

CITY OF COCOA 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 Sewer Field Operations Division

Effective April, 2020



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

April 03, 2020

Subject: City of Cocoa Technical Provisions

To Whom It May Concern:

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

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

Sincerely,

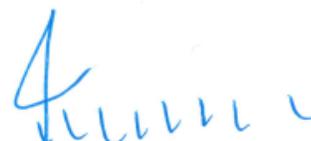

John A. "Jack" Walsh, P.E.
Utilities Director
City of Cocoa



Table of Contents

Section 1.	General Information	1
1.1	General	2
1.2	Definitions	3
1.3	Abbreviations	5
Section 2.	Water – Potable and Reclaimed	7
2.1	Water Main Crossings	8
2.1.1	GENERAL	8
2.2	Materials Specifications	8
2.2.1	Pipe	8
2.2.2	Valves, Valve Boxes, and Valve Extensions.....	9
2.2.3	Backflow Preventers	12
2.2.4	Fittings.....	13
2.2.5	Fire Hydrants.....	15
2.2.6	Service Connections, 3/4"-2"	16
2.3	Protection of Property and Obstructions.....	18
2.3.1	Protection	18
2.3.2	Obstructions.....	18
2.3.3	Existing Asbestos Cement Watermains	18
2.3.4	Abandonment of Asbestos Cement Pipe.....	19
2.4	Trench Preparation	19
2.4.1	Excavation	19
2.4.2	Shoring and Bracing	20
2.4.3	De-Watering.....	20
2.5	Pipe Line Construction	20
2.5.1	General.....	20
2.5.2	Material Handling	20
2.5.3	Inspection of Materials	21



2.5.4	Pipe Placement	21
2.5.5	Locating Wire	22
2.5.6	Service Line Location.....	23
2.5.7	Backfilled Material and Inspection	23
2.5.8	Valves and Fittings	23
2.5.9	Fire Hydrants.....	24
2.5.10	Restrained Pipe Joints.....	24
2.5.11	Thrust Blocks and Collars	24
2.5.12	Jack and Bore, Pipe Installed in Casings.....	24
2.5.13	Horizontal Directional Drilling.....	25
2.5.14	Blowoffs	27
2.6	Tie-Ins to Existing Systems	28
2.6.1	General.....	28
2.7	Testing	29
2.7.1	General.....	29
2.7.2	Jumper Meter Assembly	29
2.7.3	Flushing and Swabbing	30
2.7.4	Hydrostatic Test	32
2.7.5	Leakage Test.....	33
2.8	Disinfection and Bacteriological Testing	33
2.8.1	General.....	33
2.9	Wet Tap Connections to Existing System.....	37
2.9.1	General.....	37
2.9.2	Tapping and Linestop Procedures	37
2.10	Final Clean-Up and Acceptance	39
2.10.1	General.....	39
2.11	Fire Service.....	39
2.11.1	General.....	39
2.12	Connection of buildings over Four Floors	40



2.12.1	General.....	40
2.13	Backflow Preventers.....	40
2.13.1	General.....	40
2.14	Record Drawings.....	40
2.14.1	General.....	40
Section 3.	Wastewater.....	42
3.1	Material Specifications.....	43
3.1.1	General.....	43
3.1.2	Concrete Structures	43
3.1.3	Pipe	44
3.1.4	Manhole Access Covers	44
3.1.5	Coatings.....	45
3.1.6	Miscellaneous Materials.....	45
3.2	Construction.....	46
3.2.1	Location and Grade of Sewers.....	46
3.2.2	Material Handling	47
3.2.3	Trench Excavation, Shoring, and Sheeting.....	47
3.2.4	Control of Water	48
3.2.5	Pipe Placement and Jointing.....	49
3.2.6	Material for Bedding and Backfilling	49
3.2.7	Manhole Installation.....	49
3.3	Water Main Crossings	50
3.3.1	General.....	50
3.4	Service Connections	51
3.4.1	General.....	51
3.5	Field Testing of Sewer Systems.....	51
3.5.1	General.....	51
3.6	Record Drawings	53
3.6.1	General.....	53



3.7	Force Main Valves	55
3.7.1	General.....	55
3.8	Force Main Pipe.....	55
3.8.1	Restrained Pipe Joints.....	55
3.9	Lift Stations.....	55
3.9.1	Precast Wet Wells.....	55
3.9.2	Wet Well Access Covers.....	56
3.9.3	Coatings.....	56
3.9.4	Submersible Pumps	56
3.9.5	Valve Pit	57
3.9.6	Check Valves	57
3.9.7	Gate Valves	58
3.9.8	Control Panel.....	58
3.9.9	Site Lighting.....	61
3.10	Conduit	61
Appendix A.	APPROVED MATERIAL.....	63
	Valves and Accessories	64
	Service Materials.....	66
	Pipe Materials and Appurtenances.....	68
	Pipe Fittings.....	69
	Hydrants.....	72
	Firelines.....	72
	Wastewater Category	73
Appendix B.	APPROVED DRAWINGS AND DETAILS.....	74
	Master Meter Assembly: Plan	75
	Master Meter Assembly: Meter Station Detail	76
	Master Meter Assembly: Double Check Bypass	77
	3-Inch and Larger Meter with Backflow Preventer Above Ground Installation	78
	A.C. Pipe Tie-In	79



Alignment Ring.....	80
Blow-Off Detail 1	81
Blow-Off Detail 2	82
Blow-Off Detail 3.....	83
Canal or Drainage Ditch Crossing.....	84
Double Check Detector Assembly.....	85
Double Line Stop Detail	86
Fire Hydrant Detail	87
Fire Hydrant Guard Posts.....	88
Gate Valve and Fitting Detail	89
Gate Valve and Valve Box Detail.....	90
Jack and Bore	91
Jumper Meter Assembly	92
Line Stop Detail For Tie-In or Capping Existing Water Main.....	93
Locating Wire Detail.....	94
“N” Pattern Double Check Detector Assembly.....	95
Polyethylene Wrap	96
Restrained Pipe Table: Force Mains	97
Restrained Pipe Table: Water and Reclaimed Water Mains	98
Solid Sleeve Detail.....	99
Storm Drain Crossing	100
Swale Crossing	101
Tapping Saddle and Valve.....	102
Thrust Block Notes and Details.....	103
Thrust Collar Water and Reclaimed	104
Typical Bore plan.....	106
Typical Lot Service Line Location	107
Typical Required Separation	108
Typical Service Line	109



Valve Extension Stem For W.S.S.C. Valve Boxes.....	110
Valve Insert for A.C. Pipe	111
Typical Manhole.....	112
Typical Manhole with Outside Drop	113
Force Main Connection to Manhole.....	114
Manhole Invert	115
Manhole Ring and Cover.....	116
Lift Station Site Plan	117
Lift Station Wet Well Cross Section	118
Lift Station Valve Vault Section Views	119
Lift Station Valve Vault and Wet Well Plan View.....	120
Lift Station Specifications and Notes	121
Lift Station Electrical Panel: Front Elevation.....	122
Lift Station Electrical Panel: Rear Elevation	123
Lift Station Electrical Panel: Left Side Elevation	124
Lift Station Electrical Panel: Right Side Elevation	125
Lift Station Electrical Panel: Interior Front View.....	126
Lift Station Electrical Panel: Interior Back Panel	127
Duplex Pump Junction Box	128
Triplex Pump Junction Box.....	129
Pump Junction Box Back Plate	130
Triplex Pump Station Control Panel.....	131
Triplex Pump Station Control Panel.....	132
Triplex Pump Station Wiring Schematic	133
Triplex Pump Station Wiring Schematic	134
Triplex Pump Station Wiring Schematic	135
Triplex Pump Station Wiring Schematic and Terminal Block Layout.....	136
Triplex Pump Station Wiring Schematic and Terminal Block Layout.....	137
Triplex Pump Station Wiring Schematic and Terminal Block Layout.....	138



Air Release Valve.....	139
Check Valve Vault	140
Single Service Detail	141
Double Service Detail.....	142
Transition Coupling	143
Typical Service.....	144
RTU Panel Layout	145
RTU Panel Terminal Layout	146
RTU Panel Bill of Materials	147
RTU Communication Layout	148
RTU Power Distribution	149
RTU I/O Card No. 1; Digital Inputs: 24VAC .1	150
RTU I/O Card No. 2; Mixed I/O: Digital Inputs/Outputs	151
RTU I/O Card No. 2; Mixed I/O: Analog Inputs	152
RTU I/O Card No. 3; Mixed I/O: Digital Inputs/Outputs	153
RTU I/O Card No. 3; Mixed I/O: Analog Inputs	154
RTU Interconnections to Pump Control Valve	155
RTU Installation Details.....	156
RTU Installation Specifications.....	157
Approved Tapping and Line Stop Contractors.....	158



SECTION 1. GENERAL INFORMATION

1. GENERAL INFORMATION

April 2020

1.1 GENERAL

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

Contractor requirements include:

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

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

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

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

1. GENERAL INFORMATION

April 2020

1.2 DEFINITIONS

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

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

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

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

City - Means the City of Cocoa.

Collection Mains – Wastewater gravity mains.

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

Distribution Main – Any water main 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.

1. GENERAL INFORMATION

April 2020

Normal Working Hours - Hours are between the hours of 8:00 a.m. to 5:00 p.m. of a NORMAL WORKING DAY.

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

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

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

Swale - A manmade trench which:

- A. Has a top width-to-depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or greater than 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 to prevent erosion and reduce pollutant concentration of any discharge.

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

Transmission Main – Any water main 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).

Utilities Handbook – The City of Cocoa Utilities Handbook produced by the Customer Service Division of the Finance Department.

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

Unless otherwise specified, "**City**" means City of Cocoa; "**Utilities Department**" means City of Cocoa Utilities Department; "**Engineering Division**" means City of Cocoa Utilities Engineering

1. GENERAL INFORMATION

April 2020

Division, “**Inspections or Inspector**” means City of Cocoa Utilities Engineering Inspections Division.

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

Cross Connection Control - CCC

Dimension Ratio - DR

Double Check Backflow Assembly - DC

Double Check Detector Assemblies - DCDA

Dry Film Thickness - DFT

Ductile Iron Pipe Research Association - DIPRA

Ductile Iron Pipe - DIP

Engineer of Record - EOR

Florida Administrative Code - FAC

Florida Department of Environmental Protection - FDEP

Florida Department of Transportation - FDOT

Florida East Coast Rail Road - FECRR

Foundation for Cross-Connection Control and Hydraulic Research - FCCCHR

Flange - FL

1. GENERAL INFORMATION

April 2020

Factory Mutual - FM
High-Density Polyethylene - HDPE
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
Plain End - PE
Polyvinylchloride – PVC
Precautionary Boil Water Notice - PBWN
Portable Changeable Message Signs - PCMS
Pre-stressed Concrete Cylinder Pressure Pipe - PCCP
Project Manager - PM
Pounds per Square Inch - PSI
Raised Pavement Marker - RPM
Reduced Pressure Backflow Assembly - RP
Reduced Pressure Detector Assembly- RPDA
Reinforced Concrete Pressure Pipe - RCP
Stainless Steel - SS
Technical Provision and Standard Details - TPSD
Traffic Control Plan - TCP
Underwriters Laboratories - UL
Unified Numbering System - UNS
Variable Frequency Drive - VFD

**SECTION 2. WATER – POTABLE AND
RECLAIMED**

2. WATER – POTABLE AND RECLAIMED

April 2020

2.1 WATER MAIN CROSSINGS

2.1.1 GENERAL

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

2.2 MATERIALS SPECIFICATIONS

2.2.1 PIPE

2.2.1.1 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.

2.2.1.2 Fusible Polyvinyl Chloride Pipe, 4" – 12"

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

2.2.1.3 Ductile Iron Pipe

Ductile iron pipe will be cement-lined pressure Class 350 for 12-inch diameter and smaller and Class 250 for 16-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

2. WATER – POTABLE AND RECLAIMED

April 2020

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.

2.2.1.4 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.

2.2.1.5 Reclaimed Water

PVC pipe installed in reclaimed water systems will be Class 235 (DR 18) conforming to AWWA specification C900 and will be purple in color. Ductile iron pipe installed in the reclaimed water system will be pressure Class 350 for 12" and smaller and pressure Class 250 for 16" and larger, provided 3 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.

2.2.2 VALVES, VALVE BOXES, AND VALVE EXTENSIONS

2.2.2.1 Resilient Seat Gate Valves, 4" – 36"

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

2. WATER – POTABLE AND RECLAIMED

April 2020

the 12" of cover over the 2" operating nut can be achieved by showing all pertinent dimensions. Tapping valves shall have a centering ring.

2.2.2.2 Butterfly Valves, 16" and Larger

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

2.2.2.3 Valves, 2"

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.

2.2.2.4 Valve Boxes

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

2. WATER – POTABLE AND RECLAIMED

April 2020

2.2.2.5 Valve Extensions

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

2.2.2.6 Valve Box Debris Shield

All buried valves 4-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.

2.2.2.7 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,

2. WATER – POTABLE AND RECLAIMED

April 2020

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.

2.2.3 BACKFLOW PREVENTERS

2.2.3.1 General

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

Backflow preventers will have interior fusion bonded epoxy coating 5 to 12 mils and will be installed above grade in accordance with manufacturer’s recommendations on a concrete slab adjacent to the meter. Check valves must have bronze seats.

Commercial Services: Cross connection control device required for commercial service, including multi-family residences, shall be a reduced pressure (RP) backflow preventer unless otherwise approved by the Engineering Division.

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

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

2.2.3.2 Fire Services

Cross connection control devices for fire line systems shall be double check detector assemblies (DCDA) or reduced pressure detector assemblies (RPDA). DCDA and RPDA shall meet the requirements of the Florida Building Code and must be supplied with a ¾-inch or larger bypass assembly. DCDA will be accepted as a complete approved assembly in accordance with the section on "Backflow Prevention and Cross-Connection Control" in the Utilities Handbook. The Engineering Division will inspect the interior of the DCDA prior to installation. DCDA must be installed horizontally above ground in a grassed or non-traffic area. The DCDA will be installed

2. WATER – POTABLE AND RECLAIMED

April 2020

with 24" minimum and 30" maximum clearance from finished grade. "N" shaped DCDA will be accepted on a case-by-case basis. Fire lines requiring an RPZ will be handled on a case-by-case basis. The Engineering Division shall paint the DCDA, to be paid for by the Developer/Contractor.

2.2.3.3 Meter Station Backflow Preventer

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

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

2.2.3.4 Backflow Preventer Certification Test

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

2.2.4 FITTINGS

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

2.2.4.1 Cast Iron

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

2.2.4.2 Ductile Iron, 4" – 16"

Ductile iron compact fittings (sizes 4" through 16") must conform to AWWA specification C153. Ductile iron compact fittings will be mechanical joint with an interior cement lining with seal

2. WATER – POTABLE AND RECLAIMED

April 2020

coating and an exterior bituminous coating. All fittings will be wrapped with 6 mil polyethylene (sealed with tape).

2.2.4.3 Bolts

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

2.2.4.4 Tapping Sleeve

Tapping sleeves on mains 4" to 12" in diameter will be all Stainless Steel Sleeves.

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

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

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

The tapping valve must have centering ring and conform to Section 2.2.2.1 "Resilient Seat Gate Valves" in these Technical Provisions.

Tapping saddles to be placed on asbestos concrete (AC) pipe shall be an **JCM A432** All Stainless Steel Sleeve or equal.

2.2.4.5 Line Stop Sleeve Specifications

Sizes 4" through 12"

Sleeve/Body

The entire Line Stop sleeve shall be fabricated from 304 Stainless Steel. They shall have a pass through bolt design and provide 360° seal around the pipe. The line stop sleeve is to be fully

2. WATER – POTABLE AND RECLAIMED

April 2020

passivated to return the stainless steel to its highest corrosion resistance stage. Outlet on sleeve will be full port, i.e. on 8" sleeve, outlet will be 8", on 6" sleeve, outlet will be 6".

Bolts, Nuts & Washers

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

Gasket

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

Pressure Rating

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

Line Stop Sleeves shall be a **JCM A440 Line Stop Sleeve** or approved equal.

2.2.5 FIRE HYDRANTS

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

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

Finish grade is to be established and the proper length hydrant is to be installed by the Contractor prior to acceptance by the City. All nozzles will be a minimum of 18" and a maximum of 24" above finished grade. A 6" mechanical joint hydrant connection will be provided using a hydrant

2. WATER – POTABLE AND RECLAIMED

April 2020

valve-anchoring tee with integrally cast standard mechanical joint gland on 6" plain end branch. The Contractor will not be allowed to install risers on hydrants. At final inspection, if it is determined that a fire hydrant is not at grade, the Contractor shall purchase a proper length hydrant and install it under the direction of the Engineering Division.

2.2.6 SERVICE CONNECTIONS, 3/4"-2"

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

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

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

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

2.2.6.1 Saddles

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

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

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

2. WATER – POTABLE AND RECLAIMED

April 2020

sizes 16" and larger, for 3/4", 1", 1-1/2," and 2" services, the style 202B double strap design must be used.

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

2.2.6.2 Curb Stops, 3/4" - 2"

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

2.2.6.3 Corporation Stops, 3/4" - 2"

All corporation stops for water service 3/4" thru 2" will be brass and have "CC" inlet threads and copper flare outlet. 2" Corporation stops for "jumpers" will be "CC"-by- F.I.P.

2.2.6.4 Meter Boxes

Meter boxes for traditional meters are to be plastic with an iron flipper lid with a full pin hinge. Meter boxes for radio-read meters must have a lid compatible with City's AMR meter antennae (4-1/2" round). Service locations will be permanently cut and painted on concrete curb or the street with a blue "W" for potable water or a purple "R" for reclaimed. Reclaimed services will be located at the opposite lot corner from water services where practical or with 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 of materials per above. They are also required to have a 3" x 5" permanent plastic tag, secured to the curb stop with a nylon tie wrap, which will be supplied. Tags will be inscribed, "RECLAIMED WATER DO NOT DRINK".

2. WATER – POTABLE AND RECLAIMED

April 2020

2.3 PROTECTION OF PROPERTY AND OBSTRUCTIONS

2.3.1 PROTECTION

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

2.3.2 OBSTRUCTIONS

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

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

2.3.3 EXISTING ASBESTOS CEMENT WATERMAINS

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

2. WATER – POTABLE AND RECLAIMED

April 2020

2.3.4 ABANDONMENT OF ASBESTOS CEMENT PIPE

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

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

2.4 TRENCH PREPARATION

2.4.1 EXCAVATION

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

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

2. WATER – POTABLE AND RECLAIMED

April 2020

2.4.2 SHORING AND BRACING

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

2.4.3 DE-WATERING

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

2.5 PIPE LINE CONSTRUCTION

2.5.1 GENERAL

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

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

The minimum size tap on a Transmission Main shall be a six (6) inch.

2.5.2 MATERIAL HANDLING

2.5.2.1 Precautions

Every precaution will be taken to prevent damage to pipe and piping materials during transportation and delivery to the work site. Under no condition will pipe be dropped, bumped,

2. WATER – POTABLE AND RECLAIMED

April 2020

dragged or picked up by inserting forks into end of pipe. Pipe lifted by placing forks into pipe shall be removed from job site.

2.5.2.2 Damaged Materials

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

2.5.2.3 Storage

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

2.5.3 INSPECTION OF MATERIALS

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

2.5.4 PIPE PLACEMENT

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

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

2. WATER – POTABLE AND RECLAIMED

April 2020

After placing a length of pipe in the trench, the spigot end will be centered in the bell, the pipe forced home, brought to correct alignment, and covered with an approved backfill material. Ductile iron pipe will be backfilled to the centerline of the pipe and compacted to ninety-five percent (95%) of standard Proctor T-99.

PVC pipe will be backfilled in accordance with the manufacture's recommendations for the laying conditions.

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

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

Pipe installed under swales shall be D.I. and have 3 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.

2.5.5 LOCATING WIRE

A UF 14 Copper 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 18 inches of excess length. Wire is to be connected together using an underground wire nut with a **silicone-based sealant**.

2. WATER – POTABLE AND RECLAIMED

April 2020

The CCS wire shall meet the following requirements. HDPE Insulation of 30 mils, #14 AWG conductor, maximum Ohms resistance of 8.28 ohms per 1000 ft., breaking load 256 lbs.

When directional drilling is used, one continuous #10 CCS **extra high strength** locator wire shall be installed. The CCS wire shall meet the following requirements. HDPE Insulation of 45 mils, #10 AWG conductor, maximum Ohms resistance of 0.999 ohms per 1000 ft., breaking load 1150 lbs.

2.5.6 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.

2.5.7 BACKFILLED MATERIAL AND INSPECTION

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

2.5.8 VALVES AND FITTINGS

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

All valves will be located within two feet of the tee, see detail "Gate Valve and Fitting."

2. WATER – POTABLE AND RECLAIMED

April 2020

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

2.5.9 FIRE HYDRANTS

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

2.5.10 RESTRAINED PIPE JOINTS

The 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.

2.5.11 THRUST BLOCKS AND COLLARS

Restrained joint systems are the preferred method. Thrust blocks may only be used with the City's prior approval at bends, fire hydrants, and as specified on the plans, in accordance with the Standard Detail Sheet. Metal harnesses, tie rods, or clamps of adequate strength to prevent movement may be installed at locations where thrust blocks are not practical. Rods and clamps will be stainless steel. A 20-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.

2.5.12 JACK AND BORE, PIPE INSTALLED IN CASINGS

Pipe to be installed under pavement where open trenching is not permitted will be installed through a steel casing that has been jacked and bored. The casing pipe will be six to eight inches

2. WATER – POTABLE AND RECLAIMED

April 2020

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

2.5.13 HORIZONTAL DIRECTIONAL DRILLING

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

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

2. WATER – POTABLE AND RECLAIMED

April 2020

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

City Engineering Division Representative

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 Division 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 bore

The bore plan shall be signed by the responsible person in charge of the bore.

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

Water mains 12" and greater minimum clearance is 18"

Water mains 10" and less minimum clearance is 12"

3. The HDD contractor will be responsible for obtaining locates for all utilities in accordance with Chapter 556 of the Florida Statutes.
4. The HDD contractor shall notify the City of Cocoa Inspection Division 48 hours in advance of the bore and notify the appropriate permitting agency per the conditions of the permit.

2. WATER – POTABLE AND RECLAIMED

April 2020

ENGINEERING INSPECTOR

1. An approved copy of the bore plan will be given to Engineering Inspection Division.
2. The Inspector for the project will have a copy of the bore plan at the project site.
3. Prior to the HDD the Inspector shall verify that the materials at the project site for the directional bore are in accordance with the City of Cocoa's latest technical provisions and standard details.
4. The Inspector shall verify the following prior to the commencement of the HDD:
 - a. Verify that the HDD contractor has obtained his/her utility locates;
 - b. Verify that all utilities have been visually spotted by the HDD contractor;
 - c. Verify that the permitting agency has been notified of the HDD; and
 - d. Witness the calibration of the sonde.
5. The Inspector shall remain at the project site until completion of the HDD. Any discrepancies shall be immediately reported to the Engineering Division. Once the corrective action is determined, the proper authority will be notified.

COMPLETION OF THE BORE

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

2.5.14 BLOWOFFS

Flushing blow-offs are to be installed and constructed as shown on the Standard Detail Sheet. Blow-off materials include 2" brass for nipples, brass threaded fittings, 2" brass angle wheel valve, and plastic meter box (purple for reclaimed). The plastic meter box is to be installed at grade over the wheel valve. The angle wheel valve will be within 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 2.1.6, "Service Connections".

2. WATER – POTABLE AND RECLAIMED

April 2020

2.6 TIE-INS TO EXISTING SYSTEMS

2.6.1 GENERAL

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

2.6.1.1 Mains 8" and smaller

Existing tie-in valves will be operated and pressure tested to verify water tightness prior to the proposed tie-in. Existing system valves that are not 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 proposed 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 Inspector. All other existing valves closed as part of the job will be opened by the contractor under the supervision of Engineering Division.

