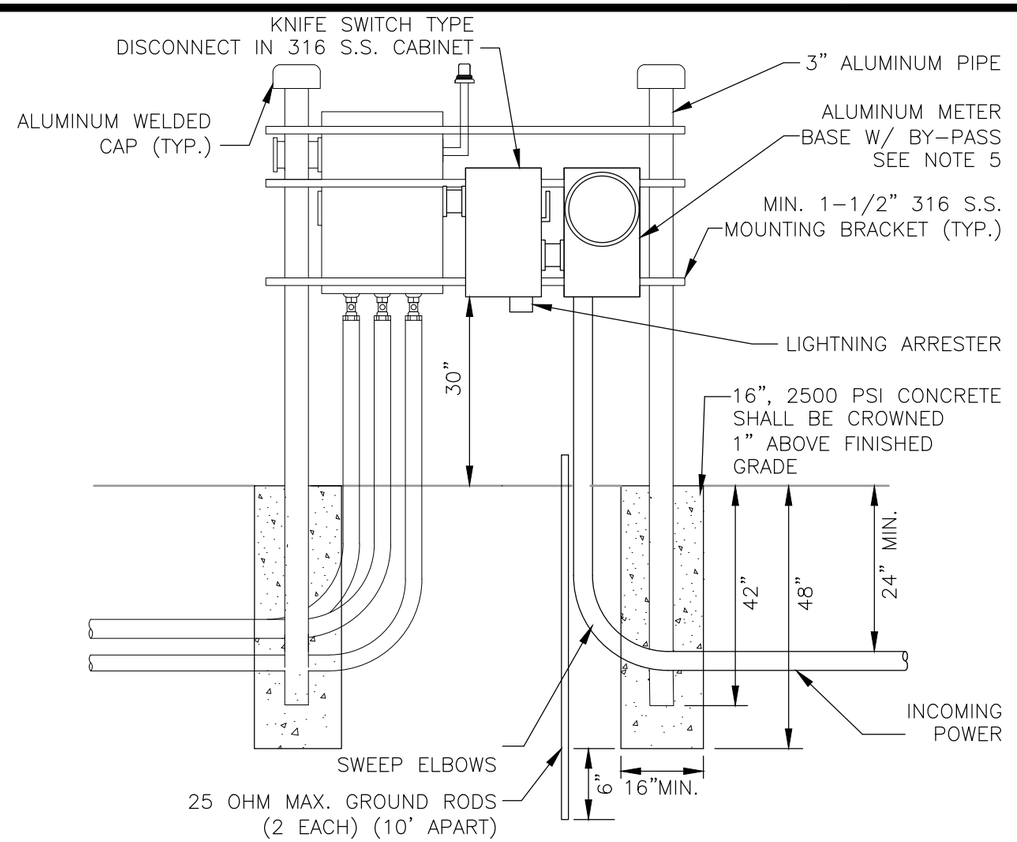
SCALE: NONE

FIG. SS–23A

REVISED 7/10



FRONT VIEW



REAR VIEW

NOTES:

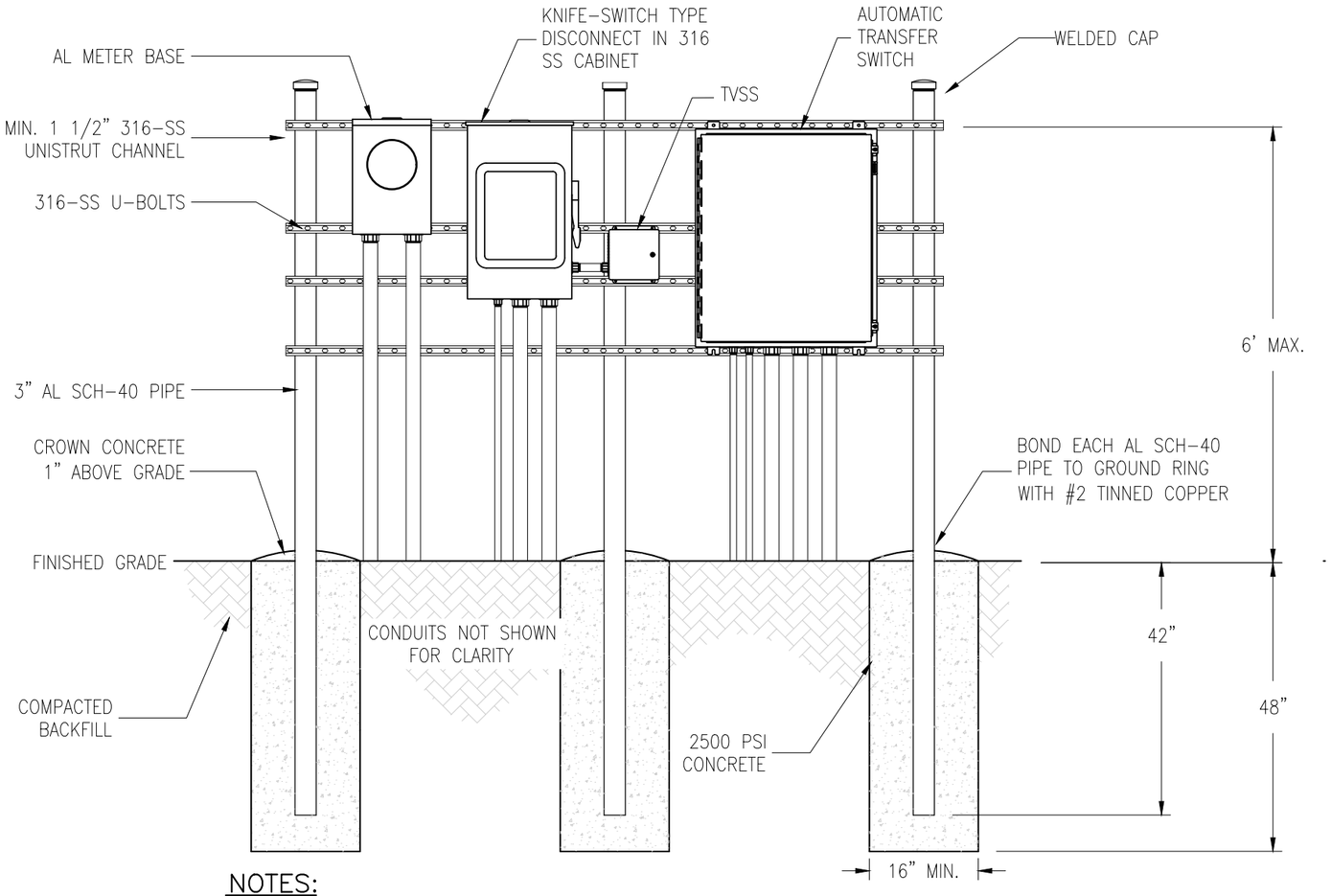
1. POWER SUPPLY SHALL BE UNDERGROUND ON THE PUMP STATION SITE. WHERE 3 PHASE IS NOT AVAILABLE, REFER TO SECTION 38.3.
2. CONTROL PANEL SHALL BE MOUNTED ON ONE SIDE OF SUPPORT ASSEMBLY; METER CAN AND DISCONNECT SWITCH ON THE OTHER SIDE.
3. ALUMINUM CONDUIT SHALL BE USED ABOVE GRADE-TRANSITION TO SCHEDULE 40 PVC AT SWEEP ELBOWS.
4. HEIGHT TO BOTTOM OF PANEL SHALL BE BASED UPON PANEL HEIGHT SUCH THAT TOP OF PANEL WILL NOT EXCEED NEC REQUIREMENTS.
5. IF THE METER IS A DIRECT CONNECTED METER WHICH DOES NOT UTILIZE EXTERNAL CURRENT TRANSFORMERS, A SERVICE DISCONNECT SWITCH MAY BE REQUIRED UPSTREAM OF THE METER. CHECK WITH LOCAL ELECTRIC COMPANY FOR REQUIREMENTS.
6. SEAL-OFFS SHALL BE EYSR AS MANUFACTURED BY COOPER CROUSE-HINDS.

DUPLEX PUMPING STATION ELECTRICAL EQUIPMENT INSTALLATION DETAIL FOR PROJECTS THAT DO NOT REQUIRE PERMANENT STANDBY POWER (DISCONNECT/METER SIDE)

SCALE: NONE

FIG. SS-24

REVISED 7/22



NOTES:

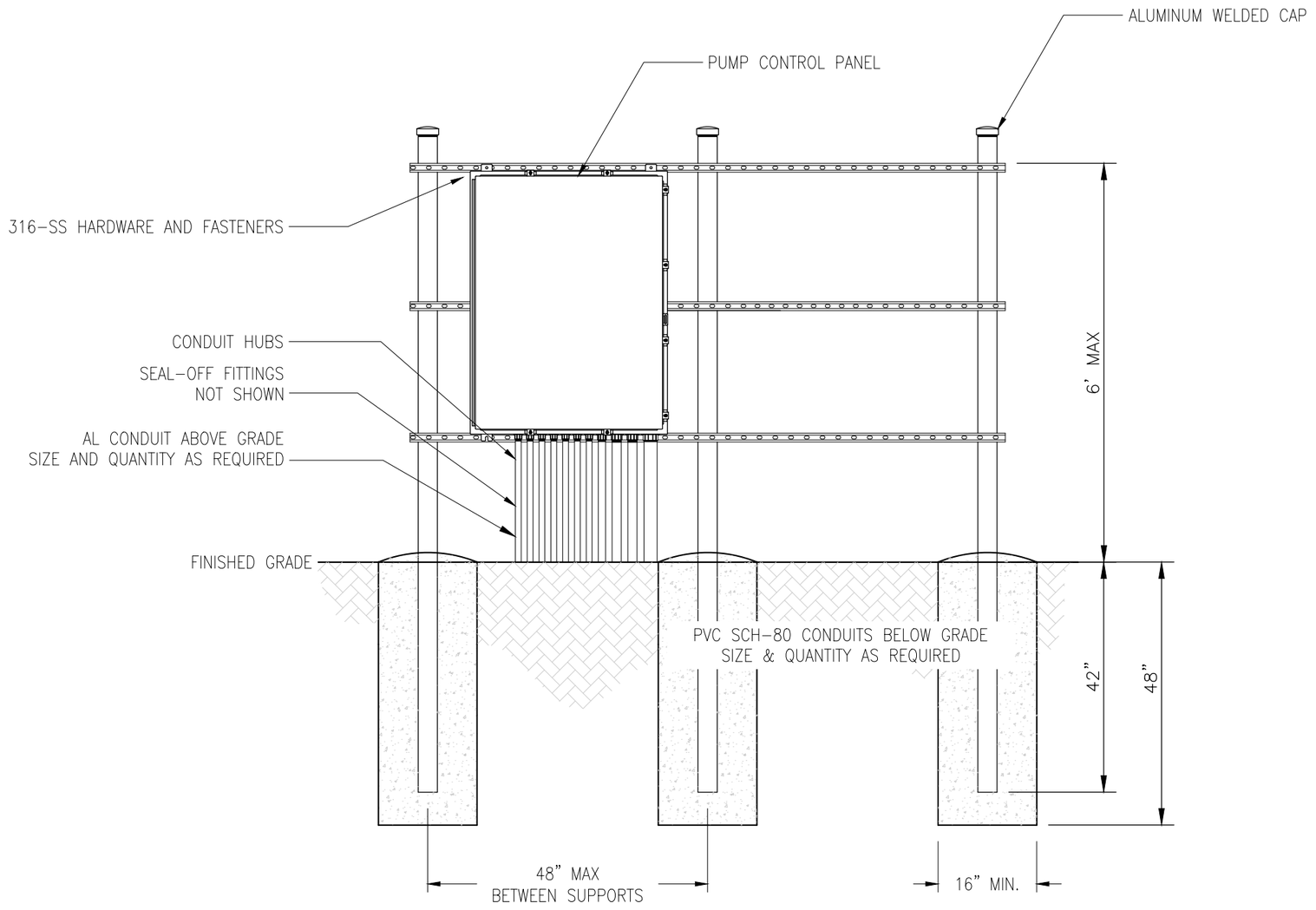
1. POWER SUPPLY SHALL BE UNDERGROUND ON THE PUMP STATION SITE. WHERE 3 PHASE IS NOT AVAILABLE, REFER TO SECTION 38.3.
2. CONTROL PANEL SHALL BE MOUNTED ON ONE SIDE OF SUPPORT ASSEMBLY; METER CAN AND DISCONNECT SWITCH ON THE OTHER SIDE.
3. ALUMINUM CONDUIT SHALL BE USED ABOVE GRADE–TRANSITION TO SCHEDULE 40 PVC AT SWEEP ELBOWS.
4. HEIGHT TO BOTTOM OF PANEL SHALL BE BASED UPON PANEL HEIGHT SUCH THAT TOP OF PANEL WILL NOT EXCEED NEC REQUIREMENTS.
5. IF THE METER IS A DIRECT CONNECTED METER WHICH DOES NOT UTILIZE EXTERNAL CURRENT TRANSFORMERS, A SERVICE DISCONNECT SWITCH MAY BE REQUIRED UPSTREAM OF THE METER. CHECK WITH LOCAL ELECTRIC COMPANY FOR REQUIREMENTS.

DUPLEX PUMPING STATION ELECTRICAL EQUIPMENT INSTALLATION DETAIL (DISCONNECT/METER SIDE) FOR PROJECTS WITH PERMANENT STANDBY POWER

SCALE: NONE

FIG. SS–24A

REVISED 7/22

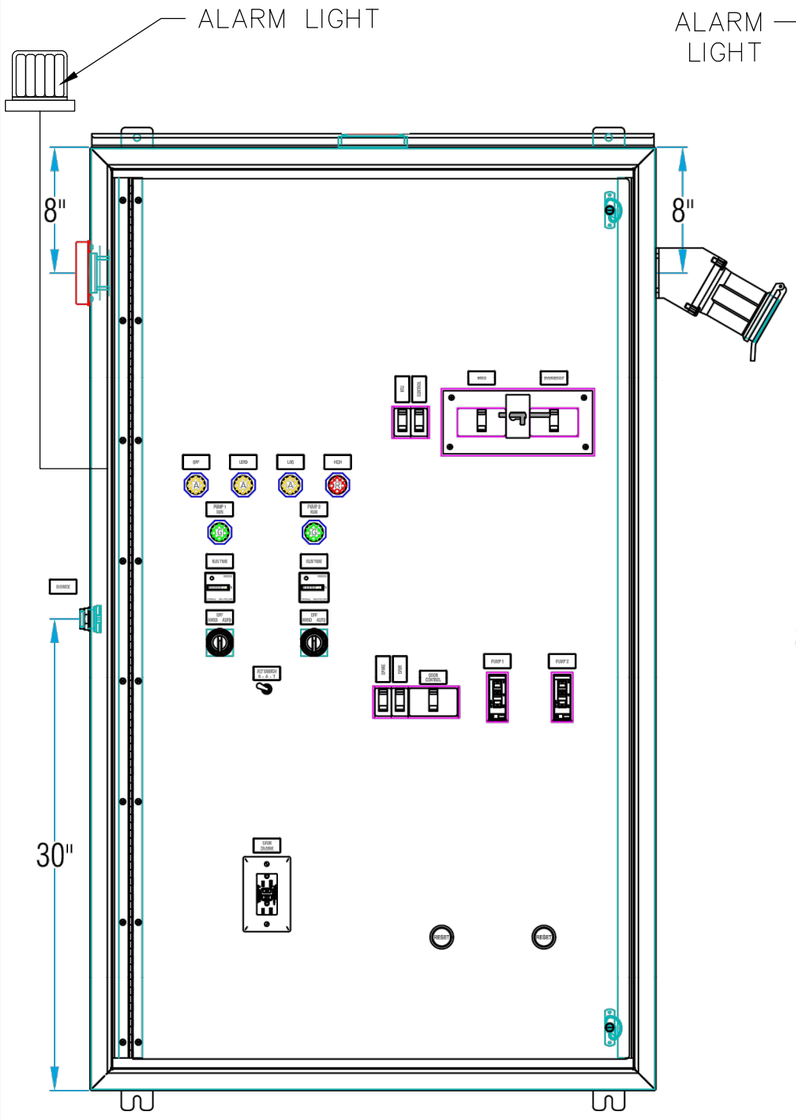


DUPLEX PUMPING STATION ELECTRICAL EQUIPMENT INSTALLATION DETAIL FOR PROJECTS WITH PERMANENT STANDBY POWER (PANEL SIDE VIEW)

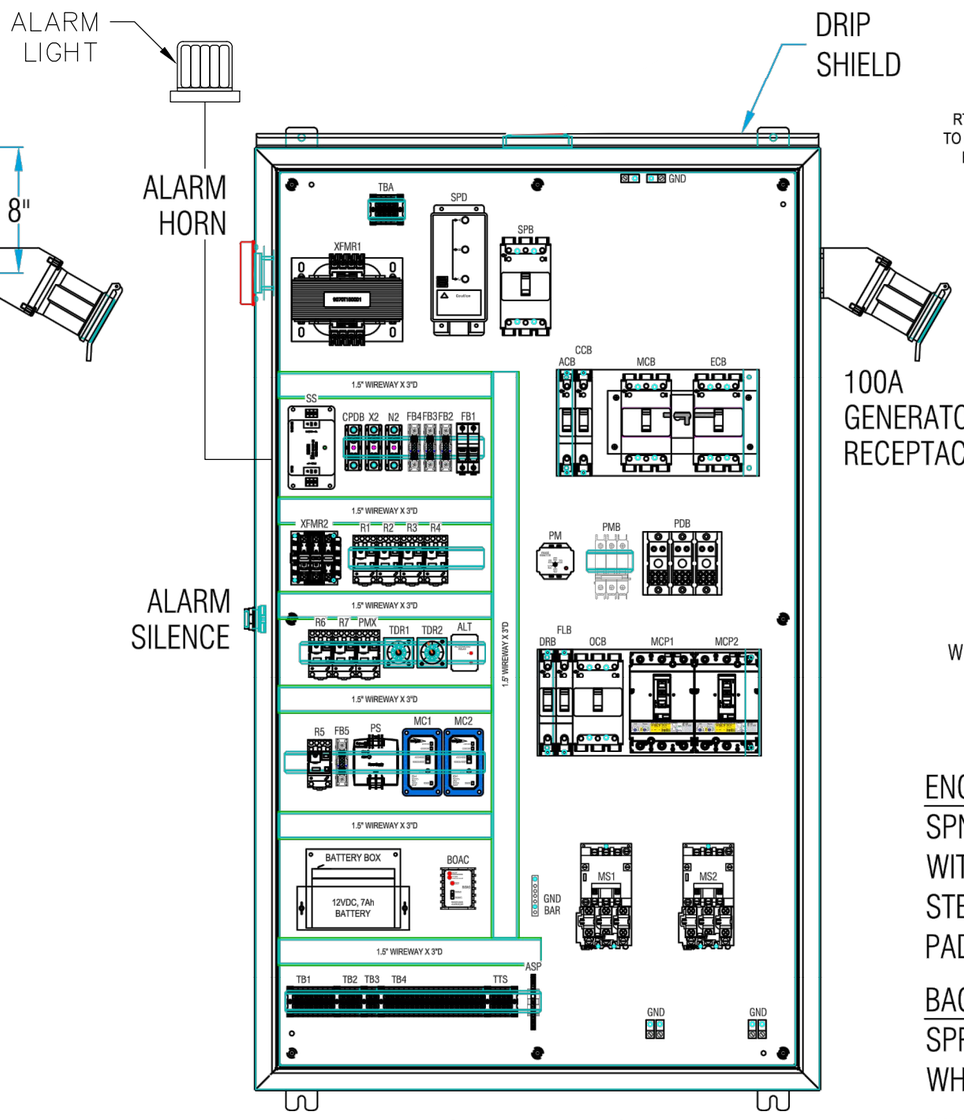
SCALE: NONE

FIG. SS–24B

REVISED 6/22

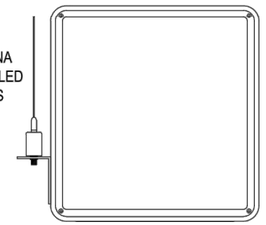


INNER DOOR LAYOUT
(OUTER DOOR REMOVED FOR CLARITY)



BACK PANEL LAYOUT

MISSION RTU ANTENNA TO BE INSTALLED BY OTHERS

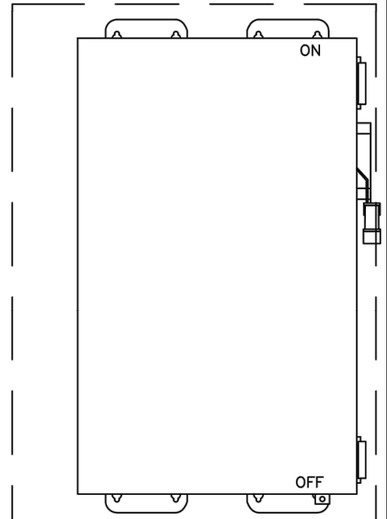


RTU PANEL:
NEMA 4X
WITH SUNSHIELD ON FRONT
(13.75"H X 13.25" W X 6.25" D)

TEXT

C170X090APT
RAISED THERMAL TRANSFER / UV / CHEMICALLY RESISTANT LABEL
(1.70" W X .90" H)
WHITE BACKGROUND WITH BLACK LETTERING

SHIPPED LOOSE AND INSTALLED BY OTHERS



ASCO SPD
"420277YP05NWAJ10"

SQUARE D
"H363SS"
600V 100A 3 POLE 316SS
FUSED DISCONNECT

ENCLOSURE:
SPN4SS6-603612-C27 (60"H x 36"W x 12"D) NEMA 4X RATED, WITH DRIP SHIELD. FABRICATED FROM TYPE 316 STAINLESS STEEL, POLISHED FINISH. OUTER DOOR HAS 3-POINT PAD-LOCKABLE HANDLE AND 90° STOP.

BACK PANEL:
SPP-6036 (57"H x 33"W) FABRICATED FROM 12ga. STEEL WITH WHITE POLYESTER POWDER COAT FINISH.

INNER DOOR:
SC-6036-DF FABRICATED FROM .125 ALUMINUM WITH CONTINUOUS HINGE, TWIST LATCHES, AND 90° DOOR STOP KIT.

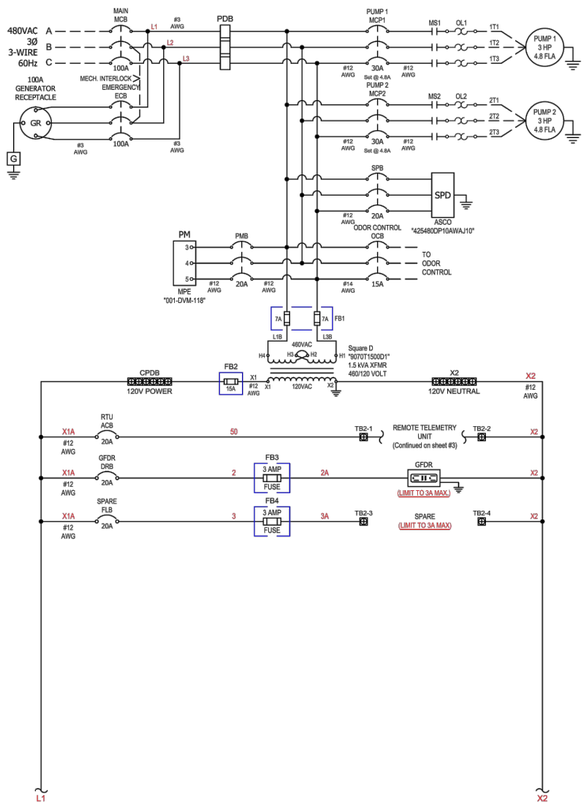
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

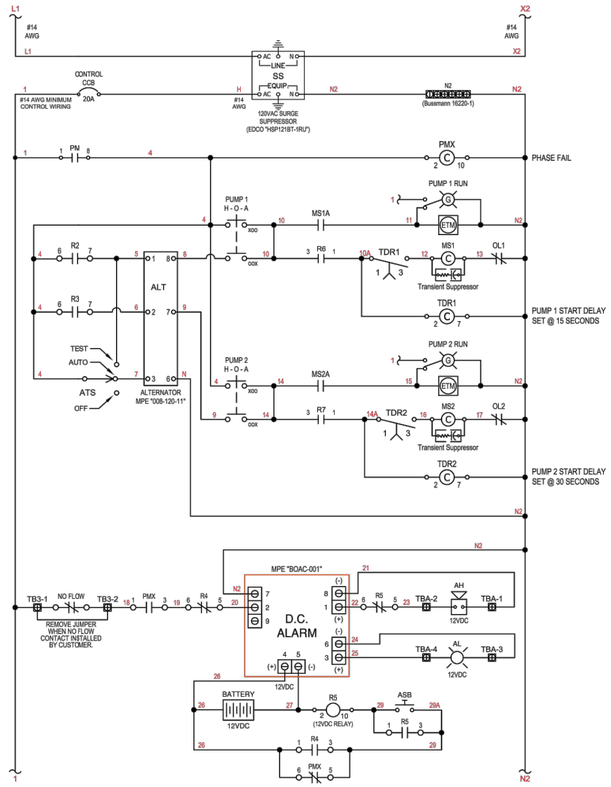
DUPLEX PUMP STATION
CONTROL PANEL DETAIL FOR 3 PHASE POWER

SCALE: NONE

FIG. SS–25

REVISED 7/22



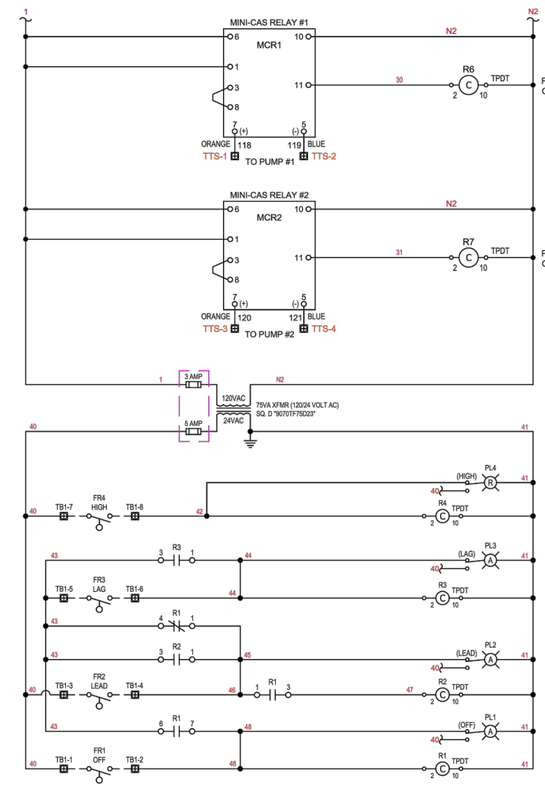


LEGEND

AH	–	ALARM HORN
AL	–	ALARM LIGHT
ALT	–	ALTERNATOR
ASB	–	ALARM SILENCE BUTTON
ATS	–	ALTERNATOR TEST SWITCH
CCB	–	CONTROL CIRCUIT BREAKER
DRB	–	DUPLEX RECEPTACLE BREAKER
ECB	–	EMERGENCY CIRCUIT BREAKER
ETM	–	ELAPSED TIME METER
F#	–	FUSE
FB	–	FUSE BLOCK
FMB	–	FLOW METER BREAKER
FR	–	FLOAT REGULATOR
GFDR	–	GROUND FAULT DUPLEX RECEPTACLE
HOA	–	HAND-OFF-AUTO SELECTOR
MCB	–	MAIN CIRCUIT BREAKER
MCP	–	MOTOR CIRCUIT PROTECTO (FOR PUMPS)
MS	–	MOTOR STARTER
OL	–	OVERLOAD
PDB	–	POWER DIST. BLOCK
PL#	–	PILOT LIGHT
PM	–	PHASE MONITOR
R#	–	RELAY
RTU	–	REMOTE TELEMETRY UNIT BREAKER
SA	–	SURGE ARRESTOR
SLB	–	SITE LIGHT BREAKER
TB	–	TERMINAL BLOCK
TBX	–	TERMINAL BLOCK FOR TRANSFORMER
TDR	–	TIME DELAY RELAY

DRAWING NOTES:

1. ALL CONTROL WIRING TO BE 14 AWG.
2. PANEL IS U.L. 508A LABELED.



ALL POINTS SHALL BE STAINLESS STEEL

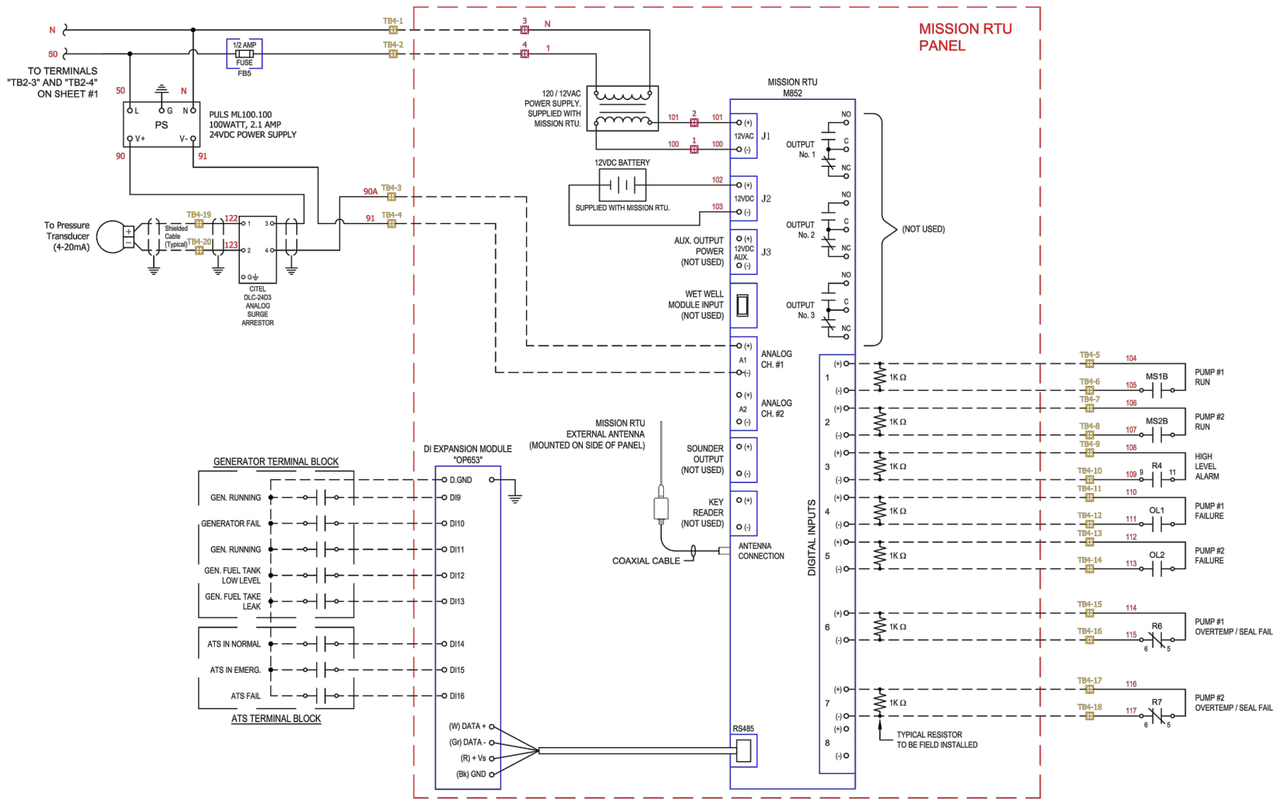
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 1 OF 2 (FOR 3 PHASE POWER)

