

*The City of Cocoa Utilities Technical Provisions  
and Standard Details*



# 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 Wastewater Division

**Effective June 1, 2017**

(Refer to Page IX for "Technical Provision Revisions")



Utilities Department  
351 Shearer Boulevard | Cocoa, FL 32922  
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June 1, 2017

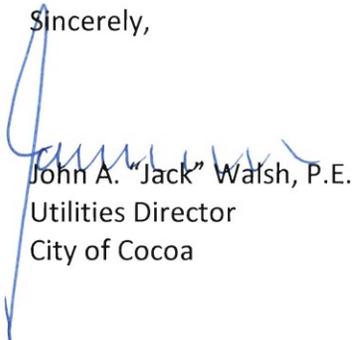
Subject: City of Cocoa Technical Provisions

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 to 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/](http://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 Supervisor George Toler at [gtoler@cocoafl.org](mailto:gtoler@cocoafl.org).

Sincerely,



John A. "Jack" Walsh, P.E.  
Utilities Director  
City of Cocoa

# 1. WATER – POTABLE AND RECLAIMED

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## TECHNICAL PROVISION REVISIONS

DATE	SPECIFICATION #	DRAWING	APPROVED MATERIAL	COMMENTS
10/17/13	2. Wastewater Appendices A & B			Changed page numbers from 39 to 117
10/17/13	2. Wastewater Appendices A & B			Updated Table of Contents page numbers
11/6/13			Tapping Sleeves	Added "Bolt Bracket" to Line 6
11/6/13			Tapping Sleeves	Added "TPS" Triple Tap Tapping Sleeve
11/6/13	Section 2.2.2.1			Added paragraph for Boot Connectors
11/6/13		3" & LARGER METER WITH BACKFLOW PREVENTER		Modified Drawing
11/6/13		DOUBLE LINE STOP DETAIL		Modified Drawing
11/6/13		LINE STOP DETAIL		Modified Drawing
11/6/13		TAPPING SADDLE AND VALVE		Modified Drawing
11/6/13		TYPICAL MANHOLE		Modified Drawing
11/6/13		TYPICAL MANHOLE WITH OUTSIDE DROP		Modified Drawing
11/6/13		FORCE MAIN CONNECTION TO MANHOLE		Modified Drawing
12/17/13			McWane Ductile Iron	Added McWane Ductile Iron to approved materials
11/7/14		TYPICAL REQUIRED SEPARATION		Modified Drawing
12/15/14				Replaced City of Cocoa Logo and Letterhead in the City of Cocoa Utilities TP&SD Manual
4/25/17		MASTER METER ASSEMBLY PLAN		Added New Original Drawing
4/25/17		MASTER METER ASSEMBLY METER		Added New Original Drawing
4/25/17		MASTER METER ASSEMBLY DOUBLE CHECK BYPASS		Added New Original Drawing

# **1. WATER – POTABLE AND RECLAIMED**

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## 1.1 SCOPE OF WORK

### 1.1.1 GENERAL

All potable water and reclaimed water mains and appurtenances must be installed in accordance with the City of Cocoa Utilities Department's Technical Provisions and Standard Details, the City of Cocoa Utilities Department Utilities Handbook and the approved plans, for the Construction of the Water Distribution System and the Water Reclamation System.

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 pre-construction meeting.** It is required that the pre-construction meeting be held prior to ordering materials.
- Scheduling materials inspection (24 hours 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.

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 Dispatch telephone number is (321) 433-8718; facsimile number is (321) 433-8708.

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## 1.1.2 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. Some contractors are only allowed to perform .75" – 2.00" taps for themselves on their on Projects, they may not perform taps for anybody else.

**Backflow Preventer Assembly** - A Backflow assembly is an approved, testable assembly 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.

**Bonafide Tapping Contractor** - Means the Contractor is in the business of doing taps or line stops.

**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 twelve inches (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.

**Manual** - City of Cocoa Utilities Technical Specification and Standard Details Manual

**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 man-made 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 three feet horizontal to one foot 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 so as 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 divisions: Engineering, Inspections, WFO, Wastewater. The committee evaluates and proposes revisions for the design standards, specifications, drawings, products and procedures for the TPSD.

**Transmission Main** – Any water main sixteen inch (16”) and larger. Fourteen inch (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 Department, Engineering Division, "**Inspections**" means City of Cocoa Engineering Inspections Division.

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## 1.1.3 ABBREVIATIONS

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  
Dimension Ratio - DR  
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  
Horizontal Directional Drilling - HDD  
Jack and Bore - J&B  
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

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Polyvinylchloride - PVC  
Portable Changeable Message Signs - PCMS  
Precautionary Boil Water Notice - PBWN  
Project Manager - PM  
Pounds per Square Inch - PSI  
Raised Pavement Marker - RPM  
Reduced Pressure Zone Assembly - RPZ  
Reinforced Concrete Pipe - RCP  
Stainless Steel - SS  
Technical Provision and Standard Details - TPSD  
Traffic Control Plan - TCP  
Underwriters Laboratories - UL  
Unified Numbering System - UNS  
Utilities Department - UD  
Variable Frequency Drive - VFD

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## 1.2 MATERIAL SPECIFICATIONS

### 1.2.1 PIPE

#### 1.2.1.1 Polyvinyl Chloride Pressure Pipe, 4"-12"

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-foot 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.

#### 1.2.1.2 Fusible Polyvinyl Chloride Pipe, 4" thru 12"

Polyvinyl chloride pressure pipe (size 4" through 12") will be cast iron pipe equivalent outside diameter and a pressure rating of 235 p.s.i. (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.

#### 1.2.1.3 Ductile Iron Pipe

Ductile iron pipe will be cement-lined pressure Class 350 for 12-inch diameter and smaller and Class 250 for 14-inch 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 Department prior to installation. Water mains that are less than 10 feet apart from building foundations or other permanent objects will be ductile iron pipe. In no case will water mains be located less than 5 feet 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.

#### 1.2.1.4 High Density Polyethylene (HDPE) Pipe

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

#### 1.2.1.5 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

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in the reclaimed water system will be pressure Class 350 for 12" and smaller and pressure Class 250 for 14" and larger, provided 3 feet of cover can be maintained. Where cover is less than 3 feet, 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.

## **1.2.2 VALVES, VALVE BOXES AND VALVE EXTENSIONS**

### **1.2.2.1 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. Engineer of Record 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.

### **1.2.2.2 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 316 Stainless Steel. Body dimensions and minimum shaft diameter will be in accordance with Tables 3 and 4 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

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450 foot pounds. Butterfly valves will have a factory installed handwheel. The valve will open when the operator nut is turned counterclockwise. **Butterfly valves will not be used for buried service.**

## 1.2.2.3 Valves, 2"

Two-inch 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 DEP 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.

## 1.2.2.4 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.

## 1.2.2.5 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.

## 1.2.2.6 Valve Box Debris Shield

All buried valves 4-inch through 12-inch 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.

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## 1.2.2.7 Insert Valve Specification

The Insert Valve shall conform to the following:

The Ductile Iron 250 p.s.i.g. 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 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.

## 1.2.3 BACKFLOW PREVENTERS

### 1.2.3.1 Fireline Check Valves

Check valves for fire line systems will be the Double Check Detector Assemblies (DCDA) manufactured by Febco, Watts, Ames, Apollo or Wilkins, in accordance with AWWA specification C510, ASSE 1048, UL 1469. Check valves must have bronze seats. DCDA must be supplied with a ¾-inch by-pass assembly. DCDA will be accepted as a complete approved assembly in accordance with the section on "Cross-Connection Control and Backflow Prevention" in the Utilities Handbook. The Utilities Department 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

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lines requiring an RPZ will be handled on a case by case base. The Utilities Department shall paint the DCDA, to be paid for by the Developer/Contractor.

## **1.2.3.2 Meter Station Backflow Preventer**

Backflow Preventers for the large meter stations are a Reduced Pressure Zone Assembly and manufactured in accordance with AWWA C-511. 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 flood plain rim. The Utilities Department shall paint the meter station assembly, to be paid for by the Developer/Contractor.

## **1.2.3.3 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.

## **1.2.4 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, such as "Field Lok" as manufactured by U.S. Pipe or an approved equal. All fittings must be manufactured in the U.S.A.

### **1.2.4.1 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).

### **1.2.4.2 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 coating and an exterior bituminous coating. All fittings will be wrapped with 6 mils polyethylene (sealed with tape).

### **1.2.4.3 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.

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## 1.2.4.4 Tapping Sleeve

Tapping sleeves on mains 4" to 12" in diameter will be ductile iron body mechanical joint type or All Stainless Steel Sleeve.

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 2.2.1 -Resilient Seat Gate Valves 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.

## 1.2.4.5 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 passivated to return the stainless steel to its highest corrosion resistance stage. Outlet on sleeve will be full port, ie. 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

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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 JCM 440 Line Stop Sleeve or approved equal.

## 1.2.5 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 installed 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 Utilities Inspection Department.

## 1.2.6 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, the PVC plug will be removed.

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**On January 4, 2014 the following specifications will be in effect for all brass fittings in contact with potable water.**

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.

## 1.2.6.1 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, Ford Meter Box Company, or Smith-Blair Company. The pipe sizes for these manufacturers are noted below:

MUELLER: For 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 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.

SMITH-BLAIR: For pipe sizes 4" to 12", for 3/4" and 1" services, the 321 series single strap design must be used. For pipe sizes 4" and larger, for 1-1/2" and 2" services, the 323 series double strap design must be used.

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

## 1.2.6.2 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-flange with locking wing or an approved equal. All curb stops shall be centered in the meter box and installed in a horizontal position.

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## **1.2.6.3 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.

## **1.2.6.4 Meter Boxes**

Meter boxes are to be plastic with an iron flipper lid with a full pin hinge, 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 five feet minimum separation.

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

For areas that are anticipated for high traffic areas, a traffic rate H-20 meter box shall be used. Reclaimed Water services will be set in purple meter boxes per section 2.6.4 above. They are also required to have a 3" x 5" permanent plastic tag, secured to the curb stop with a nylon tie wrap, will be supplied. Tags will be inscribed, "RECLAIMED WATER DO NOT DRINK". Brass fittings used for Reclaimed Water are exempt from the "no lead" requirement.

## **1.3 PROTECTION OF PROPERTY AND OBSTRUCTIONS**

### **1.3.1 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.

### **1.3.2 OBSTRUCTIONS**

All utility owners must be notified prior to beginning construction. Any known obstructions will be shown on the plans. 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 Contractors expense.

If the contractor encounters any unforeseen obstructions during construction, he shall immediately cease work in that area and notify the project engineer. The project engineer shall design and provide detailed drawings to correct the situation. The drawings shall be submitted

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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.

## **1.3.3 EXISTING ASBESTOS CEMENT WATERMAINS**

In areas where existing 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 poly vinyl chloride pipe or ductile iron pipe. New pipe material shall depend upon the type and location of the facilities being constructed. The Developers Engineer shall design the replacement and submit it for the Utilities Department approval. The Developer is responsible for all design, materials, labor, equipment, testing, and costs for the replacement. Contractor shall remove and dispose of AC pipe in accordance with FAC Codes 62-204.800 and 62-257.

## **1.4 TRENCH PREPARATION**

### **1.4.1 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 so as 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 uncovered at the bottom of the trench at sub-grade, it 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.

### **1.4.2 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

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brought up to such an elevation as to permit its safe removal. The use of a trenching box may be used in place of sheeting and bracing where appropriate. Contractor is required to have a Competent Person designated and in charge at all times while workers are in the trench.

## **1.4.3 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.

## **1.5 PIPE LINE CONSTRUCTION**

### **1.5.1 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 a six (6) inch.

### **1.5.2 MATERIAL HANDLING**

#### **1.5.2.1 Precautions**

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 end of pipe. Pipe lifted by placing forks into pipe shall be removed from job site.

#### **1.5.2.2 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.

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## **1.5.2.3 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.

## **1.5.3 INSPECTION OF MATERIALS**

Materials delivered to the job site will be subject to inspection by the Utilities Inspection Department 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 Utilities Department prior to installation will be uncovered by the Contractor at his/her expense to verify compliance with these specifications. The Contractor will furnish copies of the packing list(s) for materials upon demand.

## **1.5.4 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 Utilities Department. 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.

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 water-tight 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.

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Pipe installed under swale shall be D.I. and have 3 feet 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 feet minimum cover with a concrete cap. See “Canal or Drainage Ditch Crossing” detail and definitions.

## 1.5.5 LOCATING WIRE

A #12 Copper Clad Steel (CCS) wire that allows for the location of the pipe using an induced current line locator will be installed on all potable water, reclaimed water, and wastewater mains. The wire must be placed on the top of the pipe and taped approximately every ten feet. A run of wire must run from the main to each hydrant. Each fire hydrant must have one wrap of the wire around the barrel located at final grade.

Wire color shall be blue for water, green for wastewater, and purple for reclaimed.

A run of wire will also be brought up in each valve box. The wire will have 4 feet of excess length. Wire is to be connected together using an underground wire nut with a **silicone-based sealant**.

The CCS wire shall meet the following requirements. HDPE Insulation of 30 mils, #12 AWG conductor, maximum Ohms resistance of 7.565 ohms per 1000 ft., breaking load 256 lbs.

When directional drilling is used, one continuous #12 CCS **extra high strength** locator wire shall be installed. The CCS wire shall meet the following requirements. HDPE Insulation of 45 mils, #12 AWG conductor, maximum Ohms resistance of 7.565 ohms per 1000 ft., breaking load 1150 lbs.

## 1.5.6 SERVICE LINE LOCATION

Service lines will be located at alternating lot lines outside the sidewalk within two feet of the right-of-way line as shown on approved plans or in a grassed area behind the curb if located in other than a subdivision.

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

## 1.5.7 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

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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 Utilities Department has been completed.

## **1.5.8 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 two feet of the tee, see detail GATE VALVE AND FITTING DETAIL.

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.

## **1.5.9 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 so as to be easily visible. The hydrants will be located in such 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.

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## **1.5.10 RESTRAINED PIPE JOINTS**

The Engineer of Record 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.

## **1.5.11 THRUST BLOCKS AND COLLARS**

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. Restrained joint systems are the preferred method. 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-foot 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 feet from the end of the joint. In lieu of concrete thrust collar, restrained pipe upstream of the proposed concrete thrust collar may be used.

## **1.5.12 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 six to eight inches larger than the outside diameter of the bells on the Ductile Iron pipe. The Engineer of Record 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.

## **JACK AND BORE**

J&B installed under FDOT roadways shall conform to latest FDOT Design Standard. In the FDOT Standard Specifications for Road and Bridge Construction 2013, Section 556 applies. J&B installed under FECRR shall conform to FECRR requirements.

## **1.5.13 HORIZONTAL DIRECTIONAL DRILLING**

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

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HDD installed under FDOT roadways shall conform to latest FDOT Design Standard. In the FDOT Standard Specifications for Road and Bridge Construction 2013, Section 555 applies.

## **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
  - Engineer of Record
  - Engineering Technician
  - Inspection Supervisor
  - Engineering Inspector for the project

### **HDD CONTRACTOR:**

1. Approval required prior to the HDD, the HDD contractor shall submit a bore plan (see sample drawing in Appendix “B”) to the Engineering Supervisor for approval. 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
  - All utilities including their depths and clearances from reamer
  - Width of the right of way
  - Pavement width
  - Length of the boreThe 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.

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## **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 Engineering 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.
  - 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 one or all of the following:
  - Engineering Supervisor
  - Engineering Technician
  - Inspection SupervisorOnce the above persons have been notified by the Inspector, the proper authority will be notified for corrective action.

## **COMPLETION OF THE BORE:**

1. A bore log shall be submitted to the Engineering Division after completion of the bore.

### **1.5.14 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 six inches 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 2.6

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## 1.6 TIE-INS TO EXISTING SYSTEMS

### 1.6.1 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 Utilities Department.** All Contractors must follow the procedures listed below for connecting new mains to existing water systems.

#### 1.6.1.1 Mains 8" and smaller

Tie-in valves will be operated and pressure tested to verify water tightness prior to the tie-in. Valves that are not water tight, 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 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. The Engineer of Record 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 City Inspector. All other existing valves closed as part of the job will be opened by the contractor under the supervision of Utilities Department Inspector.

#### 1.6.1.2 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 City Inspector. All other existing valves closed as part of the job will be opened by the contractor under the supervision of Utilities Department Inspector.

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## 1.7 TESTING

### 1.7.1 GENERAL

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

### 1.7.2 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 Utilities Department Inspector. 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 Utilities Department.

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 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 to be used for filling any water main of any size 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. 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 a minimum pressure of 20 psi 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. This 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, in the presence of the Utility Department. The Utility Department will be notified in writing 48 hours prior to the flushing of said mains.

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The following procedures shall be followed:

- A. The tie-in valves shall be operated and pressure tested in the presence of the Engineering Inspection Division or Engineer to verify water tightness prior to the 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.
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.

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## 1.7.3 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 Inspection 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 40 psi. Water used during flushing will be billed to the Contractor.

The City of Cocoa Utilities Department 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 2lb. per cu/ft density open cell polyurethane foam body (swab) complete with rear polyurethane drive seal.

Pig launching station may be a "wye", "tee" or simple 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 Engineer of Record and approved by the City of Cocoa Utilities Department.

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 Utilities Department. 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 Engineer of Record 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

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be inserted into the pipeline. The isolation valve may be cracked open for a few seconds under the direction of Utility personnel 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 in cup then flushing is complete, if not flushing will continue until water is clear.

## 1.7.4 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 witnessed by Engineering Inspection Division personnel. Sufficient human resources are to be employed to insure 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.

## 1.7.5 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:

SIZE	ALLOWABLE LEAKAGE
2"	0.20 Gallons/Hour
4"	0.33 Gallons/Hour
6"	0.50 Gallons/Hour
8"	0.67 Gallons/Hour
10"	0.83 Gallons/Hour
12"	1.06 Gallons/Hour
14"	1.16 Gallons/Hour
16"	1.32 Gallons/Hour

$$L = \frac{SD \sqrt{P}}{148000}$$

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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.

## 1.8 DISINFECTION & BACTERIOLOGICAL TESTING

### 1.8.1 GENERAL

The Contractor must flush mains and arrange for complete disinfection by chlorination in coordination with the Engineering Inspection Division. Work will conform to applicable provisions of AWWA specification C651, "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 Engineer of Record. 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 a Utilities Department 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 Engineer of Record and approved by FDEP. If samples taken do not demonstrate satisfactory results, re-chlorination is required.

Disinfection of reclaimed water mains is performed in the same manner as potable water mains. Bacteriological testing of the repaired reclaim water main will be performed in compliance with regulatory agencies such as the Florida Department of Environmental Protection, and requires one day of satisfactory bacteriological results. Sample points for reclaimed water mains are determined by the Engineer of Record. Samples are collected Monday through Thursday by City of Cocoa designated personnel. To schedule a sample pickup, please contact the Lab Manager at 321-433-8707. If samples taken do not demonstrate satisfactory bacteriological results, re-chlorination and re-sampling is required. A fee will be charged by the City for additional sample collection and analysis.

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## 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 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.



Utilities Department  
351 Shearer Blvd. | Cocoa, FL 32922-7203  
Phone: (321) 433-8700 | Fax: (321) 433-8708

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 F.A.C. 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. YES \_\_\_\_\_ NO \_\_\_\_\_

**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.**

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 consecutive sets of acceptable samples were taken at least 24 hours apart. YES \_\_\_\_\_ NO \_\_\_\_\_

I certify that the bacteriological sampling has been completed in accordance with the applicable provisions of F.A.C., 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.**



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## 1.9 CONNECTION TO EXISTING SYSTEM

### 1.9.1 GENERAL

Connections to existing City transmission mains (16" and larger) will be made by Approved Tapping Contractor under the direction of the Engineering Inspection Division. On transmission mains, the Approved Tapping Contractor will install the tapping sleeve and valve. For all connections from 4" – 12" the Contractor may install tapping saddles under the supervision of the Engineering Inspection Division. For all water main connections, the Contractor must obtain all required permits; provide a dry pit area, all pit preparation including shoring and bracing, maintenance of traffic, all right-of-way restoration; and notify all utilities prior to construction. Taps on RCP, PVC, AC, or DIP mains must be made by a tapping Contractor who has been approved by the Utilities Department.

Tapping saddles and valves supplied by the Contractor will be inspected by the Engineering Inspection 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 insure a watertight installation. Saddles installed on RCP mains will be tested 10% over line pressure. The pressure test will be performed by the Contractor and witnessed by the Engineering Inspector. After the pressure test of the saddle has been completed an Approved Tapping Contractor can tap the main.

### 1.9.2 TAPPING AND LINSTOP PROCEDURES

- ALL 0.75" – 12" TAPS or LINSTOPS on City of Cocoa potable, reclaimed and wastewater mains will be performed by an Approved Tapping Contractor (see approved list).\*
- ALL 16" and larger TAPS or LINSTOPS on City of Cocoa Transmission Mains will be performed by bonafide tapping contractors ONLY. Contractors will be approved on a case-by-case basis. Bonafide means the Contractor is in the business of doing taps or line stops.\*
- Absolutely NO taps or linstops will be performed on Friday or any day preceding a holiday.
- Approved contractors to disinfect tapping machine with AWWA approved disinfectant. This will be witnessed by a City of Cocoa inspector.
- The contractors tapping or linstop machines will be in good working order with appropriate bits and shell cutters for the type of pipe being worked on (ie. shell cutter for PVC)\*\*
- When taps or linstops are installed on Transmission Mains (> 12"), a preconstruction meeting will be held with the tapping contractor prior to ANY work being performed. The meeting maybe held at the job site.

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- Taps and linestops on the Utilities reinforced concrete mains will be a two (2) day process. Day one the saddle is installed and grouted, Day two tighten straps, cut prestressing wires, install throat and valve. Pressure test on saddle is 10-15% over line pressure for 30 minutes. After successfully completing pressure test, tap can be made.
  - 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 & adaptor

## 1.10 FINAL CLEAN-UP AND ACCEPTANCE

### 1.10.1 GENERAL

Upon completion of the work and before acceptance by the Utilities Department, 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 his/her 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 Inspection Division.

- Pressure Test
- Bacteriological Testing
- Restoration
- Payment of fees
- Approved As-Builts
- Easements
- Bill of Sale
- Final Inspection

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## 1.11 FIRE SERVICE

### 1.11.1 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 appropriate backflow prevention device will be installed in accordance with the "Cross-Connection Control and Backflow Prevention" section of the Utilities Handbook.

Fire line DCDA shall be installed in non-traffic areas. Four to six bollards maybe required.

## 1.12 CONNECTION OF BUILDINGS OVER FOUR FLOORS

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

## 1.13 BACKFLOW PREVENTERS

### 1.13.1 GENERAL

Backflow preventers must be installed at locations where cross-connections may occur. The need for backflow preventers will be determined by the Utilities Department. Backflow

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preventers will be the reduced pressure type assemblies. 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. Backflow preventers are to be approved in accordance with the "Cross-Connection Control and Backflow Prevention" section of the Utilities Handbook.

## 1.14 RECORD DRAWINGS

### 1.14.1 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:

- Location of all valves, service lines, fittings and fire hydrants using at least two ties to permanent points (manholes, power poles, 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 feet.
- Elevations to the top of the water line at intervals of 300 feet and at all drainage and sewer main crossings. Bench mark to be shown on record drawings.
- Separation between reclaimed water or force mains and water mains if they are installed within 10 feet of water mains.
- Water main material and distance of mains from buildings or structures within 20 feet of the water main.
- Distance from hydrant to hydrant valve.
- Pertinent easement information.
- Certification by the surveyor or Engineer of Record 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. The name "City of Cocoa" must appear on all record drawing survey information.

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-

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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 (XREF). AutoCAD 2010 or higher, or DXF format shall be provided to the City.

CAD drawing standards for record drawings will be available from the Engineering Division upon request. These standards will provide for isolated layer information, text height, font, line type and weight, specific standard symbols (blocks), etc. which will allow transfer of record drawing data to city as-built maps in a standardized format.

## **2. WASTEWATER**

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## 2.1 SCOPE OF WORK

### 2.1.1 GENERAL

Refer to Water - Potable & Reclaimed, Section 1.1 - Scope of Work in these Technical Provisions.

## 2.2 MATERIAL SPECIFICATIONS

### 2.2.1 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.

### 2.2.2 CONCRETE STRUCTURES

#### 2.2.2.1 Precast Manholes

Precast manholes must be constructed in accordance with American Society of Testing and Manufacturing (ASTM) specification C478. 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. 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.

Resilient connectors (boots) 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.

#### 2.2.2.2 Flotation Uplift of Fiberglass Manhole

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

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## 2.2.3 PIPE

### 2.2.3.1 PVC Pipe and Fittings, DR35

PVC pipe and fittings (DR 35) will be manufactured in accordance with ASTM specification C3034. DR 35 pipe is acceptable on gravity installations with a depth of 12.0 feet or less. Pipe will be of the elastomeric gasket joint type supplied in lengths of 12.5 feet. 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.

### 2.2.3.2 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.

### 2.2.3.3 Ductile Iron

Ductile iron pipe will be 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 C105-T1.

## 2.2.4 MANHOLE ACCESS COVERS

### 2.2.4.1 Cast Iron

Cast iron manhole covers and rings must be traffic load bearing similar to USF No. 225-AS-ORS having an O-Ring seal. Bearing surfaces will be machined to produce a tight, even seating surface without rocking. Minimum clear opening will be 24". The word(s) "SEWER" or "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.

### 2.2.4.2 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

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## 2.2.5 COATINGS

### 2.2.5.1 Water Based Acrylic

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

### 2.2.5.2 HDPE Sheet Lining

Where an HDPE liner is specified, the entire wall surface of the manhole will be protected with a high density polyethylene liner cast into the concrete. This liner must be AGRU Sure Grip as manufactured by Alois Gruber or approved equal. All joints will be heat fusion welded to create a water-tight lining. Such lining must be warranted against defects in materials and workmanship for a period of five years from date of installation.

### 2.2.5.3 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 stainless steel, refer to Section 9.3.2.

## 2.2.6 MISCELLANEOUS MATERIALS

### 2.2.6.1 Manhole Steps

Manhole steps are not permitted.

### 2.2.6.2 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.

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## 2.3 CONSTRUCTION

### 2.3.1 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 maximum and minimum slopes:

SIZE	MAXIMUM	MINIMUM
4"	1.14%	1.04%
6"	.66%	.60%
8"	.36%	.33%
10"	.28%	.25%
12"	.22%	.20%

The Engineer of Record shall certify that the slopes of the gravity sewer meet the above maximum and minimum slopes. Sewer lines with slopes not meeting the above maximum and 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 Utilities Division. Manholes shall be designed with a minimum difference of 0.04 feet between the invert elevations of the incoming and outgoing sewers.

### 2.3.2 MATERIAL HANDLING

#### 2.3.2.1 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 end of pipe. Pipe lifted by placing forks into pipe shall be removed from job site.

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### **2.3.2.2 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.

### **2.3.2.3 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.

### **2.3.3 TRENCH EXCAVATION, SHORING, AND SHEETING**

#### **2.3.3.1 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 feet. Backfill in the pipe zone will be accomplished immediately after jointing the pipe to prevent movement.

#### **2.3.3.2 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.

### **2.3.4 CONTROL OF WATER**

#### **2.3.4.1 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.

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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

### **2.3.4.2 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 so as 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.

### **2.3.4.3 Static Water**

The static water level will be drawn down below the bottom of the excavation so as 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.

### **2.3.5 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.

### **2.3.6 MATERIAL FOR BEDDING AND BACKFILLING**

#### **2.3.6.1 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 Engineer of Record 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.

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### 2.3.6.2 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 Utilities Department shall require the density to be checked by a licensed laboratory at each manhole and at two points between manholes as selected by the Engineer of Record or Inspector, at no cost to the City.

### 2.3.7 MANHOLE INSTALLATION

#### 2.3.7.1 Base Unit

The base unit for manholes and wet wells will be reinforced concrete with a monolithically poured base and bottom riser section. 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  $\frac{3}{4}$ " to 1" rock (57 stone or concrete).

#### 2.3.7.2 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. Change 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 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 in manholes from inlet invert to top of floor outside the channels will not exceed two feet. Standard drop manholes will be constructed wherever free drop exceeds two feet.

#### 2.3.7.3 Joints

Precast manhole joints must be water tight 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

#### 2.3.7.4 Non-Shrink Grout

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

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## 2.4 WATER MAIN CROSSINGS

### 2.4.1 GENERAL

In all cases where sewer mains cross water mains there shall be a minimum of 6"; 12" preferred clear distance between the top of the sewer and the bottom of the water main. With less than 12", the sewer main will be constructed of ductile iron pipe (with 401 Protecto coating) for a distance of ten feet on either side of the point of crossing.

## 2.5 SERVICE CONNECTIONS

### 2.5.1 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 Utilities Department.

#### 2.5.1.1 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 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 and fitted with 45 degree bends directed toward the invert of the gravity main (see detail Force Main Connected to Manhole).

## 2.6 FIELD TESTING OF SEWER SYSTEMS

### 2.6.1 GENERAL

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

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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.

## 2.6.1.1 Visible Leaks

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

## 2.6.1.2 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. A leakage test will not be required on runs which have been televised and show no defects.

## 2.6.1.3 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 on the following table:

SIZE	ALLOWABLE LEAKAGE
4"	0.27 Gallons/Hour
6"	0.41 Gallons/Hour
8"	0.54 Gallons/Hour
10"	0.68 Gallons/Hour
12"	0.81 Gallons/Hour
16"	1.08 Gallons/Hour
20"	1.35 Gallons/Hour

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### 2.6.1.4 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.

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

DEPTH (FEET)	MANHOLE DIAMETER (INCHES)		
	48	60	72
0-8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

(Times shown are minimum elapsed times, in seconds, for a drop in vacuum of 1 inch of mercury.)

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## 2.7 RECORD DRAWINGS

### 2.7.1 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, fittings and air release valves using at least two ties to permanent points (manholes, power poles, 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 feet.
- Separation between reclaimed water or force mains and water mains if they are installed within 10 feet of water mains.
- Sewer main material and distance of mains from buildings or structures within 20 feet of the water 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.
- Pertinent easement information.
- Certification by the surveyor or Engineer of Record 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. The name "City of Cocoa" must appear on all record drawing survey information.

