The City of Cocoa Utilities

TECHNICAL PROVISIONS AND STANDARD DETAILS MANUAL

John A. Walsh, P.E.
Utilities Director

Manual Committee
Utilities Engineering Division
Utilities Water Field Operations Division
Utilities Sewer Field Operations Division

Effective July, 2021
July 23rd, 2020

Subject: City of Cocoa Technical Provisions

To Whom It May Concern:

Enclosed is the current revision of Cocoa’s Technical Provisions. Construction of all potable water, reclaimed water, and sanitary sewer facilities shall conform to these Technical Provisions and be accepted for transfer of ownership and maintenance by the City of Cocoa. The City of Cocoa proudly supports and requires buying USA domestic materials whenever possible.

Please note this document is date sensitive and will be updated on a regular basis. For the most recent version, please contact the Engineering Division at 321-433-8797 or online at www.cocoafl.org. The document is located under the department Tab then Utilities. If you see areas in this document that should be updated, please email your comments to the Engineering Division at utildevelopment@cocoafl.org.

Sincerely,

John A. "Jack" Walsh, P.E.
Utilities Director
City of Cocoa
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SECTION 1. GENERAL INFORMATION
1. GENERAL INFORMATION

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1.1 GENERAL

These Technical Provisions and Standard Details identifies design, installation, inspection, and acceptance specifications to be used for water, wastewater, and reclaimed water systems that will be maintained and operated by the City of Cocoa. All potable water, wastewater, and reclaimed water mains and appurtenances must be installed in accordance with this Manual, the City of Cocoa Cross Connection Control Program Manual, the City of Cocoa Utilities Handbook, and the approved plans.

Contractor requirements include:

- Furnishing all labor, materials, tools and equipment necessary or incidental to the construction.
- Obtaining and paying for all permits, inspections, and other official fees in connection with the work.
- Arranging a pre-construction conference with the Engineering Inspection Division. All fees must be paid prior to the pre-construction meeting. It is required that the pre-construction meeting be held prior to ordering materials.
- Scheduling materials inspection (24-hour notice), open ditch inspection, pressure/leakage test, and final inspection.
- Provide all documents per the project requirement letter, including but not limited to As Built Drawings, Bills of Sale, Easements, etc.
- Make certain that no public water/wastewater lines are placed on private property.

Technical information provided by the City shall be used for informational purposes only. The Contractor and Engineer of Record are responsible for verifying field conditions.

Any deviation from these requirements must be approved in writing by the Utilities Director or his designee prior to commencement of construction.

Fees charged by the City are set by City Council by resolution and are listed on the appendix "Water Service Rates and Charges" made a part of the Utilities Handbook. Fees are subject to change without notice. The most current fees will be charged.

The Utilities Department and Engineering Division are located at 351 Shearer Blvd., Cocoa, Florida, 32922. The telephone number is (321) 433-8701; facsimile number is (321) 433-8708.
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1.2 DEFINITIONS

The term "approved equal" is used to mean a part or item that has been approved in writing by the Technical Provision and Standard Details Advisory Committee or the Utilities Director. A written request must be made in order to have an item accepted as an approved equal. Written specifications on the part or item must be furnished with the request.

**Approved Tapping/Linestop Contractor** - A Contractor who has been approved by the Engineering Division to perform taps or linestops within the Cocoa Water System. A current list is maintained and available through the Engineering Division.

**Backflow Preventer Assembly** - A backflow preventer assembly, also called a cross connection control (CCC) device, is a mechanical or non-mechanical device used to prevent the flow of water from a non-potable source to the potable water distribution system. Approved backflow preventers are testable assemblies composed of two independently acting, approved check valves, including tightly closing resilient seated shutoff valves attached at each end of the assembly, and fitted with properly located resilient seated test cocks.

**Canal** - A trench, the bottom of which is normally covered by water, with the upper edges of its two sides normally above water.

**City** - Means the City of Cocoa.

**Collection Mains** – Wastewater gravity mains.

**Competent Person** - A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

**Distribution Main** – Any water main 12” and smaller.

**Domestic** - Means made or manufactured in the USA.

**Drainage Ditch or Irrigation Ditch** - A man-made trench which is dug for the purpose of draining water from the land or for transporting water for use on the land and which is not built for navigational purposes.

**Force Main** – Wastewater main under pressure.


**Normal Working Day** - Monday through Friday, excluding CITY holidays.
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Normal Working Hours - Hours are between the hours of 8:00 a.m. to 5:00 p.m. of a NORMAL WORKING DAY.

Passivated – Treated or coated metal to reduce the chemical reactivity of its surface.

Stainless Steel - A steel alloy with a minimum of 10.5% to 11% chromium.

Substantial Completion - The point when the construction project has been finished to the point that the City of Cocoa can use the project for the purpose it was intended.

Swale - A manmade trench which:

A. Has a top width-to-depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or greater than 3’ horizontal to 1’ vertical;
B. Contains contiguous areas of standing or flowing water only following a rainfall event;
C. Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake;
D. Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area to prevent erosion and reduce pollutant concentration of any discharge.

Technical Provision and Standard Details Committee - Committee whose members shall consist of the manager, or their designee, of the following UTILITIES staff: Engineering, Inspections, Water Field Operations, and Sewer Field Operations. The committee evaluates and proposes revisions for the design standards, specifications, drawings, products and procedures for the Manual.

Transmission Main – Any water main 16” and larger. 14” pipelines are not acceptable.

Utilities - Utilities Department of the City of Cocoa, Cocoa, Florida, and/or its designated representative(s).


Whenever a specification from a specific source is cited, the most current revision of that specification will be used. The word "shall" is mandatory, and the word "may" is permissive.

Unless otherwise specified, "City" means City of Cocoa; "Utilities Department" means City of Cocoa Utilities Department; "Engineering Division" means City of Cocoa Utilities Engineering Division, "Inspections or Inspector" means City of Cocoa Utilities Engineering Inspections Division.
1.3 ABBREVIATIONS

Ampere - A
American Association of State Highway and Transportation Officials - AASHTO
Asbestos Cement - AC
Association of PVC Pipe Manufacturers - Uni-Bell
American National Standards Institute - ANSI
American Society of Civil Engineers - ASCE
American Society of Mechanical Engineers - ASME
American Society for Testing and Materials - ASTM
American Water Works Association - AWWA
American Water Works Association Tapered Thread - CC
American Society of Sanitary Engineers - ASSE
Automatic Transfer Switch - ATS
City of Cocoa - CoC
Copper Clad Steel - CCS
Copper Development Association - CDA
Cross Connection Control - CCC
Dimension Ratio - DR
Double Check Backflow Assembly - DC
Double Check Detector Assemblies - DCDA
Dry Film Thickness - DFT
Ductile Iron Pipe Research Association - DIPRA
Ductile Iron Pipe - DIP
Engineer of Record - EOR
Florida Administrative Code - FAC
Florida Department of Environmental Protection - FDEP
Florida Department of Transportation - FDOT
Florida East Coast Rail Road - FECRR
Foundation for Cross-Connection Control and Hydraulic Research - FCCCHR
Flange - FL
Factory Mutual - FM
Ground Fault Circuit Interceptor - GFCI
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High-Density Polyethylene - HDPE
High-Strength - HS
Horizontal Directional Drilling - HDD
Jack and Bore - J&B
Kilovolt-Ampere - kVA
Maintenance of Traffic - MOT
Manual on Uniform Traffic Control Devices - MUTCD
National Association of Corrosion Engineers - NACE
National Fire Protection Association - NFPA
National Sanitation Foundation - NSF
National Standard Thread - NST
Non-rising stem - NRS
Original Equipment Manufacturer - OEM
Outside Screw and Yoke - OS&Y
National Pollution Discharge Elimination System - NPDES
Plain End - PE
Polyvinylchloride – PVC
Precautionary Boil Water Notice - PBWN
Portable Changeable Message Signs - PCMS
Pre-stressed Concrete Cylinder Pressure Pipe - PCCP
Project Manager - PM
Pounds per Square Inch - PSI
Raised Pavement Marker - RPM
Reduced Pressure Backflow Assembly - RP
Reduced Pressure Detector Assembly - RPDA
Reduced Pressure Zone - RPZ
Reinforced Concrete Pressure Pipe - RCP
SCTE – Society of Cable and Telecommunications Engineers
Stainless Steel - SS
Tamper-Proof - TP
Technical Provision and Standard Details - TPSD
Traffic Control Plan - TCP
Underwriters Laboratories - UL
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Unified Numbering System - UNS
Variable Frequency Drive - VFD
Volts Alternating Current - VAC
Weather-Proof - WP
SECTION 2. WATER – POTABLE AND RECLAIMED
2. WATER – POTABLE AND RECLAIMED

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2.1 WATER MAIN CROSSINGS

2.1.1 GENERAL

In all cases where sanitary gravity or force mains cross water mains the crossing shall meet the vertical and horizontal separation requirements of FAC Rule 62-555.314. When separation requirements cannot be met, the Engineer of Record (EOR) must propose an alternative solution that meets the requirements of FAC 62-555.314 for approval by the Engineering Division. The water main should cross above the sanitary main. When the water main must cross below the sanitary main, the minimum separation shall be 12”.

2.2 MATERIALS SPECIFICATIONS

2.2.1 PIPE

2.2.1.1 Polyvinyl Chloride Pressure Pipe, 4” – 12” (Potable Water)

Polyvinyl chloride pressure pipe (sizes 4” through 12”) will be cast iron pipe equivalent outside diameter Class 235 (DR 18) conforming to the American Water Works Association's (AWWA) specification C900 and will be blue or white in color. Pipe will be in standard 20’-lengths. All joints will be of the elastomeric-gasket type with thickened, integral solid-wall bell or coupling with the same DR as the barrel. All PVC pipe and couplings will bear the UL label and NSF approval for potable water.

2.2.1.2 Fusible Polyvinyl Chloride Pipe, 4” – 12” (Potable Water)

Polyvinyl chloride pressure pipe (size 4" through 12") will be cast iron pipe equivalent outside diameter and a pressure rating of 235 psi (DR 18) conforming to AWWA specification C900 and will be blue or white in color. Fusible PVC pipe shall be supplied by Underground Solutions, Inc. It shall be installed in accordance with the suppliers’ specifications. All PVC pipe will bear the UL label and NSF approval for potable water.

2.2.1.3 Ductile Iron Pipe (Potable Water)

Ductile iron pipe will be cement-lined pressure Class 350 for 12”-diameter and smaller and Class 250 for 16” and larger conforming to AWWA specification C151. Water main and storm drain crossing conflicts will be properly designed by the project engineer and approved by the Utilities
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Department prior to installation. Water mains that are less than 10’ apart from building foundations or other permanent objects will be ductile iron pipe. In no case will water mains be located less than 5’ from foundations. The above distances will be doubled for water mains larger than 8" in diameter. Polyethylene sleeve conforming to AWWA specification C105 will be provided for all installations. The polyethylene sleeve will be sealed with tape and shall be blue for water mains.

2.2.1.4 High Density Polyethylene (HDPE) Pipe (Potable Water)

HDPE pipe is generally not accepted in the City of Cocoa water system, except as a carrier pipe for a pressurized utility main.

2.2.1.5 Reclaimed Water

PVC pipe installed in reclaimed water systems will be Class 235 (DR 18) conforming to AWWA specification C900 and will be purple in color. Ductile iron pipe installed in the reclaimed water system will be pressure Class 350 for 12" and smaller and pressure Class 250 for 16" and larger, provided 3’ of cover can be maintained. Where cover is less than 3’, pressure Class 350 is required. Polyethylene sleeve conforming to AWWA specification C105 will be provided for all installations. The polyethylene sleeve will be sealed with tape and shall be purple for reclaimed water mains.

2.2.2 VALVES, VALVE BOXES, AND VALVE EXTENSIONS

2.2.2.1 Resilient Seat Gate Valves, 4” – 36”

Resilient seat gate valves will have mechanical joint ends as manufactured by American Flow Control; AVK; M&H; U.S. Pipe; Clow; Mueller or an approved equal. The resilient seat gate valves must conform to AWWA specification C509 or C515 and be manufactured in the U.S.A. Resilient seats will be of natural or synthetic rubber and be fully encapsulated to gate. Valves will have 18-8 Type 304 stainless steel bolts and nuts. The interior and exterior of the valve body will be fusion-bonded epoxy coated in accordance with AWWA specification C550 in order to provide a corrosion-resistant seat. The coating must be applied in a manner to withstand the action of line fluids and operation of the sealing gate under long-term service. Valve seats must seal by compression only. Wedging or sliding of the resilient seat is not acceptable. Valves will be supplied with 2"-square operating nuts and be designed to provide a bubble tight seal regardless of direction of flow. Opening the valve will be in the counterclockwise direction. Valves 16” and larger will have Bevel Gear Operators. For gate valves 16” and larger to be stood up straight, the 2” operating nut must have 12” of cover. EOR or Contractor must demonstrate the 12” of cover
over the 2" operating nut can be achieved by showing all pertinent dimensions. Tapping valves shall have a centering ring.

2.2.2.2 Butterfly Valves, 16” and Larger

Butterfly valves shall be used for above ground service. Butterfly valves shall have flanged ends, be rubber seated, 90° tight closing type, short body. The interior and exterior will be fusion-bonded epoxy coated in accordance with AWWA specification C550. The valve shaft will be of Grade 316 stainless steel. Body dimensions and minimum shaft diameter will be in accordance with Tables 1 and 3 of AWWA specification C504. The valve seat will be of molded natural or synthetic rubber, will be mechanically secured to the disc or to the valve body, and will mate against a stainless-steel seat surface. The gear ratio will be such as to require not more than 50-foot pounds of input torque to operate the valve against the worst case of a water flow velocity of 10 feet per second at a pressure of 100 psi differential. A torque-limiting device will be supplied if the allowable operator input is less than 450-foot pounds. Butterfly valves will have a factory installed hand wheel. The valve will open when the operator nut is turned counterclockwise. **Butterfly valves will not be used for buried service.**

2.2.2.3 Valves, 2"

2” valves for use with the 2" blow-off gate valve will be rated at 125 SWP or 200 WOG. All 2" gate valves must meet all EPA and FDEP requirements regarding lead and zinc contents. Brass fittings and 2" brass wheel valves are shall be used on blow-offs. All valves must be manufactured in the U.S.A.

2.2.2.4 Valve Boxes

Valve boxes and lids must be manufactured in the U.S.A. Boxes and lids must be structurally equal to those produced by East Jordan Iron Works or Tyler and must have 5-1/4" minimum inside diameter. Cast iron valve boxes will consist of a circular cast iron top and bottom section. The depth must be determined, and the appropriate valve box must be installed. No PVC or Ductile is permitted in the valve box. Boxes must be set flush with finished ground surface in such a manner as to permit easy use of a valve wrench and to prevent surface loads from being transmitted to the valve or pipe. Box sections must be telescopic and adjustable. Valve box lids should have the word "WATER" or "SEWER" or "REUSE", as appropriate, cast on the top. A concrete pad (24" L x 24" W x 4" D) will be poured around all boxes at finished grade level unless the valve is located in a paved roadway or parking lot. A Valve identification plate engraved to indicate the type, size, and number of turns will be securely anchored to the concrete pad. Valve identification plates for valves 12” and larger will also indicate the torque necessary for actuation.
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2.2.2.5 Valve Extensions

If the depth of the valve nut is greater than 48” below grade, or 30” below grade and under the water table, a valve extension stem will be required. The extension will have a centering collar and will be mechanically attached to the valve operating nut, such as extensions manufactured by the General Engineering Company, Model #4840-0001-3, or an approved equal to be determined by the Engineering Supervisor or his/her designee.

2.2.2.6 Valve Box Debris Shield

All buried valves 4” through 12” requiring a valve box shall be furnished with a valve box shield (alignment device). The device shall minimize debris infiltration and center the valve box over the operating nut. The device shall be of HDPE or plastic and colored white or black. It shall be furnished in two pieces that will lock together under the operating nut without requiring the removal of the operating nut. The device shall not affect the operation of the valve. No one-piece device will be accepted. The device shall be Box Lok, American or approved equal.

2.2.2.7 Insert Valve Specification

The Insert Valve shall conform to the following:

The Ductile Iron 250 psig Insert Valve shall be a Resilient Wedge Gate Valve designed for use in potable water, raw water, reclaimed water, wastewater and backflow control systems. The host pipe shall not be a permanent component of the Insert Valve. The ductile iron body, bonnet, and wedge provide strength and a pressure rating that meets or exceeds the requirements of AWWA C515. Insert Valve shall be ductile iron construction meeting ASTM A536 Grade 65-45-12. Sizes 12” and smaller must be capable of working on Cast/Grey Iron or Ductile Iron Class A, B, C and D, IPS PVC, C900 and C909 PVC, Steel, AC pipe diameters without changing either top or bottom portion of split valve body. The Insert Valve shall have a 250 psig maximum working pressure. The pressure rating markings must be cast into the body of the insert valve. The construction of the Resilient Wedge shall comply with AWWA C509 requirements. The ductile iron wedge shall be fully encapsulated with EPDM rubber by a high pressure and high temperature compression or injection mold process. The resilient wedge shall seat on the valve body and not the pipe to obtain the optimum seating and flow control results. The resilient wedge shall be totally independent of the carrier pipe. The resilient wedge shall not come into contact with the carrier pipe or depend on the carrier pipe to create a seal. The resilient wedge must ride inside the body channels to maintain wedge alignment throughout its travel. The insert valve is fully epoxy coated on the interior and the exterior. Valve shall be coated with a minimum of 10 mils epoxy in compliance with AWWA C550 and certified to ANSI/NSF-61. The stuffing box, operating stem
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and resilient wedge (complete bonnet and all moving parts) shall be removable, repairable and or replaceable under pressure.

See “Appendix A” Approved Materials for approved Insert Gate Valves.

2.2.3 BACKFLOW PREVENTERS

2.2.3.1 General

All connections to the City of Cocoa potable water system shall contain a backflow preventer assembly as required in the “City of Cocoa Cross Connection Control Program Manual”. Backflow preventer assemblies shall be in accordance with AWWA specification C510, ASSE 1048, UL 1469, and as listed in “Appendix A” of this document. All backflow preventers shall be installed per Standard Details in “Appendix B”. Backflow preventers on fire line and commercial services shall have test certifications submitted and approved prior to final inspection.

**Commercial Services:** Cross connection control device required for commercial service, including multi-family residences, shall be a reduced pressure (RP) backflow preventer unless otherwise approved by the Engineering Division. Backflow preventers will have interior fusion bonded epoxy coating 5 to 12 mils and will be installed above grade in accordance with manufacturer’s recommendations on a concrete slab adjacent to the meter. Check valves must have bronze seats.

**Residential Services:** Cross connection control device required for residential service shall be a dual check backflow preventer.

**Construction Sites:** Cross connection control device required for temporary construction jumpers shall be a double check backflow preventer. The Contractor shall provide test certifications on the jumper backflow preventer before the jumper is placed into service.

2.2.3.2 Fire Services

Cross connection control devices for fire line systems shall be double check detector assemblies (DCDA) or reduced pressure detector assemblies (RPDA). DCDA and RPDA shall meet the requirements of the Florida Building Code and must be supplied with a ¾” or larger bypass assembly. DCDA will be accepted as a complete approved assembly in accordance with the section on "Backflow Prevention and Cross-Connection Control" in the Utilities Handbook. The Engineering Division will inspect the interior of the DCDA prior to installation. DCDA must be installed horizontally above ground in a grassed or non-traffic area. The DCDA will be installed with 24” minimum and 30” maximum clearance from finished grade. “N” shaped DCDA will be
accepted on a case-by-case basis. Fire lines requiring a Reduced Pressure Zone (RPZ) will be handled on a case-by-case base. The Engineering Division shall paint the DCDA, to be paid for by the Developer/Contractor.

### 2.2.3.3 Meter Station Backflow Preventer

Backflow Preventers for the large meter stations (3” and larger) are an RPZ assembly and manufactured in accordance with AWWA C511. The assembly will be installed so as the relief valve opening will be a minimum of 12” above concrete slab. If the meter station is in a planter, the top of the planter is considered the flood rim and the relief valve opening shall be 12” above the concrete slab. The Engineering Division shall paint the meter station assembly, to be paid for by the Developer/Contractor.

2” meter stations may be allowed on a case-by-case basis as approved by the Engineering Division.

### 2.2.3.4 Backflow Preventer Certification Test

The Contractor will provide test certifications on the jumper backflow preventer before jumper is placed into service. Backflow preventers on fire-line and meter stations will have test certifications submitted and approved prior to final inspection.

### 2.2.4 FITTINGS

All fittings must be of the mechanical joint type with an approved joint restraint, or push-on joint with a gasket joint field restraint system. All fittings must be manufactured in the U.S.A.

#### 2.2.4.1 Cast Iron

Cast iron fittings will be AWWA specification C110; Class 250, cement lined with inside seal coating. The fittings will be bituminous coated on the outside and be wrapped with 6 mil polyethylene (sealed with tape). Cast iron fittings are only to be used in larger applications where ductile iron fittings are not available.

#### 2.2.4.2 Ductile Iron, 4" – 16"

Ductile iron compact fittings (sizes 4" through 16") must conform to AWWA specification C153. Ductile iron compact fittings will be mechanical joint with an interior cement lining with seal
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coating and an exterior bituminous coating. All fittings will be wrapped with 6 mil polyethylene (sealed with tape).

2.2.4.3 Bolts

All buried mechanical joint bolts and nuts must be CORTEN Steel. All above ground bolts and nuts for flanged fittings must be 18-8 Type 304 stainless steel. Never-seize/Anti-seize shall be applied to all SS bolts and nuts.

2.2.4.4 Tapping Sleeve

Tapping sleeves on mains 4” to 12” in diameter will be All Stainless Steel Sleeves.

The All Stainless Steel Sleeve shall be fabricated from 304 stainless steel. They shall have a pass-through bolt design and full circumferential gasket to provide 360° seal around the pipe. The tapping sleeve is to be fully passivated to return the stainless steel to its highest corrosion resistance stage.

Sleeves on mains 16” to 24” in diameter will be fabricated steel with O-ring seal, fusion bonded, epoxy coated with 304 stainless steel nuts and bolts or M.J. ductile iron body. Sleeves on mains larger than 24” will be handled on a case-by-case basis.

Tapping Sleeves for reinforced concrete mains will be handled on a case-by-case basis. The sleeves will have a fusion-bonded epoxy coating on the entire body and throat assembly. The straps and bolts shall be 18-8 Type 304 stainless steel.

The tapping valve must have centering ring and conform to Section 2.2.2.1 Resilient Seat Gate Valves, 4” – 36” in these Technical Provisions.

Tapping saddles to be placed on asbestos concrete (AC) pipe shall be a JCM 432 All Stainless Steel Sleeve or equal.

2.2.4.5 Line Stop Sleeve Specifications

Sizes 4” through 12”

Sleeve/Body

The entire Line Stop sleeve shall be fabricated from 304 stainless steel. They shall have a pass-through bolt design and provide 360° seal around the pipe. The line stop sleeve is to be fully
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passivated to return the stainless steel to its highest corrosion resistance stage. Outlet on sleeve will be full port, i.e. on 8” sleeve, outlet will be 8”, on 6” sleeve, outlet will be 6”.

**Bolts, Nuts & Washers**

18-8 Type 304 stainless steel, the bolts shall be track head type and furnished with permanently lubricated heavy-hex nuts and stainless washers.

**Gasket**

The full circumferential gasket shall be molded of synthetic rubber compounded for use with water salt solutions, mild acids, bases and sewage. The gasket shall have a gridded surface, be a full 1/4” thick with 304 stainless steel bridge plates molded flush into the gasket and have a raised hydromechanical outlet seal to seal against line surges and water hammer.

**Pressure Rating**

The sleeves shall be rated at 150 psi hydrostatic with a test pressure of 200 psi on pipe with a full circumferential break.

Line Stop Sleeves shall be a JCM 440 Line Stop Sleeve or approved equal.

### 2.2.5 FIRE HYDRANTS

Fire hydrants must be manufactured in accordance with AWWA specification C502. Hydrants must have bronze-to-bronze main seat threading surfaces. They will be traffic type with drain holes plugged at the factory. Fire hydrants will have 18-8 Type 304 stainless steel bolts and nuts (bonnet, traffic flange and shoe).

Hydrants will have a minimum 5-1/4" main valve opening, with one 4-1/2" pumper nozzle, and two 2-1/2" hose nozzles. Nozzles to have NST threads. Stem couplings are to be cast iron or stainless steel. The upper valve plate must be bronze. The hydrant shoe will be coated inside with fusion-bonded epoxy, 6 mil minimum. All hydrants will be painted at the factory with Rustoleum high-performance epoxy 9100 system, non-lead, dry film thickness 5 to 8 mils, color #9143 Yellow. City crews will apply finish paint to each new fire hydrant after the Contractor has paid the appropriate fees.

Finish grade is to be established and the proper length hydrant is to be installed by the Contractor prior to acceptance by the City. All nozzles will be a minimum of 18" and a maximum of 24" above finished grade. A 6" mechanical joint hydrant connection will be provided using a hydrant
valve-anchoring tee with integrally cast standard mechanical joint gland on 6" plain end branch. The Contractor will not be allowed to install risers on hydrants. At final inspection, if it is determined that a fire hydrant is not at grade, the Contractor shall purchase a proper length hydrant and install it under the direction of the Engineering Division.

2.2.6 SERVICE CONNECTIONS, 3/4"-2"

All service connections will be single connections. Services that are 3/4" and 1" are to be type K annealed temper soft copper. All connections are to be of the flare type. 1-1/2" and 2" services are to be of type K drawn temper in straight lengths or annealed temper if furnished in coils. Absolutely no lead-based solder joints will be accepted. Any repairs of service lines will be by flare-to-flare coupling. No compression fittings will be accepted. Taps in the pipe will be the same nominal diameter as the service line. Service taps in PVC pipe will be drilled with a shellcutter designed to cut PVC pipe, and the PVC plug will be removed.

Brass goods furnished under this specification shall be new and unused. All fittings shall conform to ANSI/AWWA Standard C800, latest revision.