SCALE: NONE

FIG. SS–26

REVISED 7/22



ALL POINTS SHALL BE STAINLESS STEEL

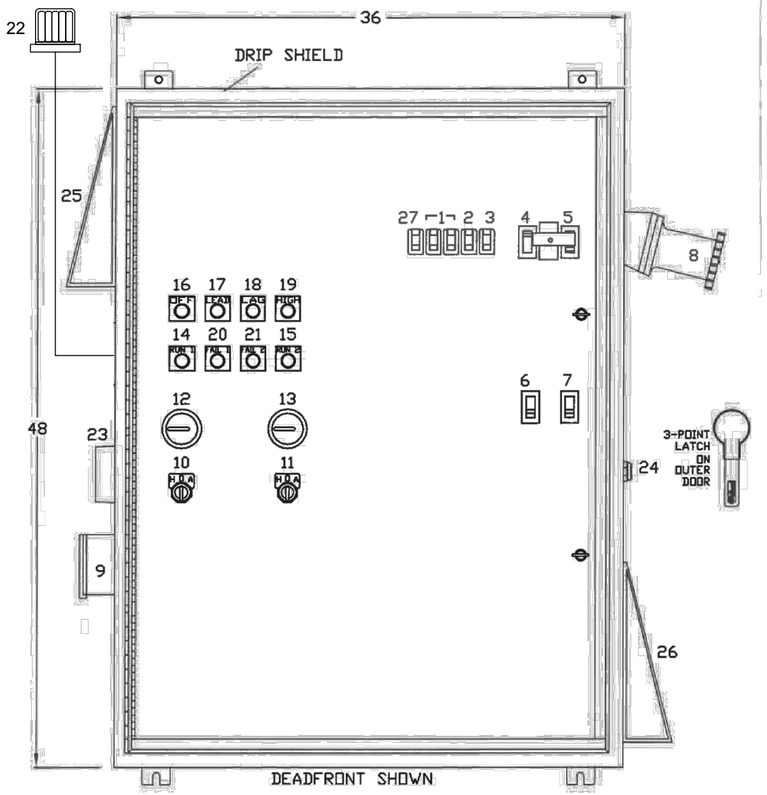
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 2 OF 2 (FOR 3 PHASE POWER)

SCALE: NONE

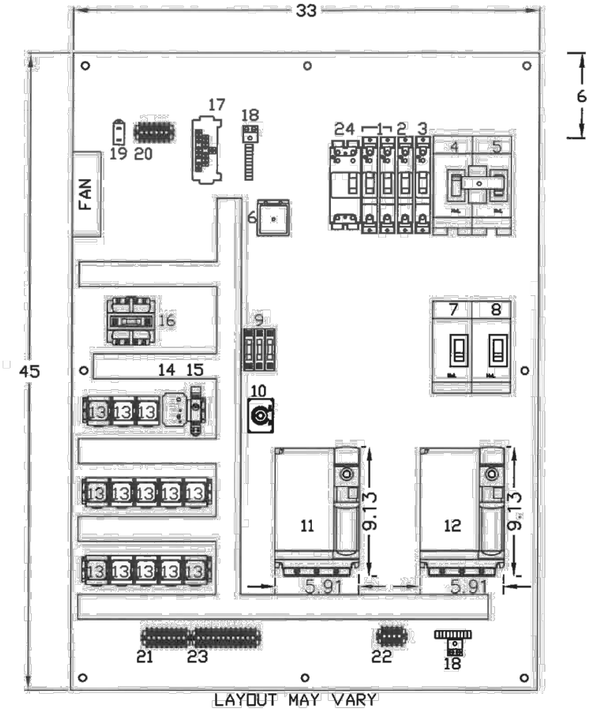
FIG. 26A

REVISED 7/22



OUTER DOOR HAS BEEN REMOVED FOR CLARITY

1 - CB1,2 SPARE, RTU, SITE LIGHT BREAKER
2 - DRB DUPLEX RECEPTACLE
3 - CCB CONTROL CIRCUIT BREAKER
4 - MCB MAIN CIRCUIT BREAKER
5 - ECB EMERGENCY CIRCUIT BREAKER
6 - MB1 MOTOR BREAKER 1
7 - MB2 MOTOR BREAKER 2
8 - GR GENERATOR RECEPTACLE
9 - DR DUPLEX RECEPTACLE (GFCI) EXTERNAL MOUNTED
10 - HOA HAND OFF AUTO SWITCH PUMP 1
11 - HOA HAND OFF AUTO SWITCH PUMP 2
12 - ETM ELAPSED TIME METER 1
13 - ETM ELAPSED TIME METER 2
14 - RL1 PUMP 1 RUN LIGHT
15 - RL2 PUMP 2 RUN LIGHT
16 - PL1 OFF LEVEL LIGHT
17 - PL2 LEAD LEVEL LIGHT
18 - PL3 LAG LEVEL LIGHT
19 - PL4 HIGH LEVEL LIGHT
20 - PL5 PUMP 1 FAIL LIGHT
21 - PL6 PUMP 2 FAIL LIGHT
22 - AL ALARM LIGHT
23 - AH ALARM HORN
24 - ASB ALARM SILENCE PUSH BUTTON
25 - AIR VENT WITH FAN
26 - AIR VENT
27 - CB2 DDOR CONTROL CIRCUIT BREAKER



LAYOUT MAY VARY

1 - CB1, SPARE, RTU, SITE LIGHT BREAKER
2 - DRB DUPLEX RECEPTACLE
3 - CCB CONTROL CIRCUIT BREAKER
4 - MCB MAIN CIRCUIT BREAKER
5 - ECB EMERGENCY CIRCUIT BREAKER
6 - SPD SURGE PROTECTION DEVICE
7 - MB1 MOTOR BREAKER 1
8 - MB2 MOTOR BREAKER 2
9 - F FUSE BLOCKS
10 - VM VOLTAGE MONITOR
11 - PC1 PHASE CONTROLLER PUMP 1
12 - PC2 PHASE CONTROLLER PUMP 2
13 - R CONTROL RELAYS
14 - ALT DUPLEX ALTERNATOR
15 - TH THERMOSTAT (FAN)
16 - CCT CONTROL CIRCUIT TRANSFORMER
17 - N NEUTRAL BLOCK
18 - GROUNDS
19 - FL ALARM LIGHT FLASHER
20 - TS-A TERMINAL STRIP A
21 - TS-B TERMINAL STRIP B
22 - TS-C TERMINAL STRIP C
23 - TS-D TERMINAL STRIP D
24 - CB2 DDOR CONTROL CIRCUIT BREAKER

ALL POINTS SHALL BE STAINLESS STEEL

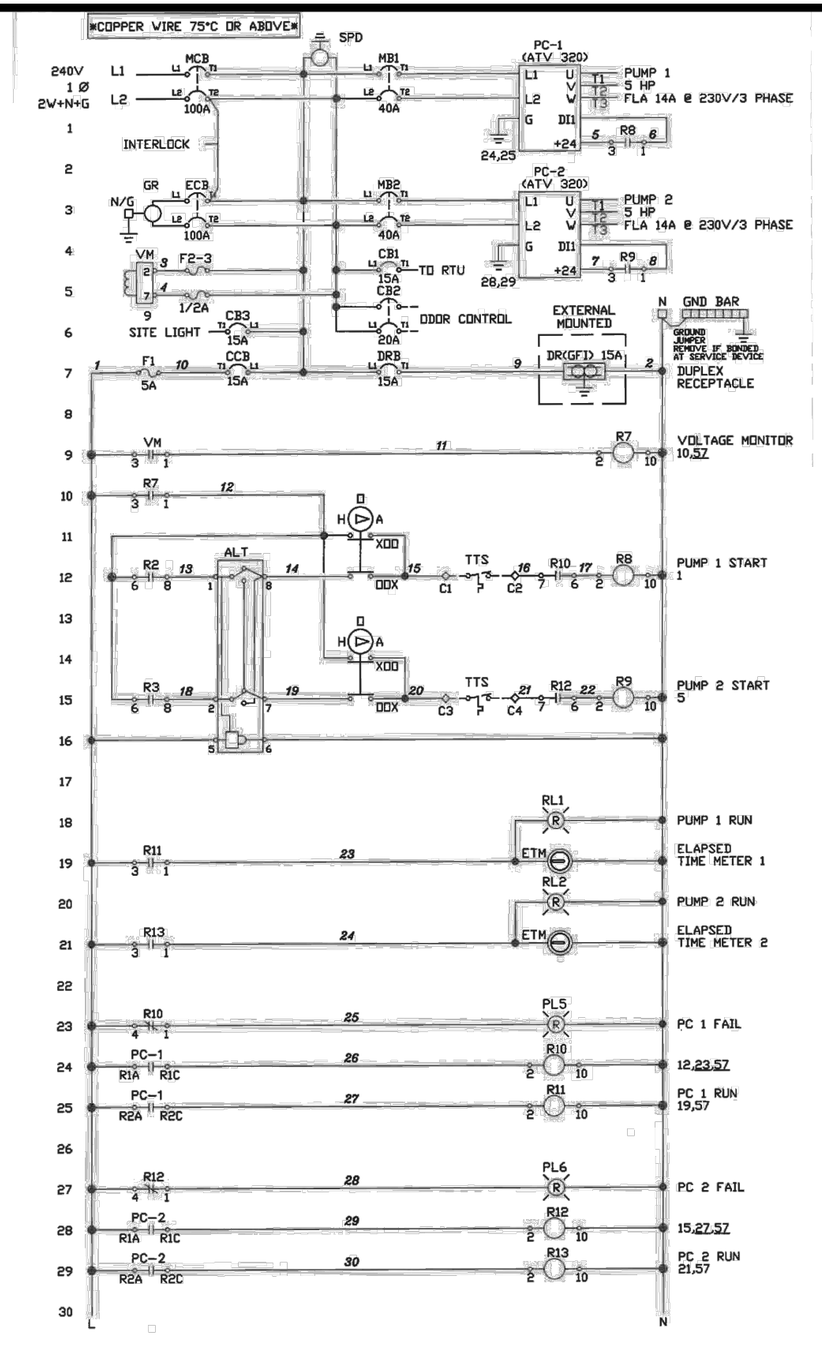
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

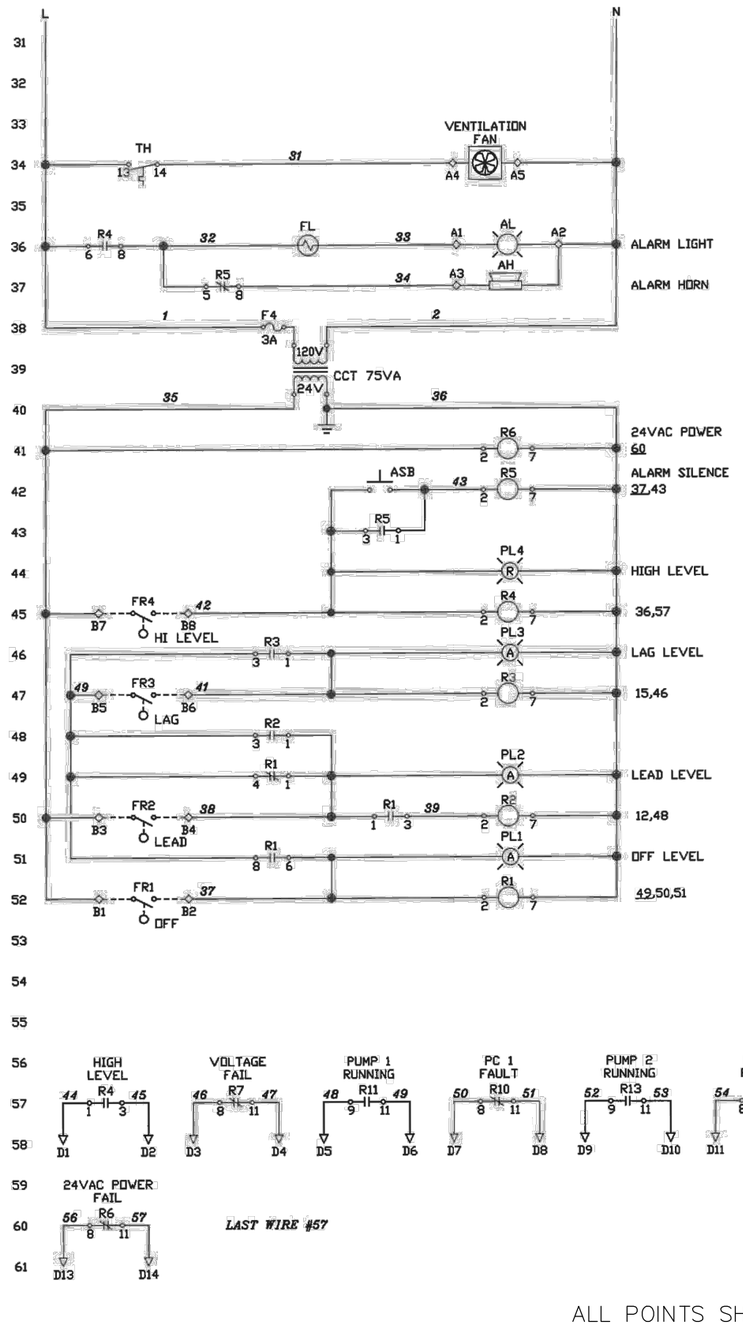
DUPLEX PUMP STATION CONTROL PANEL
DETAIL FOR SINGLE PHASE POWER

SCALE: NONE

FIG. SS-27

REVISED 7/22





ALL POINTS SHALL BE STAINLESS STEEL

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 1 OF 2 (FOR SINGLE PHASE POWER)

SCALE: NONE

FIG. SS-28

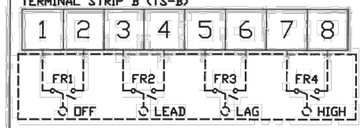
REVISED 7/22

PHASE CONTROLLER PARAMETER LIST

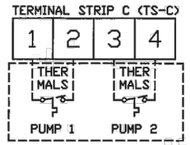
```
ConF>FuLL>

SIN-(SImply Start)
 bFr [Standard Mot. Freq.] = 60Hz.
 IPL [Input phase loss] = NO
 nPr [Rated motor power] = 5 HP
 UnS [Rated motor volt.] = 240V
 nCr [Rated motor current] = 14A
 FrS [Rated motor freq.] = 60.0Hz.
 tFr [Max frequency] = 60Hz.
 ItH [Mot. therm. current] = 14A
 LSP [Low speed] = 60Hz.
 HSP [High speed] = 60Hz.

I-O-
 tCt [2 wire type] = LEL
 r2-
  r2 [R2 Assignment] = rUn (Hold for 2s)

Fun- [Application Function]
  ADC [AUTO DC INJECTION]= NO


FLt-
   Atr-
  Atr [Automatic restart] = YES (Hold for 2s)
  IPL [Input Phase Loss] = NO
```

Nonintrinsically safe wiring terminals

TERMINAL STRIP B (TS-B)

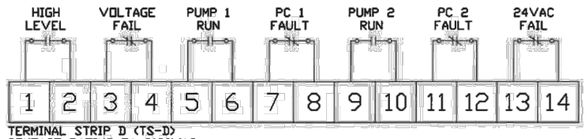


TERMINAL STRIP C (TS-C)



Dry contacts leaving panel powered by other source

REMOTE ALARMS



TERMINAL STRIP D (TS-D)
CONTACT RATING 5A @120VAC

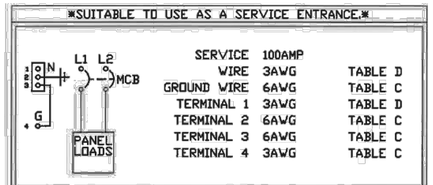
TERMINAL STRIP (SPARES)

COPPER WIRE 75°C OR ABOVE

INDICATES DEVICES AND CONNECTIONS BY INSTALLER

DEVICES ON THE BOTTOM OF TERMINAL STRIP ARE REMOTE ENTERING CONTROL PANEL.
DEVICES ON THE TOP OF TERMINAL STRIP ARE CONTACTS LEAVING THE CONTROL PANEL.

SUITABLE TO USE AS A SERVICE ENTRANCE.



SERVICE	100AMP	
WIRE	3AWG	TABLE D
GROUND WIRE	6AWG	TABLE C
TERMINAL 1	3AWG	TABLE D
TERMINAL 2	6AWG	TABLE C
TERMINAL 3	6AWG	TABLE C
TERMINAL 4	3AWG	TABLE C

FUSE REPLACEMENT CHART

FUSE	REPLACEMENT
F1	KTK-R-5/600V
F2-3	KTK-R-1/2/600V
F4	FNQ-R-3/600V

CUSTOMER	HYDRA SERVICE
JOB NAME	PALM COAST PS 57-2
ENCLOSURE	UL TYPE RATING: UL TYPE 1
VOLTAGE	240V PHASE 1 HZ 60
H.P.	#1 5 #2 5 #3 X #4 X
F.L.A.	14A 14A X X
TOTAL F.L.A.	88.5A
SERIAL #	22- DATE:
SCCR:	10 KA SYMMETRICAL RMS, 240 V. MAX.

MANUFACTURED BY:
STA CON INC 2525 S. OBT APOPKA FL 32703

SQD Terminal Block CR6 + CR6

Wire Range AWG CU	Torque lb-in.
(Type GK6) 22-10	11-12
(Type GR6) 22-8	18-20

SQD Ground Busbar PK7GTA, PK12GTA, PK15GTA

Wire Range AWG CU-AL	Torque lb-in.
14-10 CU, 12-10 AL	20
8	25
6-4	35
Two 14 or 12 CU, Two 12 or 10 AL	25

T&B BLACKBURN LUG TORQUE TIGHTENING

Wire Range/Screw Type & Wrench Size AWG CU	Torque lb-in.
(SLOTTED) 10-14	20
(SLOTTED) 8	25
(SLOTTED) 4-6	35
(SLOTTED) 2-2/0	50
(3/16 HEX) 2/0	100
(5/16 HEX) 3/0-250-350	275
(3/8 HEX) 500-600	450*
(3/8 HEX) 750-1000	550

*=UNLESS OTHERWISE NOTED ON CONNECTOR

ALL POINTS SHALL BE STAINLESS STEEL

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

DUPLEX PUMP STATION CONTROL PANEL WIRING SCHEMATIC 2 OF 2 (FOR SINGLE PHASE POWER)

SCALE: NONE

FIG. SS-28A

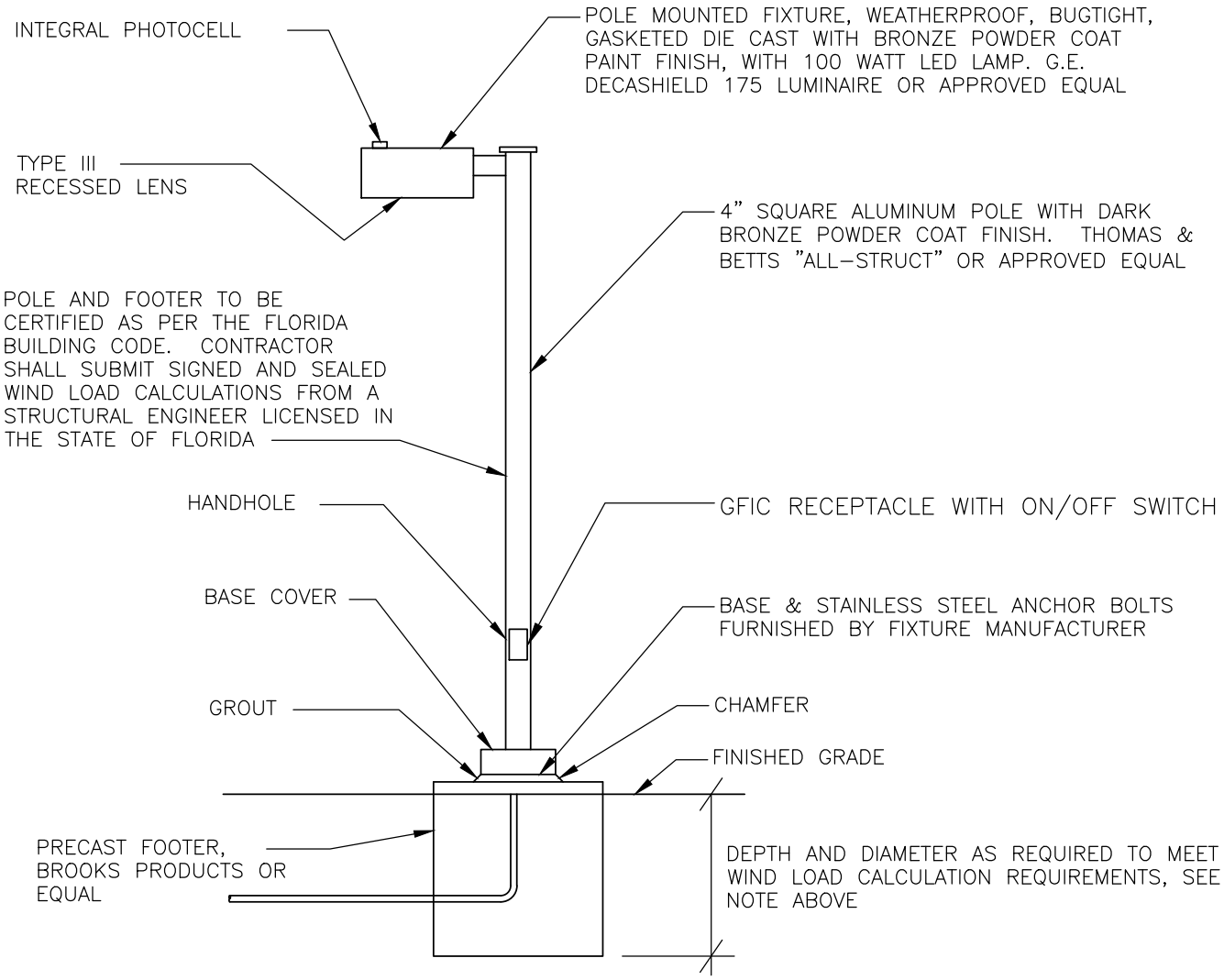
REVISED 7/22

(RESERVED)

SCALE: NONE

FIG. SS-29

REVISED 6/22



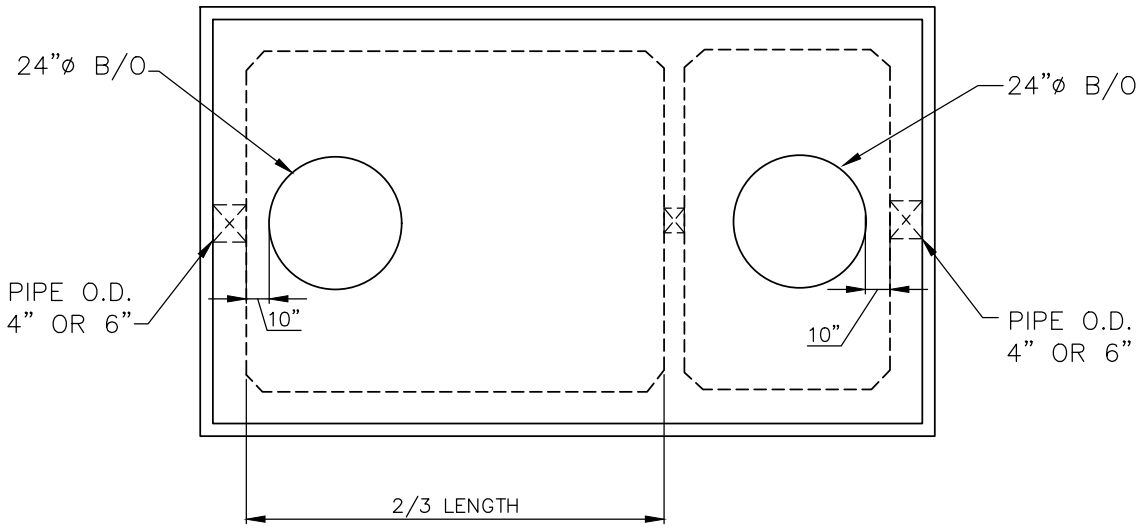
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

SERVICE POLE DETAIL

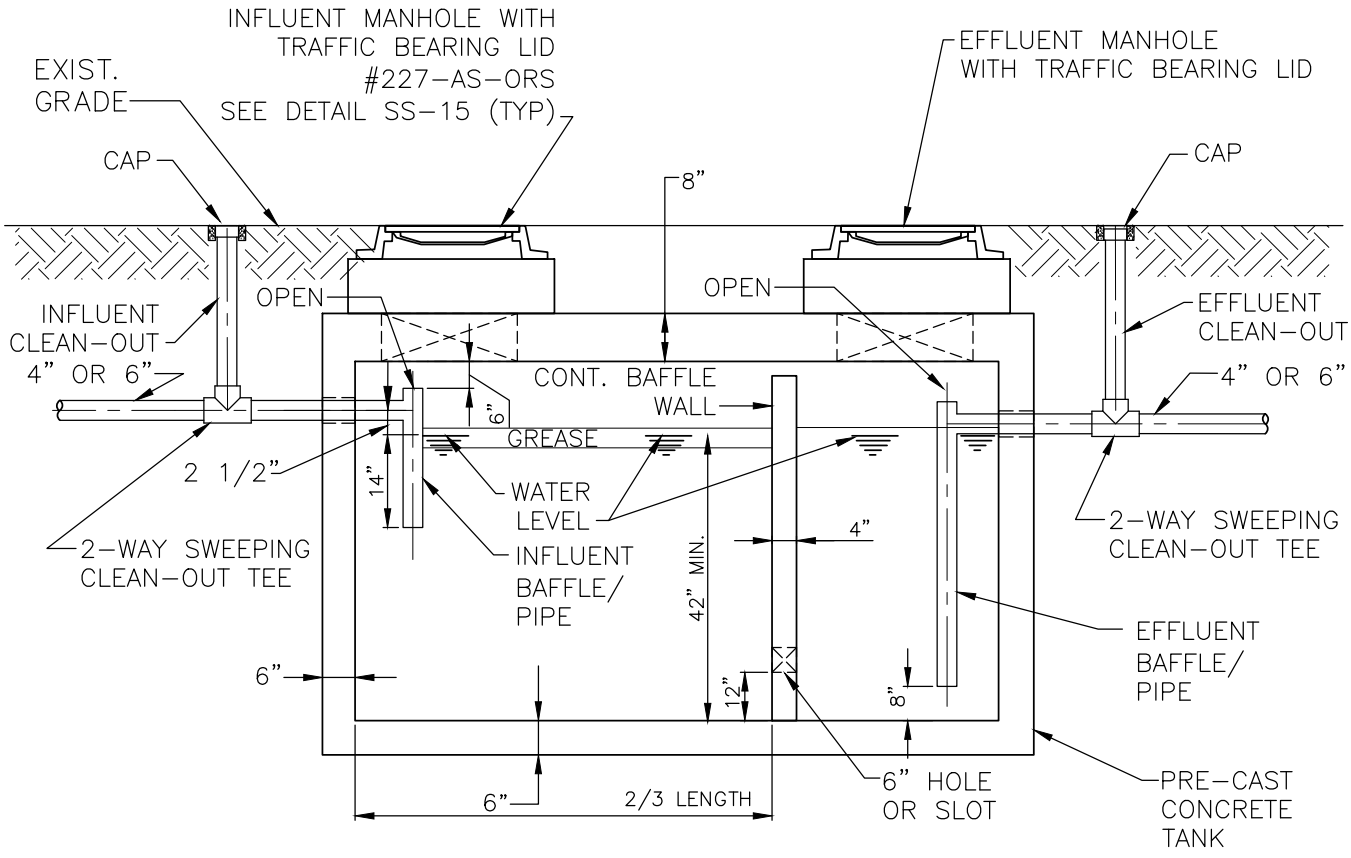
SCALE: NONE

FIG. SS-30

REVISED 6/22



PLAN VIEW



SECTION VIEW

TABLE 1

LOCATION	WALLS & BOTTOM	LID
GREEN AREA	6" MINIMUM	8" MINIMUM
TRAFFIC AREA	6" MINIMUM	8" MINIMUM

CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

GREASE INTERCEPTOR DETAIL

SCALE: NONE

FIG. SS-31

REVISED 7/22

NOTES:

1. GREASE INTERCEPTOR TANKS SHALL BE DESIGNED AND CONSTRUCTED TO MEET THE STRUCTURAL REQUIREMENTS OF FLORIDA ADMINISTRATIVE CODE CHAPTER 64E-6013.
2. THE CONTRACTOR OR ENGINEER OF RECORD SHALL PROVIDE THE CITY OF PALM COAST A COPY OF THE GREASE INTERCEPTOR(S) MANUFACTURER'S DETAILED SHOP DRAWING BEFORE APPROVAL FOR INSTALLATION.
3. GREASE INTERCEPTOR SIZING – THE EFFECTIVE CAPACITY OF EACH GREASE INTERCEPTOR IS DETERMINED ON A CASE BY CASE BASIS AND FORMULATED BY THE UTILITY DEPARTMENT. HOWEVER, THE MINIMUM GREASE INTERCEPTOR TANK VOLUME IS 750 GALLONS AND THE MAXIMUM IS 1,500 GALLONS. IF MORE THAN 1,500 GALLONS IS REQUIRED, THEN ADDITIONAL TANKS ARE INSTALLED IN SERIES FLOWING FROM ONE TO THE NEXT.
4. GREASE INTERCEPTOR TANKS SHALL BE INSPECTED UPON JOB SITE DELIVERY AND BEFORE INSTALLATION FOR STATE MANUFACTURING APPROVAL LEGEND OR DOCUMENTATION, DAMAGE AND TANK EFFECTIVE CAPACITY BY THE CITY OF PALM COAST.
5. GREASE INTERCEPTORS APPROVED FOR INSTALLATION BY THE CITY SHALL BE INSTALLED ACCORDING TO THE STANDARDS AND SPECIFICATIONS FOR WATER AND WASTEWATER CONSTRUCTION FOR THE CITY OF PALM COAST.
6. GREASE INTERCEPTOR(S) SHALL BE LOCATED AS TO PROVIDE EASY ACCESS FOR ROUTINE INSPECTIONS, CLEANING AND MAINTENANCE AS RQUIRED BY CITY ORDINANCE NO. 07-10 AND MEET THE FOLLOWING MINIMUM REQUIREMENTS:

a. GREASE INTERCEPTORS SHALL BE TWO COMPARTMENT (2/3 INLET; 1/3 OUTLET), CATEGORY FOUR (C4) TANKS AND CONSTRUCTED OF PRE-CAST CONCRETE OR APPROVED EQUIVALENT.

b. GREASE INTERCEPTORS SHALL HAVE A PROTECTIVE WATER-BASED COATING APPLIED TO THE INTERIOR AND EXTERIOR BY THE MANUFACTURER. THE EXTERIOR SHALL BE COATED TO A THICKNESS OF EIGHT (8) MILS, FOUR (4) MILS EACH COAT. THE INTERIOR SURFACES SHALL BE COATED TO A THICKNESS OF TWELVE (12) MILS, FOUR (4) MILS EACH COAT. THE COATING SHALL BE EQUIVALENT TO CONSEAL CS-55.

c. TANK WALLS SHALL BE 6" THICK C4 PRE-CAST CONCRETE OR APPROVED EQUAL FOR ALL TANKS, WHETHER LOCATED IN GREEN (NON-TRAFFIC) AREAS OR TRAFFIC AREAS. BOLLARDS OR SOME OTHER DEVICE SHALL BE PLACED AROUND THE TANK FOR PROTECTION.

d. TANK BOTTOM SHALL BE A MINIMUM 6" THICK C4 PRE-CAST CONCRETE OR APPROVED EQUAL FOR ALL TANKS, WHETHER LOCATED IN GREEN AREAS OR TRAFFIC AREAS.

e. TANK LIDS FOR TRAFFIC BEARING AND GREEN AREAS SHALL BE A MINIMUM 8" THICK WITH AN H-20 LOAD RATING.

f. TANK BAFFLE WALLS SHALL BE A MINIMUM 4" THICK MONOLITHIC PRE-CAST CONCRETE CONSTRUCTION WITH A 6" FLOW THROUGH HOLE LOCATED 12" ABOVE THE FLOOR IN THE BAFFLE WALL.

g. ACCESS MANHOLES SHALL BE A MINIMUM 24" DIAMETER AND LOCATED OVER THE INLET AND OUTLET OF EACH INTERCEPTOR AND BROUGHT TO FINISHED GRADE IN PAVED AREAS AND 2" ABOVE FINISHED GRADE IN GREEN AREAS. THE MANHOLE COVER LIDS SHALL BE LABELED (GREASE INTERCEPTOR OR GREASE TRAP) AS TO IDENTIFY THE DEVICE.

h. TANK PLUMBING SHALL BE A MINIMUM FOUR-INCH DIAMETER SCHEDULE 40 PVC. FITTINGS SHALL NOT HAVE LEDGES, SHOULDERS OR REDUCTIONS CAPABLE OF RETARDING OR OBSTRUCTING FLOW IN THE PIPING. THE INLET PIPE INVERT SHALL ENTER THE TANK A MINIMUM OF 2-1/2" ABOVE THE TANK LIQUID LEVEL AND CONNECT TO A SANITARY TEE. A DROP PIPE SHALL BE CONNECTED TO THE INLET TEE AND EXTEND STRAIGHT DOWN, 14" BELOW LIQUID LEVEL. THE OUTLET PIPE SHALL CONNECT TO A SANITARY TEE WITH A DROP PIPE EXTENDING STRAIGHT DOWN FROM THE BOTTOM OF THE TEE TO 8" OFF THE TANK FLOOR.

i. TWO-WAY SWEEPING CLEANOUT TEES SHALL BE PROVIDED AT THE INLET (INFLUENT) AND OUTLET (EFFLUENT) ENDS OF EACH TANK AND BETWEEN TANKS IF IN SERIES. CLEANOUTS LOCATED IN TRAFFIC AREAS SHALL BE PROTECTED WITH THE INSTALLATION OF A CONCRETE BOX WITH METAL LID (ELEPHANTS FOOT).

j. ALL NEWLY INSTALLED GREASE INTERCEPTORS SHALL BE CLEANED OF ANY ACCUMULATION OF WATER, SILT, DEBRIS, OR FOREIGN MATTER OF ANY KIND AND BE FREE OF SUCH ACCUMULATION AT THE TIME OF FINAL INSPECTION.