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 62-604.300(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 (XREF). AutoCAD 2010 or higher, or DXF format shall be provided to the City.

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## 2.8 FORCE MAIN VALVES

### 2.8.1 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 –Valves, and Section 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). CARV shall have a working pressure range of 3-150psi, Testing pressure of 250psi, Maximum operating temperature: 140°F, 2" threaded inlet and 1.5" outlet, Reinforced nylon body, 316 SS 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.

## 2.9 LIFT STATIONS

### 2.9.1 PRECAST WET WELLS

Precast wet wells must be constructed in accordance with American Society of Testing and Manufacturing (ASTM) specification C478. 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 Supervisor for approval prior to casting. Chairs for supporting reinforcing steel will be non-corrosive plastic or Grade 316 stainless steel. Linings for wet wells shall conform to Section 2.9.3. EOR shall approve precast wet well design.

### 2.9.2 WET WELL ACCESS COVERS

Aluminum access covers will be designed for 300 PSF live load with a safety factor times three (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 3/4"-wide lip around the inside of the frame. The hatch will be a Bilco or Halliday product. Hatch size of the cover will

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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".

### 2.9.3 COATINGS

#### 2.9.3.1 HDPE Sheet Lining

The entire interior wall and top surface of the wet well will be protected with a High Density Polyethylene (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 inches. Anchoring studs shall be the same material and shall be integrally extruded with the sheet and shall have a minimum height of 0.39 inches and a length of 0.55 inches. 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 inches. All joints will be heat fusion welded to create a water-tight lining. Such lining shall be warranted against defects in materials and workmanship for a period of five years from date of installation.

#### 2.9.3.2 Exposed Piping

Pump discharge riser pipes and fittings inside the wet well will be Grade 316 10S 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.

### 2.9.4 SUBMERSIBLE LIFT 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.

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### 2.9.5 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 inches 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 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. 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 inches. A 0-100 PSI glycerin filled pressure gauge will be installed in tapped cross boss with a brass gate valve.

### 2.9.6 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.

### 2.9.7 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.

### 2.9.8 CONTROL PANEL

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

The control panel enclosure will be Grade 316 stainless steel, NEMA 4X rated with a heat reflecting hood. The minimum inside dimensions will be 36" wide x 48" high x 12" deep. Control voltage will be 120 vac. **Control voltage transformer will be sized to support a 20 amp circuit.** 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 120 vac convenience outlet (GFI protected); an analog amp meter for each pump; a top mounted fluorescent work light minimum 18 inches in length; hand-off-automatic (HOA) switch for each pump; seal failure light

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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 interface between the control cabinet and the separate SCADA cabinet will be through Phoenix Contact terminals and component plugs and Allen-Bradley 24 VDC relays, catalog # 700-HK-36Z24 and relay bases, catalog # 700-HN121. An isolated 20 amp circuit will be provided to power SCADA equipment. Pumps will be controlled by SCADA RTU. 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 Roto-Float type-S as manufactured by Anchor Scientific with all weights and switches encapsulated. Floats will operate on normal 24 VDC from SCADA RTU.

Motor starters will be NEMA-rated with three-leg protection, as manufactured by Allen-Bradley, General Electric, or Square-D. Circuit breakers will be molded case as manufactured by General Electric, Square-D, or Cutler-Hammer. All pilot devices (switches, relays, lights) will be manufactured by General Electric, Square-D, or Allen-Bradley.

The control panel will be equipped with a **Russel Stoll model JRS 1044FR 100 amp emergency generator receptacle** and emergency main circuit breaker with lock-out from the normal main breaker. Panel will be equipped with ground and neutral terminal bars. Analog amp meter shall be installed for each pump. A power distribution block will be installed after the main breaker. A 60-foot 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 Diversified Electronics phase sequence and loss relay with fault light will be installed for each pump. Line voltage will be monitored with a Wilkinson Instruments Line Power Monitor-part# DR 6305. The control panel will be mounted on stainless steel unistrut and hardware supported by a minimum of three- 4 inch square concrete posts. The post will be a minimum of 10 foot in length and located adjacent to the wet well.

A NEMA 4X stainless steel junction box with back plate, a terminal strip, a power distribution block for each pump, and a ground bar will be installed below the main control panel. The box will be connected to the control panel with a ¾ inch diameter conduit for float wiring and a 2 inch diameter conduit for each pump. The conduits will be equipped with seal-offs to protect electrical equipment from corrosive atmosphere in the wet well.

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

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panel door and will include Cocoa's station number, pump information, station voltage, Florida Power & Light account number, if a high leg is present and if so identify the leg.

### 2.9.8.1 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.

### 2.9.8.2 SCADA

SCADA equipment will be housed in a separate Eurobex, model number 5412 ESSPCH, lockable, NEMA 4X cabinet with an inner panel for equipment mounting and a separate inner panel on the door for mounting radio. Lift station operation and monitoring will be accomplished via SCADA, utilizing Motorola Moscad-L Remote Terminal Unit (RTU) consisting of one 15X15 chassis-part# FHN6028, frame-part# FHN5890, 3 I/O motherboard-part # FRN5809, a 117 vac transformer-part# FPN5554, power supply module-part# FPN5555, Central Processing Unit (CPU)-part# F6836, external radio interface board-part # FRN5907, three mixed I/O modules-part# FRN5819, battery bracket-part # FHN6058, battery-part# FLN9059, UHF radio 438-470 MHz-part# FUE1067, radio install kit-part# FLN3268, one antenna cable-part# FKN4473, TCP/IP interface to port 1-part# V527, and all associated cables.

The antenna shall be a gold anodized fully welded UHF directional Yagis, model Y4503, as manufactured by Antenex. The antenna shall be mounted on a minimum 20 foot tall galvanized mast. The mast shall be rigid pipe, two and one half inches in diameter at the base. The upper 5 feet of mast will be rigid pipe, one and one quarter inches in diameter. The bottom of the mast will be set 3 foot below ground level and encased in a column of concrete a minimum of 12 inches in diameter and 3 foot deep. Antenna cable shall be Times Microwave Systems 3/8 inch diameter flexible low loss coaxial cable, part# LMR-400-DB and shall be fed into the antenna mast through a 1/2 inch diameter chase nipple at the top and exit the bottom through a 1/2 inch Seal Tite flexible conduit to the RTU cabinet. The mast shall be grounded to separate ground rod. A 60-foot 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. Coordination of SCADA programming will be provided by DCR Inc.

### 2.9.8.3 Surge Protection

A surge protection unit, Ditek, model KX-(applied voltage) shall be installed in a separate cabinet.

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### 2.9.8.4 Variable Frequency Drive

Variable Frequency Drive (VFD) may be required for some pumping stations and will be determined by the City of Cocoa Engineering Division at the time of plan review based on pump horsepower, force main pressure, and pumping distance. VFD's will be manufactured by ABB, Square-D, or Toshiba. VFDs will be housed in a separate NEMA 4X stainless steel cabinet with heat reflecting hood and ventilation system to ensure internal temperature does not exceed VFD design requirements. A submersible pressure transmitter manufactured by Blue Ribbon Industries will be installed to provide a 4-20mA signal for pump speed control. SCADA programming will be required.

### 2.9.9 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. Generators shall be manufactured by Baldor or Kohler and equipped with John Deere diesel engines. Generator will be equipped with a fuel tank sized to provide a minimum of 30 hours operation under full load conditions. Automatic Transfer Switch (ATS) will be installed in a separate NEMA 4X enclosure.

## 2.10 CONDUIT

Exposed electrical conduit will be galvanized rigid with protective coating where it penetrates concrete, buried conduit will be Schedule 40 PVC. Conduits will be sized in accordance with NEC or larger with a minimum diameter of 2 inches. 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. Seal failure and over-temperature wiring for the pump will be installed in the same conduit. One (1) 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 inch diameter 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.

**APPENDIX A**  
**APPROVED MATERIAL**

# APPENDIX A APPROVED MATERIAL

## VALVES AND ACCESSORIES

Item	Manufacturer	Part	Comments
<b>Air Release Valves</b>			
1.	A.R.I. USA, Inc.	D-025	Wastewater
2.	A.R.I. USA, Inc.	S-025	Wastewater
3.			
4.			
5.			
<b>Air Release Valve Vault Frame and Cover</b>			
1.	See detail		
2.			
3.			
<b>Blow Off Valve</b>			
1.	See detail		
2.			
3.			
<b>Gate Valves 4 thru 12-inch (Resilient Seated Only)</b>			
1.	American Flow Control	AFC-2500	18-8 Type 304 Stainless Steel nuts and bolts
2.	American AVK	Series 65	18-8 Type 304 Stainless Steel nuts and bolts
3.	M&H	Style 4067, Style 7000	18-8 Type 304 Stainless Steel nuts and bolts
4.	U.S. Pipe	A-USPO	18-8 Type 304 Stainless Steel nuts and bolts
5.	Mueller	A-2360 Resilient Wedge Gate Valve	18-8 Type 304 Stainless Steel nuts and bolts
6.	Clow	Model 2638	18-8 Type 304 Stainless Steel nuts and bolts
7.	Kennedy Valve	KS-RW	18-8 Type 304 Stainless Steel nuts and bolts
8.			
9.			

## APPENDIX A APPROVED MATERIAL

Item	Manufacturer	Part	Comments
<b>Gate Valves 16-inch thru 48-inch (Resilient Seated Only with Bevel Gear Operator)</b>			
1.	Mueller	A-2361	18-8 Type 304 Stainless Steel nuts and bolts
2.	American Flow Control	AFC-2500	18-8 Type 304 Stainless Steel nuts and bolts
3.	U.S. Pipe	A-USP1	
4.	American AVK	Series 45	16" only, 18-8 Type 304 Stainless Steel nuts and bolts
5.	American AVK	Series 45	18-24" only, 18-8 Type 304 Stainless Steel nuts and bolts
6.	M&H	Style 7000	16-54" only, 18-8 Type 304 Stainless Steel nuts and bolts
7.	Clow	Model 2638	18-8 Type 304 Stainless Steel nuts and bolts
8.	Kennedy Valve	KS-RW	18-8 Type 304 Stainless Steel nuts and bolts
<b>Valve Extensions</b>			
1.	<u>General Engineering Company</u>	Model #4840-0001-3	
2.			
<b>Valve Boxes</b>			
1.	East Jordan Iron Works		5-1/4" minimum inside diameter
2.	Tyler		5-1/4" minimum inside diameter
3.			
4.			
5.			
<b>Valve Boxes Alignment Rings</b>			
1.	BOXLOK	#1	
2.	BOXLOK	#2	
3.	AFC		
4.			

# APPENDIX A APPROVED MATERIAL

## SERVICE MATERIALS

Item	Manufacturer	Part Number	Comments
<b>Brass Service Saddles</b>			
1.	Mueller	BR 1 B	.75-1.00" CC thread
	Mueller	BR 2 B	1.5-2.00"; CC thread
2.	Ford	101B single	pipe sizes 4" to 12", for 3/4" and 1"
3.	Ford	style 202B	1-1/2" and 2" services
4.	Ford	style 202B	pipe sizes 16" and larger, for 3/4", 1", 1-1/2," and 2" services
5.			
<b>Corporation Stops</b>			
1.	Ford	FB600, FB600-3, FB600-4, FB600-6, FB600-7	CC x Flare; .75-2.00"
2.	Ford	FB1600	CC x F.I.P 2" Only
3.	Mueller	B-25000	CC x Flare; .75-2.00"
4.	Mueller	B-25045	2" only
5.			
<b>Curb Stops</b>			
1.	Ford	B23-232W	
2.	Ford	B23-444W	
3.	Ford	BF23-666W	
4.	Ford	BF23-777W	
5.	Mueller	B-24352	.75 - 1.00"
6.	Mueller	B-24334	1.50 - 2.00"
7.	Mueller	H-14352	.75 - 1.00"
8.			
<b>Meter Boxes (With cast Iron Reader)</b>			
1.	Carson	L-1419-12CIR	
2.	CDR Systems Corporation	<u>A00-1730-12</u>	1-1/2 and 2-inch meters
3.	DFW Plastics, Inc.	DRW 36F-12-3C	
4.	DFW Plastics, Inc.	DFW 1730-12-	
5.	DFW Plastics, Inc.	DFW 37F-12-3c	

# APPENDIX A APPROVED MATERIAL

## PIPE MATERIALS AND APPURTENANCES

Item	Manufacturer	Part Number	Comments
<b>Casing Spacers (All Sizes)</b>			
<b>Stainless Steel with Vinyl Runners</b>			
1.	Cascade	CCS	Fasteners 304 SS
2.	Cascade	CCS-ER	Fasteners 304 SS
3.	BWM Co.	BWN-SS	Fasteners 304 SS
4.	CCI Pipeline Systems	CSS8/12	Fasteners 304 SS
5.			
<b>Casing End Seals</b>			
1.	Cascade	CCES	Bands, 304 SS
2.	BWM Co.	BWM-	Bands, 304 SS
3.	CCI Pipeline Systems	ESW/ESC	Bands, 304 SS
4.			
<b>Ductile Iron Cement Lined</b>			
1.	American	FASTITE	AWWA C104 for Cement Lining
2.	U.S. Pipe	TYTON	AWWA C104 for Cement Lining
3.	Griffin	TYTON & FASTITE	AWWA C104 for Cement Lining
4.	McWane	TYTON & FASTITE	AWWA C104 for Cement Lining
5.	American	FASTITE	401 Protecto coating for wastewater
6.	U.S. Pipe	TYTON	401 Protecto coating for wastewater
7.	Griffin	TYTON & FASTITE	401 Protecto coating for wastewater
<b>Polyethylene Encasement</b>			
1.	Multiple		AWWA C105
<b>PVC</b>			
1.	Multiple	C-900 DR18	Water, Reclaimed and Sewer Force Main
2.	Multiple	SDR-35	Gravity Sewer
<b>Tracer Wire and Appurtenances</b>			
1.	Multiple	#12 CCS	See Spec 1.5.5
2.	Multiple	Wire Nut	Underground Silicone Based

# APPENDIX A APPROVED MATERIAL

## PIPE FITTINGS

Item	Manufacturer	Part Number	Comments
<b>Restraining Glands</b>			
1.	EBBA Iron		Domestic
2.	Ford Meter Box		Domestic
3.	Union Tyler		Domestic
4.	SIP Industries		Domestic
5.	JCM Industries	610, 611, 620	Undercoat & wrap rods and clamps
6.	JCM Industries	621, 630, 631	Undercoat & wrap rods and clamps
<b>Fittings C153 SSB / C110 Flange (Cement or fusion bonded epoxy lined)</b>			
1.	Tyler Union		Domestic
2.	American		Domestic
3.	U.S. Pipe		Domestic
4.	Tyler Union		401 Protecto coating for wastewater
5.	American		401 Protecto coating for wastewater
6.	U.S. Pipe		401 Protecto coating for wastewater
<b>Restrained Joints - Ductile iron pipe</b>			
1.	American	Fast Grip	
2.	American	Flex-Ring	
3.	Lok-Ring	Lok-Ring	
5.	Griffin	Talon RJ Gaskets	
6.	U.S. Pipe	TR Flex	
7.	U.S. Pipe	HP Lok	
8.	U.S. Pipe	Field-Loc	
<b>Restrained Joints - PVC pipe</b>			
1.	JM	Eagle Loc 900	C-900, DR18
2.	Underground Solutions	Fusible PVC	C-900/C-905, DR18
3.	Certain Teed	Certa-Lok	C-900, DR18
4.	Diamond Plastics	Diamond Lok-21	C-900, DR18
5.			

## APPENDIX A APPROVED MATERIAL

Item	Manufacturer	Part Number	Comments
<b>Transition Coupling</b>			
1.	Romac	Macro HP, XR501	ACP to DIP, CIP, PVC
3.	TPS	Hymax-2000	ACP to DIP, CIP, PVC
4.	FORD	FC2A, FC2W	ACP to DIP, CIP, PVC
5.			
<b>Tapping Sleeve</b>			
1.	Ford	FTSS	18-8 Type 304 Stainless Steel, bolts and flange
2.	Mueller	H-304SS	18-8 Type 304 Stainless Steel, bolts and flange
3.	JCM	#432 SS	18-8 Type 304 Stainless Steel, bolts and flange
4.	JCM	#415	18-8 Type 304 Stainless Steel nuts, bolts and straps, Epoxy Coated Body
5.	Smith-Blair	625	18-8 Type 304 Stainless Steel nuts, bolts and straps
6.	Robar	6606 SS Bolt Bracket	18-8 Type 304 Stainless Steel, bolts and flange
7.	TPS	Triple Tap Tapping Sleeve	18-8 Type 304 Stainless Steel, bolts and flange
<b>Line Stop Sleeve</b>			
1.	JCM	440	All SS 4"-12", Full opening outlet

### HYDRANTS

Item	Manufacturer	Part Number	Comments
<b>Hydrants</b>			
1.	American-Darling	B-84-B-5	5 1/4" Valve Opening
2.	American-Darling	6 B84B-5	6" Valve Opening
3.	Mueller	Super Centurion 250/HS A-423	5-1/4" Valve Opening
4.	Clow	Medallion	5-1/4" Valve Opening
5.			

# APPENDIX A APPROVED MATERIAL

## FIRELINES

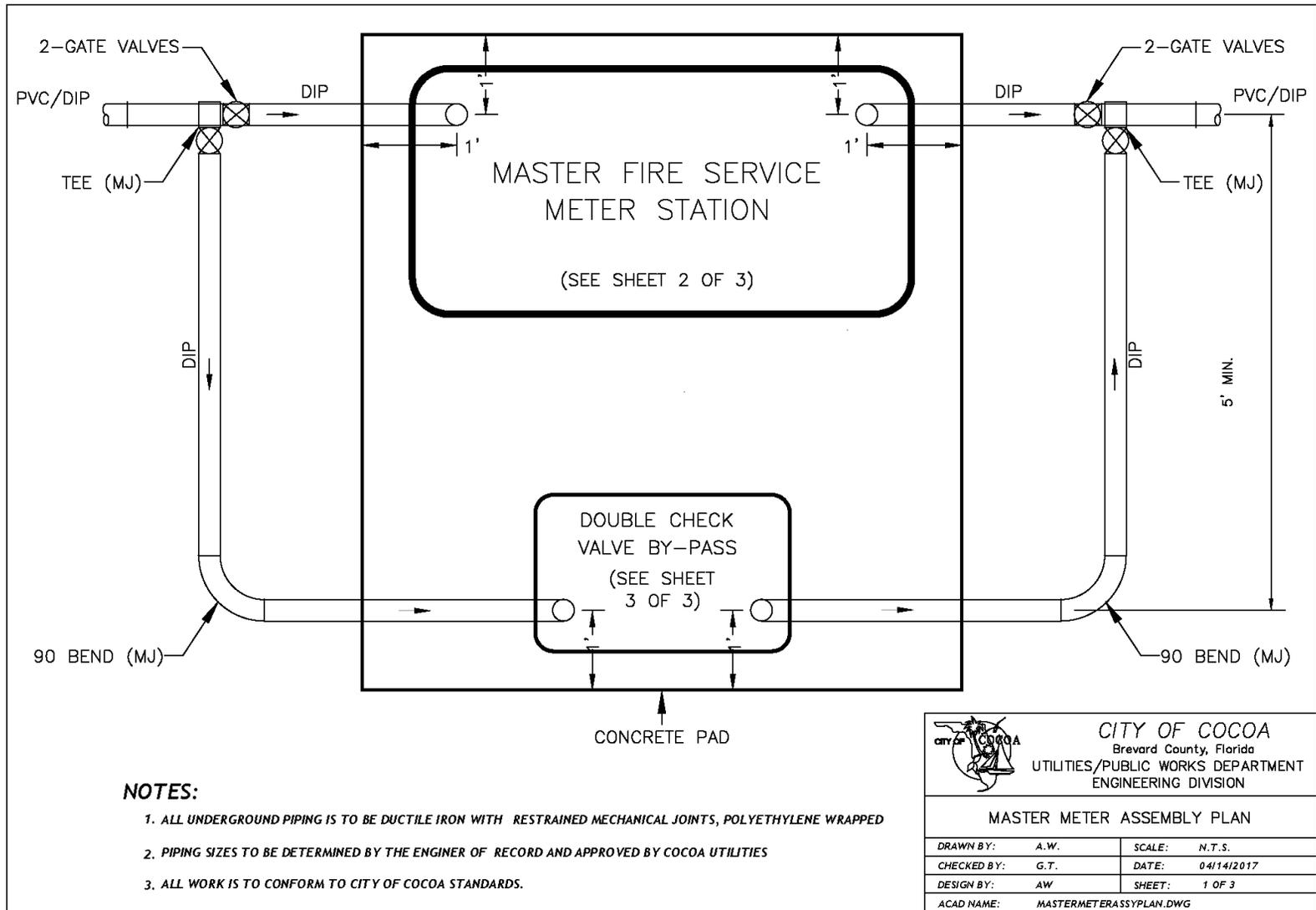
Item	Manufacturer	Part Number	Comments
<b>Firelines DCDA</b>			
1.	Ames	3000SS	
2.	Ames	Colt Series C300Na	Limited Space
3.	Febco	806YD/856 ST	
4.	Febco	876V-OSY-G	Limited Space
5.	Watts	774DCDA	
6.	Watts	757NDCDAOSY	Limited Space
7.	Wilkins	350DA	
8.	Apollo	DCDALF4AN, Type 1	Limited Space
<b>Domestic Backflow Preventors - RPZ</b>			
1.	Ames	4000S	
2.	Febco	825YD	
3.	Watts	994	
4.	Wilkins	375	

## WASTEWATER CATEGORY

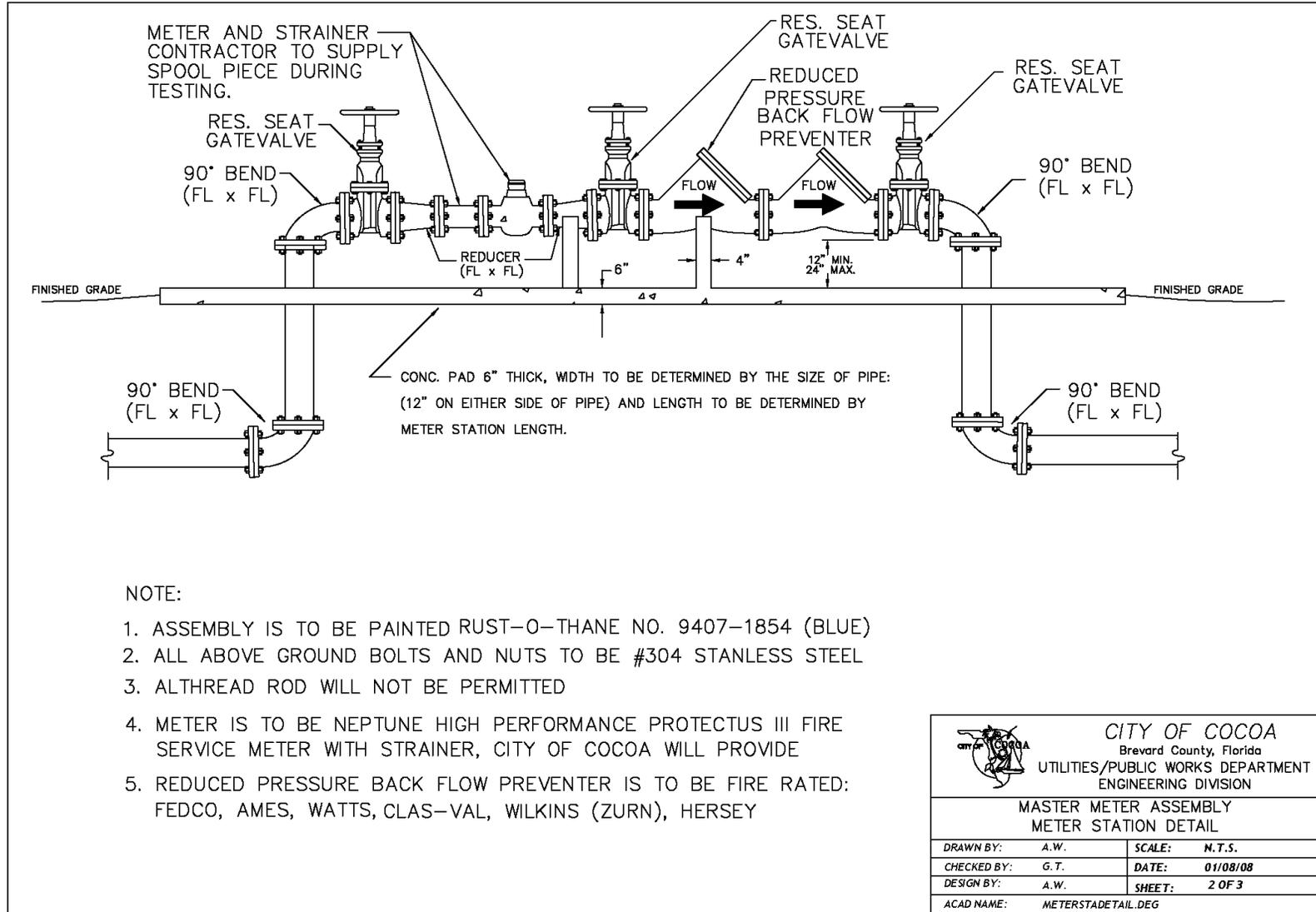
Item	Manufacturer	Part Number	Comments
1.	US Foundry	No. 225-AS-ORS	See spec 2.2.4
2.	Conseal	CS-55	Manhole coating
3.	ARGU America	HDPE SURE GRIP	Installation performed by qualified and authorized Agru installers.
4.	Multiple	Hardware	316SS
5.	Multiple	NEMA 4X SS	36" x 48" x 12"
6.	Multiple	Check Valves	See spec 2.9.6
7.	Multiple	L.S. Gate Valves	See spec 2.9.7
8.	Bilco	Aluminum access covers	300 PSF, 316 Hardware
9.	Halliday	Aluminum access covers	300 PSF, 316 Hardware
10.	Multiple	L.S. Control Panel	See spec 2.9.8
11.	Hydromatic		See spec 2.9.4
12.	ABS		See spec 2.9.4
13.	Flyght		See spec 2.9.4
14.	SCADA		See spec 2.9.8.2

**APPENDIX B**  
**APPROVED DRAWINGS AND DETAILS**

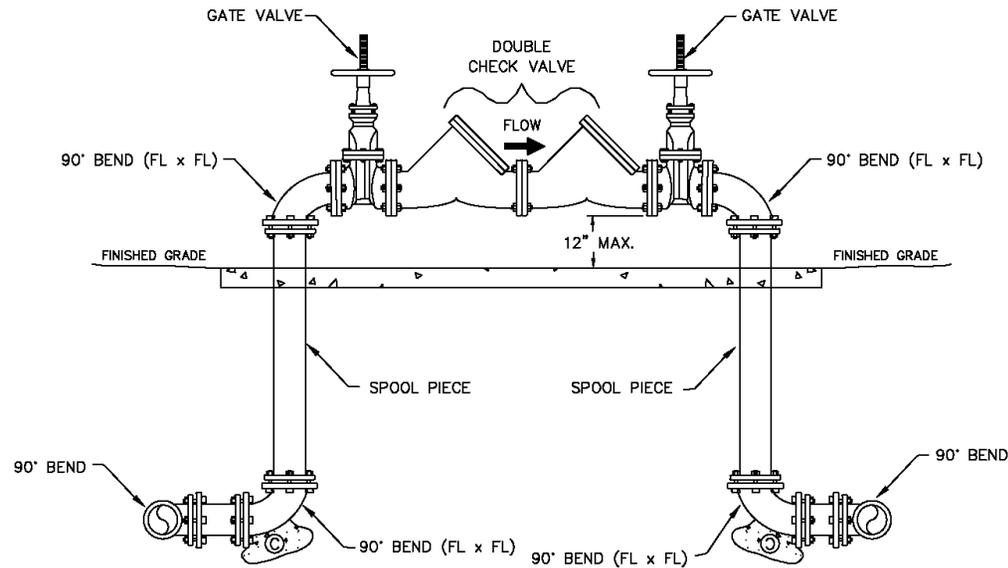
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS

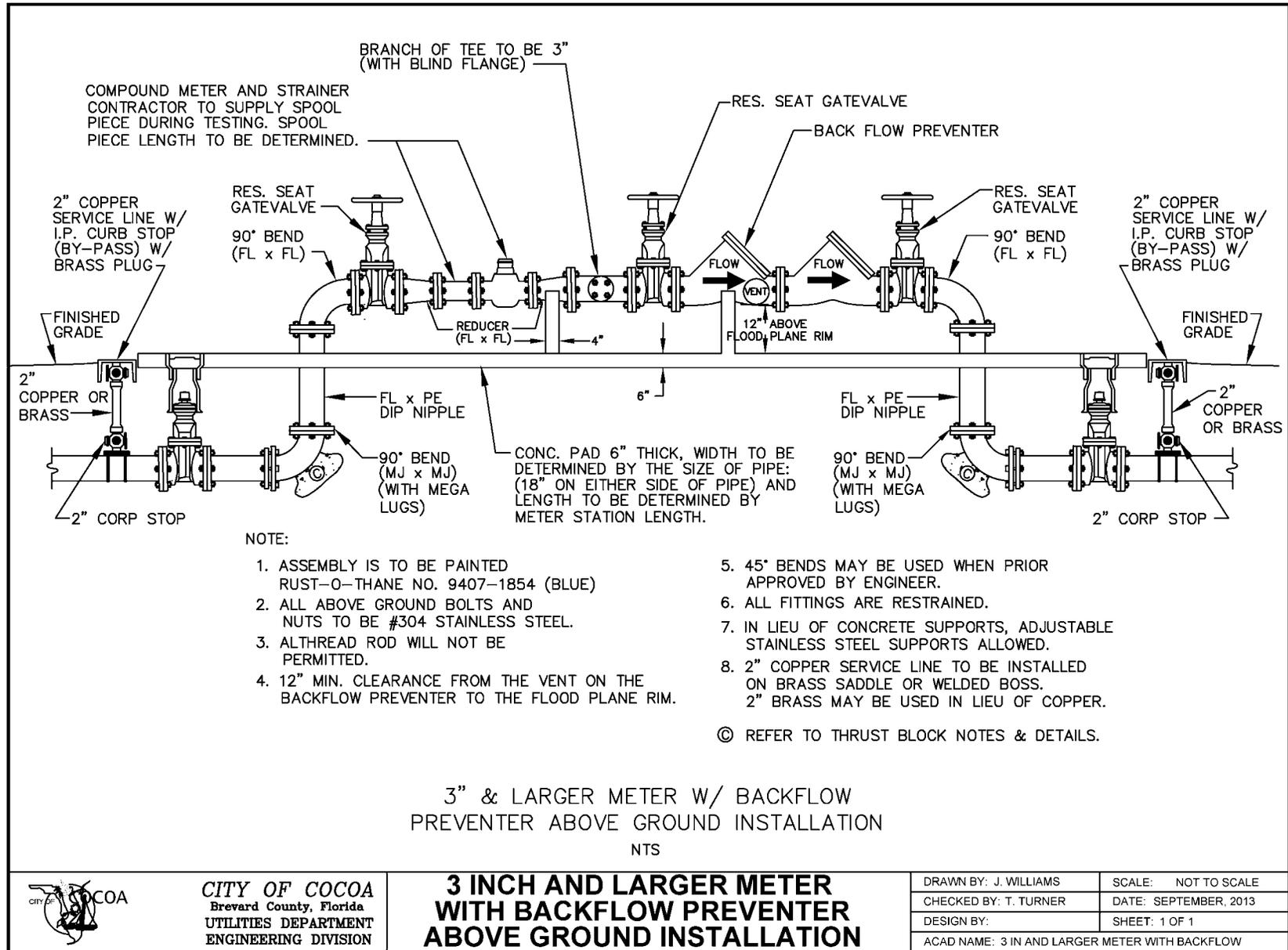


**NOTE:**

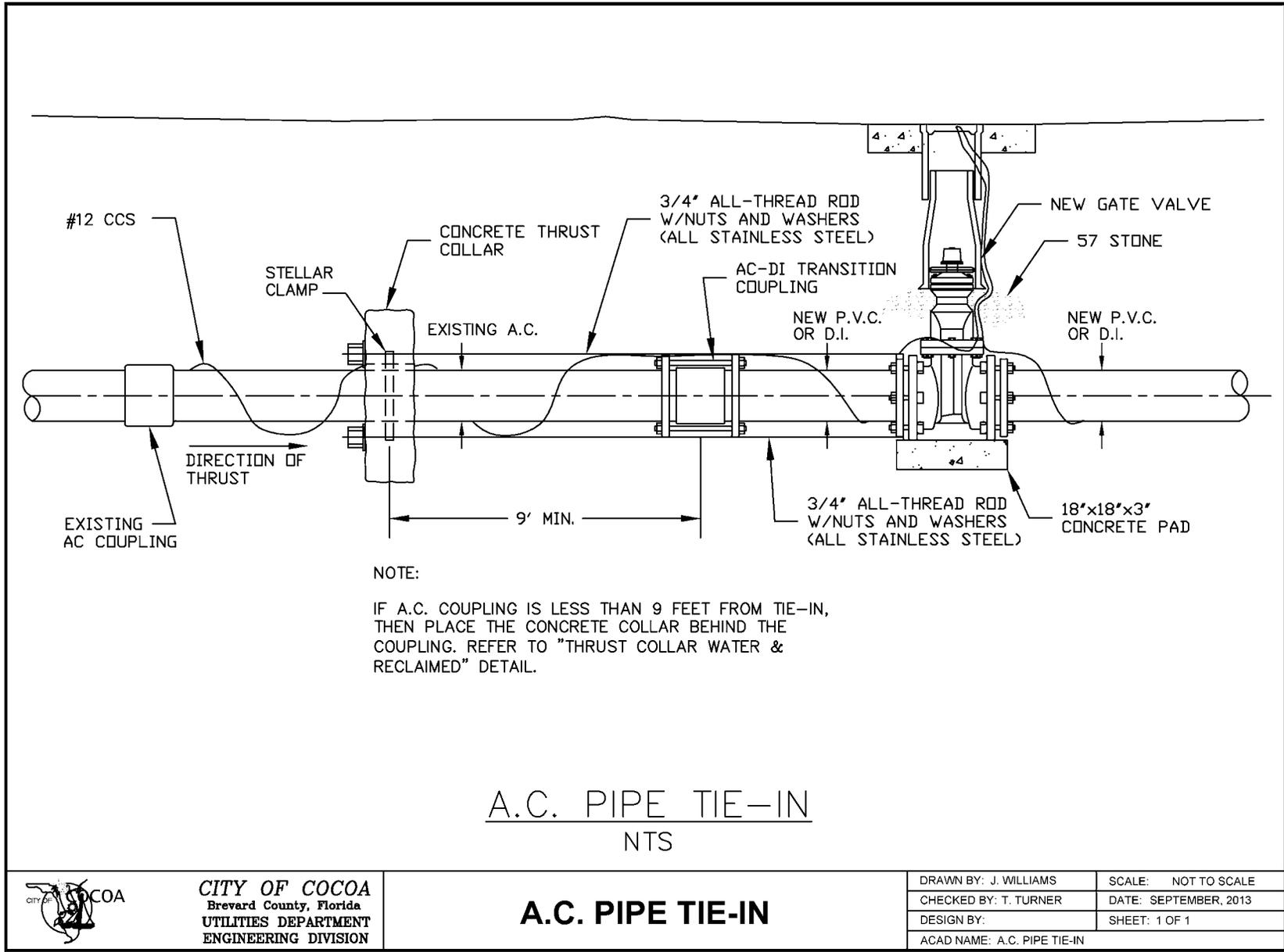
1. ASSEMBLY IS TO BE PAINTED RUST-O-THANE NO. 9407-1854 (BLUE)
2. ALL ABOVE GROUND BOLTS AND NUTS TO BE #304 STANLESS STEEL
3. ALTHREAD ROD WILL NOT BE PERMITTED
4. DOUBLE CHECK VALVE IS TO BE FIRE RATED: FEDCO, AMES, WATTS, CLAS-VAL, WILKINS (ZURN), HERSEY

	<b>CITY OF COCOA</b> Brevard County, Florida UTILITIES/PUBLIC WORKS DEPARTMENT ENGINEERING DIVISION		
	<b>MASTER METER ASSEMBLY                  DOUBLE CHECK BYPASS</b>		
<b>DRAWN BY:</b>	A.W.	<b>SCALE:</b>	N.T.S.
<b>CHECKED BY:</b>	G.T.	<b>DATE:</b>	01/08/08
<b>DESIGN BY:</b>	A.W.	<b>SHEET:</b>	3 OF 3
<b>ACAD NAME:</b>	METERVAULTASSEMBLY		

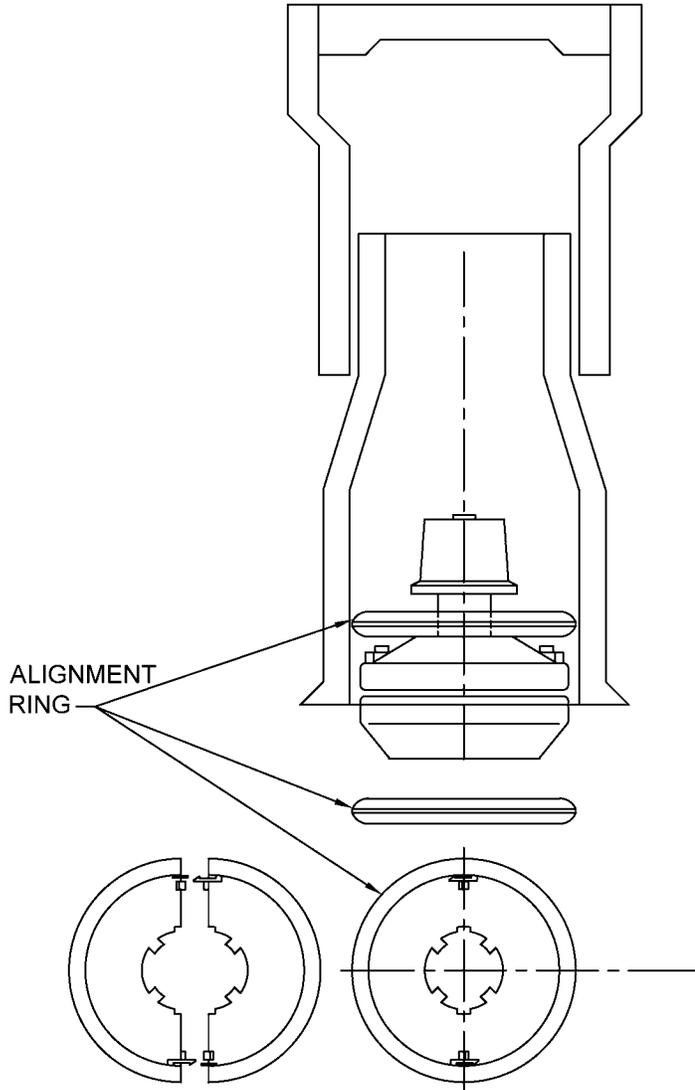
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



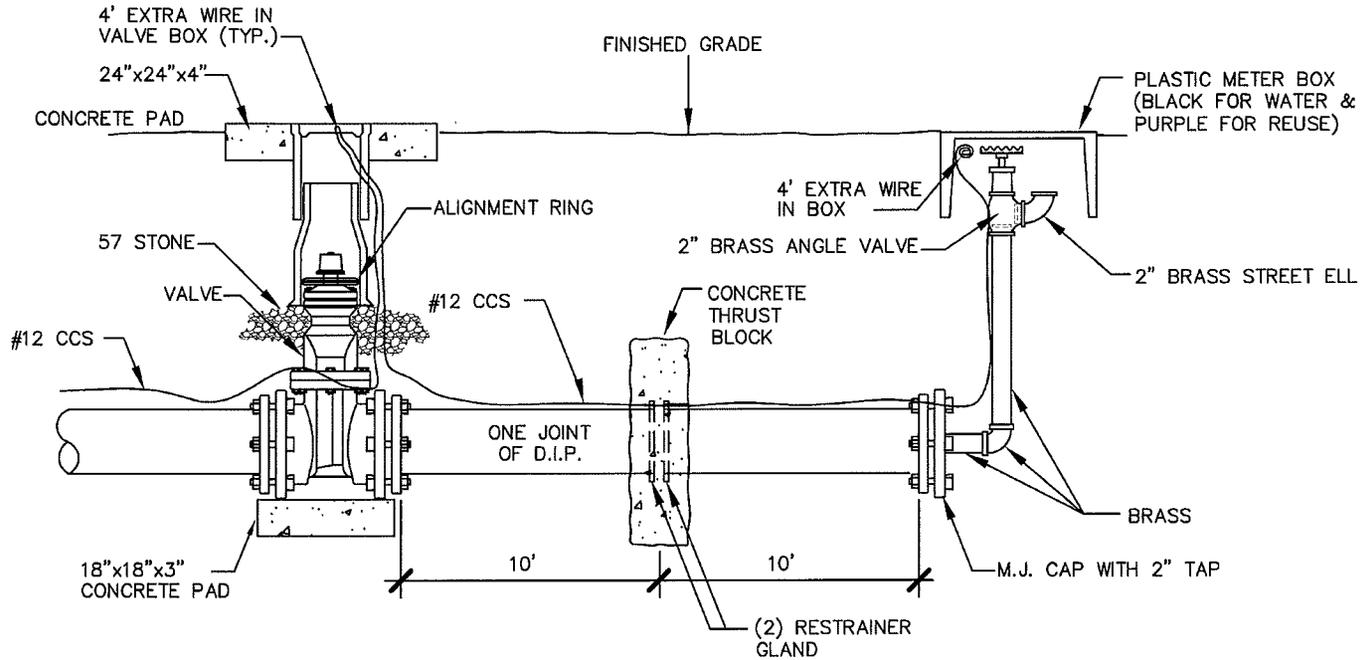
# APPENDIX B APPROVED DRAWINGS AND DETAILS



- NOTES:  
 1. FOR ALL VALVES REGARDLESS OF SIZE AND DEPTH.

 <b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>ALIGNMENT RING</b>	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: ALIGNMENT RING	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



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 DETAIL  
10" WATER MAINS  
AND SMALLER

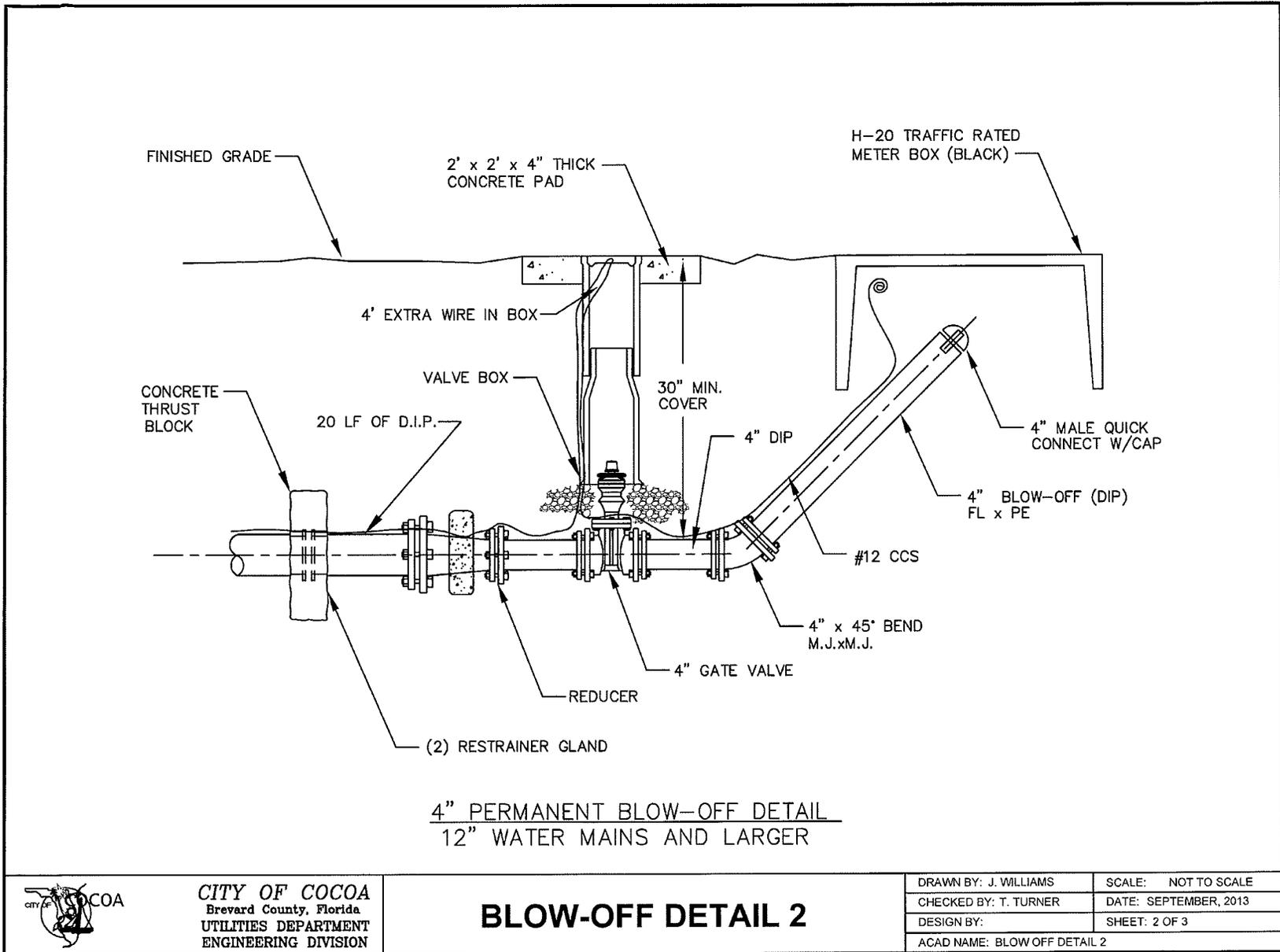


**CITY OF COCOA**  
Brevard County, Florida  
UTILITIES DEPARTMENT  
ENGINEERING DIVISION

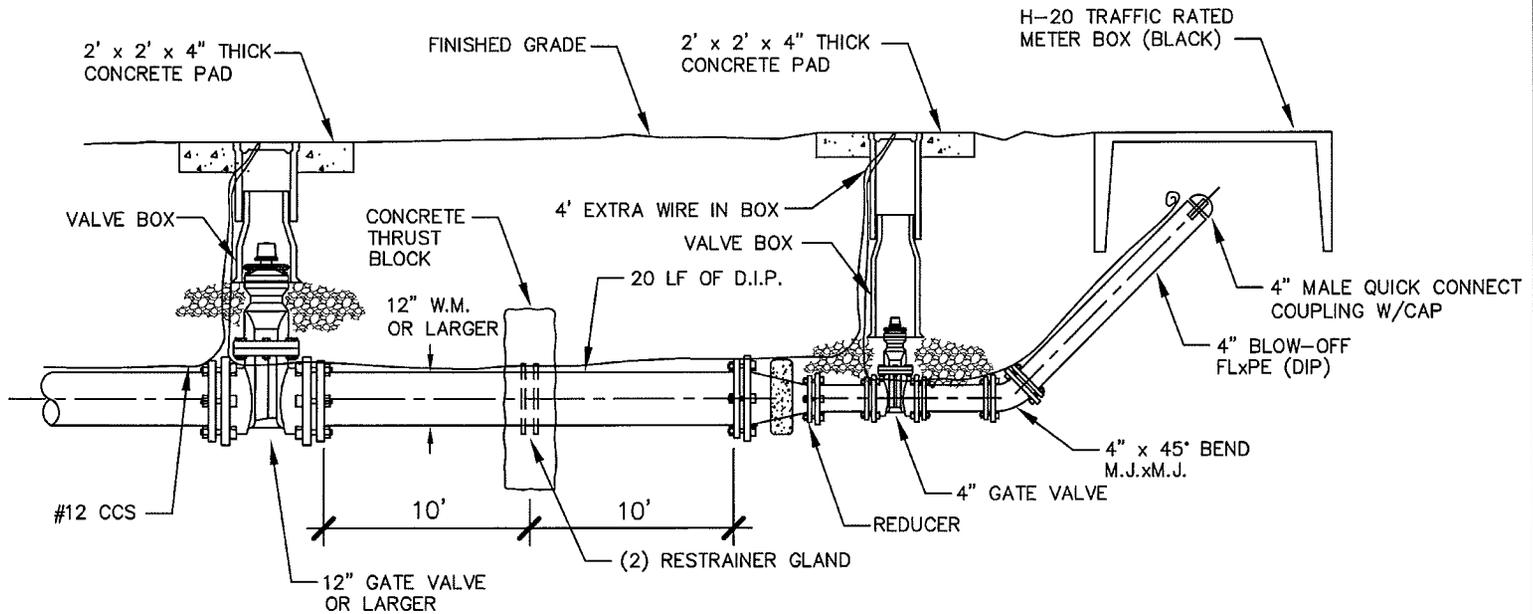
## BLOW-OFF DETAIL 1

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 3
ACAD NAME: BLOW OFF DETAIL 1	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



4" TEMPORARY BLOW-OFF DETAIL  
12" WATER MAINS AND LARGER

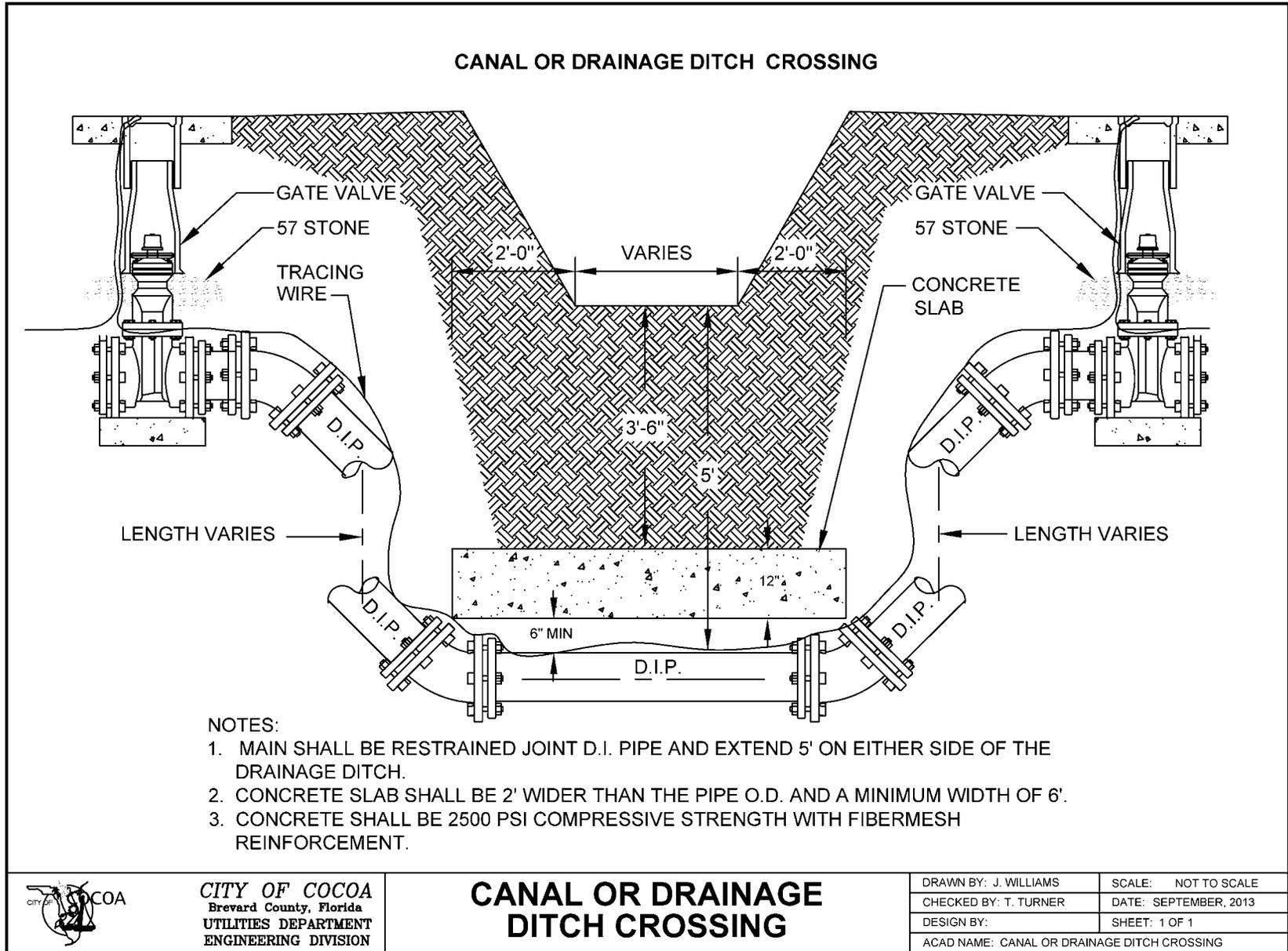


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Brevard County, Florida  
UTILITIES DEPARTMENT  
ENGINEERING DIVISION

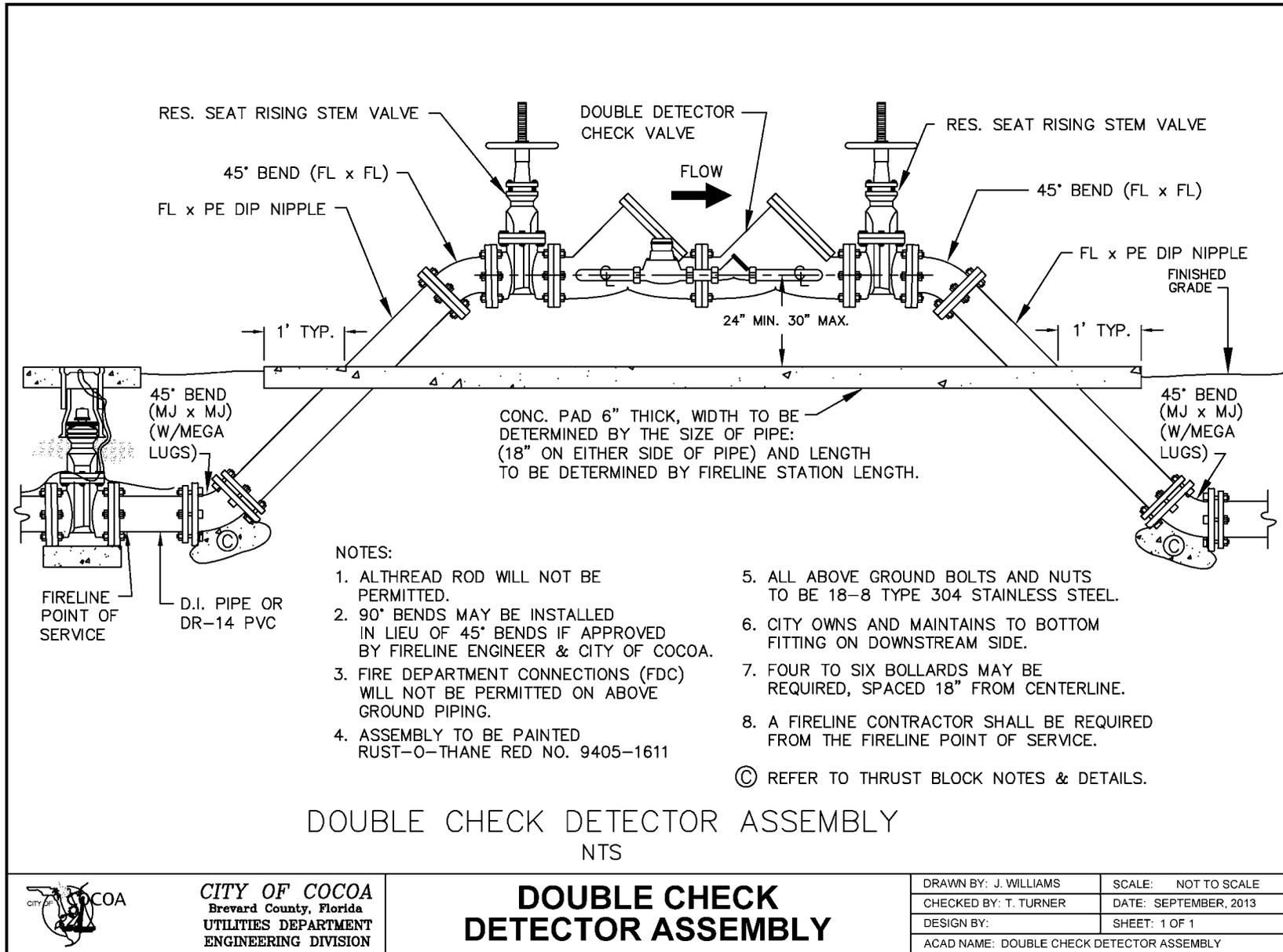
## BLOW-OFF DETAIL 3

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 3 OF 3
ACAD NAME: BLOW OFF DETAIL 3	

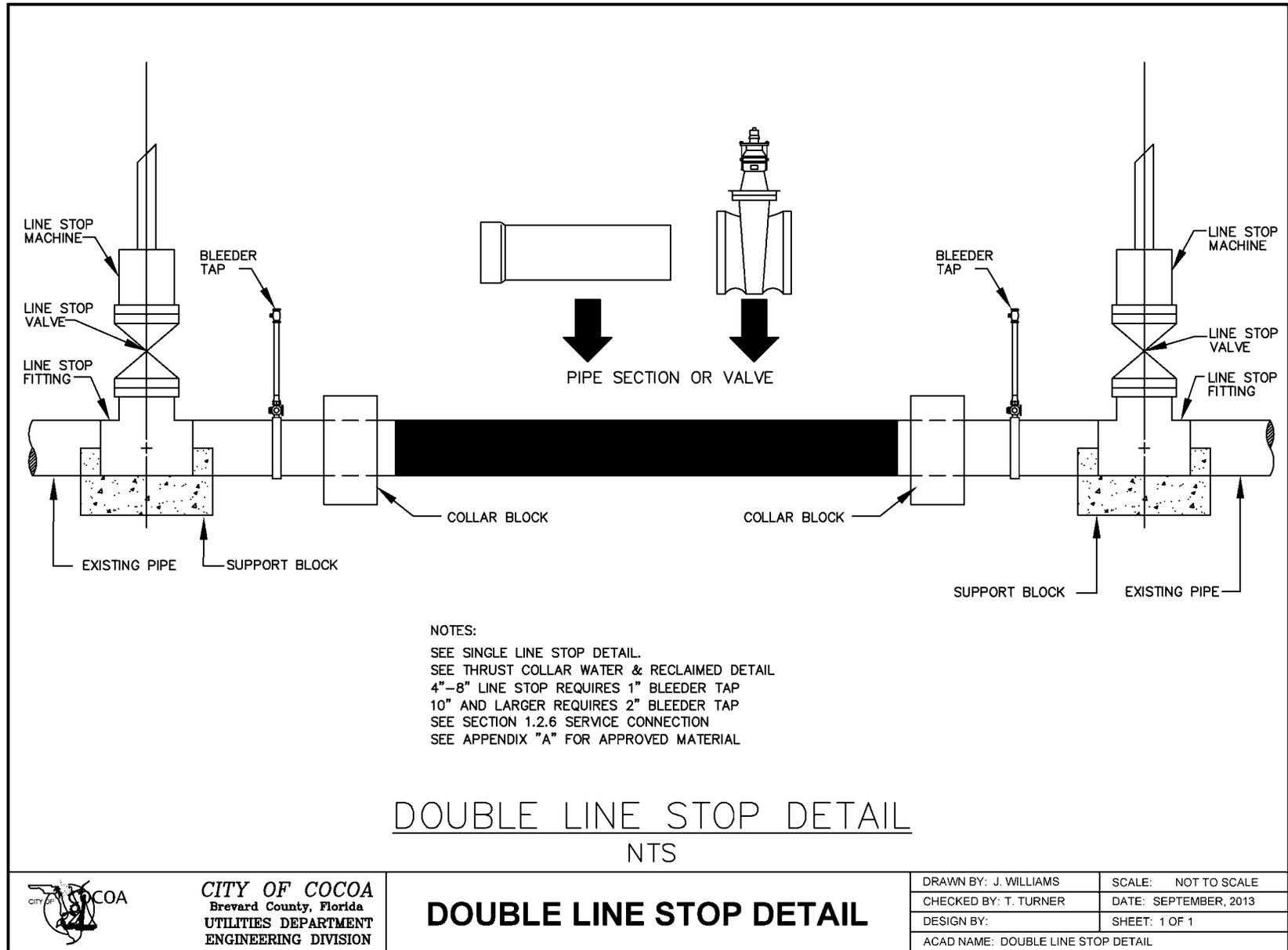
# APPENDIX B APPROVED DRAWINGS AND DETAILS