2.6.1.2 Mains 10" and Larger

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

2. WATER – POTABLE AND RECLAIMED

April 2020

2.7 TESTING

2.7.1 GENERAL

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

2.7.2 JUMPER METER ASSEMBLY

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

1. A temporary jumper connection is required at ALL connections between existing active water mains and proposed new water main improvements, per the City of Cocoa Utilities Handbook. The only exception is the installation of a new fire hydrant involving a tap and using an anchoring/swivel nipple. In this case, all fittings and fire hydrant SHALL be swabbed with a 100 ppm chlorine solution prior to installation.
2. The details for filling any water main from existing active water mains and for flushing of new mains up to 8" diameter (2.5 FPS minimum velocity) and for pulling bacteriological samples from any new water main of any size can be found in **Section 2.7.3-Flushing and Swabbing**. The jumper connection shall be maintained until after filling, flushing, testing, and disinfection of the new main has been successfully completed and clearance for use from the Florida Department of Environmental Protection (FDEP) and other pertinent agencies has been received. The jumper connection shall also be used to maintain pressure in the new mains all the time after disinfection and until the FDEP clearance letter is obtained. Adequate thrust blocking and/or restraints shall be provided temporarily, as required. Pipe and fittings used for connecting the new pipe to the existing pipe shall be disinfected prior to installation in accordance with AWWA C651. The tapping sleeve and the exterior of the main to be tapped shall be disinfected by spraying or swabbing per Section II of AWWA C561.
3. Flushing of 10" diameter and larger water mains may be done through the tie-in valve, under the direct supervision of the Engineering Division. The Engineering Division will be notified in writing 48 hours prior to the flushing of said mains.

2. WATER – POTABLE AND RECLAIMED

April 2020

The following procedures shall be followed:

- A. The existing tie-in valves shall be operated and pressure tested in the presence of the Engineering Division or Engineer to verify water tightness prior to the proposed tie-in. Valves which are not watertight shall be replaced or a new valve installed immediately adjacent to the leaking valve.
- B. The temporary jumper connection shall be constructed as detailed. The jumper connection shall be used to fill the new water main and for providing water for bacteriological sampling of the new main as required by the FDEP permit.
 - Flushing shall not be attempted during peak demand hours of the existing water main.
 - All downstream valves in the new system must be open prior to opening the tie-in valve.
 - Provide for and monitor the pressure at the tie-in point, the pressure in the existing main must not drop below 35 psi.
 - Tie-in valve shall be opened a few turns only, ensuring a pressure drop across the valve is always greater than 10 psi.
4. The contractor shall provide documentation demonstrating that the double check backflow prevention device has been tested and is in good working order at the time of installation. The test shall be performed by a qualified backflow prevention technician.
5. Except as required to flush lines of greater than 8" in diameter, the tie-in valve shall remain closed. The tie-in valve shall remain closed until the new system has been cleared for use by FDEP and all other pertinent agencies.
6. Upon receipt of clearance for use from FDEP and all other pertinent agencies, the contractor shall remove the jumper connection. The corporation stops are to be closed and plugged with 2" brass plugs.
7. All installation and maintenance of the temporary jumper connection and associated backflow prevention device fittings, valve, etc., shall be the responsibility of the contractor.

2.7.3 FLUSHING AND SWABBING

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

2. WATER – POTABLE AND RECLAIMED

April 2020

City's system be allowed to drop below 35 psi. Water used during flushing will be billed to the Contractor.

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

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

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

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

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

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

The pig will be advanced through the pipeline at a rate of 2 feet per second, 80 gpm for 4”; 180 gpm for 6”; 320 gpm for 8”. Flow rates and jumper assemblies for mains 10” and larger will be determined by the Engineer of Record and approved by the City of Cocoa Engineering Division.

The pig retrieval point or cannon will project at least one foot above the surrounding grade. The water from the pig retrieval station discharge and its location to discharge shall be approved by the Engineering Division. The contractor will be responsible for following the National Pollutant Discharge Elimination System (NPDES) requirements to remove chlorine from discharge as well as protect retrieval area from erosion. Retrieval cannons will not be left in place. After pigging and flushing are complete, the cannon will be removed and capped below ground in accordance with 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 be inserted into the pipeline. The isolation valve may be cracked open for a few seconds under the direction of the Engineering Division to move the pig past the jumper assembly downstream point so the jumper assembly can advance the pig through the pipeline.

2. WATER – POTABLE AND RECLAIMED

April 2020

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.

2.7.4 HYDROSTATIC TEST

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

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

2. WATER – POTABLE AND RECLAIMED

April 2020

2.7.5 LEAKAGE TEST

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

Size (in)	Allowable Leakage (gal/hour)
2	0.20
4	0.33
6	0.50
8	0.67
10	0.83
12	1.06
14	1.16
16	1.32

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

L = testing allowance (makeup water), in gallons per hour

S = length of pipe in feet

D = nominal diameter of pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge). P has the square root taken.

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

2.8 DISINFECTION AND BACTERIOLOGICAL TESTING

2.8.1 GENERAL

The Contractor must flush potable mains and arrange for complete disinfection by chlorination in coordination with the Engineering Division. Work will conform to applicable provisions of AWWA specification C651-14, "Disinfecting Water Mains". Water with a chlorine concentration

2. WATER – POTABLE AND RECLAIMED

April 2020

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 an Engineering Division approved laboratory. Two consecutive day samples are required for potable water mains. Water mains shall not be flushed between samples. The Contractor will be responsible for ALL bacteriological testing fees. Sample points are determined by the Engineer of Record and approved by FDEP. If samples taken do not demonstrate satisfactory results, re-chlorination and retesting of all sample locations is required at the Contractors expense.

CONTRACTORS WORKING ON EXISTING MAINS

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



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. **Attach a copy of the certification.** YES _____ NO _____

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

Lab Official _____ Cert. # _____ Date _____

Signature

Company _____



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Sampling Certification

2. The Sampling Company is a private laboratory or a company solely in the business of collection of bacteriological samples. **Personnel collecting samples must follow the procedures outlined in AWWA C651 Section 7.3 Sampling Procedure and Standard Methods for the Examination of Water and Wastewater.** YES _____ NO _____
3. The Sampling Company assumes the chain of custody for the bacteriological samples. The samples were taken by the private Sampling Company personnel from the locations indicated on the project's FDEP permit. YES _____ NO _____
4. The chlorine residual was determined at the time of sampling and was no greater than 5.0 parts per million (PPM). **Total and Free Chlorine Residuals are to be indicated for each sample taken.** YES _____ NO _____
5. Two sets of samples collected on two consecutive days, at least 24 hours apart. YES _____ NO _____

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

Sampling Official _____ Cert. # _____ Date _____

Signature

Company _____

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

If any of these procedures and certifications is not followed, the bacteriological tests will not be accepted by the City of Cocoa and will delay the FDEP Permit clearance process.

1. WATER – POTABLE AND RECLAIMED

April 2020

2.9 WET TAP CONNECTIONS TO EXISTING SYSTEM

2.9.1 GENERAL

Tap Being Performed	Parties Allowed to Perform the Tap
Taps 2" and smaller	<ul style="list-style-type: none"> • Approved tapping and line stop contractor • Contractor approved to tap mains solely for their own project <ul style="list-style-type: none"> ○ Contractor must perform 5 successful taps under the supervision of the inspection team and demonstrate possession of proper tapping equipment
Taps 2"-16"	<ul style="list-style-type: none"> • Approved tapping and line stop contractor
Taps 16" and greater	<ul style="list-style-type: none"> • Approved tapping and line stop contractor <ul style="list-style-type: none"> ○ Each tap requires independent review and approval ○ The tap must be performed under direct supervision of the engineering division
Taps on concrete transmission mains	<ul style="list-style-type: none"> • Contractor approved for taps on City of Cocoa transmission mains <ul style="list-style-type: none"> ○ Tapping plan must be submitted by the contractor prior to the tap
<ul style="list-style-type: none"> • On transmission mains, the approved tapping and line stop contractor will install the tapping saddle and valve. For all connections from 4"-12" the contractor may install tapping saddles under direct supervision of the Engineering Division. • For all water main connections, the Contractor must obtain all required permits, provide a dry pit area, provide pit preparation including shoring and bracing, provide maintenance of traffic, provide all right-of-way restoration, and notify all utilities prior to construction. Connections must be completed under direct supervision of the Engineering Division. • The list of approved contractors may be found on pg. 158. 	

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

2.9.2 TAPPING AND LINSTOP PROCEDURES

- ALL TAPS or LINSTOPS on City of Cocoa potable, reclaimed, and wastewater mains will be performed by an **Approved Tapping Contractor**.*
- Absolutely NO taps or linstops will be performed on Friday or any day preceding a holiday.

1. WATER – POTABLE AND RECLAIMED

April 2020

- Approved Contractors must disinfect tapping machine with AWWA approved disinfectant. This will be witnessed by the Inspector.
 - The Contractor's tapping or linestop machines will be in good working order with appropriate bits and shell cutters for the type of pipe being worked on (i.e. shellcutter for PVC).**
 - When taps or linestops are installed on Transmission Mains (> 12"), a preconstruction meeting will be held with the tapping contractor prior to ANY work being performed. The meeting may be held at the job site.
 - Taps and linestops on the Utilities concrete pressure mains will be a two (2) day process and will require a pre-construction meeting. Day one the saddle is installed and grouted, Day two tighten straps, cut pre-stressing wires, install throat and valve. Pressure test on saddle is 10% over line pressure for 30 minutes. After successfully completing pressure test, tap can be made.
 - Toggle bolts will be required for PCCP taps to assure the entire coupon remains intact. The coupon must be provided to the City.
 - ALL excavations must conform to current OSHA Trench Safety Act.
 - The City of Cocoa reserves the right to remove any contractor from the approved list for any work considered substandard.
- * Tap or linestop to include: Material, installation, labor, drilling, and testing
- ** Bit, boring bar, and adaptor

1. WATER – POTABLE AND RECLAIMED

April 2020

2.10 FINAL CLEAN-UP AND ACCEPTANCE

2.10.1 GENERAL

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

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

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

2.11 FIRE SERVICE

2.11.1 GENERAL

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

Fire line backflow preventer assemblies shall be installed in non-traffic areas. Four to six bollards may be required.

1. WATER – POTABLE AND RECLAIMED

April 2020

2.12 CONNECTION OF BUILDINGS OVER FOUR FLOORS

2.12.1 GENERAL

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

- A fixture unit analysis will be performed by the Owner's engineer to determine peak domestic flow requirements. This analysis is to be provided to the Engineering Division.
- A water meter and a reduced pressure backflow preventer, sized in accordance with the domestic flow requirements, will be installed above ground at the developer's expense.
- Upon written request, the City will provide the site engineer with the minimum expected system pressure. The site engineer will be responsible for providing this information to the architect and building owner. Means for providing an adequate supply of domestic water and fire protection to all parts of the building during periods of minimum pressure will be the responsibility of the building Architect or Engineer of Record.
- Repair costs for damage to the water meter caused by flows exceeding its rated capacity will be charged to the customer.

2.13 BACKFLOW PREVENTERS

2.13.1 GENERAL

All connections to the City of Cocoa potable water system shall contain a backflow preventer assembly per the Standard Details in "Appendix B." Backflow preventer requirements for each service type are described in the "City of Cocoa Cross Connection Control Program Manual" and are summarized in Paragraph 2.1.3, "Backflow Preventers" and "Appendix A" of this document.

2.14 RECORD DRAWINGS

2.14.1 GENERAL

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

1. WATER – POTABLE AND RECLAIMED

April 2020

- Location of all valves, service lines, fittings, and fire hydrants using at least two ties to permanent points (manholes, curbs, or storm water inlets). An acceptable station and offset system may be used for service lines and fittings only.
- Location of mains from property easement lines or edge of pavement at intervals of 300 feet.
- Elevations to the top of the water line at intervals of 300 feet and at all drainage and sewer main crossings. Benchmark to be shown on record drawings.
- Separation between reclaimed water or force mains and water mains, if they are installed within 10 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.
- A minimum of two (2) northings and eastings geographic coordinates.
- 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 drawings 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 62-555.900(9) that the system depicted on the record drawing was constructed in substantial conformance with approved plans and will function as intended. Lot, block numbers, and street names will be included. Provide two (2) sets of signed and sealed record drawings and one (1) digital file including all reference files in .DWG format (AutoCAD 2013 or higher).



SECTION 3. WASTEWATER

3. WASTEWATER

April 2020

3.1 MATERIAL SPECIFICATIONS

3.1.1 GENERAL

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

3.1.2 CONCRETE STRUCTURES

3.1.2.1 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.

3.1.2.2 Flotation Uplift of Fiberglass Manhole

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

3. WASTEWATER

April 2020

3.1.3 PIPE

3.1.3.1 PVC Pipe and Fittings, DR 35

PVC pipe and fittings (DR 35) will be manufactured in accordance with ASTM specification 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, coated with Protecto 401 ceramic Epoxy.

3.1.3.2 PVC Pipe, DR 18

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

3.1.3.3 Ductile Iron

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

3.1.4 MANHOLE ACCESS COVERS

3.1.4.1 Cast Iron

Cast iron manhole covers and rings must be traffic load bearing and have an O-Ring seal similar to **USF No. 225-AS ORS**. Bearing surfaces will be machined to produce a tight, even seating surface without rocking. Minimum clear opening will be 24". The words "CITY OF COCOA" and "SANITARY SEWER" will be cast into manhole covers. Manholes installed in high water areas will be sealed by a method approved by the Engineering Division.

3.1.4.2 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.

3. WASTEWATER

April 2020

See Detail Sheets:

- Manhole Ring and Cover
- Check Valve Vault
- Lift Station

3.1.5 COATINGS

3.1.5.1 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 to the coating manufacturer's recommendation with a minimum total DFT of 12 mils. Each of the coats will be 4 mils thick of contrasting colors. The interior shall be coated red, black, and a final gray coat. The exterior shall be coated red, gray, and a final black coat.

3.1.5.2 HDPE Sheet Lining

Where an HDPE liner is specified, the entire wall surface of the 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 watertight lining. The liner shall be installed and tested per the manufacturer's guidelines. Such lining must be warranted against defects in materials and workmanship for a period of five years from date of installation.

3.1.5.3 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 Grade 316 10S stainless steel, refer to Section 3.8.3.2, "Exposed Piping".

3.1.6 MISCELLANEOUS MATERIALS

3.1.6.1 Manhole Steps

Manhole steps are not permitted.

3. WASTEWATER

April 2020

3.1.6.2 Hardware

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

3.2 CONSTRUCTION

3.2.1 LOCATION AND GRADE OF SEWERS

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

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

Minimum and Maximum Slopes for Gravity Sewers

Size (in)	Maximum (%)	Minimum (%)
4	1.14	1.04
6	0.66	0.60
8	0.36	0.33
10	0.28	0.25
12	0.22	0.20

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 Engineering Division. Manholes shall

3. WASTEWATER

April 2020

be designed with a minimum difference of 0.04 feet between the invert elevations of the incoming and outgoing sewers.

3.2.2 MATERIAL HANDLING

3.2.2.1 Precautions

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

3.2.2.2 Damaged Materials

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

3.2.2.3 Storage

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

3.2.3 TRENCH EXCAVATION, SHORING, AND SHEETING

3.2.3.1 Trenches

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

3.2.3.2 Shoring, Sheeting, and Bracing of Excavations

The excavation must be sheeted and braced when necessary to prevent cave-in during excavation in unstable material or to protect adjacent structure, property, workers, and the public. The sheeting will be maintained in place until the pipe or structure has been placed and backfilled. Shoring and sheeting will be removed, as the backfilling is done, in a manner that will not damage the pipe or structure or permit voids in the backfill. All sheeting, shoring, and bracing of

3. WASTEWATER

April 2020

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.

3.2.4 CONTROL OF WATER

3.2.4.1 Equipment

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

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

3.2.4.2 Ground Water

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

3.2.4.3 Static Water

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

3. WASTEWATER

April 2020

3.2.5 PIPE PLACEMENT AND JOINTING

Pipe placement will progress upgrade with the spigot ends of the pipe pointing in the direction of flow. Each pipe will be placed true to line and grade with a laser beam system. All pipes will be joined in a professional manner and in accordance with the manufacturer's instructions.

Pipe ends will be carefully cleaned prior to jointing. Pipe will be placed either on a prepared bed of undisturbed earth in the bottom of the trench shaped as required to fit the pipe or upon a layer of properly placed bedding material.

3.2.6 MATERIAL FOR BEDDING AND BACKFILLING

3.2.6.1 Unsuitable Material

Wherever excavations of the trench expose unsuitable materials such as peat, soft clay, quicksand, rock, boulders, stones, or unstable material in the bottom of the trench which, in the opinion of the 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.

3.2.6.2 Suitable Material

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

3.2.7 MANHOLE INSTALLATION

3.2.7.1 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

3. WASTEWATER

April 2020

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

3.2.7.2 Manhole Channel

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

3.2.7.3 Joints

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

3.2.7.4 Non-Shrink Grout

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

3.2.7.5 Coating

The interior and exterior surfaces of manholes shall be coated in accordance with Section 3.1.5, "Coatings".

3.3 WATER MAIN CROSSINGS

3.3.1 GENERAL

In all cases where sanitary gravity or force mains cross water mains the crossing shall meet the vertical and horizontal separation requirements of FAC Rule 62-555.314. When separation requirements cannot be met, the Engineer of Record must propose an alternative solution that

3. WASTEWATER

April 2020

meets the requirements of FAC 62-555.314 for approval by the Engineering Division. The water main should cross above the sanitary main, when the water main must cross below the sanitary main, the minimum separation shall be 12 inches.

3.4 SERVICE CONNECTIONS

3.4.1 GENERAL

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

3.4.1.1 Connecting to Manholes

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

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

3.5 FIELD TESTING OF SEWER SYSTEMS

3.5.1 GENERAL

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

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

3. WASTEWATER

April 2020

3.5.1.1 Visible Leaks

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

3.5.1.2 Televised Inspection

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

3.5.1.3 Pressure Testing

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

Maximum Allowable Leakage per 1,000 Feet of Pipe

Size (in)	Allowable Leakage (gal/hour)
4	0.27
6	0.41
8	0.54
10	0.68
12	0.81
16	1.08
20	1.35

3.5.1.4 Vacuum Testing of Manholes

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

3. WASTEWATER

April 2020

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 following table:

Vacuum Testing for Given Manhole Size

Manhole Depth (Ft)	Time Elapsed* (Sec)		
	48 in	60 in	72 in
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.

3.6 RECORD DRAWINGS

3.6.1 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:

3. WASTEWATER

April 2020

- Location of all gate valves, valve pits, force main check valves, fittings, air release valves, tapping saddles, manholes, lift stations, wet wells, and cleanouts using at least two ties to permanent points (manholes, curbs, or storm water inlets). An acceptable station and offset system shall be used for lateral lines.
- The as-builts must include the location of the wye branch, the end of the sewer service referenced to the next downstream manhole of each run, the offset of the end of the service referenced from the centerline of the main sewage pipe, and the depth at the end of the service.
- Location of sewer mains from property easement lines or edge of pavement at intervals of 300 feet.
- Separation between reclaimed water or force mains and water mains if they are installed within 10 feet of water mains-
- Sewer main material, diameter, length of run, and distance of mains from buildings or structures within 20 feet of the sewer main.
- Elevations of the top (rim) and pipe inverts at each manhole and the length and slope of each run of pipe are required on the as-builts (all elevations must be tied to NAVD 88).
- Pertinent easement information.
- A minimum of two (2) northings and eastings geographic coordinates.
- 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 drawings 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 must be accurately shown. After the surveyor or engineer has certified the locations, the engineer will certify on DEP Form 62-604.300(8)(b) that the system depicted on the record drawing was constructed in substantial conformance with approved plans and will function as intended. Lot, block numbers, and street names will be included. Provide two (2) sets of signed and sealed record drawings and one (1) digital file including all reference files in .DWG format (AutoCAD 2013 or higher).

3. WASTEWATER

April 2020

3.7 FORCE MAIN VALVES

3.7.1 GENERAL

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

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

Air release valves will be of the Combination Air Release and Vacuum (CARV) type. CARV valves shall have a working pressure range of 3-150psi, testing pressure of 250psi, maximum operating temperature of 140°F, 2” threaded inlet and 1.5” outlet, reinforced nylon body, 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”.

3.8 FORCE MAIN PIPE

3.8.1 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.

3.9 LIFT STATIONS

3.9.1 PRECAST WET WELLS

Precast wet wells must be constructed in accordance with ASTM specification C478. Concrete will have a minimum 28-day compressive strength of 4,000 PSI. Cement will be Type II sulfide resistant. Reinforcement steel will be minimum Grade 40 and placed as shown on the drawings (“Lift Station” Sheets 1 and 2 of 4). 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 3.9.3, “Coatings”. EOR shall approve precast wet well design.

3. WASTEWATER

April 2020

3.9.2 WET WELL ACCESS COVERS

Aluminum access covers will be designed for 300 PSF live load with a safety factor of 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 ¾-inch wide lip around the inside of the frame. The hatch will be a **Bilco** or **Halliday** product. Hatch size of the cover will be determined by the wet well size and pump size to provide at least 12" of clearance on all sides of the pump with a minimum hatch dimension of 48" x 48". The wet well access cover needs to be flush with the top of the concrete.

3.9.3 COATINGS

3.9.3.1 HDPE Sheet Lining

The entire interior wall and top surface of the wet well will be protected with an HDPE liner designed to protect concrete from corrosion in a collection system pump wet well. The liner shall be a minimum thickness of 0.079 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 watertight lining. Such lining shall be warranted against defects in materials and workmanship for a period of five years from date of installation.

3.9.3.2 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.

3.9.4 SUBMERSIBLE PUMPS

Lift station submersible pumps will be **Hydromatic**, **ABS**, or **Flyght** with three-phase power and 3" minimum solids handling capacity. Pump volute, seal housing, and motor housing will be cast iron. Pump impeller will be two vane, one-piece cast iron construction. Pump shaft will be one-

3. WASTEWATER

April 2020

piece 316 stainless steel, equipped with tandem seals with separate chambers for each seal. Seals will have tungsten carbide faces with 316 stainless steel hardware. Seal chambers will be equipped with probes to detect water intrusion. Motors will be oil-filled with automatic reset over-temperature sensors embedded in the motor windings. Pumps will be equipped with a stainless steel slide rail system, dual rail type. The pump discharge coupling will be flanged cement-lined ductile iron, 4" minimum diameter, bolted to the wet well floor by 316 stainless steel fasteners. Flanges will be machine threaded. (Compression-type flanges will not be allowed) Flange bolts, washers, and nuts will be 316 stainless steel. All pipes entering or exiting the wet well shall be sealed in a manner that will prevent water leaks around pipes.

3.9.5 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 cross will be tapped to accommodate a brass gate valve with a threaded on 0-100 PSI glycerin filled pressure gauge. The valve pit is to be made of precast or cast-in-place concrete with a cast concrete cover equipped with an aluminum access hatch cast in the concrete. Aluminum access covers will be designed for 300 PSF live load with a safety factor of 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 ¾-inch wide lip around the inside of the frame. The dual swing access hatch will be a **Bilco** or **Halliday** product. Hatch size will be determined by the installation with a minimum dimension of 48 x 48 inches. The valve pit access cover needs to be flush with the top of the concrete. The valve pit depth is a maximum of 36" deep.

3.9.6 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.

3. WASTEWATER

April 2020

3.9.7 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.

3.9.8 CONTROL PANEL

The control panel will be isolated with a 200-amp fusible breaker 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); a top mounted LED work light minimum 24 inches in length; hand-off-automatic (HOA) switch for each pump; seal failure light for each pump (amber); run light for each pump (red); one trip light for each pump (amber), SCADA bypass switch, inside and outside light on-off switch.

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 VAC supplied from a step-down 120 VAC to 24 VAC transformer located in the control panel. Float wiring from control panel to pump J-box will be a minimum of #14 AWG copper wire. City will provide signal cable that will run from the control panel to the pump J-box in the same conduit as the float wiring.