7. GREASE INTERCEPTOR SHALL BE VENTED IN ACCORDANCE WITH CHAPTER 9 AND 10 OF THE FLORIDA BUILDING CODE-PLUMBING AT THE TIME OF INSTALLATION. INSPECTION OF VENTING SYSTEM REQUIRED BY PALM COAST BUILDING DEPARTMENT PRIOR TO COVERING OR OTHERWISE CONCEALING GREASE INTERCEPTOR AND VENTING SYSTEM.

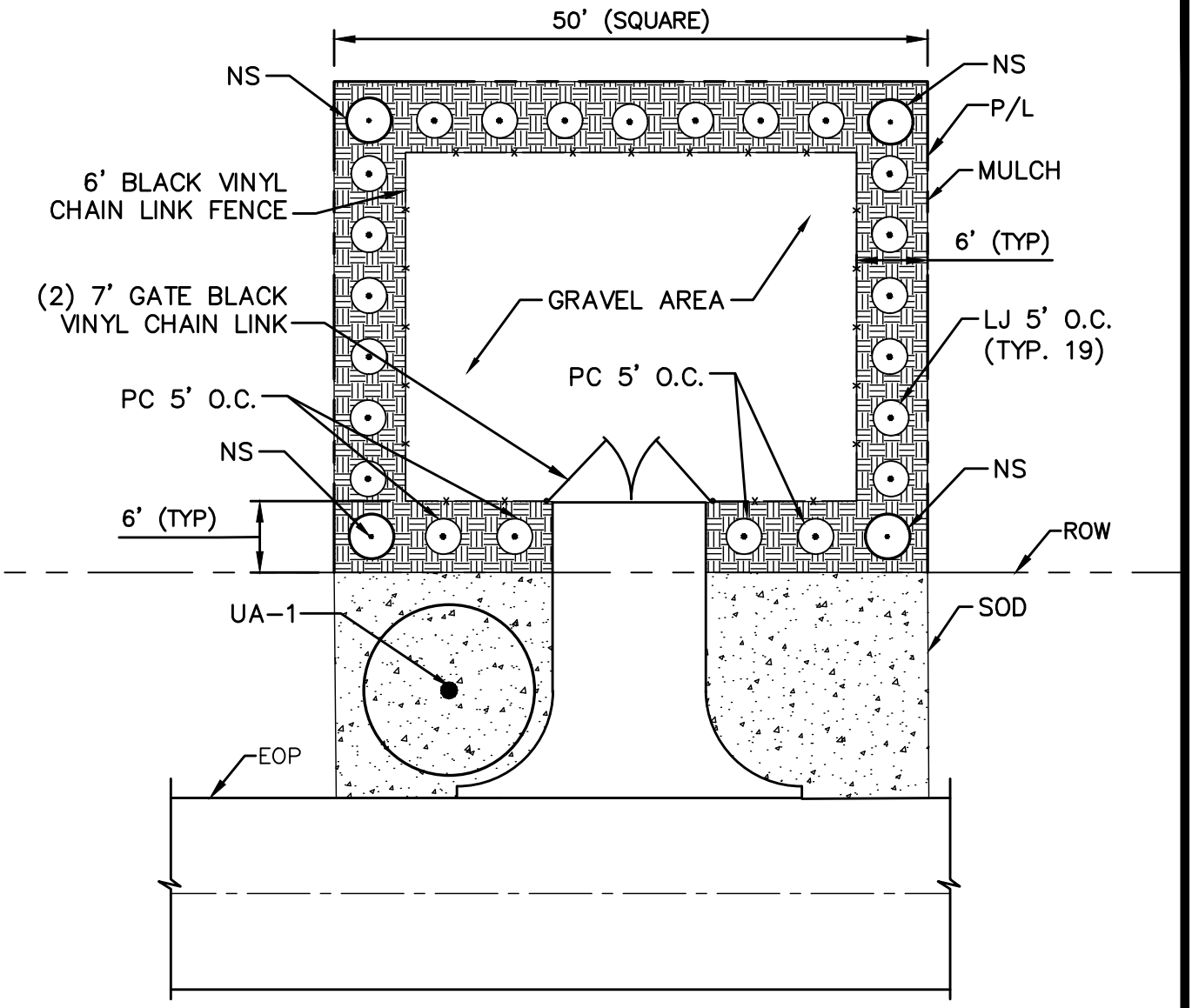
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

GREASE INTERCEPTOR NOTES

SCALE: NONE

FIG. SS-31A

REVISED 7/22



PLANT LIST

SYM.	QTY.	BOTANICAL NAME	COMMON NAME	DESCRIPTION
TREES				
UA-1	1	ULMUS ALATA	WINGED ELM	2.5"-3.0", CAL 10' HT , B&B
NS	4	ILEX X "NELLIE R. STEVENS"	NELLIE R. STEVENS	6' HT MIN., 5' O.C.
SHRUBS AND GROUNDCOVER				
PC	4	PODOCARPUS MACROPHYLLUM	PODOCARPUS	7 GAL 30" HT MIN., 5' O.C.
LJ	19	LIGUSTRUM JAPONICUM	JAPANESE PRIVET	7 GAL., 30" HT MIN., 5' O.C.
SOD				
BAHIA	BY CONTR.	PASPALUM NOTATUM 'ARGENTINE'	ARGENTINE BAHIA SOD	SOLID SOD, CONTRACTOR TO VERIFY QTY.

NOTE:

IF SPECIFIED PLANTS ARE UNAVAILABLE AT TIME OF CONSTRUCTION, CONTRACTOR MAY REPLACE SPECIFIED PLANTS WITH PLANTS APPROVED BY LANDSCAPE ARCHITECT AND CITY STAFF.

ALL OPEN SPACE AREAS WITHIN THE FENCE LINE SHALL INCORPORATE #57 STONE UNLESS PAVED, OR PLANTED WITH SHRUBS AND GROUND COVER.

PLANT BEDDING AREA SHALL INCLUDE A WEED-BLOCK FABRIC AND MULCH. SEE SHEET SS-32A FOR MULCH DETAILS.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

STANDARD PUMP STATION LANDSCAPE PLAN

SCALE: NONE

FIG. SS-32

REVISED 7/22

LANDSCAPE NOTES:

1. The landscape Contractor shall be responsible for all materials and all work as called for on the Landscape Plans and in the Landscape Specifications. In the event of variation between quantities shown on plant list and the plans, the plans shall control. The Landscape Contractor shall verify all quantities and report any discrepancies at the time of bidding.
2. The Landscape Contractor shall review architectural/engineering plans and become thoroughly familiar with surface and subsurface utilities.
3. Every possible safeguard shall be taken to protect building surfaces, equipment and furnishings. The Landscape Contractor shall be responsible for any damage or injury to person or property which may occur as a result of negligence in the execution of the work.
4. The work shall be coordinated with other trades to prevent conflicts. Coordinate the planting with the irrigation work to assure availability and proper location of irrigation items and plants.
5. All planting shall be performed by personnel familiar with planting procedure and under the supervision of a qualified planting foreman.
6. All plant material shall be graded Florida No. 1 or better as outlined under Grades and Standards for Nursery Plants, Part I and II, published by the Florida Department of Agriculture and Consumer Services.
7. The Landscape Architect or Owner shall have the right, at any stage of the operations, to reject any and all work and materials which, in his opinion, do not meet with the requirements of these specifications.
8. Except as otherwise specified, the Landscape Contractor's work shall conform to accepted horticultural practices as used in the trade.
9. The minimum acceptable size of all plants, measured after pruning, with branches in normal positions, shall conform to the measurements specified on the plant list or as indicated on the landscape drawing. Height and spread dimensions refer to main body of the plant and not extreme branch tip to tip. The caliper of tree trunks is to be taken 6" above the ground level if tree is 4" caliper and below. If tree is larger than 4", the measurement shall be taken 12" above ground level.
10. Plants shall be protected upon arrival at the site, by being thoroughly watered and properly maintained until planted.
11. All tree pits shall be excavated to size and depth in accordance with the USDA Standard for Nursery Stock 260.1, unless shown otherwise on the drawings, and backfilled with the specified planting soil. The Landscape Contractor shall test fill all tree pits with water before planting to assure proper drainage percolation is available.
12. The Landscape Contractor shall be responsible for proper watering of all plants. All plants shall be thoroughly watered at time of planting and kept adequately watered until time of acceptance. It shall be the Landscape Contractor's responsibility to assure that plants are not over watered.
13. It shall be the Landscape Contractor's responsibility to prevent plants from falling or being blown over, to restraighten and replant all plants which lean or fall and to replace all plants which are damaged due to lack of proper guying or staking. The Landscape Contractor shall be legally liable for any damage caused by instability of any plant material.
14. All trees and all palms shall be guyed or staked or braced. The Landscape Contractor shall determine which small or multi-trunk trees need to be guyed and staked to maintain plumb. Staking of trees and shrubs, if required, shall be done as per staking and guying detail prepared by the Landscape Architect. It shall be the responsibility of the Landscape Contractor to remove guys and stakes from the trees and job site after a period of 90 days.
15. Plants blown over by high winds, within the guaranteed period, shall not be cause for additional expense to the Owner, but shall be the responsibility of the Landscape Contractor. Damaged plants shall be replaced by the Landscape Contractor at no additional cost to the Owner.
16. Sod shall be certified to be free of the imported fire ant. Sod shall have a clean growth of acceptable grass, reasonably free of weeds with not less than 1 1/2" of soil firmly adhering to roots. It shall be the responsibility of the Landscape Contractor to measure and determine the exact amount required. This amount shall be verified with the Owner or Landscape Architect before installation.
17. The Landscape Contractor shall insure adequate vertical drainage in all plant beds, planters, and sod areas. Vertical drilling through any compacted fill to native soil shall be accomplished to insure drainage. If well drained fill is necessary to assure positive drainage, this issue shall be brought up by the Landscape Contractor at time of bidding.
18. The Landscape Contractor shall insure that his work does not interrupt established or projected drainage patterns.
19. The Landscape Contractor shall prune, shape and remove dead foliage/limbs from existing plant material to remain. Confirm with the Landscape Architect or Owner the extent of work required at time of bidding.
20. Mulch – All plant beds shall be top dressed with 2–3" of pine bark mulch (or approved equal).
21. Transplanted Material – The Landscape Contractor shall be responsible for determining and evaluating which plant materials are suitable for transplanting and shall verify this with the Landscape Architect or Owner. The Landscape Contractor shall take all reasonable, horticulturally acceptable measures to assure the successful transplanting of determined plant materials. The Landscape Contractor shall be responsible for replacing any relocated plant materials which die if such measures are not taken, as determined by the Landscape Architect or Owner. Replacement plants shall be of identical species and size if required.
22. MAINTENANCE PRIOR TO FINAL INSPECTION AND ACCEPTANCE:

    Maintenance shall commence after each plant is planted and the maintenance period shall continue until the job or specific phase of the job is accepted by the Landscape Architect or Owner. Extreme care shall be taken to instruct the Owner or his representatives in general maintenance procedures.

    Plant maintenance shall include watering, pruning, weeding, cultivating, mulching, tightening, and repairing of guys, replacement of sick or dead plants, resetting plants to proper grades or upright positions and restoration of the planting saucer and all other care needed for proper growth of the plants.

    During the maintenance period and up to the date of final acceptance, the Landscape Contractor shall do all seasonal spraying and/or dusting of trees and shrubs. Upon completion of all planting, an inspection for acceptance of work will be held. The Landscape Contractor shall notify the Landscape Architect or Owner for scheduling of the inspection 10 days prior to the anticipated date.

    At the time of the inspection, if all of the materials are acceptable, a written notice will be given by the Landscape Architect or Owner to the Landscape Contractor Stating the date when the Maintenance Period ends.

    GUARANTEE AND REPLACEMENT:

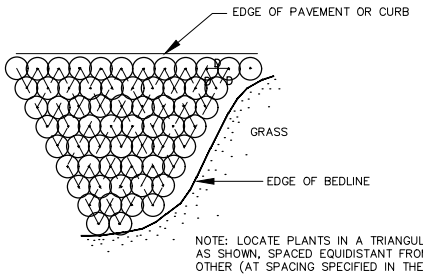
    All plant materials shall be guaranteed for one (1) year from the time of final inspection and interim acceptance shall be alive and in satisfactory growth for each specific kind of plant at the end of the guaranteed period.

    At the end of the guarantee period, any plant required under this contract that is dead or not in satisfactory growth, as determined by the Owner or the Landscape Architect, shall be removed and replaced. Replacement plants shall have an extended guarantee, as noted above, from time of replacement.

    All replacements shall be planted of the same kind and size as specified on the plant list. They shall be the responsibility of the Landscape Contractor.

23. LANDSCAPE AS–BUILTS

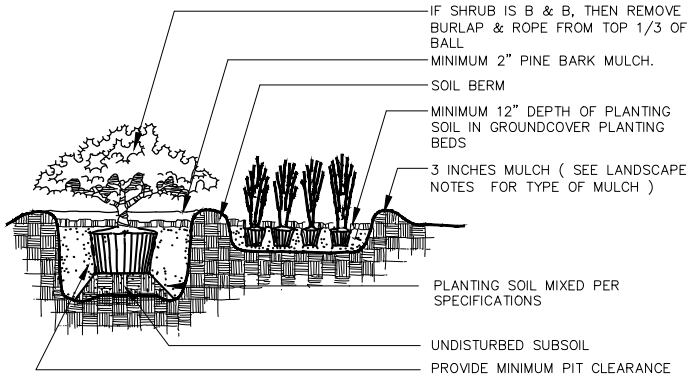
    The contractor to provide marked–up landscape as–builts to the City that CLEARLY reflect all changes.



NOTE: LOCATE PLANTS IN A TRIANGULAR PATTERN AS SHOWN, SPACED EQUIDISTANT FROM EACH OTHER (AT SPACING SPECIFIED IN THE PLANT LIST).

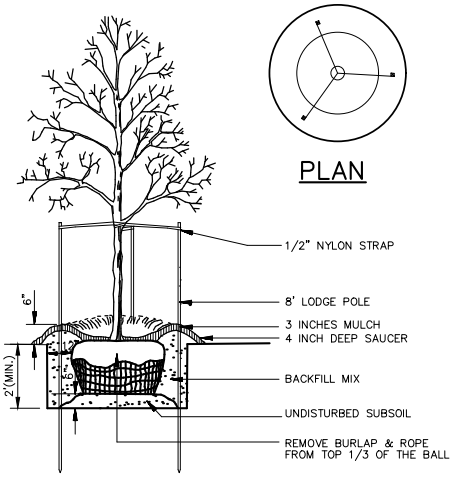
SHRUB/GROUNDCOVER SPACING PLAN

N.T.S.



SHRUB AND GROUNDCOVER PLANTING DETAIL

NTS



NOTE: SEE LANDSCAPE NOTES FOR THE TYPE OF MULCH MATERIAL TO USE.

TREE PLANTING

N.T.S.

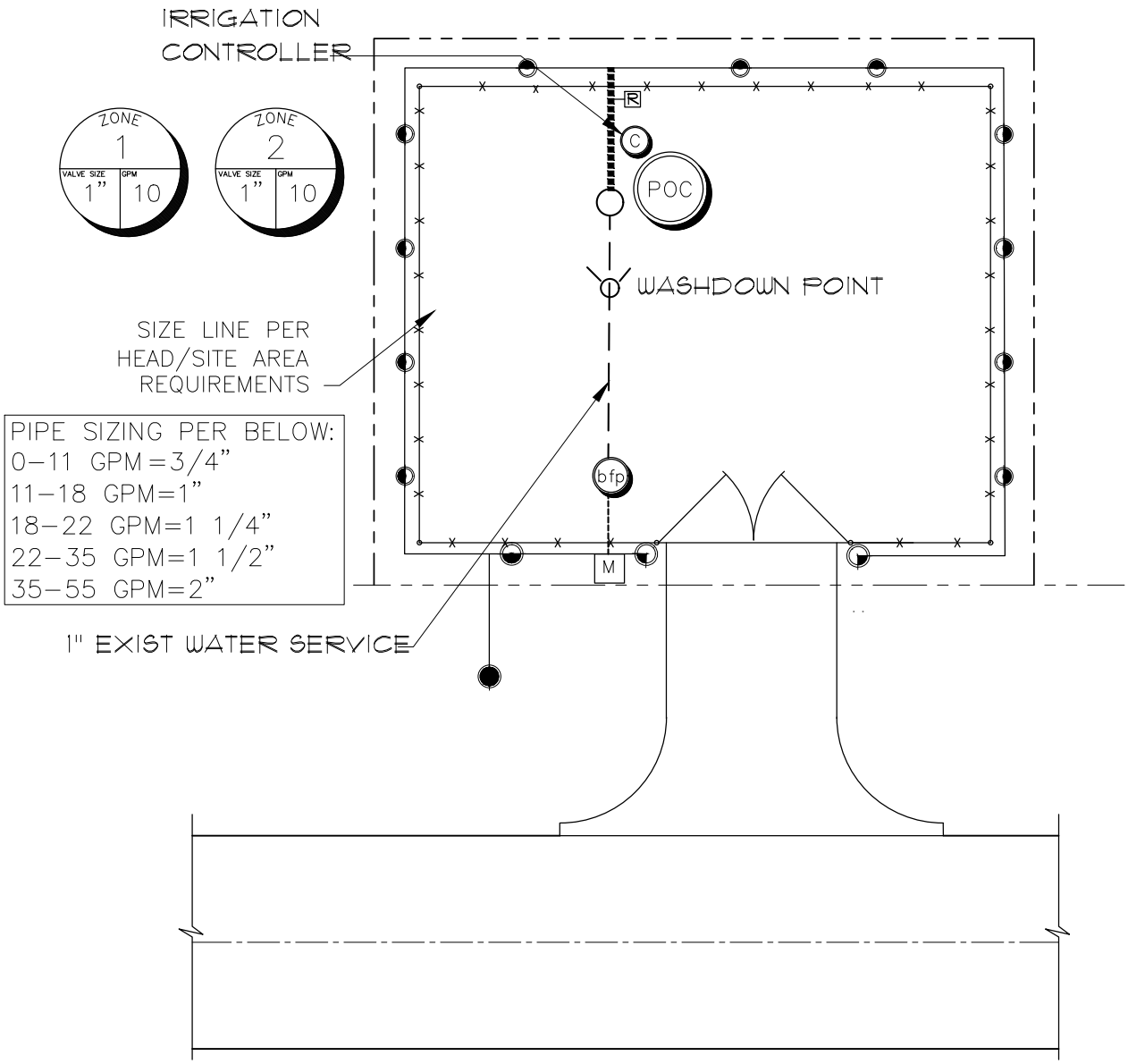
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

TYPICAL LANDSCAPE DETAILS AND NOTES

SCALE: NONE

FIG. SS–32A

REVISED 7/22



NOTES:

1. IF REUSE IRRIGATION WATER IS USED, ALL HEADS, PIPE AND VALVE BOX COVERS SHALL BE PURPLE. REUSE WARNING SIGN TO BE PLACED IN FRONT OF THE STATION PER THE CITY STANDARD DETAIL FOR REUSE IRRIGATION.

LEGEND

Sym.	DESCRIPTION
	HUNTER PRS30 6" POP-UP 180° (SPACE 15' O.C.)
	HUNTER PRS30 6" POP-UP 90° (SPACE 15' FROM NEXT HEAD)
	HUNTER PCB TREE BUBBLER @ 1GPM (REQUIRED FOR ALL TREES)
	HUNTER ELECTRIC VALVE 1 CV SERIES
C	HUNTER PRO-C CONTROLLER.
bfp	BACKFLOW PREVENTER SUPPLIED BY THE CITY OF PALM COAST
	Class 160 PVC LATERAL PIPE.
M	METER SUPPLIED BY THE CITY OF PALM COAST
R	RAIN SENSOR (WIRELESS)

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

STANDARD PUMP STATION - IRRIGATION PLAN

SCALE: NONE

FIG. SS–33

REVISED 7/22

GENERAL NOTES

1) THE DRAWINGS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL BE EXPECTED TO MAKE THOSE MODIFICATIONS NECESSARY IN THE FIELD TO REACT TO ACTUAL FIELD CONDITIONS, WITHOUT DEPARTURE FROM THE DESIGN CONCEPTS OR INTENT.

2) ALL WORK SHALL CONFORM TO ANY AND ALL APPLICABLE REGULATIONS AND CODES FOR THE LOCATION OF THE WORK. THE INSTALLER SHALL OBTAIN ANY NECESSARY LOCATES, PERMITS AND INSPECTIONS.

3) ALL WORK SHALL BE CLOSELY COORDINATED WITH THAT OF OTHER TRADES, IN ORDER TO AVOID CONFLICTS. REFER TO LANDSCAPE AND UTILITIES PLANS WHEN TRENCHING TO AVOID TREES, SHRUBS AND UNDER GROUND UTILITIES

4) ALL MATERIAL AND LABOR REQUIRED TO PROVIDE A COMPLETE, OPERATIONAL AND FULLY GUARANTEED SYSTEM SHALL BE CONSIDERED PART OF THE WORK, WHETHER OR NOT THEY ARE SPECIFICALLY INDICATED IN THE DOCUMENTS.

5) THE CONTRACTOR SHALL PREPARE AN AS-BUILT DRAWING SHOWING ALL IRRIGATION INSTALLATION. THE DRAWING SHALL LOCATE ALL PIPING AND VALVES BY SHOWING EXACT MEASUREMENTS FROM HARD SURFACES OR PERMANENT FEATURES. PLEASE SHOW WIRE DIRECTION. MEASUREMENTS TO BE TAKEN FROM AT LEAST TWO FIXED POINTS.

6) ALL HEADS SHALL BE OF THE PROPER TYPE FOR THE AREAS WHERE LOCATED, AND SHALL BE INSTALLED PLUMB AND WITH THE PROPER HEIGHT. ALL HEADS AND OTHER EQUIPMENT SHALL BE INSTALLED WITH ADEQUATE AND UNIFORM CLEARANCE FROM ALL HARD-SCAPING, TO MINIMIZE WATER OVER SPRAY ON IMPERVIOUS AREAS.

7) THE WATER SUPPLY FOR THIS SYSTEM SHALL BE CITY WATER OR CITY REUSE WATER (TAP SHALL BE MADE INTO A 1" SERVICE LINE. (SEE P.O.C. ON PLAN). THE IRR. CONTRACTOR SHALL VERIFY THE AVAILABLE FLOW AND PRESSURE EXCEEDES THE REQUIRED 10 GPM @ 50 PSI.

8) HIGH VOLTAGE POWER SUPPLY TO THE IRRIGATION CONTROLLER SHALL BE THE RESPONSIBILITY OF THE OWNERS REP. THE IRRIGATION CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING THE CONTROLLER AND THE LOW VOLTAGE WIRES.

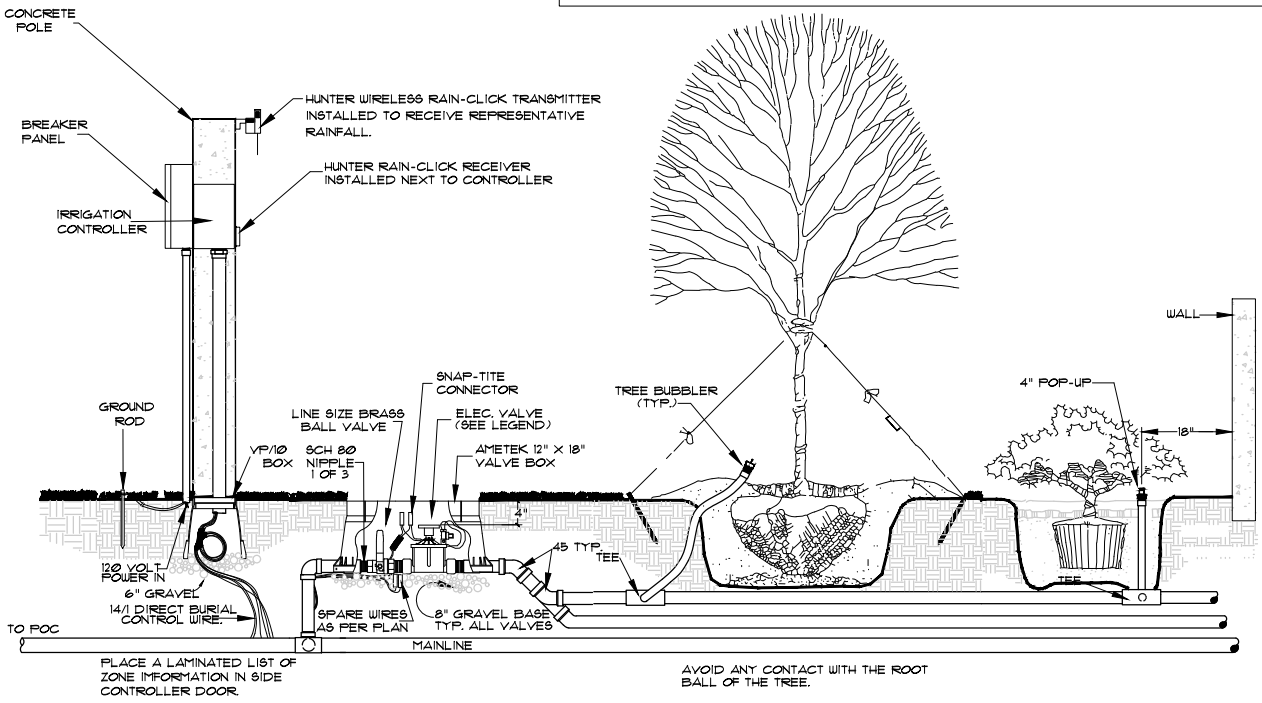
9) ALL CONTROL WIRING SHALL BE INSTALLED UNDER MAINLINE, IF NOT POSSIBLE THEN ELEC. CONDUIT SHALL BE USED FOR WIRE PROTECTION USING PULL BOXES 150' O.C. WIRES SHALL BE TAPED EVERY 20 L.F. WITH ADEQUATE SLACK AND SURGE/ EXPANSION LOOPS AND SHALL BE SPLICED ONLY IN VALVE BOXES, USING SNAP TITE CONNECTORS. THE CONTROL WIRE SHALL BE UF#14 PVC JACKETED, SINGLE CONDUCTOR CABLE, USING RED FOR "HOT" AND WHITE FOR VALVE COMMON. (SEE PLAN FOR SPARE WIRES.)

10) ALL PIPING AND WIRE PASSING UNDER PAVED AREAS SHALL BE SLEEVED WITH SCH 40 PVC PIPE, SIZED A MINIMUM OF TWO NOMINAL SIZES LARGER THAN CONTAINED PIPE.