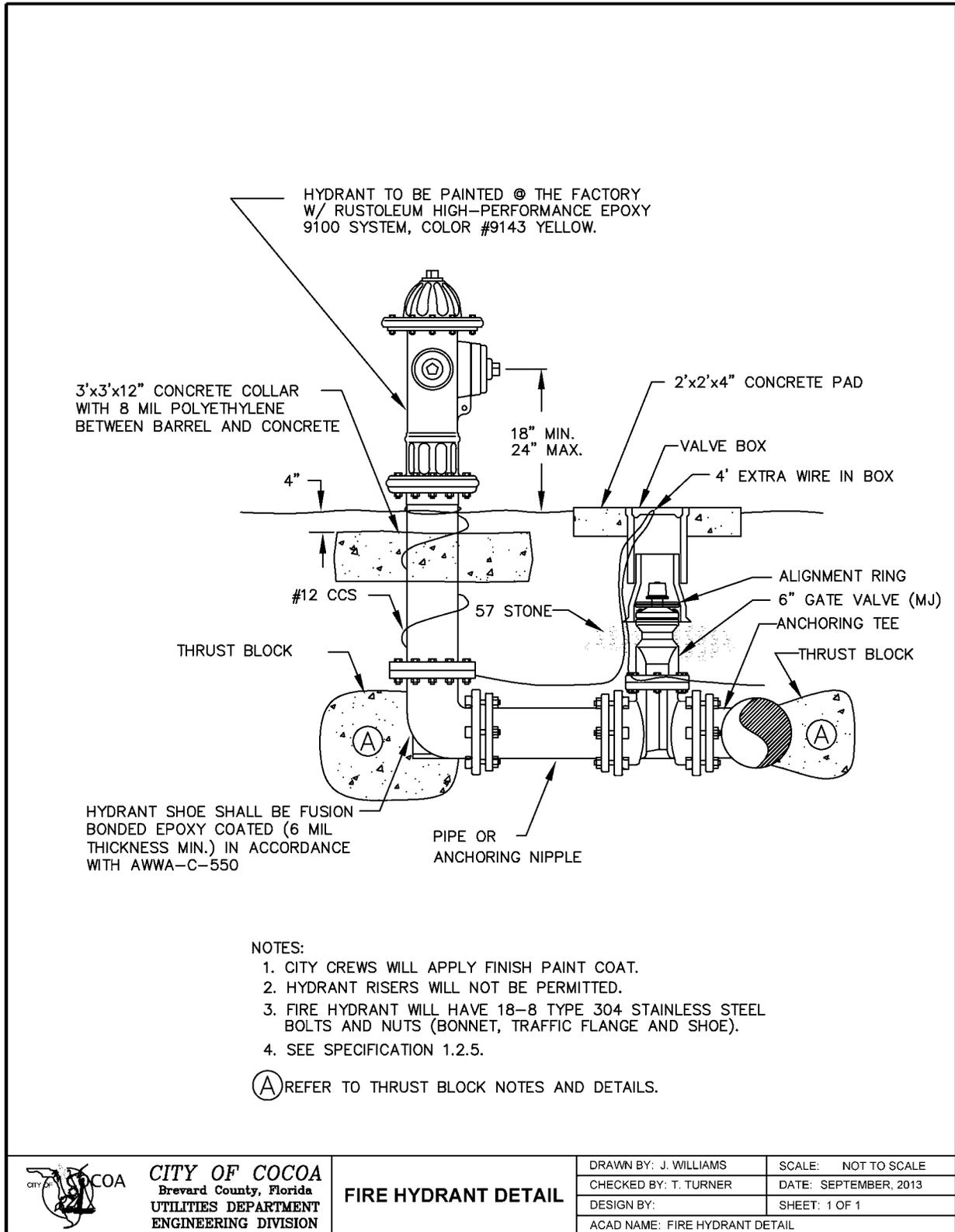
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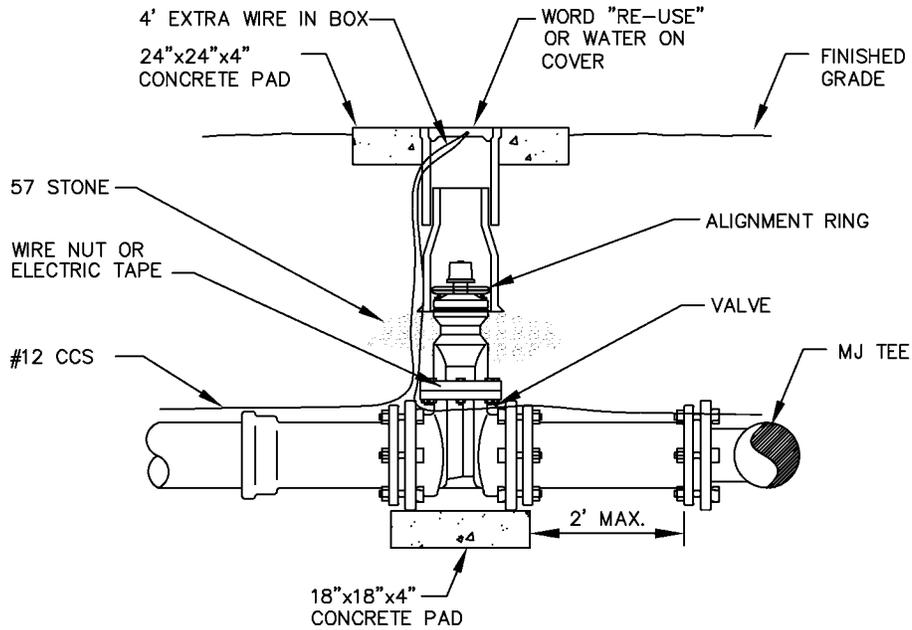
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



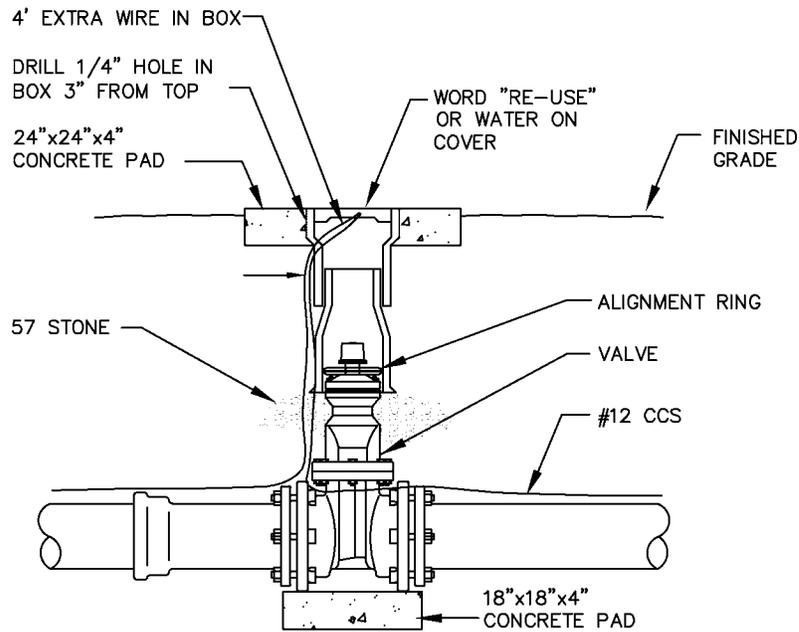
NOTE: PROPER SIZE VALVE BOX SHALL BE INSTALLED. PIPE NOT ALLOWED.

## GATE VALVE AND FITTING DETAIL NTS

 <b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>GATE VALVE AND FITTING DETAIL</b>	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: GATE VALVE & FITTING DETAIL	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

## GATE VALVE AND VALVE BOX DETAIL NTS



**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 EXTENTION 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. LOCATING WIRE SHALL BE CONTINUOUS WITH NO SPLICES AND SHALL EXTEND 24" 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.

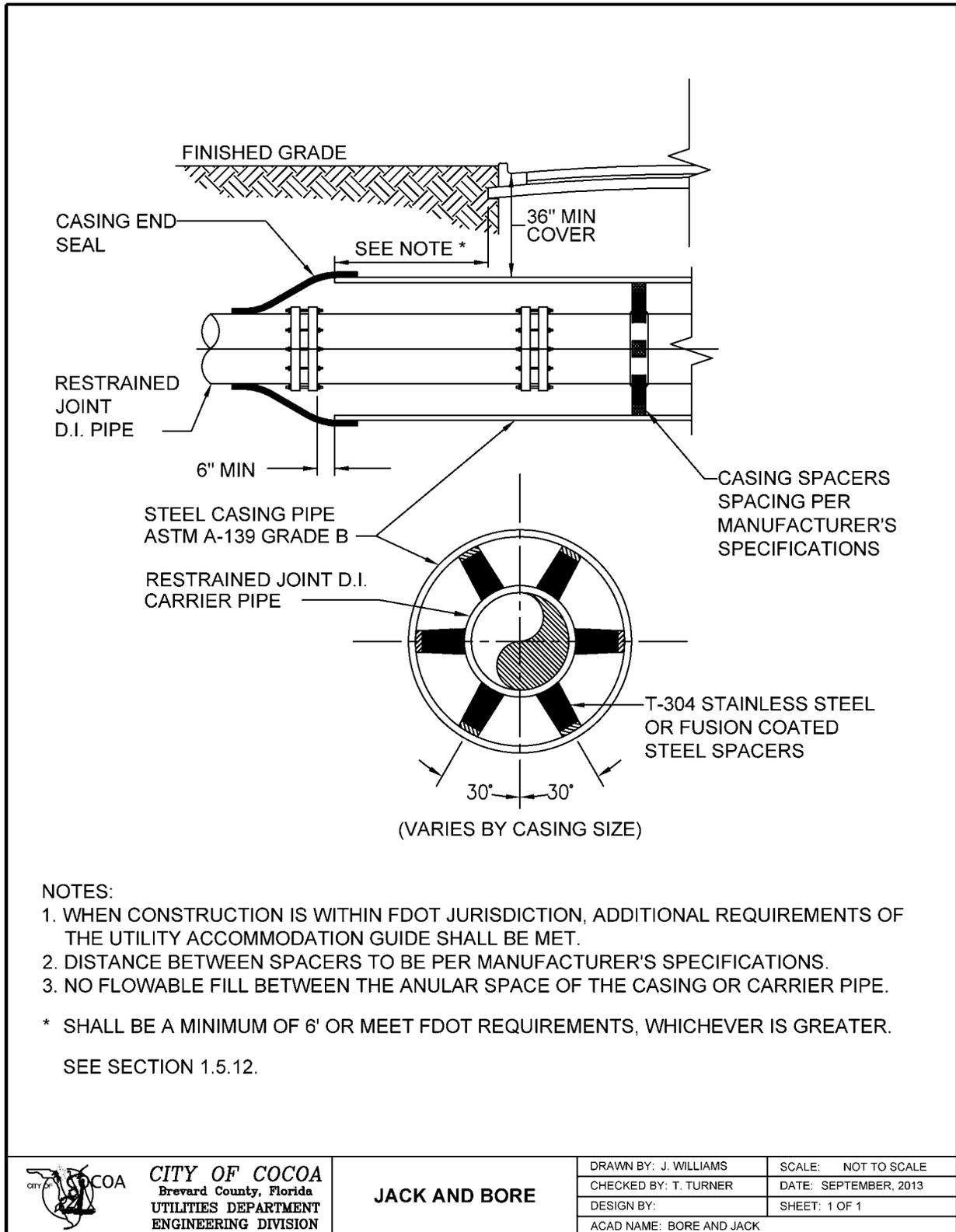


**CITY OF COCOA**  
Brevard County, Florida  
UTILITIES DEPARTMENT  
ENGINEERING DIVISION

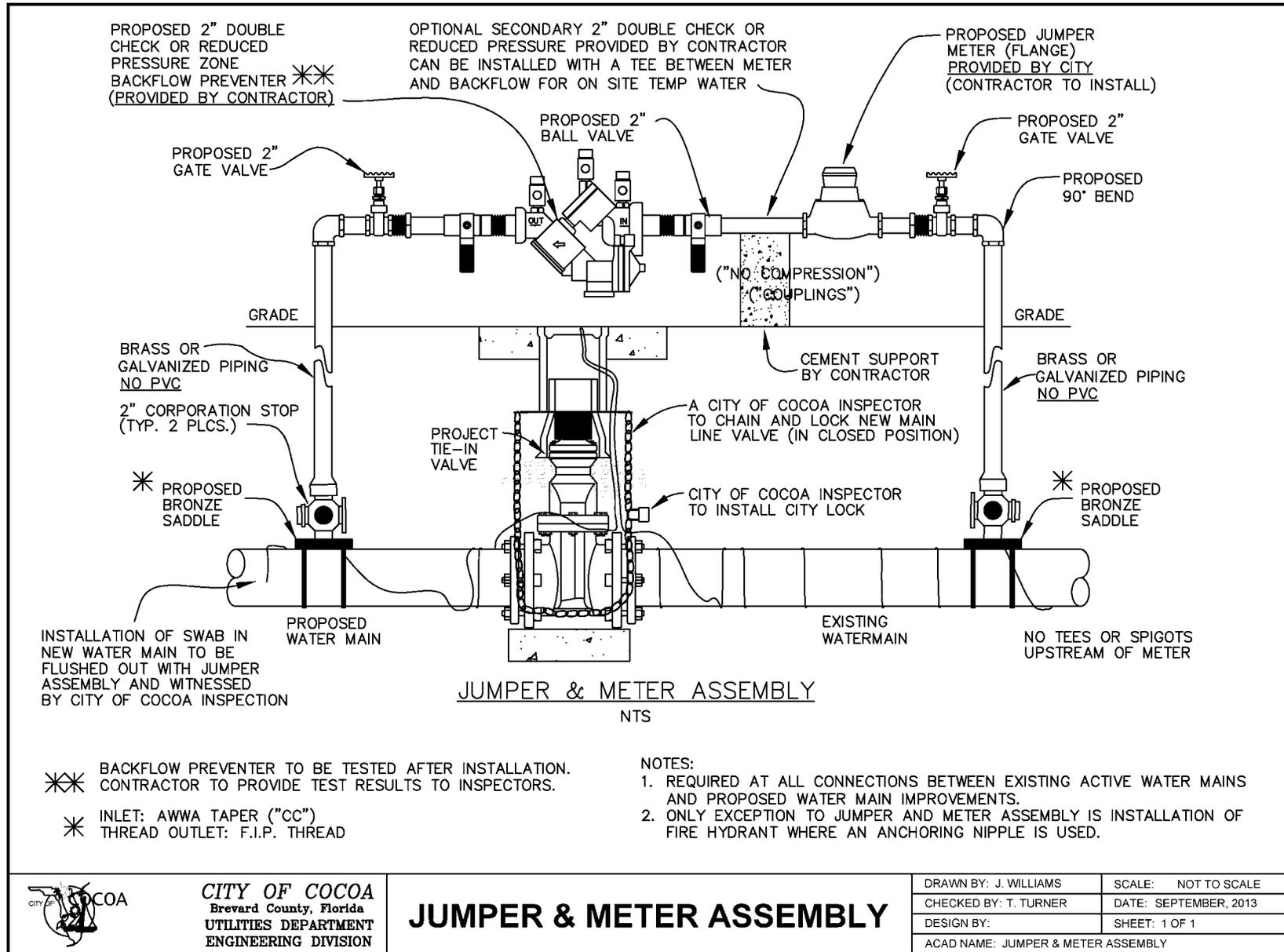
### GATE VALVE AND VALVE BOX DETAIL

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: GATE VALVE & VALVE BOX DETAIL	

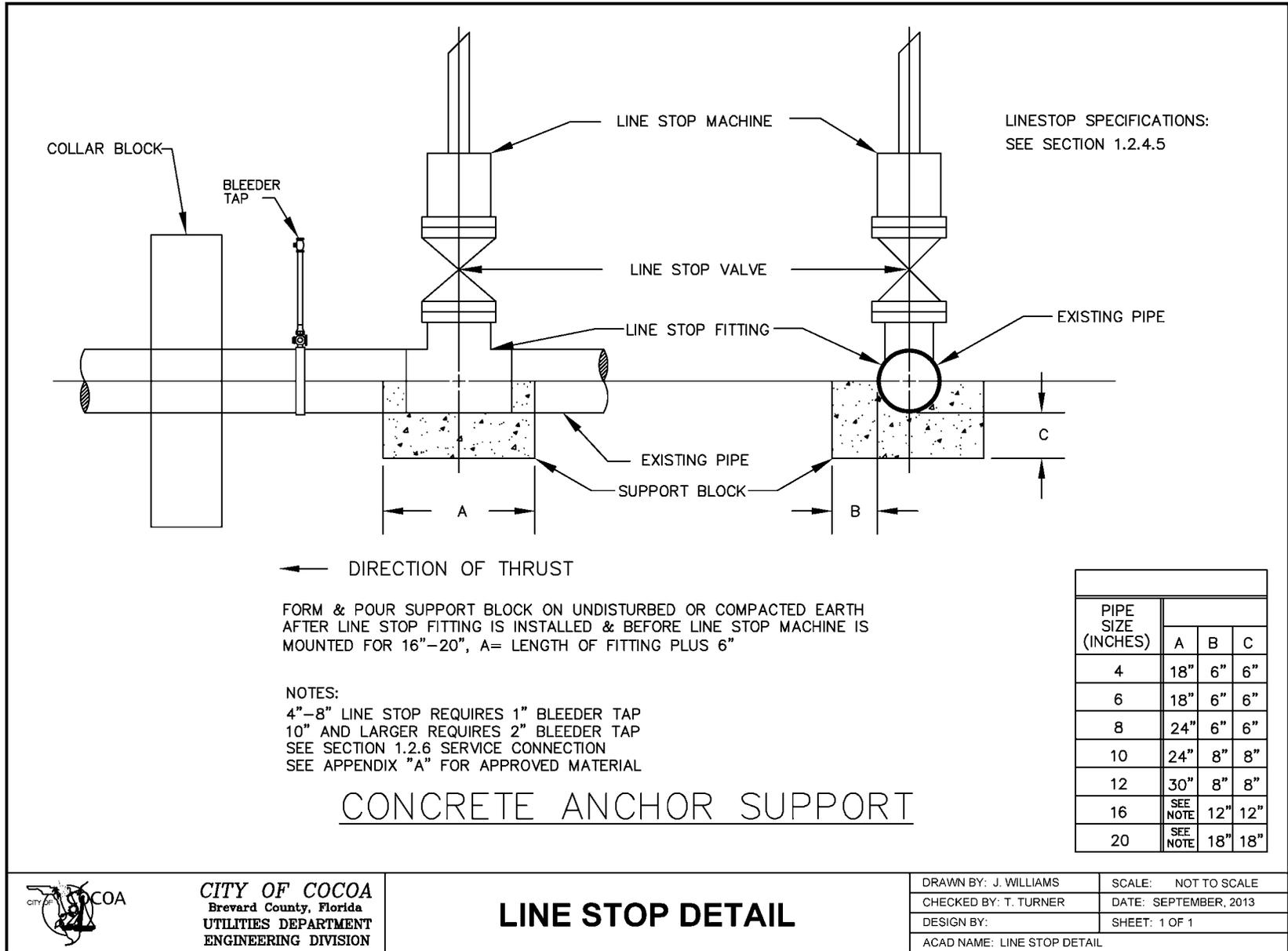
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS

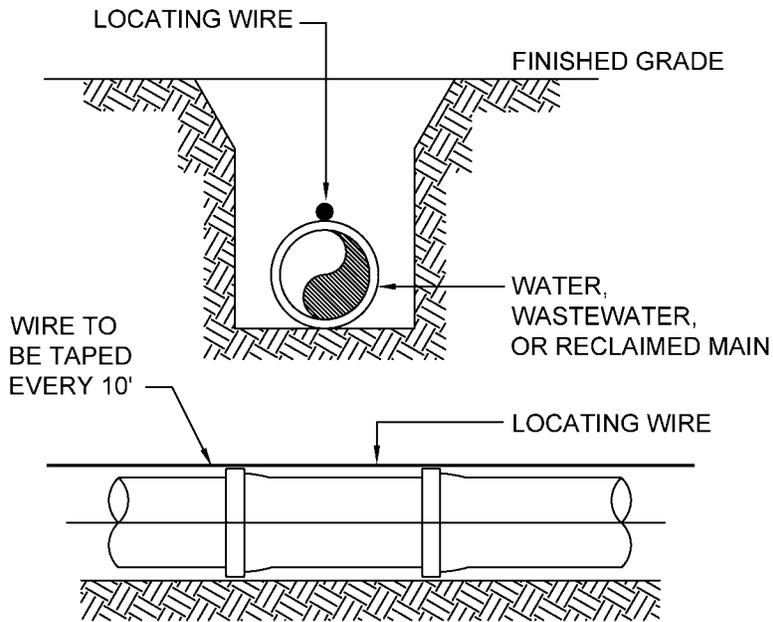


**CITY OF COCOA**  
Brevard County, Florida  
UTILITIES DEPARTMENT  
ENGINEERING DIVISION

## LINE STOP DETAIL

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: LINE STOP DETAIL	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



**NOTES:**

1. ALL PIPE SHALL REQUIRE INSULATED LOCATING WIRE (#12 CCS) CAPABLE OF DETECTION BY A CABLE LOCATOR 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 SECTION 1.5.5.

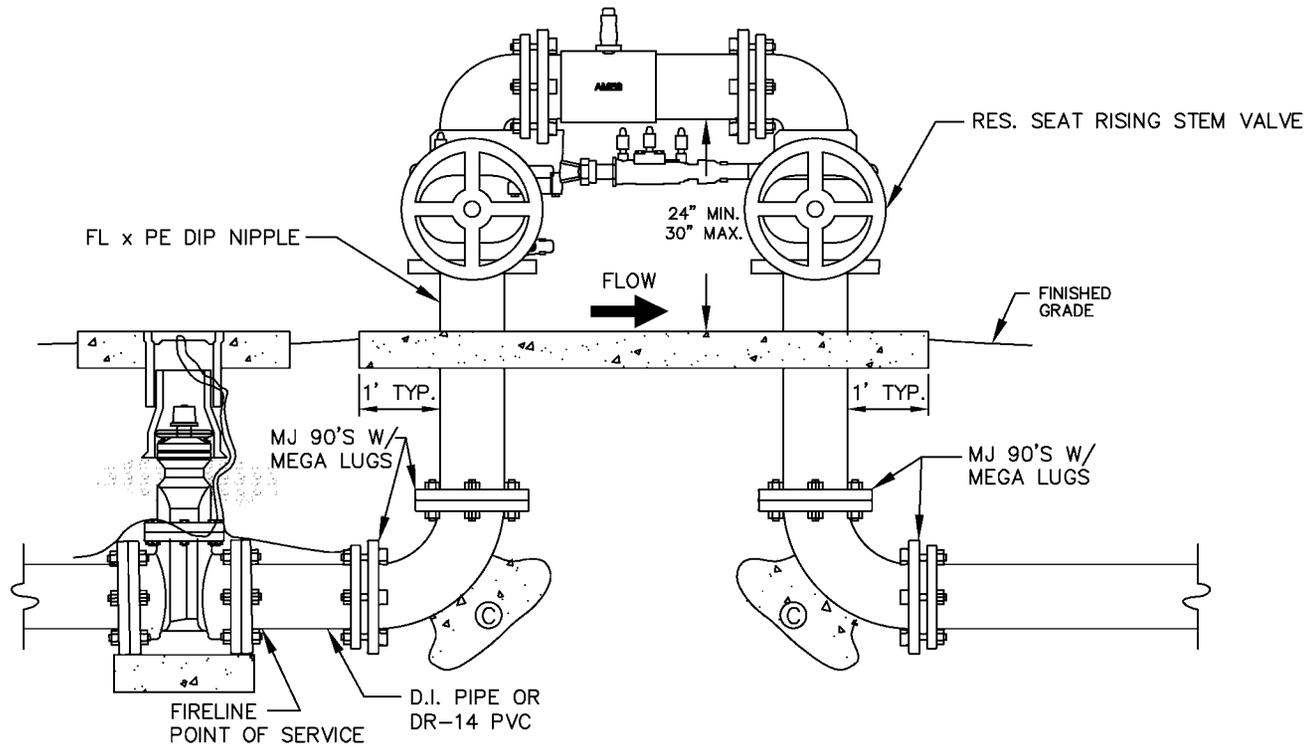


**CITY OF COCOA**  
 Brevard County, Florida  
 UTILITIES DEPARTMENT  
 ENGINEERING DIVISION

**LOCATING WIRE DETAIL**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: LOCATION WIRE DETAIL	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



**NOTES:**

1. ALTHREAD 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.

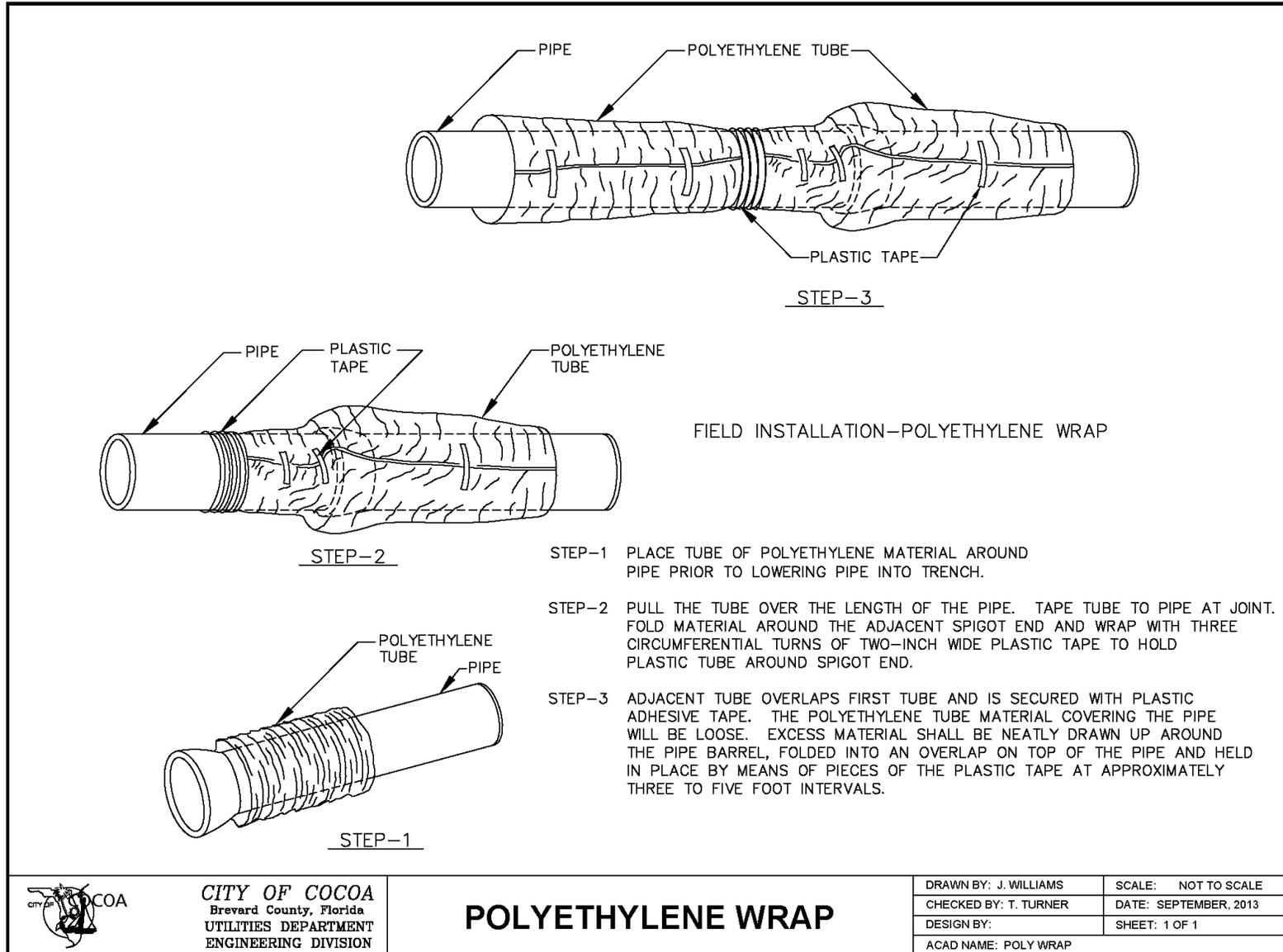


**CITY OF COCOA**  
 Brevard County, Florida  
 UTILITIES DEPARTMENT  
 ENGINEERING DIVISION

## "N" PATTERN DOUBLE CHECK DETECTOR ASSEMBLY

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: N PATTERN DOUBLE CHECK DETECTOR ASSEMBLY	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS

CITY OF COCOA UTILITIES  
TECHNICAL PROVISIONS

## RESTRAINED PIPE TABLE WATER AND RECLAIMED WATER MAINS

MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)								
TYPE	PIPE SIZE							
	4"	6"	8"	10"	12"	16"	20"	24"
90° BEND	21	29	38	45	53	66	79	91
45° BEND	9	12	16	19	22	45	33	38
22-1/2° BEND	5	6	8	9	11	14	16	19
11-1/4° BEND	3	3	4	5	6	7	8	9
PLUG, BRANCH OF TEE, VALVE	58	82	107	128	151	193	234	273

NOTES:

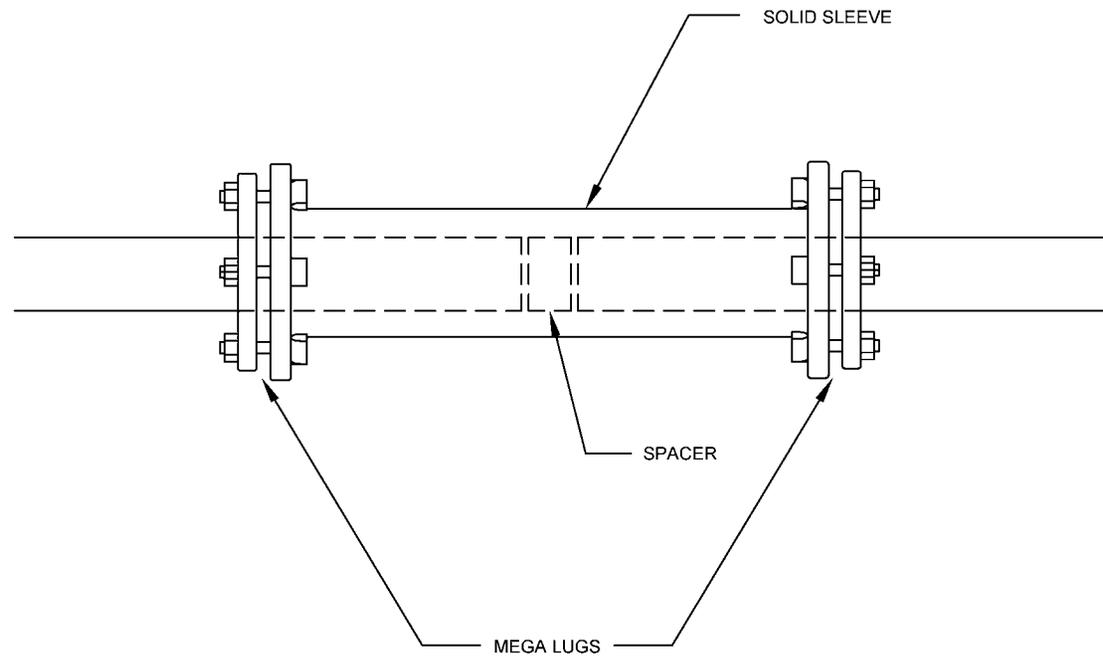
1. FITTINGS SHALL BE RESTRAINED JOINTS.
2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN SHOWN IN THE TABLE.
3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS GREATEST LENGTH OF RESTRAINED PIPE.
4. ALL LINE VALVES AND THROUGH RUN OF TEES SHALL BE RESTRAINED.
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.