Motor starters will be NEMA-rated with three-leg protection, circuit breakers (molded case), and all pilot devices (switches, relays, lights) will be manufactured by **Square-D**.

The control panel will be equipped with a **Russel Stoll model JRS 1044FR 100-amp emergency generator receptacle** and emergency main circuit breaker with lockout from the normal main breaker. Panel will be equipped with ground and neutral terminal bars. A power distribution block will be installed after the main breaker. Two 10 feet by 3/4 inches 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

3. WASTEWATER

April 2020

with a three-point latching system with hasp and staple for locking. The wiring system will be configured to allow the pumps to operate on floats if the SCADA system is by-passed. A separate by-pass switch will be installed. A **Time Mark** or **Diversified Electronics** phase sequence and loss relay with fault light will be installed for each pump. Line voltage will be monitored with a **Time Mark 257B or A257B**. The control panel will be mounted on aluminum channel or 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. When the panel door is open, a minimum of 4-foot separation between the wet well edge and the panel.

A NEMA 4X, 316 stainless steel junction box with back plate, a terminal strip, a power distribution block for each pump, and a ground bar will be installed near the main control panel with a 1 ¼ inch diameter conduit for float wiring and a 2-inch diameter conduit for the pumps. The J-Box will be the minimum specified on the plans and will be located next to and same height as the control panel. The box will be connected to the control panel with a 1 ¼-inch diameter conduit for float wiring and a 2-inch diameter conduit for each pump. The conduits will be equipped with seal-offs between the control panel and the pump J-box to protect electrical equipment from corrosive atmosphere in the wet well. The terminal strip will be mounted on DIN rail and terminals will be Phoenix Contacts with sufficient room to add thirty-five (35) Phoenix Contact terminal blocks. The motor conductors will be one size larger than required by the current National Electric Code. Motor seal failure and over-temperature wiring will be a minimum #14 AWG copper conductors consisting of Black, Red, White, and Green. One set of these four colors will be for each motor. These conductors are to be in the same 2-inch conduit for the motor conductors. Four #12 AWG copper conductors will also be installed in the same 2-inch conduit for future use. These will be Black, Red, White, and Green.

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

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

3.9.8.1 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. The disconnect panel will be a 200-amp fusible

3. WASTEWATER

April 2020

or breaker disconnect housed in a NEMA 4X, 316 stainless steel, 3 poles lockable cabinet rated for 600 volts AC. The disconnect panel is to be located next to the meter housing.

3.9.8.2 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. For more information, refer to the RTU detail sheets in "Appendix B".

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. The mast will be located in close proximity to the SCADA/RTU panel. 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 a 1-inch rigid metal conduit, mounted next to the antenna mast and shall be supported a minimum of three times along the length of the mast. The cable is to be fed into the underside of the SCADA/RTU panel. The mast shall be grounded to separate ground rod. A 20-foot copper-clad ground rod will be driven into the ground adjacent to the mast and must test less than 25 ohms resistance. Grounding wire will be Cad welded to the ground rod. Coordination of SCADA programming will be provided by the City's EOR.

The interface between the control cabinet and the separate SCADA cabinet will be through Phoenix Contact terminals and component plugs and relay bases (catalog # 700-HN121), or approved equals. An isolated 20 Amp circuit will be provided to power SCADA equipment. Pumps will be controlled by SCADA RTU.

SCADA will be our new system and will be provided by the City. Existing antenna will be used. Coaxial cable may need to be replaced at the sole responsibility of the Contractor.

3. WASTEWATER

April 2020

3.9.8.3 Surge Protection

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

3.9.8.4 Emergency Generator

Stand-alone emergency electrical generators may be required for some pumping stations will be determined by the Engineering Division at the time of plan review. Generator location to be determined by the City. Provide a concrete slab with a minimum thickness of 6 inches. Generator will be mounted on approved rubber pads for vibration dampening. Installation must meet NFPA and NEC requirements. Generators shall be manufactured by Kohler or an approved equal and equipped with a John Deere, Cummins, or Caterpillar diesel engine with a minimum 60 kW output. Generator will be equipped with a fuel tank sized to provide a minimum of 32 hours operations under full load conditions with a minimum capacity of 250 gallons. Automatic Transfer Switch (ATS) will be installed in a separate NEMA 4X enclosure. ATS to be sized to the incoming electric service voltage and amp rating.

3.9.9 Site Lighting

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

3.10 CONDUIT

Exposed electrical conduit will be Rigid Metal Conduit (galvanized rigidRMC) with protective coating where it penetrates concrete. Buried conduit will be Schedule 80 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. All conduits from wet well to J-Box will be 2-inch Schedule 80 PVC

3. WASTEWATER

April 2020

and consist of double 45-degree bends. 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
Air Release Valves			
1.	A.R.I. USA, Inc.	D-025	Wastewater
2.	A.R.I. USA, Inc.	S-025	Wastewater
Air Release Valve Vault Frame and Cover			
1.	See detail		
Blow Off Valve			
1.	See detail		
Gate Valves 4" – 12" (Resilient Seated Only)			
1.	American Ford Control	AFC-2500	18-8 Type 304 Stainless Steel nuts, bolts, and washers
2.	American AVK	Series 65	18-8 Type 304 Stainless Steel nuts, bolts, and washers
3.	M&H	C509	18-8 Type 304 Stainless Steel nuts, bolts, and washers
4.	U.S. Pipe	A-USP1, A-USP2	18-8 Type 304 Stainless Steel nuts, bolts, and washers
5.	Mueller	A-2361, A-2362 Resilient Wedge Gate Valve	18-8 Type 304 Stainless Steel nuts, bolts, and washers
6.	Clow	Model 2638	18-8 Type 304 Stainless Steel nuts, bolts, and washers
7.	Kennedy Valve	KS-RW	18-8 Type 304 Stainless Steel nuts, bolts, and washers

APPENDIX A. APPROVED MATERIAL

VALVES AND ACCESSORIES (CONTINUED)

Item	Manufacturer	Part	Comments
Gate Valves 16" – 48" (Resilient Seated Only with Bevel Gear Operator)			
1.	Mueller	A-2361	18-8 Type 304 Stainless Steel nuts, bolts, and washers
2.	American Flow Control	AFC-2500	18-8 Type 304 Stainless Steel nuts, bolts, and washers
3.	U.S. Pipe	A-USP1	
4.	American AVK	Series 45	16" only; 18-8 Type 304 Stainless Steel nuts, bolts, and washers
5.	American AVK	Series 45	18" – 24" only; 18-8 Type 304 Stainless Steel nuts, bolts, and washers
6.	M&H	C515	16" – 54" only; 18-8 Type 304 Stainless Steel nuts, bolts, and washers
7.	Clow	Model 2638	18-8 Type 304 Stainless Steel nuts, bolts, and washers
8.	Kennedy Valve	KS-RW	18-8 Type 304 Stainless Steel nuts, bolts, and washers
Valve Extensions			
1.	General Engineering	Model 4840-001-3	
Valve Boxes			
1.	East Jordan Iron Works		5.25" minimum inside diameter
2.	Tyler		5.25" minimum inside diameter

APPENDIX A. APPROVED MATERIAL

VALVES AND ACCESSORIES (CONTINUED)

Item	Manufacturer	Part	Comments
Valve Boxes Alignment Rings			
1.	BOXLOK	#1	
2.	BOXLOK	#2	
3.	AFC		

SERVICE MATERIALS

Item	Manufacturer	Part	Comments
Brass Service Saddles			
1.	Mueller	BR 1 B	0.75" – 1.00" CC thread
2.	Mueller	BR 2 B	1.50" – 2.00" CC thread
3.	Ford	101B Single Strap	Pipe sizes 4" – 12", for 0.75" and 1.00" services
4.	Ford	Style 202B	1.50" and 2.00" services
5.	Ford	Style 202 B	Pipe sizes 16" and larger, for 0.75", 1.00", 1.50", and 2.00" services
Corporation Stops			
1.	Ford	FB600, FB600-3, FB600-4, FB600-6, FB600-7	CC x Flare; 0.75" – 2.00"
2.	Ford	FB1600	CC x F.I.P 2" only
3.	Mueller	B-25000	CC x Flare; 0.75" – 2.00"
4.	Mueller	B-25045	2.00" only

APPENDIX A. APPROVED MATERIAL

SERVICE MATERIALS (CONTINUED)

Item	Manufacturer	Part	Comments
Curb Stops			
1.	Ford	B23-232W-NL	
2.	Ford	B23-444W-NL	
3.	Ford	BF23-666W-NL	
4.	Ford	BF23-777W-NL	0.75" – 1.00"
5.	Mueller	B-24352-N	1.50" – 2.00"
6.	Mueller	B-24334-N	0.75"
7.	Mueller	H-14352-N	
Meter Boxes (with Cast Iron Reader)			
1.	Carson	L-1419-12CIR	
2.	DFW Plastics, Inc.	DRW 36-12-1	
3.	DFW Plastics, Inc.	DFW 1730-12	
4.	DFW Plastics, Inc.	DFW 37-12-1	
5.	CDR Systems Corporation	A00-1730-12	1.50" and 2.00" Meters

APPENDIX A. APPROVED MATERIAL

PIPE MATERIALS AND APPURTENANCES

Item	Manufacturer	Part	Comments
Casing Spacers (All Sizes); Stainless Steel with Vinyl Runners			
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
Cascade End Seals			
1.	Cascade	CCES	Bands, 304 SS
2.	BWM Co.	BWM-	Bands, 304 SS
3	CCI Pipeline Systems	ESW/ESC	Bands, 304 SS
Ductile Iron Cement Lined			
1.	American	FASTITE	AWWA C104 for Cement Lining
2.	U.S. Pipe	TYTON	AWWA C104 for Cement Lining
3.	McWane	TYTON & FASTITE	AWWA C104 for Cement Lining
4.	American	FASTITE	401 Protecto coating for wastewater
5.	U.S. Pipe	TYTON	401 Protecto coating for wastewater
Polyethylene Encasement			
1.	Multiple		AWWA C105

APPENDIX A. APPROVED MATERIAL

PIPE MATERIALS AND APPURTENANCES (CONTINUED)

Item	Manufacturer	Part	Comments
PVC			
1.	Multiple	C-900 DR 18	Water, Reclaimed, and Sewer Force Main
2.	Multiple	SDR-3	Gravity Sewer
Tracer Wire and Appurtenances			
1.	Multiple	UF 14 Copper	See Spec 1.5.5
2.	Multiple	Wire Nut	Underground silicone based

PIPE FITTINGS

Item	Manufacturer	Part	Comments
Restraining Glands			
1.	EBA Iron		Domestic
2.	Ford		Domestic
3.	Union Tyler		Domestic
4.	SIP Industries		Domestic
5.	JCM Industries	A610, A611, A620	Undercoat & wrap rods and clamps
6.	JCM Industries	A621, A630, A631	Undercoat & wrap rods and clamps
7.	Star Pipe Products		Domestic

APPENDIX A. APPROVED MATERIAL

PIPE FITTINGS (CONTINUED)

Fittings C153 SSB / C110 Flange (Cement or fusion bonded epoxy lined)			
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
7.	Star Pipe Products		Domestic
Restrained Joints – Ductile Iron Pipe			
1.	American	Fast Grip	
2.	American	Flex-Ring	
3.	Lok-Ring	Lok-Ring	
4.	U.S. Pipe	TR Flex	
5.	U.S. Pipe	HP Lok	
6.	U.S. Pipe	Field-Loc	
7.	Star Pipe Products	Stargrip; Series 3000	Domestic
Restrained Joints – PVC Pipe			
1.	JM	Eagle Loc 900	C-900 DR 18
2.	Underground Solutions	Fusible PVC	C-900 / C-905 DR 18
3.	Certain Teed	Certa-Lok	C-900 DR 18
4.	Diamond Plastics	Diamond Lok-21	C-900 DR 18
5.	Star Pipe Products	PVC Stargrip Series 4000; PVC Pipe Restrainers Series 1100	Domestic

APPENDIX A. APPROVED MATERIAL

PIPE FITTINGS (CONTINUED)

Transition Coupling			
1.	Romac	Macro HP, XR501	ACP to DIP, CIP, PVC
2.	TPS	Hymax-2000	ACP to DIP, CIP, PVC
3.	Ford	FC2A, FC2W	ACP to DIP, CIP, PVC
Tapping Sleeve			
1.	Ford	FTSS	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
2.	Mueller	H-304 SS	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
3.	JCM	A432 SS	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
4.	JCM	A415	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
5.	Smith-Blair	625	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
6.	Robar	6606 SS Bolt Bracket	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
7.	TPS	Triple Tap Tapping Sleeve	18-8 Type 304 Stainless Steel nuts, bolts, washers, and flange
Line Stop Sleeve			
1.	JCM	A440	All SS 4" – 12", Full opening outlet

APPENDIX A. APPROVED MATERIAL

HYDRANTS

Item	Manufacturer	Part	Comments
Hydrants			
1.	American-Darling	B-84-B-5	5.25" Valve opening
2.	American-Darling	6 B84B-5	6.00" Valve opening
3.	Mueller	Super Centurion 250 / A-423	5.25" Valve opening
4.	Clow	Medallion	5.25" Valve opening

FIRELINES

Item	Manufacturer	Part	Comments
Firelines DCDA			
1.	Ames	3000 SS	
2.	Ames	Colt Series C300 Na	Limited space
3.	Febco	876 V-OSY-G	Limited space
4.	Watts	774 DCDA	
5.	Watts	757NDCDAOSY	Limited space
6.	Zurn Wilkins	375, 350 DA	
7.	Zurn Wilkins	450 DA	
Domestic Backflow Preventers – RPZ			
1.	Ames	4000 S	
2.	Febco	825 YD	
3.	Watts	994	
4.	Zurn Wilkins	375	

APPENDIX A. APPROVED MATERIAL

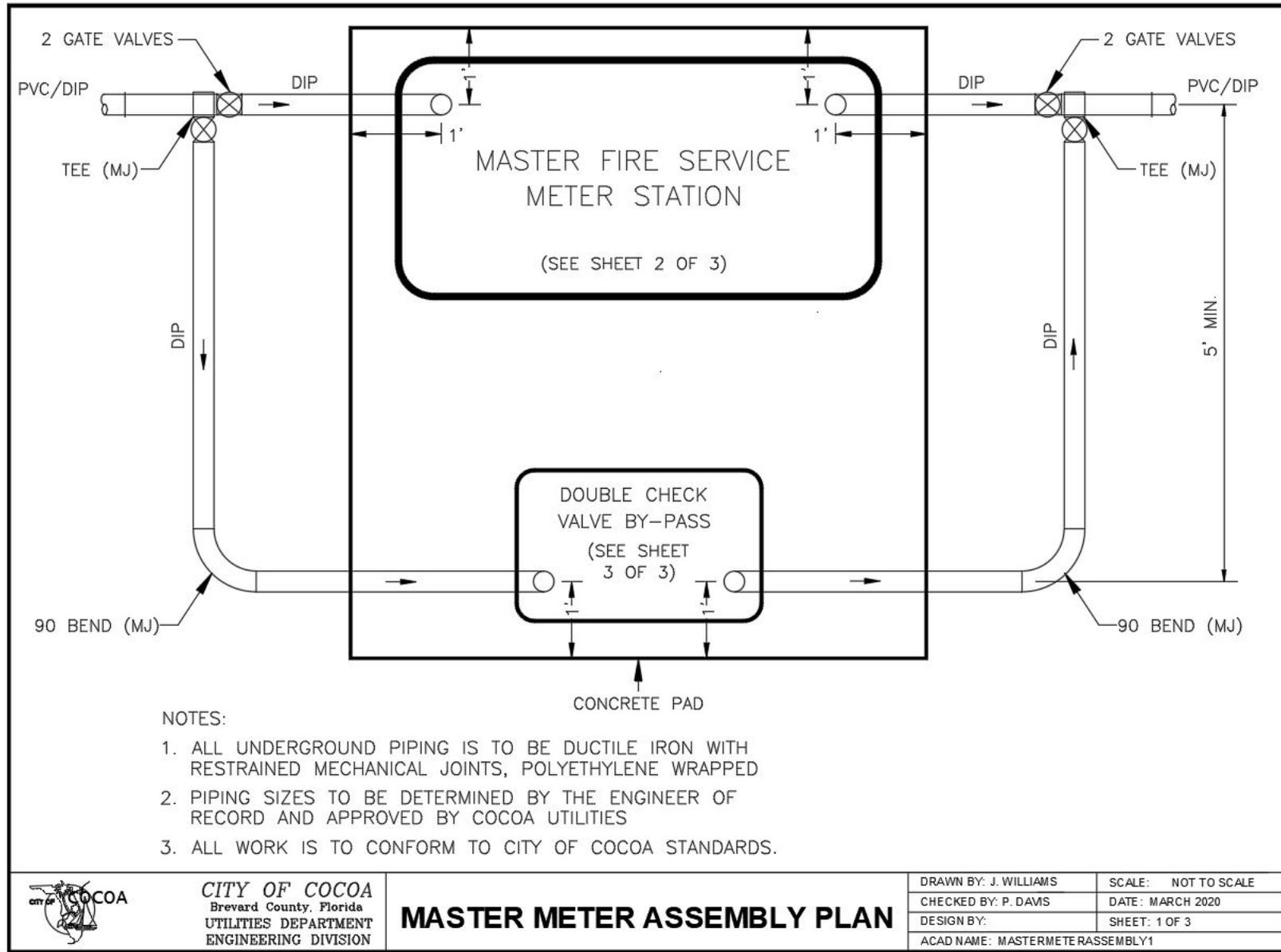
WASTEWATER CATEGORY

Item	Manufacturer	Part	Comments
1.	US Foundry	No. 225-AS-ORS	See Spec. 2.2.4
2.	Conseal	CS-55	Manhole coating
3.	AGRU America	HDPE SURE GRIP	Installation performed by qualified and authorized Agru installers
4.	Multiple	Hardwater	3166 SS
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

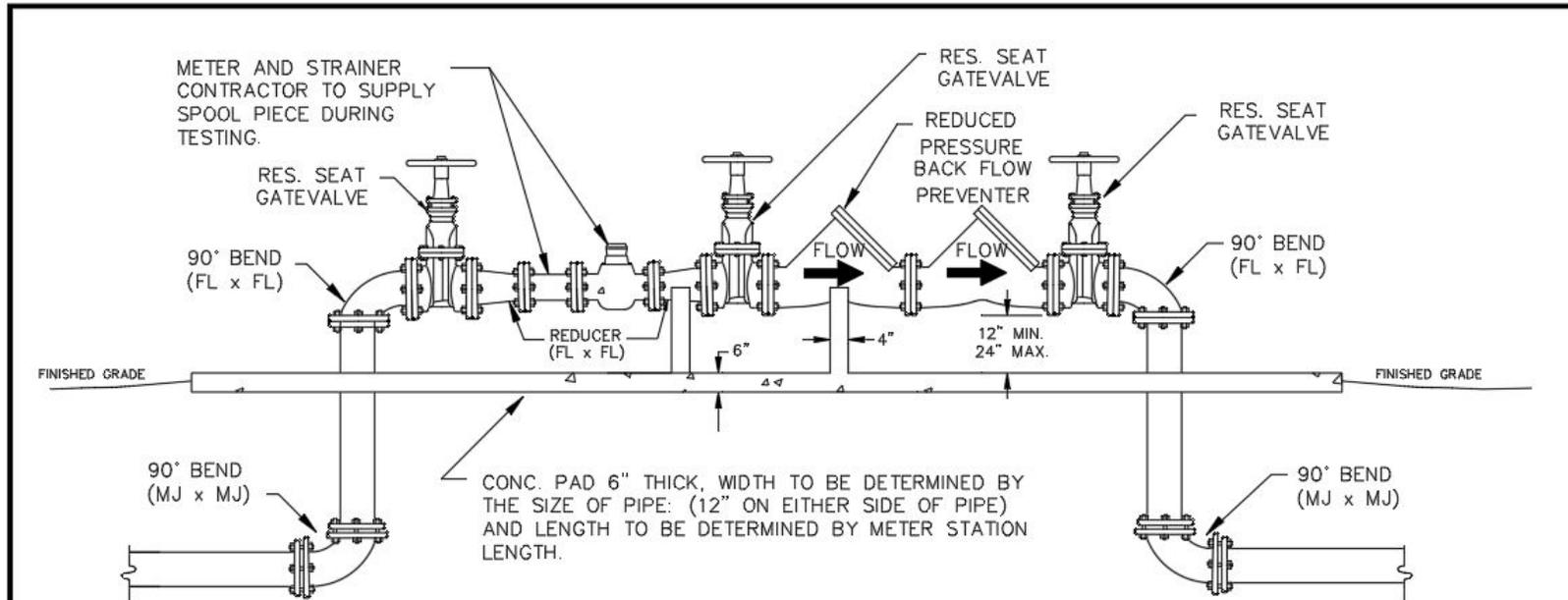


APPENDIX B. APPROVED DRAWINGS AND DETAILS

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



NOTE:

1. ASSEMBLY IS TO BE PAINTED RUST-OLEUM 9400 SYSTEM (BLUE) BY THE CITY, PAID FOR BY THE DEVELOPER.
2. ALL ABOVE GROUND NUTS, BOLTS, AND WASHERS TO BE #304 STAINLESS STEEL
3. ALTHREAD ROD WILL NOT BE PERMITTED
4. METER IS TO BE NEPTUNE HIGH PERFORMANCE PROTECTUS III FIRE SERVICE METER WITH STRAINER, PROVIDED BY THE CITY AND PAID BY THE CONTRACTOR.
5. REDUCED PRESSURE BACK FLOW PREVENTER IS TO BE FIRE RATED: FEDCO, AMES, WATTS, CLAS-VAL, WILKINS (ZURN), HERSEY

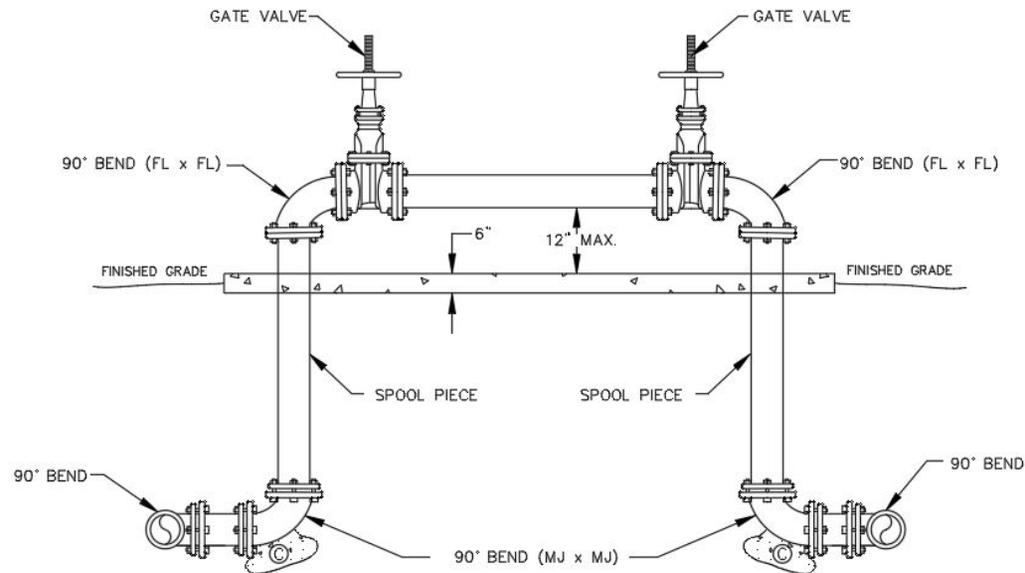


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

MASTER METER ASSEMBLY METER STATION DETAIL

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 2 OF 3
ACAD NAME: MASTERMETERASSEMBLY2	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



NOTE:

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

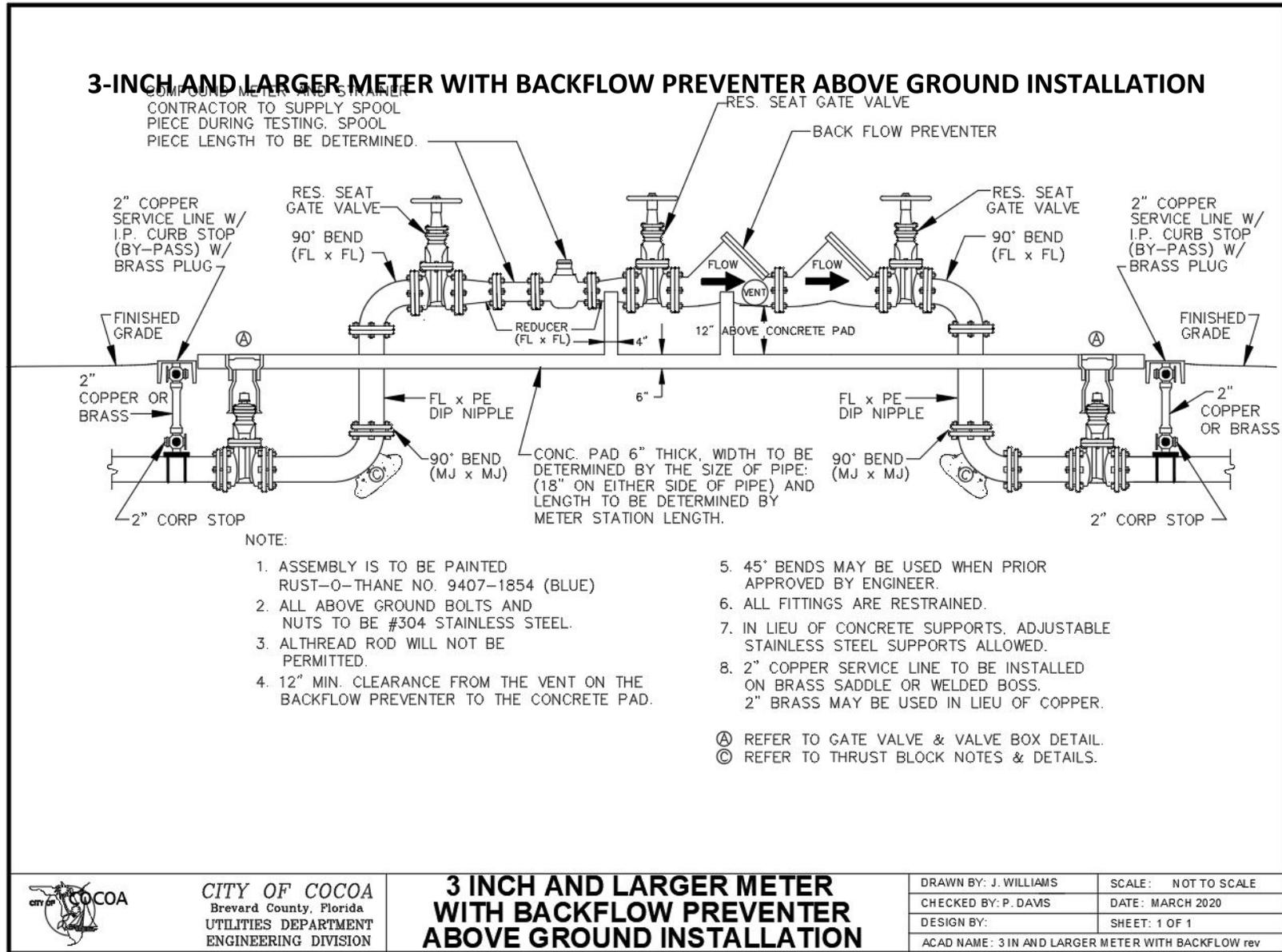


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

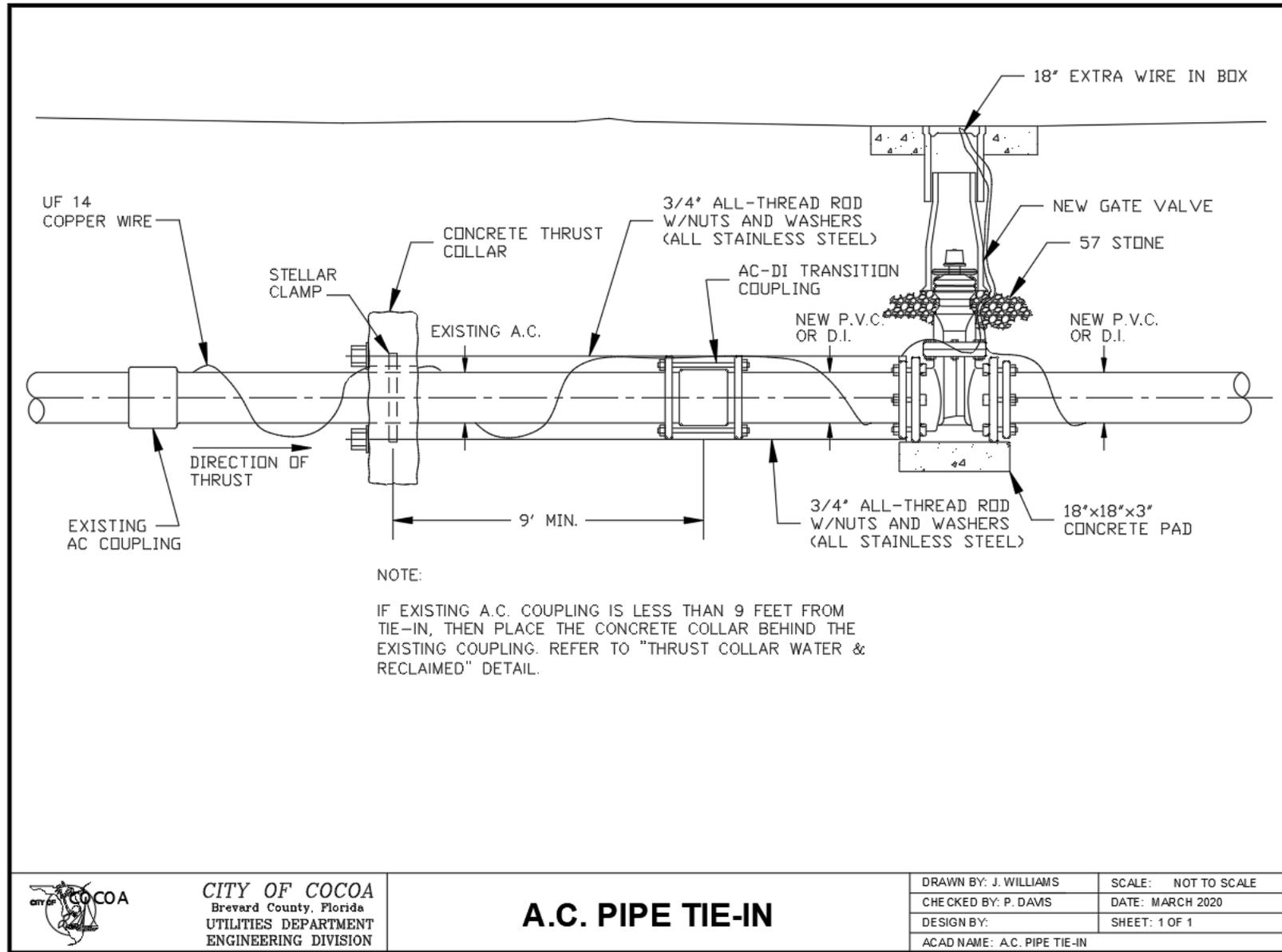
MASTER METER ASSEMBLY DOUBLE CHECK BYPASS

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 3 OF 3
ACAD NAME: MASTERMETERASSEMBLY3	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



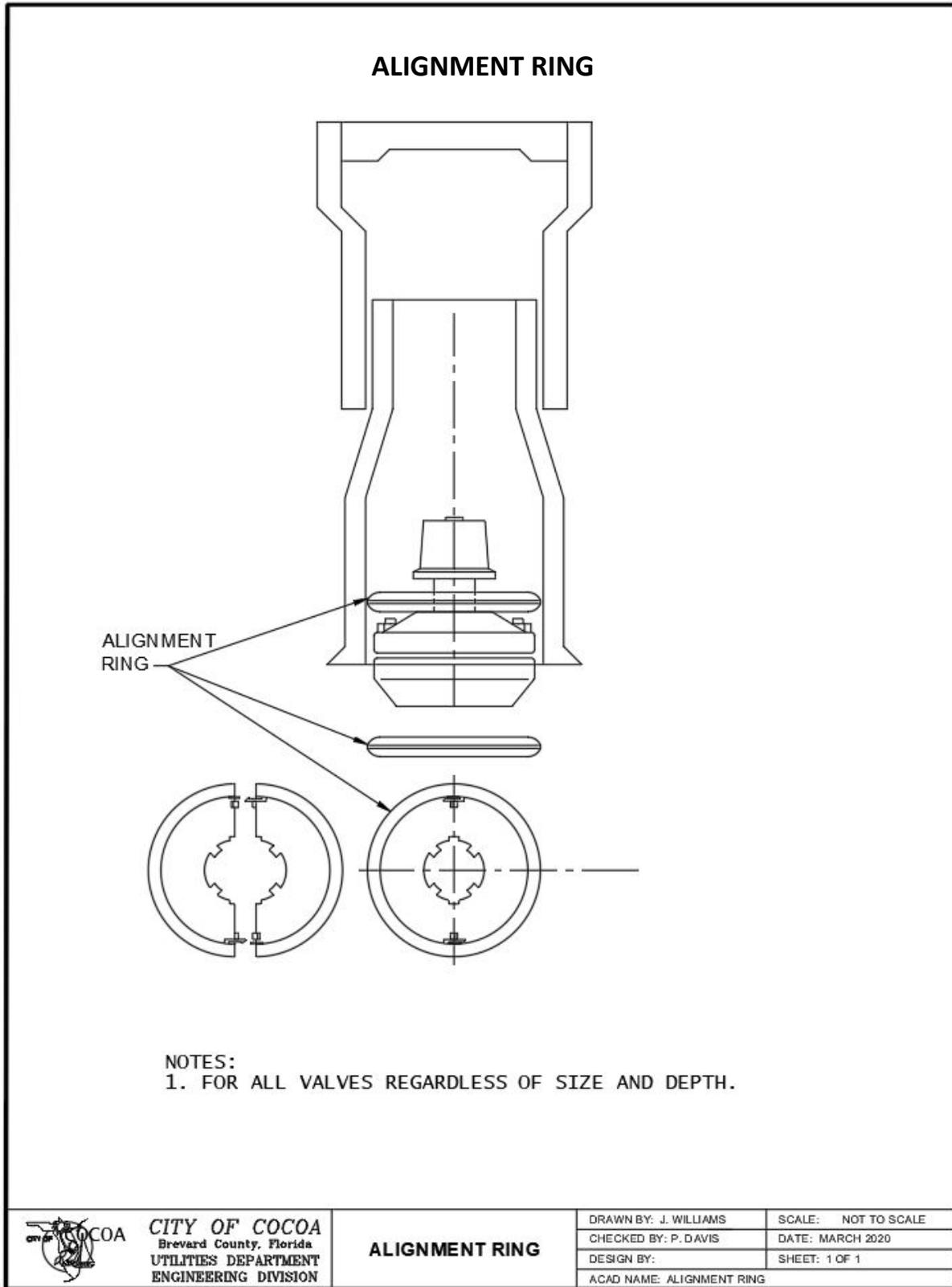
APPENDIX B. APPROVED DRAWINGS AND DETAILS



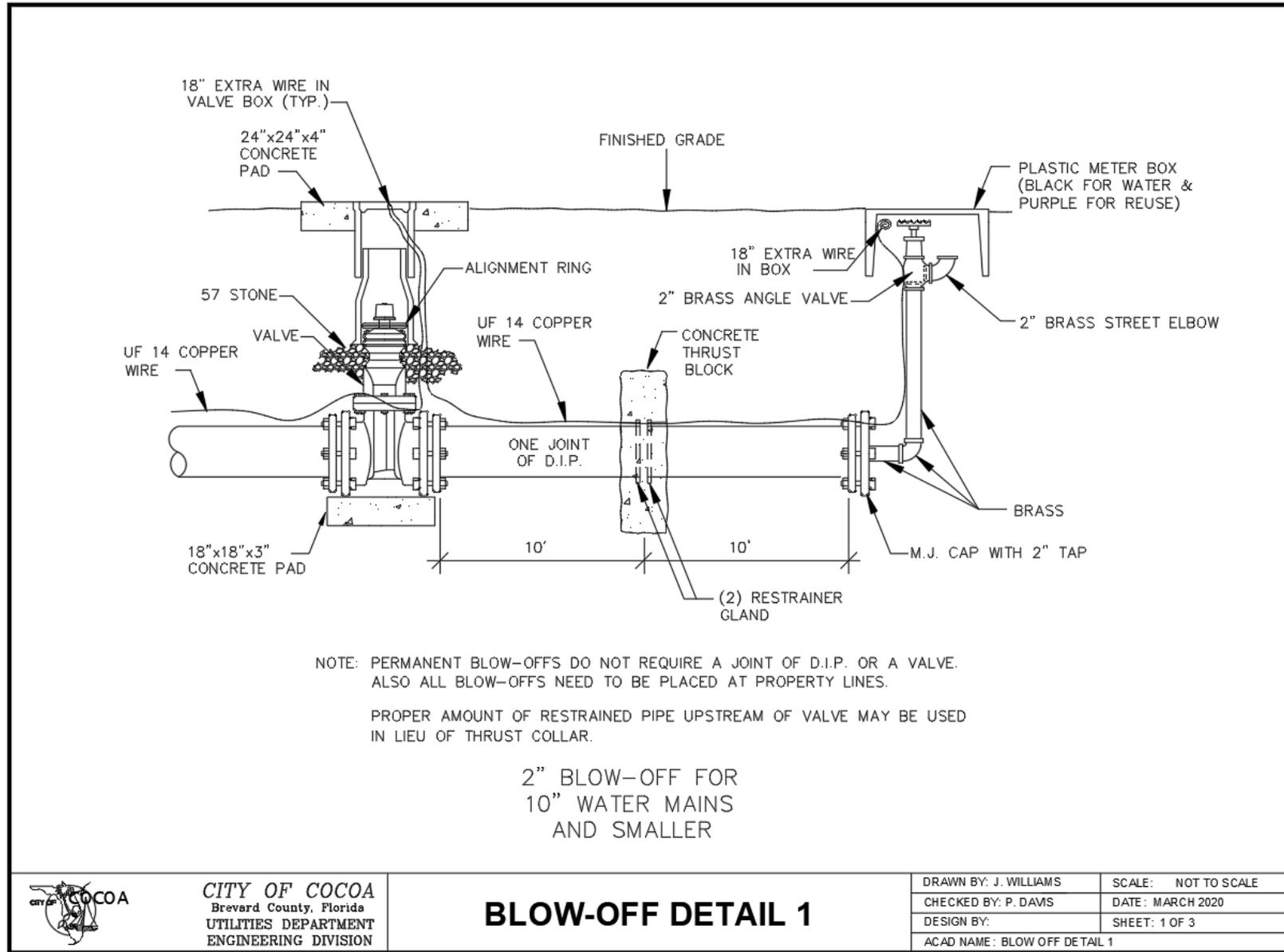
CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

A.C. PIPE TIE-IN

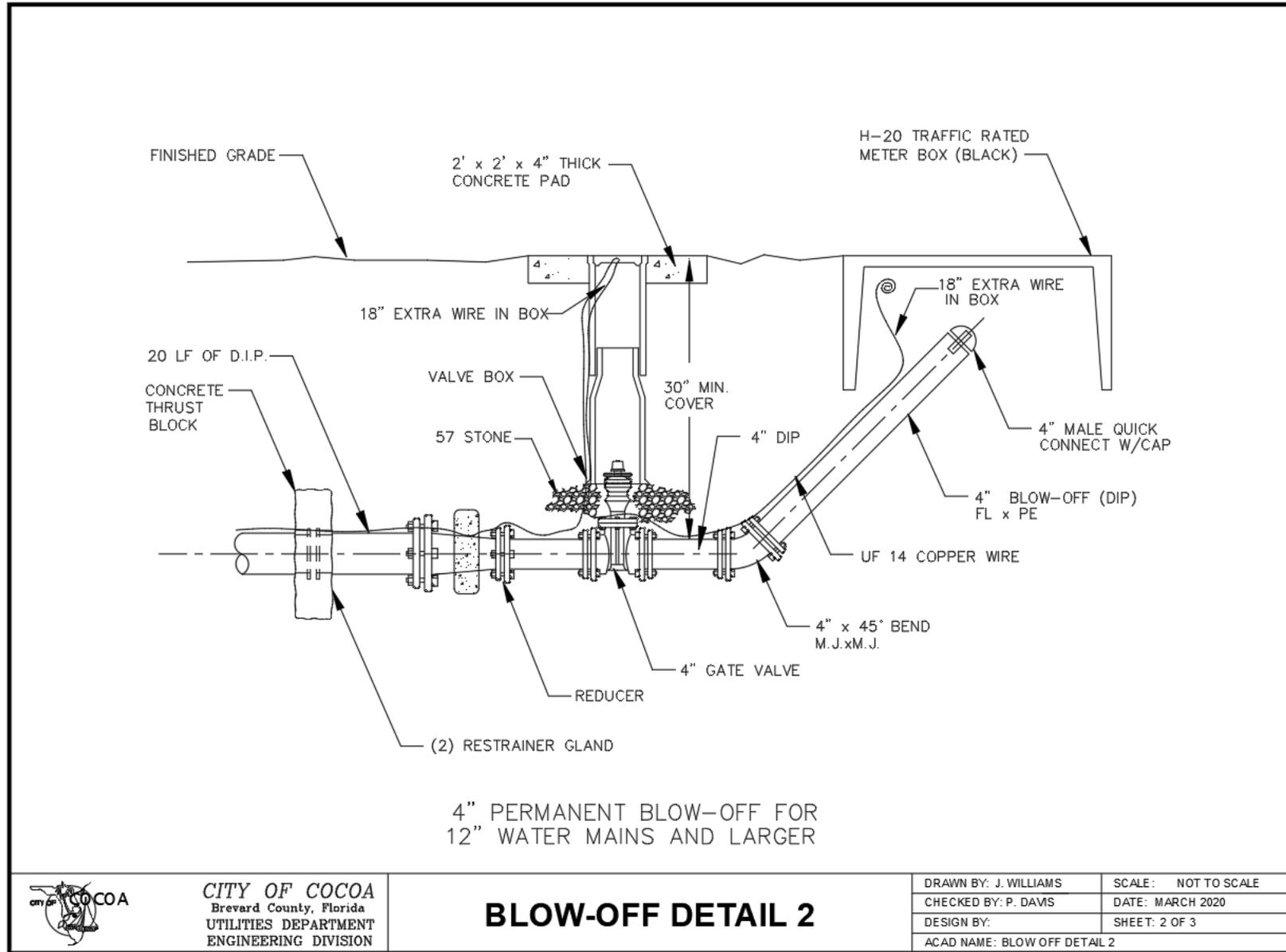
APPENDIX B. APPROVED DRAWINGS AND DETAILS



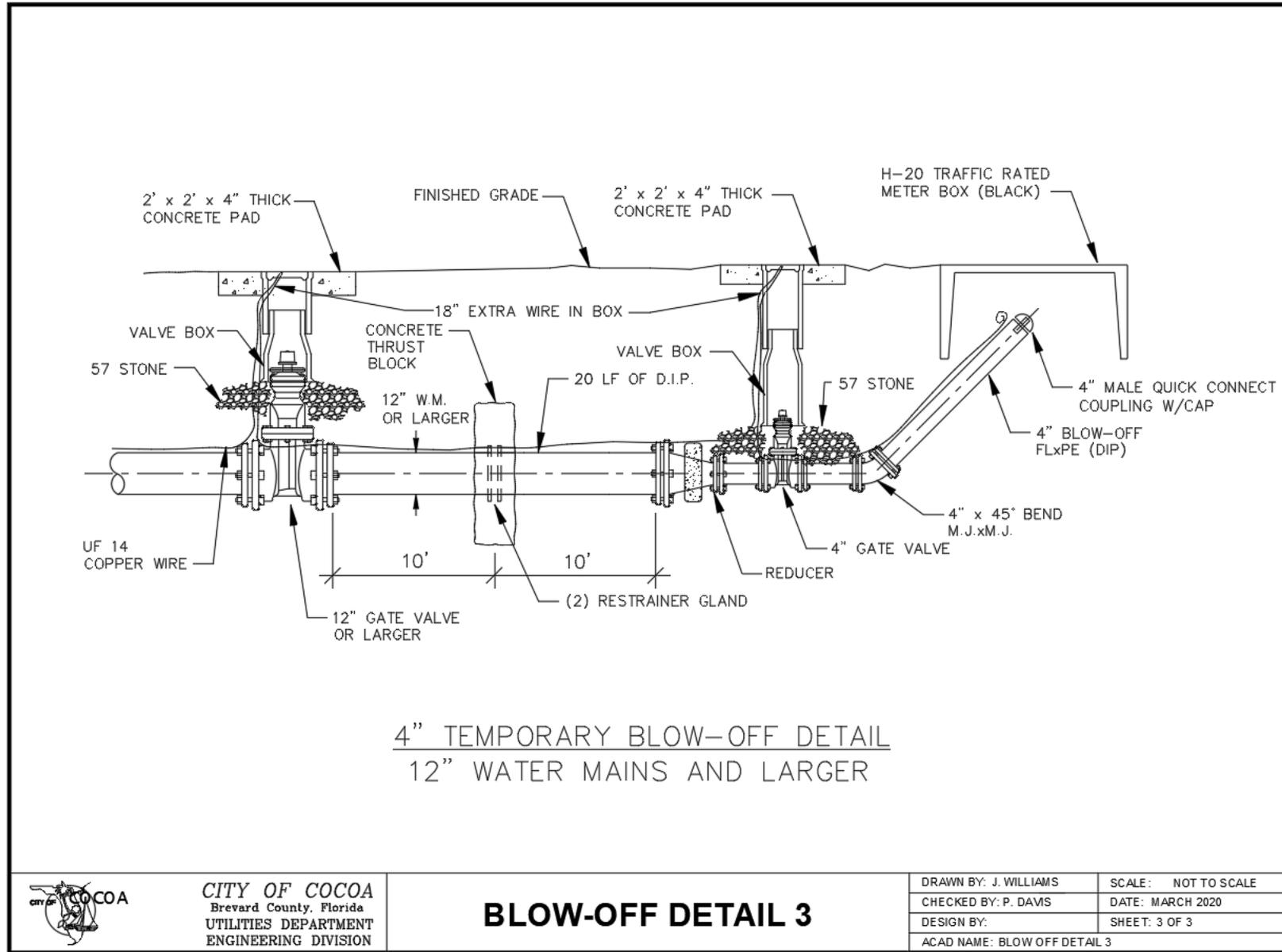
APPENDIX B. APPROVED DRAWINGS AND DETAILS