11) ANY PIPING SHOWN OUTSIDE THE PROPERTY LINE OR RUNNING OUTSIDE A LANDSCAPE AREA IS SHOWN THERE FOR CLARITY ONLY. ALL LINES SHALL BE INSTALLED ON THE PROPERTY AND INSIDE THE LANDSCAPE AREAS.

12) THE INSTALLER SHALL BE EXPECTED TO BE FAMILIAR WITH AND FOLLOW THE INSTRUCTIONS CONTAINED HEREIN, ON THE DRAWINGS, IN THE CONSTRUCTION DETAILS, AND IN THE WRITTEN SPECIFICATIONS, SHOULD A CONFLICT BE DISCOVERED WITHIN THE DOCUMENTS, HE SHALL IMMEDIATELY NOTIFY THE PROJECT MANAGER AND REQUEST CLARIFICATION.

13) DEPTH OF IRRIGATION LINES SHALL BE 12" FOR LATERAL LINES AND 18" FOR MAINLINES AS MEASURED FROM THE TOP OF THE PIPE TO THE GROUND SURFACE.



CONTROLLER DETAIL | **ELECTRIC VALVE DETAIL** | **TREE BUBBLER DETAIL** | **SHRUB SPRAY DETAIL**

TYPICAL IRRIGATION DETAILS AND NOTES

SCALE: NONE

FIG. SS-33A

REVISED 7/22

ROADWAY DETAILS

ROADWAY DETAILS

Sheet List Table	
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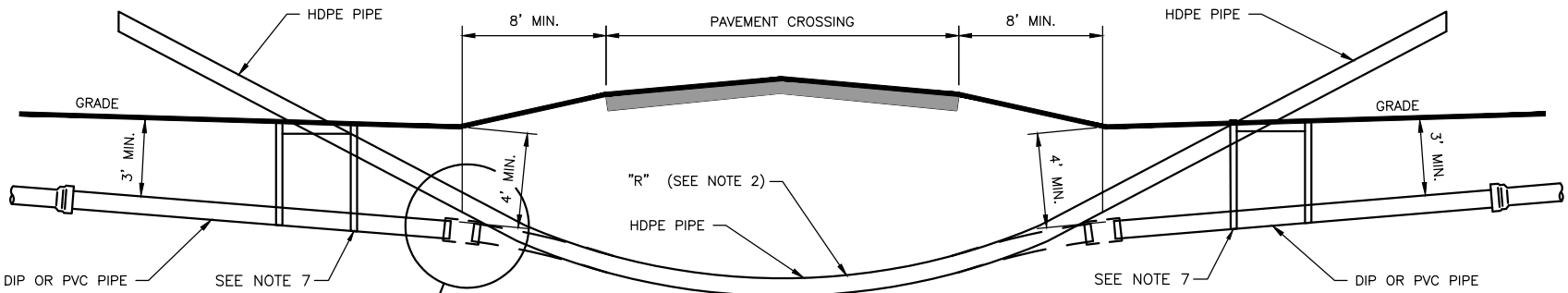
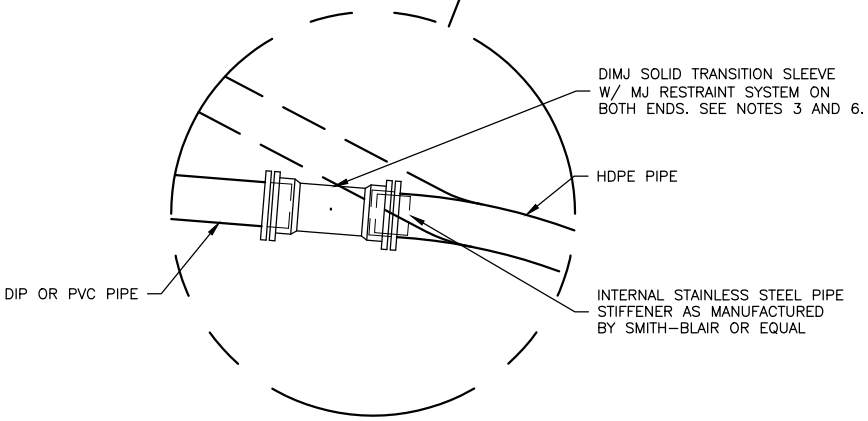
ROADWAY DETAILS	
FIG. R-1	DIRECTIONAL BORE PAVEMENT CROSSING DETAIL
FIG. R-2	DIRECTIONAL BORE PIPE CROSSING DETAIL
FIG. R-3	STANDARD ROADWAY OPEN CUT DETAIL
FIG. R-4	PIPE TRENCHING AND BEDDING, BACKFILLING AND COMPACTION DETAIL
FIG. R-5	CONCRETE ARCH AND ENCASEMENT DETAIL
FIG. R-6	DRIVEWAY MITERED END SECTION DETAIL
FIG. R-7	BORE AND JACK DETAIL





CONNECTION DETAIL (TYP. BOTH SIDES)

NOTES:

1. CONTRACTOR TO SUBMIT CALCULATIONS APPROVED BY PIPE MANUFACTURER FOR DETERMINATION OF REQUIRED HDPE PIPE THICKNESS FOR EACH INSTALLATION.

2. "R" IS TO BE BASED ON 125% OF MANUFACTURER'S RECOMMENDED MINIMUM RADIUS.

3. HDPE/MJ ADAPTER MAY BE USED IN LIEU OF STIFFENER AND SOLID TRANSITION SLEEVE.

4. A "GO/NOGO" MANDREL DEVICE, SIZED AT 80% OF THE PIPE I.D. SHALL BE PULLED THROUGH THE COMPLETED PIPELINE. REFER TO SPECIFICATION SECTION 02446.

5. AS A PART OF THE DIRECTIONAL DRILL INSTALLATION, THE CONTRACTOR SHALL INCLUDE 3 STRANDS OF TRACING WIRE. THE WIRE SHALL BE A STEEL CORE, 10 GAGE, SINGLE STRAND THWN SOLID COPPER ENCAPSULATED IN 45 MIL HDPE JACKET. TRACING WIRE BREAK LOAD SHALL BE 1150 LBS.

6. RESTRAIN 20LF OF PIPE FROM TRANSITION SLEEVE. IF A FITTING IS USED AT TRANSITION, REFER TO RESTRAINED JOINT DETAIL (FIG. W-9).

7. METER BOXES SHALL BE 13"X23" HIGHLINE CHA1324155 BOX INSTALLED AT THE ENDS OF HDD'S TO SERVE AS SPLICE BOXES FOR TRACER WIRE.

8. NO DRILLING ON FRIDAY WITHOUT PRIOR APPROVAL BY THE CITY OF PALM COAST.

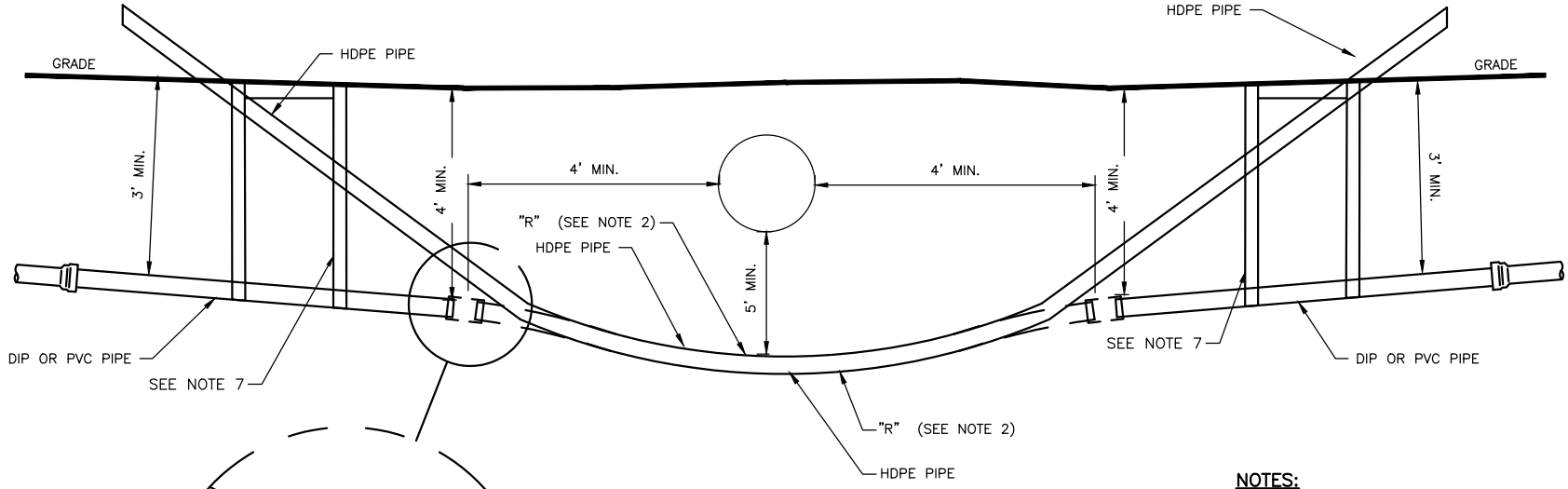
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

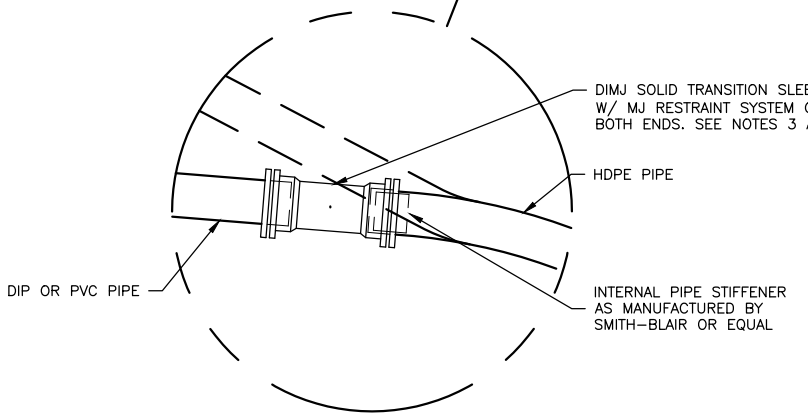
DIRECTIONAL BORE
PAVEMENT CROSSING DETAIL

SCALE: NONE

FIG. R-1

REVISED 8/19





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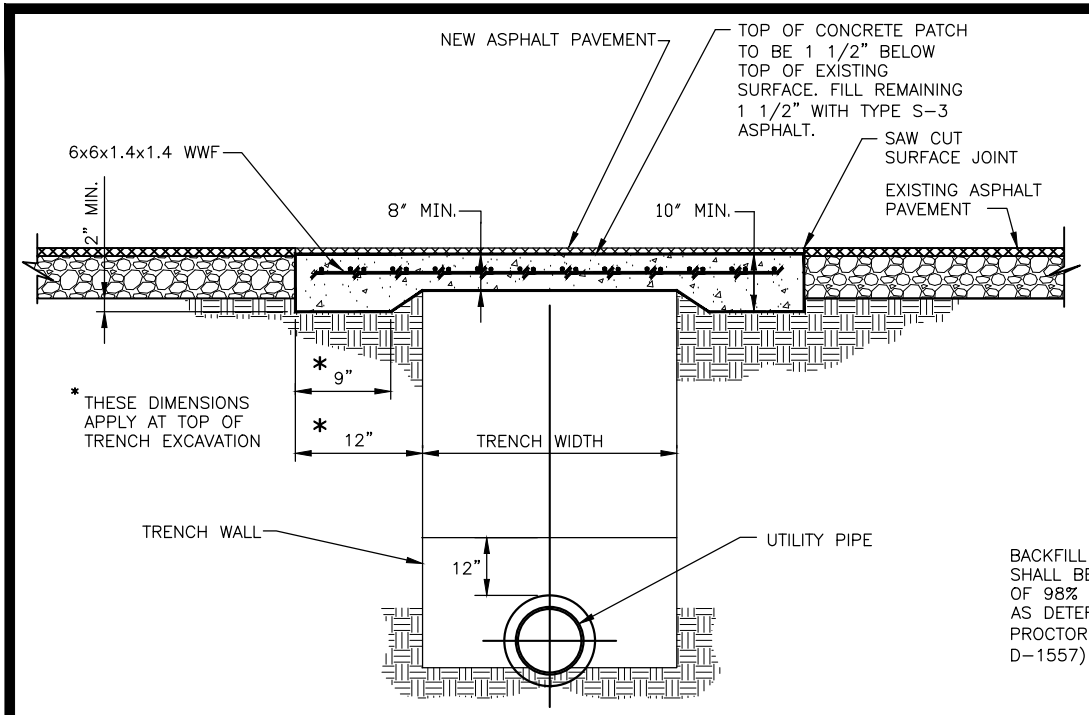
DIRECTIONAL BORE PIPE CROSSING DETAIL

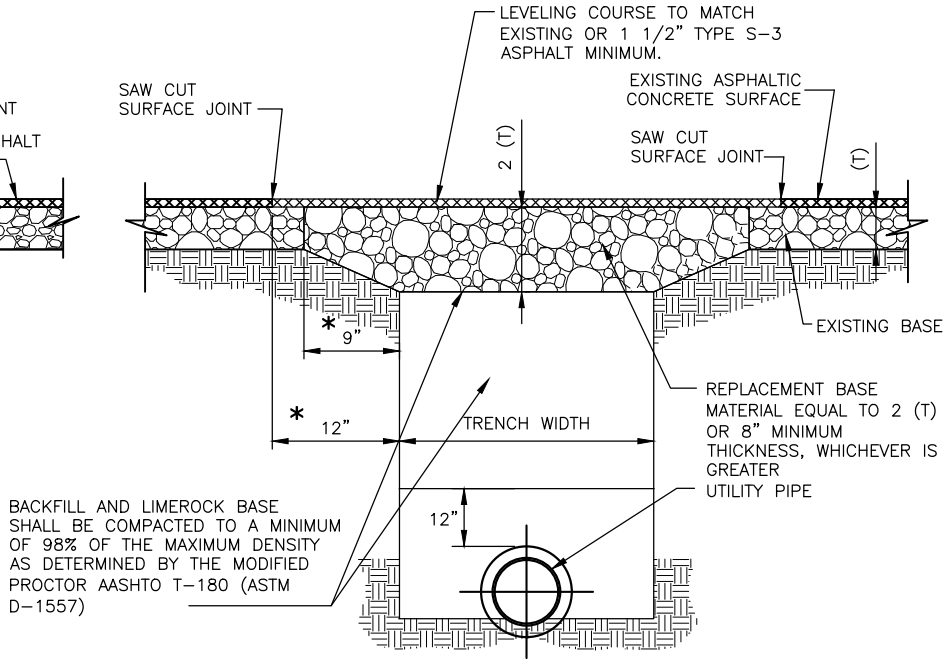
SCALE: NONE

FIG. R-2

REVISED 7/18



PORTLAND CEMENT CONCRETE PATCH



ASPHALTIC CONCRETE PATCH

NOTES:

1. ALL PUBLIC ROADS AND PAVED DRIVE CROSSINGS SHALL BE BACKFILLED WITH COMMON FILL MATERIAL AND TOPPED WITH AT LEAST 8" IN THICKNESS OF LIMEROCK BASE COURSE MATERIAL DURING CONSTRUCTION OF UTILITY TRENCH.
2. IN AREAS WHERE ABOVE DETAILS DEVIATE FROM COUNTY AND/OR CITY STANDARDS, THE CONTRACTOR SHALL PROVIDE ALL NECESSARY MATERIALS AND LABOR TO CONFORM TO SAID STANDARDS.
3. ALL EXCAVATIONS SHALL COMPLY WITH THE TRENCH SAFETY ACT (F.S. 553.60 THRU 553.64, LAWS OF FLORIDA). LATEST EDITION.

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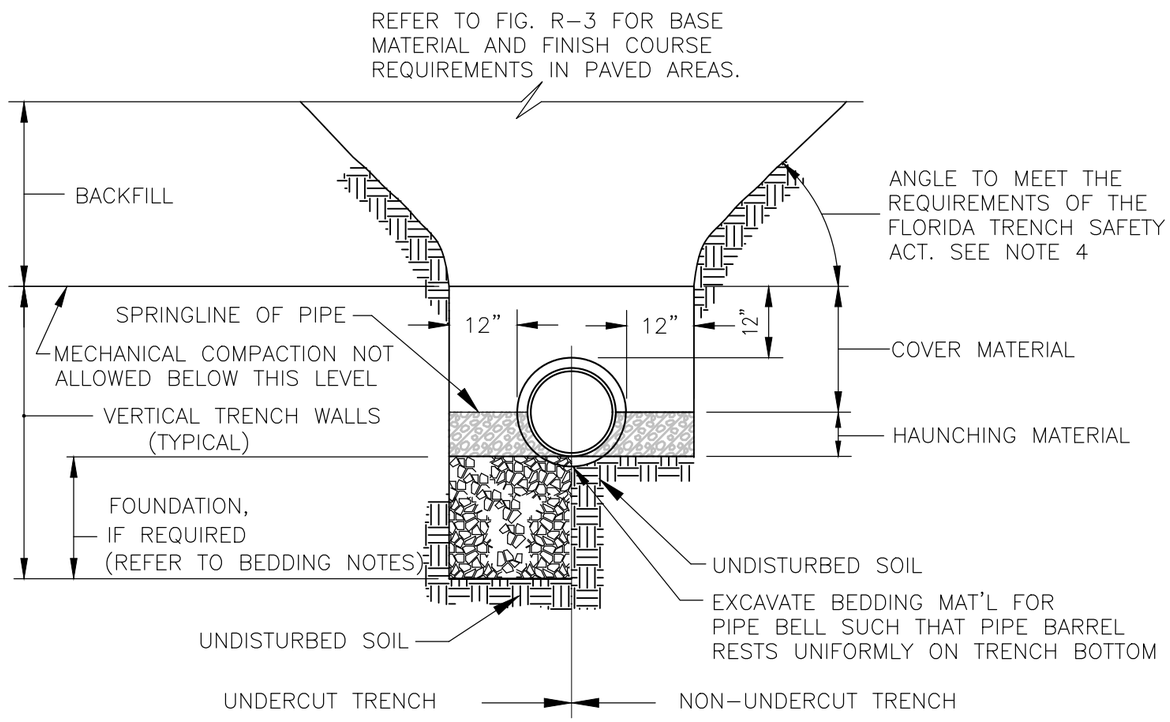
STANDARD ROADWAY OPEN-CUT DETAIL

SCALE: NONE

FIG. R-3

REVISED 3/09



TYPICAL DETAIL–OPEN CUT

1. BEDDING NOTES:

   A. NORMALLY APPROVED CLEAN BACKFILL MATERIAL WILL BE USED AS A 4–INCH TYPICAL BEDDING UNDER THE PIPE. HOWEVER, WHERE UNSTABLE OR UNSITABLE MATERIAL EXISTS FOR BEDDING, AS DETERMINED BY THE UTILITY INSPECTOR AND / OR DESIGN ENGINEER, A SUFFICIENT DEPTH OF THE UNSTABLE MATERIAL SHALL BE REMOVED AND REPLACED WITH NOT LESS THAN 6–INCHES NOR MORE THAN 24–INCHES OF ONE OF THE FOLLOWING MATERIALS:
      (1) APPROVED CLEAN BACKFILL (FROM ADJACENT AREA)
      (2) FDOT SIZE 6 AGGREGATE (3/8–INCH TO 3/4–INCH)
      (3) CRUSHED SHELL AS REQUIRED TO IMPLEMENT A STABLE BEDDING FOR THE PIPE.
   B. BEDDING COMPACTION OF 95 PERCENT IS REQUIRED WHERE CLEAN BACKFILL MATERIAL IS USED. WHEN USING CRUSHED SHELL OR GRAVEL AS BACKFILL, HAND TAMPING IS REQUIRED.
   C. IF SOLID HARDPAN IS ENCOUNTERED AT THE TRENCH BOTTOM, AND NO UNDERCUT (EXCLUDING TEETH DEPTH) HAS BEEN MADE IN THE HARDPAN, NO COMPACTION IS REQUIRED ON THE MATERIAL USED TO BRING THE EXCAVATION TO THE TRENCH BOTTOM.
   D. ALL ASPECTS OF THIS BEDDING WORK WILL BE DETERMINED BY THE UTILITY INSPECTOR.

2. PERCENT COMPACTION:

   COMPACTION REQUIREMENTS LISTED BELOW ARE IN PERCENTAGES OF MAXIMUM DENSITY AS DETERMINED BY THE MODIFIED PROCTOR AASHTO T–180 (ASTM D–1557) UNLESS OTHERWISE SPECIFICALLY APPROVED.
   A. 95 PERCENT FOR PIPE BEDDING, EXCEPT FOR THE VARIOUS EXCEPTIONS LISTED IN THE BEDDING NOTES IN WHICH NO FORMAL COMPACTION TEST IS REQUIRED.
   B. BAR TAMP HAUNCHING MATERIAL.
   C. 95 PERCENT FOR COVER MATERIAL. (6–INCH LIFTS)
   D. 95 PERCENT FOR BACKFILL IN NON–ROADWAY AREAS. (12–INCH LIFTS)
   E. 98 PERCENT FOR BACKFILL IN ROADWAY AREAS. (12–INCH LIFTS)

3. TESTING FREQUENCY:

   LOCATION OF TESTING STATIONS WILL BE RANDOMLY SELECTED AND WITHIN THE FOLLOWING MINIMUM FREQUENCIES:
   BACKFILL: ONE (1) TEST PER 300 LINEAR FEET OR PORTION THEROF.
   TYPICAL ELEVATIONS OF TEST POINTS WILL BE EVERY TWO (2) FEET, STARTING ONE FOOT ABOVE TOP OF PIPE. THE PERCENT (%) OF MAXIMUM DENSITY LISTED ABOVE ARE MINIMUMS AND MAY BE INCREASED AT THE DIRECTION OF THE UTILITY INSPECTOR AND / OR DESIGN ENGINEER.

4. IF ANGLE CANNOT BE MET DUE TO TIGHT WORKING CONDITIONS, TRENCH SHALL BE SHEETED OR A TRENCH BOX UTILIZED.

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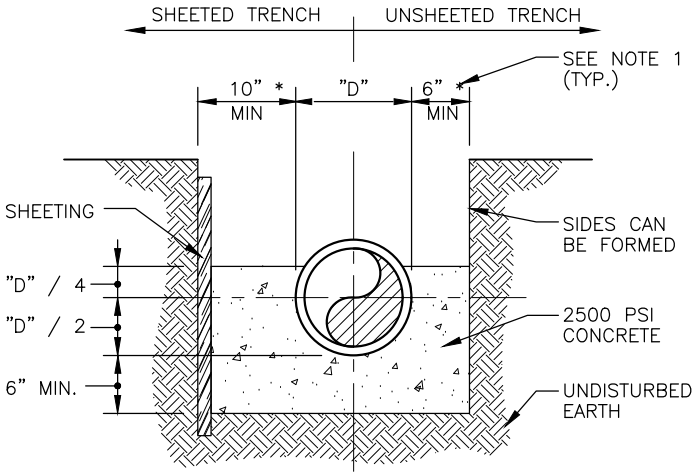
PIPE TRENCHING, BEDDING, BACKFILLING & COMPACTION DETAIL

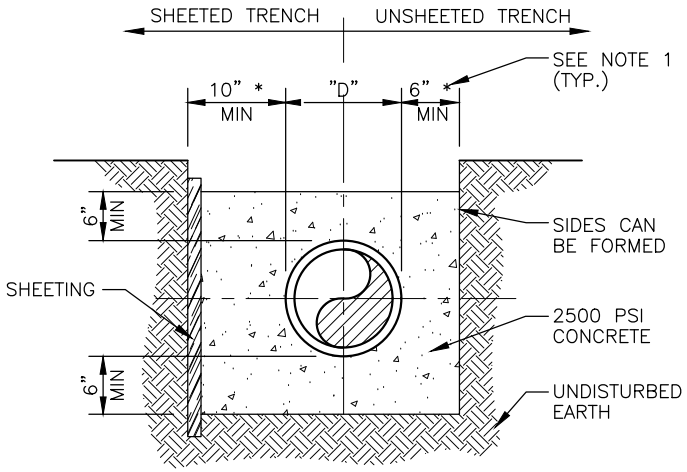
SCALE: NONE

FIG. R–4

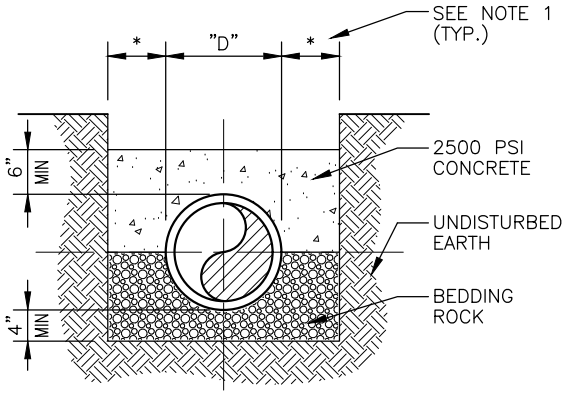
REVISED 7/11



CRADLE OR HALF ENCASEMENT



FULL ENCASEMENT



CONCRETE ARCH

NOTES:

1. * 15" MAX. FOR PIPE DIAMETER LESS THAN 24", & 24" MAX. FOR PIPE DIAMETER 24" AND LARGER.
2. "D" REFERS TO THE DIAMETER OF THE PIPE.
3. USE OF CONCRETE ARCH HALF ENCASEMENT OR FULL ENCASEMENT TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE UTILITY INSPECTOR OR DESIGN ENGINEER.
4. REFER TO THE SPECIFICATIONS FOR SHEETING AND BRACING EXCAVATIONS.

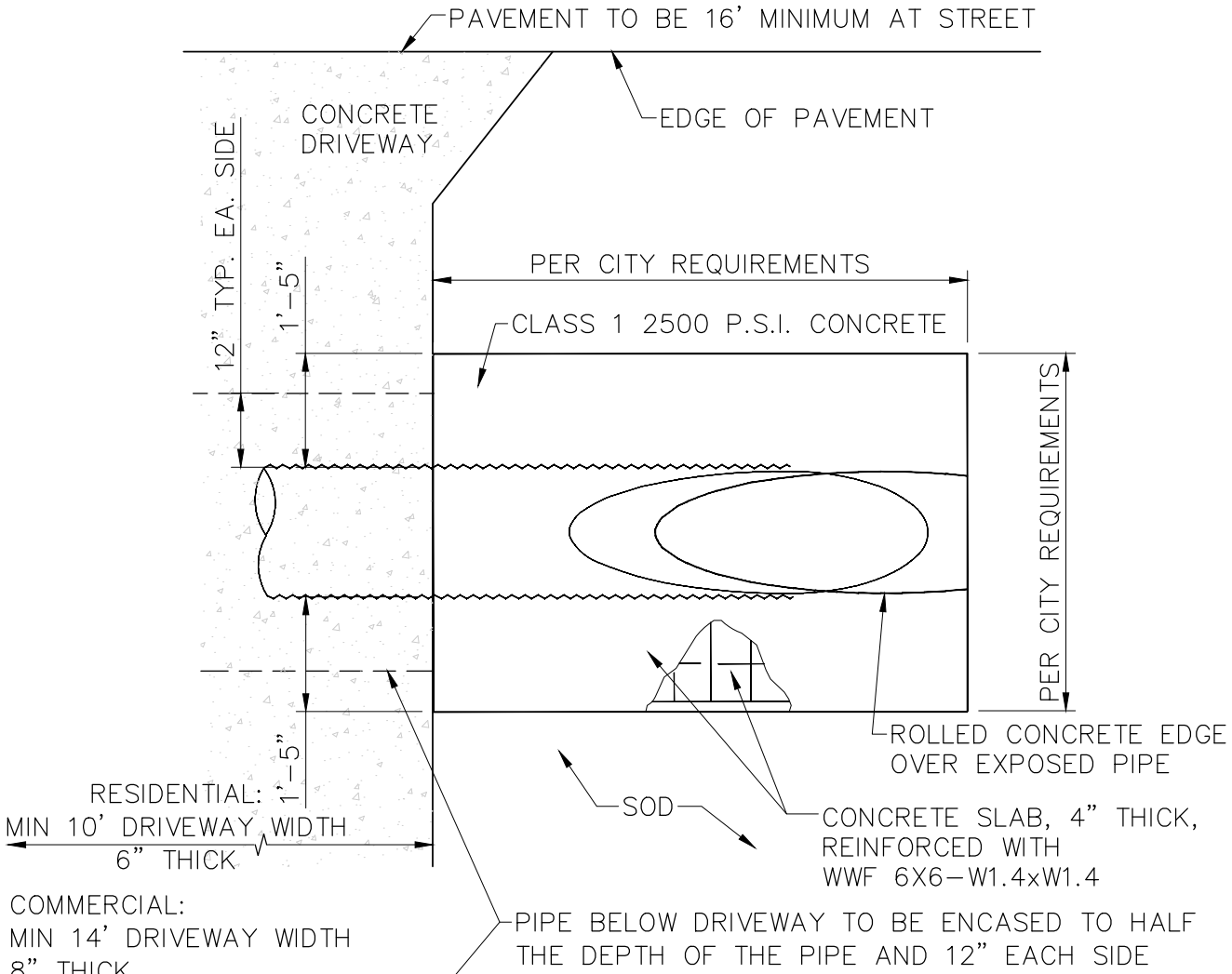
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

CONCRETE ARCH AND ENCASEMENT DETAIL

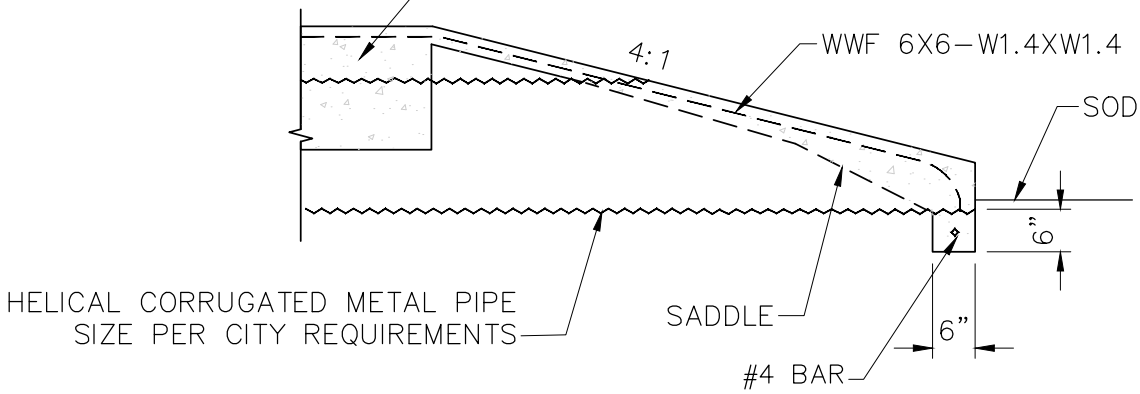
SCALE: NONE

FIG. R–5

REVISED 3/09



PLAN VIEW



SECTION

GENERAL NOTES:

1. PIPE PROTECTION RAILS MAY BE REQUIRED AT THE CITY'S DISCRETION.
2. FINISH GRADE TO MATCH DRIVEWAY AND MITERED END SECTION EDGE.
3. HELICAL CORRUGATED METAL PIPE IS REQUIRED; SUBSTITUTES WILL REQUIRE PRIOR CITY APPROVAL.
4. THE USE OF PRE-CAST MITERED END SECTIONS ARE PROHIBITED.
5. ALL PERMITS AND INSPECTIONS OF DRIVEWAY CONSTRUCTION WILL BE CONDUCTED AS CURRENTLY REQUIRED.