All brass components in contact with potable water must be made from either CDA/UNS Brass Alloys C89520 or C89833 with a maximum lead content of .25% by weight. Brass alloys not listed in ANSI/AWWA C800 Paragraph 4.1.2 are not approved. All service fittings shall be certified as suitable for contact with drinking water by an ANSI accredited organization in accordance with ANSI/NSF Standard 61. All fittings shall be stamped or embossed with a mark or name indicating that the product is manufactured from the low-lead alloy as specified above.

Brass saddles shall be made from CDA/UNS C83600 and are exempt from the “no lead” requirement.

2.2.6.1 Saddles

Saddles must be used for all connections to PVC, AC and D.I. pipe. Saddles must be all brass with “CC” threads as manufactured by Mueller Company, or Ford Meter Box Company. The pipe sizes for these manufacturers are noted below (approved materials are also listed in “Appendix A”):

**MUeller**: For ductile iron pipe sizes 4" to 12", for 3/4" and 1" services, the single strap design must be used. For 1-1/2" and 2" services, the BR 2 B double strap design must be used.

**FORD**: For pipe sizes 4" to 12", for 3/4" and 1" services, the style 101B single strap design must be used. For 1-1/2" and 2" services, the style 202B double strap design must be used. For pipe
sizes 16" and larger, for 3/4", 1", 1-1/2," and 2" services, the style 202B double strap design must be used.

An approved equal may be used in lieu of any of the above-listed designs/models.

2.2.6.2 Curb Stops, 3/4" - 2"

Curb stops 3/4" and 1" in size will be flare-by-meter coupling. **Curb stops must have locking wings and a swivel meter nut.** Curb stops that are 1-1/2" or 2" will be flare-by-meter flange with locking wing or an approved equal. All curb stops shall be centered in the meter box and installed in a horizontal position.

2.2.6.3 Corporation Stops, 3/4" - 2"

All corporation stops for water service ¾" thru 2" will be brass and have “CC” inlet threads and copper flare outlet. 2” Corporation stops for “jumpers” will be “CC”-by- F.I.P.

2.2.6.4 Meter Boxes

Meter boxes for radio-read meters must have a lid compatible with City’s AMR meter antennae (4-1/2” round). Service locations will be permanently cut and painted on concrete curb or the street with a blue "W" for potable water or a purple "R" for reclaimed. Reclaimed services will be located at the opposite lot corner from water services where practical or with 5’ minimum separation.

For larger 1-1/2” and 2” meters, 17” x 30” meter boxes shall be used.

Meter boxes shall have the appropriate ANSI/SCTE 77 load rating for their intended location: Meter boxes located within paved areas subject to deliberate heavy vehicular traffic such as roadways, driveways, and parking lots shall be AASHTO H-20 load rated; otherwise, meter boxes shall be Tier 15 load rated.

Reclaimed Water services will be set in purple meter boxes of materials per above. They are also required to have a 3” x 5” permanent plastic tag, secured to the curb stop with a nylon tie wrap, which will be supplied. Tags will be inscribed, "RECLAIMED WATER DO NOT DRINK".
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2.3 PROTECTION OF PROPERTY AND OBSTRUCTIONS

2.3.1 PROTECTION

Temporary supports and/or adequate protection and maintenance must be provided on all underground and surface structures encountered in the progress of the work. Structures that have been disturbed will be restored to a condition equal to their original state upon completion of the work.

2.3.2 OBSTRUCTIONS

All utility owners must be notified prior to beginning construction. Any known obstructions will be shown on the plans; however, Contractor is solely responsible for field verifying existing conditions. The utmost caution will be taken in all operations to avoid damage to existing obstructions whether or not shown on the plans. Damage to other utilities will be at the Contractor’s expense.

If the Contractor encounters any unforeseen obstructions during construction, the Contractor shall immediately cease work in that area and notify the EOR. The EOR shall design and provide detailed drawings to correct the situation. The drawings shall be submitted to the Engineering Division for approval. After approval by the Engineering Division, a set of approved drawings will be given to the contractor and they may resume work.

2.3.3 EXISTING ASBESTOS CEMENT WATERMAINS

In areas where asbestos cement water mains are existing, water main relocations or replacements may be necessary. If new construction of facilities is over, under, or near asbestos cement water mains, it shall require that the asbestos cement water main be changed out to polyvinyl chloride pipe or ductile iron pipe. All asbestos cement pipe that is replaced shall be removed and disposed of by the contractor unless specifically directed in writing by the City to abandon in place. New pipe material shall depend upon the type and location of the facilities being constructed. The Developer’s Engineer shall design the replacement and submit it to the Engineering Division for approval. The Developer is responsible for all design, materials, labor, equipment, testing, and costs for the replacement.

2.3.4 ABANDONMENT OF ASBESTOS CEMENT PIPE

Contractor shall remove and dispose of AC pipe in accordance with FAC Codes 62-204.800 and 62-257. Where asbestos cement water mains have been directed by the City to be abandoned
in place they shall be filled with a sand/cement grout by the contractor. Grout shall be injected within the pipe sections to be abandoned where the ends of the sections shall be capped and or plugged. The grouting program shall consist of pumping sand-cement grout with suitable chemical additives at pressures necessary to fill the pipe sections to prevent the potential for future collapse. The rate of pumping shall not exceed six (6) cubic feet per minute. The pumping pressures shall be in the range of 100 to 150 psi.

The Contractor shall provide standpipes and/or additional means of visual inspections as required by the City to determine if adequate grout material has filled the entire pipe section(s).

2.4 TRENCH PREPARATION

2.4.1 EXCAVATION

A trench will be opened so that the pipe can be installed to the alignment and depth required. It will be excavated only so far in advance of pipe placement as necessary. The trench will be excavated to the depth required to provide a uniform and continuous bearing support for the pipe or undisturbed ground. Bell holes will be provided at each joint to permit jointing to be made and inspected properly.

During excavation, if ashes, cinders, muck or other organic material considered unsuitable is discovered at the bottom of the trench at sub-grade, unsuitable material will be removed and backfilled with approved material. This material will be compacted in layers to provide a uniform and continuous bearing characteristic of that area's soil condition. Where the bottom of the trench at sub-grade consists of unstable material to such a degree that it cannot be removed and replaced with an approved material to support the pipe properly, a suitable foundation must be constructed. Excavated material will be piled in such a manner that it will not endanger work or obstruct natural watercourses, sidewalks or driveways. Fire hydrants under pressure, valve boxes, or other utility controls will be left unobstructed and accessible at all times. Gutters will be kept clear or other satisfactory provisions will be made for street drainage.

2.4.2 SHORING AND BRACING

Open cut trenches must be sloped, shored or braced as required by all governing State law, municipal ordinances, OSHA Standards, and as may be necessary to protect life, property, or the work. Trench bracing may be removed after backfilling has been completed or has been brought up to such an elevation as to permit its safe removal. The use of a trenching box may be used in
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place of sheeting and bracing where appropriate. The Contractor is required to have a Competent Person designated and in charge at all times while workers are in the trench.

2.4.3 DE-WATERING

Excess water must not be allowed in the trench at any time. An adequate supply of well points, headers or pumps, all in first-class operating condition, may be used to remove the water. The use of gravel and pumps will also be an acceptable means of removing the water. The trench will be excavated no more than the available pumping facilities are capable of de-watering. Discharge from pumps will be accommodated in accordance with the St. Johns River Water Management District’s requirements. The Contractor is responsible for obtaining all de-watering permits such as NPDES permit.

2.5 PIPELINE CONSTRUCTION

2.5.1 GENERAL

All water mains, service lines, and appurtenances must be installed as specified on the approved plans and in accordance with the Standard Detail Sheet. Installation will conform to AWWA specification C600 except as modified herein.

Domestic water service can only come from a Distribution main. When water service is requested and the only water main available is a Transmission main, a large tap and section of pipe shall be installed on the Transmission Main for the water service.

The minimum size tap on a Transmission Main shall be 6".

2.5.2 MATERIAL HANDLING

2.5.2.1 Precautions

Every precaution will be taken to prevent damage to pipe and piping materials during transportation and delivery to the work site. Under no condition will pipe be dropped, bumped, dragged or picked up by inserting forks into end of pipe. Pipe lifted by placing forks into pipe shall be removed from job site.
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2.5.2.2 Damaged Materials

If in the process of transportation, unloading or handling, any pipe or fitting is damaged, it will be rejected and removed from the site.

2.5.2.3 Storage

Pipe fittings and specials will be stored in a manner which will assure the protection of the material from damage and which will keep it clean.

2.5.3 INSPECTION OF MATERIALS

Materials delivered to the job site will be subject to inspection by the Engineering Division prior to installation. Contractor shall notify Inspections 24 hours in advance. All materials found to be defective or not meeting specifications during inspection or during the progress of the work will be rejected and removed from the job site without delay. All materials delivered to the job site will be in accordance with the materials specifications. Materials not inspected by the Engineering Division prior to installation will be uncovered by the Contractor at their expense to verify compliance with these specifications. The Contractor will furnish copies of the packing list(s) for materials upon demand.

2.5.4 PIPE PLACEMENT

The bottom of the trench will not be excavated below the specified grade. If undercutting occurs, the bottom of the trench will be brought up to the original grade with approved material and thoroughly compacted, as directed by the Engineering Division. Before placing pipe into the trench, the outside of the spigot and the inside of the bell will be wiped clean, dry, and free from oil and grease. Every precaution will be taken to prevent foreign material from entering the pipe. During placement operation, no debris, tools, clothing or other material will be placed in the pipe.

All mechanical joints will be made up in strict accordance with the manufacturer's specifications. Beveled ends will be removed from PVC pipe entering a mechanical joint. The bell will be carefully cleaned before the gasket is inserted. Gaskets must be evenly seated, the gland placed in position with the bolts, and evenly tightened. All slip joints will be made up in strict accordance with the manufacturer's specifications.

After placing a length of pipe in the trench, the spigot end will be centered in the bell, the pipe forced home, brought to correct alignment, and covered with an approved backfill material. Ductile iron pipe will be backfilled to the centerline of the pipe and compacted to ninety-five percent (95%) of standard Proctor T-99.
PVC pipe will be backfilled in accordance with the manufacturer’s recommendations for the laying conditions.

Pipe will be installed with 30” minimum cover. Maximum cover of 42” will be accepted. Cover depth will be determined from proposed finish grade as indicated on the plans. At times when pipe placement is not in progress, the open ends of pipe must be closed by a watertight plug or other approved means. This provision will apply during the lunch hour as well as overnight. If water is in the trench, the seal will remain in place until the trench is pumped completely dry.

All underground water main shall meet the horizontal and vertical separation requirements in FAC 62-555.314 as related to sanitary force main and gravity main, reclaim mains, and storm water gravity and force mains.

Pipe installed under swales shall be D.I. and have 3’ minimum cover. D.I. pipe to be centered on swale. If more than one joint of pipe is necessary, restrained joint pipe is required. See “Swale Crossing” detail and definitions.

Pipe installed under canal or drainage ditch shall conform to all FDEP requirements. Pipe shall be restrained joint D.I. pipe with gate valves on both sides of canal/ditch. D.I. pipe shall have 5’ minimum cover with a concrete cap. See “Canal or Drainage Ditch Crossing” detail and definitions.

2.5.5 TRACER WIRE

For the purpose of electronically locating pipe after it is buried, tracer wire will be installed with all potable, reclaimed, and wastewater mains in accordance with the Standard Detail Sheet.

The color of the wire insulation shall be the same color as the color code for the pipe being installed. Insulation color shall be blue for potable, purple for reclaimed, and green for wastewater.

Tracer wire for pipe installed by direct burial will meet the following requirements: #12 AWG (0.0808” diameter) fully annealed copper wire, rated at 30 volts, insulated with a 30 mil, high-density, high molecular weight polyethylene (HDPE) insulation, rated for direct burial use.

Tracer wire for pipe installed by directional drilling or jack and bore will meet the following requirements: #10 AWG (0.1019” diameter) fully annealed, high carbon 1055 grade steel, high strength solid copper-clad steel conductor (HS-CCS) rated at 30 volts, insulated with a 45 mil, high-density, high molecular weight polyethylene (HDPE) insulation rated for horizontal directional drill use, average with minimum break load of 1,940lbs.
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Branch connections and tracer wire splices shall be connected together using a direct-bury wire connector filled with a dielectric silicone sealant.

Tracer wire shall be properly grounded at all dead ends and shall be achieved by use of a 1.5lb drive-in magnesium grounding anode rod specifically manufactured for this purpose.

The tracer wire shall be installed in such a manner as to be able to properly trace all pipelines without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire. The tracer wire shall be installed as a continuous single wire. Except for approved spliced-in repair or replacement connections, tracer wire shall be continuous and without splices from each tracer wire access point.

Tracer wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation. It shall be secured and taped to the top of the pipe in 10’ intervals. Protect wire insulation from damage during installation and backfilling. Wire insulation that is broken, cut, or damaged shall be replaced. If the pipeline requiring tracer wire is over 8’ deep, special circumstances exist and the installation method must be submitted to the Engineering Division for approval.

Provide no less than 18” of coiled wire at access points and valve boxes. A run of tracer wire must run from the main to each fire hydrant and each fire hydrant must have one wrap of the wire around the barrel located at final grade.

Where existing tracer wire is encountered on an existing utility that is being extended or tied into, the new and existing tracer wire splice shall be connected using a direct-bury wire connector. At all main end caps, a minimum of 6’ of tracer wire shall be extended beyond the end of the pipe, coiled, and secured to the cap for future connections and shall be properly grounded.

After all of the trench backfill operations are successfully completed, and prior to final paving, the Contractor shall perform continuity and trace tests on all newly installed tracer wire in the presence of an Inspector. If the tracer wire is found to not be continuous after testing, the Contractor shall repair or replace the failed segment of the wire and retest for continuity. Tracer wire exposed during testing shall have the insulation restored with 30 mil rubber splicing tape. The Contractor shall be responsible for all costs to confirm, locate, and repair any breaks in the tracer wire identified in the continuity test.
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2.5.6 SERVICE LINE LOCATION

Service lines will be located at alternating lot lines and within the right of way or easement. Curb stop shall be installed within two feet of the right-of-way line.

Reclaimed service line is to be located adjacent to sewer cleanouts.

2.5.7 BACKFILLED MATERIAL AND INSPECTION

All backfilling material will be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks, stones, or other material which is considered unsuitable. When backfill material is not specified on the plans, backfilling with the excavated material may be acceptable provided that such material is suitable for backfilling. Pipe should be backfilled as soon as possible to minimize the length of open trench. Pipe joints, valves, fittings, and thrust blocks will be left uncovered until inspection by the Engineering Division has been completed.

2.5.8 VALVES AND FITTINGS

All valves and fittings will be set and joined to the pipe in the proper location as shown on the plans. Valves should be installed outside of the pavement where practical. A roadway valve box will be provided for every valve. This valve box must not transmit shock or stress to the valve. Valve will have alignment ring installed and valve box centered and plumb over the wrench nut of the valve. The box cover is to be flush with the surface of the finished pavement or grade level as specified in the plans. A 24"-square concrete pad 4" in thickness will be poured around the valve box when it is located outside of pavement. A bronze or stainless steel disc will be cast into the pad for all valves 12" or larger. Valve nomenclature to be stamped into the disc will include the valve size, type, manufacturer's initials, number of turns, and direction to open the valve. (Example: 12" G.V. U.S.P. 20 c.c.w.)

All valves will be located within 2’ of the tee, see detail “Gate Valve and Fitting.”

When solid sleeves or couplings are used to join/tie-in pipelines, a Spacer Piece shall be installed if there is a gap in the pipeline.

2.5.9 FIRE HYDRANTS

All fire hydrants (hydrants) will be located as shown on the plans and marked on the pavement with a blue reflector. On unpaved streets, a blue reflector will be affixed to a post and placed as close to the edge of the road as feasible to be easily visible. The hydrants will be located in such
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a manner as to provide complete accessibility and in a manner so that the possibility of damage from vehicles or injury to pedestrians will be minimized. All hydrants must stand plumb and the bury line of the hydrant at the finished grade. Hydrants installed in State highway rights-of-way will be placed in accordance with any F.D.O.T. requirements. Contractors shall not turn or add risers to hydrants. All hydrants will be connected to the main in the manner shown on the Standard Detail Sheet. If the installation of the hydrant requires the hydrant to be greater than 40 ft. away from the fire hydrant valve, an additional valve shall be installed. If the fire hydrant valve ends up in asphalt of a major road (not subdivision) an additional hydrant valve regardless of distance shall be installed.

2.5.10 RESTRAINED PIPE JOINTS

The EOR shall provide a restrained joint detail on drawings submitted to the City for approval. Restraining is to apply to all new fittings installed as part of the job, including tapping saddles.

2.5.11 THRUST BLOCKS AND COLLARS

Restained joint systems are the preferred method. Thrust blocks may only be used with the City’s prior approval at bends, fire hydrants, and as specified on the plans, in accordance with the Standard Detail Sheet. Metal harnesses, tie rods, or clamps of adequate strength to prevent movement may be installed at locations where thrust blocks are not practical. Rods and clamps will be stainless steel. A 20’ length of ductile iron pipe will be installed at all main endings and a concrete thrust collar will be poured around the pipe at a distance of 10’ from the end of the joint. In lieu of concrete thrust collar, restrained pipe upstream of the proposed concrete thrust collar may be used.

2.5.12 JACK AND BORE, PIPE INSTALLED IN CASINGS

Pipe to be installed under pavement where open trenching is not permitted will be installed through a steel casing that has been jacked and bored. The casing pipe will be 6” to 8” larger than the outside diameter of the bells on the Ductile Iron pipe. The EOR will design the casing and bore to meet FDOT or FECRR requirements.

Ductile Iron pipe of the appropriate Class will be installed in the casing. Water mains must be pushed or pulled through the casing on stainless steel casing spacers with polyethylene skids attached to the pipe with stainless steel straps. The stainless steel casing spacers with polyethylene skids will be placed in accordance with manufacturer’s recommendations. Casing spacers must be manufactured by Cascade or an approved equal. Restrained joints are required on mains installed inside casings.
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JACK AND BORE

J&B installed under FDOT roadways shall conform to the latest FDOT Road and Bridge Construction design standards. J&B installed under FECRR shall conform to FECRR requirements.

2.5.13 HORIZONTAL DIRECTIONAL DRILLING

Only DIP and Fusible PVC may be horizontal directional drilled (HDD) under pavement or surface waterway crossings. The HDD pipe shall only extend to 10’ on each side of the crossing. Then the piping will change to the standard piping material.

HDD installed under FDOT roadways shall conform to the latest FDOT Road and Bridge Construction design standards.

ENGINEERING PROCEDURE HORIZONTAL DIRECTIONAL DRILLS

PRECONSTRUCTION CONFERENCE

1. A preconstruction conference will be required. The preferred attendees for the preconstruction shall be but not limited to:
   - The directional bore contractor (preferably the Field Superintendent)
   - The permitting agency
   - EOR
   - City Engineering Division Representative
   - Inspector for the project

ENGINEER OF RECORD

1. The EOR must include a scaled drawing showing the details of the directional drill on the construction drawings (i.e., profile, depth, location of existing utilities, maximum deflection angle).
2. If during construction it is determined a directional drill is required (and was not previously approved), the EOR is required to update the construction drawings and receive approval.

HDD CONTRACTOR

1. Approval required prior to the HDD, the HDD contractor shall submit a bore plan (see sample drawing in “Appendix B”) to Utilities Development allowing for a 5-business day
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review period. The bore plan shall be a scaled drawing or computer generated drawing showing the following information but not limited to: (see drawing “Typical Bore Plan”)

- The entrance and exit location
- Profile of the bored pipe
- Proposed deflection angle for approach and exit
- Documentation on the allowable maximum and minimum deflection for the particular pipe being used
- All utilities including their depths and clearances from reamer
- Width of the right of way
- Pavement width
- Length of the bore
- The bore plan shall be signed by the responsible person in charge of the bore

2. The HDD contractor shall follow the minimum clearances as shown below from the bottom of the water main to the top of the reamer:

- Water mains 12” and greater minimum clearance is 18”
- Water mains 10” and less minimum clearance is 12”

3. The HDD contractor will be responsible for obtaining locates for all utilities in accordance with Chapter 556 of the Florida Statutes.

4. The HDD contractor shall notify the City of Cocoa Inspection Division 48 hours in advance of the bore and notify the appropriate permitting agency per the conditions of the permit.

ENGINEERING INSPECTOR

1. An approved copy of the bore plan will be given to Engineering Inspection Division.

2. The Inspector for the project will have a copy of the bore plan at the project site.

3. Prior to the HDD the Inspector shall verify that the materials at the project site for the directional bore are in accordance with the City of Cocoa’s latest technical provisions and standard details.

4. The Inspector shall verify the following prior to the commencement of the HDD:
   a. Verify that the HDD contractor has obtained his/her utility locates;
   b. Verify that all utilities have been visually spotted by the HDD contractor;
   c. Verify that the permitting agency has been notified of the HDD; and
   d. Witness the calibration of the sonde.

5. The Inspector shall remain at the project site until completion of the HDD. Any discrepancies shall be immediately reported to the Engineering Division. Once the corrective action is determined, the proper authority will be notified.
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COMPLETION OF THE BORE

1. A bore log shall be submitted to Utilities Development after completion of the bore.

2.5.14 BLOWOFFS

Flushing blow-offs are to be installed and constructed as shown on the Standard Detail Sheet. Blow-off materials include 2" brass for nipples, brass threaded fittings, 2" brass angle wheel valve, and plastic meter box (purple for reclaimed). The plastic meter box is to be installed at grade over the wheel valve. The angle wheel valve will be within 6" of finished grade and will be plugged with a brass plug. 4" blow-offs will be required on both potable water and reclaimed water mains 12" and larger and must be constructed as shown on the Standard Detail Sheet. A reclaimed tag will be installed on reclaimed main blow-offs in a reclaimed meter box.

Brass used in potable water shall meet the low lead requirements as set forth in Section 2.2.6 Service Connections, 3/4"-2".

2.6 TIE-INS TO EXISTING SYSTEMS

2.6.1 GENERAL

The Contractor is not to operate any valve or remove any thrust block from City-owned mains except under direct supervision of an Inspector of the Engineering Division. The Contractor may need a post restraining the existing piping for the tie-in as required by the Engineering Division. All Contractors must follow the procedures listed below for connecting new mains to existing water systems.

2.6.1.1 Mains 8" and smaller

Existing tie-in valves will be operated and pressure tested to verify water tightness prior to the proposed tie-in. Existing system valves that are not watertight, shall have a new valve installed immediately adjacent (within 2') to the existing valve. The Contractor will provide a 2" tap on the new main and a 2" tap on the existing main at the tie-in valve. A 2" jumper equipped with a City supplied meter and contractor supplied backflow preventer (double check) will be installed. The jumper will be utilized for filling the main, flushing the main, providing water for bacteriological sampling, and maintaining pressure in the main after a successful bacteriological test. The proposed tie-in valve is not to be operated and the jumper is not to be removed until
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clearance has been obtained from FDEP and the City. The EOR will be required to provide an executed FDEP certificate of completion prior to clearance. After clearance, the tie-in valve will be opened, the jumper removed, and the main thoroughly flushed under the supervision of the Inspector. All other existing valves closed as part of the job will be opened by the contractor under the supervision of Engineering Division.

2.6.1.2 Mains 10" and Larger

The same procedure as noted for mains 8" and smaller will be used for mains 10" and larger except that the jumper will be utilized only for filling the main, providing water for bacteriological sampling, and maintaining pressure in the main after a successful bacteriological test. The tie-in valve can be opened for flushing and during chlorination only under the supervision of the Engineering Inspection Division. The tie-in valve is not to be operated and the jumper is not to be removed until clearance has been obtained from FDEP and the City. After clearance, the tie-in valve will be opened, the jumper removed, and the main thoroughly flushed under the supervision of the Inspector. All other existing valves closed as part of the job will be opened by the contractor under the supervision of the Inspector.

2.7 TESTING

2.7.1 GENERAL

All newly installed pipe and services that have been backfilled must be tested in accordance with AWWA specification C651.

2.7.2 JUMPER METER ASSEMBLY

All filling, and flushing, must be accomplished through a jumper meter assembly. The jumper meter assembly shall consist of a meter (provided by the City, paid for by the Developer/Contractor), and a double check backflow preventer and galvanized piping (provided by the Contractor). The jumper meter assembly shall be installed by the Contractor under the direct supervision of the Engineering Division. After installation, the Contractor shall have the backflow preventer certified by a backflow technician, and a copy of the test report shall be provided to the Engineering Division.

1. A temporary jumper connection is required at ALL connections between existing active water mains and proposed new water main improvements, per the City of Cocoa Utilities Handbook. The only exception is the installation of a new fire hydrant involving a tap and
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using an anchoring/swivel nipple. In this case, all fittings and fire hydrant SHALL be swabbed with a 100 ppm chlorine solution prior to installation.

2. The details for filling any water main from existing active water mains and for flushing of new mains up to 8” diameter (2.5 FPS minimum velocity) and for pulling bacteriological samples from any new water main of any size can be found in Section 2.7.3 Flushing and Swabbing. The jumper connection shall be maintained until after filling, flushing, testing, and disinfection of the new main has been successfully completed and clearance for use from the Florida Department of Environmental Protection (FDEP) and other pertinent agencies has been received. The jumper connection shall also be used to maintain pressure in the new mains all the time after disinfection and until the FDEP clearance letter is obtained. Adequate thrust blocking and/or restraints shall be provided temporarily, as required. Pipe and fittings used for connecting the new pipe to the existing pipe shall be disinfected prior to installation in accordance with AWWA C651. The tapping sleeve and the exterior of the main to be tapped shall be disinfected by spraying or swabbing per Section II of AWWA C561.

3. Flushing of 10” diameter and larger water mains may be done through the tie-in valve, under the direct supervision of the Engineering Division. The Engineering Division will be notified in writing 48 hours prior to the flushing of said mains.

The following procedures shall be followed:

A. The existing tie-in valves shall be operated and pressure tested in the presence of the Engineering Division or Engineer to verify water tightness prior to the proposed tie-in. Valves which are not watertight shall be replaced or a new valve installed immediately adjacent to the leaking valve.