 <b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>RESTRAINED PIPE TABLE WATER &amp; RECLAIMED WATER MAINS</b>	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: RESTRAINED PIPE TABLE WATER AND RECLAIMED	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

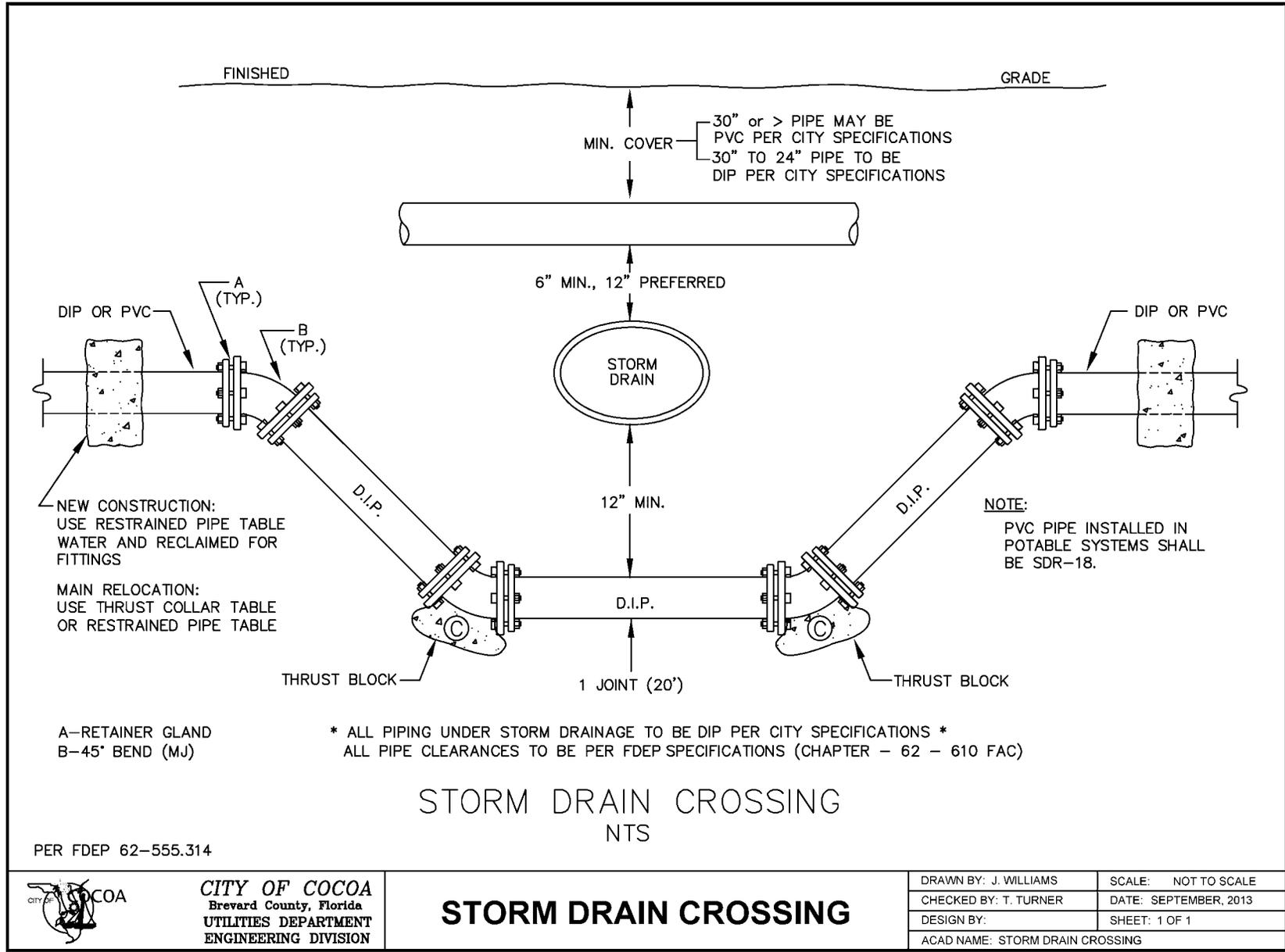


**CITY OF COCOA**  
Brevard County, Florida  
UTILITIES DEPARTMENT  
ENGINEERING DIVISION

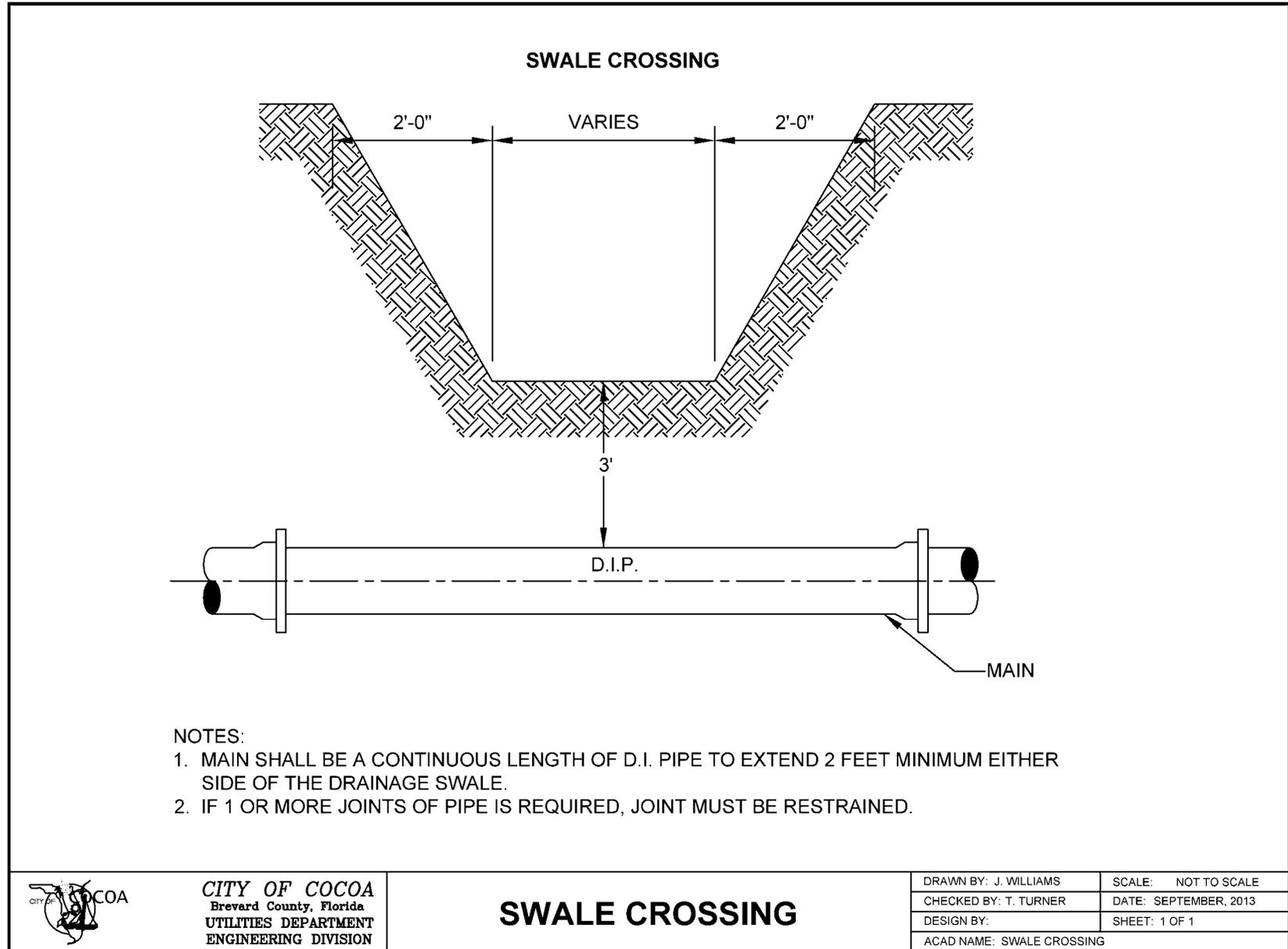
## SOLID SLEEVE DETAIL

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: SOLID SLEEVE DETAIL	

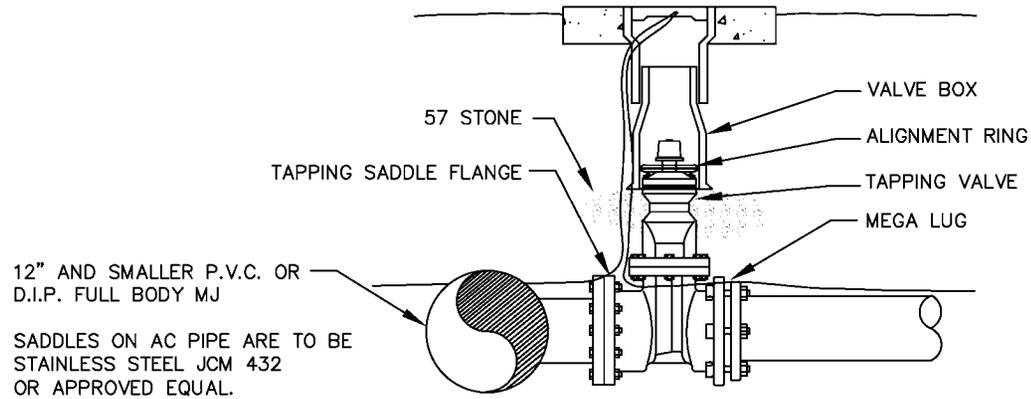
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



TAPPING SADDLE AND VALVE

NTS



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 Brevard County, Florida  
 UTILITIES DEPARTMENT  
 ENGINEERING DIVISION

## TAPPING SADDLE AND VALVE

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TAPPING SADDLE AND VALVE	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

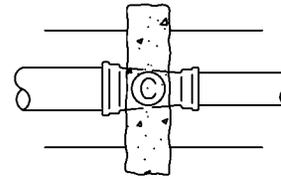
## THRUST BLOCK NOTES

- 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.

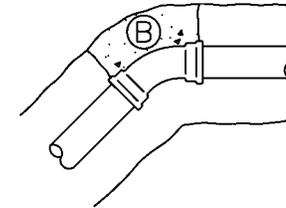
## MINIMUM BEARING AREA (SQ. FT.)

LETTER	PIPE SIZE						
	4"	6"	8"	10"	12"	16"	20"
A	1-1/2	2-3/4	5	7-1/4	10-1/4	18	27-1/2
B(22-1/2)	3/4	1	2	3	4	7	11
B (45°)	1	2-1/4	3-3/4	5-1/2	8	13-3/4	21
C	2	4	7	11-1/4	14-1/2	25-1/4	39

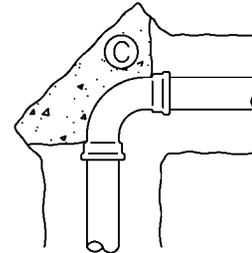
THE FIGURES IN THIS TABLE REPRESENT AREA OF CONCRETE BLOCKING AGAINST THE VERTICAL TRENCH WALL OF UNDISTURBED EARTH IN SQUARE FEET AT 2000 P.S.F. SOIL BEARING CAPACITY.



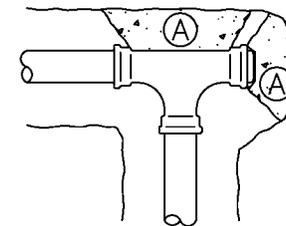
REDUCER  
NTS



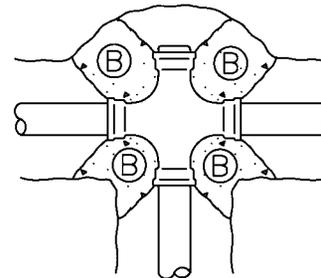
BEND  
NTS



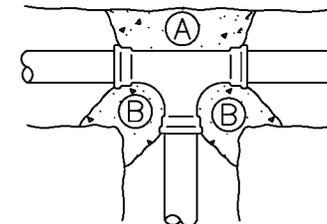
90° ELBOW  
NTS



TEE & PLUG  
NTS



CROSS & PLUG  
NTS



TEE  
NTS

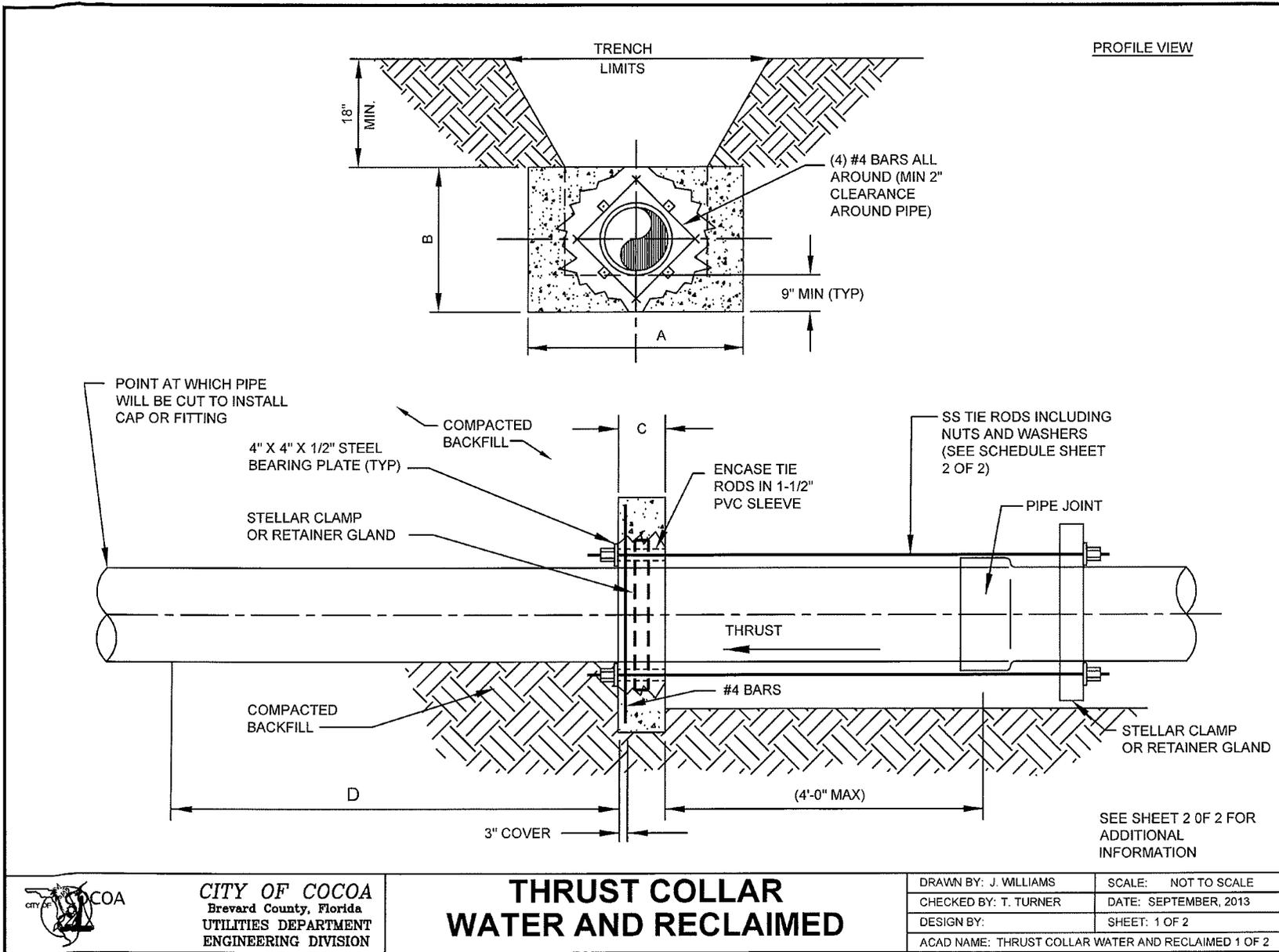


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ENGINEERING DIVISION

## THRUST BLOCK NOTES & DETAILS

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: THRUST BLOCK NOTES & DETAILS	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



**CITY OF COCOA**  
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## THRUST COLLAR WATER AND RECLAIMED

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 2
ACAD NAME: THRUST COLLAR WATER AND RECLAIMED 1 OF 2	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

SCHEDULE OF DIMENSIONS AND MATERIALS						
PIPE SIZE (INCHES)	DIMENSIONS (FT.)				TIE RODS REQ'D	
	A	B	C	D	DIA. (in.)	NO.
4	2.0	2.0	1.0	2.0	3/4	2
6	2.0	2.0	1.0	4.0	3/4	2
8	3.0	3.0	1.0	5.0	3/4	2
10	4.0	3.0	1.0	8.0	3/4	4
12	5.0	3.0	1.0	10.0	3/4	4
16	*	*	*	*	*	*
20	*	*	*	*	*	*
24	*	*	*	*	*	*

NOTE: THRUST COLLAR AREAS TO BE COMPUTED ON BASIS OF 2000 LBS/SF SOIL RESTRAINT BEARING. SOIL DENSITY ASSUMED 120 PCF. SOIL COHESION 20°.

**NOTES:**

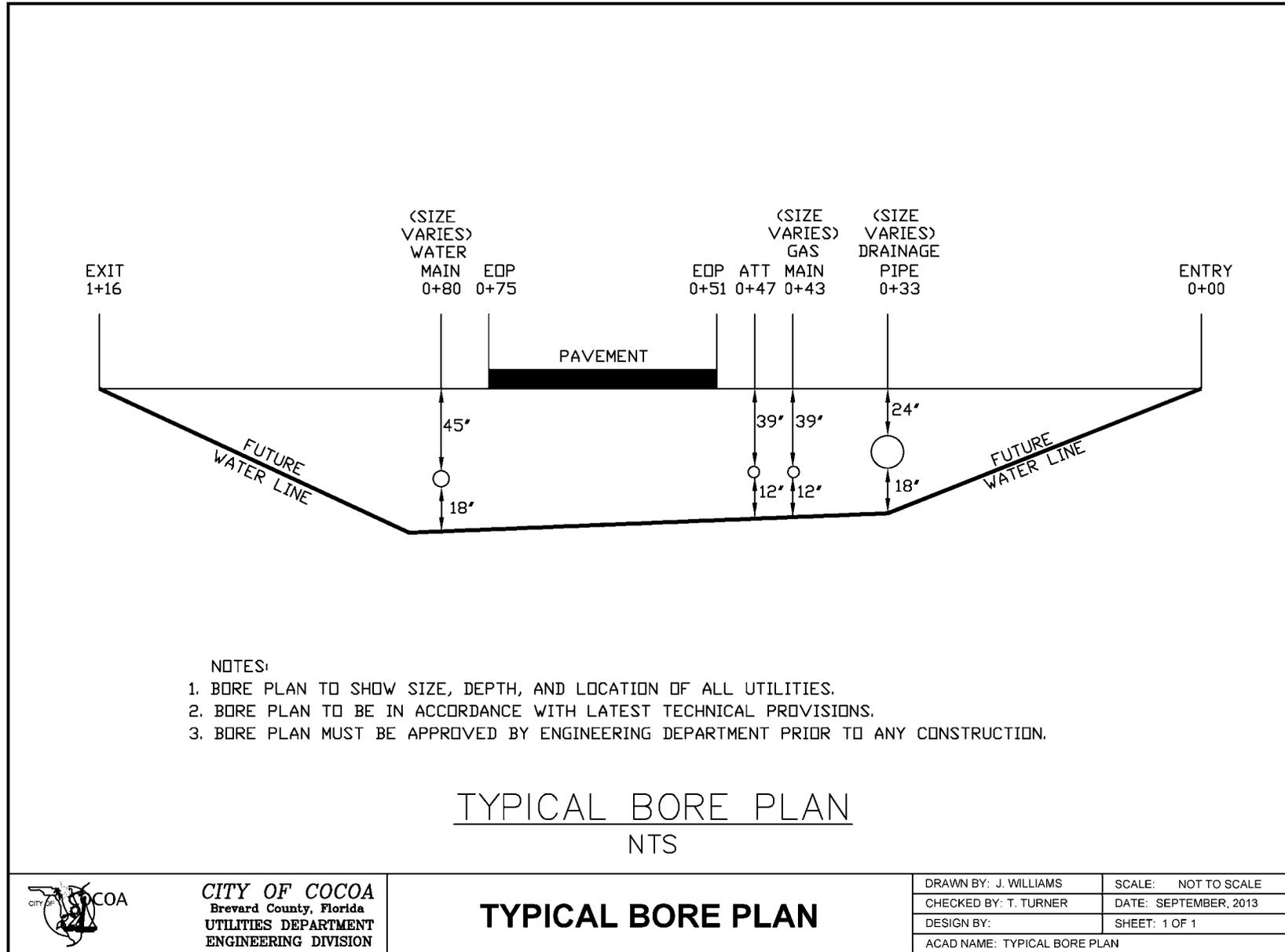
- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. ADDITIONAL REINFORCEMENTS SHALL BE AS SPECIFIED BY THE ENGINEER.</li> <li>2. MINIMUM COMPRESSIVE STRENGTH FOR CONCRETE SHALL BE 3000 PSI.</li> <li>3. BEDDING, BACKFILL AND COMPACTION SHALL BE AS SPECIFIED ELSEWHERE IN THE STANDARD DRAWINGS.</li> </ol> | <ol style="list-style-type: none"> <li>4. ALL FORM BOARDS SHALL BE REMOVED PRIOR TO BACKFILL.</li> <li>5. NO ALLOWANCE SHALL BE MADE FOR FRICTION BETWEEN THE PIPE WALL AND THE THRUST COLLAR.</li> <li>6. DESIGN PRESSURE: <u>150</u> PSI.</li> <li>7. TIE RODS TO BE 3/4" SS 18-8 TYPE 304.</li> </ol> |
|---|--|

\* TO BE DESIGNED BY ENGINEER OF RECORD.

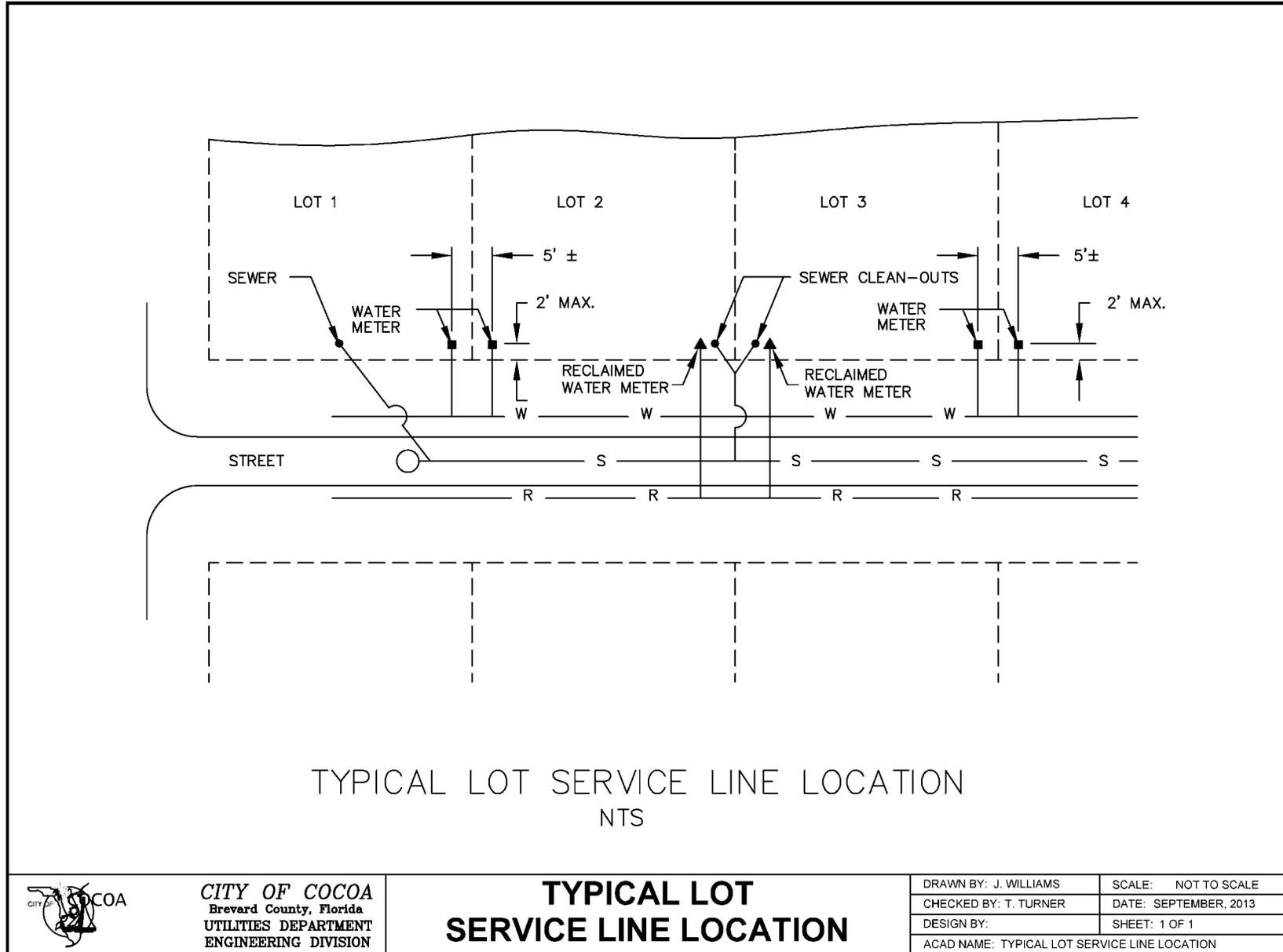
SEE SHEET 1 OF 2 FOR  
ADDITIONAL  
INFORMATION

	<b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>THRUST COLLAR WATER AND RECLAIMED</b>	DRAWN BY: J. WILLIAMS CHECKED BY: T. TURNER DESIGN BY: ACAD NAME: THRUST COLLAR WATER AND RECLAIMED 2 OF 2	SCALE: NOT TO SCALE DATE: SEPTEMBER, 2013 SHEET: 2 OF 2
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# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



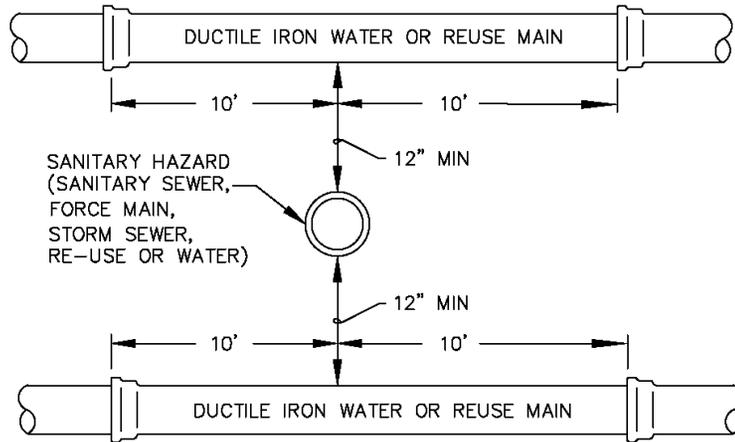
**CITY OF COCOA**  
Brevard County, Florida  
UTILITIES DEPARTMENT  
ENGINEERING DIVISION