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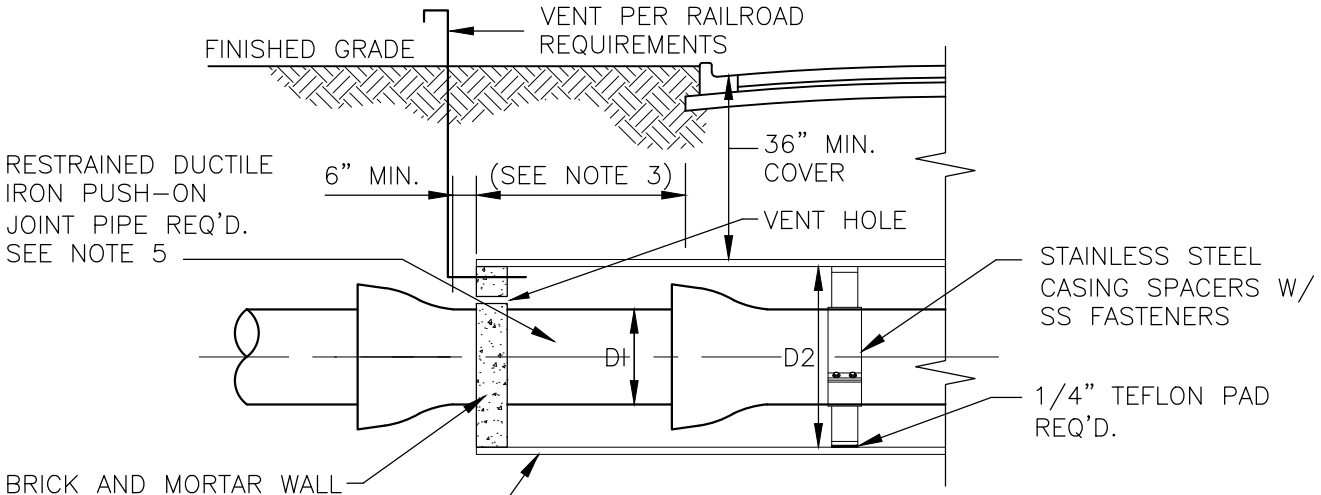
DRIVEWAY MITERED END SECTION DETAIL

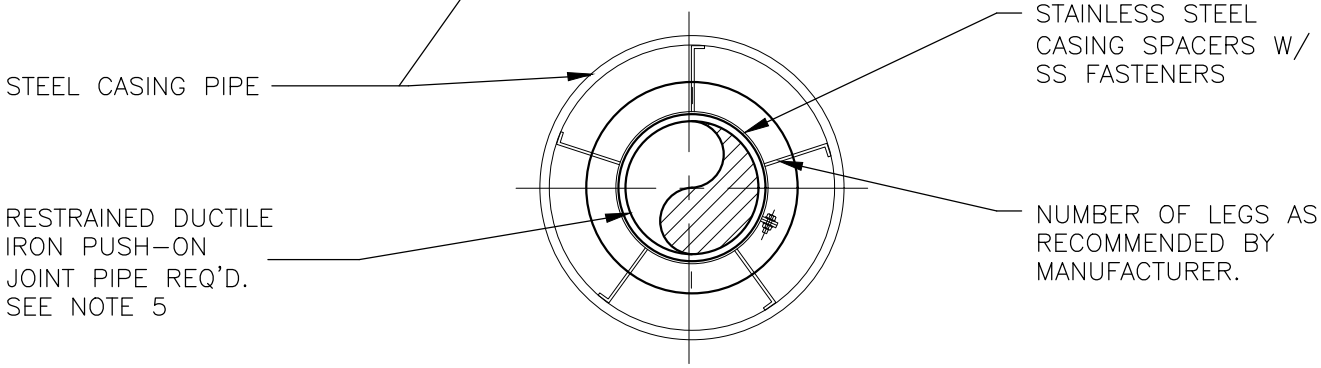
SCALE: NONE

FIG. R-6

REVISED 3/09



ELEVATION



SECTION

CARRIER PIPE AND CASING PIPE SIZES (MIN.)										
CARRIER PIPE NOM. DIA. (DI)	2	4	6	8	10	12	14	16	20	24
CASING PIPE NOM. DIA. (D2)	6	14	16	18	22	24	30	30	36	48
WALL THICKNESS (IN.) FDOT	0.250	0.250	0.250	0.250	0.250	0.250	0.312	0.312	0.375	0.500
WALL THICKNESS (IN.) RAILROAD	0.250	0.250	0.250	0.312	0.375	0.375	0.500	0.500	0.563	0.625

NOTES:

1. WHEN CONSTRUCTION IS WITHIN FDOT OR RAILROAD JURISDICTION, ADDITIONAL REQUIREMENTS OF EACH AGENCY SHALL BE MET.
2. STAINLESS STEEL CASING SPACERS ARE REQUIRED AS SHOWN.
3. WHERE PRACTICAL, CASING SHALL EXTEND A MIN. OF 8' BEYOND EDGE OF PAVEMENT OR LONGER AS REQUIRED BY LOCAL PERMITTING AGENCIES.
4. A MINIMUM OF 3 CASING SPACERS PER 20 LINEAR FEET OF INSTALLED CARRIER PIPE SHALL BE PROVIDED.
5. IF UTILITY MAIN CONVEYS RAW WATER TO WTP NO. 2, CARRIER PIPE SHALL BE RESTRAINED JOINT AWWA C-900 PVC PIPE.
6. NO BORING ON FRIDAY WITHOUT PRIOR APPROVAL BY THE CITY OF PALM COAST.

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

BORE & JACK DETAIL

SCALE: NONE

FIG. R-7

REVISED 8/20

STRUCTURAL DETAILS

STRUCTURAL DETAILS

Sheet List Table	
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STRUCTURAL DETAILS	
FIG. S-1	STRUCTURAL GENERAL NOTES
FIG. S-2	STRUCTURAL GENERAL NOTES
FIG. S-3	STRUCTURAL GENERAL NOTES
FIG. S-4	EQUIPMENT PAD DETAIL
FIG. S-5	CONCRETE PIPE SUPPORT DETAIL
FIG. S-6	STAINLESS STEEL PIPE SUPPORT DETAIL

STRUCTURAL GENERAL NOTES

SHEET 1 OF 3

GENERAL NOTES

1. THE GENERAL NOTES AND TYPICAL DETAILS APPLY TO THE ENTIRE PROJECT EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY.

2. GENERAL NOTES: STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH JOB SPECIFICATIONS AND ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND SITE DRAWINGS. CONSULT THESE DRAWINGS FOR SLEEVES, DEPRESSIONS, AND OTHER DETAILS NOT SHOWN ON STRUCTURAL DRAWINGS.

3. STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

4. MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SPECIFIED ON THE STRUCTURAL DRAWINGS BUT SPECIFIED ON OTHER CONTRACT DRAWINGS SHALL BE PROVIDED PRIOR TO CASTING CONCRETE.

5. THE STRUCTURE IS DESIGNED TO BE SELF SUPPORTING AND STABLE AFTER THE BUILDING IS COMPLETE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ERECTION PROCEDURES AND SEQUENCE TO INSURE SAFETY OF THE BUILDING AND ITS COMPONENTS DURING ERECTION. THIS INCLUDES THE ADDITION OF NECESSARY SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIE DOWNS.

6. SLOPE DRAINAGE SURFACES UNIFORMLY TO DRAIN, SLOPE SHALL BE 1/4" PER FOOT UNLESS OTHERWISE SPECIFIED. SEE MECHANICAL DRAWINGS FOR LOCATION, TYPE AND SIZE OF FLOOR DRAINS.

7. FOUNDATION DESIGN IS BASED ON A SOIL BEARING PRESSURE OF 3,000 psf MAXIMUM.

CONCRETE MASONRY

1. CONCRETE MASONRY CONSTRUCTION UNITS SHALL BE IN ACCORDANCE WITH ACI 531 (LATEST EDITION). BUILDING CODE REQUIREMENT FOR CONCRETE MASONRY STRUCTURE.

2. CONCRETE MASONRY UNITS SHALL BE TYPE N–1 HOLLOW CONCRETE BLOCKS AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM C–90.

3. THE MINIMUM COMPRESSIVE STRENGTH OF CONCRETE MASONRY (f'm) SHALL BE 2500 PSI. TYPE M MORTAR SHALL CONFORM TO THE REQUIREMENTS OF ASTM C–270 AND GROUT SHALL CONFORM TO THE REQUIREMENTS OF ASTM C–476.

4. MASONRY WALLS: UNLESS NOTED OTHERWISE EIGHT–INCH MASONRY WALLS SHALL BE PARTIALLY REINFORCED MASONRY WALL CONSTRUCTION WITH #5 VERTICAL REINFORCING BARS AT 4 FEET C/C IN CONCRETE FILLED BLOCK CELLS IN INTERIOR WALLS AND 1 #5 REINFORCING BAR IN CONCRETE FILLED BLOCK CELL 1 FOOT FROM EDGES OF WALL OPENINGS EXCEEDING 2 FEET WIDE.

5. PROVIDE 9 GAUGE GALVANIZED HORIZONTAL JOINT REINFORCING (DUR–O–WALL OR ENGINEER APPROVED SUBSTITUTION) AT ALTERNATE BLOCK COURSES.

6. REINFORCING STEEL SHALL BE GRADE 60 DEFORMED BILLET STEEL BARS IN CONFORMANCE WITH THE REQUIREMENTS OF ASTM A–615.

7. TIE BEAMS: BEAMS SHALL BE OF CONCRETE POURED AFTER THE BLOCK WALLS BELOW ARE IN PLACE. REINFORCING SHALL BE CONTINUOUS THROUGH TIE BEAMS WITH MINIMUM LAP SPLICES OF 48 BAR DIAMETERS AND BENT BARS AT CORNERS. USE METAL LATH, MORTAR, OR SPECIAL UNITS TO CONFINE CONCRETE TO AREA REQUIRED, IN ACCORDANCE WITH ACI 530.1, SECTION 4.3.3.3. (SOLID METAL OR FELT CAVITY CAPS ARE PROHIBITED).

8. LINTELS: MASONRY OPENINGS LESS THAN 16 FEET SHALL BE SPANNED WITH 8"X16" CONCRETE LINTELS WITH 2#5 REINFORCING BARS TOP AND BOTTOM. MASONRY OPENINGS LESS THAN 12 FEET SHALL BE SPANNED WITH 8"X12" CONCRETE LINTELS WITH 2#5 REINFORCING BARS TOP AND BOTTOM. MASONRY OPENINGS LESS THAN 6 FEET SHALL BE SPANNED WITH 8"X8" PRECAST CONCRETE LINTELS WITH 2#5 REINFORCING BARS. ALL PRECAST LINTELS SHALL BEAR A MINIMUM OF 8" AT EACH END.

ALUMINUM

1. ALUMINUM CONSTRUCTION SHALL CONFORM TO THE LATEST EDITION OF THE ALUMINUM CONSTRUCTION MANUAL OF THE ALUMINUM ASSOCIATION.

2. UNLESS OTHERWISE INDICATED, STRUCTURAL ALUMINUM SHALL BE ALLOY 6061–T6 AS SPECIFIED IN ASTM B–308.

3. WHERE ALUMINUM IS IN CONTACT WITH CONCRETE OR MASONRY SURFACES, CONTACT SURFACES SHALL BE COATED WITH HEAVY ALKALI–RESISTANT BITUMINOUS PAINT.

REINFORCED CONCRETE

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE LATEST EDITION OF THE ACI BUILDING CODE (ACI–318).

2. FORM WORK AND SHORING: NO STRUCTURAL CONCRETE SHALL BE STRIPPED UNTIL IT HAS REACHED AT LEAST TWO–THIRDS OF THE 28 DAY DESIGN STRENGTH. DESIGN, ERECTION AND REMOVAL OF ALL FORM WORK, SHORES AND RESHORES SHALL MEET THE REQUIREMENTS SET FORTH IN ACI STANDARDS 347 & 301.

3. PLUMBING SLEEVES: MINIMUM SLEEVE SPACING SHALL BE TWO DIAMETERS CENTER TO CENTER OF THE LARGER SLEEVE OR 6" CLEAR BETWEEN SLEEVES, WHICHEVER IS GREATER. PRIOR TO CONSTRUCTION SLEEVE LOCATIONS AND SIZES SHALL BE APPROVED BY ENGINEER.

4. UNLESS OTHERWISE SPECIFIED, DETAILING, FABRICATION AND ERECTION OF REINFORCING BARS SHALL BE IN ACCORDANCE WITH THE MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED STRUCTURES (ACI–315) LATEST EDITION.

STRUCTURAL GENERAL NOTES
SHEET 2 OF 3

DESIGN STRESSES

1. CONCRETE, F'c=4000 PSI ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS

2. REINFORCING STEEL, Fy = 60000 PSI, ASTM A615.

3. CONCRETE: SUBMIT PROPOSED MIX DESIGN WITH RECENT FIELD CYLINDER OR LAB TESTS FOR REVIEW PRIOR TO USE. MIX SHALL BE UNIQUELY IDENTIFIED BY MIX NUMBER OR OTHER POSITIVE IDENTIFICATION. MIX SHALL MEET THE REQUIREMENT OF ASTM C33 FOR COARSE AGGREGATE (MINIMUM #57 GRADATION, TABLE 2).

4. CONCRETE COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS WITH MINIMUM COVER OF ONE BAR DIAMETER.

A. FOOTINGS AND FOUNDATION MATS CAST AGAINST EARTH – 3"

B. CONCRETE IN CONTACT WITH LIQUID – 2–1/2"

C. CONCRETE IN CONTACT WITH EARTH OR WEATHER.

1. BARS GREATER THAN #5 – 2"

2. BARS #5 OR SMALLER – 1–1/2"

D. CONCRETE NOT EXPOSED TO GROUND, WEATHER, OR LIQUID.

1. BEAM – 1–1/2"

2. SLABS, WALLS AND JOINTS – 1".

5. DOWELS SHALL BE THE SAME SIZE AND SPACING AS BARS WITH WHICH THEY ARE LAPPED. THE LAP EMBEDMENT SHALL BE 32 BAR DIAMETERS MINIMUM FOR EACH. VERTICAL BAR SPLICES IN COLUMN REINFORCEMENT SHALL HAVE A MINIMUM LAP OF 20 BAR DIAMETERS. ALL OTHER BAR SPLICES SHALL BE LAPPED AS FOLLOWS UNLESS OTHERWISE SPECIFIED:

BAR SIZE	SPLICE
#3	12"
#4	1'–2"
#5	1'–5"
#6	1'–10"
#7	2"–6"
#8	3'–4"
#9	4'–2"

6. ALL REINFORCEMENT ENDING AT THE FACE OF A BEAM OR SLAB SHALL BE HOOKED FOR ANCHORAGE. IN CASES WHERE REINFORCING BARS CANNOT BE EXTENDED AS FAR AS REQUIRED DUE TO THE LIMITED EXTENT OF THE ADJACENT CONCRETE STRUCTURE, THE BARS SHALL EXTEND AS FAR AS POSSIBLE AND END IN STANDARD HOOKS.

7. BARS ENDING IN RIGHT ANGLE BENDS OR HOOKS SHALL CONFORM TO THE REQUIREMENTS OF PARAGRAPH 7–1, ACI–318.

8. MONOLITHIC SLABS WITH TOPS THAT ARE SLOPED SHALL HAVE BOTTOMS SLOPED THE SAME AMOUNT MAINTAINING A UNIFORM SLAB THICKNESS, UNLESS OTHERWISE SHOWN.

9. EXCEPT AS OTHERWISE REQUIRED, EXPOSED CONCRETE CORNERS SHALL HAVE 3/4" CHAMFERS. RE–ENTRANT CORNERS SHALL NOT HAVE FILLETS.

10. TOPPING CONCRETE SHALL BE AS SPECIFIED. THE MINIMUM DEPTH OF TOPPING CONCRETE SHALL BE 2 INCHES.

11. CONCRETE TESTING: AN INDEPENDENT TESTING LABORATORY SHALL PERFORM THE FOLLOWING TESTS ON CAST IN PLACE CONCRETE:

A) ASTM C143 – "STANDARD TEST METHOD FOR SLUMP OF PORTLAND CEMENT CONCRETE".

B) ASTM C39 – "STANDARD TEST METHOD FOR COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS". A SEPARATE TEST SHALL BE CONDUCTED FOR EACH CLASS FOR EVERY 50 CUBIC YARDS (OR FRACTION THEREOF), PLACED PER DAY. REQUIRED CYLINDER(S) QUANTITIES AND TEST AGE AS FOLLOWS:

1 AT 3 DAYS
1 AT 7 DAYS
2 AT 28 DAYS

12. ONE ADDITIONAL RESERVE CYLINDER TO BE TESTED UNDER THE DIRECTION OF THE ENGINEER, IF REQUIRED. IF 28 DAY STRENGTH IS ACHIEVED, THE ADDITIONAL CYLINDER(S) MAY BE DISCARDED.

13. PENETRATIONS: NO PENETRATIONS SHALL BE MADE IN ANY STRUCTURAL MEMBERS OTHER THAN THOSE LOCATED ON THESE DRAWINGS WITHOUT PREVIOUS APPROVAL OF THE ENGINEER.

PRECAST PRESTRESSED CONCRETE

1. THE MANUFACTURER OF PRESTRESSED HOLLOW CORE SLABS AND DOUBLE TEES SHALL CONFORM TO THE REQUIREMENTS OUTLINED IN PRESTRESSED CONCRETE INSTITUTE MANUAL 116, MANUAL FOR QUALITY CONTROL FOR PLANTS AND PRODUCTION OF PRECAST, PRESTRESSED CONCRETE PRODUCTS.

2. ALL PRESTRESSED CONCRETE DESIGN SHALL BE ACCOMPLISHED BY, OR UNDER THE SUPERVISION OF, A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA. HE/SHE SHALL AFFIX HIS/HER SIGNATURE AND SEAL TO ALL DESIGN CALCULATIONS AND SHOP DRAWINGS CERTIFYING THAT ALL PRESTRESSED CONCRETE PRODUCTS HAVE BEEN DESIGNED TO MEET THE SPECIFICATIONS AND THESE NOTES. DESIGN OF THE PRECAST PRESTRESSED UNITS SHALL INCLUDE BEAM LAPS, BEARING DETAILS, AND REINFORCING. DESIGN SHALL ACCOUNT FOR ALL OPENINGS SHOWN OR NOTED IN THE CONSTRUCTION DOCUMENTS.

3. THE SIX (6") INCH HOLLOW CORE SLABS SHALL BE DESIGNED FOR A SAFE SUPERIMPOSED UNIFORM LOAD OF 30 PSF.

STRUCTURAL GENERAL NOTES

SHEET 3 OF 3

STEEL

1. STEEL CONSTRUCTION SHALL CONFORM TO THE SPECIFICATIONS AND CODES OF THE AISC STEEL CONSTRUCTION MANUAL, LATEST EDITION.

2. ALL STRUCTURAL SHAPES, BARS, PLATES, AND SHEETS INDICATED ON THE DRAWINGS SHALL BE A-36 STEEL.

3. UNLESS OTHERWISE NOTED, EXPANSION ANCHOR BOLTS SHALL TYPE 316 STAINLESS STEEL, ASTM A278. THE SIZE AND MINIMUM EMBEDMENT OF ANCHOR BOLTS SHALL BE AS SPECIFIED IN THE DRAWINGS.

4. ALL BOLTS SHALL BE SERIES 300 STAINLESS STEEL FASTENERS WITH THREADS EXCLUDED FROM THE SHEAR PLANE(S).

5. WELDING SHALL CONFORM TO THE LATEST AWS CODE (AWS D.1.1-88) FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION. ALL WELDS SHALL BE PREQUALIFIED AND ALL WELDERS AWS CERTIFIED.

6. STEEL COMPLETELY ENCASED IN CONCRETE SHALL NOT BE GALVANIZED OR PAINTED AND SHALL HAVE A CLEAN SURFACE FOR BONDING TO CONCRETE.

7. STRUCTURAL STEEL SHALL BE PAINTED IN ACCORDANCE WITH THE SPECIFICATIONS.

WOOD

1. STRUCTURAL WOOD COMPONENTS (BEAMS, JOISTS, RAFTERS, ETC.) SHALL HAVE THE FOLLOWING MINIMUM ALLOWABLE FIBER STRESSES OF NO. 2 SOUTHERN PINE CONFORMING TO 1991 NDS, AS FOLLOWS:

SHEAR		Fv = 90 psi
BENDING	2X6	Fb = 1,250 psi
BENDING	2X8	Fb = 1,200 psi
BENDING	2X10	Fb = 1,050 psi
BENDING	2X12	Fb = 975 psi

2. WOOD IN CONTACT WITH CONCRETE OR MASONRY, AND AT OTHER LOCATIONS AS SHOWN ON STRUCTURAL DRAWINGS, SHALL BE PROTECTED OR PRESSURE TREATED IN ACCORDANCE WITH AITC-109. MEMBER SIZES SHOWN ARE NOMINAL UNLESS NOTED OTHERWISE.

3. ENGINEERED WOOD TRUSS SYSTEMS SHALL BE DESIGNED BY SUPPLIER'S SPECIALTY ENGINEER TO CONFIGURATION AND LOAD-CARRYING CAPACITY SHOWN ON DRAWINGS AND SPECIFICATIONS. ALTERNATE TRUSS LAYOUTS ARE ACCEPTABLE ONLY AS A CHANGE ORDER WHICH WILL INCLUDE ENGINEERING CHARGES FOR REDESIGN OF THE STRUCTURE BY THE ENGINEER OF RECORD. SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION. SHOP DRAWINGS SHALL SHOW AND SPECIFY ALL CONNECTOR TYPES UTILIZED WITHIN TRUSSES, AS WELL AS CONNECTORS UTILIZED IN ALL OTHER CONNECTIONS AND ATTACHMENTS BETWEEN TRUSSES OR COMPONENTS SUPPLIED AS PART OF THE ENGINEERED TRUSS SYSTEM. AN ERECTION DRAWING SHALL BE INCLUDED, IDENTIFYING ALL TRUSS SYSTEM COMPONENTS, AS WELL AS ALL PERMANENT BRACING REQUIRED FOR TRUSS DESIGN.

4. ENGINEERED SHOP DRAWINGS SHALL BEAR THE SIGNATURE AND IMPRESSED SEAL OF A FLORIDA REGISTERED PROFESSIONAL ENGINEER AS THE SPECIALTY ENGINEER. THE FOLLOWING LOAD DURATION FACTORS SHALL BE USED:

DEAD LOAD	0.90
DEAD LOAD + FLOOR LIVE LOAD	1.00
DEAD LOAD + ROOF LIVE LOAD	1.25
DEAD LOAD + WIND LOAD	1.33

5. PLYWOOD ROOF, FLOOR, AND WALL SHEATHING ARE DESIGNED AS DIAPHRAGMS AND SHALL COMPLY WITH APPLICABLE PROVISIONS OF CHAPTER 17 OF THE STANDARD BUILDING CODE AND SHALL BE FASTENED IN ACCORDANCE WITH TABLE 1705.1 - FASTENING SCHEDULE, UNLESS SHOWN OTHERWISE.

6. WOOD FRAMING CONNECTORS: ALL CONNECTORS SHALL BE GALVANIZED. CONNECTOR MODEL NUMBERS SHOWN ARE STRONG-TIE CONNECTORS AS MANUFACTURED BY SIMPSON STRONG-TIE CO., 1450 DOOLITTLE DR., POST OFFICE BOX 1568, SAN LEANDRO, CA 94577. SUBSTITUTIONS ARE ACCEPTABLE WITH THE APPROVAL OF THE STRUCTURAL ENGINEER. UNLESS SHOWN OTHERWISE, INSTALL SIZE AND NUMBER OF FASTENERS SHOWN IN LATEST SIMPSON CATALOG.

MODIFICATION OF EXISTING CONCRETE

1. THE FOLLOWING NOTES ON MODIFICATION OF EXISTING CONCRETE ARE GENERAL AND APPLY TO THE ENTIRE PROJECT UNLESS OTHERWISE SPECIFIED.

2. EXISTING CONCRETE SURFACE TO BE JOINED WITH NEW CONCRETE SHALL BE THOROUGHLY CLEANED BY SANDBLASTING AND COATED WITH EPOXY BONDING COMPOUND JUST PRIOR TO PLACEMENT OF NEW CONCRETE.

3. WHERE A WATERSTOP BETWEEN NEW AND EXISTING CONCRETE IS REQUIRED, CONTRACTOR SHALL CUT A SUITABLE GROOVE IN THE EXISTING CONCRETE AND INSTALL WATERSTOP WITH EPOXY GROUT AND BONDING COMPOUND PRIOR TO CONCRETE WORK.

4. WHERE "PLUG EXISTING OPENING" IS INDICATED, CONTRACTOR SHALL REMOVE ANY ATTACHED METALWORK AND CONCRETE CURBS OR PROJECTIONS, ROUGHEN AND KEY EXISTING CONCRETE, COAT WITH EPOXY BONDING COMPOUND, AND POUR NEW CONCRETE FLUSH WITH ADJACENT SURFACES AND FINISH SIMILAR TO EXISTING SURFACE: EXISTING OPENINGS SHALL BE REINFORCED AS FOLLOWS:

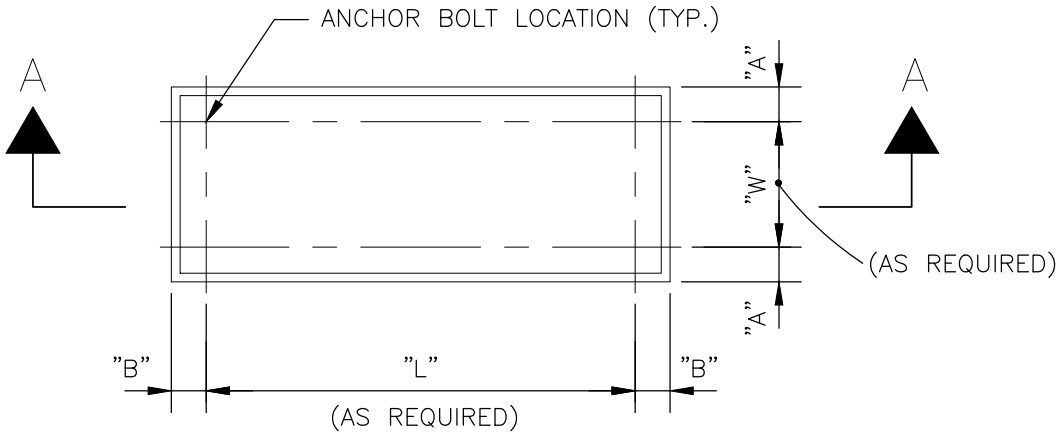
A. WALL THICKNESS LESS THAN OR EQUAL TO EIGHT (8) INCHES:
REINFORCE WITH #4 BARS E.W. - POSITION ON CENTERLINE.

B. WALL THICKNESS TWELVE (12) INCHES OR GREATER: REINFORCE WITH #5 BARS E.W. E.F.

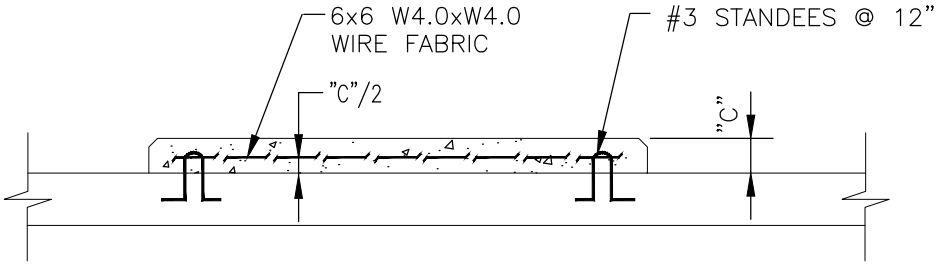
PROVIDE DOWELS FOR ANCHORAGE TO EXISTING CONCRETE. DOWEL SPACING SHALL BE AS NOTED ABOVE. DRILL HOLES FOR DOWELS AND ANCHOR WITH EPOXY GROUT, (ANCHOR BOND BY CELTITE, SIKASTIX BY SIKA PRODUCTS, OR APPROVED EQUAL).

5. NEW OPENINGS IN EXISTING CONCRETE SHALL BE CUT 2 INCHES OVERSIZE, COATED WITH EPOXY BONDING COMPOUND, AND MORTAR FINISHED TO THE REQUIRED FINISH AND SIZE.

6. STRUCTURAL DIMENSIONS RELATED TO OR CONTROLLED BY EXISTING STRUCTURES SHALL BE VERIFIED IN FIELD BY THE CONTRACTOR PRIOR TO CONCRETE WORK.

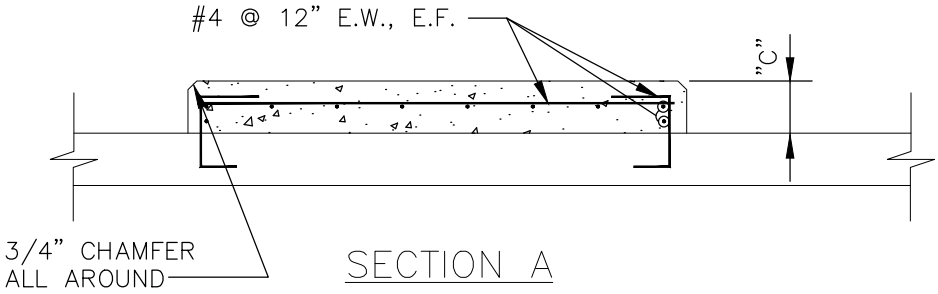


PLAN



SECTION A

(FOR "C" EQUAL TO/LESS THAN 6")



SECTION A

(FOR "C" GREATER THAN 6")

NOTES:

1. "A" AND "B" SHALL BE AS REQUIRED BY THE EQUIPMENT MANUFACTURER BUT NOT LESS THAN 3"
2. "C" SHALL BE AS SHOWN ON THE PLANS OR AS REQUIRED TO SET THE EQUIPMENT AT THE REQUIRED ELEVATION, BUT SHALL NOT BE LESS THAN 3".