B. The temporary jumper connection shall be constructed as detailed. The jumper connection shall be used to fill the new water main and for providing water for bacteriological sampling of the new main as required by the FDEP permit.

- Flushing shall not be attempted during peak demand hours of the existing water main.

- All downstream valves in the new system must be open prior to opening the tie-in valve.

- Provide for and monitor the pressure at the tie-in point, the pressure in the existing main must not drop below 35 psi.

- Tie-in valve shall be opened a few turns only, ensuring a pressure drop across the valve is always greater than 10 psi.

4. The contractor shall provide documentation demonstrating that the double check backflow prevention device has been tested and is in good working order at the time of installation. The test shall be performed by a qualified backflow prevention technician.
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5. Except as required to flush lines of greater than 8” in diameter, the tie-in valve shall remain closed. The tie-in valve shall remain closed until the new system has been cleared for use by FDEP and all other pertinent agencies.

6. Upon receipt of clearance for use from FDEP and all other pertinent agencies, the contractor shall remove the jumper connection. The corporation stops are to be closed and plugged with 2” brass plugs.

7. All installation and maintenance of the temporary jumper connection and associated backflow prevention device fittings, valve, etc., shall be the responsibility of the contractor.

2.7.3 FLUSHING AND SWABBING

The City will provide an adequate volume of water for the filling, flushing, and testing of mains. The Contractor will notify the Engineering Division prior to flushing or filling mains. The pressure in the City's system will be monitored during the flushing; at no time should the pressure in the City's system be allowed to drop below 35 psi. Water used during flushing will be billed to the Contractor.

The City of Cocoa Engineering Division requires all new mains regardless of size or material to be pigged/swabbed. In an effort to make sure all footages of a pipeline are pigged, the following procedures are to be used as a guide and in no way to be construed as means and methods.

The following terminology may be used in the discussion or operation of the pigging procedure.

Pigs shall be manufactured of a 2 pounds per cubic foot density open cell polyurethane foam body (swab) complete with rear polyurethane drive seal.

Pig launching station may be a “wye”, “tee”, or simply inserting the pig at the very beginning of the pipeline. The beginning of the pipeline is defined at the jumper assembly location.

Pig retrieval point or cannon is a “wye”, “tee” or open end of pipe at which point the pig will exit the pipeline.

The pipeline will be filled through the jumper assembly the day before of the pigging operation.

The pig will be advanced through the pipeline at a rate of 2 feet per second, 80 gpm for 4”; 180 gpm for 6”; 320 gpm for 8”. Flow rates and jumper assemblies for mains 10” and larger will be determined by the EOR and approved by the City of Cocoa Engineering Division.
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The pig retrieval point or cannon will project at least one foot above the surrounding grade. The water from the pig retrieval station discharge and its location to discharge shall be approved by the Engineering Division. The contractor will be responsible for following the National Pollutant Discharge Elimination System (NPDES) requirements to remove chlorine from discharge as well as protect retrieval area from erosion. Retrieval cannons will not be left in place. After pigging and flushing are complete, the cannon will be removed and capped below ground in accordance with EOR details or City of Cocoa Standard Details.

The contractor may insert the pig into the first section of pipe between the isolation valve and the downstream point of jumper assembly. By inserting the pig between the isolation valve and the downstream jumper assembly point it will allow the pipeline to be filled without moving the pig down the pipeline. If the pig is moved during filling operation another pig will be inserted into the pipeline. The isolation valve may be cracked open for a few seconds under the direction of the Engineering Division to move the pig past the jumper assembly downstream point so the jumper assembly can advance the pig through the pipeline.

When the pig exits the pipeline, the flushing will continue until the water is clear. A simple way to determine if water is running clear is to capture some water in a WHITE cup. If water is clear and no particles settle in the cup then flushing is complete; if not, flushing will continue until water is clear.

2.7.4 HYDROSTATIC TEST

A blow-off or fire hydrant will be installed at the end of the pipeline under test. The line being tested will be slowly filled with water to the specified test pressure. Before applying the specified test pressure, all air will be expelled from the test section including service connections. If fire hydrants or blow-offs are not available at high elevations, taps at points of highest elevation will be made to facilitate air removal and testing. When testing is complete, the service lines installed for air removal must be removed.

The line must hold the 150 psi test pressure for a two-hour test period and must be performed under the direct supervision of the Engineering Division. Sufficient human resources are to be employed to ensure inspection. If the line fails to meet the test, it will be repaired and re-tested until the test requirements are satisfied. Line pressure will be maintained to within 5 psi of the test pressure at all times.
2.7.5 LEAKAGE TEST

A leakage test at 150 psi will be performed on all newly installed sections of pipe in accordance with AWWA C600 or C605 after installation of all service connections. Any leakage observed must be less than the following per thousand feet of pipe:

<table>
<thead>
<tr>
<th>Size (in)</th>
<th>Allowable Leakage (gal/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.20</td>
</tr>
<tr>
<td>4</td>
<td>0.33</td>
</tr>
<tr>
<td>6</td>
<td>0.50</td>
</tr>
<tr>
<td>8</td>
<td>0.67</td>
</tr>
<tr>
<td>10</td>
<td>0.83</td>
</tr>
<tr>
<td>12</td>
<td>1.06</td>
</tr>
<tr>
<td>14</td>
<td>1.16</td>
</tr>
<tr>
<td>16</td>
<td>1.32</td>
</tr>
</tbody>
</table>

\[ L = \frac{SD\sqrt{P}}{148,000} \]

L = testing allowance (makeup water), in gallons per hour
S = length of pipe in feet
D = nominal diameter of pipe, in inches
P = average test pressure during the hydrostatic test, in pounds per square inch (gauge). P has the square root taken.

On small main extensions where the allowable leakage loss cannot be reasonable measured (.25 gallons or less), NO LOSS OF PRESSURE shall be allowed.

2.8 DISINFECTION AND BACTERIOLOGICAL TESTING

2.8.1 GENERAL

The Contractor must flush potable mains and arrange for complete disinfection by chlorination in coordination with the Engineering Division. Work will conform to applicable provisions of AWWA specification C651-14, "Disinfecting Water Mains". Water with a chlorine concentration
of 50 ppm will be evenly distributed throughout the pipe system and allowed to remain in the pipe for twenty-four hours. Transmission mains may be chlorinated using the “slug method”. If the slug method is used, a detailed written procedure shall be submitted for approval. The main shall be dechlorinated to zero ppm chlorine before any flushing is performed. The method for dechlorination shall be approved by the EOR. After flushing, the water shall remain in the pipe for 24 hours before sampling. Service connections and tie-ins made before testing must be disinfected in accordance with AWWA specification C651. Samples will be taken by an Engineering Division approved laboratory. Two consecutive day samples are required for potable water mains. Water mains shall not be flushed between samples. The Contractor will be responsible for ALL bacteriological testing fees. Sample points are determined by the EOR and approved by FDEP. If samples taken do not demonstrate satisfactory results, re-chlorination and retesting of all sample locations is required at the Contractors expense.

CONTRACTORS WORKING ON EXISTING MAINS

When existing water mains are taken out of service by contractors, and water service to existing customers is interrupted causing a precautionary boil water notice (PBWN), the water main will be taken out of service on Monday or Tuesday. If for some reason the water main cannot be taken out of service on Monday or Tuesday, then the contractor at their expense shall have the laboratory perform bacteriological testing after normal working hours. This procedure is to lessen the time water customers are under a PBWN.
BACTERIOLOGICAL TESTING PROCEDURES BY PRIVATE LABORATORIES

The following information shall be completed and certified by the Testing Lab and Sampling Company. If any of the information is not completed, is answered “no”, or is not certified, the bacteriological results will not be accepted by the City.

A copy of the City of Cocoa pressure test report must be provided to the Sampling Company prior to samples being collected.

If any of the samples do not pass the bacteriological test, then all the sample points shall be retested.

Testing Laboratory Certification

1. The private laboratory is certified by the State of Florida in microbiology membrane filtration and/or MMO-MUG. YES ______ NO ______ Attach a copy of the certification.

I certify that the bacteriological testing has been completed in accordance with the applicable provisions of FAC and the previous information.

Lab Official __________________________ Cert. # __________________________ Date ________________

Signature

Company ________________________________
Sampling Certification

2. The Sampling Company is a private laboratory or a company solely in the business of collection of bacteriological samples. Personnel collecting samples must follow the procedures outlined in AWWA C651 Section 7.3 Sampling Procedure and Standard Methods for the Examination of Water and Wastewater.  

YES ______  NO _____

3. The Sampling Company assumes the chain of custody for the bacteriological samples. The samples were taken by the private Sampling Company personnel from the locations indicated on the project’s FDEP permit. 

YES ______  NO _____

4. The chlorine residual was determined at the time of sampling and was no greater than 5.0 parts per million (PPM). Total and Free Chlorine Residuals are to be indicated for each sample taken.  

YES ______  NO _____

5. Two sets of samples collected on two consecutive days, at least 24 hours apart.  

YES ______  NO _____

I certify that the bacteriological sampling has been completed in accordance with the applicable provisions of FAC, AWWA specifications, and items 2, 3, 4, and 5 above.  

Sampling Official ______________________ Cert. # ______________ Date ____________

Signature

Company ____________________________________________

This form (not a copy) must accompany the original forms of the bacteriological results and the Testing Laboratory Certification. The bacteriological test reports and a copy of the pressure test report are to be sent to the City of Cocoa Engineering Division for approval. 

If any of these procedures and certifications is not followed, the bacteriological tests will not be accepted by the City of Cocoa and will delay the FDEP Permit clearance process.
2.9 WET TAP CONNECTIONS TO EXISTING SYSTEM

2.9.1 GENERAL

<table>
<thead>
<tr>
<th>Tap Being Performed</th>
<th>Parties Allowed to Perform the Tap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taps 2” and smaller</td>
<td>• Approved tapping and line stop contractor</td>
</tr>
<tr>
<td></td>
<td>• Contractor approved to tap mains solely for their own project</td>
</tr>
<tr>
<td></td>
<td>o Contractor must perform 5 successful taps under the supervision of the inspection team and demonstrate possession of proper tapping equipment</td>
</tr>
<tr>
<td>Taps 2”-16”</td>
<td>• Approved tapping and line stop contractor</td>
</tr>
<tr>
<td>Taps 16” and greater</td>
<td>• Approved tapping and line stop contractor</td>
</tr>
<tr>
<td></td>
<td>o Each tap requires independent review and approval</td>
</tr>
<tr>
<td></td>
<td>o The tap must be performed under direct supervision of the engineering division</td>
</tr>
<tr>
<td>Taps on concrete transmission mains</td>
<td>• Contractor approved for taps on City of Cocoa transmission mains</td>
</tr>
<tr>
<td></td>
<td>o Tapping plan must be submitted by the contractor prior to the tap</td>
</tr>
</tbody>
</table>

- On transmission mains, the approved tapping and line stop contractor will install the tapping saddle and valve. For all connections from 4”-12” the contractor may install tapping saddles under direct supervision of the Engineering Division.
- For all water main connections, the Contractor must obtain all required permits, provide a dry pit area, provide pit preparation including shoring and bracing, provide maintenance of traffic, provide all right-of-way restoration, and notify all utilities prior to construction. Connections must be completed under direct supervision of the Engineering Division.
- The list of approved contractors may be found on page 68.

Tapping saddles and valves supplied by the Contractor will be inspected by the Engineering Division prior to installation. The installed tapping saddle and valve must be tested with water at 100 psi for 15 minutes prior to tapping to ensure a watertight installation. Saddles installed on concrete pressure pipe will be tested 10% over line pressure. The pressure test will be performed by the Contractor and supervised by the Engineering Division. After the pressure test of the saddle has been completed, an Approved Tapping Contractor can tap the main.

2.9.2 TAPPING AND LINESTOP PROCEDURES

- ALL TAPS or LINESTOPS on City of Cocoa potable, reclaimed, and wastewater mains will be performed by an Approved Tapping Contractor.*
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- Absolutely NO taps or linestops will be performed on Friday or any day preceding a holiday.
- Approved Contractors must disinfect tapping machine with AWWA approved disinfectant. This will be witnessed by the Inspector.
- The Contractor’s tapping or linestop machines will be in good working order with appropriate bits and shell cutters for the type of pipe being worked on (i.e. shellcutter for PVC).**
- When taps or linestops are installed on Transmission Mains (> 12”), a preconstruction meeting will be held with the tapping contractor prior to ANY work being performed. The meeting may be held at the job site.
- Taps and linestops on the Utilities concrete pressure mains will be a two (2) day process and will require a pre-construction meeting. Grout submittal will need to be submitted for approval prior to work. Day one the saddle is installed and grouted, Day two tighten straps, cut pre-stressing wires, install throat and valve. Pressure test on saddle is 10% over line pressure for 30 minutes. After successfully completing pressure test, tap can be made.
- Toggle bolts will be required for PCCP taps to assure the entire coupon remains intact. The coupon must be provided to the City.
- ALL excavations must conform to current OSHA Trench Safety Act.
- The City of Cocoa reserves the right to remove any contractor from the approved list for any work considered substandard.

* Tap or linestop to include: Material, installation, labor, drilling, and testing

** Bit, boring bar, and adaptor
2.10 FINAL CLEAN-UP AND ACCEPTANCE

2.10.1 GENERAL

Upon completion of the work and before acceptance by the Engineering Division, the Contractor will meet all permit conditions, remove all debris, and complete sodding, sprigging, or seeding if required by the plans. The Contractor will leave all areas affected by operations in a neat and presentable condition.

Acceptance of completed work by the City will be contingent on the following work items completed to the satisfaction of the Engineering Division.

- Pressure Test
- Bacteriological Testing
- Restoration
- Payment of fees
- Approved As-Builts
- Easements
- Bill of Sale
- Fire line DCDA certification, as needed
- Final Inspection

2.11 FIRE SERVICE

2.11.1 GENERAL

All Fire Lines shall be installed by a licensed Fire Line Contractor in accordance with Florida Statute Chapter 633 and Rule Chapter: 69A-46. Where wet pipe sprinkler service is used, an RPDA or DCDA will be installed in accordance with the "Backflow Prevention and Cross-Connection Control" Section of the Utilities Handbook and as described in the “City of Cocoa Cross Connection Control Program Manual”.

Fire line backflow preventer assemblies shall be installed in non-traffic areas. Four to six bollards may be required.
2.12 CONNECTION OF BUILDINGS OVER FOUR FLOORS

2.12.1 GENERAL

Connection of domestic water supply systems serving buildings over four floors in height to the City's water distribution system will be subject to the following requirements:

- A fixture unit analysis will be performed by the Owner's engineer to determine peak domestic flow requirements. This analysis is to be provided to the Engineering Division.

- A water meter and a reduced pressure backflow preventer, sized in accordance with the domestic flow requirements, will be installed above ground at the developer's expense.

- Upon written request, the City will provide the site engineer with the minimum expected system pressure. The site engineer will be responsible for providing this information to the architect and building owner. Means for providing an adequate supply of domestic water and fire protection to all parts of the building during periods of minimum pressure will be the responsibility of the building Architect or EOR.

- Repair costs for damage to the water meter caused by flows exceeding its rated capacity will be charged to the customer.

2.13 BACKFLOW PREVENTERS

2.13.1 GENERAL

All connections to the City of Cocoa potable water system shall contain a backflow preventer assembly per the Standard Details in “Appendix B.” Backflow preventer requirements for each service type are described in the “City of Cocoa Cross Connection Control Program Manual” and are summarized in Paragraph 2.2.3, “Backflow Preventers” and “Appendix A” of this document.

2.14 RECORD DRAWINGS

2.14.1 GENERAL

Record drawings are required for all systems to be accepted by the Engineering Division. Record drawings will be prepared by a surveyor or an engineer registered in the State of Florida and will contain the following information:
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- Location of all valves, service lines, fittings, and fire hydrants using at least two ties to permanent points (manholes, curbs, or storm water inlets). An acceptable station and offset system may be used for service lines and fittings only.

- Location of mains from property easement lines or edge of pavement at intervals of 300’.

- Elevations to the top of the water line at intervals of 300’ and at all drainage and sewer main crossings. Benchmark to be shown on record drawings.

- Separation between reclaimed water or force mains and water mains, if they are installed within 10’ of water mains.

- Water main material and distance of mains from buildings or structures within 20’ of the water main.

- Distance from hydrant to hydrant valve.

- Pertinent easement information.

- A minimum of two benchmarks with northings and eastings in NAD83 or NAVD88 that are clearly labelled on each individual sheet. The benchmarks shall be placed away from the center of the drawing in opposite corners.

- Certification by the surveyor accepting responsibility for accuracy of information supplied on the record drawings and a statement certifying that all mains are within easements and/or public right-of-way.

- Certification by the EOR certifying that the potable water and reclaimed system has been constructed in substantial conformance with approved construction plans and specifications and that all mains are within easements and/or public right of way.

- The name "City of Cocoa" must appear on all record drawings survey information.

- The page number in the format “page x of y” needs to be on each page where x is the specific page number and y is the total number of pages.

Record drawings will be drawn at an engineering scale that is legible and readable as determined by City staff. Areas requiring additional detail may be enlarged as necessary. Right-of-way, easements, and lot lines will be accurately shown. After the surveyor or engineer has certified the locations, the engineer will certify on DEP Form 62-555.900(9) that the system depicted on the record drawing was constructed in substantial conformance with approved plans and will function as intended. Lot, block numbers, and street names will be included. Provide two (2) sets of signed and sealed record drawings and one (1) digital file including all reference files in .DWG format (AutoCAD 2013 or higher).
SECTION 3. WASTEWATER
3. WASTEWATER

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3.1 MATERIAL SPECIFICATIONS

3.1.1 GENERAL

The Contractor will furnish all new materials of the size and kind shown on the drawings which will meet the following specifications or requirements. If the type of material is not specified on the drawings, the Contractor may use any of the types listed in this specification. The use of concrete for repairs on gravity sewer piping and lateral tie-ins is not permitted.

3.1.2 MANHOLES

3.1.2.1 Precast Concrete Manholes

Concrete manholes shall not be used in turbulent flow conditions: outside drop manholes, the first immediate manhole receiving force main flow, and the first manhole preceding a lift station.

Precast manholes must be constructed in accordance with American Society of Testing and Manufacturing (ASTM) specification C 478 and ASTM C 857. Concrete will have a minimum 28-day compressive strength of 4,000 PSI. Cement will be Type II sulfide resistant. Steel will be minimum Grade 40 and placed as shown on the drawings. Shop drawings of manholes and lift station wet wells will be submitted to the Engineering Division for approval prior to casting. Chairs for supporting reinforcing steel will be non-corrosive plastic or Grade 316 stainless steel.

Wall sections shall be designed for depth and loading conditions Standard manholes will be 4 feet in diameter with a wall thickness of 5" for manholes of 6 feet in depth or less and wall thickness of 8" for manholes deeper than 6 feet. Precast base sections shall be cast monolithically. Manholes shall be designed with sufficient bottom anchorage and side friction to resist buoyancy with a minimum factor of safety of 2.0 under full depth conditions. Field cast flotation collars are acceptable.

Manhole sections shall utilize bell and spigot type joints and shall be joined with plastic preformed joint filler similar to Ram-Nek to maintain joint water-tightness; both the gasket material and the manhole joint shall meet the requirements of ASTM C990-09.

Each concrete manhole component shall be free of all defects that affect the strength and serviceability of the component part. Each manhole shall be marked with the Manufacturer’s name or trademark, location, and production date.
3. WASTEWATER

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Resilient connectors (boots) conforming to requirements of ASTM C 923 shall be used where PVC pipe penetrates manhole walls. Boots shall be NPC Kor-N-Seal or approved equal, watertight and shall be manufactured of materials resistant to decay caused by the sanitary sewer environment or by ambient soil conditions. All hardware shall be stainless steel. Boots shall be installed in accordance with manufacturer’s recommendations.

Seating surfaces of covers and frames shall be properly faced to prevent rocking.

3.1.2.2 Polymer Concrete Manholes

Polymer concrete manholes shall be used in turbulent flow conditions: outside drop manholes, the first immediate manhole receiving force main flow, and the first manhole preceding a lift station.

Polymer concrete manholes and related components shall be designed to meet or exceed the load and strength requirements of ASTM C 478 and ASTM C 857, and reinforced in accordance with ACI 440.1R-15. Polymer concrete manholes must use fiber-reinforced polymer bar for reinforcement.

Polymer concrete mix design shall consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix. All sand and aggregate shall be inert in an acidic environment and shall meet the requirements of ASTM C33, where applicable. Resin content shall be a minimum of 7% by weight. Polymer concrete shall have a minimum unconfined compressive strength of 9,000 psi.

Risers, cones, reducer slabs, base slabs, and adjusting rings shall all be made of polymer concrete. Wall sections shall be designed for depth and loading conditions. Standard manholes with a 48” diameter shall have a minimum wall thickness of 4”. Cone walls shall have a minimum thickness of 5”. Precast base sections shall be cast monolithically. Manholes shall be designed with sufficient bottom anchorage and side friction to resist buoyancy with a minimum factor of safety of 2.0 under full depth conditions. Field cast flotation collars are acceptable.

Manhole sections shall utilize bell and spigot type joints and shall be joined with plastic preformed joint filler similar to Ram-Nek to maintain joint water-tightness; both the gasket material and the manhole joint shall meet the requirements of ASTM C990-09.

Each polymer concrete manhole component shall be free of all defects that affect the strength and serviceability of the component part. Each manhole shall be marked with the Manufacturer’s name or trademark, location, and production date.
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Resilient connectors (boots) conforming to requirements of ASTM C 923 shall be used where PVC pipe penetrates manhole walls. Boots shall be NPC Kor-N-Seal or approved equal, watertight and shall be manufactured of materials resistant to decay caused by the sanitary sewer environment or by ambient soil conditions. All hardware shall be stainless steel. Boots shall be installed in accordance with manufacturer’s recommendations.

Seating surfaces of covers and frames shall be properly faced to prevent rocking.

3.1.2.3 Flotation Uplift of Fiberglass Manhole

When a fiberglass manhole is specified, the EOR shall provide the design analysis showing where flotation uplift is counteractive.

3.1.3 PIPE

3.1.3.1 PVC Pipe and Fittings, DR 35

PVC pipe and fittings (DR 35) will be manufactured in accordance with ASTM specification D3034. DR 35 pipe is acceptable on gravity installations with a depth of 12.0’ or less. Pipe will be of the elastomeric gasket joint type supplied in lengths of 12.5’. Solid wall ribbed PVC pipe with a stiffness of 60 psi or greater will be considered on a case-by-case basis at the discretion of the Engineering Division. Critical installations, as determined by the Engineering Division, will require use of poly-lined ductile iron pipe, coated with Protecto 401 ceramic Epoxy.

3.1.3.2 PVC Pipe, DR 18

PVC pipe (DR-18) will be manufactured in accordance with AWWA specification C900. DR-18 pipe is required for pressure force main installation. Pipe will be of the elastomeric gasket joint type. Color-coded identification tape will be installed on all force mains.

3.1.3.3 Ductile Iron

Ductile iron pipe will be coated with Protecto 401 ceramic Epoxy for force main, gravity, and valve pit installation. Exposed piping in valve pits will be pressure Class 350 with coal tar epoxy exterior coating. Buried ductile iron pipe will be wrapped in a color-coded polyethylene encasement in accordance with ANSI/AWWA T1/C105.
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3.1.4 MANHOLE ACCESS COVERS

3.1.4.1 Cast Iron

Cast iron manhole access covers shall be used on manholes located within roadways with speed limits greater than 45 mph. Covers must meet AASHTO M306 H-20/HS20 Traffic Rating. Cast iron manhole access covers and rings must be traffic load bearing and have an O-Ring seal similar to USF No. 225-AS ORS. Bearing surfaces will be machined to produce a tight, even seating surface without rocking. Minimum clear opening will be 24". The words “CITY OF COCOA” and "SANITARY SEWER" will be cast into manhole covers. Manholes installed in high water areas will be sealed by a method approved by the Engineering Division.

3.1.4.2 Composite

Composite manhole access covers shall be used on manholes located within roadways with speed limits less than or equal to 45 mph. Covers must meet AASHTO M306 H-20/HS20 Traffic Rating. Covers shall be constructed of a thermosetting resin matrix and shall be polyester, vinylester, or a blend of these; metal reinforcements are not permitted. Covers shall weigh at least 60 lbs. Cover shall have at least one 316 stainless steel locking mechanism. Covers shall be sealed by an EPDM or Neoprene gasket. Minimum clear opening will be 24". The words “CITY OF COCOA” and "SANITARY SEWER" shall be molded into the substrate of the cover. Manholes installed in high water areas will be sealed by a method approved by the Engineering Division.

3.1.4.3 Aluminum

Aluminum access covers will be designed for 300 psf live load and will be equipped with stainless steel hinges, automatic lock mechanism in the open position, closed position lock hasp, and retractable grip for opening.

See Detail Sheets:
- Manhole Ring and Cover
- Check Valve Vault
- Lift Station

3.1.4.4 Exposed Piping

Exposed piping, pumps, and equipment exposed to raw sewage in manholes, valve pits, and wet wells will be coated with a two-coat coal tar epoxy exterior coating system with a minimum DFT
of 12-15 mils. Coal tar epoxy will be Rustoleum 9578 or approved equal. Equipment and pump information tags will not be painted. Pump discharge piping in lift station wet wells will be Grade 316 10S stainless steel, refer to Section 3.8.3.2 Exposed Piping.

3.1.5 COATINGS

3.1.5.1 Water Based Acrylic

The interior and exterior surfaces of precast concrete manholes shall be coated with a three-coat water based acrylic coating. The interior and exterior coats shall be factory applied to the coating manufacturer’s recommendation with a minimum total DFT of 12 mils. Each of the coats will be 4 mils thick of contrasting colors. The interior shall be coated red, gray, and a final black coat. The exterior shall be coated red, gray, and a final black coat.