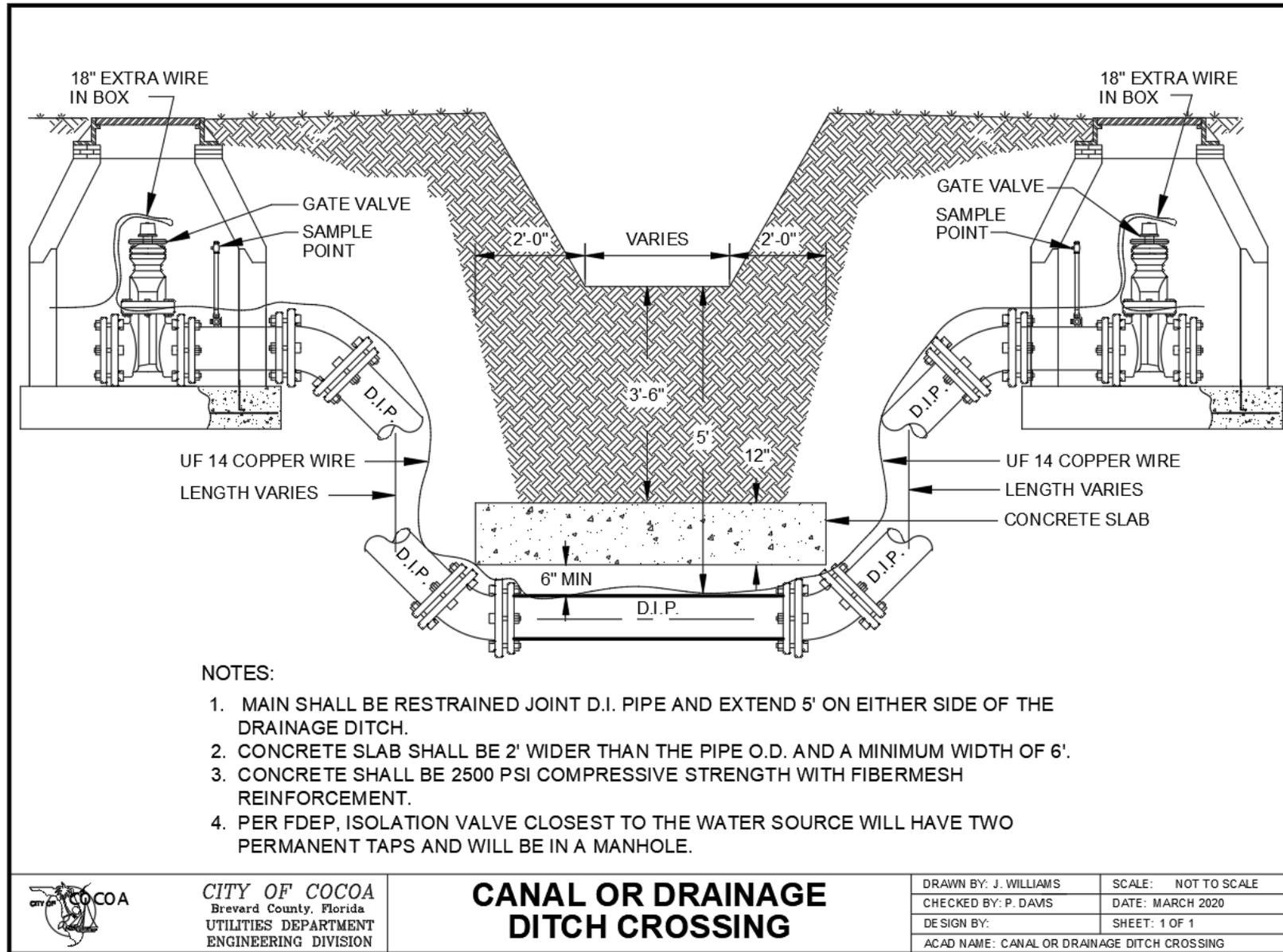
APPENDIX B. APPROVED DRAWINGS AND DETAILS



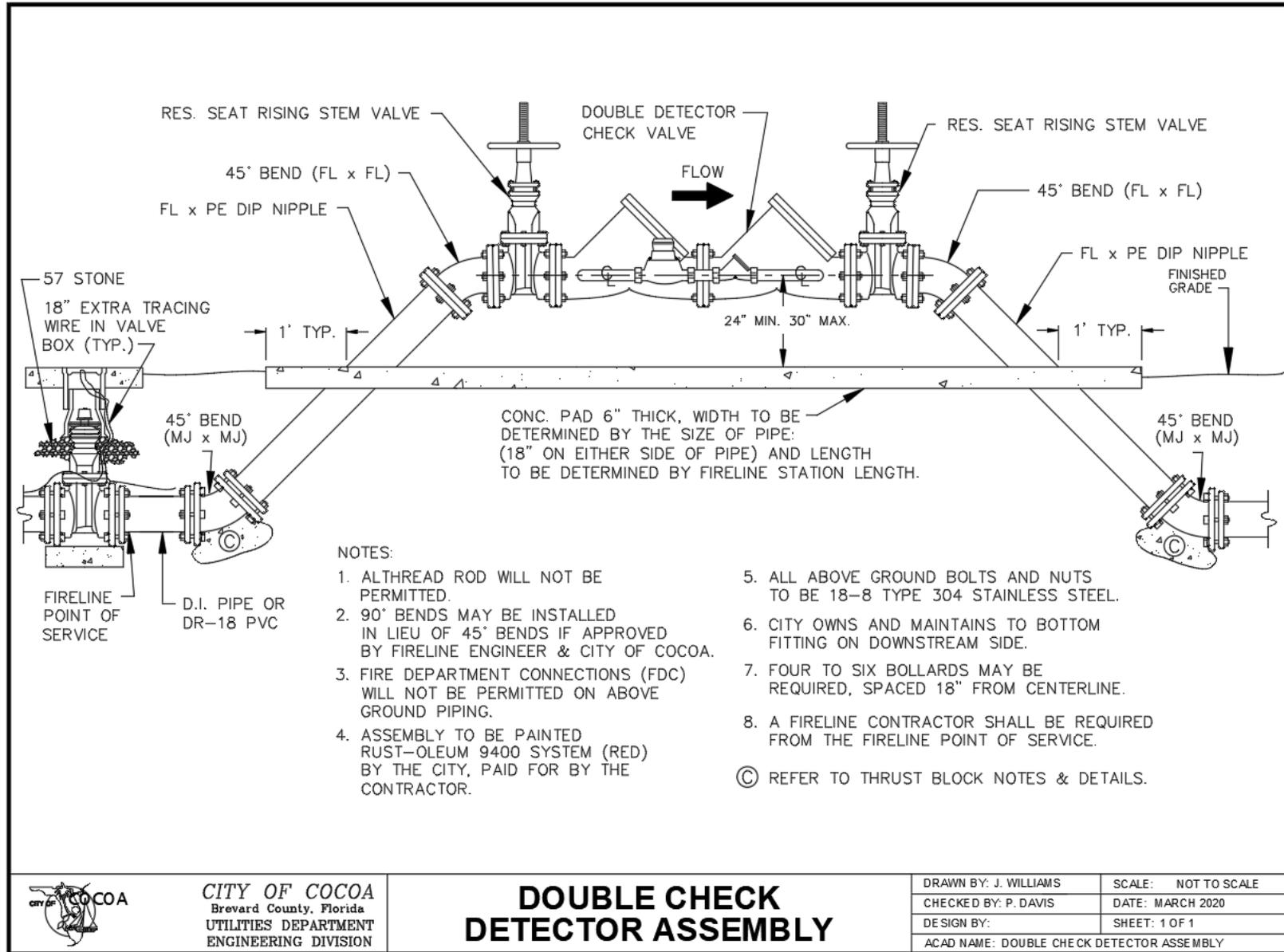
APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

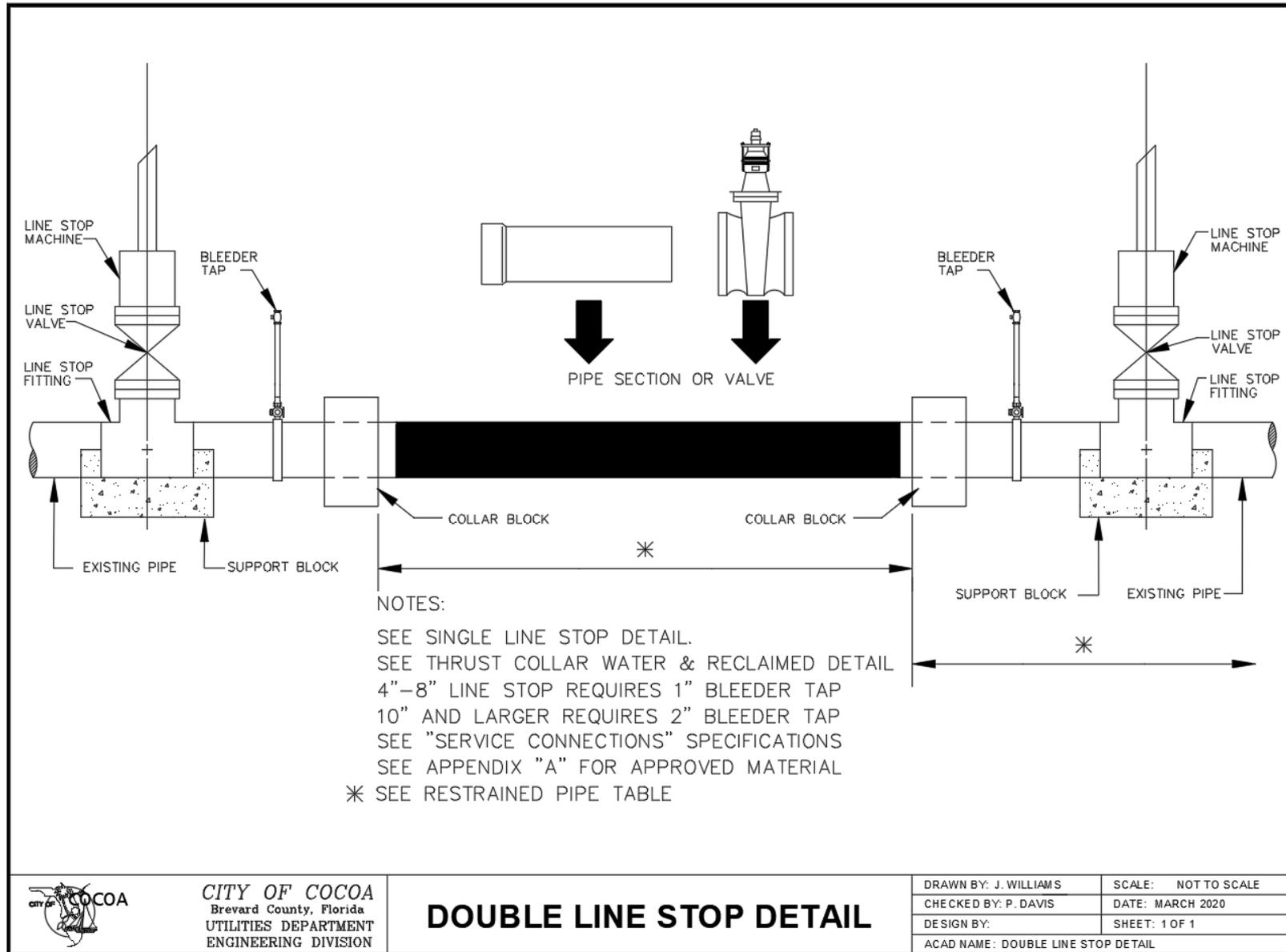


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

DOUBLE CHECK DETECTOR ASSEMBLY

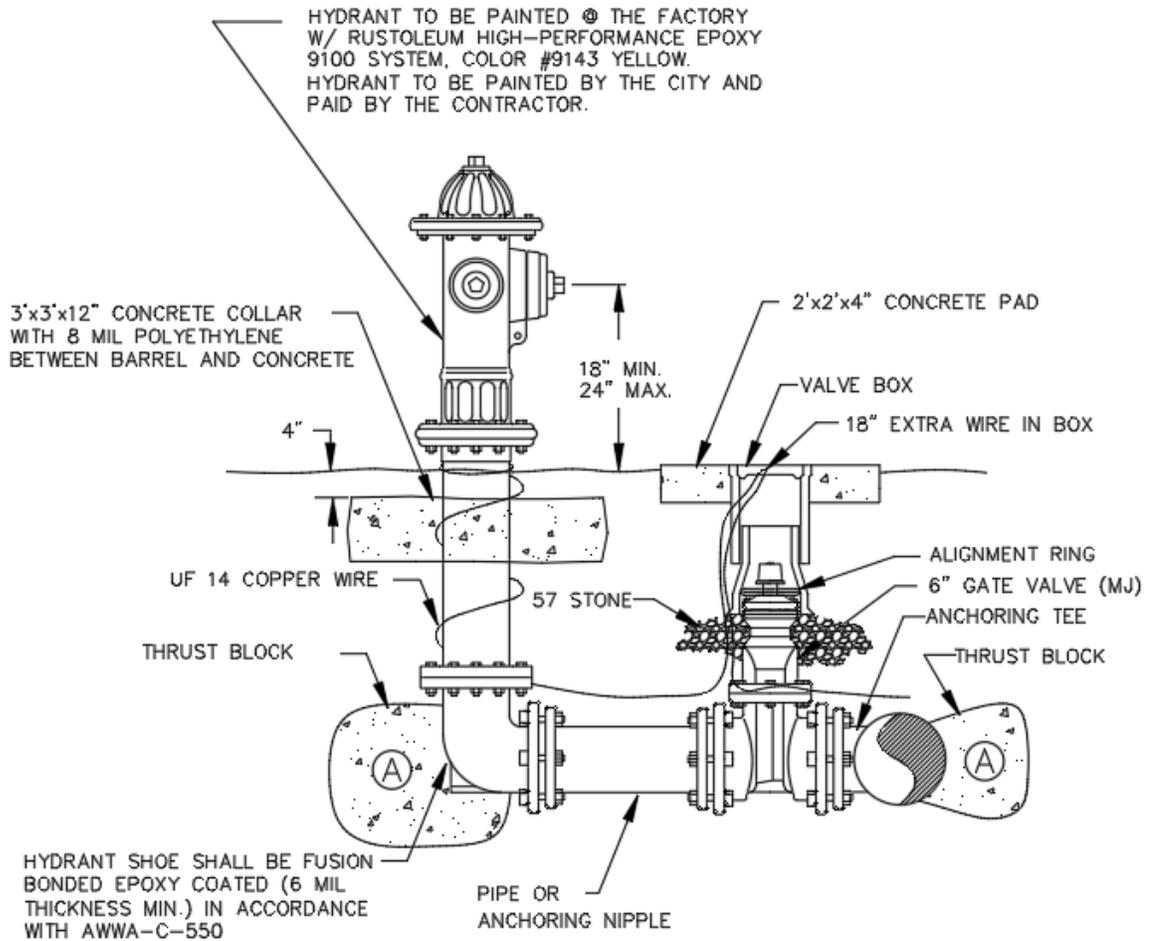
DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: DOUBLE CHECK DETECTOR ASSEMBLY	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

FIRE HYDRANT DETAIL



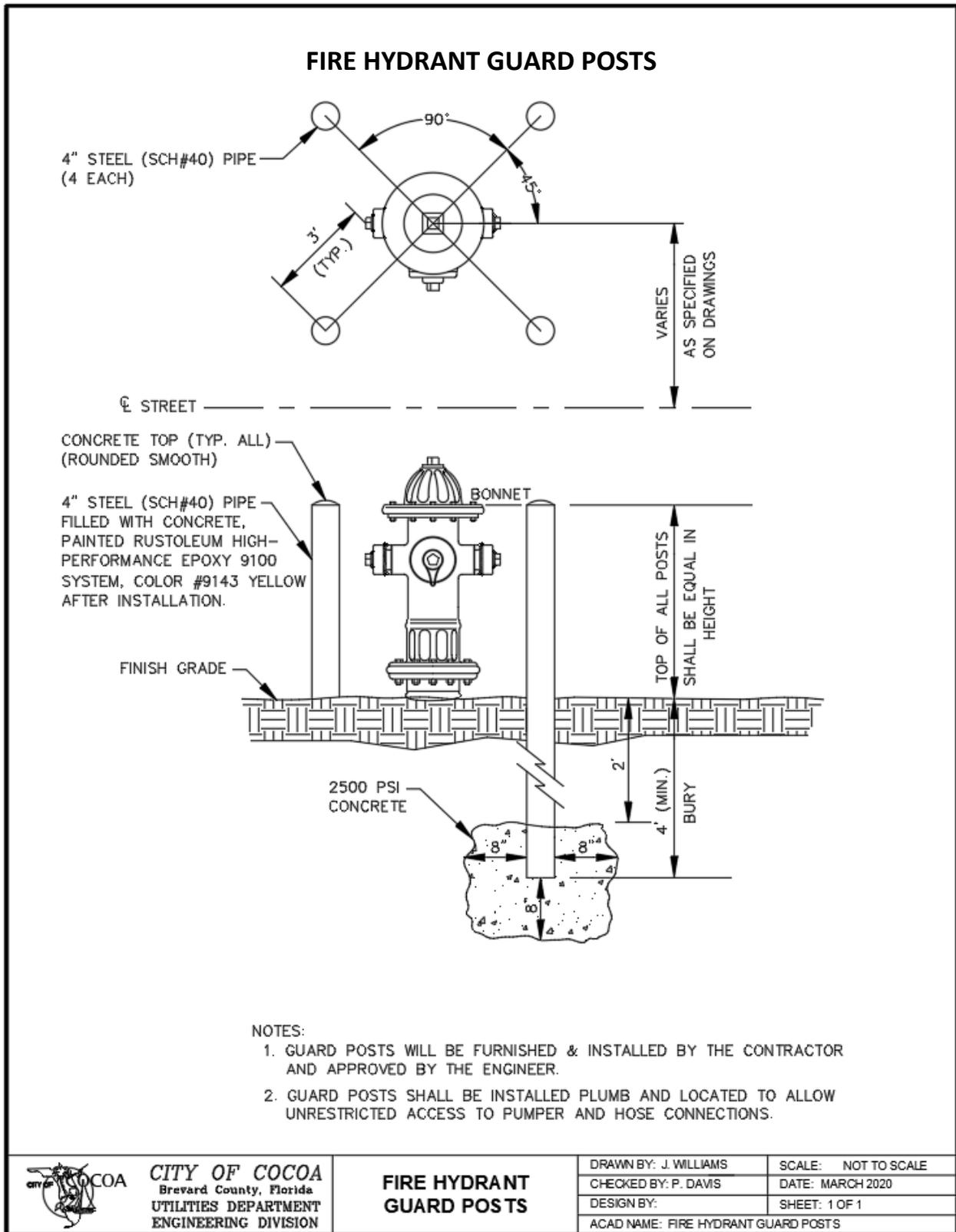
NOTES:

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

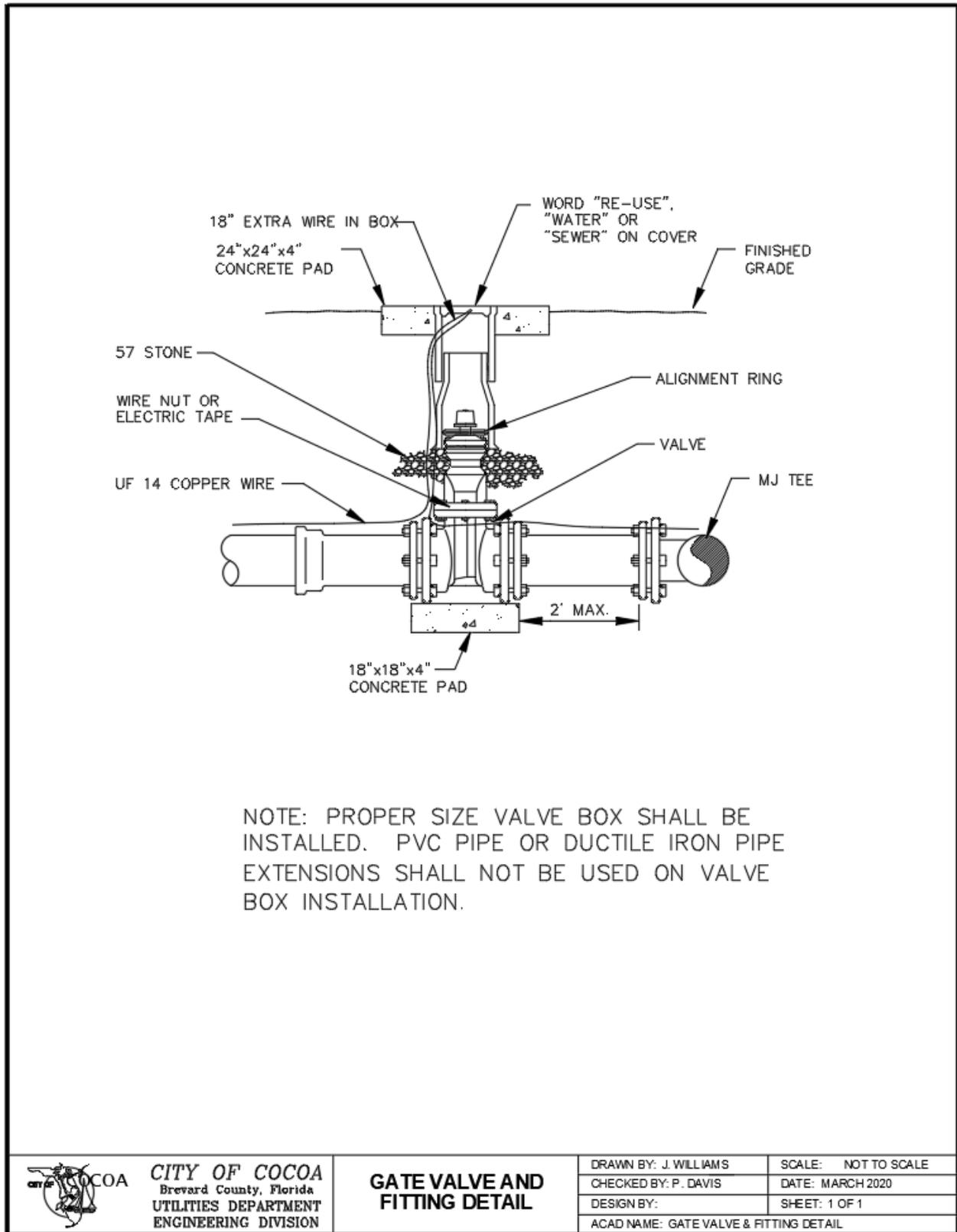
(A) REFER TO THRUST BLOCK NOTES AND DETAILS.

 CITY OF COCOA Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	FIRE HYDRANT DETAIL	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: P. DAVIS	DATE: MARCH 2020
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: FIRE HYDRANT DETAIL	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

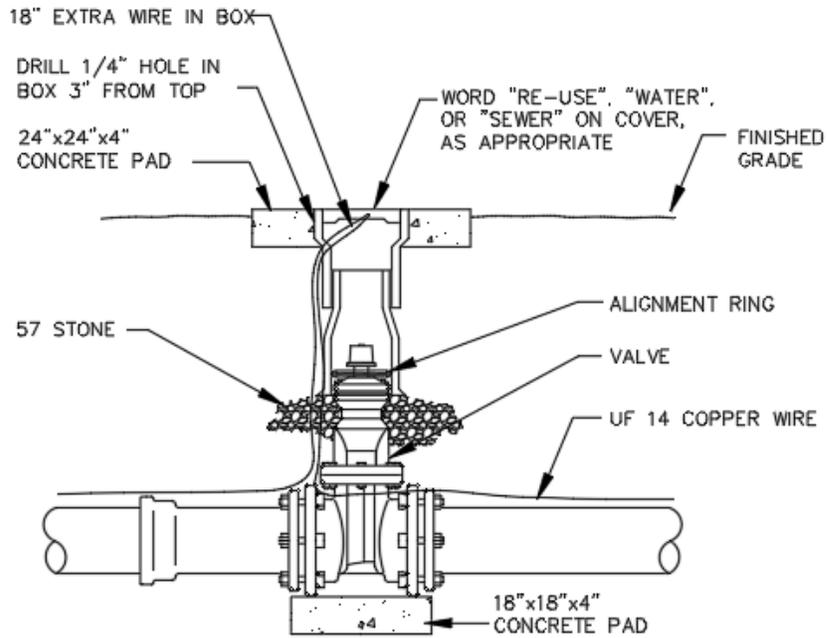


APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

GATE VALVE AND VALVE BOX DETAIL



NOTES:

1. PVC PIPE OR DUCTILE IRON PIPE EXTENSIONS SHALL NOT BE USED ON VALVE BOX INSTALLATION.
2. IF THE DEPTH OF THE VALVE NUT IS GREATER THAN 48" BELOW GRADE, OR 30" BELOW GRADE AND UNDER THE WATER TABLE, A VALVE EXTENSION WILL BE REQUIRED. SEE VALVE EXTENSION STEM DETAIL.
3. PROVIDE A PLASTIC DEBRIS SHIELD/ALIGNMENT RING WHICH INSTALLS BELOW THE VALVE ACTUATING NUT. THIS SHIELD SHALL CENTER THE RISER PIPE BOX OVER THE ACTUATING NUT AND MINIMIZE INFILTRATION.
4. 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.