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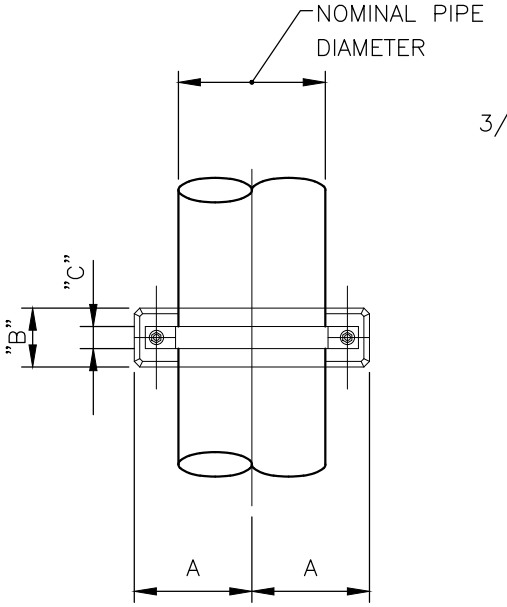
EQUIPMENT PAD DETAIL

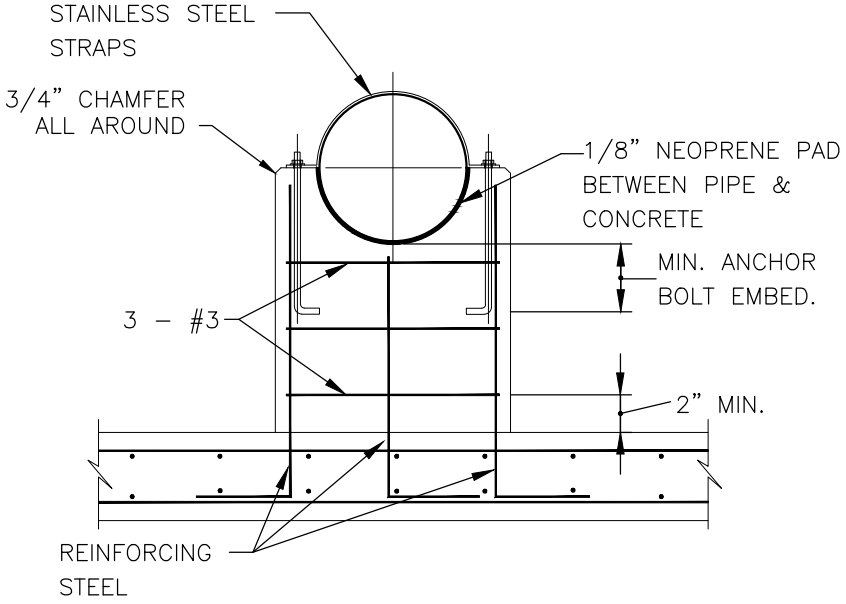
SCALE: NONE

FIG. S-4

REVISED 1/07



PLAN



ELEVATION

NOMINAL PIPE DIAMETER	MINIMUM CONCRETE BASE DIMENSIONS		STAINLESS STEEL STRAPS (1)			ANCHOR BOLTS (STAINLESS STEEL) (2)			REINFORCING STEEL
	"A"	"B"	QTY.	"C"	THICK	QTY.	SIZE	MIN. EMBED	
4"	6"	6"	1	2"	1/4"	2	1/2"	6"	3 #4
6"	9"	6"	1	2"	1/4"	2	1/2"	6"	3 #4
8"	9"	6"	1	2"	1/4"	2	1/2"	6"	3 #4
10"	12"	8"	1	2"	3/8"	2	3/4"	9"	3 #5
12"	12"	8"	1	2"	3/8"	2	3/4"	9"	3 #5
14"	14"	8"	1	2"	3/8"	2	3/4"	9"	3 #5
16"	14"	8"	1	2"	3/8"	2	3/4"	9"	3 #6
18"	16"	8"	1	3"	3/8"	2	3/4"	9"	3 #6
20"	16"	8"	1	3"	3/8"	2	3/4"	9"	3 #6

NOTE:

1. STAINLESS STEEL SHALL BE 316.

2. ANCHOR BOLTS MAY BE EITHER HOOK–TYPE OR WEDGE–ANCHOR TYPE OF STAINLESS STEEL EXPANSION ANCHOR BOLTS.

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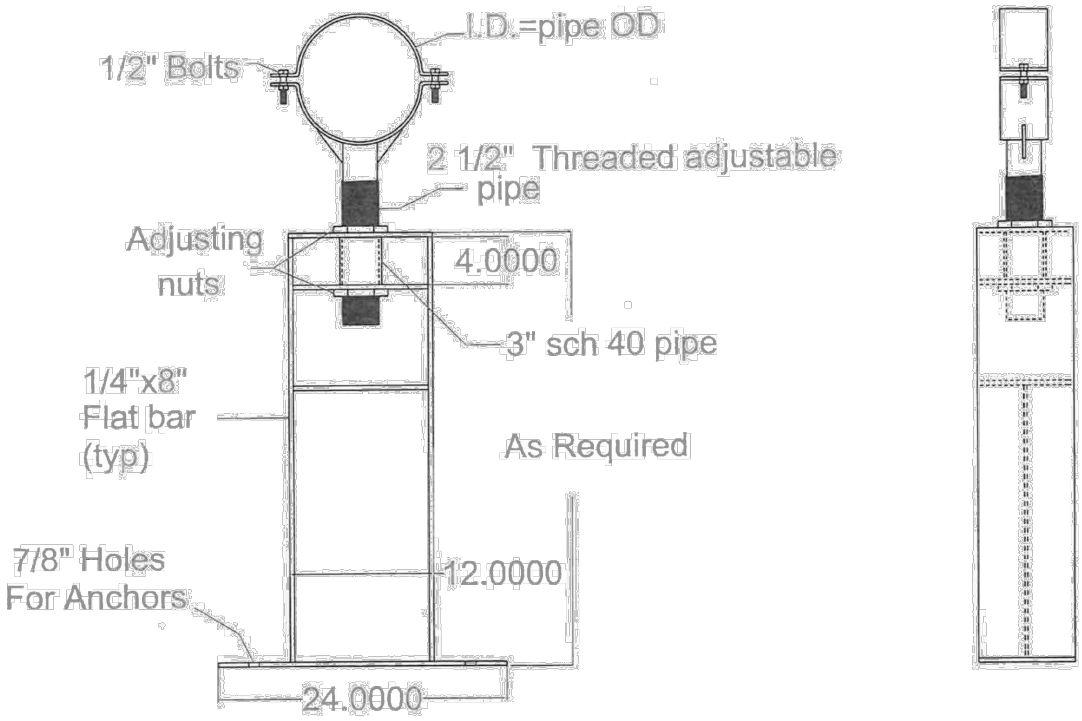
CONCRETE PIPE SUPPORT DETAIL

SCALE: NONE

FIG. S–5

REVISED 7/14



NOTES:

1. ALL STAINLESS STEEL SHALL BE 316.

2. FOR QUESTIONS REGARDING CONSTRUCTION/ FABRICATION OF PIPE SUPPORTS, CONTACT PBM CONSTRUCTORS AT 904-714-6353.

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STAINLESS STEEL PIPE SUPPORT DETAIL

SCALE: NONE

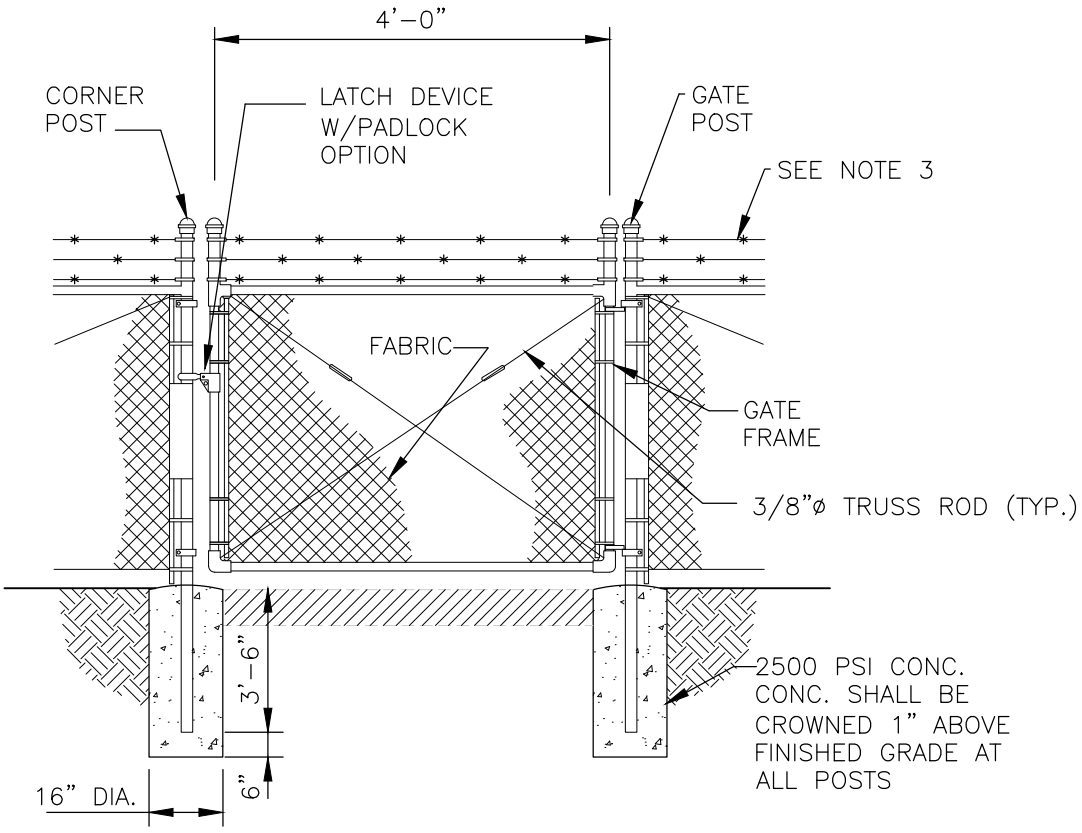
FIG. S-6

REVISED 7/18

MISCELLANEOUS DETAILS

MISCELLANEOUS DETAILS

Sheet List Table	
Sheet Number	Sheet Title
MISCELLANEOUS DETAILS	
FIG. M-1	WALK THRU GATE DETAIL
FIG. M-2	SINGLE SWING GATE DETAIL
FIG. M-3	DOUBLE SWING GATE DETAIL
FIG. M-4	6 FOOT FENCE CORNER DETAIL
FIG. M-5	CANTILEVERED ROLLER GATE
FIG. M-6	ADJUSTABLE PIPE SUPPORT DETAIL
FIG. M-7	RECLAIMED WATER SIGN DETAIL- ADJACENT TO HOSE BIBB
FIG. M-8	RECLAIMED WATER SIGN DETAIL - ALONG GOLF COURSES
FIG. M-9	RECLAIMED WATER SIGN DETAIL - ADJACENT TO BODIES OF WATER
FIG. M-10	RECLAIMED WATER SIGN DETAIL - FOR ENTRANCES TO DEVELOPMENT
FIG. M-11	HYDROPNUEMATIC TANK STANDARD FOR RWM REPLACEMENT DETAIL
FIG. M-12	WALL PENETRATION LINK SEAL DETAIL
FIG. M-13	GUARD POST DETAIL
FIG. M-14	ENERGY DISSIPATION BOX DETAIL
FIG. M-15	AERIAL PIPE CROSSING PEDESTRIAN FAN GUARD DETAIL
FIG. M-16	DIPS AND IPS MJ ADAPTER DETAIL (CONNECTS HDPE TO DUCTILE IRON)
FIG. M-17	GENERATOR PAD DETAIL
FIG. M-18	EQUIPMENT RACK DETAIL
FIG. M-18A	EQUIPMENT RACK DETAIL



NOTES:

1. TRUSS RODS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST ONLY.

2. FABRIC, POSTS, HARDWARE SHALL BE BLACK VINYL COATED.

3. BARBED WIRE WILL NOT BE REQUIRED AT SEWAGE LIFT/PUMP STATIONS, BUT WILL BE REQUIRED AT WELL SITES, ELEVATED/GROUND STORAGE TANKS AND TREATMENT PLANT PERIMETERS.

4. REFER TO SECTION 36.8 OF THIS MANUAL FOR DIMENSIONS AND DETAILS OF FENCE MATERIAL.

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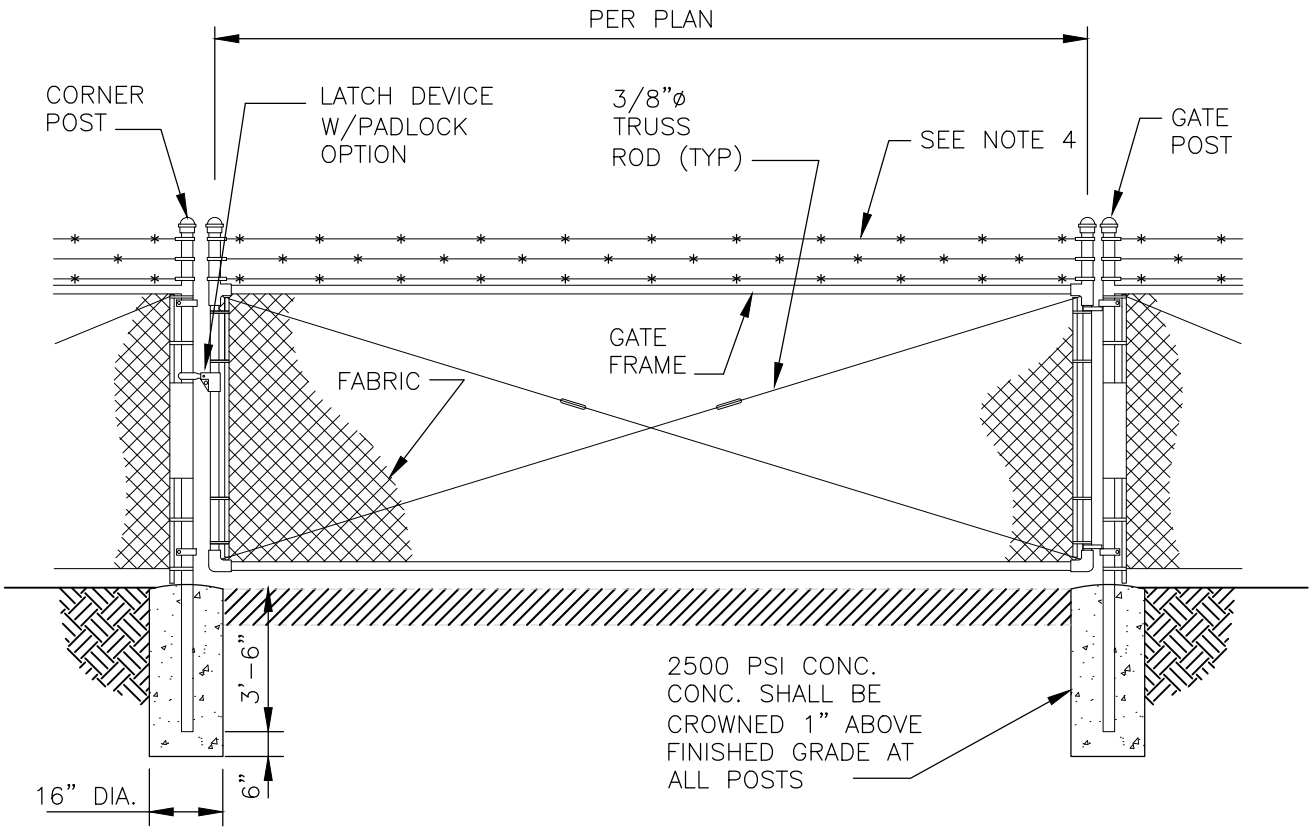
WALK THRU GATE DETAIL

SCALE: NONE

FIG. M–1

REVISED 1/10



NOTES:

1. TRUSS RODS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST ONLY.

2. FABRIC, POSTS, HARDWARE SHALL BE BLACK VINYL COATED

3. PROVIDE GATE KEEPERS.

4. BARBED WIRE WILL NOT BE REQUIRED AT SEWAGE LIFT/PUMP STATIONS, BUT WILL BE REQUIRED AT WELL SITES, ELEVATED/GROUND STORAGE TANKS AND TREATMENT PLANT PERIMETERS.

5. REFER TO SECTION 36.8 OF THIS MANUAL FOR DIMENSIONS AND DETAILS OF FENCE MATERIAL.

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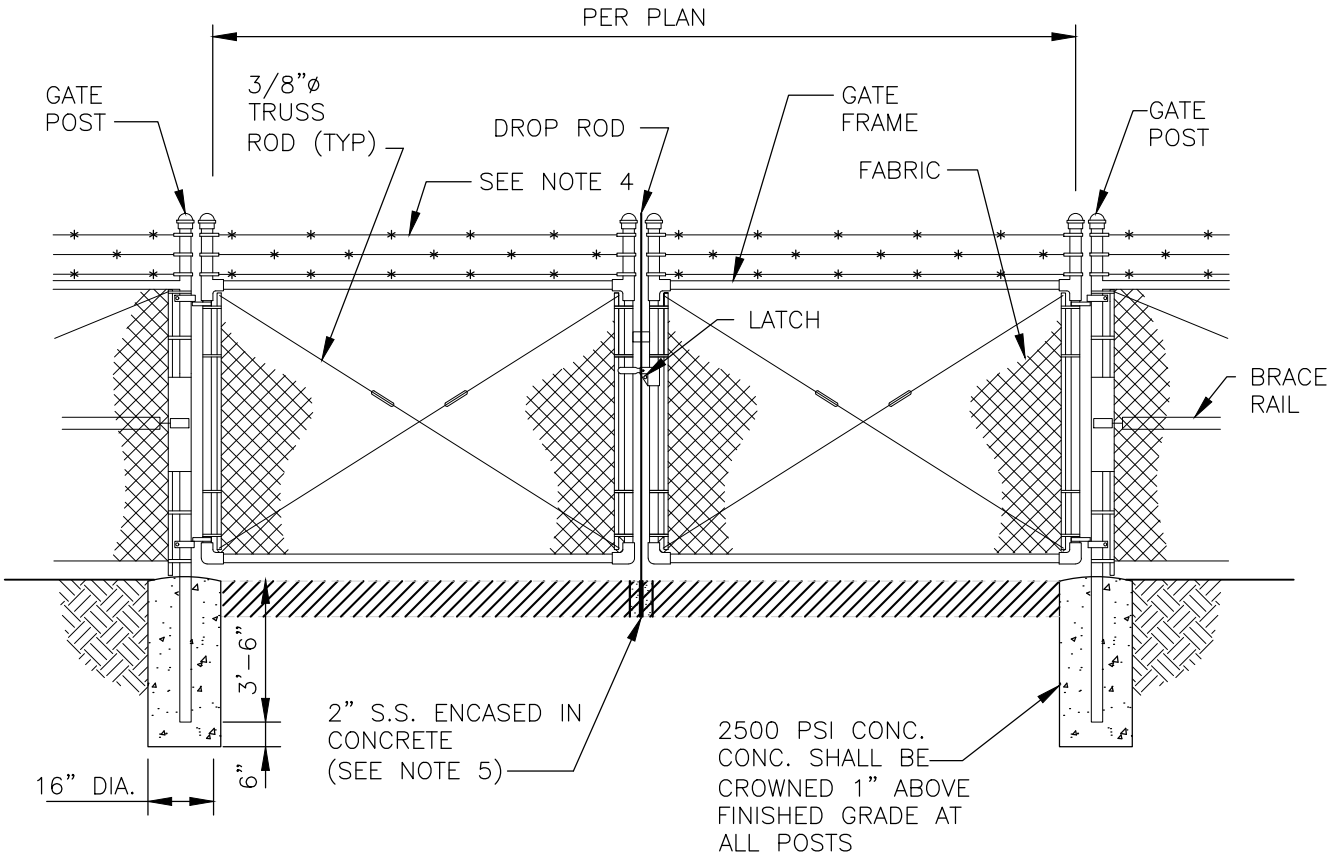
SINGLE SWING GATE DETAIL

SCALE: NONE

FIG. M-2

REVISED 1/10



NOTES:

1. TRUSS RODS ARE REQUIRED FOR EACH GATE SECTION AND THE FIRST SPAN ON EACH SIDE OF A CORNER POST ONLY.

2. PROVIDE GATE KEEPERS.

3. ALL POSTS, FABRIC, HARDWARE TO BE BLACK VINYL COATED.

4. BARBED WIRE WILL NOT BE REQUIRED AT SEWAGE LIFT/PUMP STATIONS, BUT WILL BE REQUIRED AT WELL SITES, ELEVATED/GROUND STORAGE TANKS AND TREATMENT PLANT PERIMETERS.

5. PIPE ENCASED IN CONCRETE SHALL BE INSTALLED IN ALL DIRT AND GRAVEL DRIVEWAYS. PIPE SHALL BE 3 FEET LONG, STAINLESS STEEL AND ENCASED IN A 12"ø SONATUBE 12" DEEP.

6. REFER TO SECTION 36.8 OF THIS MANUAL FOR DIMENSIONS AND DETAILS OF FENCE MATERIAL.

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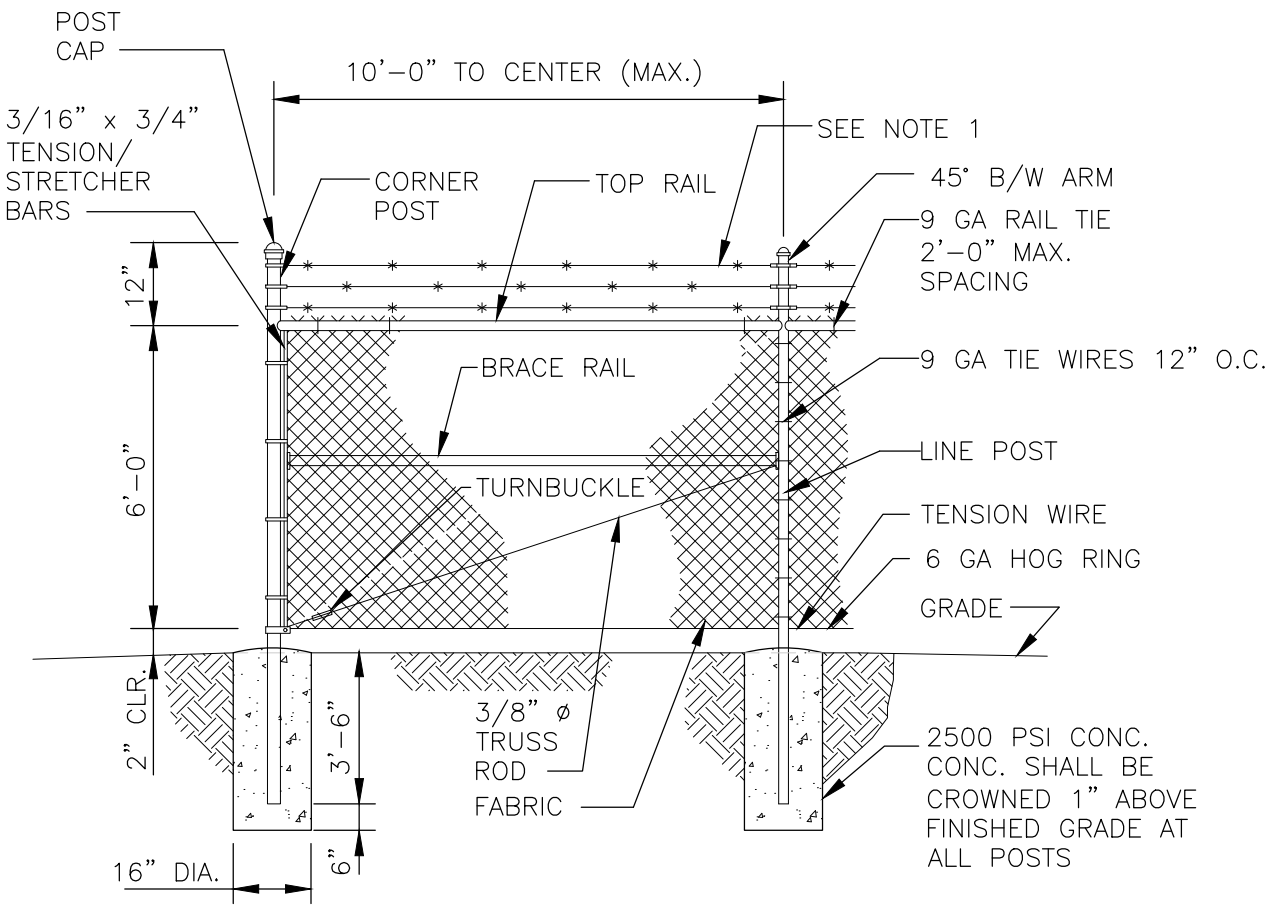
DOUBLE SWING GATE DETAIL

SCALE: NONE

FIG. M-3

REVISED 1/10



NOTES:

1. BARBED WIRE WILL NOT BE REQUIRED AT SEWAGE LIFT/PUMP STATIONS, BUT WILL BE REQUIRED AT WELL SITES, ELEVATED/GROUND STORAGE TANKS AND TREATMENT PLANT PERIMETERS.

2. REFER TO SECTION 36.8 OF THIS MANUAL FOR DIMENSIONS AND DETAILS OF FENCE MATERIAL.

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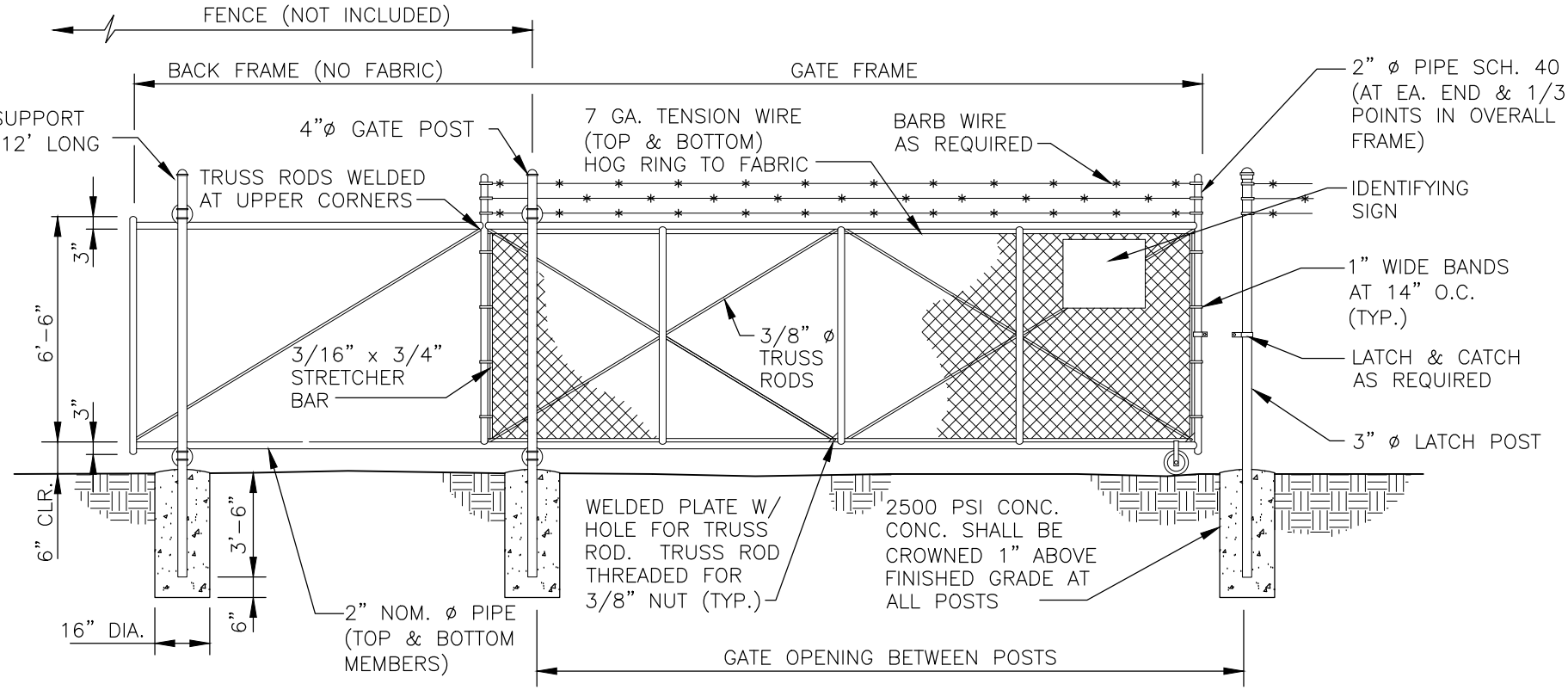
6' FENCE CORNER DETAIL

SCALE: NONE

FIG. M–4

REVISED 1/10



NOTES

1. REFER TO SECTION 36.8 OF THIS MANUAL FOR DIMENSIONS AND DETAILS OF FENCE MATERIAL.

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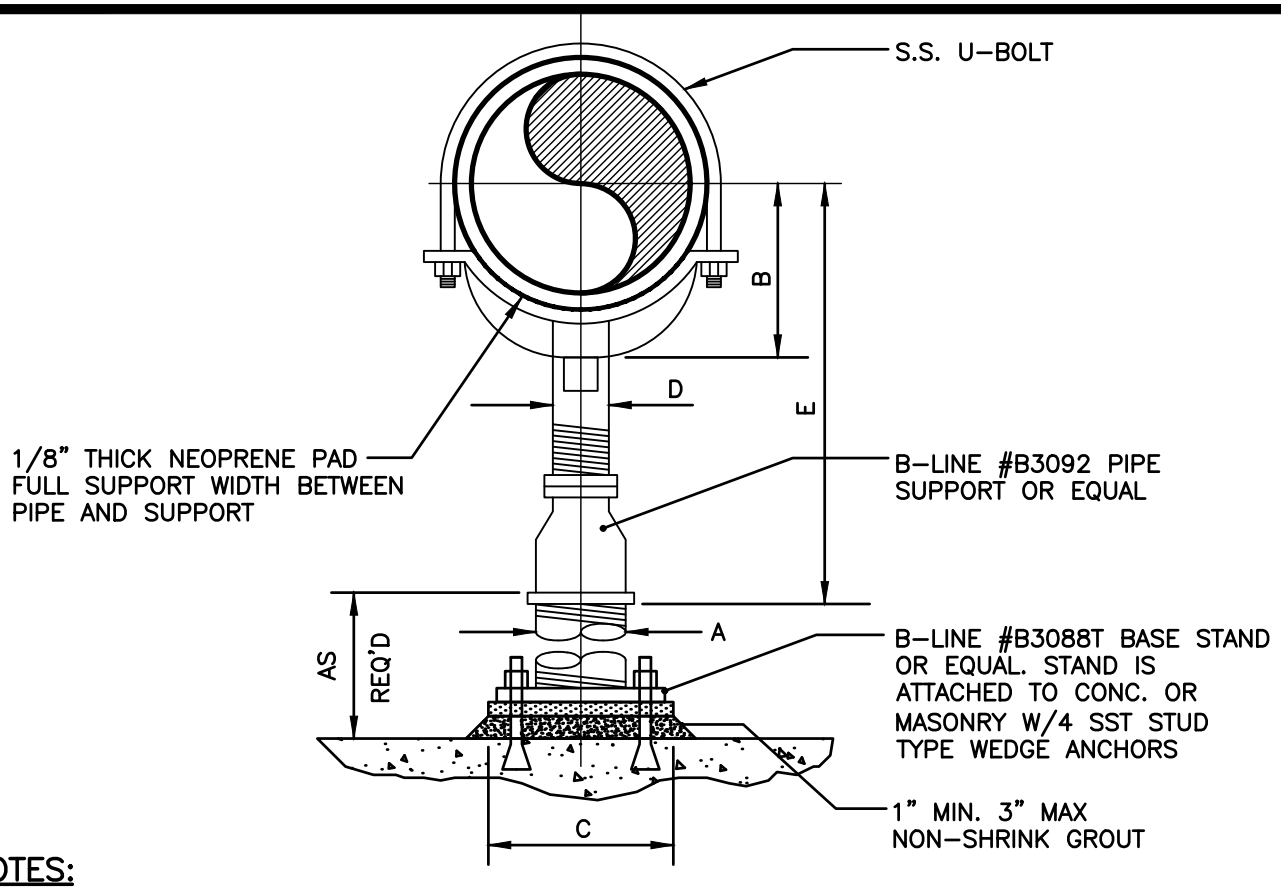
CANTILEVERED ROLLER GATE DETAIL

SCALE: NONE

FIG. M-5

REVISED 1/10



NOTES:

1. PROVIDE HALF ROUND RIGID INSULATION & INSULATION PROTECTION SHIELD, SIMILAR TO GRINNELL FIG.167 OR ELCEN FIG.219 WHEN PIPING IS INSULATED.