3.1.5.2 HDPE Sheet Lining

Where an HDPE liner is specified, the entire wall surface of the precast concrete manhole will be protected with a high-density polyethylene liner cast into the concrete. This liner must be AGRU Sure Grip as manufactured by AGRU America or approved equal. All joints will be heat fusion welded to create a watertight lining. The liner shall be installed and tested per the manufacturer’s guidelines. Such lining must be warranted against defects in materials and workmanship for a period of five years from date of installation.

3.1.6 MISCELLANEOUS MATERIALS

3.1.6.1 Manhole Steps

Manhole steps are not permitted.

3.1.6.2 Hardware

All nuts, bolts, washers, anchors, and brackets inside the wet well or manhole must be manufactured from Grade 316 stainless steel. Bolts for fastening flanged fittings inside the valve pit may be steel, coated with the specified piping coating system. Never-seize/Anti-seize shall be applied to all SS bolts and nuts.
3.2 CONSTRUCTION

3.2.1 LOCATION AND GRADE OF SEWERS

The line and the grade of the sewer, as well as the location of manholes, services, and all other appurtenances, will be as shown on the drawings. The grade line as given on the drawings indicates the grade of the invert of the sewer pipe.

Gravity sewer shall be designed and constructed with the following minimum slopes:

<table>
<thead>
<tr>
<th>Size (in)</th>
<th>Design (%)</th>
<th>Minimum Constructed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1.14</td>
<td>1.04</td>
</tr>
<tr>
<td>6</td>
<td>0.66</td>
<td>0.60</td>
</tr>
<tr>
<td>8</td>
<td>0.36</td>
<td>0.33</td>
</tr>
<tr>
<td>10</td>
<td>0.28</td>
<td>0.25</td>
</tr>
<tr>
<td>12</td>
<td>0.22</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Utilities Department staff will review the slopes submitted to verify that the velocities are within acceptable ranges. The EOR shall certify that the slopes of the gravity sewer meet the above minimum slopes. Sewer lines with slopes not meeting the above minimum slopes will be rejected.

“As-built” drawings shall show the gravity line slopes.

Sewers shall be laid with uniform slope and straight alignment between manholes. Gravity sewer pipe shall be installed with the bell end upstream. The pipe shall be installed from downstream to upstream unless specific permission is obtained from the Engineering Division. Manholes shall be designed with a minimum difference of 0.04’ between the invert elevations of the incoming and outgoing sewers.
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3.2.2 MATERIAL HANDLING

3.2.2.1 Precautions

All supplies shall be stored and maintained by the contractor per manufacturer’s recommendations. Every precaution will be taken to prevent injury to pipe and piping materials during transportation and delivery to the work site. Under no condition will pipe be dropped, bumped, dragged, or picked up by inserting forks into the end of pipe. Pipe lifted by placing forks into pipe shall be removed from job site.

3.2.2.2 Damaged Materials

If in the process of transportation, unloading, or handling, any pipe or fitting is damaged, it will be rejected and removed from the site.

3.2.2.3 Storage

Pipe fittings and specials will be stored in a manner which will assure the protection of the material from damage and which will keep it clean. Sun damaged materials exposed to adverse conditions will be rejected.

3.2.3 TRENCH EXCAVATION, SHORING, AND SHEETING

3.2.3.1 Trenches

Sewer trenches will not be opened in advance of the placing of the sewer pipe for a distance greater than that required to install the sewer pipe. In no case will the open trench ahead of the sewer pipe exceed 25’. Backfill in the pipe zone will be accomplished immediately after jointing the pipe to prevent movement.

3.2.3.2 Shoring, Sheeting, and Bracing of Excavations

The excavation must be sheeted and braced when necessary to prevent cave-in during excavation in unstable material or to protect adjacent structure, property, workers, and the public. The sheeting will be maintained in place until the pipe or structure has been placed and backfilled. Shoring and sheeting will be removed, as the backfilling is done, in a manner that will not damage the pipe or structure or permit voids in the backfill. All sheeting, shoring, and bracing of excavations will conform to the Trench Safety Act and requirements of the Federal, State, or local public agency having jurisdiction. The most stringent of these requirements will apply. The Contractor shall have a Competent Person (trench safety) on the job site at ALL times.
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3.2.4 CONTROL OF WATER

3.2.4.1 Equipment

The contractor will furnish, install, and, operate all necessary machinery, appliances, and equipment to keep the excavations reasonably free from water during construction. The Contractor will de-water and dispose of the water so as not to cause damage to public or private property or to cause a nuisance or a menace to the public. The Contractor will at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies and will have available at all times competent human resources for the operation of the pumping equipment. The de-watering system will not be shut down between shifts, on holidays or on weekends, or during work stoppages.

All equipment shall conform to The City of Cocoa’s noise ordinance Chapter 13.5, Article II, Section 13.5-21 through Section 13.5-26.

3.2.4.2 Ground Water

The control of ground water must be such that softening of the bottom of excavations or formation of "quick" conditions or "boils" will be prevented. De-watering systems will be designed and operated to prevent the removal of the natural soils. Discharge from pumps will be accommodated in accordance with the St. Johns River Water Management District's requirements. The Contractor is responsible for obtaining all de-watering permits such as NPDES permit.

3.2.4.3 Static Water

The static water level will be drawn down below the bottom of the excavation to maintain the undisturbed state of the natural soils and allow the placement of backfill to the required density. The de-watering system will be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

3.2.5 PIPE PLACEMENT AND JOINTING

Pipe placement will progress upgrade with the spigot ends of the pipe pointing in the direction of flow. Each pipe will be placed true to line and grade with a laser beam system. All pipes will be joined in a professional manner and in accordance with the manufacturer's instructions.
Pipe ends will be carefully cleaned prior to jointing. Pipe will be placed either on a prepared bed of undisturbed earth in the bottom of the trench shaped as required to fit the pipe or upon a layer of properly placed bedding material.

3.2.6 MATERIAL FOR BEDDING AND BACKFILLING

3.2.6.1 Unsuitable Material

Wherever excavations of the trench expose unsuitable materials such as peat, soft clay, quicksand, rock, boulders, stones, or unstable material in the bottom of the trench which, in the opinion of the EOR or Inspector, is unsuitable foundation upon which to lay or support the pipe, backfill, and expected superimposed loads, such unsuitable materials will be removed to a depth necessary to reach material having adequate bearing capacity and at a width of trench at least equal to the minimum trench width as specified. The space created by removal of this unsuitable material will be backfilled using suitable backfill or bedding material as specified.

3.2.6.2 Suitable Material

Suitable material for bedding and backfilling will be dry, clean natural sand or gravel. The material will be placed in 6” layers and compacted, using mechanical compacting equipment, to a dry density equal to 98 percent (98%) of the maximum dry density as determined by the standard Proctor compaction test ASTM specification D698, each layer being compacted to the required density prior to placing the next layer. The Engineering Division shall require the density to be checked by a licensed laboratory at each manhole and at two points between manholes as selected by the EOR or Inspector, at no cost to the City.

3.2.7 MANHOLE INSTALLATION

3.2.7.1 Base Unit

The base unit will be placed before the sewer pipe is placed to or away from the manhole. The base unit will be placed in a dry hole on a bedding of 6” to 8” of ¾” to 1” rock (57 stone or recycled concrete aggregate per FDOT specifications).

3.2.7.2 Manhole Channel

Invert channels will be constructed, smooth and semicircular in shape, conforming to the inside of the adjacent sewer section. Changes in direction of flow will be made in a smooth curve of as large a radius as possible. Changes in size and grade of channels will be made gradually and evenly. Invert channels will be formed by one of the following methods: formed directly into a
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poured concrete manhole base, built up with brick and mortar, half tile set in concrete, or full section of sewer pipe installed through the manhole with the top half cut out. The manhole floor outside of channels will be made smooth and will be sloped toward channels. Free drop connections inside manholes are not allowed. All drop connections will be constructed outside the manhole.

3.2.7.3 Joints

Precast manhole joints must be watertight and sealed with plastic pre-formed joint filler similar to Ram-Nek. All joint areas will be factory primed. Manhole-to-pipe connections will be by factory-supplied flexible boots.

3.2.7.4 Non-Shrink Grout

The annular space between the sewer pipe and the opening in the manhole will be grouted with non-shrink grout to ensure a watertight joint.

3.3 WATER MAIN CROSSINGS

3.3.1 GENERAL

In all cases where sanitary gravity or force mains cross water mains the crossing shall meet the vertical and horizontal separation requirements of FAC Rule 62-555.314. When separation requirements cannot be met, the EOR must propose an alternative solution that meets the requirements of FAC 62-555.314 for approval by the Engineering Division. The water main should cross above the sanitary main, when the water main must cross below the sanitary main, the minimum separation shall be 12”.

3.4 SERVICE CONNECTIONS

3.4.1 GENERAL

The contractor must install commercially manufactured wye branches compatible with the material used in the sewer main. Where the service line piping is of a different material than the sewer main, the fittings and transition pieces will be specially designed for the connection of the different materials and must be approved by the Engineering Division.
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3.4.1.1 Connecting to Manholes

Service connections made directly to a manhole shall be core drilled and fitted with a flexible coupling to provide a seal around pipe. Pipe will be a minimum of 6” in diameter and shall include a wye and clean-out in a green meter box located on the Customer side of the right-of-way or easement (see “Typical Lot Service Line Location” detail). Connections requiring a drop will be piped to the bottom of the manhole on the outside (see “Manhole with Outside Drop” detail).

Force mains coming from private lift stations into a gravity manhole requiring a drop will be piped to the bottom on the outside of the manhole and fitted with 45-degree bends directed toward the invert of the gravity main (see detail “Force Main Connection to Manhole”).

3.5 FIELD TESTING OF SEWER SYSTEMS

3.5.1 GENERAL

All sewer lines will be subject to a leakage test at the discretion of the Engineering Division. The test shall be either an infiltration, exfiltration, or air pressure test as determined by the Engineering Division. The test will be conducted by and at the expense of the Contractor in the presence of the Inspector.

Maximum allowable leakage is 100 gallons per day, per inch diameter of pipe, per mile of pipe. If the amount of maximum leakage is exceeded, the Contractor will make the necessary repairs and schedule a re-test. Acceptable methods of repairing leaks are by excavation.

3.5.1.1 Visible Leaks

All visible leaks in structures will be eliminated regardless of the amount of flow.

3.5.1.2 Televised Inspection

Television inspection must be provided by the contractor and will be performed after final compaction of the job site or roadway. A Digital Video Disc (DVD) record of the inspection with an audible description of the run, including its direction and location, the location and description of any service laterals, and a description of any defect or abnormality must be included.
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3.5.1.3 Pressure Testing

Force mains will be hydrostatically tested at a pressure of 100 psi for one hour. The contractor will install air reliefs as necessary for relieving air prior to testing. The maximum allowable leakage of water per thousand feet of pipe is as indicated in the following table:

<table>
<thead>
<tr>
<th>Size (in)</th>
<th>Allowable Leakage (gal/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0.27</td>
</tr>
<tr>
<td>6</td>
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<tr>
<td>12</td>
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</tr>
<tr>
<td>16</td>
<td>1.08</td>
</tr>
<tr>
<td>20</td>
<td>1.35</td>
</tr>
</tbody>
</table>
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3.5.1.4 Vacuum Testing of Manholes

All sewer manholes shall be required to meet the requirements of the vacuum test as per the current ASTM C 1244 “Standard Test Method for Concrete Sewer Manholes by the negative Air Pressure (Vacuum) Test” prior to acceptance. Manholes and connected piping must be backfilled to finished grade prior to testing.

A vacuum of 10” of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time for the vacuum to drop to 9” of mercury shall not be less than that shown in the following table:

Vacuum Testing for Given Manhole Size

<table>
<thead>
<tr>
<th>Manhole Depth (Ft)</th>
<th>Time Elapsed* (Sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48 in</td>
</tr>
<tr>
<td>0-8</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
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<td>30</td>
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<td>26</td>
<td>64</td>
</tr>
<tr>
<td>28</td>
<td>69</td>
</tr>
<tr>
<td>30</td>
<td>74</td>
</tr>
</tbody>
</table>

* Times shown are minimum elapsed times, in seconds, for a drop in vacuum of 1” of mercury.
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3.6 FORCE MAIN VALVES

3.6.1 GENERAL

Valves for use in force mains must be epoxy coated resilient seat gate valves. The resilient seating surface will be bonded to the gate and will seal under compression without wedging or sliding.

Requirements stated in Potable & Reclaimed Water Section 2.2.2 Valves, Valve Boxes, and Valve Extensions and Section 2.5.8 Valves and Fittings shall also be met for force main valves.

Air release valves will be of the Combination Air Release and Vacuum (CARV) type. CARV valves shall have a working pressure range of 3-150psi, testing pressure of 250psi, maximum operating temperature of 140°F, 2” threaded inlet and 1.5” outlet, reinforced nylon body, Grade 316 stainless steel internal parts. See “Appendix A”, Approved Materials.

CARV valves will be installed in a concrete pit at high points in the main. See Detail “Air Release Valve”.

3.7 FORCE MAIN PIPE

3.7.1 RESTRAINED PIPE JOINTS

The EOR shall provide a restrained joint detail on drawings submitted to the City for approval. Restraining is to apply to all new fittings installed as part of the job, including tapping saddles.

3.8 LIFT STATIONS

3.8.1 PRECAST WET WELLS

Precast wet wells must be constructed in accordance with ASTM specification C478. Concrete will have a minimum 28-day compressive strength of 4,000 psi. Cement will be Type II sulfide resistant. Reinforcement steel will be minimum Grade 40 and placed as shown on the drawings (“Lift Station” Sheets 1 and 2 of 4). The base unit shall be constructed of reinforced concrete with monolithically poured base and bottom riser section. Shop drawings of manholes and lift station wet wells will be submitted to the Engineering Division Supervisor for approval prior to casting. Chairs for supporting reinforcing steel will be non-corrosive plastic or Grade 316 stainless
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steel. Linings for wet wells shall conform to Section 3.8.3 Coatings. EOR shall approve precast wet well design.

3.8.2 WET WELL ACCESS COVERS

Aluminum access covers will be designed for 300 psf live load with a safety factor of 3. There shall be two 24” x 48” swing covers equipped with Grade 316 stainless steel hinges and Grade 316 stainless steel tamper-proof fasteners, closed position lock hasp, and retractable grip for opening. The cover will open to 90 degrees and lock automatically in the open position with a stainless steel positive locking arm. The release will be made by a stainless steel release handle. The cover will be flush with the top of the frame and rest on a ¼” wide lip around the inside of the frame. The hatch will be a Bilco or Halliday product. Hatch size of the cover will be determined by the wet well size and pump size to provide at least 12” of clearance on all sides of the pump with a minimum hatch dimension of 48” x 48”. The wet well access cover needs to be flush with the top of the concrete.

3.8.3 COATINGS

3.8.3.1 HDPE Sheet Lining

The entire interior wall and top surface of the wet well will be protected with an HDPE liner designed to protect concrete from corrosion in a collection system pump wet well. The liner shall be a minimum thickness of 0.079”. Anchoring studs shall be the same material, and shall be integrally extruded with the sheet and shall have a minimum height of 0.39” and a length of 0.55”. The HDPE sheeting will be cast into the concrete. This liner will be AGRU Sure Grip as manufactured by AGRU America, Inc. or approved equal. Flat liner used for overlapping joints shall have a minimum thickness of 0.018”. All joints will be heat fusion welded to create a watertight lining. Such lining shall be warranted against defects in materials and workmanship for a period of five years from date of installation.

3.8.3.2 Exposed Piping

Pump discharge riser pipes and fittings inside the wet well will be Grade 316 stainless steel with flanged fittings. Piping exposed to raw sewage in valve pits will be coated with a two-coat coal tar epoxy exterior coating system with a minimum DFT of 12-15 mils. Coal tar epoxy will be Rustoleum 9578 or approved equal. Equipment and pump information tags will not be painted.
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3.8.4 SUBMERSIBLE PUMPS

Lift station submersible pumps will be Hydromatic, ABS, or Flyght with three-phase power and 3" minimum solids handling capacity. Pump volute, seal housing, and motor housing will be cast iron. Pump impeller will be two vane, one-piece cast iron construction. Pump shaft will be one-piece 316 stainless steel, equipped with tandem seals with separate chambers for each seal. Seals will have tungsten carbide faces with 316 stainless steel hardware. Seal chambers will be equipped with probes to detect water intrusion. Motors will be oil-filled with automatic reset over-temperature sensors embedded in the motor windings. Pumps will be equipped with a stainless steel slide rail system, dual rail type. The pump discharge coupling will be flanged cement-lined ductile iron, 4" minimum diameter, bolted to the wet well floor by 316 stainless steel fasteners. Flanges will be machine threaded. (Compression-type flanges will not be allowed) Flange bolts, washers, and nuts will be 316 stainless steel. All pipes entering or exiting the wet well shall be sealed in a manner that will prevent water leaks around pipes.

3.8.5 VALVE PIT

A separate valve pit shall be constructed adjacent to the wet well to house a check valve for each pump, a gate valve for each pump, and one gate valve for emergency pump-out. The valve pit shall be configured to allow a minimum of 8" between the bottom of pipe flanges and the floor or wall. The emergency pump outlet will include a brass 4" male quick-disconnect complete with brass cover. The cross will be tapped to accommodate a brass gate valve with a threaded on 0-100 psi glycerin filled pressure gauge. The valve pit is to be made of precast or cast-in-place concrete with a cast concrete cover equipped with an aluminum access hatch cast in the concrete. Aluminum access covers will be designed for 300 psf live load with a safety factor of 3. There shall be two 24" x 48" swing covers equipped with Grade 316 stainless steel hinges and Grade 316 stainless steel tamper-proof fasteners, closed position lock hasp, and retractable grip for opening. The cover will open to 90 degrees and lock automatically in the open position with a stainless steel positive locking arm. The release will be made by a stainless steel release handle. The cover will be flush with the top of the frame and rest on a ¾" wide lip around the inside of the frame. The dual swing access hatch will be a Bilco or Halliday product. Hatch size will be determined by the installation with a minimum dimension of 48" x 48". The valve pit access cover needs to be flush with the top of the concrete. The valve pit depth is a maximum of 36” deep.

3.8.6 CHECK VALVES

Check valves will be flanged, with fusion bonded epoxy coating with an outside weight and lever, cast iron housing, 316 stainless steel seat ring, clapper with neoprene sealing surface, O-ring-
sealed stuffing box (minimum size 4”). Bolts, washers, and nuts will be Grade 316 stainless steel. Check valves shall meet AWWA specification C508. Flanged end dimensions will be drilled to ANSI standard B16.1 class 125.

### 3.8.7 GATE VALVES

Gate valves will be resilient seated, 4” minimum diameter, with flanged ends, hand wheel operated, non-rising stem, epoxy coated, equipped with double O-ring-sealed stuffing box and Grade 316 stainless steel fasteners. Gate valves will meet AWWA specification C509 and C515. Flanged end dimensions will be drilled to ANSI standard B16.1 class 125.

### 3.8.8 CONTROL PANEL

The control panel will be isolated with a 200-amp fused or breaker disconnect housed in a NEMA 4X, stainless steel lockable cabinet.

All enclosures, panels, and cabinets will be mounted on 12-gauge aluminum or 316 stainless steel strut channels and will be supported by a minimum of three 4” Schedule 40 304 stainless steel pipes with threaded PVC end caps. All mounting hardware for strut channels and conduit will be 316 stainless steel. Posts will be a minimum of 10’ in length and located adjacent to the wet well. Posts will be set in concrete with a minimum depth of 4’ below grade. When the panel door is open, there will be a minimum of 4’ separation between the wet well edge and the panel.

A step-down transformer rated at a minimum of 5kVA will be used for 480/277vAC powered lift stations and must be mounted externally from the control panel. A two-pole breaker will supply this transformer and must be sized correctly for the kVA rating of the step-down transformer. This breaker will be mounted inside the control panel.

The control panel enclosure will be Grade 316 stainless steel, NEMA 4X rated with a heat-reflecting hood and minimum inside dimensions will be 36” wide x 48” high x 12” deep. The control panel door will be connected by continuous piano hinge and will have a padlock hasp. Control voltage will be 120 VAC. Control wiring will be 14 AWG stranded. The enclosure will be equipped with an aluminum dead front inner panel with cutouts for all circuit breakers; elapsed time meter (non-reset, hour and one-tenth hour, five digits); one duplex 20A, 120VAC Ground Fault Circuit Interceptor (GFCI), weather-proof (WP) and tamper-proof (TP) convenience receptacle; a top mounted LED work light at least 24” in length; hand-off-automatic (HOA) switch for each pump; seal failure light for each pump (amber); run light for each pump (red); one trip light for each pump (amber), SCADA bypass switch, inside and outside light on-off switch.
The control panel will contain the following breakers: one main breaker, one emergency breaker, two or three pump breakers (duplex or triplex station), one 20A convenience power breaker, one 15A control power breaker, and one 20A RTU power breaker. All breakers will be **Square-D** or **General Electric** only and sized as required by NEC or per manufacturer specifications.

Floats will be used to provide level control. There will be one float for pump shut-off, one for lead pump turn-on, one for lag pump turn-on, and one for high-level alarm. Floats will be **Anchor Scientific Roto-Float type-S** with all weights and switches encapsulated. Floats will operate on normal 24 VAC supplied from a step-down 120 VAC to 24 VAC transformer located in the control panel. Float wiring from control panel to pump J-box will be a minimum of #14 AWG copper wire. City will provide signal cable that will run from the control panel to the pump J-box in the same conduit as the float wiring. Provisions will be made for a level/pressure transducer located in the wet well and will be housed within Schedule 80 PVC pipe with a 6” minimum diameter. Pipe diameter may increase based on pressure transducer size. The pipe will be mounted to the interior wall of the wet well with 316 stainless steel hardware. Location and length to be determined by City of Cocoa staff.

Motor starters will be NEMA-rated **Square-D Series 8536S** with 3 phase protection, bimetallic overload relays, and manual resets.

The control panel will be equipped with a **Russel Stoll model JRS 1044FR 100-amp emergency generator receptacle** and emergency main circuit breaker with lockout from the normal main breaker. Panel will be equipped with ground and neutral terminal bars. A power distribution block will be installed after the main breaker. Two 10’ by ¾” copper-clad ground rod will be driven into the ground adjacent to the control panel and must test less than 25 ohms resistance. Grounding wire will be cad-welded to the ground rod. The door will be equipped with a three-point latching system with hasp and staple for locking. The wiring system will be configured to allow the pumps to operate on floats if the SCADA system is by-passed. A separate by-pass switch will be installed. A **Time Mark** or **Diversified Electronics** phase sequence and loss relay with fault light will be installed for each pump. Incoming line voltage at the main breaker will be monitored with a **Time Mark 257B or A257B**.

A NEMA 4X, 316 stainless steel junction box with back plate, a terminal strip, a power distribution block for each pump, and a ground bar will be installed near the main control panel with a 1-½”-diameter conduit for float wiring and a 2”-diameter conduit for the pumps. The J-Box will be the minimum specified on the plans and will be located next to and same height as the control panel. The box will be connected to the control panel with a 1-½”-diameter conduit for float wiring and a 2”-diameter conduit for each pump. The conduits will be equipped with seal-offs between the control panel and the pump J-box to protect electrical equipment from corrosive atmosphere in
the wet well. The terminal strip will be mounted on DIN rail and terminals will be Phoenix Contacts with sufficient room to add thirty-five terminal blocks. The motor conductors will be one size larger than required by the current National Electric Code. Motor seal failure and over-temperature wiring will be a minimum #14 AWG copper conductors consisting of Black, Red, White, and Green. One set of these four colors will be for each motor. These conductors are to be in the same 2” conduit for the motor conductors. Four #12 AWG copper conductors will also be installed in the same 2” conduit for future use. These will be Black, Red, White, and Green.

A laminated as-built electrical wiring diagram (minimum 8.5” x 11”) will be securely attached to the inside of the control panel door. A separate copy of the as-built wiring diagram will be provided to City of Cocoa Engineering Division. An information plate will also be located inside panel door and will include Cocoa’s station number, pump information, and station voltage. An information plate with the address of the lift station will be located on the exterior of the meter can. If a high leg is present, identify the leg with orange color.

A site meeting will be held for each project to determine the exact placement of the panel components.

3.8.8.1 Pump Junction Box

The pump junction box enclosure will be Grade 316 stainless steel, NEMA 4X rated, and minimum inside dimensions will be 24” wide x 24” high x 12” deep with an interior back plate. Triplex pump stations will have larger dimensions as necessary. The control panel door will be connected by continuous piano hinge and will have a padlock hasp.

Install a minimum of two aluminum or galvanized steel conduits, with seal-off conduit bodies between control panel and pump junction box. Install a minimum sized 2” conduit for motor conductors, and 1-1/2” conduit for the float conductors and shielded signal cables.

For duplex pump stations, install two 4-pole power splice blocks rated at 100A minimum, 600VAC; install three power splice blocks for triplex pump stations. Install 20 terminal blocks (Square-D 9080GK6 or equivalent) with corresponding terminal strip. For duplex pump stations, install a minimum of three 2” Schedule 80 PVC conduits from pump junction box to wet well; for triplex pump stations install a minimum of four 2” Schedule 80 PVC conduits. Conduit will be joined with Crouse-Hinds EYSR6 Retrofit Sealing Fittings and filled with Polywater FST Foam Sealant, Part# FST-MINI-1G.
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3.8.8.2 Electrical Meter Enclosure

Electrical meter enclosure will be FPL approved, rated for 3 phase 200A with a bypass, and constructed of aluminum or 316 stainless steel. Enclosure will be grounded with two copper-clad ground rods that are each ¾” in diameter and 10’ long.

3.8.8.3 Disconnect Panel

A lightning suppressor shall be installed on the exterior side of the disconnect panel. It will not be permitted on the inside of the control panel. The service disconnect device will be a 200-amp fusible or breaker disconnect housed in a NEMA 4X, 316 stainless steel, 3 poles lockable cabinet rated for 600 volts AC. The disconnect panel is to be located next to the meter housing. Conductors from the meter can to the main disconnect will be #3/0 THHN copper. Grounded (neutral) conductor will not be derated. See NEC 250.24 (C)(3)

3.8.8.4 SCADA

SCADA software will be provided by the City. SCADA equipment location will be determined by City of Cocoa staff. SCADA equipment will be housed in a separate Eurobex 5412 ESSPCH, lockable, NEMA 4X cabinet with an inner panel for equipment mounting and a separate inner panel on the door for mounting radio and will have a factory powder-coated white finish. Lift station operation and monitoring will be accomplished via SCADA. For more information, refer to the RTU detail sheets in “Appendix B”.