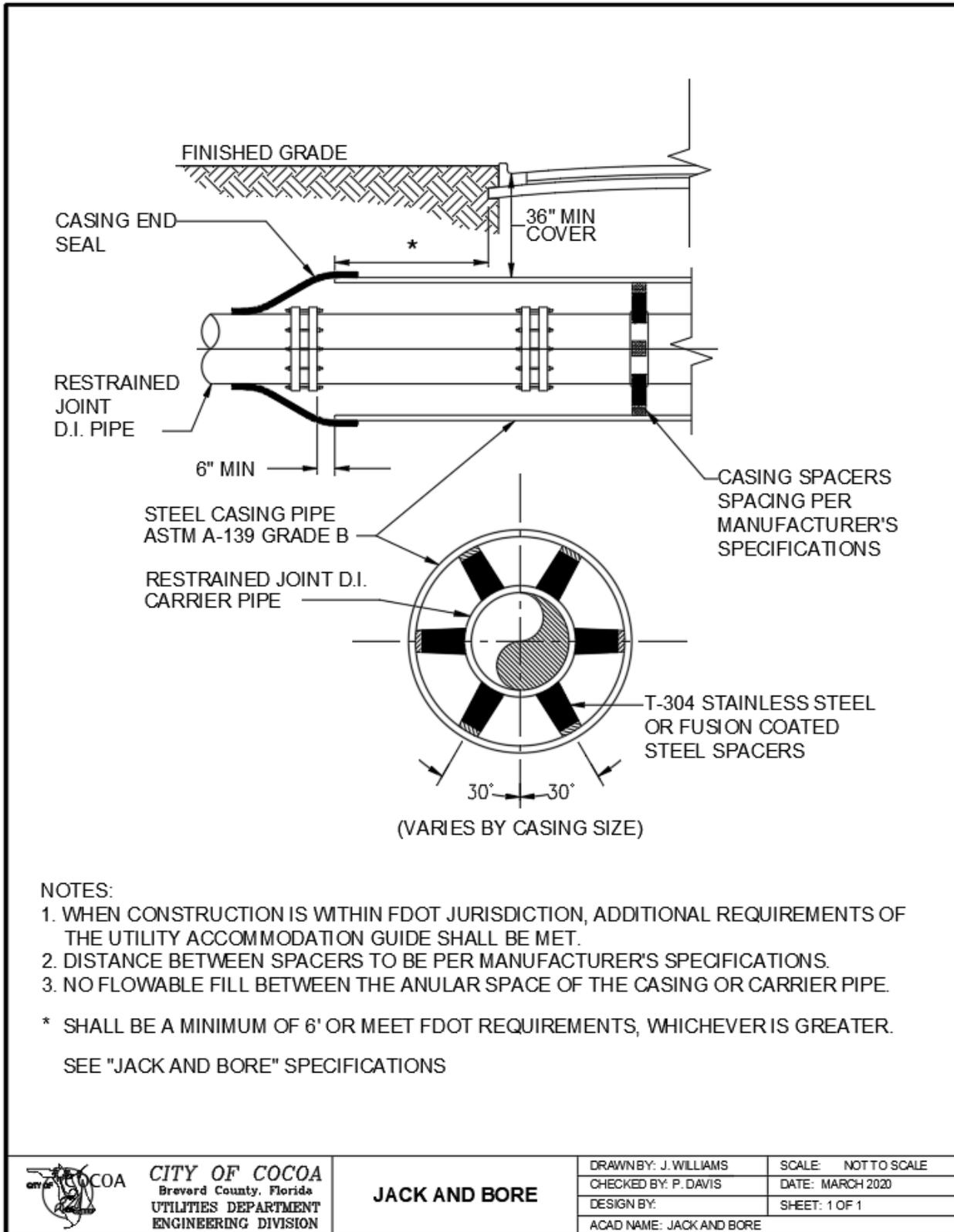


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

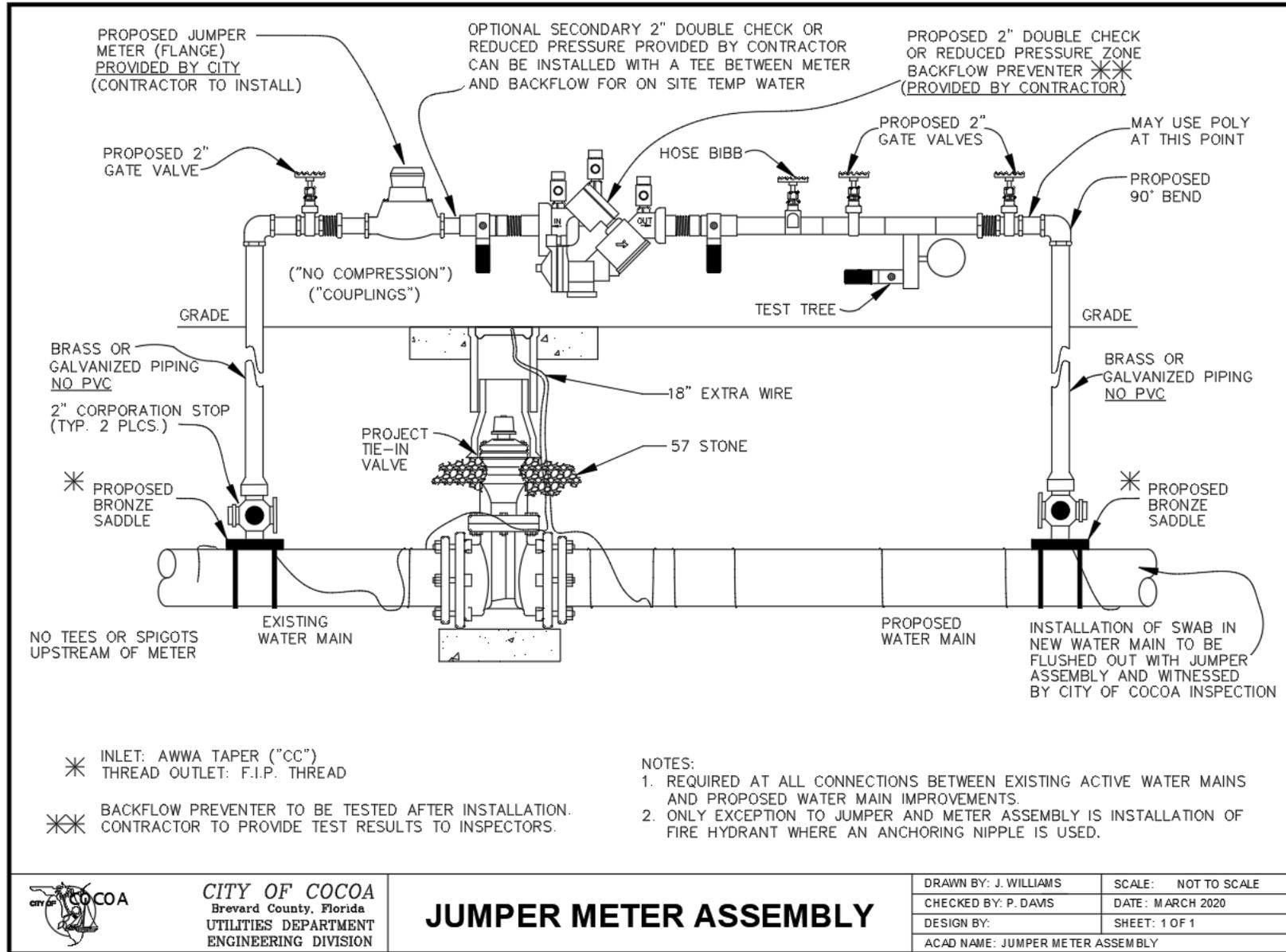
GATE VALVE AND VALVE BOX DETAIL

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
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

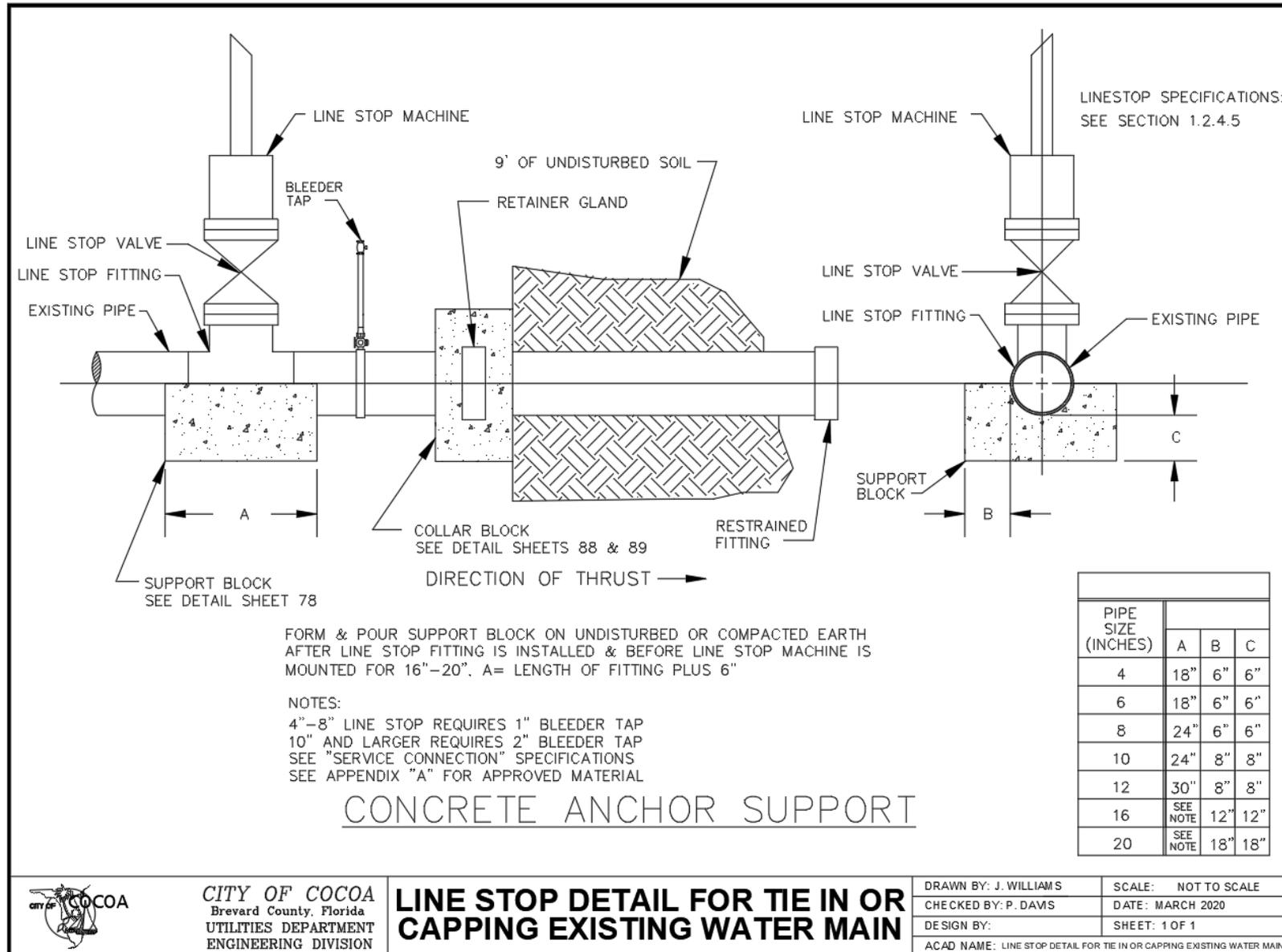


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

JUMPER METER ASSEMBLY

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: JUMPER METER ASSEMBLY	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

LINE STOP DETAIL FOR TIE IN OR CAPPING EXISTING WATER MAIN

DRAWN BY: J. WILLIAMS

SCALE: NOT TO SCALE

CHECKED BY: P. DAVIS

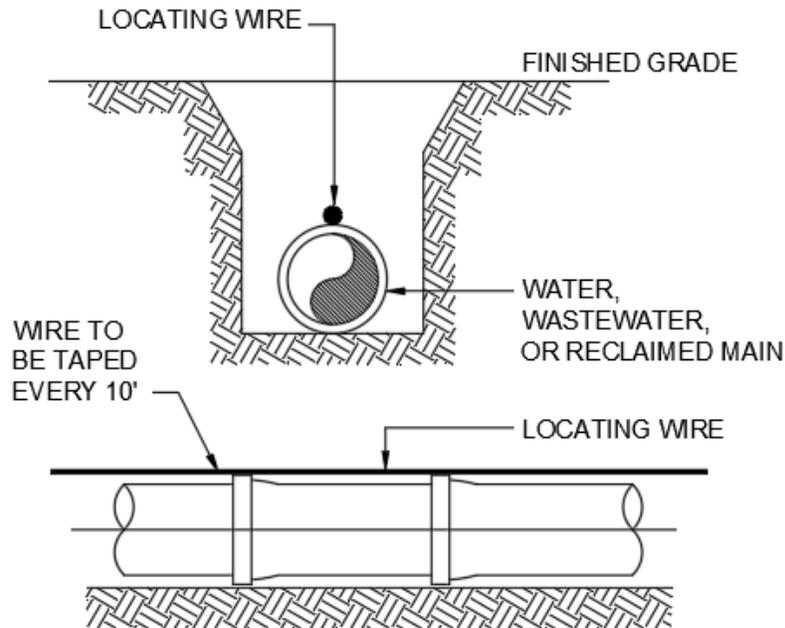
DATE: MARCH 2020

DESIGN BY:

SHEET: 1 OF 1

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

APPENDIX B. APPROVED DRAWINGS AND DETAILS



NOTES:

1. ALL PIPE SHALL REQUIRE INSULATED LOCATING WIRE (UF 14 COPPER WIRE) 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 "LOCATING WIRE" SPECIFICATIONS.

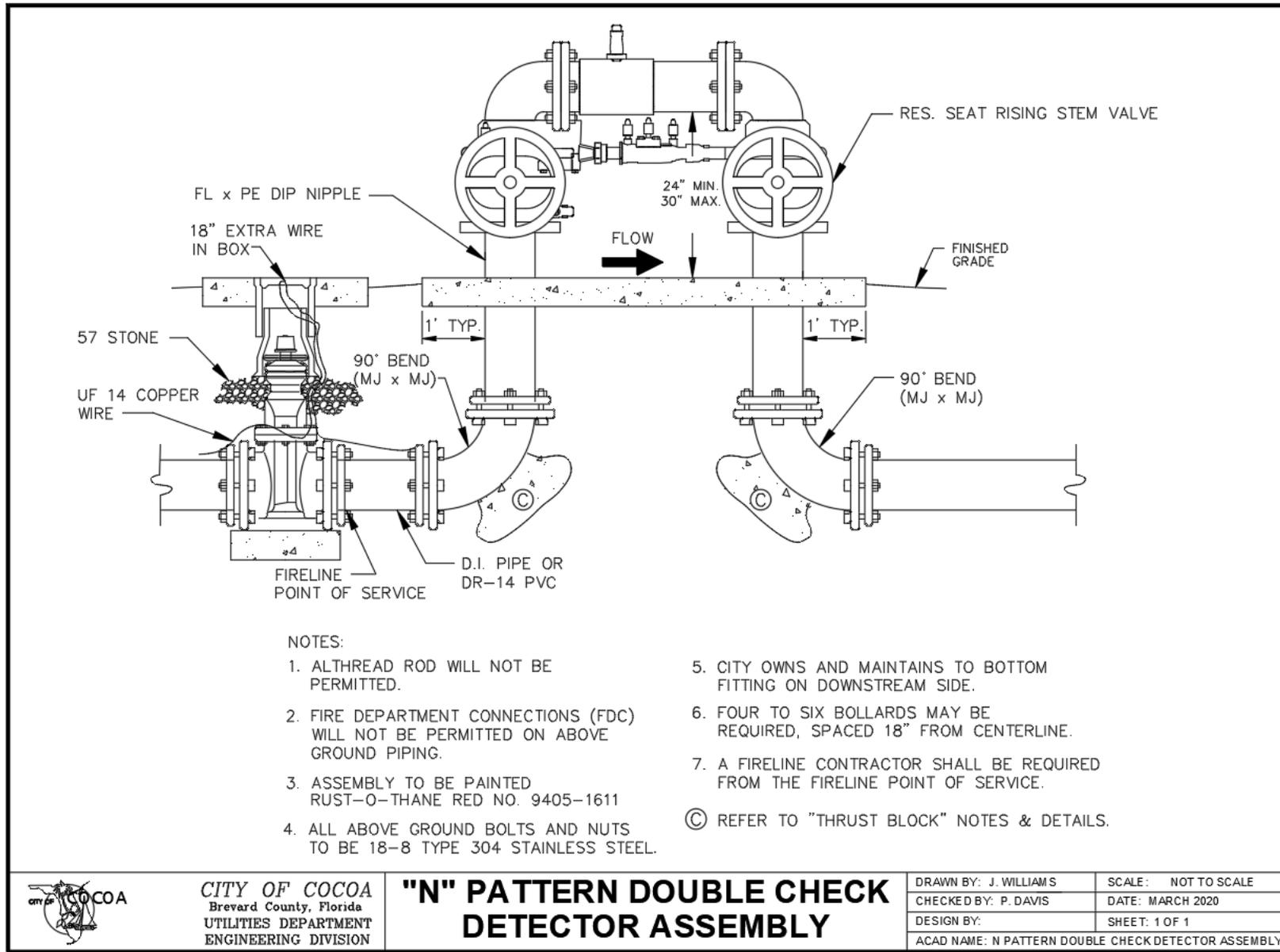


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

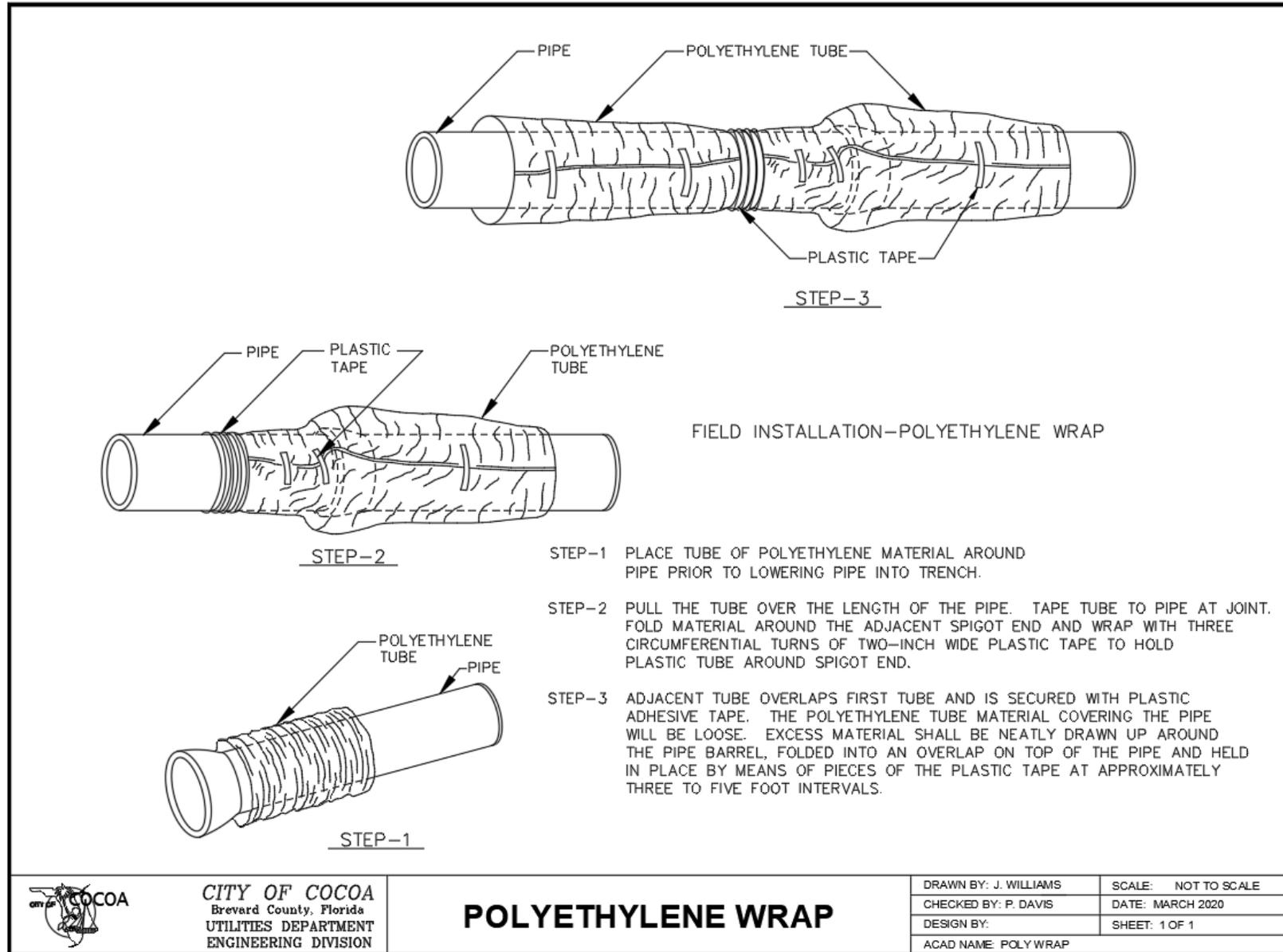
LOCATING WIRE DETAIL

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: LOCATION WIRE DETAIL	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

RESTRAINED PIPE TABLE
FORCE MAINS

MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)						
TYPE	PIPE SIZE					
	4"	6"	8"	10"	12"	16"
90° BEND	11	16	20	24	28	36
45° BEND	5	7	9	10	11	15
22-1/2° BEND	3	4	4	5	6	8
11-1/4° BEND	2	2	2	3	3	4
PLUG, BRANCH OF TEE, VALVE	25	35	45	54	64	82

NOTES:

- FITTINGS SHALL BE RESTRAINED JOINTS.
- INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN SHOWN IN THE TABLE.
- WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS GREATEST LENGTH OF RESTRAINED PIPE.
- ALL LINE VALVES AND THROUGH RUN OF TEES SHALL BE RESTRAINED.
- LENGTHS SHOWN IN THE TABLE HAVE BEEN CALCULATED USING THE EBAA IRON RESTRAINT LENGTH CALCULATOR WITH THE FOLLOWING ASSUMPTIONS:
 WORKING PRESSURE: 70 PSI
 SOIL DESIGNATION: SM (SAND SILT)
 SAFETY FACTOR: 2.0 TO 1
 TRENCH TYPE 3
 DEPTH OF BURY 3 FT
- TABLE IS FOR PVC ONLY. RESTRAINED LENGTH FOR ALTERNATE MATERIALS WILL NEED TO BE SUBMITTED TO THE ENGINEERING DIVISION FOR APPROVAL.



CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

RESTRAINED PIPE TABLE
FORCE MAINS

DRAWN BY: P. DAVIS	SCALE: NOT TO SCALE
CHECKED BY: K. JOSEPH	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RESTRAINED PIPE TABLE FORCE MAINS	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

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:

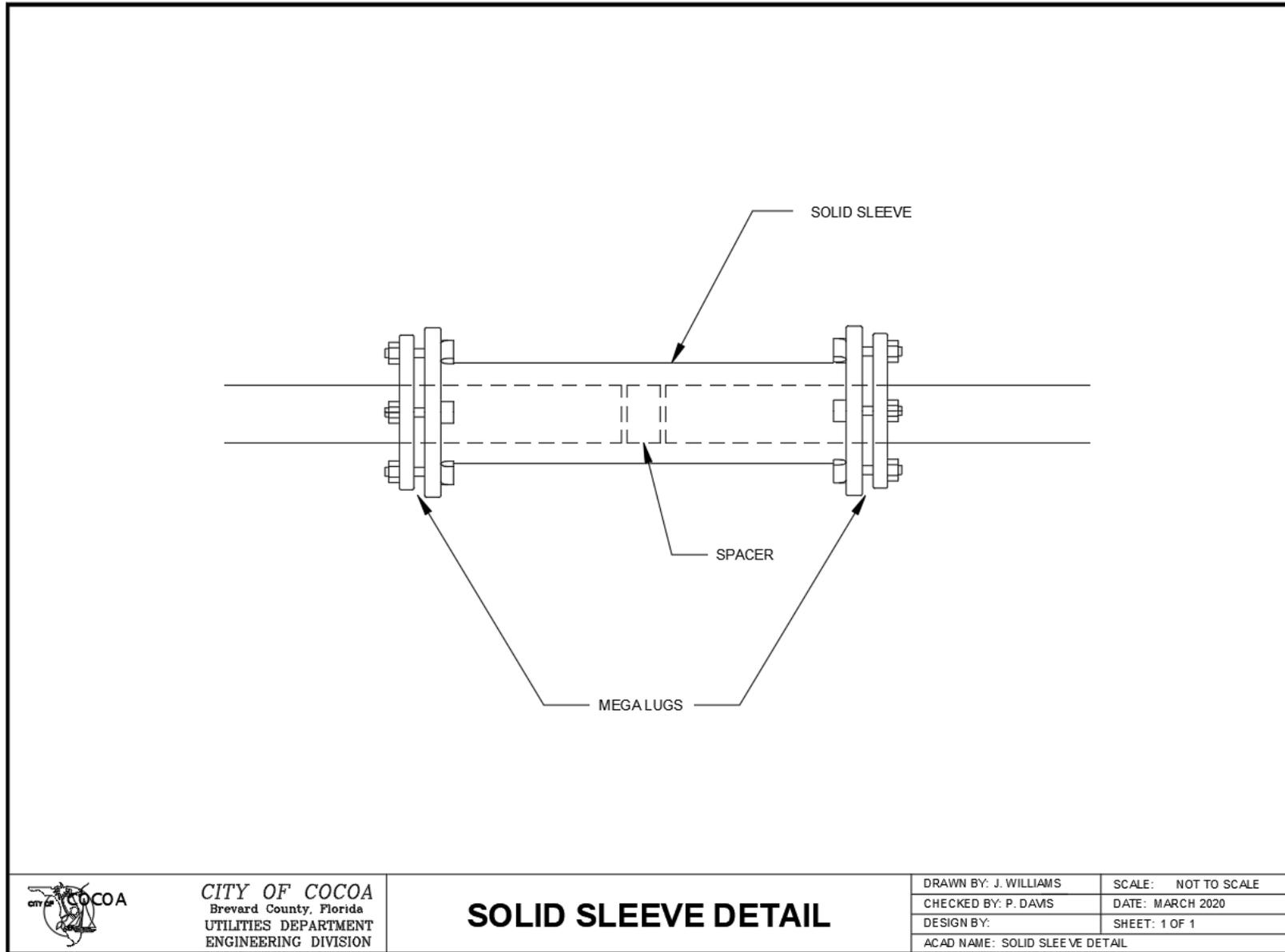
1. FITTINGS SHALL BE RESTRAINED JOINTS.
2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO OR GREATER THAN SHOWN IN THE TABLE.
3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS GREATEST LENGTH OF RESTRAINED PIPE.
4. ALL LINE VALVES AND THROUGH RUN OF TEES SHALL BE RESTRAINED.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

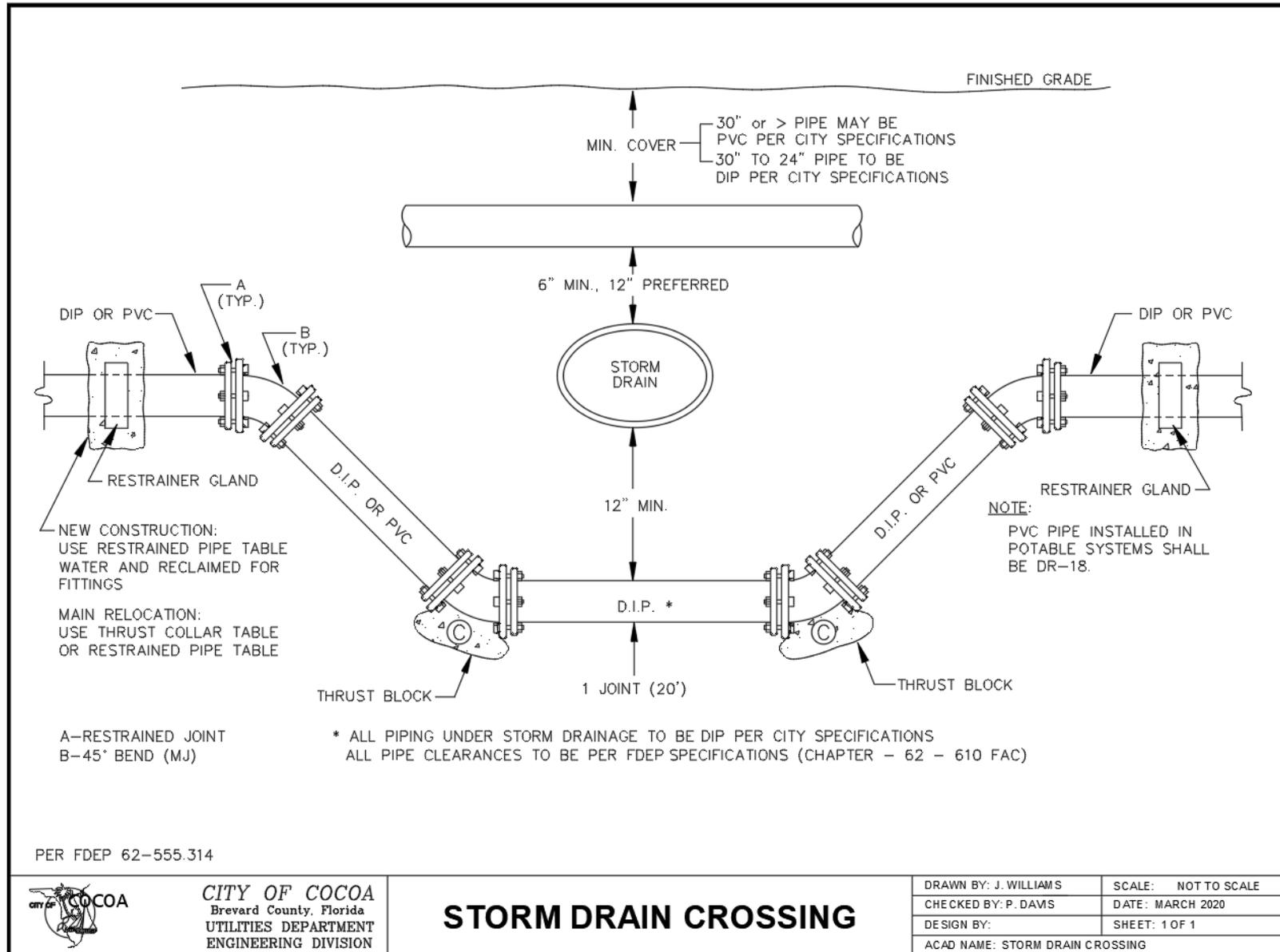
6. TABLE IS FOR PVC AND WRAPPED DUCTILE IRON.

 CITY OF COCOA Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	RESTRAINED PIPE TABLE WATER & RECLAIMED WATER MAINS	DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
		CHECKED BY: P. DAMS	DATE: MARCH 2020
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: RESTRAINED PIPE TABLE WATER AND RECLAIMED	

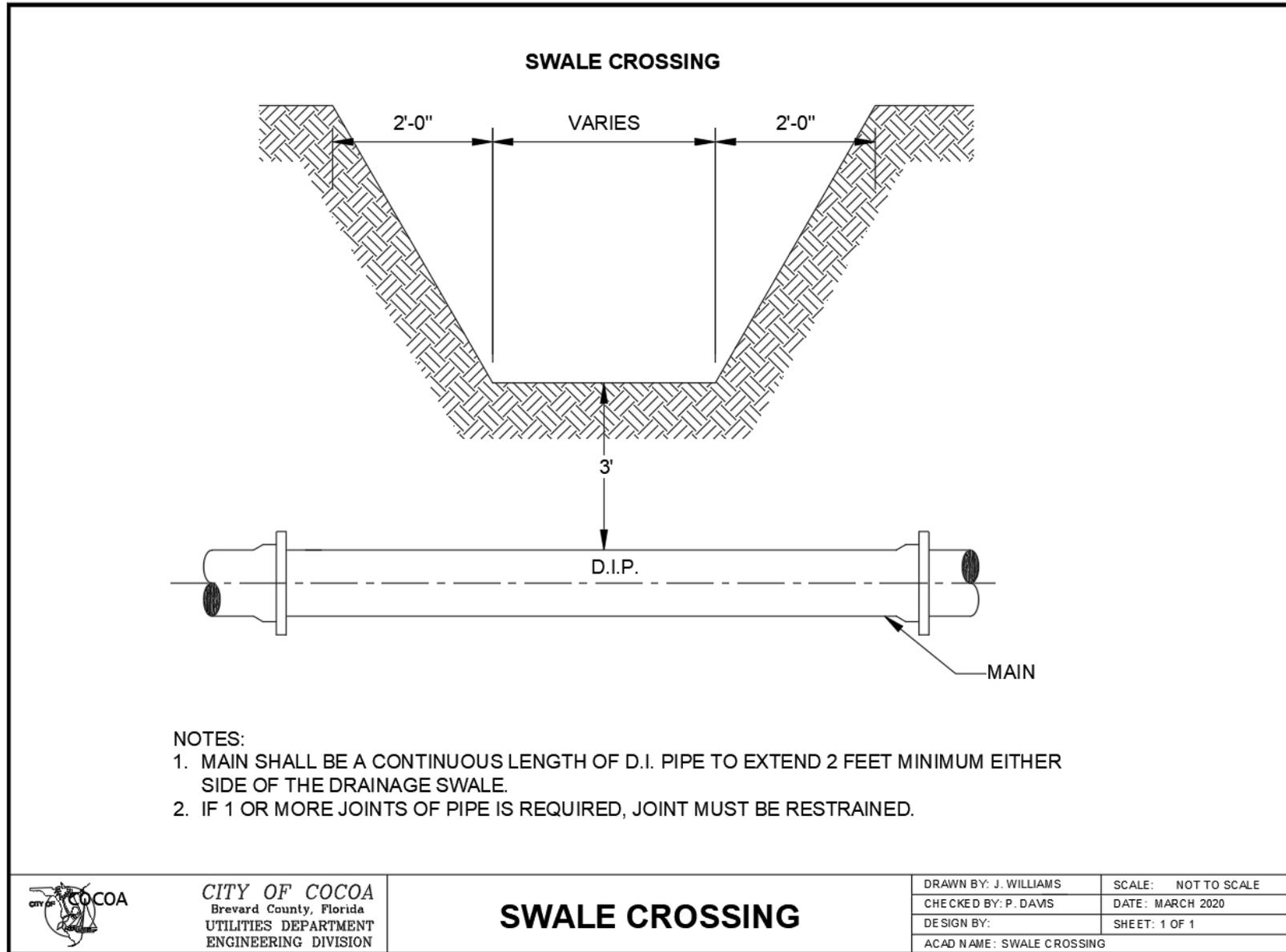
APPENDIX B. APPROVED DRAWINGS AND DETAILS



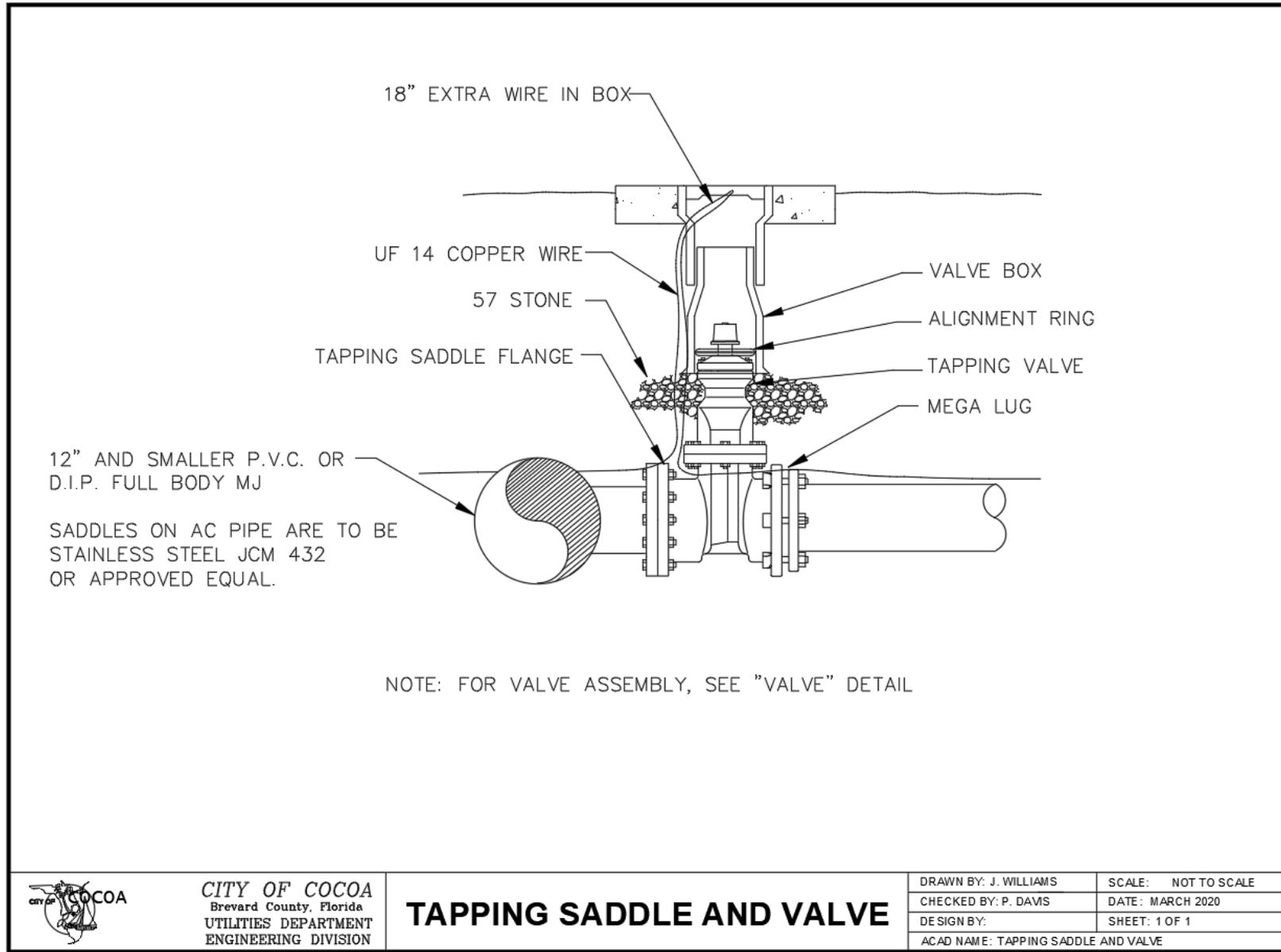
APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

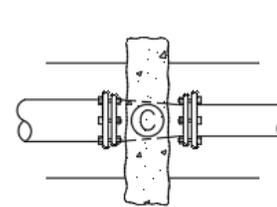
THRUST BLOCK NOTES

- 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.

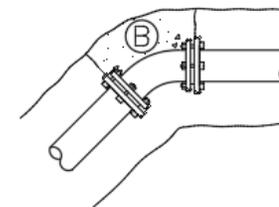
MINIMUM BEARING AREA (SQ. FT.)

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

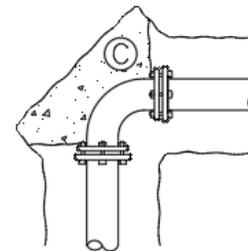
THE FIGURES IN THIS TABLE REPRESENT AREA OF CONCRETE BLOCKING AGAINST THE VERTICAL TRENCH WALL OF UNDISTURBED EARTH IN SQUARE FEET AT 2000 P.S.F. SOIL BEARING CAPACITY.



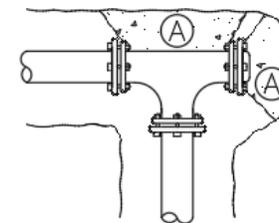
REDUCER
NTS



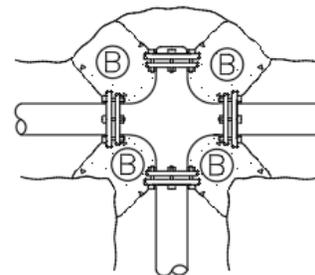
BEND
NTS



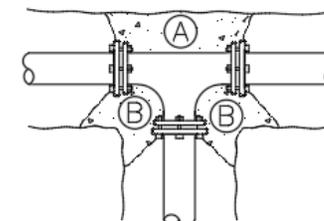
90° ELBOW
NTS



TEE & PLUG
NTS



CROSS & PLUG
NTS



TEE
NTS



CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

THRUST BLOCK NOTES & DETAILS

DRAWN BY: J. WILLIAMS

SCALE: NOT TO SCALE

CHECKED BY: P. DAMS

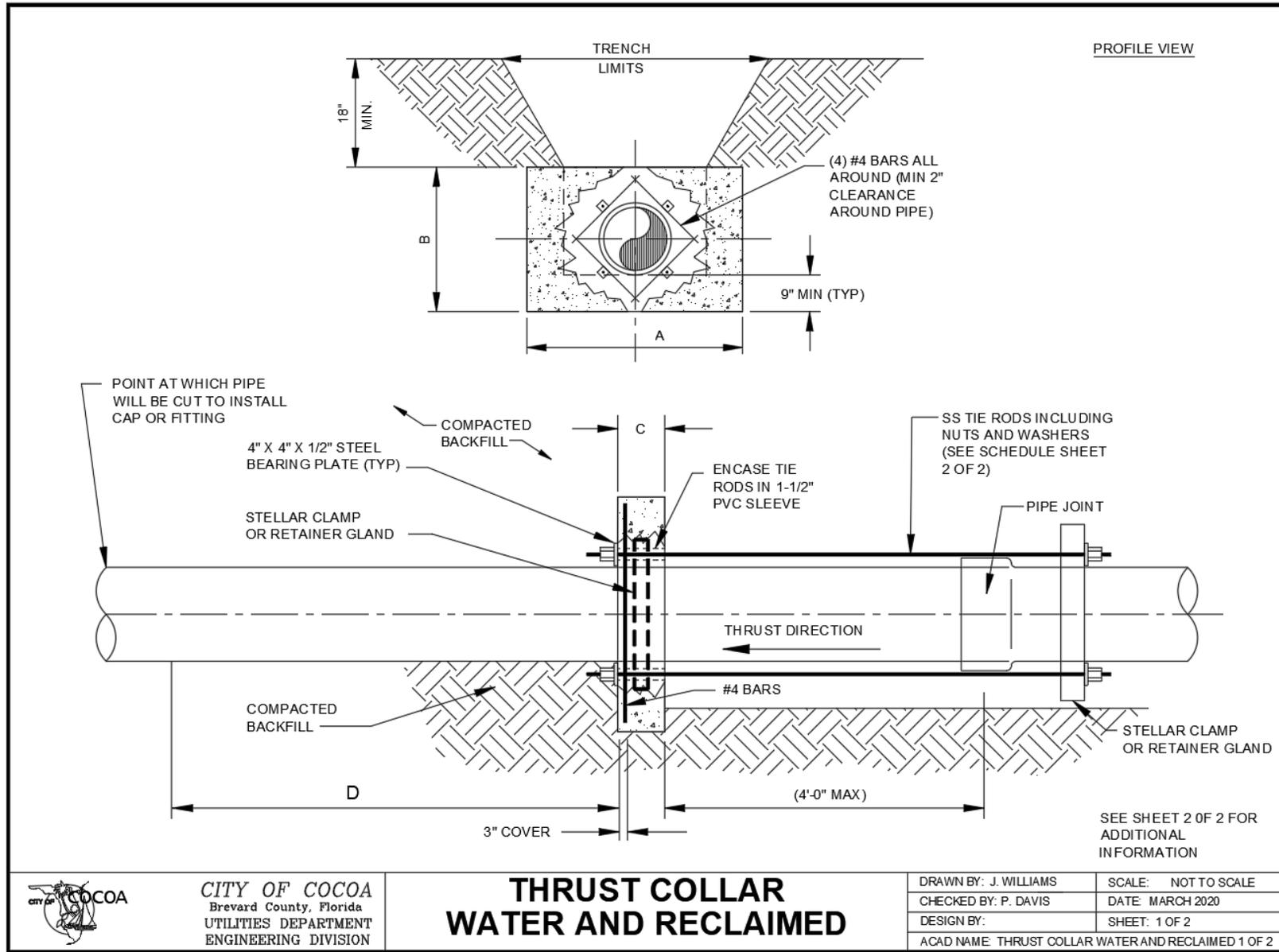
DATE: MARCH 2020

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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 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

THRUST COLLAR WATER AND RECLAIMED

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
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"> 1. ADDITIONAL REINFORCEMENTS SHALL BE AS SPECIFIED BY THE ENGINEER. 2. MINIMUM COMPRESSIVE STRENGTH FOR CONCRETE SHALL BE 3000 PSI. 3. BEDDING, BACKFILL AND COMPACTION SHALL BE AS SPECIFIED ELSEWHERE IN THE STANDARD DRAWINGS. | <ol style="list-style-type: none"> 4. ALL FORM BOARDS SHALL BE REMOVED PRIOR TO BACKFILL. 5. NO ALLOWANCE SHALL BE MADE FOR FRICTION BETWEEN THE PIPE WALL AND THE THRUST COLLAR. 6. DESIGN PRESSURE: <u>150</u> PSI. 7. TIE RODS TO BE 3/4" SS 18-8 TYPE 304. |
|---|--|

* TO BE DESIGNED BY ENGINEER OF RECORD.