2. FOR BASE, HEIGHT, & FLANGE DIMENSIONS, SEE TABLE TO RIGHT. ALL DIMENSIONS IN INCHES.

3. ALL COMPONENTS OF PIPE SUPPORT SHALL BE STAINLESS STEEL.

PIPE SIZE	A	B	C	D	E	
					MIN.	MAX.
2 1/2	2 1/2	3 1/2	9	1 1/2	8	13
3	2 1/2	3 3/4	9	1 1/2	8 1/4	13 1/4
3 1/2	2 1/2	4	9	1 1/2	8 1/2	13 1/2
4	3	4 1/4	9	2 1/2	9 1/4	14
5	3	4 7/8	9	2 1/2	10	14 3/4
6	3	5 1/2	9	2 1/2	10 1/2	15 1/4
8	3	6 7/8	9	2 1/2	11 3/4	16 1/2
10	3	8 1/2	9	2 1/2	13 1/2	18 1/4
12	3	9 15/16	9	2 1/2	15	19 3/4
14	4	10 15/16	11	3	16 1/4	20 3/4
16	4	12 3/8	11	3	17 3/4	22 1/4
18	6	13 7/8	13 1/2	3 1/2	19 1/2	24
20	6	15 3/8	13 1/2	3 1/2	21	25 1/2
24	6	17 15/16	13 1/2	4	23 3/4	28 1/4

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PALM COAST
INCORPORATED 1999

ADJUSTABLE PIPE SUPPORT DETAIL

SCALE: NONE

FIG. M-6

REVISED 2/16

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999	RECLAIMED WATER SIGN DETAIL; ADJACENT TO HOSE BIBB	SCALE: NONE FIG. M–7 REVISED 1/08

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

RECLAIMED WATER SIGN DETAIL;
ALONG GOLF COURSES

SCALE: NONE

FIG. M–8

REVISED 1/08

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

RECLAIMED WATER SIGN DETAIL: ADJACENT TO BODIES OF WATER

SCALE: NONE

FIG. M-9

REVISED 1/08

RECLAIM WATER SIGN DETAIL NOTES

(1) SIGN(S) SHALL BE 0.080 GAUGE ALUMINUM WITH ENGINEERING GRADE REFLECTIVE WHITE BACKGROUND, PANTENE PURPLE AND BLACK COLORED TEXT, PANTENE PURPLE BORDER WITH THE DO NOT DRINK INTERNATIONAL SYMBOL AS SHOWN IN THE SIGN DETAIL. THE USE OF A FACILITY LOGO IS RECOMMENDED BUT NOT REQUIRED.

(2) SIGN(S) SHALL BE MOUNTED TO GALVANIZED POSTS OR AN APPROVED DURABLE ALTERNATIVE USING STAINLESS STEEL HARDWARE.

(3) THE HEIGHT OF THE SIGN(S) WILL DEPEND ON THE LOCATION AND SURROUNDING LANDSCAPE BUT IN ALL CASES THE SIGN(S) SHALL BE STRATEGICALLY LOCATED AS TO REMAIN CONSPICUOUS AND HIGHLY VISIBLE TO THE PUBLIC AT ALL TIMES.

(4) SIGN(S) SHALL BE INSTALLED BY THE CONTRACTOR ACCORDING TO THE CITY APPROVED ENGINEERING PLANS IN ORDER TO MEET THE REQUIREMENTS OF FAC, CHAPTER 62-610.468 ACCESS CONTROL AND ADVISORY SIGNS.

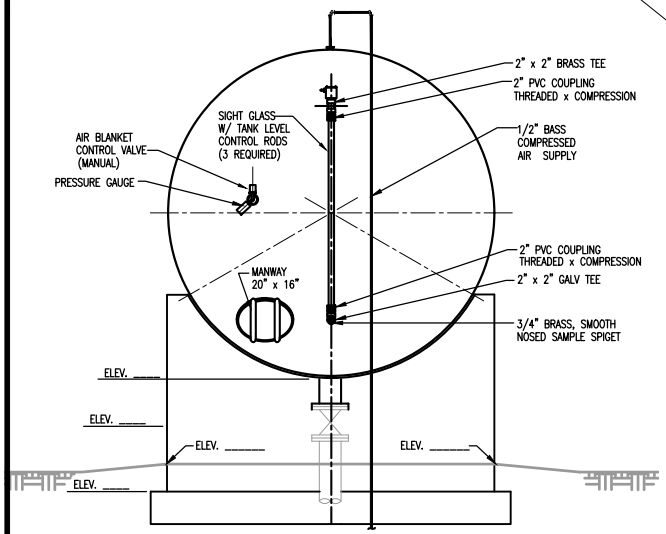
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

RECLAIMED WATER SIGN DETAIL; FOR ENTRANCES TO COMMERCIAL & RESIDENTIAL DEVELOPMENTS

SCALE: NONE

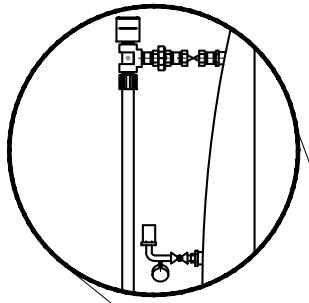
FIG. M–10

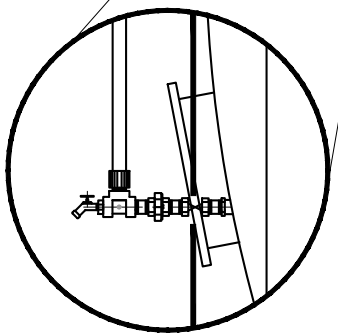
REVISED 2/16

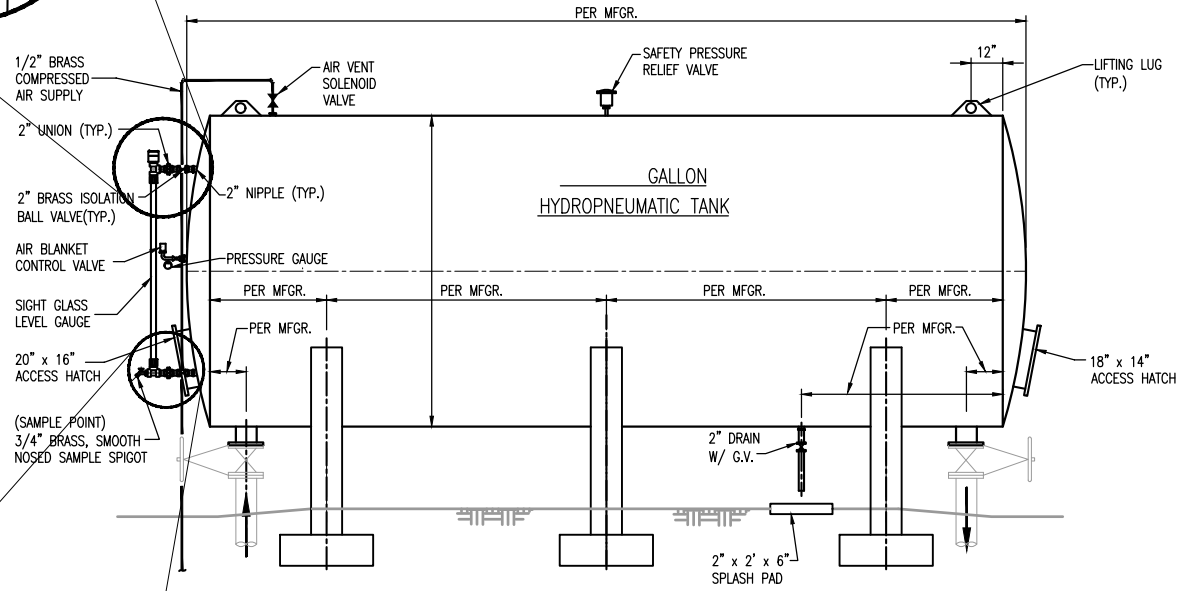


END VIEW

SCALE: NTS







NOTES:

1. SIGN SHALL BE INSTALLED ADJACENT TO THE TANK IDENTIFYING IT FOR REUSE PURPOSES (REFER TO FIG. M-7 "TYPICAL YARD MOUNTING")

2. TANK AND PIPING SHALL BE PAINTED LAVENDER.

ELEVATION

SCALE: NTS

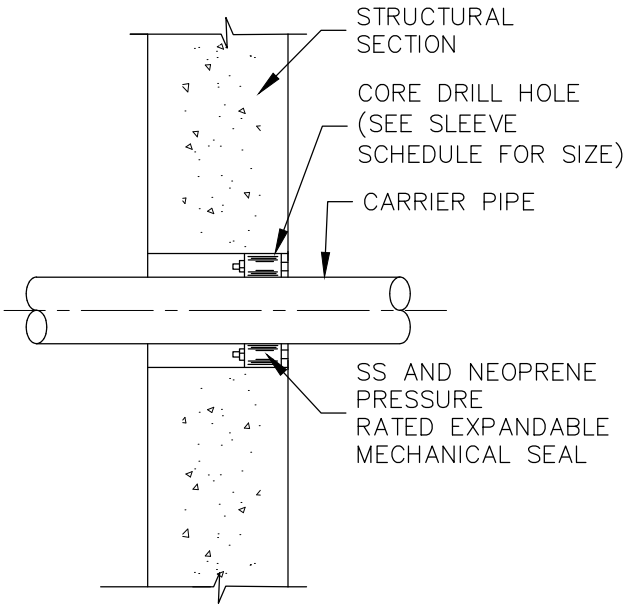
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

HYDROPNEUMATIC TANK STANDARD FOR REUSE WATER REPLACEMENT DETAIL

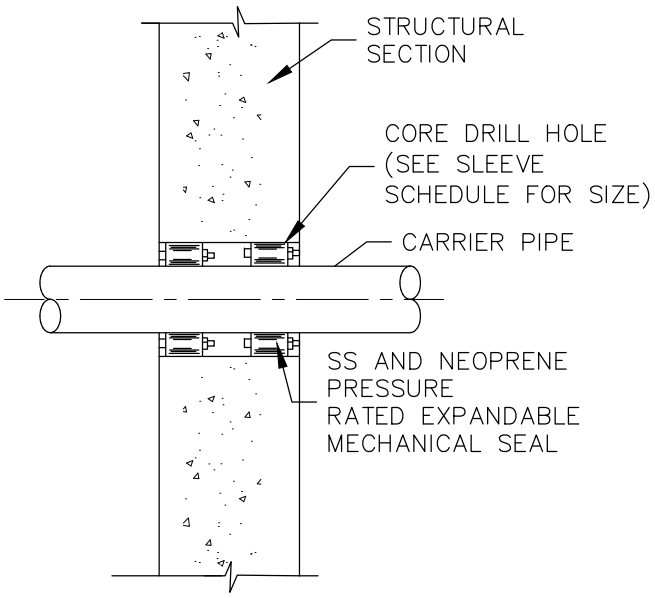
SCALE: NONE

FIG. M-11

REVISED 7/07



TYPE 1



TYPE 2

FOR USE IN FLOODED TANK CONDITIONS

SLEEVE SCHEDULE			
CARRIER PIPE			CORE DRILLED HOLE (INCHES)
NOMINAL DIAMETER (INCHES)	MATERIAL	OUTSIDE DIAMETER (INCHES)	
1/2	SCH. 80 PVC	0.84	2
3/4	SCH. 80 PVC	1.05	2.5
1	SCH. 80 PVC	1.315	3.0
1 1/2	SCH. 80 PVC	1.90	4
2	SCH. 80 PVC	2.38	4
3	SCH. 80 PVC	3.50	5
4	D.I.	4.80	6
6	D.I.	6.90	10
8	D.I.	9.05	12
10	D.I.	11.10	14
12	D.I.	13.20	16
16	D.I.	17.40	20
18	D.I.	19.50	24
24	D.I.	25.80	30
36	D.I.	38.30	43
42	D.I.	44.50	48

NOTE:
INSTALL SEALS FROM DRY SIDE OF PENETRATION.(APPLIES TO TYPE 1 INSTALLATION ONLY)

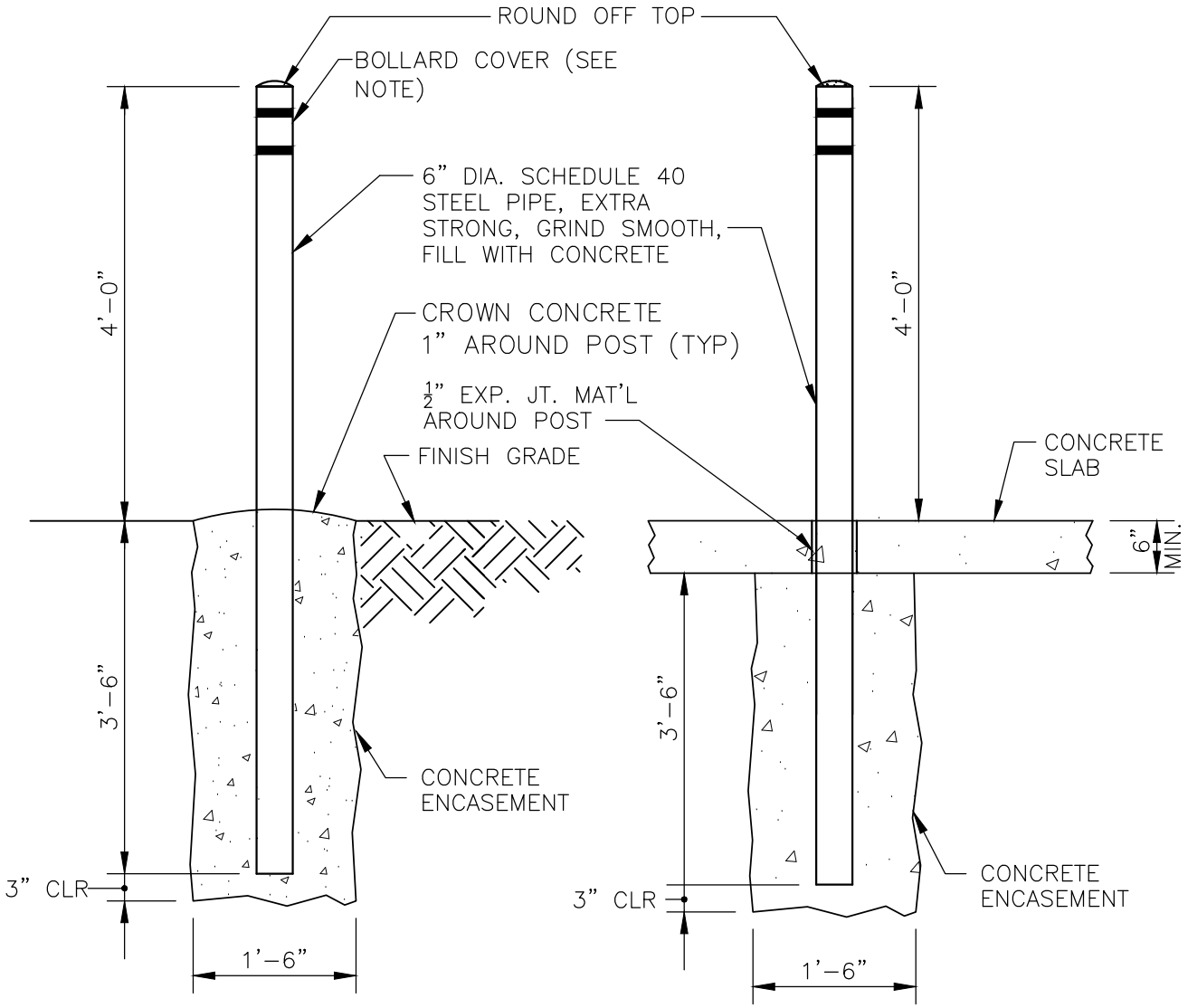
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

WALL PENETRATION LINK SEAL DETAIL

SCALE: NONE

FIG. M–12

REVISED 1/10



EARTHEN INSTALLATION

SLAB INSTALLATION

NOTE:
BOLLARD COVERS SHALL BE MANUFACTURED OF 1/4" THICK HIGH DENSITY POLYETHYLENE WITH ULTRAVIOLET AND ANTI STATIC ADDITIVES. SLEEVES SHALL BE MANUFACTURED BOLLARDS & SLEEVES, LLC 800-914-4771; HTTPS://BOLLARDSLEEVES.COM OR EQUIVALENT. COLOR OF SLEEVE SHALL BE DETERMINED BY CITY OF PALM COAST.

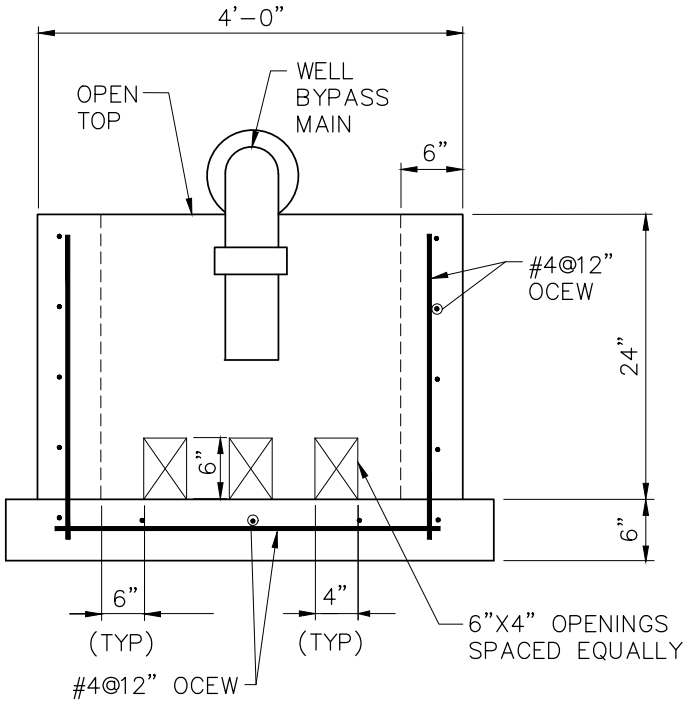
CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

GUARD POST DETAIL

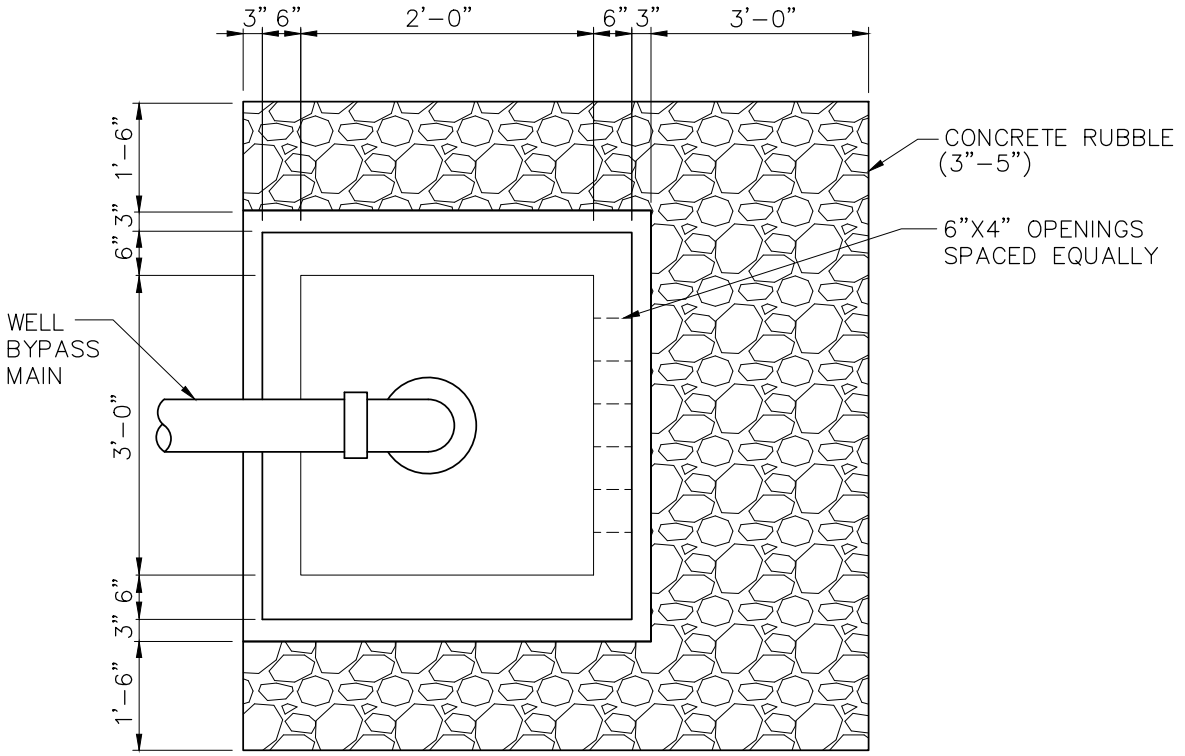
SCALE: NONE

FIG. M-13

REVISED 7/18



ELEVATION



PLAN VIEW

NOTES:

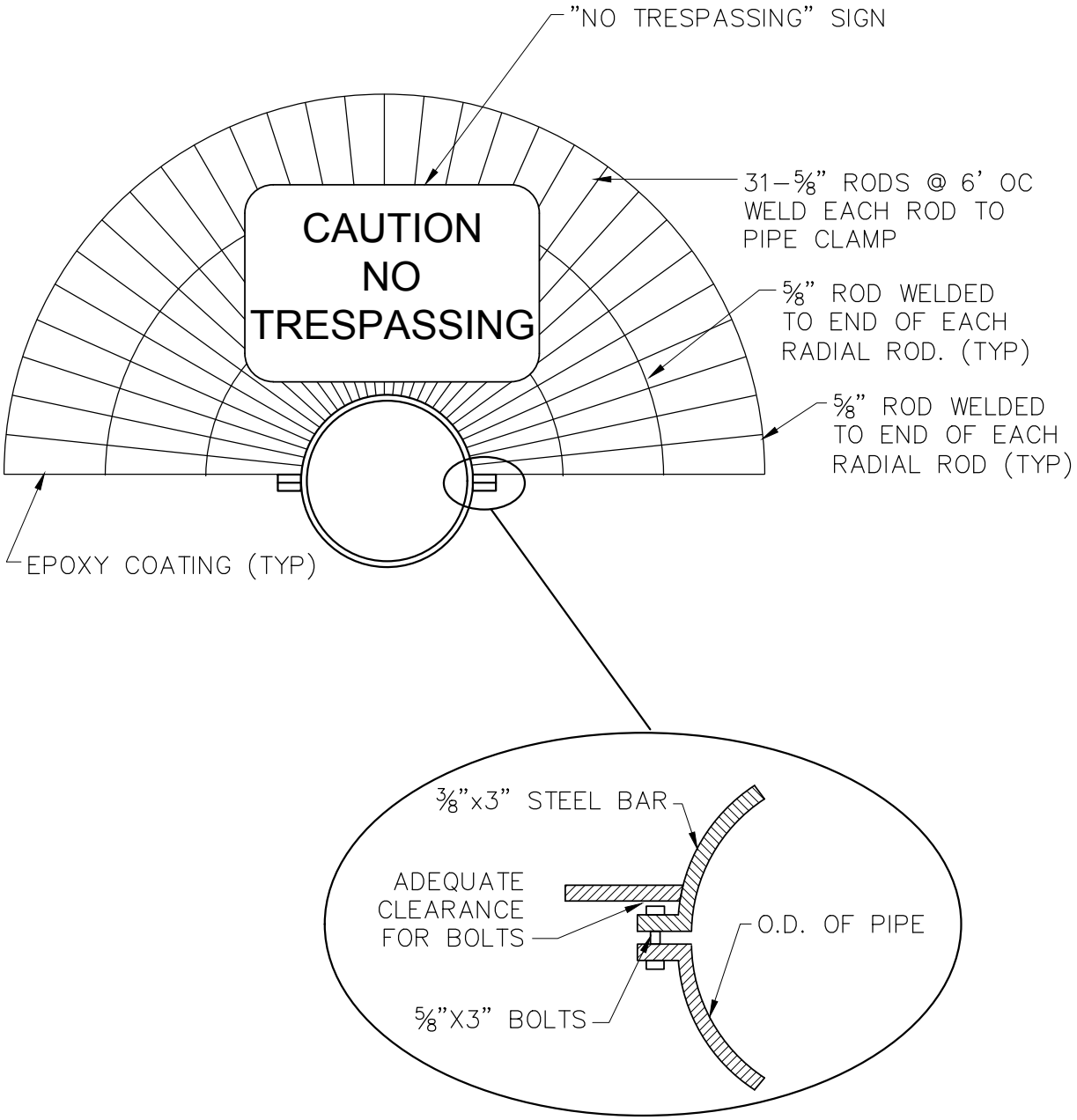
1. BOX SHALL BE 4'-0"x3'-0"x2'-6"H.
2. CONCRETE SHALL BE 3000 PSI.

ENERGY DISSIPATION BOX DETAIL

SCALE: NONE

FIG. M-14

REVISED 7/07



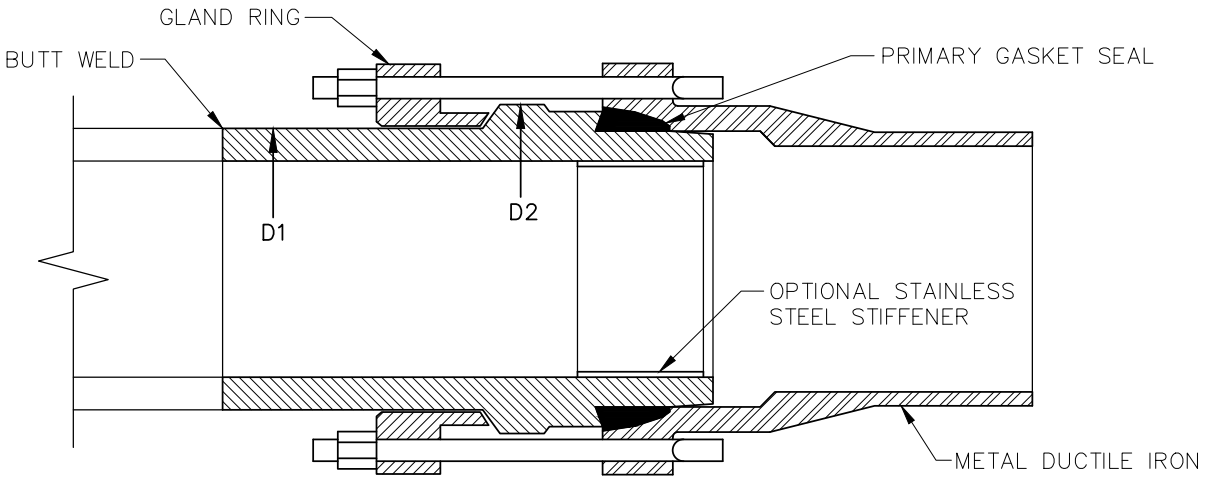
CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

AERIAL PIPE CROSSING
PEDESTRIAN FAN GUARD DETAIL

SCALE: NONE

FIG. M–15

REVISED 7/07



- KIT INCLUDES HDPE ANCHOR FITTING, STANDARD RUBBER GASKET, EXTRA LENGTH T–BOLTS, C–110 GLAND RING, AND INTERNAL STAINLESS STEEL STIFFENER (OPTIONAL).
- ALL ADAPTERS ARE AWWA COMPLIANT. MJ ADAPTERS ARE FULLY PRESSURE RATED TO THE DR ORDERED.

STOCKED IN DR–11; REBORED TO DR AS ORDERED. DR–7 AND DR–9 ARE AVAILABLE.

(DIMENSIONS IN INCHES)

NOMINAL SIZE IPS & DIPS	D1 IPS	D1 DIPS	D2	OAL	WEIGHT (LBS)
2" IPS	2.38	–	3.50	8.00	5
3"	3.50	3.96	5.37	8.00	8
4"	4.50	4.80	6.63	8.00	11
6"	6.63	6.90	8.63	9.00	17
8"	8.63	9.05	10.75	11.50	28
10"	10.75	11.10	12.75	13.00	36
12"	12.75	13.20	15.38	13.50	46
14"	14.00	15.30	17.50	13.50	85
16"	16.00	17.40	20.00	14.50	116
18"	18.00	19.50	22.00	16.00	123
20"	20.00	21.60	24.00	16.50	164
24"	24.00	25.80	28.00	18.00	222

Notes:

*Manufacturers MJ's incorporate a short nose design in order to work with most MJ butterfly valves, however it is recommended that specific valve information be supplied prior to ordering to insure proper clearance of the butterfly valve disc. MJ adapters should always be field tested for valve clearance before burial/final install.