The antenna shall be a gold anodized fully welded Ultra High Frequency (UHF) directional Yagi, Amtenex Y4503. The antenna shall be mounted on a minimum 20’-tall galvanized mast. The mast shall be rigid pipe, 2-1/2” in diameter at the base. The upper 5’ of mast will be rigid pipe, 1-1/4” in diameter. The bottom of the mast will be set 3’ below ground level and encased in a column of concrete a minimum of 12” in diameter and 3’ deep. The mast will be located in close proximity to the SCADA/RTU panel. Antenna cable shall be Times Microwave Systems LMR-400-DB 3/8” diameter flexible low loss coaxial cable, and shall be fed into a 1” rigid metal conduit, mounted next to the antenna mast and shall be supported a minimum of three times along the length of the mast. The cable shall be supported by a strain relief connector at the top of the conduit. The cable is to be fed into the underside of the SCADA/RTU panel. The mast shall be grounded to separate ground rod. Two copper-clad ground rods that are each ¾” in diameter and 10’ long will be driven into the ground adjacent to the mast and must test less than 25 ohms resistance. Grounding wire will be Cad welded to the ground rod. Coordination of SCADA programming will be provided by the City’s EOR.
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The interface between the control cabinet and the separate SCADA cabinet will be through Phoenix Contact terminals and component plugs and relay bases (Allen-Bradley 700-HN121), or approved equals. An isolated 20A circuit will be provided to power SCADA equipment. Pumps will be controlled by SCADA RTU.

3.8.8.5 Surge Protection

A Ditek D200 Series Surge Protection Device or approved equal shall be connected to the load side of the main disconnect panel and installed in a separate cabinet. Installation shall meet the requirements specified in NEC 285.12, NEC 285.23, and NEC 230.82.

3.8.8.6 Emergency Generator

Stand-alone emergency electrical generators may be required for some pumping stations and will be determined by the Engineering Division at the time of plan review. Generator location to be determined by the City. Provide a concrete slab with a minimum thickness of 6”. Generator will be mounted on approved rubber pads for vibration dampening. Installation must meet NFPA and NEC requirements. Generators shall be manufactured by Kohler or an approved equal and equipped with a John Deere, Cummins, or Caterpillar diesel engine with a minimum 60 kW output. Generator will be equipped with a fuel tank sized to provide a minimum of 32 hours operations under full load conditions with a minimum capacity of 250 gallons.

Automatic Transfer Switch (ATS) will be installed in a separate NEMA 4X enclosure. ATS to be sized to the incoming electric service voltage and amp rating. Install three 1” Schedule 80 PVC conduit from generator to ATS and from ATS to control panel. Install two 2” Schedule 80 PVC conduits from generator to ATS.

3.8.9 Site Lighting

Total number of lights will be determined by total area of the lift station site and equipment location. At least one light and pole will be located near the wet well and valve pit. Exact location to be determined by the City. Light pole must be RAB PS4-11-15D2 or an approved equal. Light pole must be steel, square, and bronze in color. Pole must be wind rated for the location. Total pole height, including in-ground base, will not exceed 16’ above finished grade. Light must be RAB Lighting #ALED3T150 or an approved equal.
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3.8.10 Conduit

Exposed electrical conduit will be rigid metal conduit made of aluminum or galvanized steel and coated with protective coating where it penetrates concrete. Buried conduit will be Schedule 80 PVC. Conduits will be a minimum of ¾” in diameter and sized in accordance with NEC or as required by City of Cocoa staff. PVC conduits for pump and float wiring will be installed through the side of the wet well, below the lid, and above the high-water level.

Each pump power cable will be installed through a separate conduit from the wet well to the control panel junction box. All conduits from wet well to J-Box will be at least 2” in diameter, Schedule 80 PVC. Seal failure and over-temperature cables will be installed in their corresponding pump conduits. One conduit will be provided to accommodate float wiring. Conduits for power and float wiring will be installed in close proximity and located to provide the straightest possible run to the junction box. Wiring from the wet well will be terminated in the junction box. Continuous wiring through the box will not be permitted.

A separate 2” Schedule 80 PVC conduit will be installed through the side of the wet well with the ends capped for future use. This conduit will be located at 90, 180, or 270 degrees from the others. The Engineering Division will determine the exact location during plan review.

3.8.11 Conduit Fittings

Exposed electrical conduit will be connected with Crouse-Hinds EYSR6 Retrofit Sealing Fittings and will be used for pump and float conduits from wet well to Pump J-box. These fittings will be installed above ground and half the distance from finish grade to the bottom of the Pump J-box. Copper-based anti-size compound meeting MIL-PRF-907E specification will be applied to all mating surfaces and threads of the retrofit sealing fittings. The EYSR6 fittings will be filled with Polywater FST Foam Sealant, Part# FST-MINI-1G.

Buried electrical conduit will be connected with Schedule 80 PVC fittings.

Conduit bends between the wet well and J-Box will be comprised of 45-degree elbows. All other buried or exposed conduits can utilize 90-degree elbows.
3. WASTEWATER

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3.9 RECORD DRAWINGS

3.9.1 GENERAL

Record drawings are required for all systems to be accepted by the Engineering Division. Record drawings will be prepared by a surveyor or an engineer registered in the State of Florida and will contain the following information:

- Location of all gate valves, valve pits, force main check valves, fittings, air release valves, tapping saddles, manholes, lift stations, wet wells, and cleanouts using at least two ties to permanent points (manholes, curbs, or storm water inlets). An acceptable station and offset system shall be used for lateral lines.

- The as-builts must include the location of the wye branch, the end of the sewer service referenced to the next downstream manhole of each run, the offset of the end of the service referenced from the centerline of the main sewage pipe, and the depth at the end of the service.

- Location of sewer mains from property easement lines or edge of pavement at intervals of 300’.

- Separation between reclaimed water or force mains and water mains if they are installed within 10’ of water mains.

- Sewer main material, diameter, length of run, and distance of mains from buildings or structures within 20’ of the sewer main.

- Elevations of the top (rim) and pipe inverts at each manhole and the length and slope of each run of pipe are required on the as-builts (all elevations must be tied to NAVD 88).

- Pertinent easement information.

- A minimum of two benchmarks with northings and eastings in NAD83 or NAVD88 that are clearly labelled on each individual sheet. The benchmarks shall be placed away from the center of the drawing in opposite corners.

- Certification by the surveyor accepting responsibility for accuracy of information supplied on the record drawings and a statement certifying that all mains are within easements and/or public right-of-way.

- Certification by the EOR certifying that the sewer water system has been constructed in substantial conformance with approved construction plans and specifications and that all mains are within easements and/or public right of way.

- The name "City of Cocoa" must appear on all record drawings survey information.
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• The page number in the format “page x of y” needs to be on each page, where x is the specific page number and y is the total number of pages.

Record drawings will be drawn at an engineering scale that is legible and readable as determined by city staff. Areas requiring additional detail may be enlarged as necessary. Right-of-way, easements, and lot lines must be accurately shown. After the surveyor or engineer has certified the locations, the engineer will certify on DEP Form 62-604.300(8)(b) that the system depicted on the record drawing was constructed in substantial conformance with approved plans and will function as intended. Lot, block numbers, and street names will be included. Provide two (2) sets of signed and sealed record drawings and one (1) digital file including all reference files in .DWG format (AutoCAD 2013 or higher).
3. WASTEWATER

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Approved Tapping and Line Stop Contractors

<table>
<thead>
<tr>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLS Utilities, Inc.</td>
<td>(321) 403-4001</td>
</tr>
<tr>
<td>1305 Heritage Acres Blvd</td>
<td></td>
</tr>
<tr>
<td>Rockledge, FL 32955</td>
<td></td>
</tr>
<tr>
<td>Central Florida Tapping and Construction Services, Inc.</td>
<td>(407) 834-8271</td>
</tr>
<tr>
<td>287 Park Ave</td>
<td></td>
</tr>
<tr>
<td>Longwood, FL 32750</td>
<td></td>
</tr>
<tr>
<td>Landmasters Development, Inc. **</td>
<td>(321) 724-1697</td>
</tr>
<tr>
<td>1445 Columbia Lane #B</td>
<td></td>
</tr>
<tr>
<td>Melbourne, FL 32904</td>
<td></td>
</tr>
<tr>
<td>¾ to 2” taps only</td>
<td></td>
</tr>
<tr>
<td>TDW *, ***</td>
<td>(407) 855-6422</td>
</tr>
<tr>
<td>8351 Parkline Blvd</td>
<td></td>
</tr>
<tr>
<td>Orlando, FL 32809</td>
<td></td>
</tr>
<tr>
<td>Rangeline Tapping Services *, ***</td>
<td>(561) 623-8208</td>
</tr>
<tr>
<td>7256 Westport Place</td>
<td></td>
</tr>
<tr>
<td>Suite A</td>
<td></td>
</tr>
<tr>
<td>West Palm Beach, FL 33413</td>
<td></td>
</tr>
<tr>
<td>Mac Tapping ***</td>
<td>(407) 468-0557</td>
</tr>
<tr>
<td>P.O. Box 210155</td>
<td></td>
</tr>
<tr>
<td>Royal Palm Beach, FL 33421</td>
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</tr>
<tr>
<td>EA Tapping Services, LLC *, ***</td>
<td>(407) 880-6786</td>
</tr>
<tr>
<td>626 Cooper Industrial Parkway</td>
<td></td>
</tr>
<tr>
<td>Apopka, FL 32703</td>
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</tr>
</tbody>
</table>

* Approved for tapping City of Cocoa’s concrete pressure pipe.
** Approved for tapping water mains only for their company.
*** Approved tapping and line stop contractor.

Revised 1/8/2020
3. WASTEWATER

July 2021

APPENDIX A. APPROVED MATERIALS
## APPENDIX A. APPROVED MATERIALS

<table>
<thead>
<tr>
<th>Category</th>
<th>Potable</th>
<th>Reclaimed</th>
<th>Waste</th>
<th>Manufacturer</th>
<th>Part Identifier</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Piping Pressurized PVC | ✓       | ✓         | ✓     | JM Eagle              | Blue Brute (C900)/Big Blue (C905) | Potable/Reclaimed/Waste Water:  
• Pipe will be cast iron pipe equivalent outside diameter Class 235, DR18, AWWA C900-16, 20'-length.  
• All joints will be of the elastomeric-gasket type with thickened, integral solid-wall bell or coupling with the same DR as the barrel. |
| 4"-12" Push-On Joint | ✓       | ✓         | ✓     | Diamond Plastics Corp. | C900/Trans-21    |                                                                      |
|                    | ✓       | ✓         | ✓     | North American Pipe Corp. | C900/IB         | Potable Water Pipe:  
• Blue/white in color, pipe and couplings will bear the UL Label and NSF approval. |
|                    | ✓       | ✓         | ✓     | National Pipe & Plastics | Dura-Blue C900  | Reclaimed Water Pipe:  
• Purple in color. |
|                    | ✓       | ✓         | ✓     | Sanderson Pipe        | C900            | Waste Water Pipe:  
• Green in color and color coded identification tape. |
| Restrained Joint   | ✓       | ✓         | ✓     | JM Eagle              | Eagle Loc 900   | Self-Restrained Push-On Joint:  
• Pipe shall be field checked for proper engagement per manufacturer’s recommendations.  
• Bulldog Gaskets shall be factory applied to Diamond Lok-21 pipe and Eagle Loc 900 pipe  
• Rieberlok Gaskets shall only be used on C900-16 pipe. |
|                    | ✓       | ✓         | ✓     | Certain Teed          | Certa-Lok       |                                                                      |
|                    | ✓       | ✓         | ✓     | Diamond Plastics Corp. | Diamond Lok-21   |                                                                      |
| Self-Restrained Push-On Joint | ✓       | ✓         | ✓     | Bulldog Restraint    | Bulldog Gasket  |                                                                      |
|                    | ✓       | ✓         | ✓     | Rieberlok             | RieberLok Gasket |                                                                      |
| Fusible PVC        | ✓       | ✓         | ✓     | Underground Solutions | Fusible C-900   |                                                                      |
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<td>Ductile Iron Pipe 4&quot; and Larger</td>
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<td>American Cast Iron Pipe Company</td>
<td>Fastite Joint w/ Amarillo Fast-Grip Gasket</td>
<td>Potable/Reclaimed/Waste Water: Pipe will be Class 350 for 12&quot;-diameter and smaller pipe, Class 250 for 16&quot;-diameter and larger pipe given 3' of cover can be provided.</td>
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<td>U.S. Pipe</td>
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<td>HP Lok Joint</td>
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<tr>
<td>Gravity Sewer PVC 4&quot;-12&quot;</td>
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<td>JM Eagle</td>
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<td>Fittings Pressurized PVC and Ductile Iron Pipe</td>
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<td>U.S. Pipe</td>
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**Potable/Reclaimed/Waste Water Pipe for depths up to 12’:**
- Pipe will be DR35, ASTM D3034, 12.5’-length.
- All joints will be of the elastomeric-gasket type with thickened, integral solid-wall bell or coupling with the same DR as the barrel.

**Potable/Reclaimed/Waste Water:**
- Cast iron fittings will conform to AWWA C110, Class 250.
- Ductile iron fittings will conform to AWWA C153.
- Buried fittings shall have an exterior bituminous coating.
- All fittings must use an approved joint restraint system.

**Potable/Reclaimed Water:**
- Cement-lined interior coating per AWWA C104.

**Waste Water:**
- Protecto 401 Ceramic Epoxy interior coating.
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<th>Part Identifier</th>
<th>Notes</th>
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<td>PTPFC</td>
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<td>JCM Industries</td>
<td>Model 610</td>
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<td></td>
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<td></td>
<td>Series 1200G2C</td>
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<td>Series 4100P</td>
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<td>✓</td>
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<td>Series 4400</td>
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**Potable/Reclaimed/Waste Water:**
- All buried mechanical joint bolts and nuts must be CORTEN Steel.
- All above ground bolts and nuts for flanged fittings must be 18-8 Type 304 stainless steel.
- Never-seize/Anti-seize shall be applied to all stainless steel bolts and nuts.
# APPENDIX A. APPROVED MATERIALS

<table>
<thead>
<tr>
<th>Category</th>
<th>Part Identifier</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potable</td>
<td>Series 1100</td>
<td>All buried mechanical joint bolts and nuts must be CORTEN Steel.</td>
</tr>
<tr>
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<td>Series 1100SD</td>
<td>All above ground bolts and nuts for flanged fittings must be 18-8 Type 304 stainless steel.</td>
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<tr>
<td>Waste</td>
<td>Series 1500TD</td>
<td>Never-seize/Anti-seize shall be applied to all stainless steel bolts and nuts.</td>
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<td>Series 1700</td>
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<td>EBAA Iron</td>
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<td></td>
<td>Series 4000</td>
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<tr>
<td>Tyler Union</td>
<td>Series 1000</td>
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<td>Series 1500</td>
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<td>JCM Industries</td>
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<td>Series 3000S</td>
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<td>Series 3100S</td>
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<td>Star Pipe Products</td>
<td>Series 100</td>
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<td>Series 3000</td>
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<td>Series 3100S</td>
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<td>Model 631</td>
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## APPENDIX A. APPROVED MATERIALS

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<thead>
<tr>
<th>Category</th>
<th>Potable</th>
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<th>Waste</th>
<th>Manufacturer</th>
<th>Part Identifier</th>
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<tbody>
<tr>
<td>Transition Coupling</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Romac</td>
<td>Macro HP</td>
<td>• 2”-16”&lt;br&gt;• ACP to DIP, CIP, PVC; coupling shall have Romacoat System.</td>
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<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>XR501</td>
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<td>• 4”- 12”&lt;br&gt;• ACP to DIP, CIP, PVC coupling shall have Romacoat System.</td>
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<td>✓</td>
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<td>Krausz</td>
<td>Hymax-2000</td>
<td>• 4”-12”&lt;br&gt;• ACP to DIP, CIP, PVC</td>
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<td>✓</td>
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<td>Ford Meter Box Co.</td>
<td>FC2A</td>
<td>• 4”-24”&lt;br&gt;• ACP to DIP, CIP, PVC</td>
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<td>✓</td>
<td></td>
<td></td>
<td>FC2W</td>
<td>• 4”-16”&lt;br&gt;• ACP to DIP, CIP, PVC</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>EBAA Iron</td>
<td>Megaflange Series 2100</td>
<td>• 4”-20”&lt;br&gt;• DIP, PVC</td>
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<td>✓</td>
<td>✓</td>
<td>Ford Meter Box Co.</td>
<td>Series 420</td>
<td>• 4”-12”&lt;br&gt;• DIP</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Star Pipe Products</td>
<td>Starflange Series 4200</td>
<td>• 4”-36”&lt;br&gt;• PVC</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Superflange Series 7200</td>
<td>• 4”-20”&lt;br&gt;• DIP, PVC</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Starflange Series 3200</td>
<td>• All sizes&lt;br&gt;• DIP</td>
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## APPENDIX A. APPROVED MATERIALS

<table>
<thead>
<tr>
<th>Category</th>
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<th>Waste</th>
<th>Manufacturer</th>
<th>Part Identifier</th>
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<tr>
<td>Air Release</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>A.R.I. USA, Inc.</td>
<td>D-025</td>
<td>• Shall be combination air release and vacuum (CARV) type.</td>
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<td></td>
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<td></td>
<td></td>
<td>S-025</td>
<td>• Working pressure range of 3-150 psi, testing pressure of 250 psi.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Maximum operating temperature of 140°F.</td>
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<td></td>
<td></td>
<td>• 2” threaded inlet and 1-1/2” threaded outlet.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Reinforced nylon body.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Grade 316 stainless steel internal parts.</td>
</tr>
<tr>
<td>Gate Valves</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>American Flow Control</td>
<td>AFC-2500</td>
<td></td>
</tr>
<tr>
<td>4”-12” (Resilient Seated-Only)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>American AVK</td>
<td>Series 65</td>
<td>All Valves:</td>
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<tr>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>M&amp;H</td>
<td>C509</td>
<td>• Mechanical joint ends and conforming to AWWA C509/C515.</td>
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<tr>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>US Pipe</td>
<td>A-USP1</td>
<td>• Resilient seats shall be of natural or synthetic rubber and be fully encapsulated to gate.</td>
</tr>
<tr>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Mueller</td>
<td>A-2361</td>
<td>• 18-8 Type 304 stainless steel bolts and nuts.</td>
</tr>
<tr>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Clow</td>
<td>Model 2638</td>
<td>• Interior and exterior of valve body shall be fusion-bonded epoxy coated in accordance with AWWA C550.</td>
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<tr>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Kennedy Valve</td>
<td>KS-RW</td>
<td>• Valve seats must seal by compression only.</td>
</tr>
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<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Mueller</td>
<td>A-2361</td>
<td>4”-12”:</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>American Flow Control</td>
<td>AFC-2500</td>
<td>• Valves shall have 2” square operating nuts and open CCW.</td>
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<td>16”-48” (Resilient Seated-Only)</td>
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<td>✔</td>
<td>✔</td>
<td>US Pipe</td>
<td>A-USP1</td>
<td>16”-48”:</td>
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<td>✔</td>
<td>✔</td>
<td>American AVK</td>
<td>Series 45 (16”, 18”-24”)</td>
<td>• Valves shall have 2” square operating nuts and open CCW with bevel gear operator.</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>M&amp;H</td>
<td>C515</td>
<td>Gate Valves Used in Lift Stations:</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Clow</td>
<td>Model 2638</td>
<td>• Flanged ends, hand wheel operated, non-rising stem, epoxy coated, equipped with double O-ring-sealed stuffing box.</td>
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<tr>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Kennedy Valve</td>
<td>KS-RW</td>
<td>• Grade 316 stainless steel fasteners.</td>
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<td>Insert Valves</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Team</td>
<td>-</td>
<td>4”-12”:</td>
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<tr>
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<td></td>
<td></td>
<td>• Resilient seated and conforming to AWWA C515.</td>
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<td></td>
<td>• Coated to conform to AWWA C550.</td>
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<td>• Wedge shall be ductile iron fully encapsulated in EPDM rubber.</td>
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### APPENDIX A. APPROVED MATERIALS

<table>
<thead>
<tr>
<th>Category</th>
<th>Potable</th>
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<th>Waste</th>
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<tr>
<td>Valve Extensions</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>General Engineering</td>
<td>Model 4840-001-3</td>
<td>• Extension shall have a centering collar and attach mechanically to valve nut</td>
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<tr>
<td>Valve Boxes</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>East Jordan Iron Works</td>
<td>Series 8550</td>
<td>• 5-1/4&quot; minimum inside diameter.</td>
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<td>✓</td>
<td>✓</td>
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<td>East Jordan Iron Works</td>
<td>6800045 (Roadway)</td>
<td>• Box sections shall be telescopic and adjustable.</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>East Jordan Iron Works</td>
<td>6800073 (Roadway)</td>
<td>• Valve box lids shall be appropriately casted with the label &quot;WATER&quot;, &quot;REUSE&quot; or &quot;SEWER&quot; on top.</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>Tyler</td>
<td>Series 6500/6850/6860</td>
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<td>Valve Box Alignment Rings</td>
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<td>Boxlok</td>
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# APPENDIX A. APPROVED MATERIALS

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<th>Part Identifier</th>
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<tr>
<td>Tapping Sleeve</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Ford</td>
<td>FTSS</td>
<td>• Sleeve shall be fabricated entirely from 18-8 Type 304 stainless steel and fully passivated.</td>
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<td>✓</td>
<td>✓</td>
<td>Mueller</td>
<td>H-304 SS</td>
<td>• Pass-through bolt design and full circumferential gasket.</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>JCM</td>
<td>432</td>
<td><strong>Sleeves on 16” to 24” mains:</strong>&lt;br&gt;• O-ring seal.&lt;br&gt;• Fusion bonded, epoxy coated.&lt;br&gt;• 18-8 Type 304 stainless steel nuts and bolts.</td>
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<td>✓</td>
<td>✓</td>
<td>JCM</td>
<td>415</td>
<td><strong>Sleeves on ACP:</strong>&lt;br&gt;• JCM 432 or approved equal.</td>
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<td>✓</td>
<td>Smith-Blair</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Robar</td>
<td>6606</td>
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<td>✓</td>
<td>TPS</td>
<td>Triple Tap Tapping Sleeve</td>
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<table>
<thead>
<tr>
<th>Category</th>
<th>Potable</th>
<th>Reclaimed</th>
<th>Waste</th>
<th>Manufacturer</th>
<th>Part Identifier</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Line Stop Sleeve | ✓       | ✓         | ✓     | JCM                | 440             | **Line Stop sleeves on 4”-12” Mains:**  
• Entire line stop sleeve shall be fabricated from 18-8 Type 304 stainless steel and fully passivated.  
• Sleeve outlet shall be full port.  
• 18-8 Type 304 stainless steel nuts and bolts  
  **Gasket:**  
• 1/4” thick full circumferential gasket molded of synthetic rubber compound with a gridded surface  
• 18-8 Type 304 stainless steel bridge plates molded flush into the gasket with a raised hydromechanical outlet seal to seal against line surges and water hammer.  
  **Pressure Rating**  
• Sleeves rated at 150 psi hydrostatic with a test pressure of 200 psi on pipe with a full circumferential break. |
| Hydrants       | ✓       |           |       | American-Darling   | B-84-B-5        | **Hydrant:**  
• Manufactured in accordance with AWWA C502.  
• Bronze-to bronze main seat threading surfaces.  
• Traffic type with drain holes factory plugged.  
• 18-8 Type 304 stainless steel nuts and bolts.  
• Minimum 5-1/4” valve opening, (1) 4-1/2” pumper nozzle, and (2) 2-1/2” hose nozzles; nozzles must have NST threads.  
• Stem couplings to be cast iron or stainless steel. Upper valve plate must be bronze.  
  **Coating:**  
• Hydrant shoe will be coated inside with fusion-bonded epoxy, minimum of 6 mils.  
• Factory coated with Rustoleum high-performance epoxy 9100 system, non-lead, dry film thickness of 5 to 8 mils, color #9143 yellow. |
|                | ✓       |           |       | Mueller            |                 |                                                                         |
|                |         |           |       | Super Centurion 250 A-423 |                 |                                                                         |
|                | ✓       |           |       | Super Centurion 350 A-423 |                 |                                                                         |
|                | ✓       |           |       | Clow               |                 |                                                                         |
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<tr>
<th>Category</th>
<th>Potable</th>
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<th>Waste</th>
<th>Manufacturer</th>
<th>Part Identifier</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Brass Service Saddles     | ✓       | ✓         |       | Mueller      | BR1B           | • 3/4”-1” services  
                               |         |           |       |              |                | • CC thread                   |
|                           | ✓       | ✓         |       |              | BR2B           | • 1-1/2”-2” services  
                               |         |           |       |              |                | • CC thread                   |
|                           | ✓       | ✓         |       | Ford         | Style 101B     | • 3/4”-1” services for pipe sizes 4”-12”  
                               |         |           |       |              |                | • CC thread                   |
|                           | ✓       | ✓         |       | Ford         | Style 202B     | • 3/4”-2” services for pipe sizes 16” and larger  
                               |         |           |       |              |                | • CC thread                   |
| Service Materials         | ✓       | ✓         |       | Mueller      | FB600, FB600-3, FB600-4, FB600-6, FB600-7 | • 3/4”-2” services  
                               |         |           |       |              |                | • CC thread x Flare            |
|                           | ✓       | ✓         |       | Ford         | FB1600         | • 2” services  
                               |         |           |       |              |                | • CC thread x F.I.P            |
| Corporation Stop          | ✓       | ✓         |       | Mueller      | B-25000        | • 3/4”-2” services  
                               |         |           |       |              |                | • CC thread x Flare            |
|                           | ✓       | ✓         |       |              | B-25045        | • 2” services  
                               |         |           |       |              |                | • CC thread x F.I.P            |
## APPROVED MATERIALS