## TYPICAL LOT SERVICE LINE LOCATION

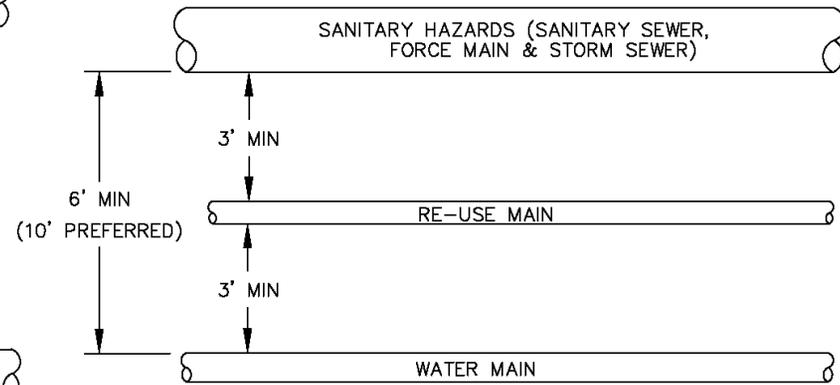
DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL LOT SERVICE LINE LOCATION	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

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



VERTICAL CLEARANCE



HORIZONTAL CLEARANCE

## TYPICAL REQUIRED SEPARATION NTS

PER FDEP 62-555.314

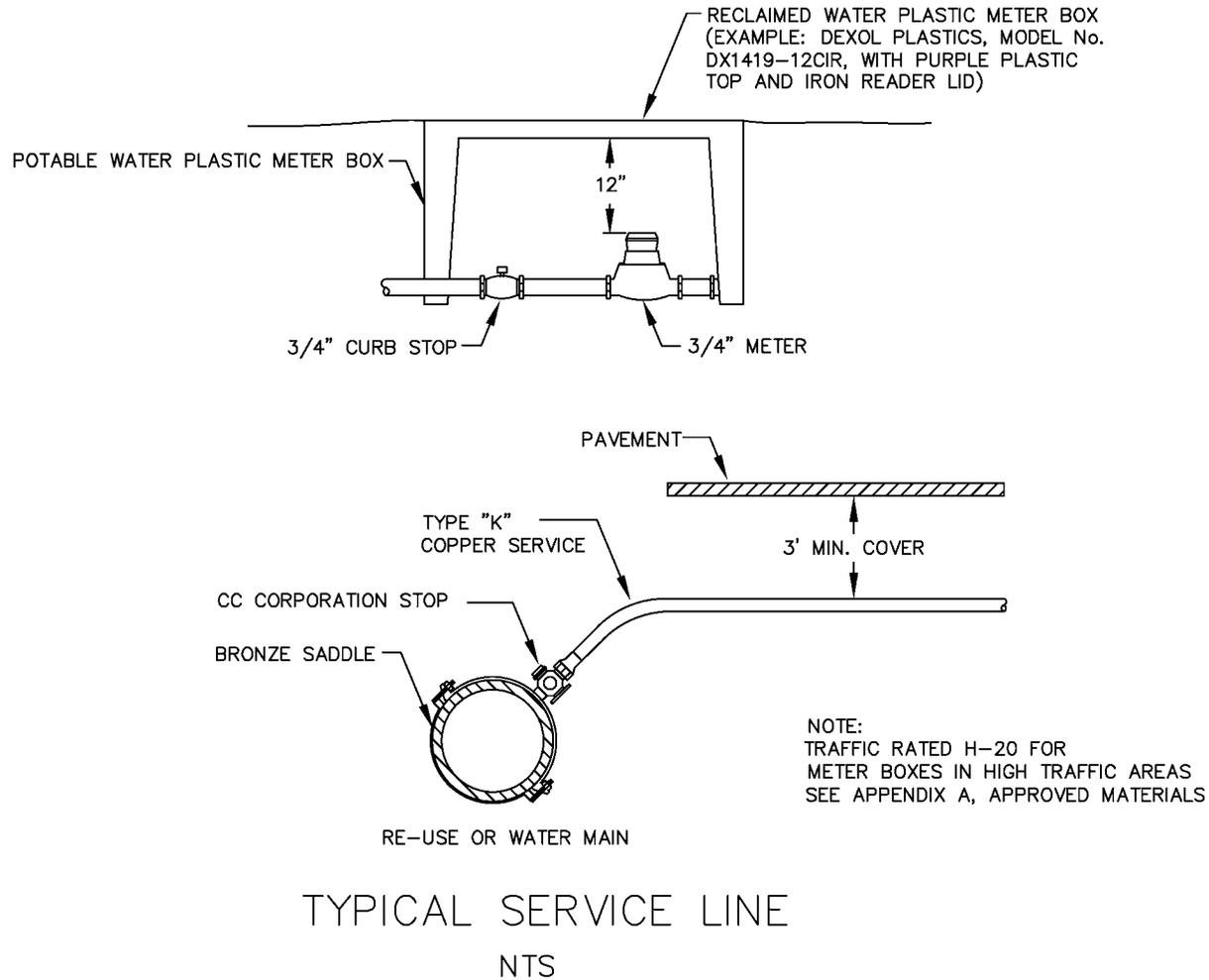


**CITY OF COCOA**  
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ENGINEERING DIVISION

## TYPICAL REQUIRED SEPARATION

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL REQUIRED SEPARATION	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

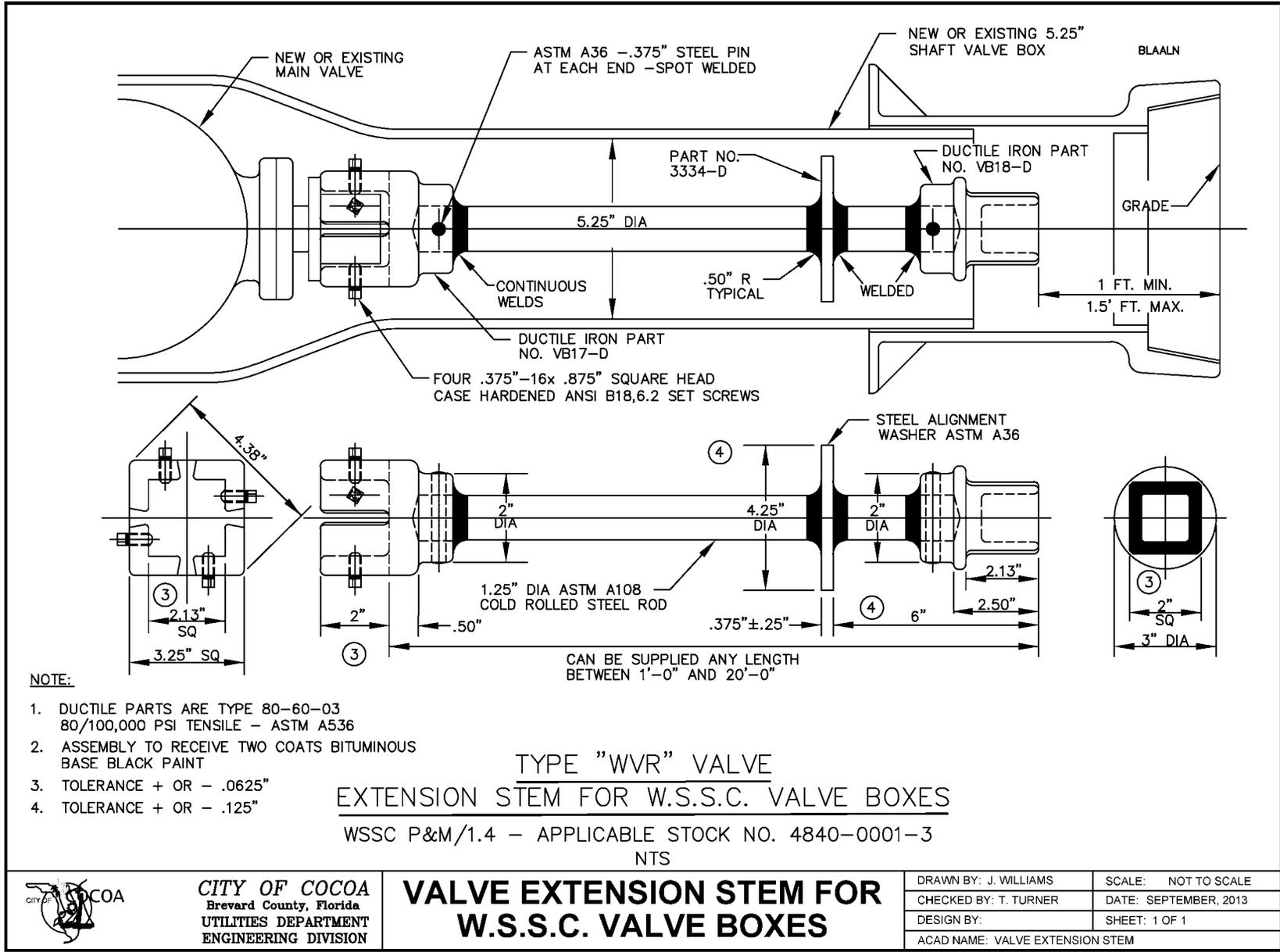


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ENGINEERING DIVISION

## TYPICAL SERVICE LINE

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL SERVICE LINE	

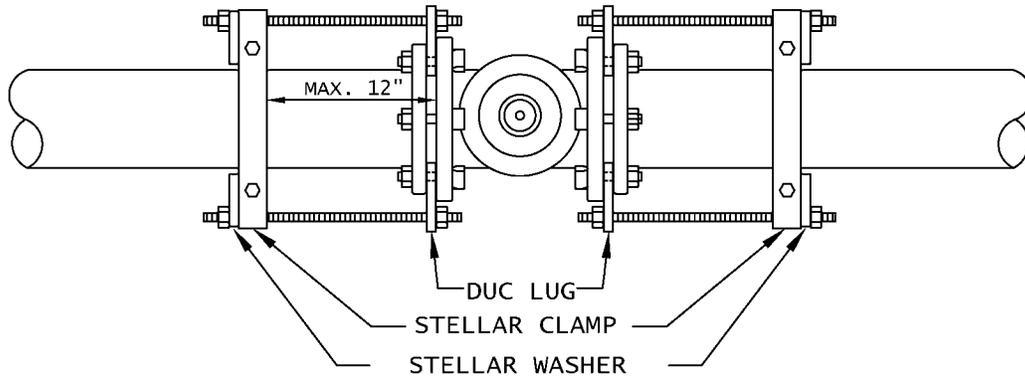
# APPENDIX B APPROVED DRAWINGS AND DETAILS



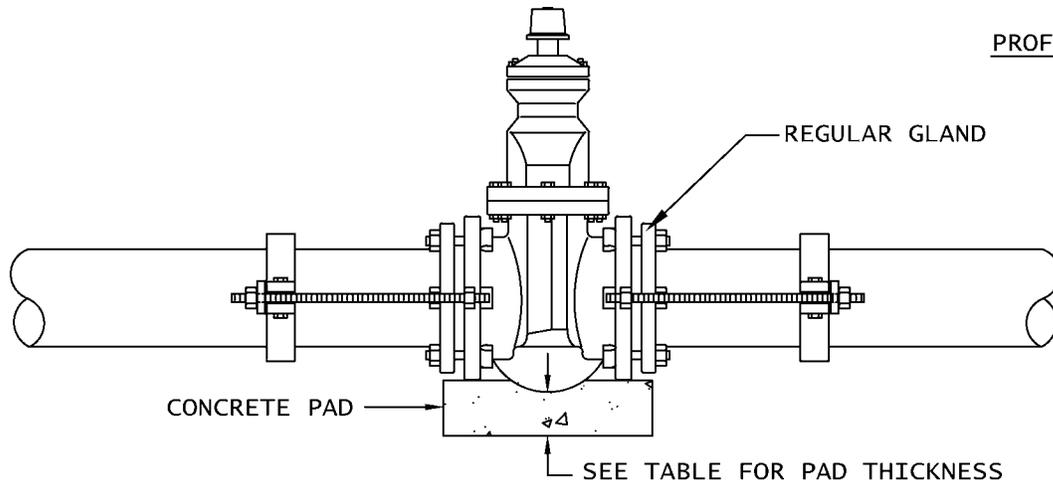
# APPENDIX B APPROVED DRAWINGS AND DETAILS

## VALVE INSERT FOR A.C. PIPE

PLAN



PROFILE



SIZE	MIN. COVER OF PIPE	CONCRETE PAD SIZE FROM LOWEST POINT OF FITTING
4"	24"	16"x16"x6"
6"	26"	18"x18"x6"
8"	30"	20"x20"x6"
*10"	36"	24"x24"x8"
*12"	40"	30"x30"x8"

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

VALVES INSTALLED PER MANUFACTURER'S RECOMMENDATION ON DIP AND PVC.



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**VALVE INSERT  
FOR A.C. PIPE**

DRAWN BY: J. WILLIAMS

SCALE: NOT TO SCALE

CHECKED BY: T. TURNER

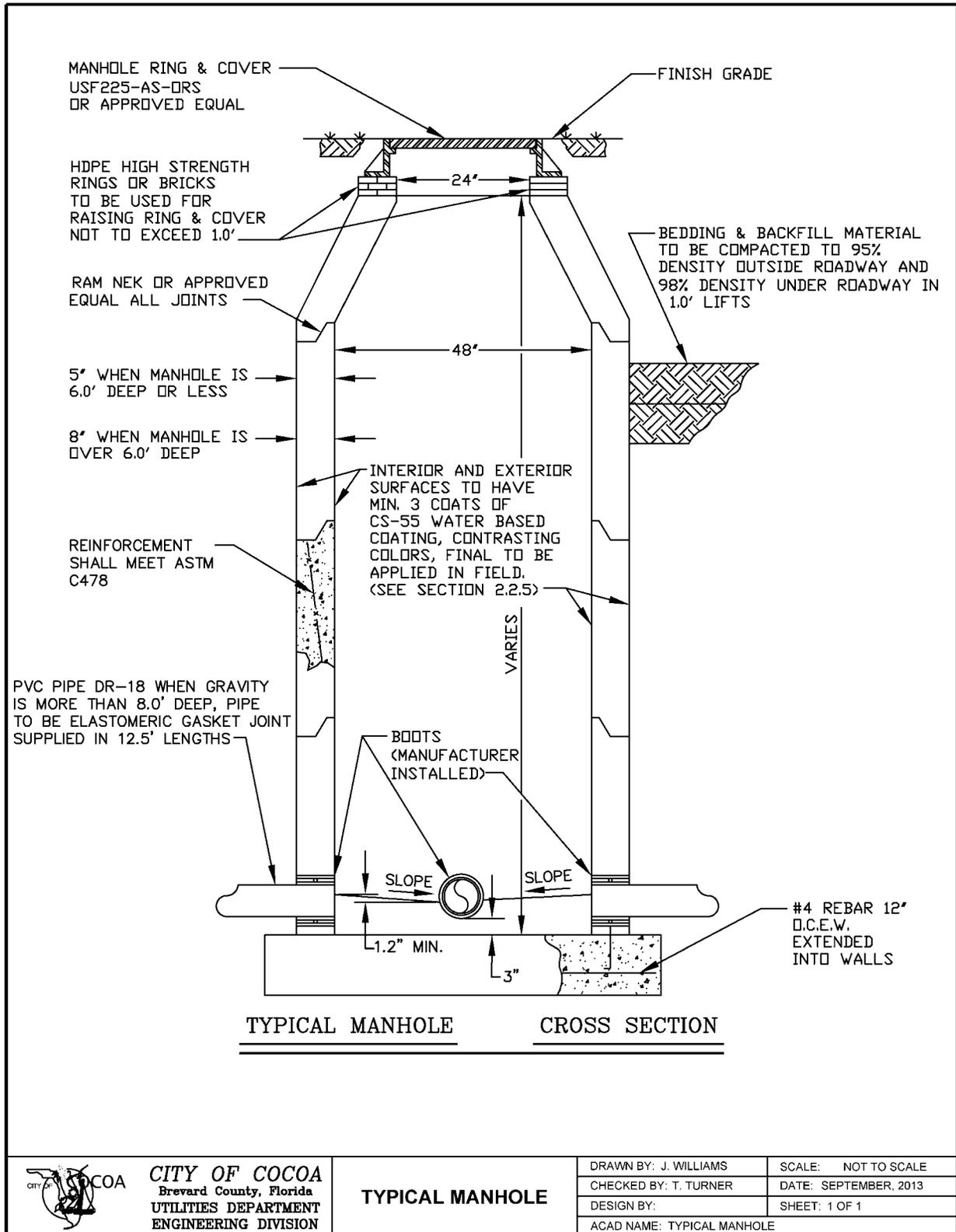
DATE: SEPTEMBER, 2013

DESIGN BY:

SHEET: 1 OF 1

ACAD NAME: VALVE INSERT

# APPENDIX B APPROVED DRAWINGS AND DETAILS

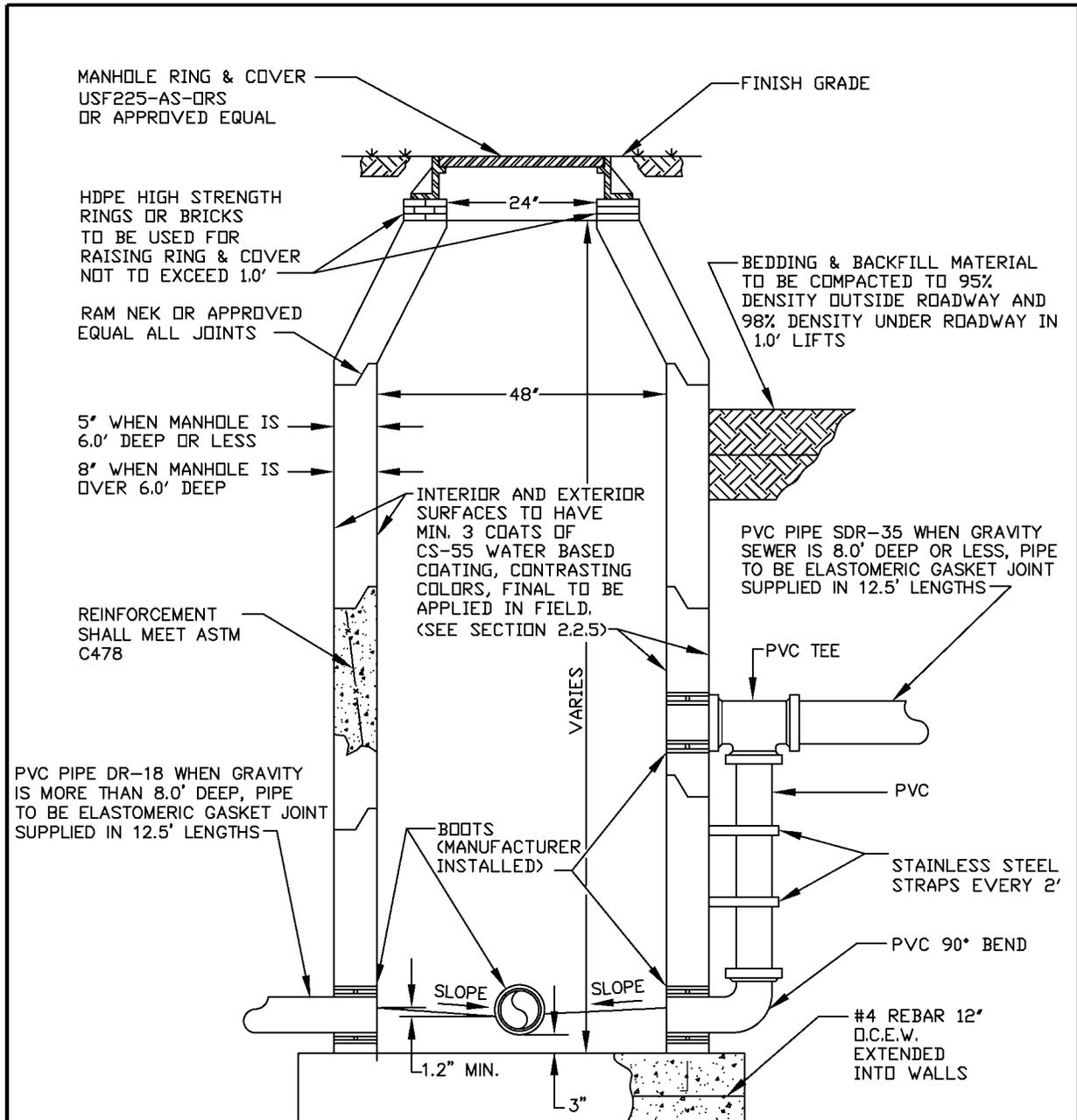


**CITY OF COCOA**  
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ENGINEERING DIVISION

## TYPICAL MANHOLE

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL MANHOLE	

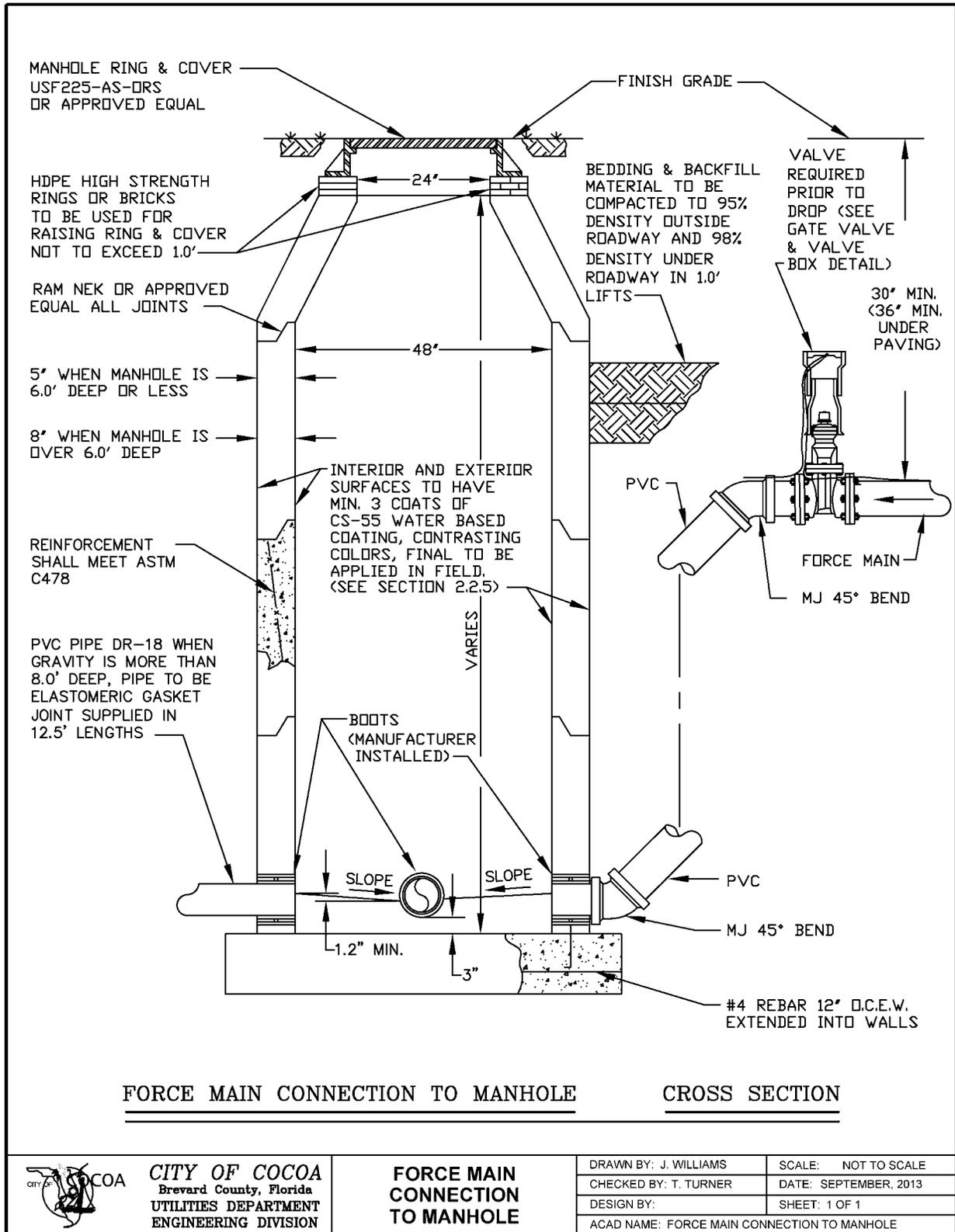
# APPENDIX B APPROVED DRAWINGS AND DETAILS



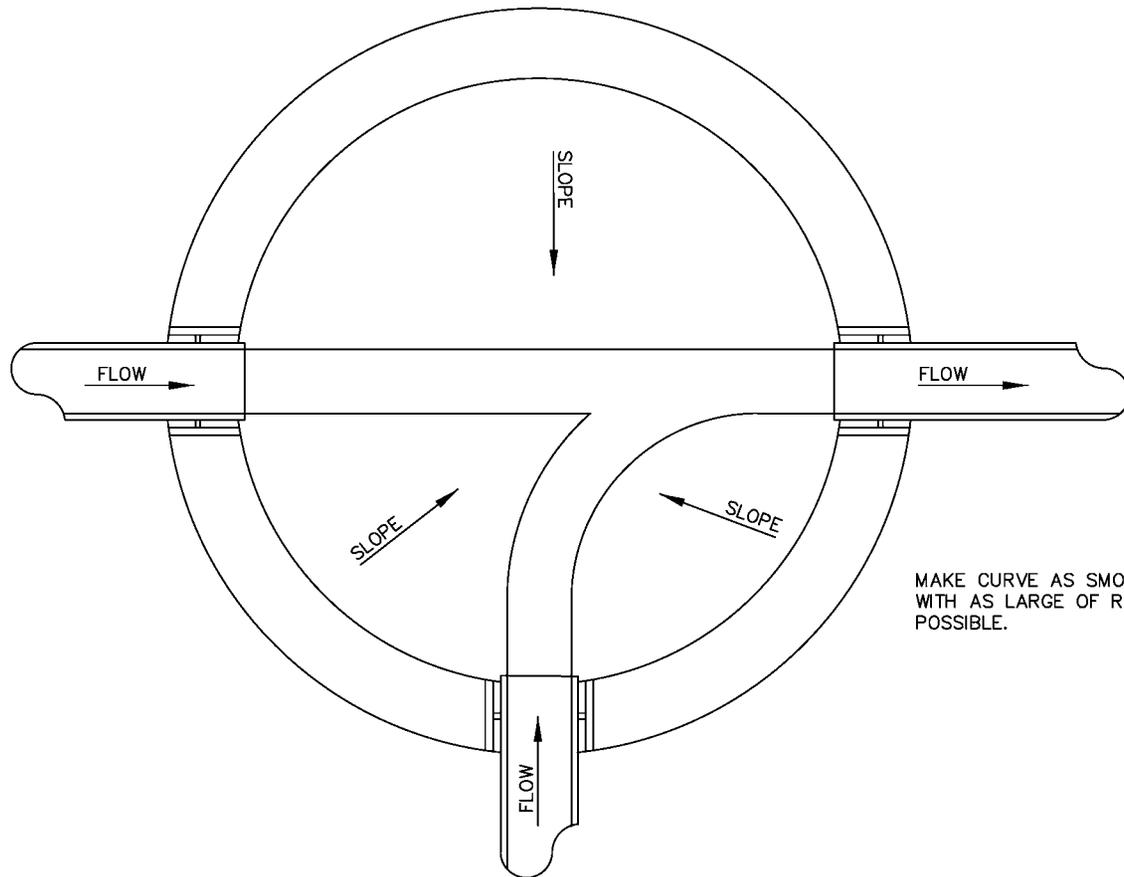
**TYPICAL MANHOLE WITH OUTSIDE DROP CROSS SECTION**

 <b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>TYPICAL MANHOLE WITH OUTSIDE DROP</b>	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: TYPICAL MANHOLE WITH OUTSIDE DROP	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



MANHOLE INVERT PLAN



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 UTILITIES DEPARTMENT  
 ENGINEERING DIVISION

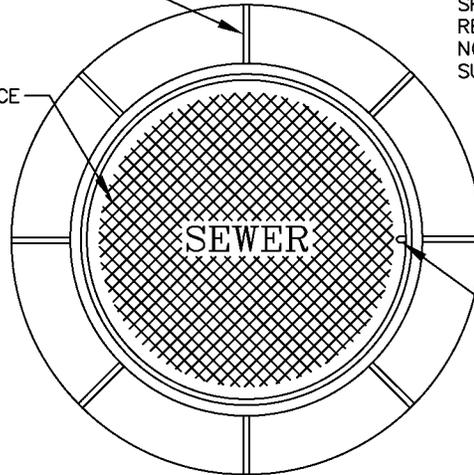
## MANHOLE INVERT

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: MANHOLE INVERT	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

1/2" RIBS (TYP.)

NON-SKID SURFACE



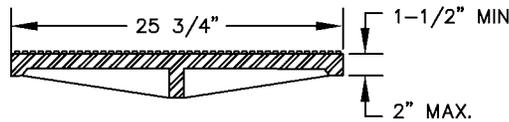
MANHOLE RINGS & COVERS TO BE CAST IRON WITH BEARING SURFACES TO BE MACHINED, TRAFFIC LOAD BEARING IN ACCORDANCE WITH FEDERAL SPECIFICATIONS RR-F-621-C OR LATEST REVISION, MIN. WEIGHT 430 LBS., WITH NON-PENETRATING PICKHOLE & NON-SKID SURFACE, WITH O-RING SEAL.