**Connections to PVC may require use of a D.I. solid sleeve (not included).

CITY OF PALM COAST, FLORIDA — PALM COAST — INCORPORATED 1999

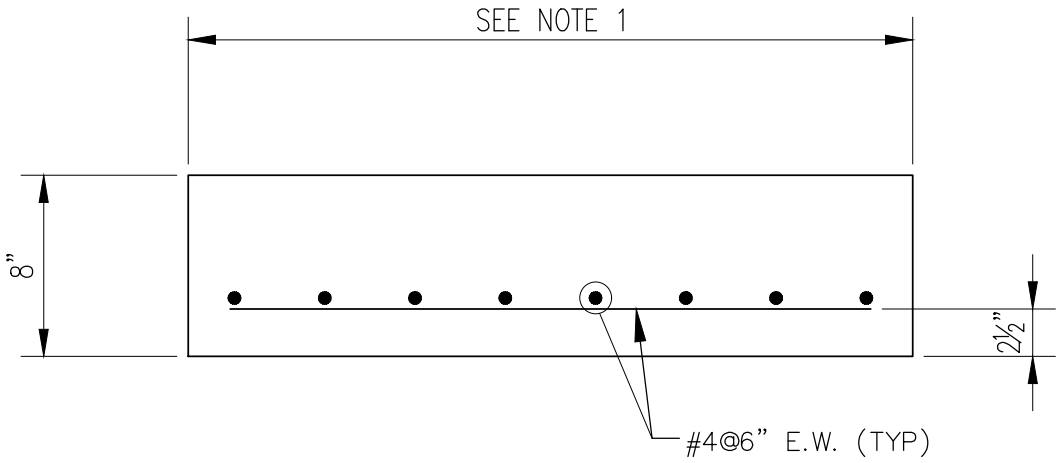
DIPS & IPS MJ ADAPTER DETAIL

CONNECTS HDPE TO DUCTILE IRON

SCALE: NONE

FIG. M–16

REVISED 1/08



NOTES:
1. LENGTH AND WIDTH OF SLAB DEPENDENT UPON SIZE OF GENERATOR.

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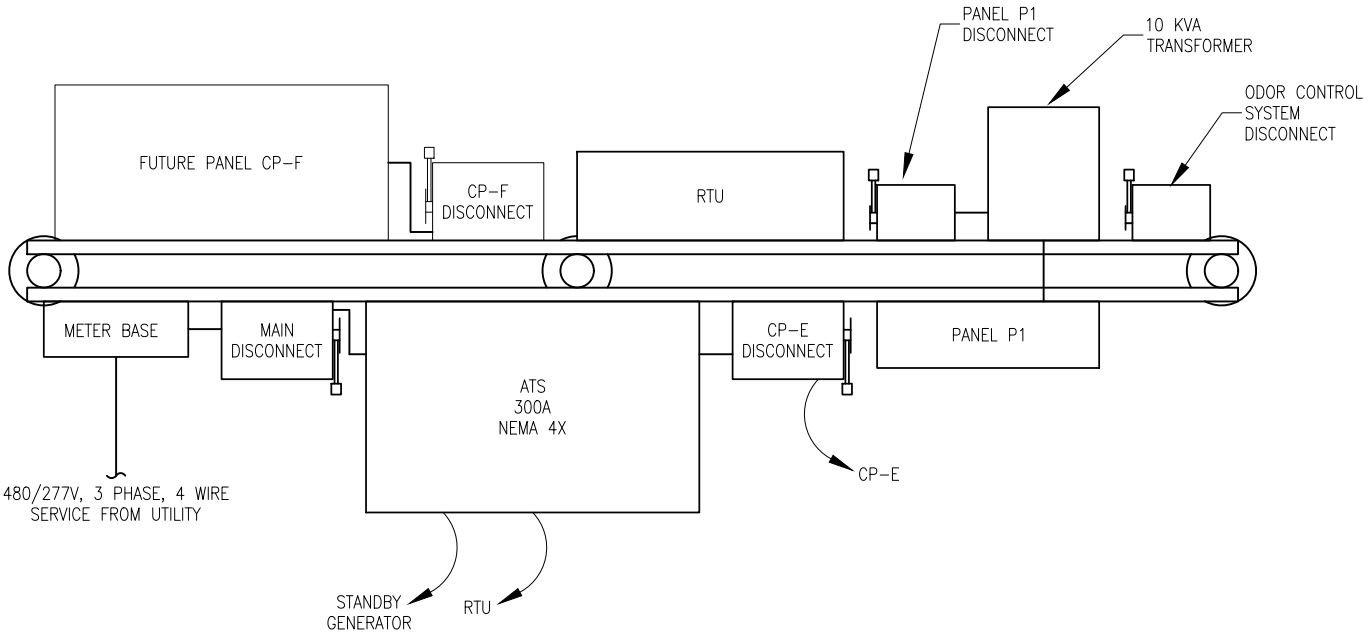
INCORPORATED 1999

GENERATOR PAD DETAIL

SCALE: NONE

FIG. M–17

REVISED 3/09

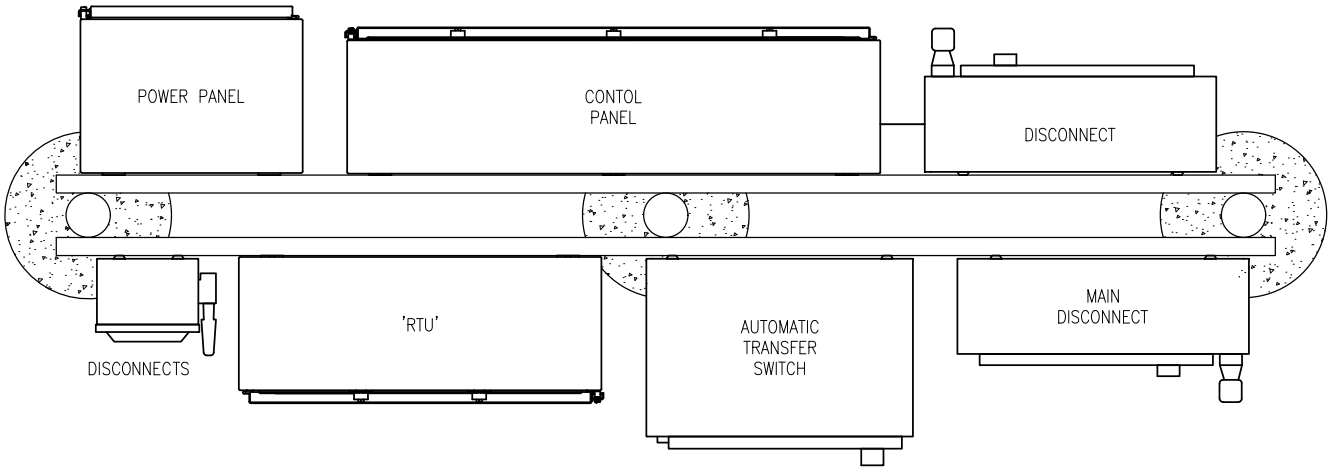


EQUIPMENT RACK DETAIL

SCALE: NONE

FIG. M-18

REVISED 1/09



CITY OF PALM COAST, FLORIDA
PALM COAST
INCORPORATED 1999

EQUIPMENT RACK DETAIL

SCALE: NONE

FIG. M-18A

REVISED 1/09

DIVISION 5

LIST OF MATERIALS

AND

APPROVED MANUFACTURERS

APPROVED MATERIALS LIST

July 2022

WATER DISTRIBUTION

If not shown, model numbers shall be approved by THE CITY OF PALM COAST Utility Department.

AIR RELEASE VALVES:

APCO #200 (2")
A.R.I. 2" D-040-C w/one way valve (for use on pipe exposed to atmosphere)
A.R.I. 2" D-040 w/one way valve (for use on pipe in valve vaults)

BACKFLOW PREVENTION DEVICES:

All Devices shall have stainless steel hardware to include handles, bolts, nuts, washers, etc. All Devices shall be chloramine resistant. All Devices that require a detector meter shall incorporate a Sensus TRPL register meter. On dedicated fire flow assemblies, a Dole FP35 or FP45 anti-freeze valve and a single check valve must be installed on the farthest downstream point on the bypass line.

Double Check Valve Assembly: (for residential, domestic and dedicated fire mains)

Watts Model LF 719 (3/4" - 2")
Watts 757 (2 1/2" - 10")
Febco LF850 (1/2" – 2")
Febco LF850 (2 1/2" – 10")
Wilkens Model 950 XLT (Top Loading) (3/4" - 2")
Wilkens Model 350, 350DA (2-1/2" – 10")
Apollo/Conbraco DCLF4A

Reduced Pressure Assembly

Watts LF919 (3/4" - 2")
Watts 994 Stainless (2 1/2" – 10")
Conbraco Model 40-200 (2-1/2" – 10")
Wilkens Model 975 XL (3/4" - 2")
Wilkens Model 375, 375DA (2-1/2" – 10")
Febco LF860 (1/2" – 2")

BUTTERFLY VALVES:

Mueller
Pratt
M&H
DeZurik

CASING SPACERS:

Cascade
PSI
CCI Pipeline Systems

CHECK VALVES: (4" & Larger)

ITT Kennedy 106
M&H 159
Mueller A-2600-6
Clow F-5382
GoldenAnderson GA 340-S (for wells)

APPROVED MATERIALS LIST

July 2022

WATER DISTRIBUTION (Continued)

CORPORATION STOPS:	Ford Model FB1100 Series
CURB STOPS:	Ford Model B41-444W Ford Model BRW41-XXXW(Reuse) Mueller Model P-25170-20 (Reuse) Ford Model B41-777 Ford Model B11-444 Ford Model B11-777 Mueller Model B-20200 Mueller Model P-25170 Ford Model B13-332W McDonald 6101MW
EXPANSION JOINTS:	Mercer Metraflex EBAA Iron Red Valve
FIRE HYDRANTS:	Mueller Model Super Centurion M&H Model 129 American B-84-B-5
FITTINGS (Ductile Iron):	McWane/Tyler-Union ACIPCO Sigma SIP
GATE VALVES: **(Resilient Seat/Wedge)**	Mueller Models A-2360, A2361 M&H Model 4067, 7000 Kennedy KS-FW, KS-RW, R/W American Flow Control Series 2500
IN-GROUND FLUSHING UNITS: **(Blow-off Assembly)**	Kupferle Model TF550 (or approved equivalent)
LOCATE TAPE:	Terra-Tape-Reef Industries Seton Pro-Line
METERS: **(All meters shall be TRPL register)** **Potable:**	Sensus – Iperl, Omni Master Meter – Octave Sonata – Must have touch pad allowing it to communicate with Sensus

APPROVED MATERIALS LIST

July 2022

WATER DISTRIBUTION (Continued)

Reuse: (Continued):

Sensus – Accustream for 1"
Sensus – Omni for 1½" and larger
Master Meter – Octave – Must be equipped with a strainer

Commercial Fire Line

Sensus – Omni + Fireline (F^2) Bypass Retrofit Meter
Master Meter – Octave

METERS
Residential Fire Line
Transmitter

Hersey Model RFM (Std.) with Translator Register (3/4"-2")
Sensus – Accustream
Master Meter – Octave Sonata – Must have touch pad allowing it to communicate with Sensus

METER BOXES:
Meter Box Usage:

Any meter boxes that are placed in concrete or asphalt must be sized to fit the largest meter the service line can feed. Example: a 2" service line can feed up to a 2" meter. Also the height of the meter must be taken into account for 2" compound meters. Meter boxes shall be sized to accommodate the largest meter for the size of the service line.

Potable Water:

5/8" x 3/4" Meters and 1" Meters can accommodate Double Check (Green Areas Only)
1-1/2" Meters and 2" Meters (Positive Displacement) (Master Backflowed) (Green Area)
1-1/2" Meters and 2" Meters (Turbine w/Internal Strainer) (Master Backflowed) (Green Area)

	NDS Pro Series Model 125BCDWB (Solid Lid)	24-3/4"L x 15-1/4"W x 15"D
	NDS Pro Series Model 125BCDMCIFB (Reader Lid)	24-3/4"L x 15-1/4"W x 15"D
Contractor Version	Highline LUB #195123P2	2"x4" Mouse Hole Ends
	Highline LUB #195123 (Reader Lid)	26-5/8"L x 13-11/16"W x 15"D Solid Ends
	Carson 1324-15 (Reader Lid)	23-5/16"L x 13-15/16"W x 15"D Solid Ends

2" Compound Meters (With Bypass Line for Testing) (External Strainer) (Master Backflowed) (Green Area)

	Highline AUCHA 304824SW2	30"W x 48"L x 24"D

APPROVED MATERIALS LIST

July 2022

WATER DISTRIBUTION (Continued)

METER BOXES (Continued):

5/8" x 3/4" Meters Concrete or Asphalt 10,000 lb. Load Rating (Master Backflowed)

Contractor Version	Highline PHA111812SW1P2	2"x4" Mouse Hole Ends
	Highline PHA111812S	16-3/4"L x 9-7/8"W x 12"D Straight Wall Solid Ends
	Highline CHA111812S	16-3/4"L x 9-7/8"W x 12"D Flared Wall Solid Ends
Contractor Version	Highline CHA111812SW1P2	2"x4" Mouse Hole Ends
	Carson MSBC1118-12 CIR/1TR	18-1/8"L x 11-1/4"W x 12"D 3"x4" Mouse Hole Ends

METER BOXES (Continued):

1" Meters Concrete or Asphalt 10,000 lb. Load Rating (Master Backflowed)

Contractor Version	Highline PHA132415SW1P2	3"x4" Mouse Hole Ends
	Highline PHA132415S	23"L x 13"W x 15"D Straight Wall Solid Ends
	Highline CHA132415S	23"L x 13"W x 15"D Flared Wall Solid Ends
Contractor Version	Highline CHA132415SW2P2	3"x4" Mouse Hole Ends
	Carson MSBC1324-12 CIR/1TR	23-1/8"L x 13-3/4"W x 12"D 3"x4" Mouse Hole Ends

2" Meters Concrete or Asphalt 10,000 lb. Load Rating
Positive Displacement or Turbine (Master Backflowed)

Contractor Version	Highline PHA173018SW1P2	3"x4" Mouse Hole Ends
	Highline PHA173018S	28-1/2"L x 15-1/2"W x 18"D Straight Wall Solid Ends
	Highline CHA173018S	28-1/2"L x 15-1/2"W x 19"D Flared Wall Solid Ends
Contractor Version	Highline CHA173018SW1P2	3"x4" Mouse Hole Ends
	Carson MSBC1730-18 CIR/1TR	30"L x 17"W x 18"D 3"x4" Mouse Hole Ends

APPROVED MATERIALS LIST

July 2022

WATER DISTRIBUTION (Continued)

METER BOXES (Continued):

2" Compound Meters (with Bypass Line) Concrete or Asphalt 10,000 lb. Load Rating (Master Backflowed)

Contractor and Utility Version	Highline AUCVA306024SW2	30"W x 60"L x 24"D

2" Compound Meters (with Bypass Line) Concrete or Asphalt 20,000 lb. Load Rating (Master Backflowed)

Contractor and Utility Version	Highline AUCVA306024HW2	30"W x 60"L x 24"D

5/8" x 3/4" Meters Concrete or Asphalt 20,000 lb. Load Rating (Master Backflowed)

Contractor Version	Highline PHA111812HW1P2	2"x4" Mouse Hole Ends
	Highline PHA111812H	16-3/4"L x 9-7/8"W x 12"D Straight Wall Solid Ends
	Highline CHA111812H	16-3/4"L x 9-7/8"W x 12"D Flared Wall Solid Ends
Contractor Version	Highline CHA111812HW1P2	2"x4" Mouse Hole Ends
	Carson MSBCF1118-12XL CIR/1TR	18-1/8"L x 11-1/4"W x 12"D 3"x4" Mouse Hole Ends

1" Meters Concrete or Asphalt 20,000 lb. Load Rating (Master Backflowed)

Contractor Version	Highline PHA132415HW1P2	3"x4" Mouse Hole Ends
	Highline PHA132415H	23"L x 13"W x 15"D Straight Wall Solid Ends
	Highline CHA132415H	23"L x 13"W x 15"D Flared Wall Solid Ends
Contractor Version	Highline CHA132415HW1P2	3"x4" Mouse Hole Ends
	Carson MSBCF1324-12XL CIR/1TR	23-1/8"L x 13-3/4"W x 12"D 3"x4" Mouse Hole Ends

APPROVED MATERIALS LIST
July 2022

WATER DISTRIBUTION (Continued)

METER BOXES (Continued):

2" Meters Concrete or Asphalt 20,000 lb. Load Rating
Positive Displacement or Turbine (Master Backflowed)

Contractor Version	Highline PHA173018HW1P2	3"x4" Mouse Hole Ends
	Highline PHA173018H	28-1/2"L x 15-1/2"W x 18"D Straight Wall Solid Ends
	Highline CHA173018H	28-1/2"L x 15-1/2"W x 19"D Flared Wall Solid Ends
Contractor Version	Highline CHA173018HW1P2	3"x4" Mouse Hole Ends
	Carson MSBCF1730-18XL CIR/1TR	30"L x 17"W x 18"D 3"x4" Mouse Hole Ends

PAINTING:

Surface Preparation — Power tool cleaning (SSPC-SP3) or brush-off blast cleaning (SSPC-SP7)

Primer — Acrylic Enamel, minimum 3.0 mils DFT
(If shop coat is damaged, reprime bare areas in field. If shop coat is bituminous coating, prime with 2 coats of stain barrier, 1 mil of dry film)

Finish — Two coats, applied by spray, of Acrylic Enamel BLP Mobile Paints, minimum 4.0 mils DFT. "Precaution Blue" #310-37, "Maintenance White" #310-16, or approved equivalent.

PIPE (Ductile Iron):
American
US Pipe
McWane
Griffin

PIPE (HDPE):
(3" and Larger)
Driscopipe
J-M

PIPE (PVC):
Sanderson
National Pipe
North American
J-M Plastic
Diamond

APPROVED MATERIALS LIST

July 2022

WATER DISTRIBUTION (Continued)

RESTRAINED JOINTS:

1. MJ Fitting and MJ Pipe Restraint:
EBAA Iron Megalug
Tyler Union Tuf Grip
Sigma One-LOK
SIP

2. Bell & Spigot Restraint:
Ford Wedge Action Restrainer
Tyler Union Series 3000
Sigma PV-LOK

SERVICE PIPE (Poly Tubing):
(2" & Smaller Service Pipe)
Endot Endopure
Orangeburg
CTS for Copper Tubing Size
Charter Plastics

SERVICE SADDLE:
(2" & Smaller)
Ford S-71, S-91, 202B, 202BS
Mueller H1300, S1300, DR2S
Smith-Blair 317
Romac 202NS

TAPPING SADDLES:
(Stainless Steel Body, Outlet and Fasteners)
Cascade Waterworks Style CS22
Ford Style FS323, FS333, FS343
Smith Blair 372

TAPPING SLEEVES:
(Stainless Steel Body, Throat & Flange)
Mueller H-304SS
Romac SST
Total Piping Solutions Triple Tap Series TS

TAPPING VALVES:
Mueller T-2360, T-2361
M&H 4751
American Flow Control Series 2500
Clow F-5093

TRACING WIRE:
Copperhead Industries
Pro-Line Safety Products

U-BRANCHES:
A. Y. McDonald #09B2FWF

*All three pieces required for complete U-Branch

*Ford	Ball Valve (2)	#B111-333
	U-Branch Piece	#U18-43
	Angle Ell	#LA84-44
*Mueller	Ball Valve (2)	#B-20200
	U-Branch Piece	#H-153645 (7½"spread)
	Angle Ell	#P-15534

APPROVED MATERIALS LIST
July 2022

WATER DISTRIBUTION (Continued)

VALVE BOXES:	Tyler Sigma
VALVE BOX ALIGNMENT ADAPTERS/DEVICES:	Emma Sales Boxlok Carson V-Guard Valve Box Adapter American Flow Control Alignment Ring

APPROVED MATERIALS LIST

July 2022

WASTEWATER FORCE MAIN

AIR RELEASE VALVES:	ARI D-025P w/One Way Valve (Force Main) ARI S-021 w/One Way Valve (PEP & Reuse Mains)
CASING SPACERS:	Cascade PSI CCI Pipeline Systems
CHECK VALVES: **(4" & Larger)**	ITT Kennedy 106 M&H 159 Mueller A-2600-6-01 Clow F-5382
EXPANSION JOINTS:	Mercer Metraflex EBBA Iron Red Valve
FITTINGS (Ductile Iron): (Ceramic Epoxy Lined)	McWane/Tyler-Union ACIPCO Sigma SIP
GREASE INTERCEPTOR TANKS:	Florida Septic Hanson Southern Precast Old Castle Precast Standard Precast
LOCATE TAPE:	Terra-Tape-Reef Industries Seton Pro-Line
MANHOLE FRAME & COVER:	US Foundry USF #227-AS-ORS (built-up) US Foundry USF #1295-AS-ORS (slab-type)
MANHOLE JOINTING MATERIAL:	K. T. Snyder Co., Inc. Ram-Nek
MANHOLE LID RISERS: (Steel Expandable)	American Highway Products, Ltd. (or approved equivalent)
MANHOLE LID ADJUSTMENT RINGS (HDPE):	LadTech
MANHOLE SURFACE COATINGS FOR NEW MANHOLES THAT DO NOT RECEIVE FORCE MAIN FLOW:	Conseal CS-55 (Gray)

APPROVED MATERIALS LIST

July 2022

WASTEWATER FORCE MAIN (Continued)

METER BOXES (Continued):
Meter Box Usage:

Any meter boxes that are placed in concrete or asphalt must be sized to fit the largest meter the service line can feed. Example: a 2" service line can feed up to a 2" meter. Also the height of the meter must be taken into account for 2" compound meters. Meter boxes shall be sized to accommodate the largest meter for the size of the service line.

METER BOXES
Reclaimed Water:

1" Reclaimed PMM Meters (Green Areas Only)

Contractor Version	Highline #174538P Standard	2"x4" Mouse Hole Ends
Contractor Version	Highline #190122P Jumbo	2"x4" Mouse Hole Ends
	Highline #170200 Standard	15"L x 10"W x 12"D Lavender Color Solid Ends
	Highline #194559 Jumbo	20"L x 13"W x 12"D Lavender Color Solid Ends
	Highline #195124 LUB	24"L x 13"W x 15"D Lavender Color Solid Ends
Contractor Version	Highline #195124P LUB	3"x4" Mouse Hole Ends

2" Reclaimed Turbine Meters (Green Areas Only)

	Highline #195125 XLUB	30"L x 17"W x 18"D Lavender Color Solid Ends
Contractor Version	Highline #195140	3"x4" Mouse Hole Ends

1" Reclaimed Meters Concrete or Asphalt 10,000 lb. Load Rating (Master Backflowed)

Contractor Version	Highline PHA11181SW2P	2"x4" Mouse Hole Ends
	Highline PHA111812S	16-3/4"L x 9-7/8"W x 12"D Straight Wall Solid Ends
	Highline CHA111812S	16-3/4"L x 9-7/8"W x 12"D Flared Wall Solid Ends
Contractor Version	Highline CHA111812SW2P	2"x4" Mouse Hole Ends
	Carson MSBC1118-12 CIR/1T	18-1/8"L x 11-1/4"W x 12"D 3"x4" Mouse Hole Ends

APPROVED MATERIALS LIST

July 2022

WASTEWATER FORCE MAIN (Continued)

METER BOXES (Continued):

Contractor Version	Highline PHA132415SW2P	3”x4” Mouse Hole Ends
	Highline PHA132415S	23”L x 13”W x 15”D Straight Wall Solid Ends
	Highline CHA132415S	23”L x 13”W x 15”D Flared Wall Solid Ends
Contractor Version	Highline CHA132415SW2P	3”x4” Mouse Hole Ends
	Carson MSBC1324-12 CIR/1TR	23-1/8”L x 13-3/4”W x 12”D 3”x4” Mouse Hole Ends

2” Reclaimed Turbine Meters Concrete or Asphalt 10,000 lb. Load Rating

Contractor Version	Highline PHA173018SW2P2	3”x4” Mouse Hole Ends
	Highline PHA173018S	28-1/2”L x 15-1/2”W x 18”D Straight Wall Solid Ends
	Highline CHA173018S	28-1/2”L x 15-1/2”W x 19”D Flared Wall Solid Ends
Contractor Version	Highline CHA173018SW2PE	3”x4” Mouse Hole Ends
	Carson MSBCF1730-18 CIR/1TR	30”L x 17”W x 18”D 3”x4” Mouse Hole Ends

1” Reclaimed PMM Meters Concrete or Asphalt 20,000 lb. Load Rating

Contractor Version	Highline PHA111812HW2P	2”x4” Mouse Hole Ends
	Highline PHA111812H	16-3/4”L x 9-7/8”W x 12”D Straight Wall Solid Ends
	Highline CHA111812H	16-3/4”L x 9-7/8”W x 12”D Flared Wall Solid Ends
Contractor Version	Highline CHA111812HW2P	2”x4” Mouse Hole Ends
	Carson MSBCF1118-12XL CIR/1TR	18-1/8”L x 11-1/4”W x 12”D 3”x4” Mouse Hole Ends
Contractor Version	Highline PHA132415HW2P2	3”x4” Mouse Hole Ends
	Highline PHA132415H	23”L x 13”W x 15”D Straight Wall Solid Ends
	Highline CHA132415H	23”L x 13”W x 15”D Flared Wall Solid Ends

APPROVED MATERIALS LIST

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WASTEWATER FORCE MAIN (Continued)

METER BOXES (Continued):

Contractor Version	Highline CHA132415HW2PE	3"x4" Mouse Hole Ends
	Carson MSBCF1324-12XL CIR/1TR	23-1/8"L x 13-3/4"W x 12"D 3"x4" Mouse Hole Ends

2" Reclaimed Turbine Meters Concrete or Asphalt 20,000 lb. Load Rating

Contractor Version	Highline PHA173018HW2P2	3"x4" Mouse Hole Ends
	Highline PHA173018H	28-1/2"L x 15-1/2"W x 18"D Straight Wall Solid Ends
	Highline CHA173018H	28-1/2"L x 15-1/2"W x 19"D Flared Wall Solid Ends
Contractor Version	Highline CHA173018HW2P2	3"x4" Mouse Hole Ends
	Carson MSBCF1730-18XL CIR/1TR	30"L x 17"W x 18"D 3"x4" Mouse Hole Ends

PAINTING:

Surface Preparation: Power tool cleaning (SSPC-SP3) or brush-off blast Cleaning (SSPC-SP7)

Primer: Polyamide Epoxy, minimum 3.0 mils DFT
(If shop coat is damaged, reprime bare areas in field. If shop coat is bituminous coating, prime with 2 coats of stain barrier, 1 mil of dry film)

Finish: Two coats, applied by spray, of Polyamide Epoxy, BLP Mobile Paints, minimum 4.0 mils DFT. "John Deere Green" #513-45A; OSHA Safety Lavender #0031010, or approved equivalent

PIPE (Ductile Iron):
(Ceramic Epoxy Lined)
American
McWane
US Pipe

PIPE (PVC) FORCE MAIN & GRAVITY MAIN:
Sanderson
National Pipe
North American
J-M Plastic
Diamond
Freedom Plastic

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WASTEWATER FORCE MAIN (Continued)

PLUG VALVES:	Pratt Ballcentric (up to 12”) Milliken Milcentric (up to 12”) DeZurik PEF 100% Port Golden Anderson (GA) (up to 24”)
RESTRAINED JOINTS:	
1. MJ Fitting and MJ Pipe Restraint:	EBAA Iron Megalug Tyler Union Tuf Grip Sigma One-LOK SIP
2. Bell & Spigot Restraint:	Ford Wedge Action Restrainer Tyler Union Series 3000 Sigma PV-LOK
TAPPING SADDLES: **(Stainless Steel Body, Outlet And Fasteners)**	Cascade Waterworks Style CS22 Ford Style FS323, FS333, FS343 Smith Blair 372
TAPPING SLEEVES: **(Stainless Steel Body, Throat and Flange)**	Mueller H-304SS Romac SST Total Piping Solutions Triple Tap Series TS
TAPPING VALVES:	Mueller T-2360, T-2361 M&H 4751 American Flow Control Series 2500 Clow F-5093
TRACING WIRE:	Copperhead Industries Pro-Line Safety Products
VALVE BOXES:	Tyler Sigma
WET WELL SUMP:	Flygt TOP 100/150

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WASTEWATER PUMP STATION

ALARM HORN (AH):	Wheelock
ALARM LIGHT (AL):	Ingram Products
CONTROL CIRCUIT BREAKER (CCB):	Square D
CONTROL CIRCUIT TRANSFORMER (CCT):	Square D
CONTROL PANEL (CP): 1*	
DUPLEX PUMP CONTROL	SC 100 MPE
DUPLEX RECEPTACLE/GFI (DR):	Square D Leviton
ELAPSE TIME METER (ETM):	ENM
EMERGENCY CIRCUIT BREAKER (ECB):	Square D
ENCLOSURE: 2*	Hoffman Universal
FLASHER (FL):	Sta-Con, Inc. Ingram Products
FLOAT REGULATOR (FR):	Roto-Float Flygt
FUSES:	Bussmann
GENERATOR RECEPTACLE (GR):	
230V, 100A, 3P, 4W	Leviton
230/460V, 200A, 3P, 4W	Square D
GENERATOR SYSTEM:	Caterpillar Onan (Cummins) Tradewinds Generac

1* Control panel manufacturer shall provide proof that it has a minimum of 3-years experience in construction of pump control panels.
2* The control panel enclosure shall be Underwriters Laboratories (U.L.) 50 type 4X listed. Size shall be as shown on Drawings.

APPROVED MATERIALS LIST

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WASTEWATER PUMP STATION (Continued)

HAND-AUTO-OFF-SELECTOR (HOA):	Square D
HORN SILENCE BUTTON (HSS):	Square D
MAIN CIRCUIT BREAKER (MCB):	Square D
MAIN CIRCUIT TRANSFORMER (MCT):	Square D
MOTOR STARTER (MS):	Square D
OVERLOAD HEATER (OL):	Square D
PHASE MONITOR:	MPC Diversified
PRESSURE GAUGE:	Ashcroft
RELAY (R):	Square D
SOFT START STARTERS	Allen Bradley
SUBMERSIBLE PUMP:	Flygt
SURGE PROTECTOR (LA):	Square D
TELEMETRY SYSTEM:	Mission
TERMINAL STRIP (TS):	Square D
TRANSDUCER	Primex
TRIPLEX PUMP CONTROL	SC 1000 MPE
VARIABLE FREQUENCY DRIVE	Schneider Electric
WETWELL ACCESS FRAME & COVER:	Halliday Products, Inc. Bilco Co. U.S. Foundry
WETWELL SONAR	Pulsar