<table>
<thead>
<tr>
<th>Category</th>
<th>Potable</th>
<th>Reclaimed</th>
<th>Waste</th>
<th>Manufacturer</th>
<th>Part Identifier</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Curb Stops        | ✓       | ✓         |       | Ford         | B23-232W-NL              | 3/4” - 1” Curb Stops:  
• Flare-by-meter coupling.  
• Locking wings and a swivel meter nut. |
|                   | ✓       | ✓         |       | B23-444W-NL  |                          |                                                                      |
|                   | ✓       | ✓         |       | BF23-666W-NL | BF23-666W-NL             |                                                                      |
|                   | ✓       | ✓         |       | BF23-777W-NL | BF23-777W-NL             |                                                                      |
|                   | ✓       | ✓         |       | Mueller      | B-24352-N                | 1-1/2” - 2” Curb Stops:  
• Flare-by-meter flange.  
• Locking wings and a swivel meter nut. |
|                   | ✓       | ✓         |       | B-24334-N    |                          |                                                                      |
|                   | ✓       | ✓         |       | H-14352-N    |                          |                                                                      |
| Service Materials | ✓       | ✓         |       | Oldcastle Enclosure Solutions | 1324 (Tier 15) | All Meter Boxes:  
• See Section 2.2.6.4 for ANSI/SCTE load tier requirements.  
Radio Read Meters:  
• Lid compatible with City’s AMR meter antennae. |
| Meter Boxes       | ✓       | ✓         |       | B-1730 (AASHTO H20) | B1324 (AASHTO H20) |                                                                      |
|                   | ✓       | ✓         |       | B-1730 (AASHTO H20) | B1730 (AASHTO H20) |                                                                      |
|                   | ✓       | ✓         |       | DFW Plastics  | DFW 1730C-12 (Tier 15)  | Meter Boxes for Reclaimed Services:  
• Purple meter box. |
|                   | ✓       | ✓         |       | DFW 37C-12-1 (Tier 15) | DFW 37C-12-1 (Tier 15) |                                                                      |
|                   | ✓       | ✓         |       | Hubbel Power Systems | PG1730HA00 (Tier 15) |                                                                      |
## APPENDIX A. APPROVED MATERIALS

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<thead>
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<td><strong>Firelines</strong></td>
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<td>✓</td>
<td></td>
<td>Ames</td>
<td>3000 SS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Ames</td>
<td>Colt Series C300 Na (Limited space)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Febco</td>
<td>876 V-OSY-G (Limited space)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Watts</td>
<td>774 DCDA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Watts</td>
<td>757NDCDAOSY (Limited space)</td>
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<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Zurn Wilkins</td>
<td>350 DA</td>
<td>• See Section 2.2.3</td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Zurn Wilkins</td>
<td>375</td>
<td></td>
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<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Zurn Wilkins</td>
<td>450 DA</td>
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<tr>
<td><strong>Domestic Backflow Preventers</strong></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Ames</td>
<td>4000 S</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>✓</td>
<td></td>
<td>Febco</td>
<td>825 YD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
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<td>Watts</td>
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<tr>
<td></td>
<td>✓</td>
<td>✓</td>
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<td>Zurn Wilkins</td>
<td>375</td>
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## APPENDIX A. APPROVED MATERIALS

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<tr>
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<td>✓</td>
<td>✓</td>
<td>Cascade</td>
<td>CCS</td>
<td></td>
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<tr>
<td>Casing Spacers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Cascade</td>
<td>CCS-ER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>BWM Co.</td>
<td>BWN-SS</td>
<td>All Sizes:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CCI Pipeline Systems</td>
<td>CSS8/12</td>
<td>• Stainless steel with polyethylene skids.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Bands and fasteners shall be 18-8 Type 304 stainless steel.</td>
</tr>
<tr>
<td>Casing End Seals</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Cascade</td>
<td>CCES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>BWM Co.</td>
<td>BWM</td>
<td>• Bands shall be 18-8 Type 304 stainless steel.</td>
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<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>CCI Pipeline Systems</td>
<td>ESW/ESC</td>
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## APPENDIX A. APPROVED MATERIALS

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<tr>
<td>Manholes</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>Armorock</td>
<td>-</td>
<td>• See Section 3.1.2.1</td>
</tr>
<tr>
<td>Polymer Concrete Manholes</td>
<td></td>
<td>-</td>
<td>✓</td>
<td>Armorock</td>
<td>-</td>
<td>• See Section 3.1.2.1</td>
</tr>
<tr>
<td>Flexible Pipe Connectors</td>
<td>✓</td>
<td>-</td>
<td></td>
<td>Trelleborg</td>
<td>Kor-N-Seal Series 106/206/406</td>
<td></td>
</tr>
<tr>
<td>Frames &amp; Lids</td>
<td>✓</td>
<td>-</td>
<td></td>
<td>US Foundry</td>
<td>No. 225-AS-ORS</td>
<td>• See Section 3.1.4</td>
</tr>
<tr>
<td>Composite</td>
<td>✓</td>
<td>-</td>
<td></td>
<td>Composite Access Products</td>
<td>CAP ONE</td>
<td>• See Section 3.1.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>✓</td>
<td>Trumbull</td>
<td>Model 367</td>
<td></td>
</tr>
<tr>
<td>Liner</td>
<td>✓</td>
<td>-</td>
<td></td>
<td>AGRU America</td>
<td>HDPE Sure Grip</td>
<td>• See Section 3.1.5.2&lt;br&gt;• Installation shall be performed by qualified and authorized AGRU installers</td>
</tr>
<tr>
<td>Joint Sealant</td>
<td>✓</td>
<td>-</td>
<td></td>
<td>Henry</td>
<td>Ram-Nek RN101</td>
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<td>Category</td>
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<td>Waste</td>
<td>Manufacturer</td>
<td>Part Identifier</td>
<td>Notes</td>
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<td>-------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------------------------------------------------------------</td>
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</table>
| Lift Stations    |         |           |       | AGRU America   | HDPE Sure Grip  | • See Section 3.8.3.1  
                        |         |           | ✓     |                |                | • Installation shall be performed by qualified and authorized AGRU installers |
| Lighting         |         | ✓         |       | RAB Lighting   | PS4-11-15D2    | • Bronze color.                                                       |
| Electrical       |         |           |       | RAB Lighting   | ALED3T150      | • 5000K color temperature                                             |
| Surge Protection |         |           | ✓     | Ditek          | D200 Series    | • Shall be installed in a separate cabinet enclosure.                |
## Appendix A. Approved Materials

<table>
<thead>
<tr>
<th>Category</th>
<th>Potable</th>
<th>Reclaimed</th>
<th>Waste</th>
<th>Manufacturer</th>
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</tr>
<tr>
<td>Electrical</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Control Panel</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Square-D</td>
<td></td>
<td>-</td>
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<tr>
<td>Terminal Blocks</td>
<td>✓</td>
<td></td>
<td></td>
<td>General Electric</td>
<td></td>
<td>-</td>
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<tr>
<td>Motor Starters</td>
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<td></td>
<td></td>
<td>Square-D</td>
<td>Series 8536S</td>
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<td>Float Switch</td>
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<td></td>
<td>Phoenix Contact</td>
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<td>-</td>
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<tr>
<td>Emergency Generator Receptacle</td>
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<td></td>
<td></td>
<td>Anchor Scientific</td>
<td>Roto-Floate S</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Russel Stoll</td>
<td>JRS 1044FR</td>
<td>100-Amp</td>
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# APPENDIX A. APPROVED MATERIALS

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<th>Category</th>
<th>Potable</th>
<th>Reclaimed</th>
<th>Waste</th>
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<th>Part Identifier</th>
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<td>Lift Stations</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>↑</td>
<td>↓</td>
<td></td>
<td>Square-D</td>
<td>9080GK6</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Crouse-Hinds</td>
<td>EYSR6 Retrofit Sealing Fitting</td>
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<td></td>
<td></td>
<td>Polywater</td>
<td>FST Foam Sealant, Part # FST-MINI-1G</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Eurobex</td>
<td>5412 ESSPCH</td>
<td>• Cabinet shall be NEMA 4x, lockable, with an inner panel for equipment mounting and a separate inner panel on the door for mounting radio and will have a factory powder-coated white finish.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yagis</td>
<td>Y4503</td>
<td></td>
</tr>
<tr>
<td>SCADA</td>
<td>↑</td>
<td>↓</td>
<td></td>
<td>Times Microwave Systems</td>
<td>LMR-400-DB</td>
<td>• 3/8&quot; diameter flexible low loss coaxial cable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hubbell</td>
<td>SHC1023</td>
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<td></td>
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<td>Allen-Bradley</td>
<td>700-HN121</td>
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<th>Manufacturer</th>
<th>Part Identifier</th>
<th>Notes</th>
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<tr>
<td>Lift Stations</td>
<td></td>
<td>✓</td>
<td></td>
<td>Kohler</td>
<td></td>
<td>• Equipped with John Deere, Cummins, or Caterpillar engine with a minimum 60 kW output.</td>
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<tr>
<td>Mechanical</td>
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<td></td>
<td>AVK</td>
<td>Series 41</td>
<td>• Flanged with fusion bonded epoxy coating with an outside weight and lever, cast iron housing, 316 stainless steel seating ring, clapper with neoprene sealing surface, O-ring sealed stuffing box (minimum size of 4”).</td>
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<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>American Flow</td>
<td>Series 52</td>
<td>• Bolts nuts and washers will be Grade 316 stainless steel.</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>Control</td>
<td></td>
<td>• In accordance with AWWA C508.</td>
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<td>Kennedy Valve</td>
<td>106LW</td>
<td>• Flanged end dimensions drilled to ANSI B16.1 Class 125.</td>
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<td></td>
<td></td>
<td></td>
<td>• Flanged end dimensions drilled to ANSI B16.1 Class 125.</td>
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<td>Mueller</td>
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<td>No. A-2600-6-01</td>
<td>• Flanged end dimensions drilled to ANSI B16.1 Class 125.</td>
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<td>Submersible Pumps</td>
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<td>Hydromatic</td>
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<td>• See Section 3.8.4</td>
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<td></td>
<td></td>
<td></td>
<td>ABS</td>
<td></td>
<td>• See Section 3.8.4</td>
</tr>
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<td></td>
<td></td>
<td>Flyght</td>
<td></td>
<td>• See Section 3.8.4</td>
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<th>Part Identifier</th>
<th>Notes</th>
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<td>✓</td>
<td>✓</td>
<td>Bilco</td>
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<td>• See Section 3.8.2 and Section 3.8.5</td>
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<td>Structural</td>
<td></td>
<td></td>
<td></td>
<td>Halliday</td>
<td>-</td>
<td></td>
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<tr>
<td>Aluminum Access Covers</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tracer Wire</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Pro-Line</td>
<td>CU HDPE 30 MIL 12 AWG</td>
<td>• Used for open-cut installations</td>
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<tr>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>Pro-Trace HDD-CCS PE45 10 AWG</td>
<td>• Used for horizontal directional drilling installations</td>
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<td>✓</td>
<td>✓</td>
<td>Dryconn</td>
<td>King 6 Blue</td>
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<tr>
<td>Connector</td>
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<td></td>
<td></td>
<td>Direct Bury Lug Aqua</td>
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</tr>
<tr>
<td>Polyethylene Tubing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>T. Christy's Enterprises</td>
<td>-</td>
<td>• Shall conform to AWWA C105 requirements</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>AA Thread</td>
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<td>• Blue for potable water, purple for reclaimed water, and green for waste water</td>
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<td>✓</td>
<td>Trumbull</td>
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APPENDIX B. DRAWINGS AND DETAILS
2 GATE VALVES - PVC/DIP

MASTER FIRE SERVICE METER STATION

(SEE SHEET 2 OF 3)

DOUBLE CHECK VALVE BY-PASS
(SEE SHEET 3 OF 3)

CONCRETE PAD

NOTES:
1. ALL UNDERGROUND PIPING IS TO BE DUCTILE IRON WITH RESTRAINED MECHANICAL JOINTS, POLYETHYLENE WRAPPED
2. PIPING SIZES TO BE DETERMINED BY THE ENGINEER OF RECORD AND APPROVED BY COCOA UTILITIES
3. ALL WORK IS TO CONFORM TO CITY OF COCOA STANDARDS.
NOTE:

1. ASSEMBLY IS TO BE PAINTED RUST–OLEUM 9400 SYSTEM (BLUE) BY THE CITY, PAID FOR BY THE DEVELOPER.

2. ALL ABOVE GROUND NUTS, BOLTS, AND WASHERS TO BE #304 STAINLESS STEEL

3. ALTHREAD ROD WILL NOT BE PERMITTED

4. METER IS TO BE NEPTUNE HIGH PERFORMANCE PROTECTUS III FIRE SERVICE METER WITH STRAINER, PROVIDED BY THE CITY AND PAID BY THE CONTRACTOR.

5. REDUCED PRESSURE BACK FLOW PREVENTER IS TO BE FIRE RATED: FEDCO, AMES, WATTS, CLAS–VAL, WILKINS (ZURN), HERSEY
NOTE:

1. ASSEMBLY IS TO BE PAINTED RUST–OLEUM 9400 SYSTEM (BLUE) BY THE CITY, PAID FOR BY THE DEVELOPER.
2. ALL ABOVE GROUND NUTS, BOLTS, AND WASHERS TO BE #304 STAINLESS STEEL
3. ALL THREAD ROD WILL NOT BE PERMITTED
4. METER IS TO BE NEPTUNE HIGH PERFORMANCE PROTECTUS III FIRE SERVICE METER WITH STRAINER, CITY OF COCOA WILL PROVIDE
5. DOUBLE CHECK VALVE IS TO BE FIRE RATED: FEDCO, AMES, WATTS, CLAS–VAL, WILKINS (ZURN), HERSEY
6. CONCRETE PAD TO BE SAME ELEVATION AS TOP OF EXISTING METER VAULT. MAY REQUIRE FILL MATERIAL

© REFER TO THRUST BLOCK NOTES & DETAILS.
COMPOUND METER AND STRAINER
CONTRACTOR TO SUPPLY SPOOL PIECE DURING TESTING. SPOOL PIECE LENGTH TO BE DETERMINED.

2" COPPER SERVICE LINE W/ I.P. CURB STOP (BY-PASS) W/ BRASS PLUG

RES. SEAT GATE VALVE
90° BEND (FL x FL)
REDUCER (FL x FL)
FLOW
12"
ABOVE CONCRETE PAD
FLOW

NOTE:
1. ASSEMBLY IS TO BE PAINTED RUST-O-THANE NO. 9407-1854 (BLUE)
2. ALL ABOVE GROUND BOLTS AND NUTS TO BE #304 STAINLESS STEEL
3. ALTHREAD ROD WILL NOT BE PERMITTED.
4. 12" MIN. CLEARANCE FROM THE VENT ON THE BACKFLOW PREVENTER TO THE CONCRETE PAD.
5. 45° BENDS MAY BE USED WHEN PRIOR APPROVED BY ENGINEER.
6. ALL FITTINGS ARE RESTRAINED.
7. IN LIEU OF CONCRETE SUPPORTS, ADJUSTABLE STAINLESS STEEL SUPPORTS ALLOWED.
8. 2" COPPER SERVICE LINE TO BE INSTALLED ON BRASS SADDLE OR WELDED BOSS. 2" BRASS MAY BE USED IN LIEU OF COPPER.
9. ABOVE GROUND ASSEMBLY SHALL BE SETBACK A MINIMUM OF 3' FROM BACK OF CURB.

® REFER TO GATE VALVE & VALVE BOX DETAIL.
© REFER TO THRUST BLOCK NOTES & DETAILS.

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

3 INCH AND LARGER METER
WITH BACKFLOW PREVENTER
ABOVE GROUND INSTALLATION

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: 3 IN AND LARGER METER WITH BACKFLOW rev
TRACER WIRE
EXISTING AC COUPLING
STELLAR CLAMP
CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

3/4" ALL-THREAD ROD
W/NUTS AND WASHERS
(ALL STAINLESS STEEL)

18' EXTRA TRACER WIRE IN BOX

NEW GATE VALVE
57 STONE

AC-DI TRANSITION COUPLING

3/4" ALL-THREAD ROD
W/NUTS AND WASHERS
(ALL STAINLESS STEEL)

18'x18'x4'
CONCRETE PAD

NOTE:
IF EXISTING A.C. COUPLING IS LESS THAN 9 FEET FROM TIE-IN, THEN PLACE THE CONCRETE COLLAR BEHIND THE EXISTING COUPLING. REFER TO "THRUST COLLAR WATER & RECLAIMED" DETAIL.

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: A.C. PIPE TIE-IN

A.C. PIPE TIE-IN
NOTES:
1. FOR ALL VALVES REGARDLESS OF SIZE AND DEPTH.
NOTE: PERMANENT BLOW-OFFS DO NOT REQUIRE A JOINT OF D.I.P. OR A VALVE. ALSO ALL BLOW-OFFS NEED TO BE PLACED AT PROPERTY LINES.

PROPER AMOUNT OF RESTRAINED PIPE UPSTREAM OF VALVE MAY BE USED IN LIEU OF THRUST COLLAR.

2" BLOW-OFF FOR 10" WATER MAINS AND SMALLER
4" PERMANENT BLOW-OFF FOR 12" WATER MAINS AND LARGER
4" TEMPORARY BLOW-OFF DETAIL
12" WATER MAINS AND LARGER
NOTES:

1. MAIN SHALL BE RESTRAINED JOINT D.I. PIPE AND EXTEND 5' ON EITHER SIDE OF THE DRAINAGE DITCH.
2. CONCRETE SLAB SHALL BE 2' WIDER THAN THE PIPE O.D. AND A MINIMUM WIDTH OF 6'.
3. CONCRETE SHALL BE 2500 PSI COMPRESSIVE STRENGTH WITH FIBERMESH REINFORCEMENT.
4. PER FDEP, ISOLATION VALVE CLOSEST TO THE WATER SOURCE WILL HAVE TWO PERMANENT TAPS AND WILL BE IN A MANHOLE.
NOTES:
1. ALTHEARD ROD WILL NOT BE PERMITTED.
2. 90° BENDS MAY BE INSTALLED IN LIEU OF 45° BENDS IF APPROVED BY FIRELINE ENGINEER & CITY OF COCOA.
3. FIRE DEPARTMENT CONNECTIONS (FDC) WILL NOT BE PERMITTED ON ABOVE GROUND PIPING.
4. ASSEMBLY TO BE PAINTED RUST-OLEUM 9400 SYSTEM (RED) BY THE CITY, PAID FOR BY THE CONTRACTOR.
5. ALL ABOVE GROUND BOLTS AND NUTS TO BE 18–8 TYPE 304 STAINLESS STEEL.
6. CITY OWNS AND MAINTAINS TO BOTTOM FITTING ON DOWNSTREAM SIDE.
7. FOUR TO SIX BOLLARDS MAY BE REQUIRED, SPACED 18" FROM CENTERLINE.
8. A FIRELINE CONTRACTOR SHALL BE REQUIRED FROM THE FIRELINE POINT OF SERVICE.
9. ABOVE GROUND ASSEMBLY SHALL BE SETBACK A MINIMUM OF 3' FROM BACK OF CURB.

© REFER TO THRUST BLOCK NOTES & DETAILS.
NOTES:

SEE SINGLE LINE STOP DETAIL.
SEE THRUST COLLAR WATER & RECLAIMED DETAIL
4"-8" LINE STOP REQUIRES 1" BLEEDER TAP
10" AND LARGER REQUIRES 2" BLEEDER TAP
SEE "SERVICE CONNECTIONS" SPECIFICATIONS
SEE APPENDIX "A" FOR APPROVED MATERIAL
* SEE RESTRAINED PIPE TABLE
HYDRANT TO BE PAINTED @ THE FACTORY W/ RUSTOLEUM HIGH-PERFORMANCE EPOXY 9100 SYSTEM, COLOR #9143 YELLOW. HYDRANT TO BE PAINTED BY THE CITY AND PAID BY THE CONTRACTOR.

3'x3'x12" CONCRETE COLLAR WITH 8 MIL POLYETHYLENE BETWEEN BARREL AND CONCRETE

18" MIN. 24" MAX.

2'x2'x4" CONCRETE PAD

VALVE BOX

18" EXTRA WIRE IN BOX

TRAVERSE WIRE

THRU BLOCK

57 STONE

ALIGNMENT RING

6" GATE VALVE (MJ)

ANCHORING TEE

THRU BLOCK

PIPE OR ANCHORING NIPPLE

HYDRANT SHOE SHALL BE FUSION BONDED EPOXY COATED (6 MIL THICKNESS MIN.) IN ACCORDANCE WITH AWWA–C–550

NOTES:

1. CITY CREWS WILL APPLY FINISH PAINT COAT.
2. HYDRANT RISERS WILL NOT BE PERMITTED.
3. FIRE HYDRANT WILL HAVE 18–8 TYPE 304 STAINLESS STEEL BOLTS AND NUTS (BONNET, TRAFFIC FLANGE AND SHOE).
4. SEE "FIRE HYDRANTS" SPECIFICATIONS.
5. PAINT PAID BY THE CONTRACTOR.

REFER TO THRUST BLOCK NOTES AND DETAILS.
4" STEEL (SCH#40) PIPE
(4 EACH)

CONCRETE TOP (TYP. ALL)
(ROUNDED SMOOTH)

4" STEEL (SCH#40) PIPE
FILLED WITH CONCRETE,
PAINTED RUSTOLEUM HIGH-
PERFORMANCE EPOXY 9100
SYSTEM, COLOR #9143 YELLOW
AFTER INSTALLATION.

FINISH GRADE

2500 PSI CONCRETE

NOTES:
1. GUARD POSTS WILL BE FURNISHED & INSTALLED BY THE CONTRACTOR
   AND APPROVED BY THE ENGINEER.
2. GUARD POSTS SHALL BE INSTALLED PLUMB AND LOCATED TO ALLOW
   UNRESTRICTED ACCESS TO PUMPER AND HOSE CONNECTIONS.
NOTE: PROPER SIZE VALVE BOX SHALL BE INSTALLED. PVC PIPE OR DUCTILE IRON PIPE EXTENSIONS SHALL NOT BE USED ON VALVE BOX INSTALLATION.
NOTES:

1. PVC PIPE OR DUCTILE IRON PIPE EXTENSIONS SHALL NOT BE USED ON VALVE BOX INSTALLATION.

2. IF THE DEPTH OF THE VALVE NUT IS GREATER THAN 48" BELOW GRADE, OR 30" BELOW GRADE AND UNDER THE WATER TABLE, A VALVE EXTENSION WILL BE REQUIRED. SEE VALVE EXTENSION STEM DETAIL.

3. PROVIDE A PLASTIC DEBRIS SHIELD/ALIGNMENT RING WHICH INSTALLS BELOW THE VALVE ACTUATING NUT. THIS SHIELD SHALL CENTER THE RISER PIPE BOX OVER THE ACTUATING NUT AND MINIMIZE INFILTRATION.

4. TRACER WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 18" ABOVE TOP OF COLLAR. WIRE SHALL BE COLOR CODED TO MATCH THE UTILITY INSTALLED.

5. FOR NEW CONSTRUCTION, THE VALVE BOX SHALL BE ADJUSTED TO MIDRANGE TO ALLOW FOR FUTURE BOX ADJUSTMENTS.

THIS DETAIL APPLIES TO ALL BURIED VALVES.
NOTES:
1. WHEN CONSTRUCTION IS WITHIN FDOT JURISDICTION, ADDITIONAL REQUIREMENTS OF THE UTILITY ACCOMMODATION GUIDE SHALL BE MET.
2. DISTANCE BETWEEN SPACERS TO BE PER MANUFACTURER'S SPECIFICATIONS.
3. NO FLOWABLE FILL BETWEEN THE ANULAR SPACE OF THE CASING OR CARRIER PIPE.

* SHALL BE A MINIMUM OF 6' OR MEET FDOT REQUIREMENTS, WHICHEVER IS GREATER.

SEE "JACK AND BORE" SPECIFICATIONS
PROPOSED JUMPER METER (FLANGE) PROVIDED BY CITY (CONTRACTOR TO INSTALL)

PROPOSED 2" GATE VALVE "NO COMPRESSION" "COUPLINGS"

GRADE BRASS OR GALVANIZED PIPING NO PVC

2" CORPORATION STOP (TYP. 2 PLCS.)