ORDER NO. : USF 225-AS-ORS RING & COVER SERIES OR APPROVED EQUAL

NON-PENETRATING PICKHOLE

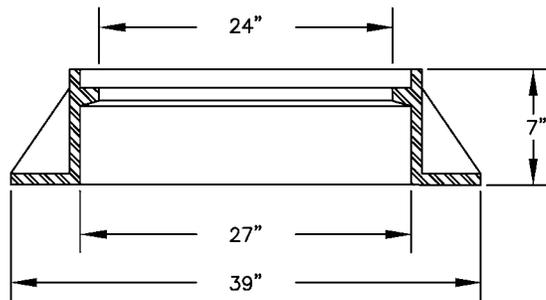
**MANHOLE RING AND COVER**

**PLAN**



**MANHOLE COVER**

**CROSS SECTION**



**MANHOLE RING**

**CROSS SECTION**

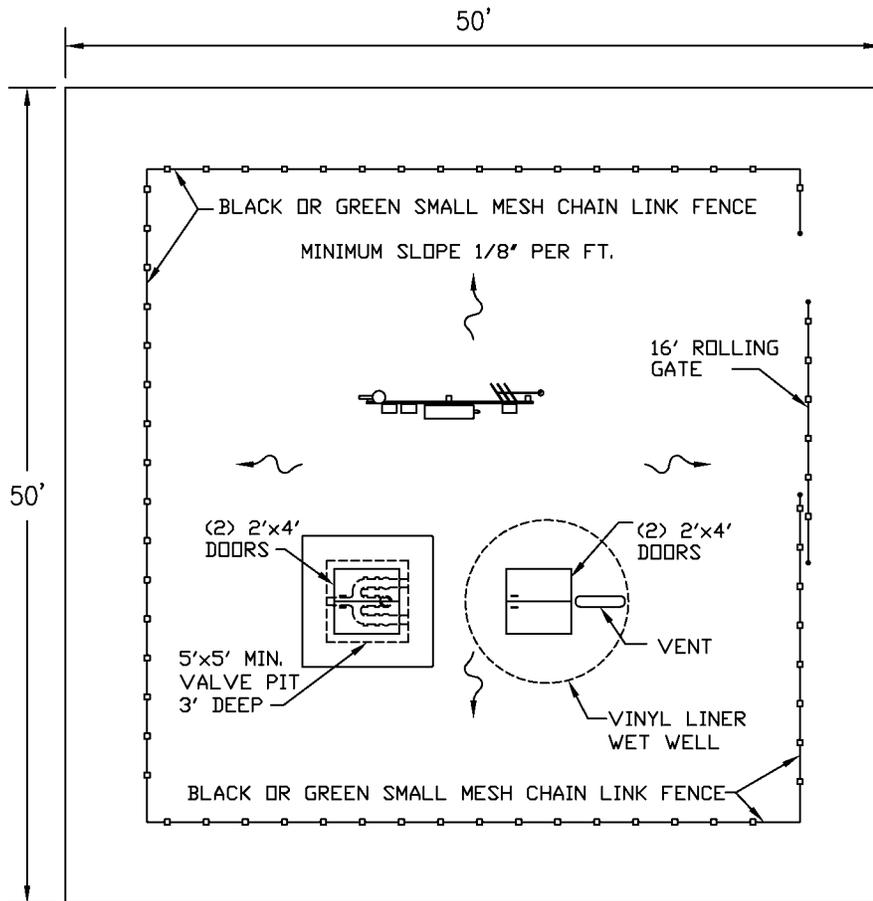


**CITY OF COCOA**  
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ENGINEERING DIVISION

**MANHOLE RING AND COVER**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: MANHOLE RING AND COVER	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

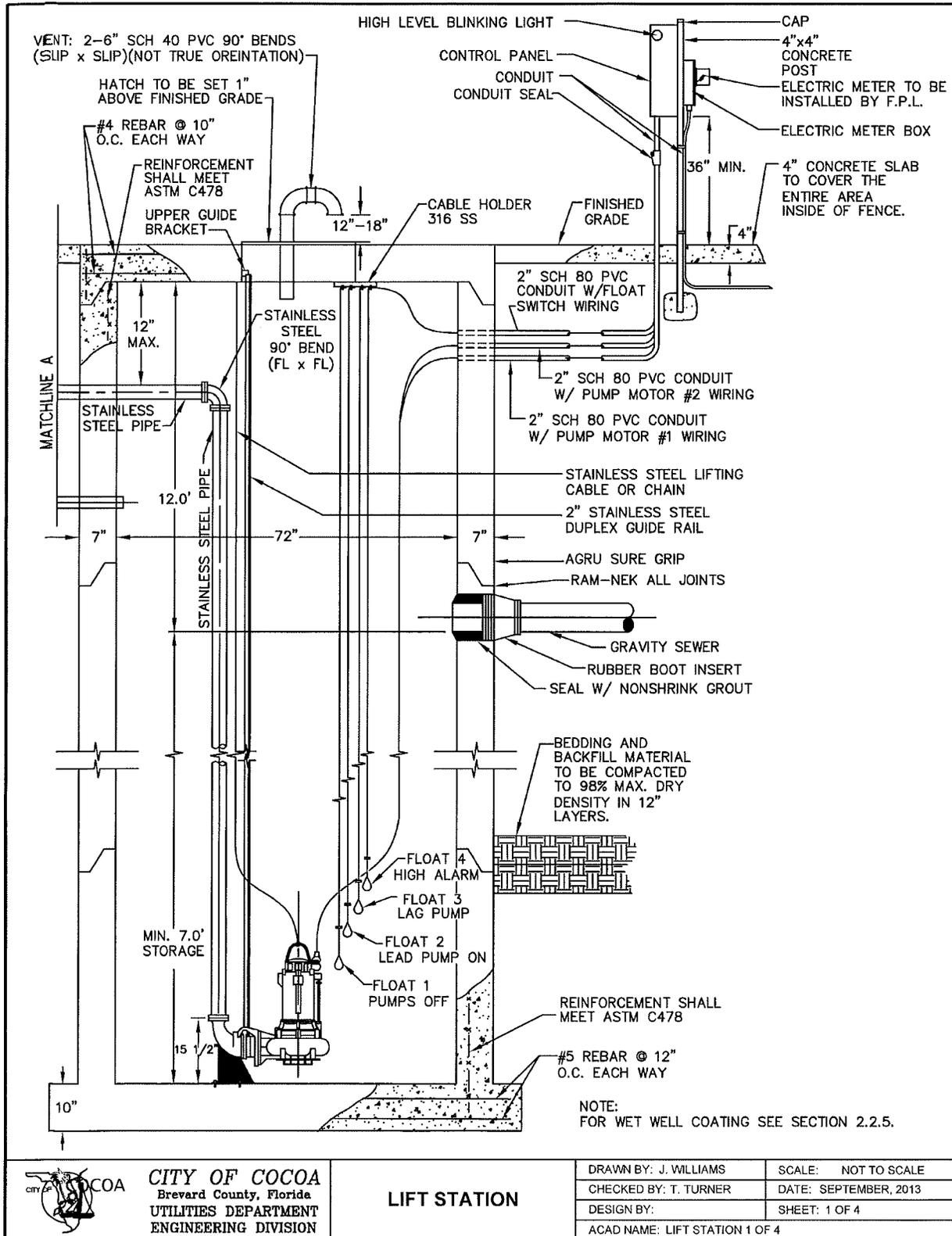


**CITY OF COCOA**  
 Brevard County, Florida  
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 ENGINEERING DIVISION

**LIFT STATION SITE PLAN**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: LIFT STATION SITE PLAN	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

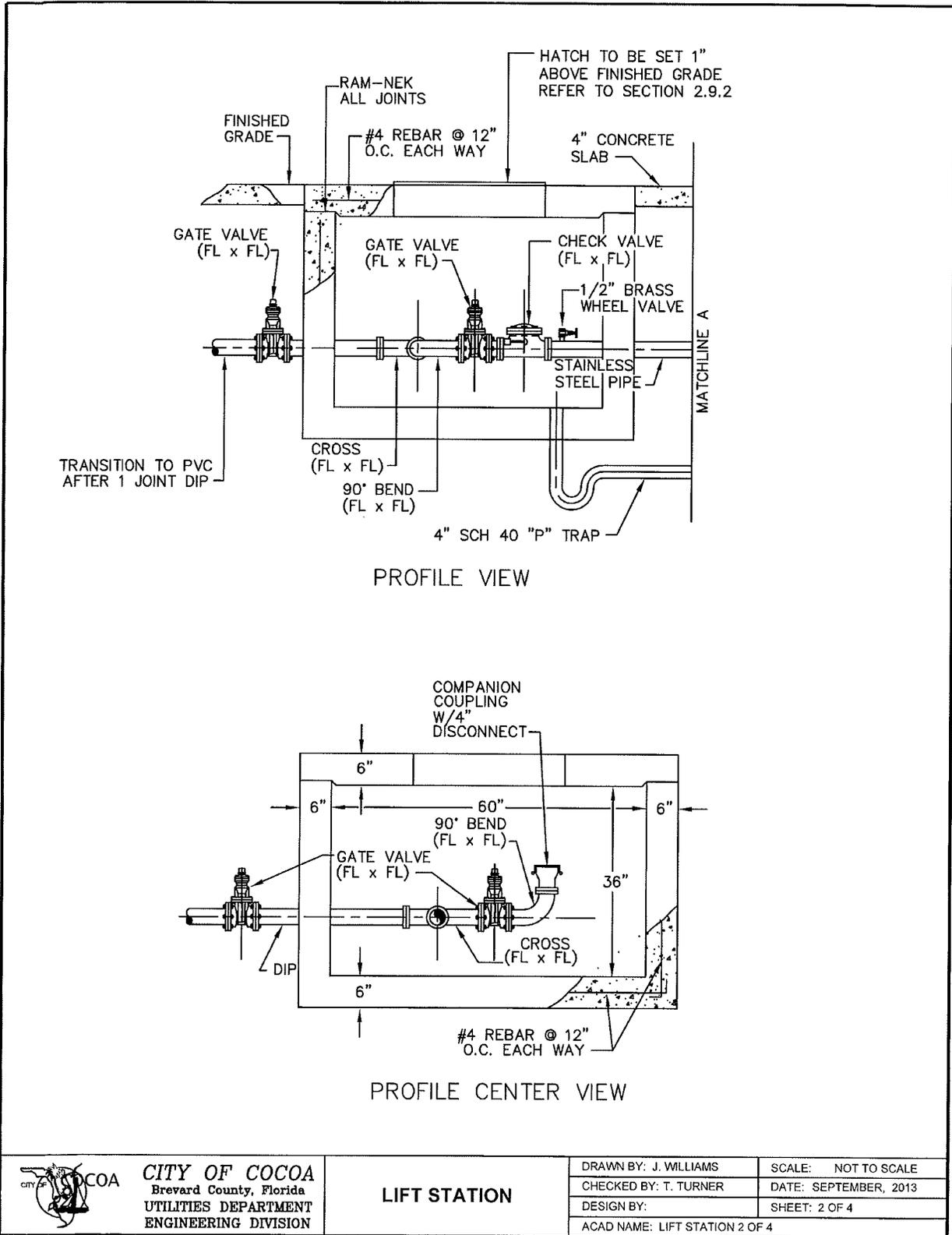


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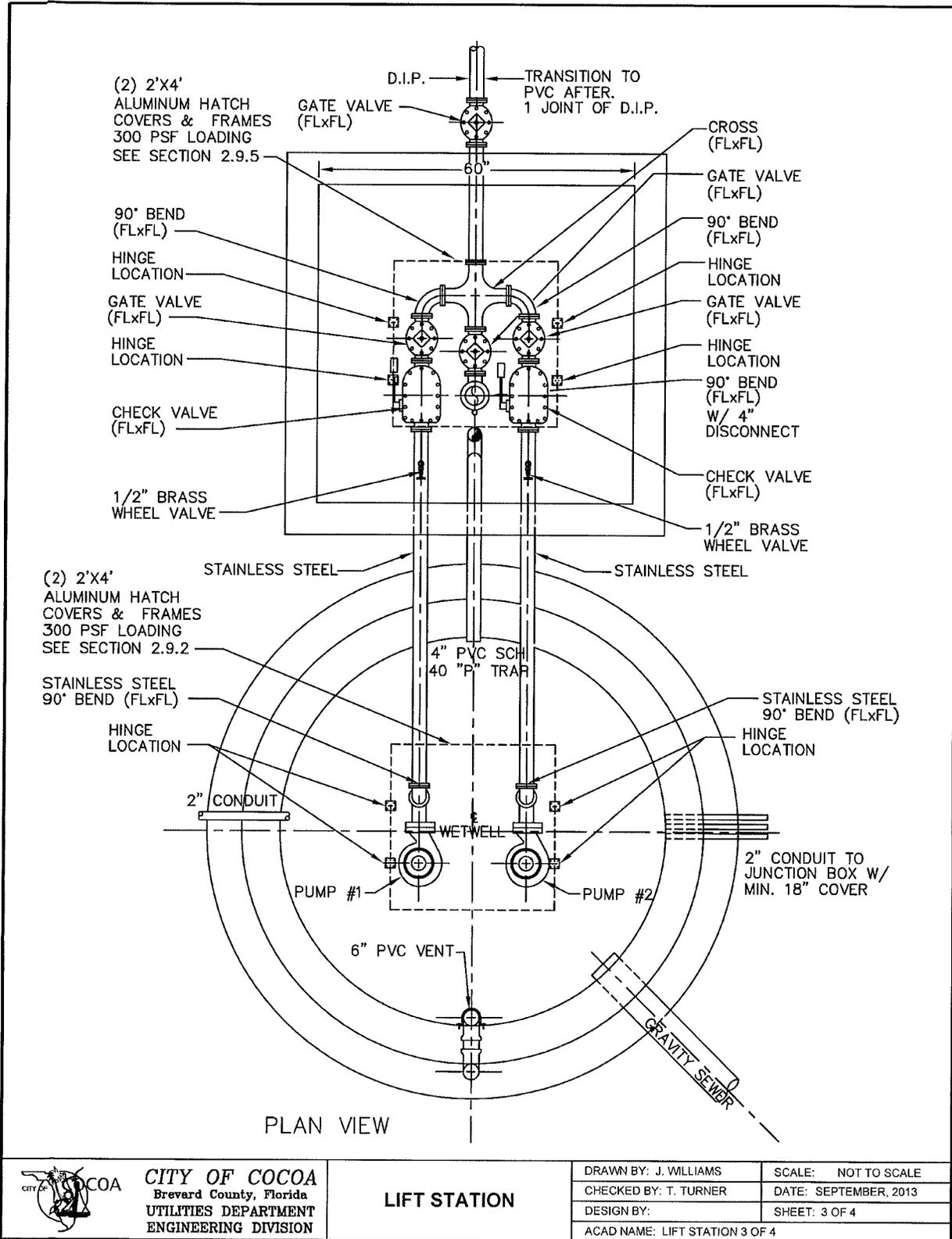
## LIFT STATION

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 4
ACAD NAME: LIFT STATION 1 OF 4	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS

## LIFT STATION ELECTRICAL REQUIREMENTS

- NEMA 4 OR 4x ENCLOSURE - STAINLESS STEEL SIZE 36"x 48"x 12" MIN.
- MAIN CIRCUIT BREAKER -(GENERAL ELECTRIC, WESTINGHOUSE, SQUARE D)
- BRANCH CIRCUIT BREAKER FOR EACH PUMP (GENERAL ELECTRIC, WESTINGHOUSE, SQUARE D) ADJUSTABLE TRIP.
- 20 AMP, 1 POLE CIRCUIT BREAKER FOR 115 VOLT DUPLEX CONVENIENCE RECEPTACLE (GIF)
- MERCURY FLOAT CONTROLS
- HIGH LEVEL ALARM (FLASHING LIGHT)
- ALTERNATOR (FURNAS)
- 120 VOLT CONTROL VOLTAGE
- ALLEN BRADLEY MOTOR STARTERS BUL. 509
- 3 LEG OVERLOAD PROTECTION
- LOW VOLTAGE MOTOR START
- DELAY START ON 2nd PUMP STARTUP
- HOUR METERS NO RESET
- 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
- STAINLESS STEEL 316 CABLE OR CHAIN FOR PUMP (FOR LIFTING)
- PHASE FAILURE RELAY
- LIGHTNING ARRESTOR, OUTSIDE BACK OF DISCONNECT BOX
- CONDUIT FROM WETWELL TO CONTROL PANEL MUST BE VAPOR TIGHT (BY USE OF CONDUIT SEAL)
- THREE CONDUIT RUNS FROM CONTROL PANEL TO WETWELL
- COPPER CLAD GROUND ROD 60' MIN.

## FENCE SPECIFICATIONS:

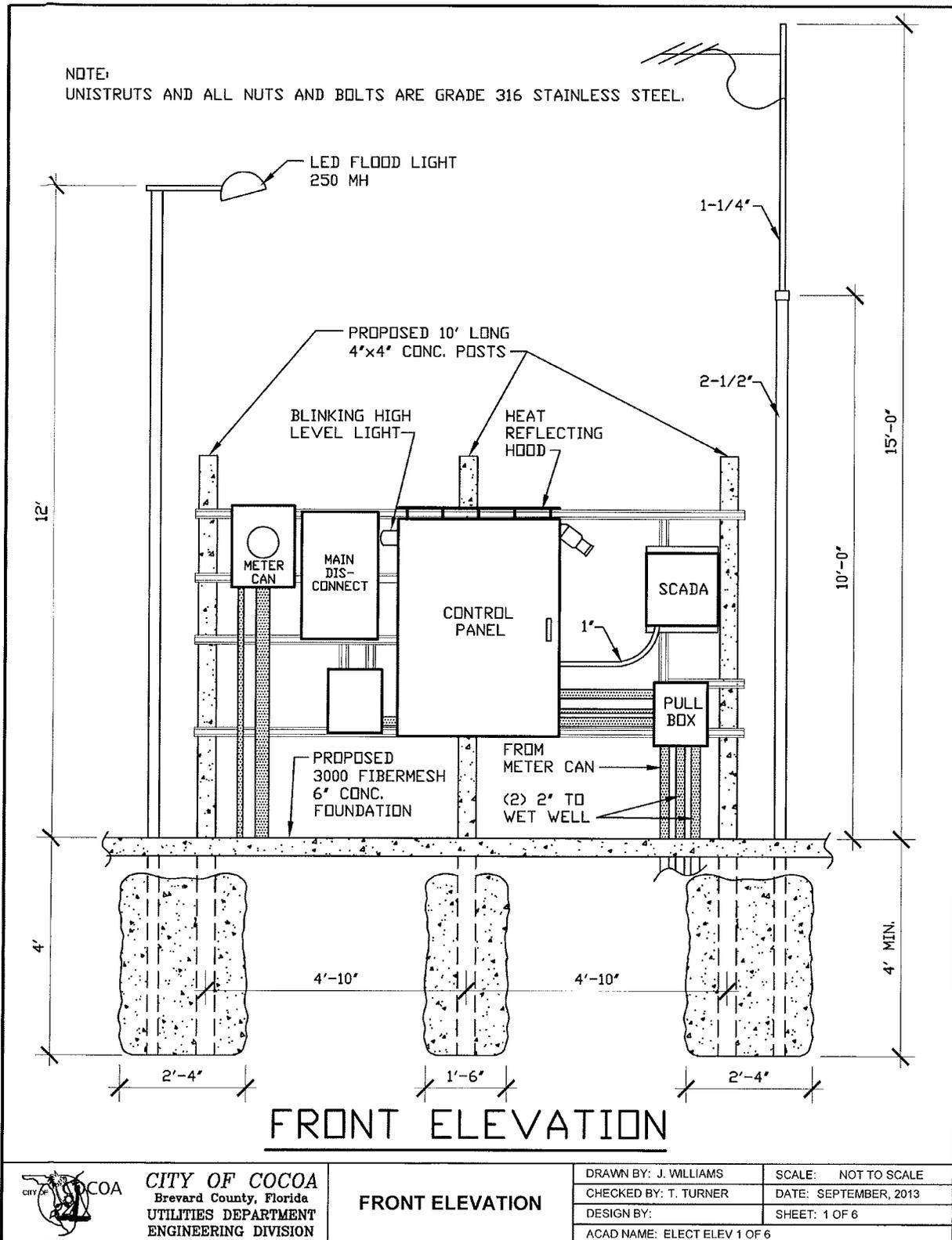
- 1) FABRIC 9-GA, HOT DIPPED GALVANIZED BLACK OR GREEN SMALL MESH.
- 2) CORNER POSTS AND GATE POSTS TO BE 3" O.D., SCHEDULE 40x 9'-0"
- 3) LINE POSTS ON 10' CENTERS TO BE 2" O.D., SCHEDULE 40x 8'-0"
- 4) TOP RAIL TO BE 1-5/8" O.D., SCHEDULE 40
- 5) 16'-0" ROLLING GATE TO BE CONSTRUCTED OF 1-5/8" O.D.,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

## NOTES:

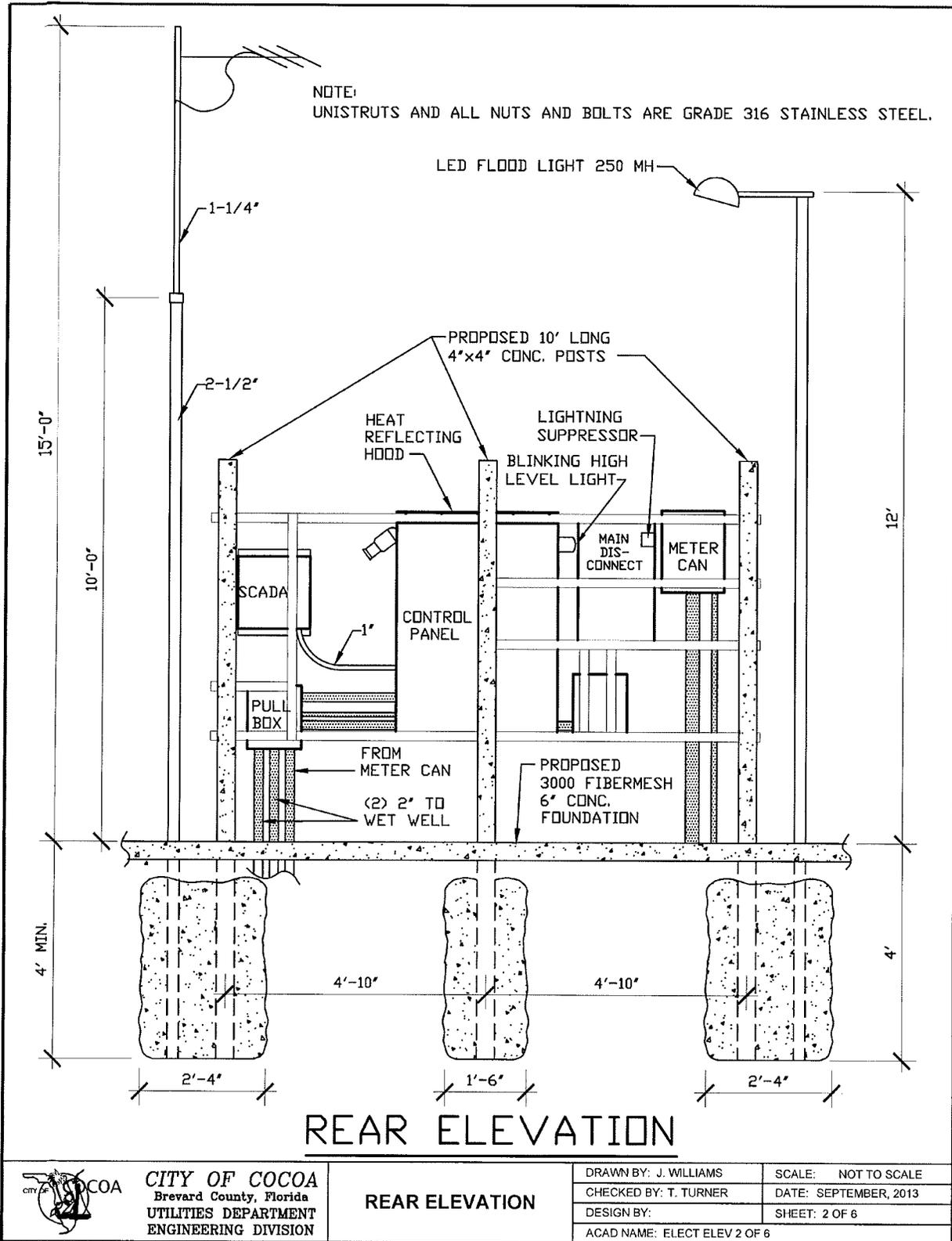
- 1) PUMPS TO BE FURNISHED WITH HIGH PRESSURE DISCHARGE COUPLING, STAINLESS STEEL SLIDERAIL SYSTEM, SEAL FAILURE AND THERMAL OVERLOAD INDICATORS.
- 2) ALL PIPES, INVERTS AND HATCHES TO BE THE SIZE AND KIND SPECIFIED ON THE SET OF APPROVED CONSTRUCTION PLANS.
- 3) D.I.P. TO BE CLASS 54 MIN. THICKNESS.
- 4) ALL HARDWARE INSIDE WETWELL TO BE 316 STAINLESS STEEL.

 <b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>LIFT STATION</b>	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
		DESIGN BY:	SHEET: 4 OF 4
		ACAD NAME: LIFT STATION 4 OF 4	

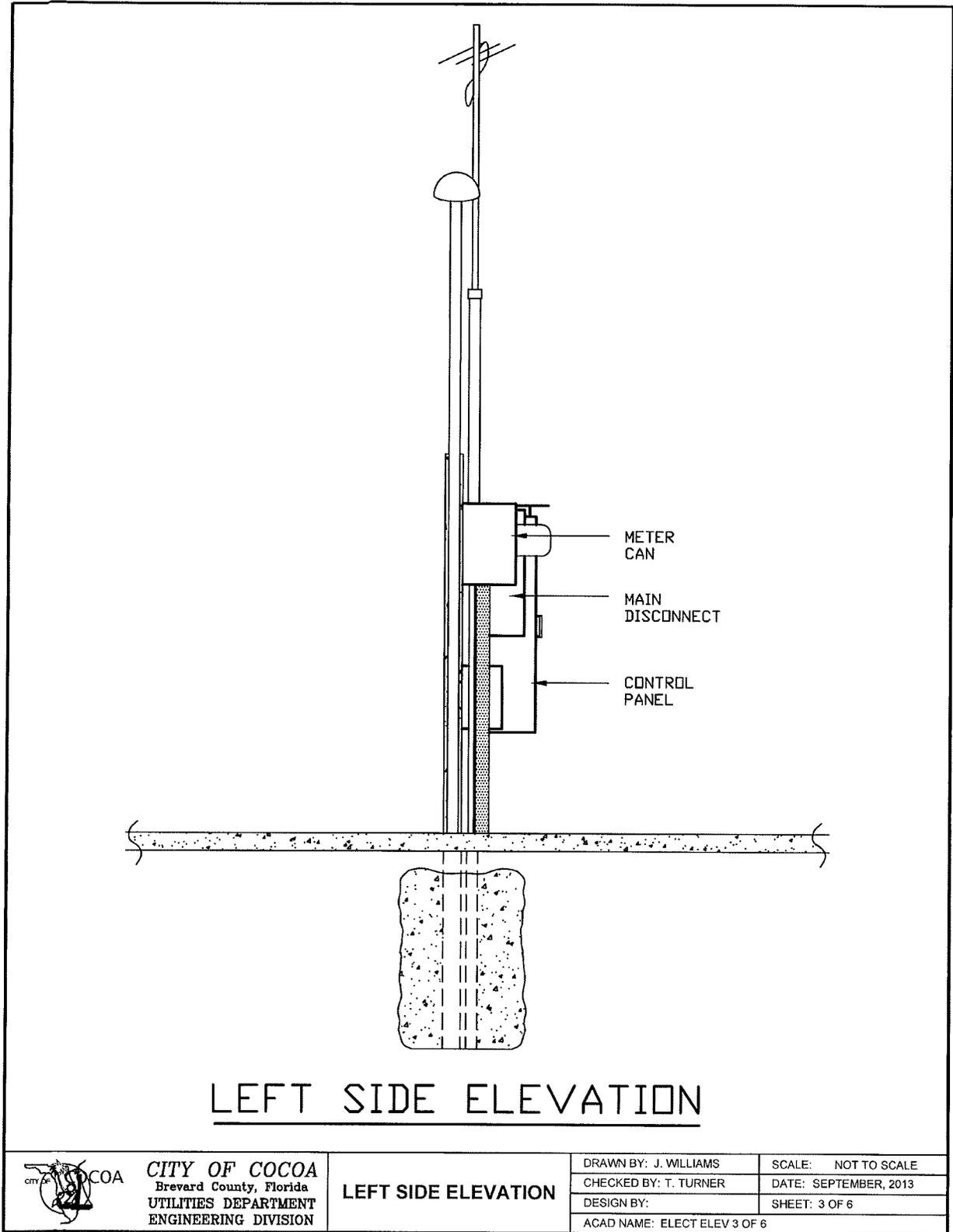
# APPENDIX B APPROVED DRAWINGS AND DETAILS



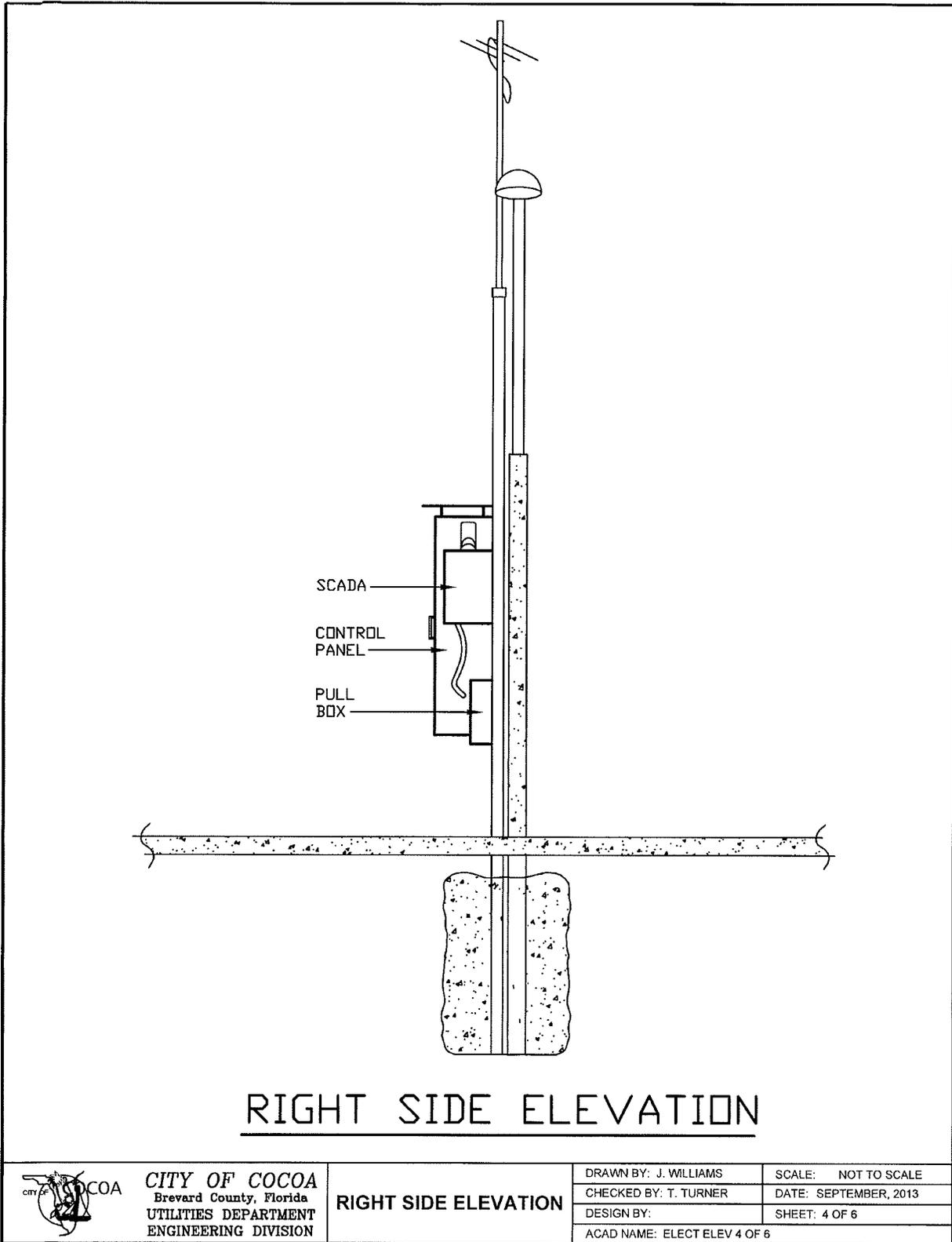
# APPENDIX B APPROVED DRAWINGS AND DETAILS