PROPOSED BRONZE SADDLE NO TEES OR SPIGOTS UPSTREAM OF METER

EXISTING WATER MAIN

INLET: AWWA TAPER ("CC") THREAD OUTLET: F.I.P. THREAD

PROJECT TIE-IN VALVE

57 STONE

18" EXTRA WIRE

PROPOSED 2" GATE VALVES

PROPOSED 2" DOUBLE CHECK OR REDUCED PRESSURE ZONE BACKFLOW PREVENTER (PROVIDED BY CONTRACTOR)

MAY USE POLY AT THIS POINT PROPOSED 90° BEND

GRADE BRASS OR GALVANIZED PIPING NO PVC

PROPOSED 90° BEND INSTALLATION OF SWAB IN NEW WATER MAIN TO BE FLUSHED OUT WITH JUMPER ASSEMBLY AND WITNESSED BY CITY OF COCOA INSPECTION

NOTES:
1. REQUIRED AT ALL CONNECTIONS BETWEEN EXISTING ACTIVE WATER MAINS AND PROPOSED WATER MAIN IMPROVEMENTS.
2. ONLY EXCEPTION TO JUMPER AND METER ASSEMBLY IS INSTALLATION OF FIRE HYDRANT WHERE AN ANCHORING NIPPLE IS USED.
LINE STOP MACHINE

LINE STOP FITTING

EXISTING PIPE

LINE STOP VALVE

BLEEDER TAP

9' OF UNDISTURBED SOIL

RETAINER GLAND

COLLAR BLOCK

SEE THRUST COLLAR WATER AND RECLAIMED DETAIL

RESTRAINED FITTING

SUPPORT BLOCK

FORM & POUR SUPPORT BLOCK ON UNDISTURBED OR COMPACTED EARTH

AFTER LINE STOP FITTING IS INSTALLED & BEFORE LINE STOP MACHINE IS MOUNTED FOR 16"–20", A= LENGTH OF FITTING PLUS 6"

NOTES:

4"–8" LINE STOP REQUIRES 1" BLEEDER TAP

10" AND LARGER REQUIRES 2" BLEEDER TAP

SEE "SERVICE CONNECTION" SPECIFICATIONS

SEE APPENDIX "A" FOR APPROVED MATERIAL

CONCRETE ANCHOR SUPPORT

PIPE SIZE (INCHES) | A | B | C
---|---|---|---
4 | 18" | 6" | 6"
6 | 18" | 6" | 6"
8 | 24" | 6" | 6"
10 | 24" | 8" | 8"
12 | 30" | 8" | 8"
16 | SEE NOTE | 12" | 12"
20 | SEE NOTE | 18" | 18"

LINE STOP SPECIFICATIONS:
SEE SECTION 2.2.4.5

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:

ACAD NAME: LINE STOP DETAIL FOR TIE IN OR CAPPING EXISTING WATER MAIN

ACAD NAME: LINE STOP DETAIL FOR TIE IN OR CAPPING EXISTING WATER MAIN
NOTES:
1. ALL PIPE SHALL REQUIRE INSULATED TRACER WIRE CAPABLE OF DETECTION AND SHALL BE TAPED EVERY 10' TO TOP CENTERLINE OF THE PIPE.
2. WIRE IS TO BE CONNECTED TOGETHER USING AN UNDERGROUND WIRE NUT WITH A SILICON BASED SEALANT.
3. SEE "TRACER WIRE" SPECIFICATIONS.
NOTES:
1. ALTHEREAD ROD WILL NOT BE PERMITTED.
2. FIRE DEPARTMENT CONNECTIONS (FDC) WILL NOT BE PERMITTED ON ABOVE GROUND PIPING.
3. ASSEMBLY TO BE PAINTED RUST-O-THANE RED NO. 9405-1611
4. ALL ABOVE GROUND BOLTS AND NUTS TO BE 18-8 TYPE 304 STAINLESS STEEL.
5. CITY OWNS AND MAINTAINS TO BOTTOM FITTING ON DOWNSTREAM SIDE.
6. FOUR TO SIX BOLLARDS MAY BE REQUIRED, SPACED 18" FROM CENTERLINE.
7. A FIRELINE CONTRACTOR SHALL BE REQUIRED FROM THE FIRELINE POINT OF SERVICE.

© REFER TO "THRUST BLOCK" NOTES & DETAILS.
STEP-1 PLACE TUBE OF POLYETHYLENE MATERIAL AROUND PIPE PRIOR TO LOWERING PIPE INTO TRENCH.

STEP-2 PULL THE TUBE OVER THE LENGTH OF THE PIPE. TAPE TUBE TO PIPE AT JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH THREE CIRCUMFERENTIAL TURNS OF TWO-INCH WIDE PLASTIC TAPE TO HOLD PLASTIC TUBE AROUND SPIGOT END.

STEP-3 ADJACENT TUBE OVERLAPS FIRST TUBE AND IS SECURED WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE WILL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED INTO AN OVERLAP ON TOP OF THE PIPE AND HELD IN PLACE BY MEANS OF PIECES OF THE PLASTIC TAPE AT APPROXIMATELY THREE TO FIVE FOOT INTERVALS.
## Minimum Length (ft) to Be Restained on Each Side of Fitting(s)

<table>
<thead>
<tr>
<th>Type</th>
<th>4&quot;</th>
<th>6&quot;</th>
<th>8&quot;</th>
<th>10&quot;</th>
<th>12&quot;</th>
<th>16&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° Bend</td>
<td>11</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>45° Bend</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>22-1/2° Bend</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>11-1/4° Bend</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Plug, Branch of Tee, Valve</td>
<td>25</td>
<td>35</td>
<td>45</td>
<td>54</td>
<td>64</td>
<td>82</td>
</tr>
</tbody>
</table>

### Notes:

1. Fittings shall be restrained joints.
2. Install full length joints with total length equal to or greater than shown in the table.
3. Where two or more fittings are together, use fitting which yields greatest length of restrained pipe.
4. All line valves and through run of tees shall be restrained.
5. Lengths shown in the table have been calculated using the EBAA Iron Restraint Length Calculator with the following assumptions:
   - Working Pressure: 70 PSI
   - Soil Designation: SM (SAND SILT)
   - Safety Factor: 2.0 TO 1
   - Trench Type: 3
   - Depth of Bury: 3 FT
6. Table is for PVC only. Restrained length for alternate materials will need to be submitted to the engineering division for approval.
<table>
<thead>
<tr>
<th>MINIMUM LENGTH (FT) TO BE REstrained</th>
<th>PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE 1</td>
<td>4&quot; 6&quot; 8&quot; 10&quot; 12&quot; 16&quot; 20&quot; 24&quot;</td>
</tr>
<tr>
<td>90°BEND</td>
<td>21 29 38 45 53 66 79 91</td>
</tr>
<tr>
<td>45°BEND</td>
<td>9 12 16 19 22 45 33 38</td>
</tr>
<tr>
<td>22-1/2°BEND</td>
<td>5 6 8 9 11 14 16 19</td>
</tr>
<tr>
<td>11-1/4°BEND</td>
<td>3 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td>PLUG, BRANCH OF TEE, VALVE</td>
<td>58 82 107 128 151 193 234 273</td>
</tr>
</tbody>
</table>

NOTES:

1. FITTINGS SHALL BE RESTRAINED JOINTS.

2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN SHOWN IN THE TABLE.

3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS GREATEST LENGTH OF RESTRAINED PIPE.

4. ALL LINE VALVES AND THROUGH RUN OF TEES SHALL BE RESTRAINED.

5. LENGTHS SHOWN IN THE TABLE HAVE BEEN CALCULATED IN ACCORDANCE WITH THE PROCEDURE OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" AS PUBLISHED BY DIPRA, WITH THE FOLLOWING ASSUMPTIONS:

   WORKING PRESSURE: 150 PSI
   SOIL DESIGNATION: SM (SAND SILT)
   LAYING CONDITIONS: 3

6. TABLE IS FOR PVC AND WRAPPED DUCTILE IRON.
NEW CONSTRUCTION:
USE RESTRAINED PIPE TABLE
WATER AND RECLAIMED FOR FITTINGS

MAIN RELOCATION:
USE THRUST COLLAR TABLE
OR RESTRAINED PIPE TABLE

A–RESTRAINED JOINT
B–45° BEND (MJ)

* ALL PIPING UNDER STORM DRAINAGE TO BE DIP PER CITY SPECIFICATIONS
ALL PIPE CLEARANCES TO BE PER FDEP SPECIFICATIONS (CHAPTER – 62 – 610 FAC)

PER FDEP 62–555.314

RESTRAINER GLAND

1 JOINT (20')

12’ MIN.

D.I.P.

NOTE:
PVC PIPE INSTALLED IN POTABLE SYSTEMS SHALL BE DR–18.

FINISHED GRADE

MIN. COVER

30” or > PIPE MAY BE PVC PER CITY SPECIFICATIONS
30” TO 24” PIPE TO BE DIP PER CITY SPECIFICATIONS

STORM DRAIN

6” MIN., 12” PREFERRED

DIP OR PVC

THRUSt BLOCK

DIP OR PVC

THRUSt BLOCK

DIP OR PVC

DIP OR PVC

RESTRAINER GLAND

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

STORM DRAIN CROSSING

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: STORM DRAIN CROSSING

SCALE: NOT TO SCALE

SHEET: 1 OF 1
NOTES:
1. MAIN SHALL BE A CONTINUOUS LENGTH OF D.I. PIPE TO EXTEND 2 FEET MINIMUM EITHER SIDE OF THE DRAINAGE SWALE.
2. IF 1 OR MORE JOINTS OF PIPE IS REQUIRED, JOINT MUST BE RESTRAINED.
18" EXTRA WIRE IN BOX

TRACER WIRE

57 STONE

TAPPING SADDLE FLANGE

VALVE BOX

ALIGNMENT RING

TAPPING VALVE

MEGA LUG

12" AND SMALLER P.V.C. OR D.I.P. FULL BODY MJ

SADDLES ON AC PIPE ARE TO BE STAINLESS STEEL JCM 432 OR APPROVED EQUAL.

NOTE: FOR VALVE ASSEMBLY, SEE "VALVE" DETAIL
1.) WRAP ALL FITTINGS WITH POLYETHYLENE FILM BEFORE POURING THRUST BLOCK, MAKING CERTAIN TO KEEP CONCRETE AWAY FROM ALL BOLTS, GLANDS, AND FLANGES.

2.) THRUST BLOCKS TO BE POURED AGAINST UNDISTURBED EARTH.

3.) REQUIRED VOLUMES OF BEARING AREAS TO BE AS SHOWN IN CHART. ADJUSTMENTS, IF NEEDED, WILL BE ALLOWED TO CONFORM TO TEST PRESSURE AND ALLOWABLE SOIL BEARING STRESS AS SHOWN IN SPECIFICATIONS.

4.) BEARING AREA FOR TRANSIT BLOCKS ON HORIZONTAL BENDS IS BASED ON A TEST PRESSURE OF 150 P.S.I. AND SOIL BEARING STRESS OF 2,000 P.S.F. THE DEPTH TO THE THRUST BLOCK BASE TO BE EQUAL TO OR GREATER THAN TWICE THE HEIGHT. (EXAMPLE: IF BLOCK IS 2' THICK, THE BASE IS TO BE NO GREATER THAN 4' BELOW GRADE.)

5.) VERTICAL BEND THRUST BLOCKS TO BE THE SAME AS HORIZONTAL BENDS.

6.) BEARING AREA OF THRUST BLOCK TO BE NOT LESS THAN ONE SQUARE FOOT.

MINIMUM BEARING AREA (SQ. FT.)

<table>
<thead>
<tr>
<th>LETTER</th>
<th>PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4” 6” 8” 10” 12” 16” 20”</td>
</tr>
<tr>
<td>A 1-1/2 2-3/4 5 7-1/4 10-1/4 18 27-1/2</td>
<td></td>
</tr>
<tr>
<td>B (22-1/2) 3/4 1 2 3 4 7 11</td>
<td></td>
</tr>
<tr>
<td>B (45°) 1 2-1/4 3-3/4 5-1/2 8 13-3/4 21</td>
<td></td>
</tr>
<tr>
<td>C 2 4 7 11-1/4 14-1/2 25-1/4 39</td>
<td></td>
</tr>
</tbody>
</table>

THE FIGURES IN THIS TABLE REPRESENT AREA OF CONCRETE BLOCKING AGAINST THE VERTICAL TRENCH WALL OF UNDISTURBED EARTH IN SQUARE FEET AT 2000 P.S.F. SOIL BEARING CAPACITY.
POINT AT WHICH PIPE WILL BE CUT TO INSTALL CAP OR FITTING

COMPACTED BACKFILL

4" X 4" X 1/2" STEEL BEARING PLATE (TYP)

STELLAR CLAMP OR RETAINER GLAND

ENCASE TIE RODS IN 1-1/2" PVC SLEEVE

SS TIE RODS INCLUDING NUTS AND WASHERS (SEE SCHEDULE SHEET 2 OF 2)

PIPE JOINT

COMPACTED BACKFILL

#4 BARS

THrust DIRECTION

3" COVER

(4'-0" MAX)

SEE SHEET 2 OF 2 FOR ADDITIONAL INFORMATION

THrust COLLAR WATer AND RECLAIMED

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: THRUST COLLAR WATER AND RECLAIMED 1 OF 2

SCALE: NOT TO SCALE
### SCHEDULE OF DIMENSIONS AND MATERIALS

<table>
<thead>
<tr>
<th>PIPE SIZE (INCHES)</th>
<th>DIMENSIONS (FT.)</th>
<th>TIE RODS REQ'D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
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<td>12</td>
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<tr>
<td>16 *</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>20</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>24</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Note: Thrust collar areas to be computed on basis of 2000 lbs/sf soil restraint bearing. Soil density assumed 120pcf. Soil cohesion 20°.

### NOTES:
1. Additional reinforcements shall be as specified by the engineer.
2. Minimum compressive strength for concrete shall be 3000 psi.
3. Bedding, backfill and compaction shall be as specified elsewhere in the standard drawings.
4. All form boards shall be removed prior to backfill.
5. No allowance shall be made for friction between the pipe wall and the thrust collar.
7. Tie rods to be 3/4" SS 18-8 type 304.

* To be designed by engineer of record.
NOTES:
1. BORE PLAN TO SHOW SIZE, DEPTH, AND LOCATION OF ALL UTILITIES.
2. BORE PLAN TO BE IN ACCORDANCE WITH LATEST TECHNICAL PROVISIONS.
3. BORE PLAN MUST BE APPROVED BY ENGINEERING DEPARTMENT PRIOR TO ANY CONSTRUCTION.
4. DEPTH OF BORE PER BREVARD COUNTY OR FDOT JURISDICTION.
1. IF DEPTH IS 30" OR >, PIPE MAY BE PVC PER CITY SPECIFICATIONS
2. IF DEPTH IS 30" TO 24", PIPE TO BE DIP PER CITY SPECIFICATIONS

DUCTILE IRON WATER OR REUSE MAIN

10'

10'

SANITARY HAZARD (SANITARY SEWER, FORCE MAIN, STORM SEWER, RE-USE OR WATER)

12" MIN

10'

10'

VERTICAL CLEARANCE

HORIZONTAL CLEARANCE

SANITARY HAZARDS (SANITARY SEWER, FORCE MAIN & STORM SEWER)

6' MIN

3' MIN

(10' PREFERRED)

RE-USE MAIN

WATER MAIN

PER FDEP 62-555.314
1. When within Brevard County ROW, any excavation within 8' of the EOP or 3' from the edge of sidewalk will require shoring to prevent undermining.

NOTE:
TRAFFIC RATED H-20 FOR METER BOXES IN HIGH TRAFFIC AREAS
SEE APPENDIX A, APPROVED MATERIALS
1. Ductile parts are Type 80-60-03 80/100,000 PSI tensile - ASTM A536
2. Assembly to receive two coats bituminous base black paint
3. Tolerance + or -.0625"
4. Tolerance + or -.125"

Type "WVR" valve extension stem
WSSC P&M/1.4 - applicable stock no. 4840-0001-3
STELLAR CLAMP
STELLAR WASHER

PLAN

MAX. 12"

DUC LUG

STELLAR CLAMP

STELLAR WASHER

PROFILE

CONCRETE PAD

REGULAR GLAND

SEE TABLE FOR PAD THICKNESS

<table>
<thead>
<tr>
<th>SIZE</th>
<th>MIN. COVER OF PIPE</th>
<th>CONCRETE PAD SIZE FROM LOWEST POINT OF FITTING</th>
</tr>
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<tbody>
<tr>
<td>4&quot;</td>
<td>24&quot;</td>
<td>16&quot;x16&quot;x6&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>26&quot;</td>
<td>18&quot;x18&quot;x6&quot;</td>
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<td>8&quot;</td>
<td>30&quot;</td>
<td>20&quot;x20&quot;x6&quot;</td>
</tr>
<tr>
<td>*10&quot;</td>
<td>36&quot;</td>
<td>24&quot;x24&quot;x8&quot;</td>
</tr>
<tr>
<td>*12&quot;</td>
<td>40&quot;</td>
<td>30&quot;x30&quot;x8&quot;</td>
</tr>
</tbody>
</table>

* NOTE: 10" AND 12" REQUIRE TWO CLAMPS AND FOUR RODS PER SIDE.

VALVES INSTALLED PER MANUFACTURER’S RECOMMENDATION ON DIP AND PVC.
MANHOLE FRAME & COVER
SEE SECTION 3.1.4

CONCRETE RINGS: MIN 3 IN. WIDE X 1/2 IN. THICK, NOT TO EXCEED 1.0 FT.

RAM NEK OR APPROVED
EQUAL ALL JOINTS

5 IN. WHEN MANHOLE
IS 6.0 FT. DEEP OR LESS

8 IN. WHEN MANHOLE
IS OVER 6.0 FT. DEEP

REINFORCEMENT
SHALL MEET ASTM C478

LIFT HOLES OR INSERTS
SHALL NOT PENETRATE
MANHOLE WALL

PVC PIPE DR-18 WHEN
GRAVITY IS MORE THAN
12 FT. DEEP, PIPE TO BE
ELASTOMERIC GASKET
JOINT

INTERIOR AND EXTERIOR
SURFACES TO HAVE
MIN. 3 COATS OF CS-55
WATER BASED COATING,
CONTRASTING COLORS,
FINAL TO BE APPLIED IN
FIELD (SEE "COATINGS"
SPECIFICATIONS)

PRECAST MANHOLE SHALL HAVE
TYPE II CONCRETE MIN. 4,000 PSI
28 DAY COMpressive STRENGTH
CONFORMING TO ASTM C478 AND
ASTM C857

ENCASE RIBS IN CEMENT MORTAR
COLLAR ALL AROUND

BEDDING & BACKFILL MATERIAL
TO BE COMPACTED TO 95%
DENSITY OUTSIDE ROADWAY AND
98% DENSITY UNDER ROADWAY IN
1.0' LIFTS

RIM ELEVATION
INDICATED ON PLANS

FINISH GRADE

ENCASE RIBS IN CEMENT MORTAR
COLLAR ALL AROUND

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

TYPICAL MANHOLE

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: TYPICAL MANHOLE

NOT TO SCALE

#4 REBAR 12'
O.C.E.W.
EXTENDED
INTO WALLS
MANHOLE FRAME & COVER
SEE SECTION 3.1.4

PRE-CAST POLYMER
CONCRETE RINGS; MIN 3
IN. WIDE X 1/2 IN.
THICK. NOT TO EXCEED
1.0 FT.

5 IN. MINIMUM CONE
THICKNESS.

RAM NEK OR APPROVED
EQUAL ALL JOINTS

4 IN. MINIMUM WALL
THICKNESS.

FIBER-REINFORCED
POLYMER BAR SHALL
MEET ASTM C478 AND
SHALL BE USED FOR
REINFORCEMENT AS
APPLICABLE

LIFT HOLES OR INSERTS
SHALL NOT PENETRATE
MANHOLE WALL

PVC PIPE DR-18 WHEN
GRAVITY IS MORE THAN
12 FT. DEEP, PIPE TO BE
ELASTOMERIC GASKET
JOINT

BEDDING & BACKFILL MATERIAL
TO BE COMPACTED TO 95%
DENSITY OUTSIDE ROADWAY AND
98% DENSITY UNDER ROADWAY IN
1.0' LIFTS

ENCASE RIBS IN CEMENT MORTAR
COLLAR ALL AROUND

RIM ELEVATION
INDICATED ON PLANS

FINISH GRADE

ENCASE RIBS IN CEMENT MORTAR
COLLAR ALL AROUND

PRECAST MANHOLE SHALL HAVE
POLYMER CONCRETE MIN. 9600 PSI
28 DAY COMPRESSIVE STRENGTH
CONFORMING TO ASTM C478 AND
ASTM C857

MANHOLES SHALL HAVE
FACTORY-BUILT BENCH
AND CHANNEL MADE OF
POLYMER CONCRETE AND
SHALL BE CAST
MONOLITHICALLY

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

TYPICAL POLYMER
CONCRETE MANHOLE

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
SHEET: 1 OF 1

ACAD NAME: TYPICAL POLYMER CONCRETE MANHOLE
**TYPICAL MANHOLE WITH OUTSIDE DROP**

**CROSS SECTION**

- MANHOLE FRAME & COVER
  - SEE SECTION 3.1.4

- PRE-CAST POLYMER CONCRETE RINGS; MIN 3 IN. WIDE X 1/2 IN. THICK. NOT TO EXCEED 1.0 FT.

- 5 IN. MINIMUM CONE THICKNESS.

- RAM NEK OR APPROVED EQUAL ALL JOINTS

- PRECAST MANHOLE SHALL HAVE POLYMER CONCRETE MIN. 9,000 PSI 28 DAY COMpressive STRENGTH CONFORMING TO ASTM C478 AND ASTM C857

- FIBER-REINFORCED POLYMER BAR SHALL MEET ASTM C478 AND SHALL BE USED FOR REINFORCEMENT AS APPLICABLE

- LIFT HOLES OR INSERTS SHALL NOT PENETRATE MANHOLE WALL

- PVC PIPE DR-18 WHEN GRAVITY IS MORE THAN 12 FT. DEEP, PIPE TO BE ELASTOMERIC GASKET JOINT

- PVC PIPE SDR-35 WHEN GRAVITY SEWER IS 8.0’ DEEP OR LESS, PIPE TO BE ELASTOMERIC GASKET JOINT SUPPLIED IN 12.5’ LENGTHS

- PVC TEE

- STAINLESS STEEL STRAPS EVERY 2’

- SLOPE

- FACOTRY-BUILT BENCH AND CHANNEL MADE OF POLYMER CONCRETE AND SHALL BE CAST MONOLITHICALLY

- MANHOLES SHALL HAVE (

- PVC 90° BEND

- MANUFACTURER INSTALLED)
MANHOLE FRAME & COVER
SEE SECTION 3.1.4
ENCASE RIBS IN CEMENT MORTAR COLLAR ALL AROUND
PRE-CAST POLYMER CONCRETE RINGS SET IN BUTYL RUBBER SEALANT STRIPS; MIN 3 IN. WIDE X 1/2 IN. THICK, NOT TO EXCEED 1.0 FT.
5 IN. MINIMUM CONE THICKNESS.
RAM NEK OR APPROVED EQUAL ALL JOINTS
4 IN. MINIMUM WALL THICKNESS
FIBER-REINFORCED POLYMER BAR SHALL MEET ASTM C478 AND SHALL BE USED FOR REINFORCEMENT AS APPLICABLE
LIFT HOLES OR INSERTS SHALL NOT PENETRATE MANHOLE WALL
PVC PIPE DR-18 WHEN GRAVITY IS MORE THAN 12 FT. DEEP, PIPE TO BE ELASTOMERIC GASKET JOINT

BEDDING & BACKFILL MATERIAL TO BE COMPACTED TO 95% DENSITY OUTSIDE ROADWAY AND 98% DENSITY UNDER ROADWAY IN 1.0' LIFTS

PRECAST MANHOLE SHALL HAVE POLYMER CONCRETE MIN. 9,000 PSI 28 DAY COMPRESSIVE STRENGTH CONFORMING TO ASTM C478 AND ASTM C857

BOOTS (MANUFACTURER INSTALLED)

FORCE MAIN
45° BEND (MJ x MJ)

MANHOLE SHAPE SHALL HAVE FACTORY-builtin BENCH AND CHANNEL MADE OF POLYMER CONCRETE AND SHALL BE CAST MONOLITHICALLY

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT ENGINEERING DIVISION

FORCE MAIN CONNECTION TO MANHOLE

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DESIGN BY:
ACAD NAME: FORCE MAIN CONNECTION TO MANHOLE

NOT TO SCALE
45° BEND (MJ x MJ)
3" 6" MIN.
6" MIN.
1.2" MIN.
SLOPE
SLOPE
PVC

CROSS SECTION
FLOW

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

FLOW

MANHOLE INVERT

MAKE CURVE AS SMOOTH, WITH AS LARGE OF RADIUS AS POSSIBLE.

PLANT

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021

SCALE: NOT TO SCALE
DESIGN BY:

ACAD NAME: MANHOLE INVERT
ENCASE RIBS IN CEMENT MORTAR COLLAR ALL AROUND

FRAME SHALL HAVE GASKET / O-RING SEAL

NON-SKID SURFACE

NON-PENETRATING PICKHOLE

24" MINIMUM CLEAR OPENING
NOTES:

1. CONTROL PANEL DOOR WHEN OPEN SHALL BE NO MORE THAN 4 FEET FROM WET WELL.

2. 6'' THICK REINFORCED CONCRETE DRIVEWAY (NOT PICTURED) REQUIRED FROM STREET TO WET WELL

3. EXACT SITE LAYOUT, INCLUDING DRIVEWAY AND GATE, WILL BE SITE SPECIFIC.
FINISHED GRADE

RAM-NEK ALL JOINTS

#4 REBAR @ 12" O.C. EACH WAY

4" CONCRETE SLAB

TRANSITION TO PVC AFTER 1 JOINT DIP

GATE VALVE (FL x FL)

CROSS (FL x FL)

90° BEND (FL x FL)

HATCH TO BE FLUSH WITH FINISHED GRADE REFER TO SECTION 3.8.2

CHECK VALVE (FL x FL)

1/2" BRASS WHEEL VALVE

STAINLESS STEEL PIPE

4" SCH 40 "P" TRAP

VALVE VAULT SECTION A-A

COMPANION COUPLING W/4" DISCONNECT

6" 60"

90° BEND (FL x FL)

36"

6" 6" 6"

GATE VALVE (FL x FL)

CROSS (FL x FL)

DIP

#4 REBAR @ 12" O.C. EACH WAY

VALVE VAULT SECTION B-B
LIFT STATION ELECTRICAL REQUIREMENTS

- NEMA 4 OR 4x ENCLOSURE – STAINLESS STEEL SIZE 36” x 48” x 12” MIN.
- MAIN CIRCUIT BREAKER – (GENERAL ELECTRIC, SQUARE D)
- BRANCH CIRCUIT BREAKER FOR EACH PUMP (GENERAL ELECTRIC, SQUARE D) ADJUSTABLE TRIP.
- 20 AMP, 1 POLE CIRCUIT BREAKER FOR 115 VOLT DUPLEX CONVENIENCE RECEPTACLE (GFI)
- MERCURY FLOAT CONTROLS
- HIGH LEVEL ALARM (FLASHING LIGHT)
- ALTERNATOR
- 120 VOLT CONTROL VOLTAGE
- MOTOR STARTERS SQUARE D
- 3 LEG OVERLOAD PROTECTION
- LOW VOLTAGE MOTOR START
- DELAY START ON 2nd PUMP STARTUP
- THERMAL OVERLOAD IN PUMP MOTOR (W/ WARNING LIGHT)
- MOISTURE PROBE IN PUMP MOTOR (W/ WARNING LIGHT)
- PUMPS TO BE INSTALLED W/ GUIDE RAIL (STAINLESS STEEL)
- HAND OFF AUTO SWITCH FOR EACH PUMP
- PHASE FAILURE RELAY PUMPS AND MAIN
- LIGHTNING ARRESTOR, OUTSIDE BACK OF DISCONNECT BOX
- CONDUIT FROM PUMP J-BOX TO CONTROL PANEL MUST BE VAPOR TIGHT (BY USE OF CONDUIT SEAL)
- THREE CONDUIT RUNS FROM PUMP J-BOX TO WETWELL
- 2 COPPER CLAD GROUND RODS SIZE 10’ BY 3/4”
- MAIN DISCONNECT

FENCE SPECIFICATIONS:

1) FABRIC 9-GA, HOT DIPPED GALVANIZED BLACK OR GREEN SMALL MESH.
2) CORNER POSTS AND GATE POSTS TO BE 3” O.D., SCHEDULE 40 X 9’-0”
3) LINE POSTS ON 10’ CENTERS TO BE 2” O.D., SCHEDULE 40 X 8’-0”
4) TOP RAIL TO BE 1-5/8” O.D., SCHEDULE 40
5) 16’-0” ROLLING GATE TO BE CONSTRUCTED OF 1-5/8” O.D., SCHEDULE 40 TUBE AND TO BE EQUIPPED WITH CENTER LOCKING DROP RODS AND DIAGONAL TRUSS RODS.