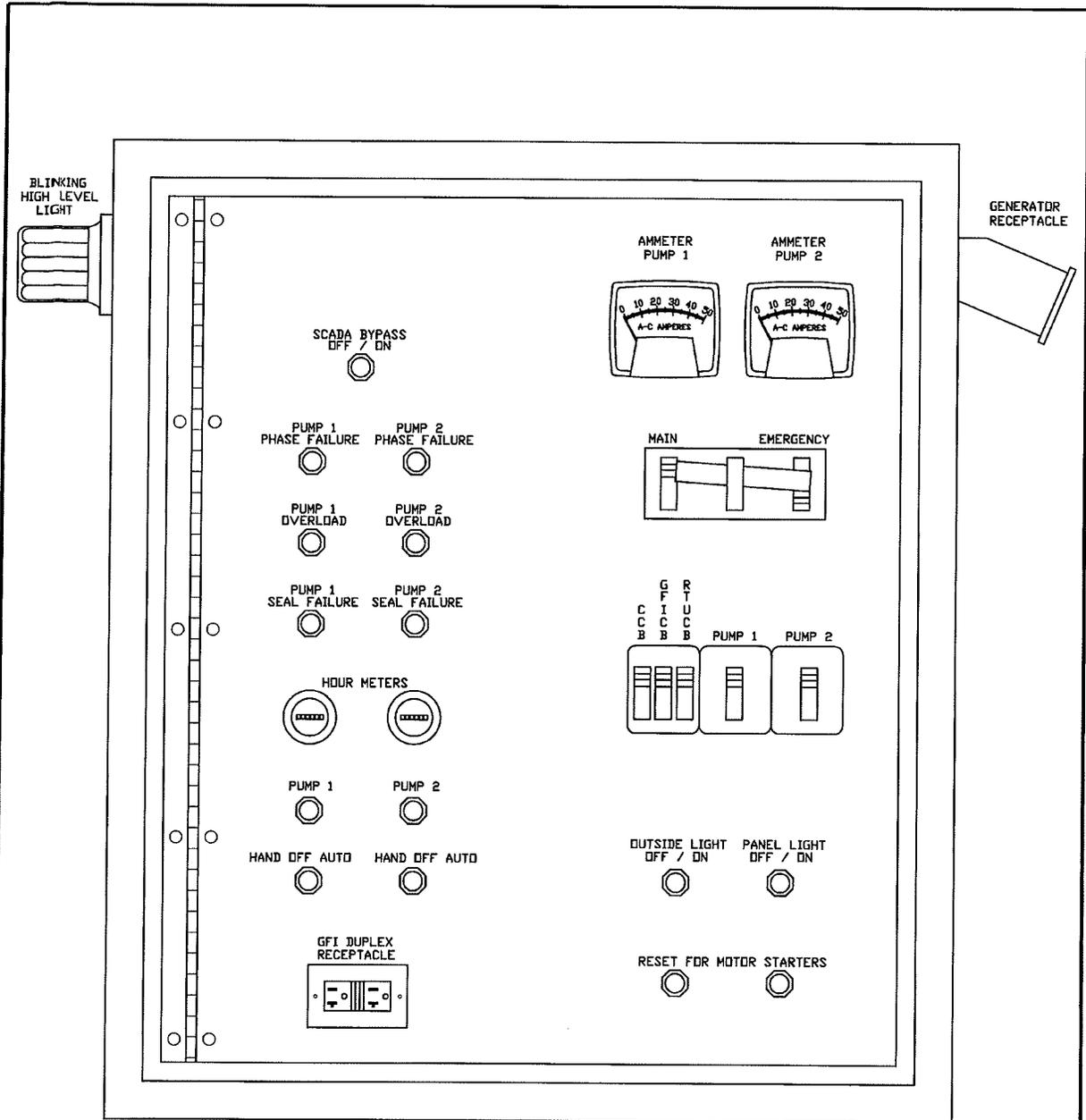
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



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.

## INTERIOR FRONT VIEW

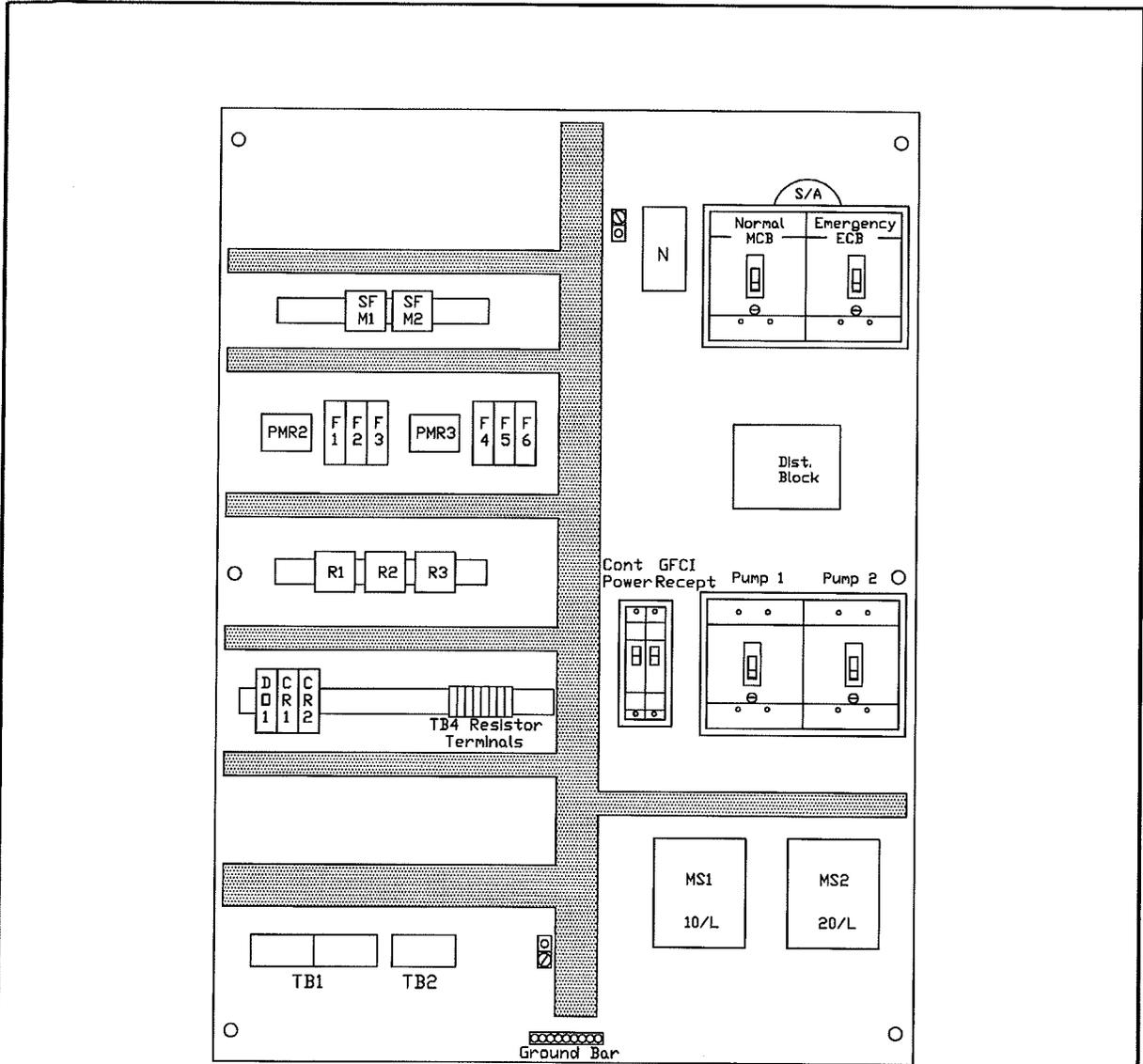


**CITY OF COCOA**  
 Brevard County, Florida  
 UTILITIES DEPARTMENT  
 ENGINEERING DIVISION

### INTERIOR FRONT VIEW

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 5 OF 6
ACAD NAME: ELECT ELEV 5 OF 6	

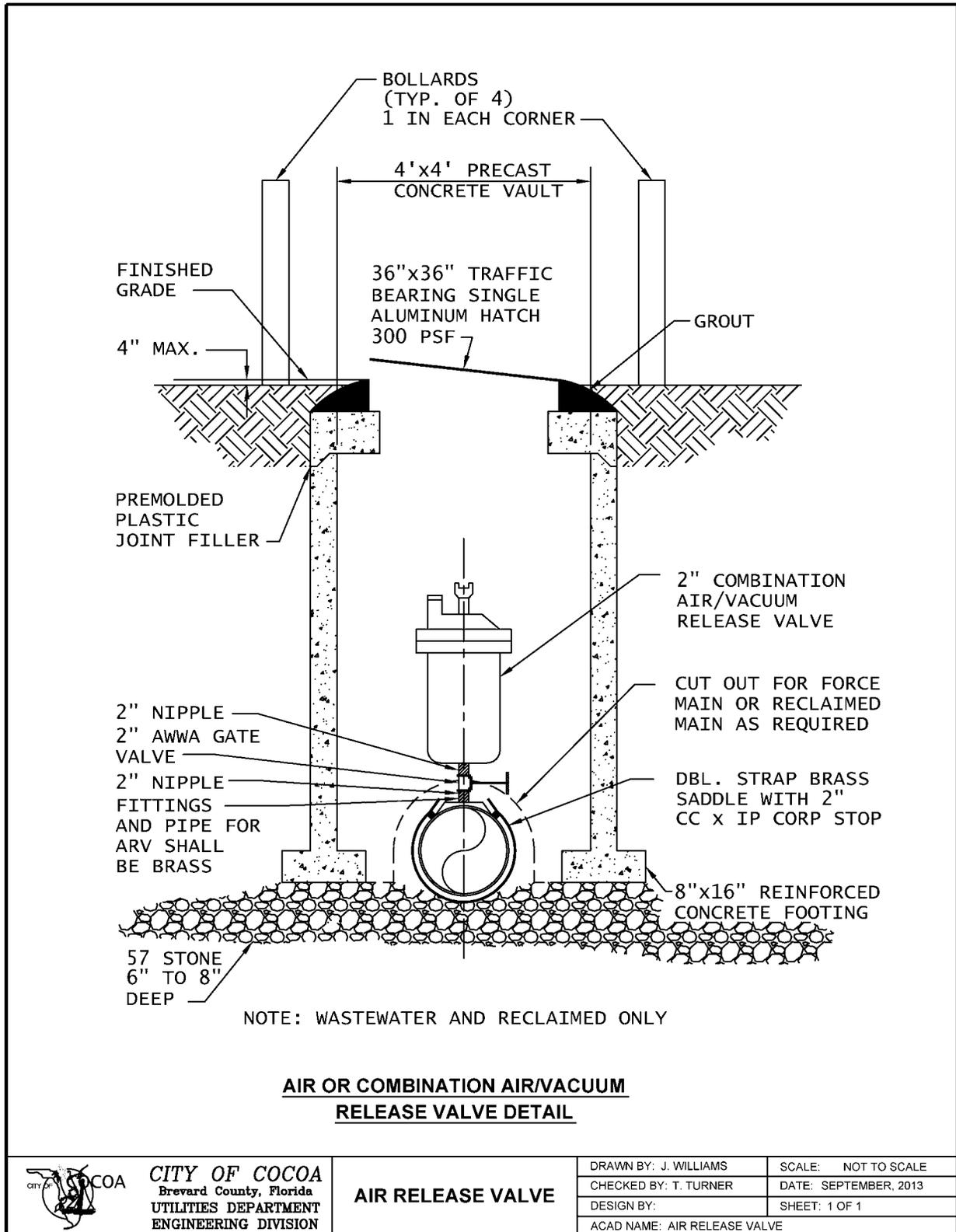
# APPENDIX B APPROVED DRAWINGS AND DETAILS



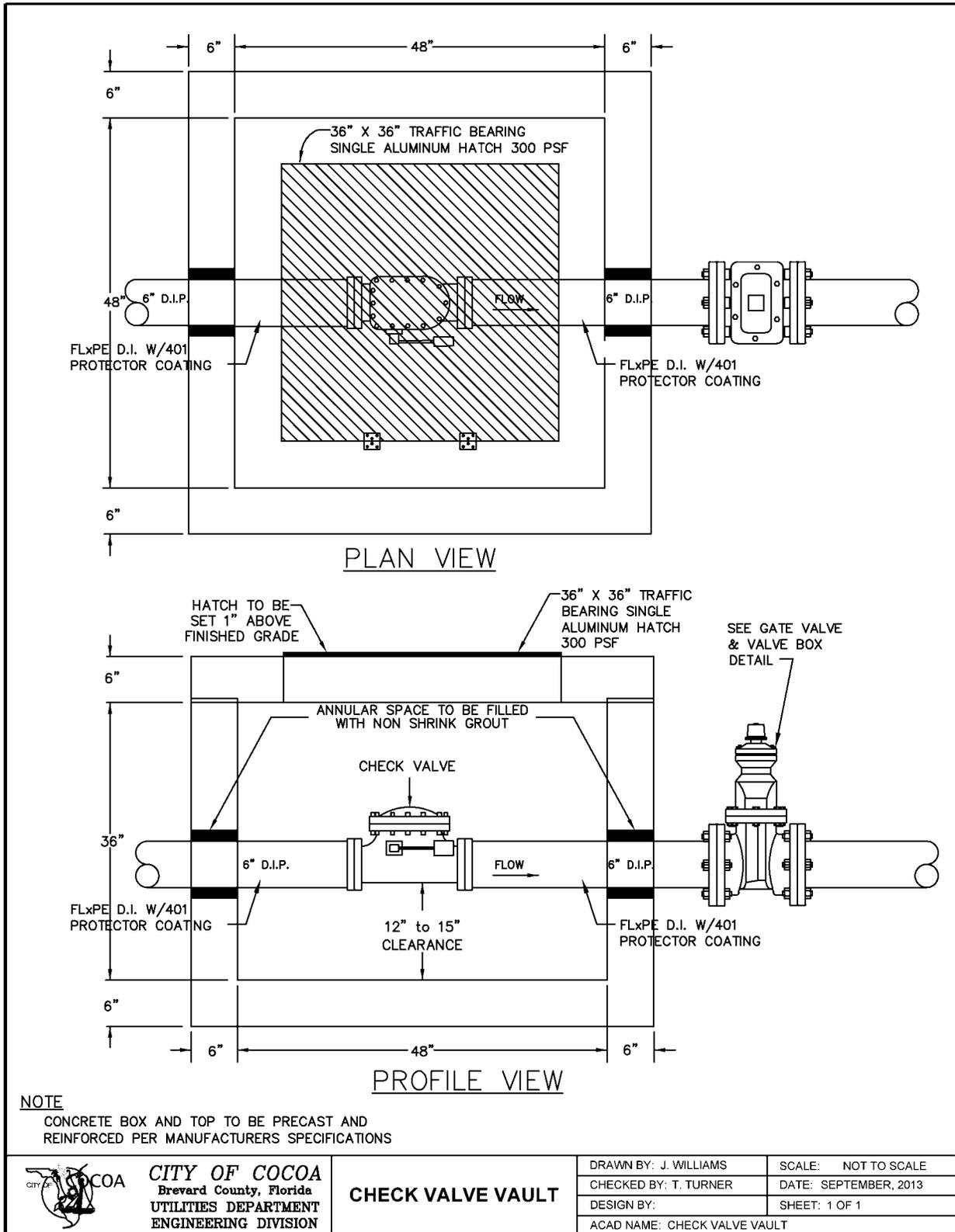
## INTERIOR BACK PANEL

 <b>CITY OF COCOA</b> Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	<b>INTERIOR BACK PANEL</b>	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
		DESIGN BY:	SHEET: 6 OF 6
		ACAD NAME: ELECT ELEV 6 OF 6	

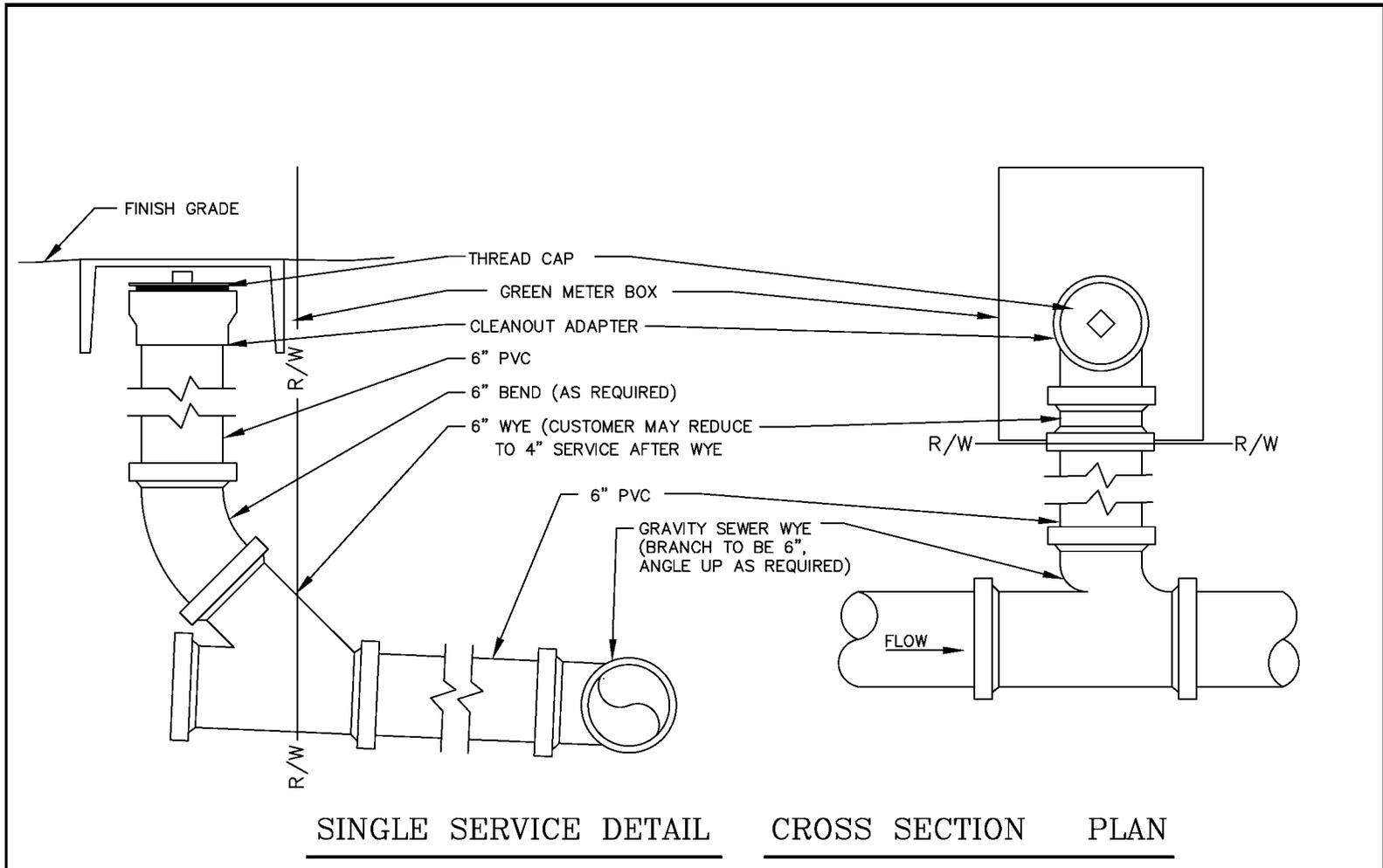
# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS



# APPENDIX B APPROVED DRAWINGS AND DETAILS

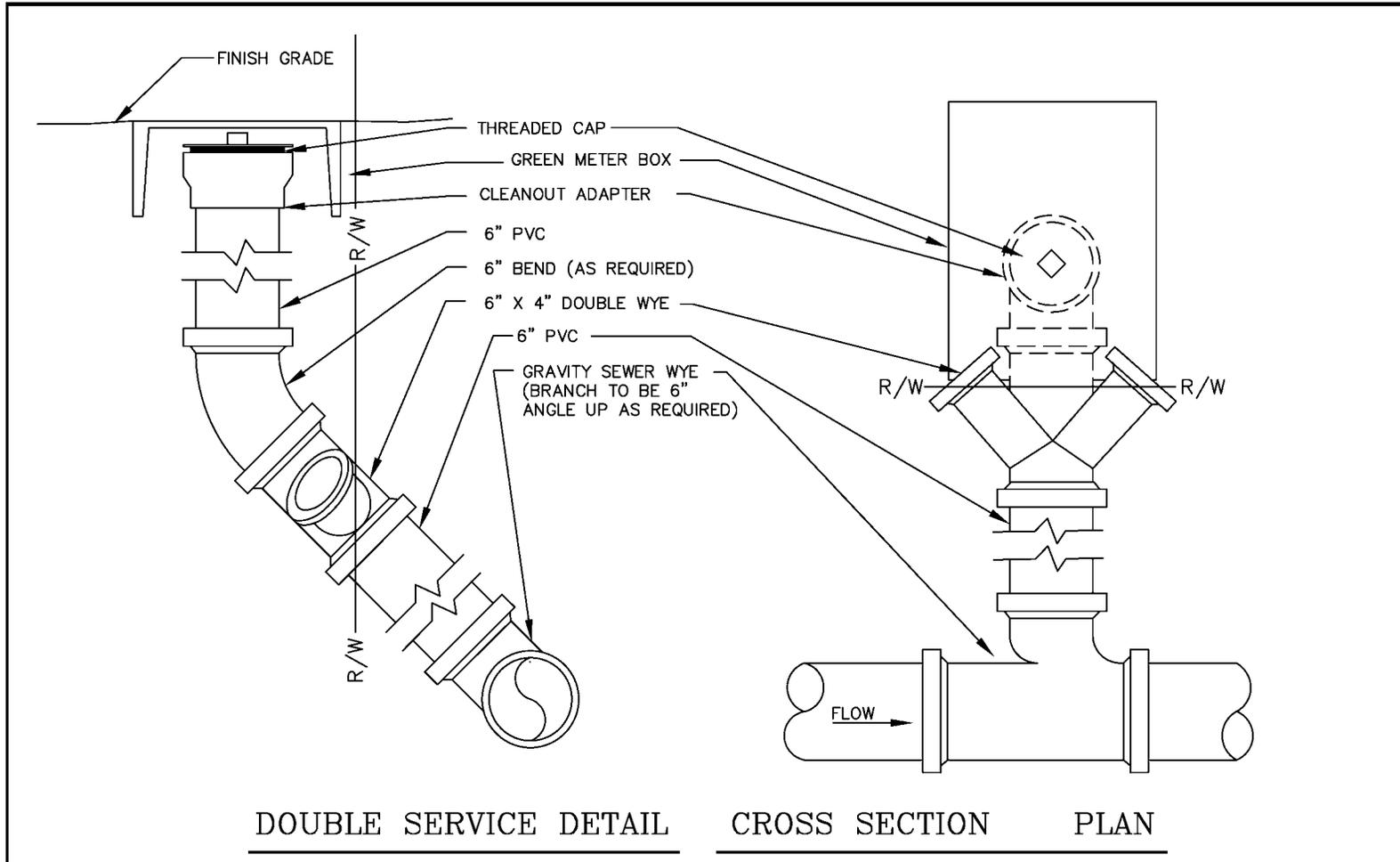


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## SINGLE SERVICE DETAIL

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DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: SINGLE SERVICE DETAIL	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



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 ENGINEERING DIVISION

## DOUBLE SERVICE DETAIL

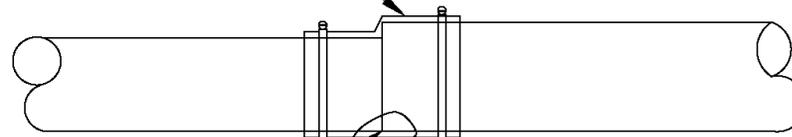
DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: DOUBLE SERVICE DETAIL	

# APPENDIX B APPROVED DRAWINGS AND DETAILS

SIZE (I.D.)	SDR-35(O.D.)	DR-18(O.D.)	D.I.P.(O.D.)
8"	8.4"	9.05"	9.05"
10"	10.5"	11.10"	11.10"
12"	12.5"	13.2"	13.2"

TRANSITION COUPLING WITH  
STAINLESS STEEL STRAPS  
& BOLTS

WHEN O.D. IS THE SAME BETWEEN  
PVC & D.I.P. A TRANSITION COUPLING  
IS NOT REQUIRED.



FLOW LINE TO  
REMAIN CONSTANT

SEE APPENDIX A  
APPROVED MATERIALS

TRANSITION COUPLING

DETAIL

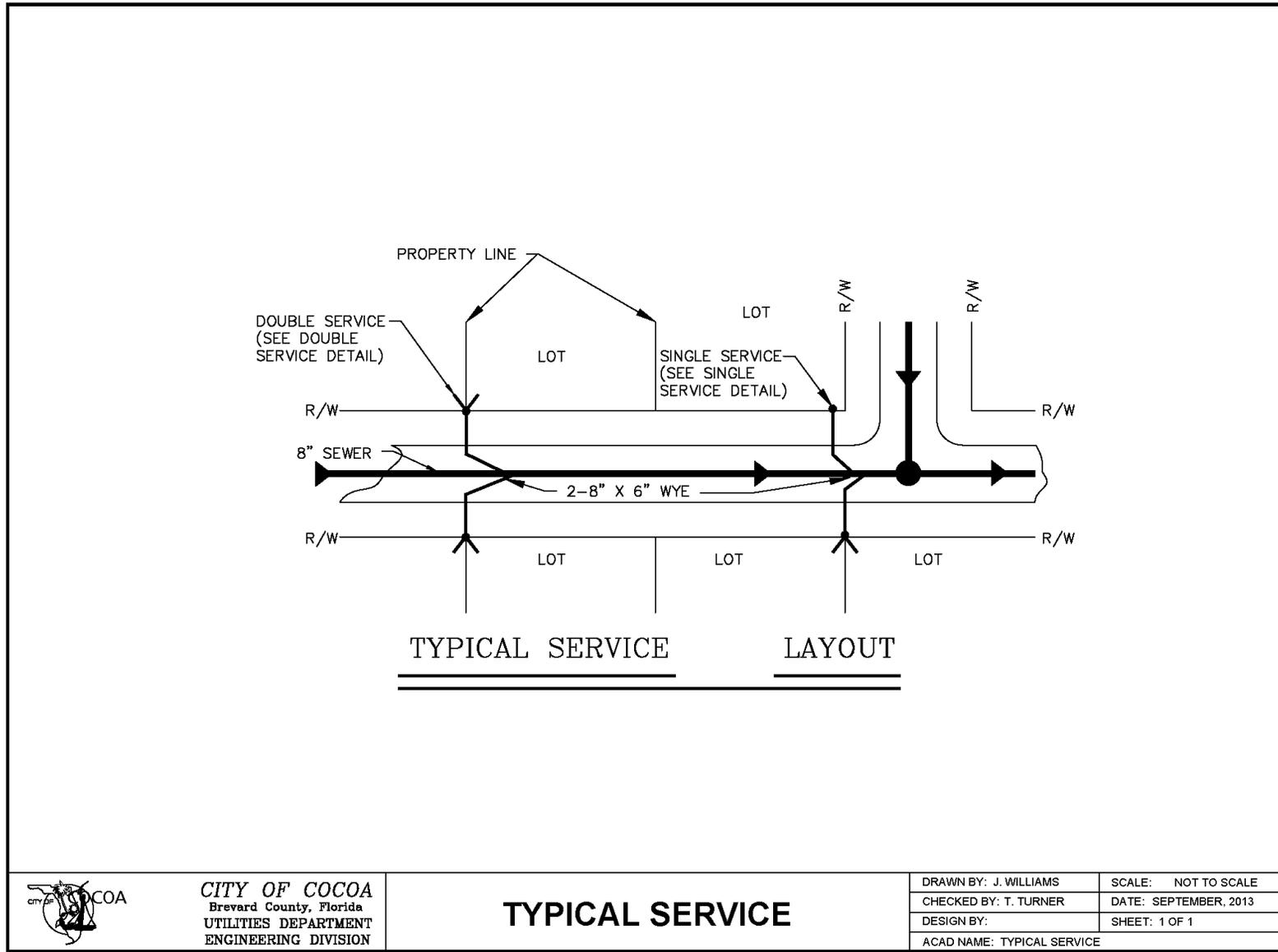


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## TRANSITION COUPLING

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TRANSITION COUPLING	

# APPENDIX B APPROVED DRAWINGS AND DETAILS



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 ENGINEERING DIVISION

## TYPICAL SERVICE

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CHECKED BY: T. TURNER	DATE: SEPTEMBER, 2013
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL SERVICE	