NOTES:

1) PUMPS TO BE FURNISHED WITH HIGH PRESSURE DISCHARGE COUPLING, STAINLESS STEEL SLIDERRAIL SYSTEM, SEAL FAILURE AND THERMAL OVERLOAD INDICATORS.

2) ALL PIPES, INVERTS AND HATCHES TO BE THE SIZE AND KIND SPECIFIED ON THE SET OF APPROVED CONSTRUCTION PLANS.

3) D.I.P. TO BE CLASS 54 MIN. THICKNESS.

4) ALL HARDWARE INSIDE WETWELL TO BE 316 STAINLESS STEEL.
NOTE:
UNISTRUTS AND ALL NUTS AND BOLTS ARE GRADE 316 STAINLESS STEEL.

RTU

1-1/4" 15'-0"

1" ALUMINUM OR STAINLESS CONDUIT

1" ALUMINUM OR STAINLESS CONDUIT

3 CLAMPS MINIMUM (3 FT MAX BETWEEN CLAMPS)

LED FLOOD LIGHT LOCATION TO BE DETERMINED AT SITE MEETING

PROPOSED 10' LONG 4" SCHEDULE 40 304 STAINLESS STEEL PIPE

BLINKING HIGH LEVEL LIGHT

HEAT REFLECTING HOOD

CONTROL PANEL

PULL BOX

2" MIN. W/ CONDUIT SEALS

2-1/2"

PROPOSED 3000 FIBERMESH 6" CONC. FOUNDATION

SEE SECTION 3.8.11 CONDUIT FITTINGS

METER CAN MAIN DISCONNECT

SURGE PROTECTION CABINET

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

LIFT STATION
ELECTRICAL PANEL
FRONT ELEVATION

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: ELECT ELEV 1 OF 6

SCALE: NOT TO SCALE

4'-10" 4'-10"

4'-10"

1'-6"

2'-4"

2'-4"
NOTE:
UNISTRUTS AND ALL NUTS AND BOLTS ARE GRADE 316 STAINLESS STEEL.

LED FLOOD LIGHT LOCATION TO BE DETERMINED AT SITE MEETING

1" ALUMINUM OR STAINLESS CONDUIT

3 CLAMPS MINIMUM (3 FT MAX BETWEEN CLAMPS)

PROPOSED 10' LONG
4" SCHEDULE 40
304 STAINLESS STEEL PIPE

HEAT REFLECTING HOOD

LIGHTNING SUPPRESSOR
BLINKING HIGH LEVEL LIGHT

PROPOSED 1000 FIBERMESH 6" CONC. FOUNDATION

SEE SECTION 3.8.11 CONDUIT FITTINGS

CONTROL PANEL

PULL BOX

SCADA

MAIN DISCONNECT

METER CAN

SURGE PROTECTION CABINET

1'-6'

2'-4'

4'

10'-6'

15'-6"
ENCLOSURE - NEMA 4X, (48"Hx36"Wx12"D) Fabricated from Type 316 Stainless Steel with door stop kit. Inner Door - Fabricated from H5052-H32 .125 thick Marine Alloy Aluminum with Continuous Hinge with inner door stop.
**BILL OF MATERIALS**

<table>
<thead>
<tr>
<th>QTY</th>
<th>ABBR.</th>
<th>DESCRIPTION</th>
<th>MANUFACTURER, PART#</th>
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<tbody>
<tr>
<td>1</td>
<td>J-BOX</td>
<td>JUNCTION BOX, 316SS N4X</td>
<td>SCHAEFER’S, SPN4SS6-24246</td>
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<td>CONTROL TERMINALS</td>
<td>PHOENIX CONTACT #3044102</td>
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<td>MOTOR POWER BLOCKS</td>
<td>NFI INDUSTRIES, #AS-K1-K1</td>
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<tr>
<td>1</td>
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<td>GROUNDING BAR</td>
<td>EATON, GBK5</td>
</tr>
<tr>
<td>2</td>
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<td>END BLOCKS</td>
<td>PHOENIX CONTACT, #1201442</td>
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</table>

**NOTE:** EXACT LAYOUT MAY BE DIFFERENT AS LONG AS ALL CONTENTS ARE PRESENT

**PUMP JUNCTION BOX INTERIOR DETAIL**

**(FOR DUPLEX SET-UP)**
BILL OF MATERIALS

<table>
<thead>
<tr>
<th>QTY</th>
<th>ABBR.</th>
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<tr>
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<td>J-BOX</td>
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<td>MOTOR POWER BLOCKS</td>
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<td>END BLOCKS</td>
<td>PHOENIX CONTACT, #1201442</td>
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</tbody>
</table>

NOTE: EXACT LAYOUT MAY BE DIFFERENT AS LONG AS ALL CONTENTS ARE PRESENT

PUMP JUNCTION BOX INTERIOR DETAIL
(FOR TRIPLEX SET-UP)
CUSTOM ENCLOSURE:
SPN4DSS6-484812 (48"H x 48"W x 12"D)
NEMA 4X TYPE 316 STAINLESS STEEL
WITH HEAT SHIELD. OUTER DOORS
HAVE HEAVY-DUTY 3-POINT
PAD-LOCKABLE HANDLES, 90° DOOR
STOPS.

BACK PANEL:
SPPAL-4848 (45"H x 45"W)
FABRICATED FROM .125 ALUMINUM.

HINGED INNER DOOR:
(2) HID-4824 FABRICATED FROM .125
BLACK ENGRAVED ALUMINUM WITH
CONTINUOUS HINGES, TWIST
LATCHES, AND 90° DOOR STOPS.
NOTE: REMOVE YELLOW JUMPERS AFTER CONNECTING OVERTEMP CONTACT FROM EACH PUMP (IF APPLICABLE)

FROM LOR (YELLOW)

X1  X2
PUMP3 STARTER

X1  X2
PUMP 3 IN HAND TO RTU
PUMP 3 IN AUTO TO RTU

HOA3 OFF

FROM LOR

TB1 [24KQ] TB3 [24KQ]
TB3 [10] TB3 [10]

OL2 [22] OT2 [23] TR1 [23]

24VAC LAG LEVEL

HIGH LEVEL RELAY

LEAD LEVEL RELAY

OFF LEVEL RELAY

FUSE ON BOARD

RED #14 AWG
WHITE #14 AWG

N

X1

X2

RELAY 3PDT

TB1 [41] TB1 [42] TB1 [43]

75VA

TB1 [44] TB1 [45]

TB1 [46]

24VAC FMR-5 (SCHNEIDER ELECTRIC T165-7A220V)

#14 AWG RED

#14 AWG WHITE
FINISHED GRADE

4" MAX.

PREMOLDED PLASTIC JOINT FILLER

36"x36" TRAFFIC BEARING SINGLE ALUMINUM HATCH 300 PSF

MINIMUM CLEARANCE BETWEEN THE TOP OF THE AIR RELEASE VALVE AND FINISHED GRADE TO BE PER MANUFACTURER'S RECOMMENDATIONS

2" COMBINATION AIR/VACUUM RELEASE VALVE

FILL ANNULAR SPACE WITH BRICK AND MORTAR OR NON-SHRINK GROUT

DBL. STRAP BRASS SADDLE WITH 2" CC X IP CORP STOP

8"x16" REINFORCED CONCRETE FOOTING

NOTE: WASTEWATER AND RECLAIMED ONLY

AIR OR COMBINATION AIR/VACUUM RELEASE VALVE
76" ----------------- 48" ------- 6" ...

36" X 36" TRAFFIC BEARING SINGLE ALUMINUM HATCH 300 PSF

PLAN VIEW

HATCH TO BE FLUSH WITH FINISHED GRADE

36" X 36" TRAFFIC BEARING SINGLE ALUMINUM HATCH 300 PSF

NOTE
CONCRETE BOX AND TOP TO BE PRECAST AND REINFORCED PER MANUFACTURERS SPECIFICATIONS

PROFILE VIEW

ANNULAR SPACE TO BE FILLED WITH NON SHRINK GROUT

CHECK VALVE

12" TO 15" CLEARANCE

CHECK VALVE VAULT

FLxPE D.I. W/401 PROTECTOR COATING

NOTE
CONCRETE BOX AND TOP TO BE PRECAST AND REINFORCED PER MANUFACTURERS SPECIFICATIONS

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

CHECK VALVE VAULT

DRAWN BY: J. WILLIAMS   SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS   DATE: JULY 2021
DESIGN BY:   SHEET: 1 OF 1
ACAD NAME: CHECK VALVE VAULT
FINISH GRADE

THREAD CAP
GREEN METER BOX
CLEANOUT ADAPTER
6" PVC
6" BEND (AS REQUIRED)
6" WYE (CUSTOMER MAY REDUCE TO 4" SERVICE AFTER WYE)

6" PVC

GRAVITY SEWER WYE (BRANCH TO BE 6", ANGLE UP AS REQUIRED)

SLOPE *

CROSS SECTION

FLOW

* MINIMUM SLOPE PER TECHNICAL SPECIFICATIONS

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

SINGLE SERVICE DETAIL

DRAWN BY: J. WILLIAMS
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: SINGLE SERVICE DETAIL
Transition Coupling with Stainless Steel Straps & Bolts

Flow Line to Remain Constant

See Appendix A Approved Materials

When O.D. is the same between PVC & D.I.P., a Transition Coupling is not required.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
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<td>12&quot;</td>
<td>12.5&quot;</td>
<td>13.2&quot;</td>
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</tbody>
</table>
GAS ALARM

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

RTU PANEL LAYOUT

DRAWN BY: CDM SMITH
CHECKED BY: P. DAVIS
DESIGN BY:
ACAD NAME: RTU PANEL LAYOUT 1-3

SCALE: NOT TO SCALE
DATE: JULY 2021
SHEET: 1 OF 1
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<th>PART#</th>
<th>DESCRIPTION</th>
<th>MANUFACTURER</th>
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<td>E-Box Enclosures</td>
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<td>Backplane</td>
<td>E-Box Enclosures</td>
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<td>ACE3600 RTU Package: City of Cocoa Standard</td>
<td>Motorola</td>
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<td>855PB-B10SE422</td>
<td>Alarm Light: Panel Mount, 30mm, Red</td>
<td>Allen-Bradley</td>
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<td>2905228</td>
<td>Plugtrab Mains Surge Protector</td>
<td>Phoenix Contact</td>
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<td>SDN 5-24-100C</td>
<td>Power Supply: 24VDC, 5A</td>
<td>Sola</td>
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<td>1-Pole Circuit Breaker: 15A</td>
<td>Square D</td>
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<td>M9F43105</td>
<td>1-Pole Circuit Breaker: 5A</td>
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<td>M9F43102</td>
<td>1-Pole Circuit Breaker: 2A</td>
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<td>1-Pole Circuit Breaker: 1A</td>
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<tr>
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<td>Surge Protection: Base</td>
<td>DEHN</td>
<td>8</td>
</tr>
<tr>
<td>14</td>
<td>RXG22B7</td>
<td>Interface Relay: 24VAC coil, 5A contacts, LED</td>
<td>Square D</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>RGZE1S48M</td>
<td>Interface Relay Socket</td>
<td>Square D</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>PK15GTA</td>
<td>Ground Bar</td>
<td>Schneider Electric</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>1492-J4</td>
<td>Terminal Block: Grey, 600V, 35A, 22-10AWG</td>
<td>Allen-Bradley</td>
<td>132</td>
</tr>
<tr>
<td>18</td>
<td>1492-J4-W</td>
<td>Terminal Block: White, 600V, 35A, 22-10AWG</td>
<td>Allen-Bradley</td>
<td>6</td>
</tr>
<tr>
<td>19</td>
<td>1492-JG4</td>
<td>Grounding Terminal Block</td>
<td>Allen-Bradley</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>1492-WFB424</td>
<td>Fused Terminal Block: 10-57VDC, with blown fuse indicator</td>
<td>Allen-Bradley</td>
<td>8</td>
</tr>
<tr>
<td>21</td>
<td>1492-EBJ3</td>
<td>End Barrier</td>
<td>Allen-Bradley</td>
<td>14</td>
</tr>
<tr>
<td>22</td>
<td>1492-EBJ16</td>
<td>Partition Plate</td>
<td>Allen-Bradley</td>
<td>4</td>
</tr>
<tr>
<td>23</td>
<td>1492-EAJ35</td>
<td>End Anchor</td>
<td>Allen-Bradley</td>
<td>8</td>
</tr>
<tr>
<td>24</td>
<td>1492-CJJ6-10</td>
<td>Center Jumper</td>
<td>Allen-Bradley</td>
<td>1 lot</td>
</tr>
<tr>
<td>25</td>
<td>1492-MR6X12</td>
<td>Marking Tags: Blank, snap-in</td>
<td>Allen-Bradley</td>
<td>128</td>
</tr>
<tr>
<td>26</td>
<td>199-DR1</td>
<td>Din Rail, 35mm</td>
<td>Allen-Bradley</td>
<td>1 Lot</td>
</tr>
<tr>
<td>27</td>
<td>F2X3WH6</td>
<td>Wire duct: 2&quot;W x 3&quot;H, white</td>
<td>Panduit</td>
<td>1 Lot</td>
</tr>
<tr>
<td>28</td>
<td>C2WH6</td>
<td>Wire duct cover: 2&quot;, white</td>
<td>Panduit</td>
<td>1 Lot</td>
</tr>
<tr>
<td>29</td>
<td>F1X3WH6</td>
<td>Wire duct: 1&quot;W x 3&quot;H, white</td>
<td>Panduit</td>
<td>1 Lot</td>
</tr>
<tr>
<td>30</td>
<td>C1WH6</td>
<td>Wire duct cover: 1&quot;, white</td>
<td>Panduit</td>
<td>1 Lot</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>IS-B50LN-C2</td>
<td>Antenna Surge Protector</td>
<td>Polyphaser</td>
<td>1</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>Antenna Cable</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td></td>
<td>Antenna: Yagi</td>
<td></td>
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</tbody>
</table>
1. REFER TO STANDARD TOWER AND ANTENNA DETAIL SHOWN ON DRAWING 1–14 FOR FURTHER INFORMATION.
120 VAC, SINGLE PHASE, 20A
FROM PUMP CONTROL PANEL

GAS ALARM
LIGHT

NOTES:
1. CONNECT GROUNDING STRAP ON RTU CHASSIS TO PANEL GROUND.
2. ETHERNET SWITCH IS OPTIONAL.
1. Add jumper to high level float if lag-lag float is not available.
2. Insert jumper to 7210 if gas sensor doesn't have a discrete output contact.
NOTES:
1. WIRING OF SURGE PROTECTION DEVICES MAY NEED TO CHANGE TO MEET THE WIRING REQUIREMENTS OF THE INSTRUMENT.
2. TYPICAL WIRING FOR A LOOP POWERED (2-WIRE) INSTRUMENT.
3. TYPICAL WIRING FOR NON-LOOP POWERED (4-WIRE) INSTRUMENT.
4. REFER TO LEVEL TRANSDUCER INSTALLATION DETAIL FOR INFORMATION ON THIS JUNCTION BOX.
1. Wiring of surge protection devices may need to change to meet the wiring requirements of the instrument.
2. Typical wiring for a loop powered (2-wire) instrument.
3. Typical wiring for non-loop powered (4-wire) instrument.
NOTES:

1. GROUND WIRE 2 AWG STRANDED (OR 2/0 STRANDED FOR TOWERS OVER 75 FT) PER NFPA 780, OR LARGER INSULATED GROUND WIRE

2. YAGI RADIO ANTENNA

3. ANTENNA CABLE

4. ANTENNA MOUNTING BRACKETS, HOT DIP GALVANIZED

5. RADIO CABLE CLAMPS, HOT DIP GALVANIZED, CLAMP CABLE TO POLE (3 FT MAX BETWEEN CLAMPS)

6. RADIO ANTENNA HEIGHT

7. FOUNDATION DESIGN AS RECOMMENDED BY TOWER MANUFACTURER FOR LOCAL SITE CONDITIONS.

8. TOWER GROUNDING SYSTEM PER NFPA 780, 10 FOOT COPPER CLAD MINIMUM.

9. BOND TO ELECTRICAL GROUND ELECTRODES WITH #6 AWG PER NEC.

10. SPECIFY RADIO/LOCATION THAT ANTENNA CABLE IS BEING ROUTED TO, RF CABLE MUST BE LISTED FOR INDOOR USE IF OVER 50 FT.

11. LIGHTNING ROD PER NFPA 780

12. PROVIDE SUPERFLEX COAXIAL CABLE JUMPER FOR FINAL CONNECTION

13. RF CABLE GROUNDING KIT

14. PROVIDE A MINIMUM OF 10 FT. BETWEEN OTHER ANTENNAS ON THE SAME TOWER.

15. UL LISTED COPPER GROUND BAR

16. SURGE PROTECTOR

17. BONDING JUMPER #10 AWG COPPER MINIMUM

18. PROTECT CONNECTION WITH SEALING TAPE

19. RF CABLE FEED THROUGH PANEL

20. GRAVEL FOR DRAINAGE.

21. DRIP LOOP

22. EXOTHERMIC WELD

GUY LINE DETAIL FOR GUYED TOWERS

SELF SUPPORTING TOWER AND ANTENNA MOUNTING DETAIL

CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

DRAWN BY: CDM SMITH
CHECKED BY: P. DAVIS
DATE: JULY 2021
DESIGN BY:
ACAD NAME: RTU INSTALLATION DETAILS 1-14
PROJECT SPECIFICATIONS

REFERENCE STANDARDS
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
NFPA 70, NATIONAL ELECTRICAL CODE (NEC)
NFPA 79, INDUSTRIAL CONTROL EQUIPMENT.
UL 508 – INDUSTRIAL CONTROL EQUIPMENT – FOR CUSTOM FABRICATED EQUIPMENT

GENERAL
ALL INSTRUMENTATION AND ELECTRONIC EQUIPMENT SHALL BE OF THE MANUFACTURER’S LATEST DESIGN, UTILIZING PRINTED CIRCUITRY AND EPOXY OR EQUAL COATING TO PREVENT CONTAMINATION BY DUST, MOISTURE AND FUNGUS. THE FIELD MOUNTED EQUIPMENT AND SYSTEM COMPONENTS SHALL BE DESIGNED FOR INSTALLATION IN DUSTY, HUMID AND SLIGHTLY CORROSIVE SERVICE CONDITIONS.

ALL EQUIPMENT, CABINETS AND DEVICES FURNISHED SHALL BE HEAVY DUTY TYPE, DESIGNED FOR CONTINUOUS INDUSTRIAL SERVICE. THE SYSTEM SHALL CONTAIN SIMILAR PRODUCTS OF A SINGLE MANUFACTURER, AND SHALL CONSIST OF EQUIPMENT MODELS, WHICH ARE CURRENTLY IN PRODUCTION. ALL EQUIPMENT PROVIDED SHALL BE OF MODULAR CONSTRUCTION AND SHALL BE CAPABLE OF FIELD EXPANSION.

ALL SWITCHES SHALL HAVE DOUBLE POLE, DOUBLE THROW CONTACTS RATED AT A MINIMUM OF 600 VA, UNLESS NOTED OTHERWISE.

SWITCHES AND/OR SIGNALS INDICATING AN ALARM, FAILURE OR UPSET CONDITION SHALL BE WIRED IN A FAIL-SAFE MANNER. A FAIL-SAFE CONDITION IS AN OPEN CIRCUIT WHEN IN AN ALARM STATE.

MATERIALS AND EQUIPMENT SHALL BE UL APPROVED WHENEVER SUCH APPROVED EQUIPMENT AND MATERIALS ARE AVAILABLE.

ELECTRICAL SURGE PROTECTION
SURGE PROTECTION SHALL BE PROVIDED TO PROTECT THE ELECTRONIC INSTRUMENTATION SYSTEM FROM INDUCED SURGES PROPAGATING ALONG THE SIGNAL AND POWER SUPPLY LINES FROM LIGHTNING OR THE UTILITY SYSTEM. THE PROTECTION SYSTEMS SHALL BE SUCH THAT THE PROTECTIVE LEVEL SHALL NOT INTERFERE WITH NORMAL OPERATION, BUT SHALL BE LOWER THAN THE INSTRUMENT SURGE WITHSTAND LEVEL. PROTECTION SHALL BE MAINTENANCE FREE AND SELF RESTORING. DEVICES SHALL HAVE A RESPONSE TIME OF LESS THAN 50 NANOSECONDS AND BE CAPABLE OF HANDLING A DISCHARGE SURGE CURRENT (AT AN 8X20MS IMPULSE WAVEFORM) OF AT LEAST 8 KA.

PROVIDE PROTECTION OF ALL 120 VAC POWER FEEDS INTO CONTROL PANELS AND INSTRUMENTS.

PROVIDE PROTECTION OF ALL ANALOG SIGNAL (4-20 MA) CIRCUITS WHERE ANY PART OF THE CIRCUIT IS OUTSIDE OF THE BUILDING ENVELOPE.

PROVIDE PROTECTION OF ALL COMMUNICATION CABLES BETWEEN RADIOS AND ANTENNAS. MOUNT THIS PROTECTION EITHER INSIDE THE PANEL OR IN THE WALL OF THE ENCLOSURE IN ACCORDANCE WITH NEMA AND UL STANDARDS. INSTALL SURGE PROTECTIVE DEVICES AT EACH END OF ALL ANTENNA CABLE PROVIDED.

GROUND WIRES FOR ALL INSTRUMENTATION DEVICE SURGE PROTECTORS SHALL BE CONNECTED TO A LOW RESISTANCE GROUND.

FURNISH AND INSTALL GROUND ROD AND GROUND WIRE AS SHOWN ON DRAWING.

ANTENNAS AND MASTS
ANTENNA AND MAST SHALL BE PROVIDED, INSTALLED, AND CONFIGURED FOR RADIO TELEMETRY. ANTENNA SHALL BE YAGI-DIRECTIONAL. ANTENNA FREQUENCY RANGE SHALL INCLUDE 450-462 MHZ. THE ANTENNAS SHALL BE FABRICATED OF 6061/T6 ALUMINUM ROD AND SEAMLESS DRAWN PIPE. ANODIZED FOR MAXIMUM RELIABILITY AND CORROSION RESISTANCE. THE HARDWARE AND FASTENINGS SHALL BE STAINLESS STEEL. RATED WIND VELOCITY SHALL BE 150 MPH (NOMINAL); 180 MPH (MAX). THE ANTENNA MAST SHALL BE SELF-SUPPORTING.

ANTENNA CABLE ASSEMBLY
ANTENNA CABLE ASSEMBLIES SHALL BE PROVIDED AND INSTALLED BETWEEN THE ANTENNA AND THE RADIO. CABLE LENGTHS WILL BE DETERMINED BY COORDINATING WITH THE OWNER AS TO THE ANTENNA, MAST, AND TOWER LOCATIONS AND THE LOCATION OF THE ENCLOSURES IN WHICH THE RADIO IS INSTALLED.

EACH ANTENNA CABLE ASSEMBLY SHALL CONSIST OF FOAM-INSULATED COAXIAL CABLE, CONNECTORS, GROUNDING KIT, SURGE PROTECTOR, JUMPER CABLES, AND TOWER CLAMPS AS REQUIRED FOR A COMPLETE OPERATIONAL COMMUNICATIONS LINK.

CABLE ASSEMBLIES SHALL BE PROVIDED AND INSTALLED, COMPLETE WITH CABLE CONNECTOR AND FASTENING HARDWARE FOR ALL ANTENNAS.

CABLE SIZE
1. LESS THAN 100 FT. (30M) IN LENGTH: 1/2 INCH (13MM) DIAMETER MINIMUM
2. 100 FT. TO 200 FT. (30M TO 60M) IN LENGTH: 7/8 INCH (22MM) DIAMETER MINIMUM
3. GREATER THAN 200 FT. (60M) IN LENGTH: 1-5/8 INCH (41MM) DIAMETER MINIMUM

CABLE INSTALLATION
THE CABLE SHALL BE GROUNDED AT THREE LOCATIONS;
1. AT THE ANTENNA LOCATION (GROUND TO TOWER).
2. AT THE POINT THE CABLE LEAVES THE TOWER (GROUND TO TOWER).
3. AT THE RADIO EQUIPMENT LOCATION (GROUND TO THE EXISTING SYSTEM GROUND).
4. FURNISH A SINGLE CONTINUOUS PIECE OF COAXIAL CABLE FOR THE MAIN RUNS OF CABLE; SPLICING IS NOT ACCEPTABLE.
5. WEATHERPROOF ALL ANTENNA CABLE CONNECTIONS USING BUTYL RUBBER TAPE.