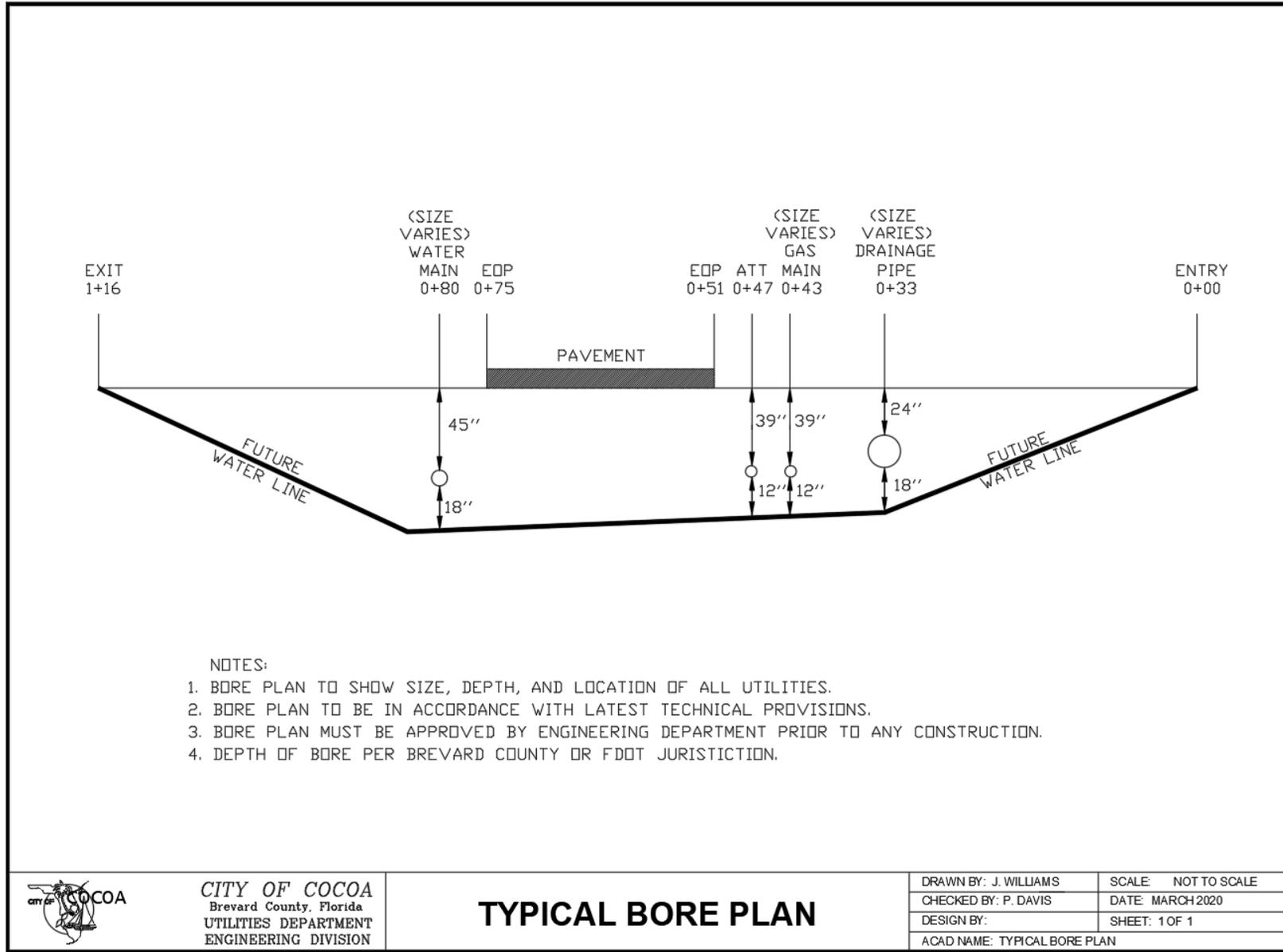


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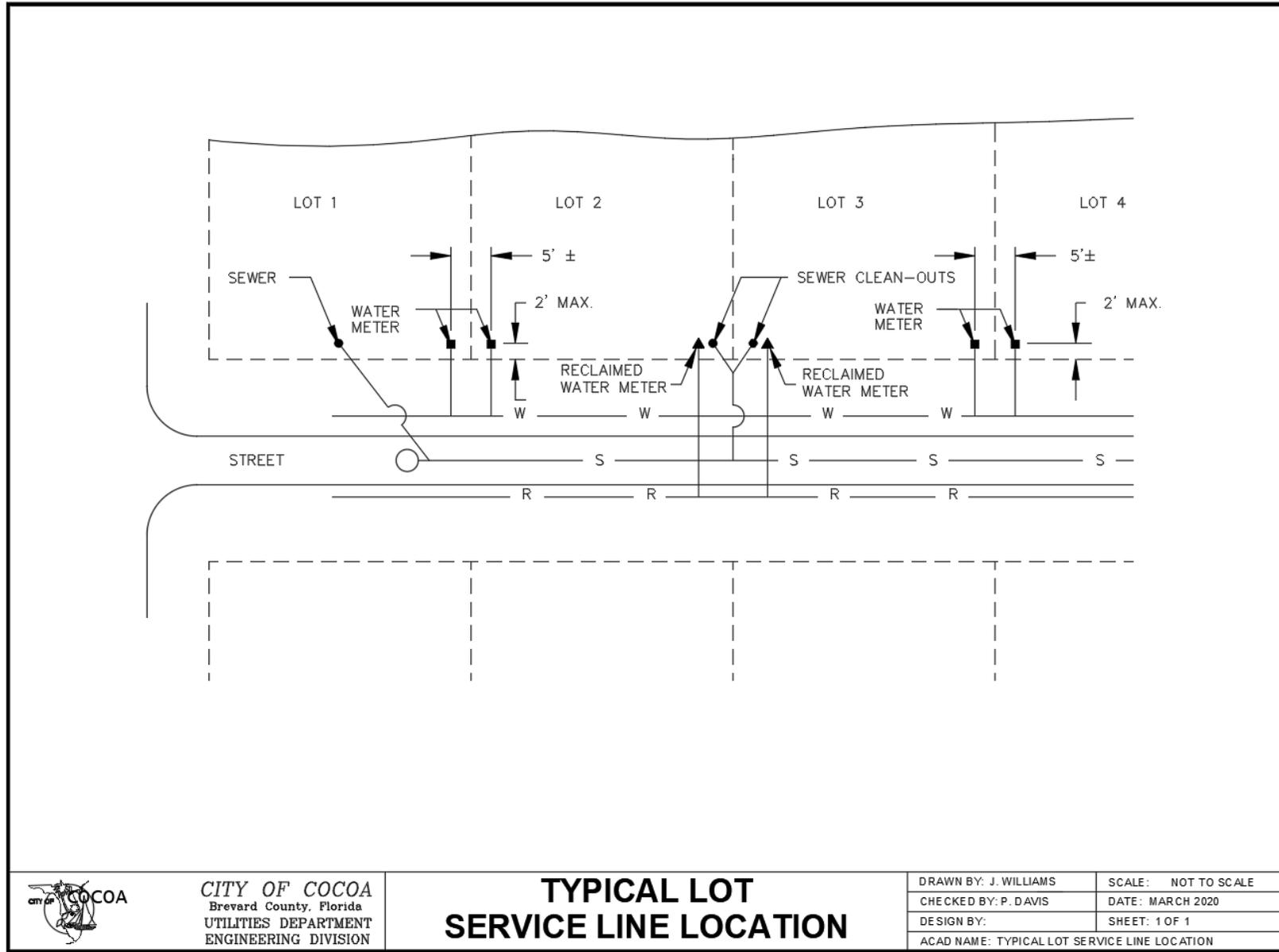
THRUST COLLAR WATER AND RECLAIMED

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAMS	DATE: MARCH 2020
DESIGN BY:	SHEET: 2 OF 2
ACAD NAME: THRUST COLLAR WATER AND RECLAIMED 2 OF 2	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

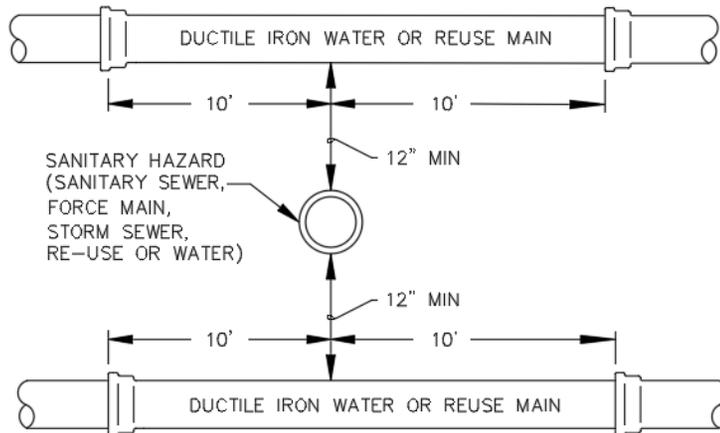


APPENDIX B. APPROVED DRAWINGS AND DETAILS

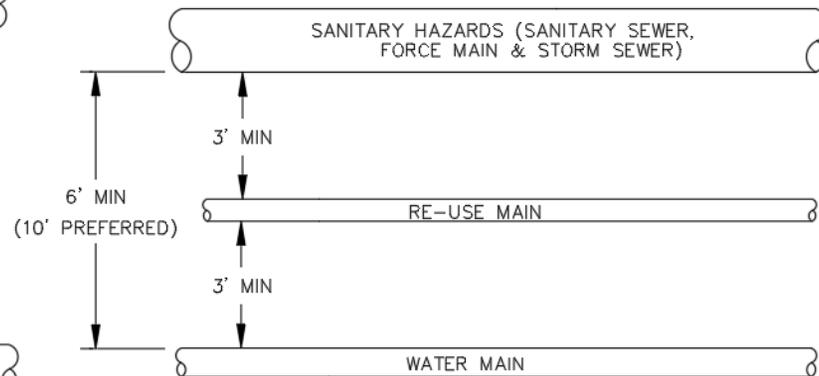


APPENDIX B. APPROVED DRAWINGS AND DETAILS

1. IF DEPTH IS 30" OR >, PIPE MAY BE PVC PER CITY SPECIFICATIONS
2. IF DEPTH IS 30" TO 24", PIPE TO BE DIP PER CITY SPECIFICATIONS



VERTICAL CLEARANCE



HORIZONTAL CLEARANCE

PER FDEP 62-555.314

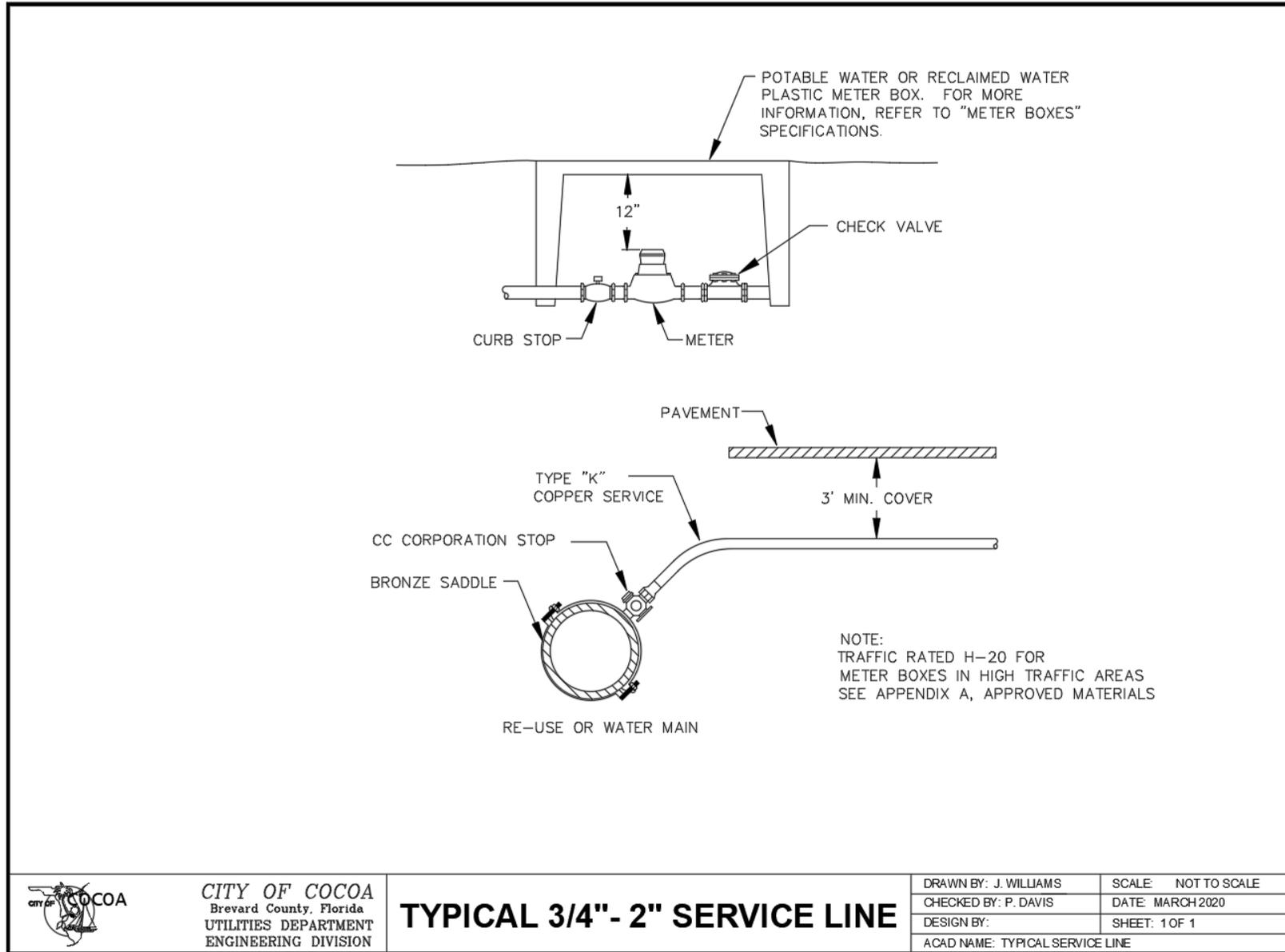


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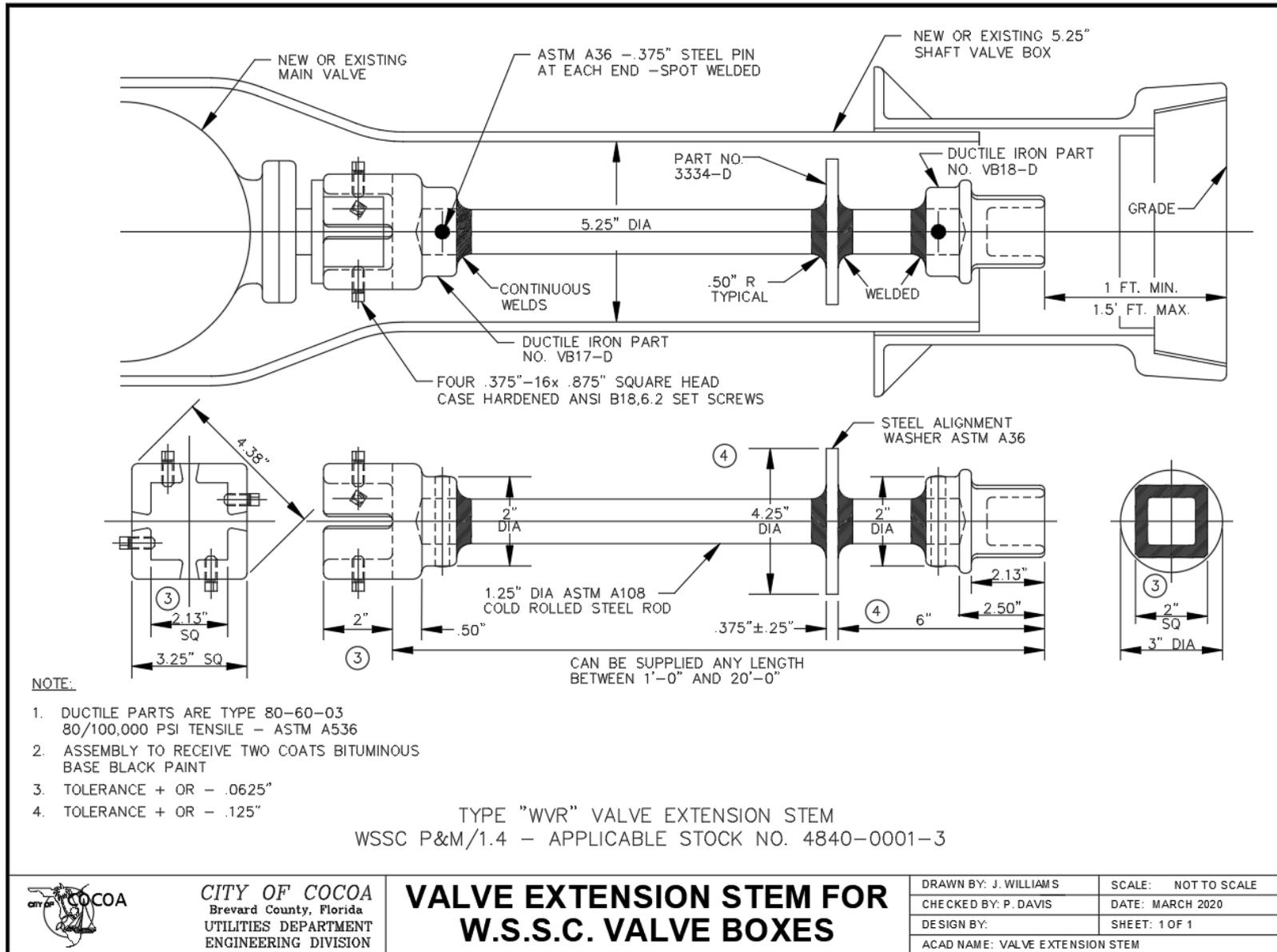
TYPICAL REQUIRED SEPARATION

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL REQUIRED SEPARATION	

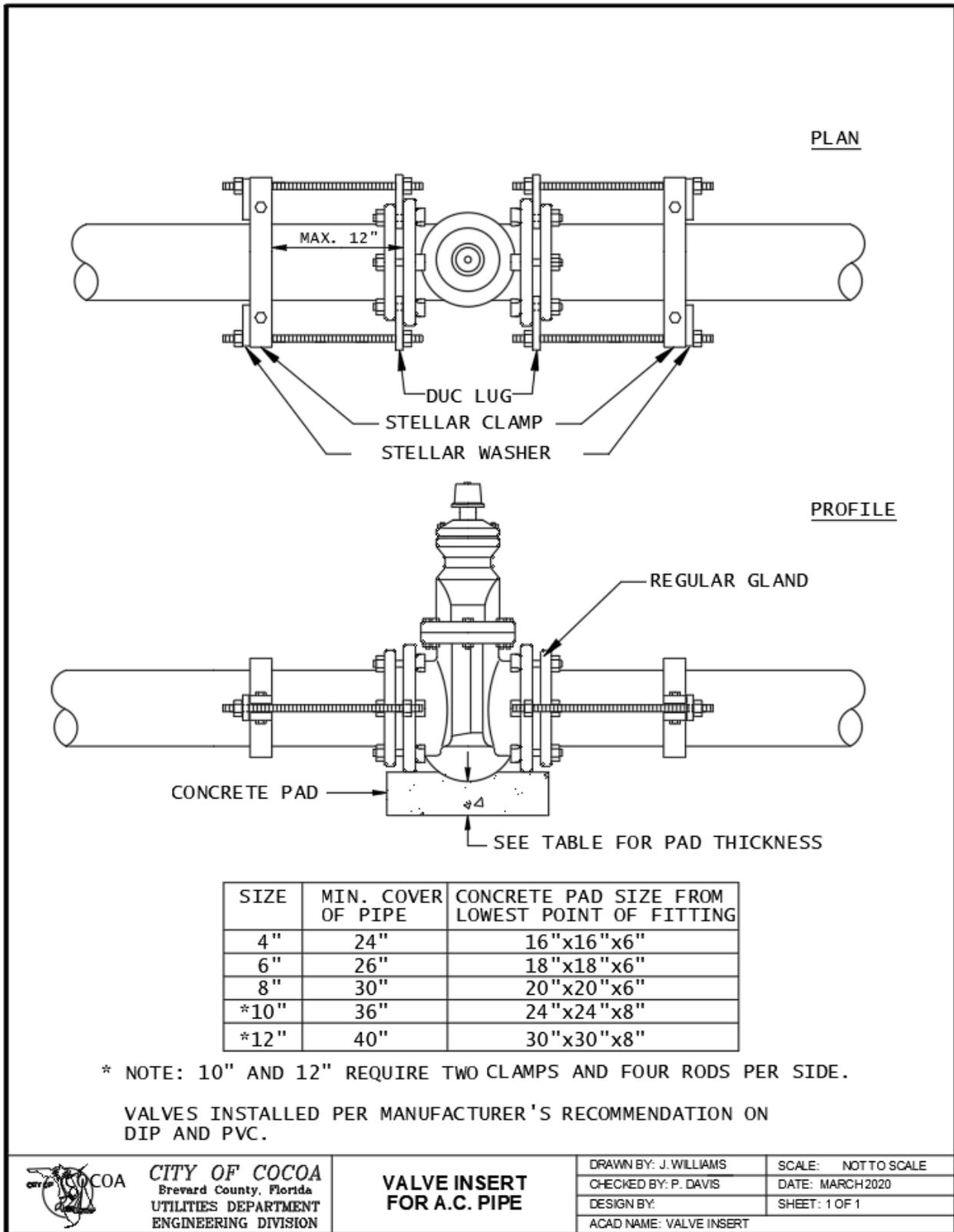
APPENDIX B. APPROVED DRAWINGS AND DETAILS



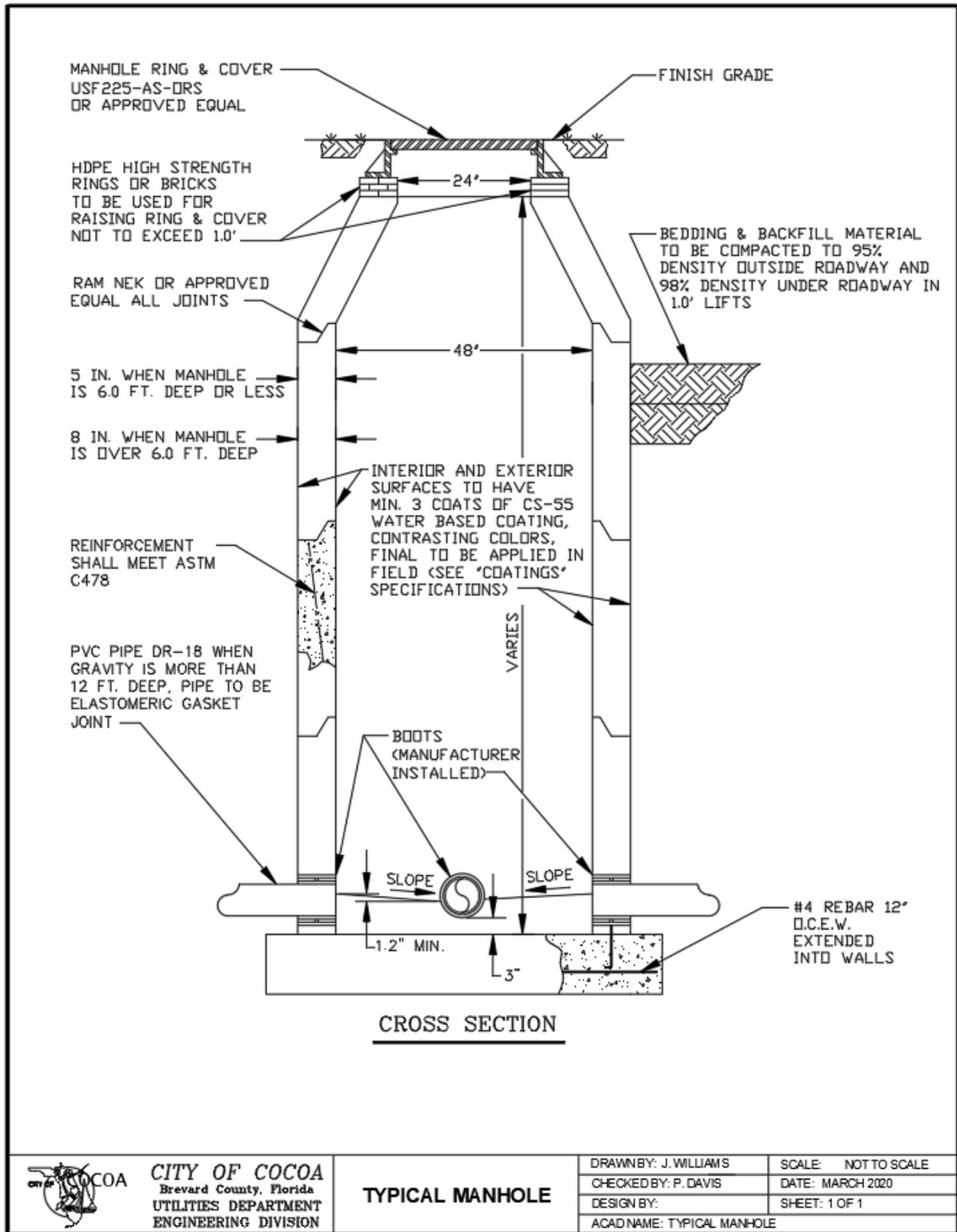
APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

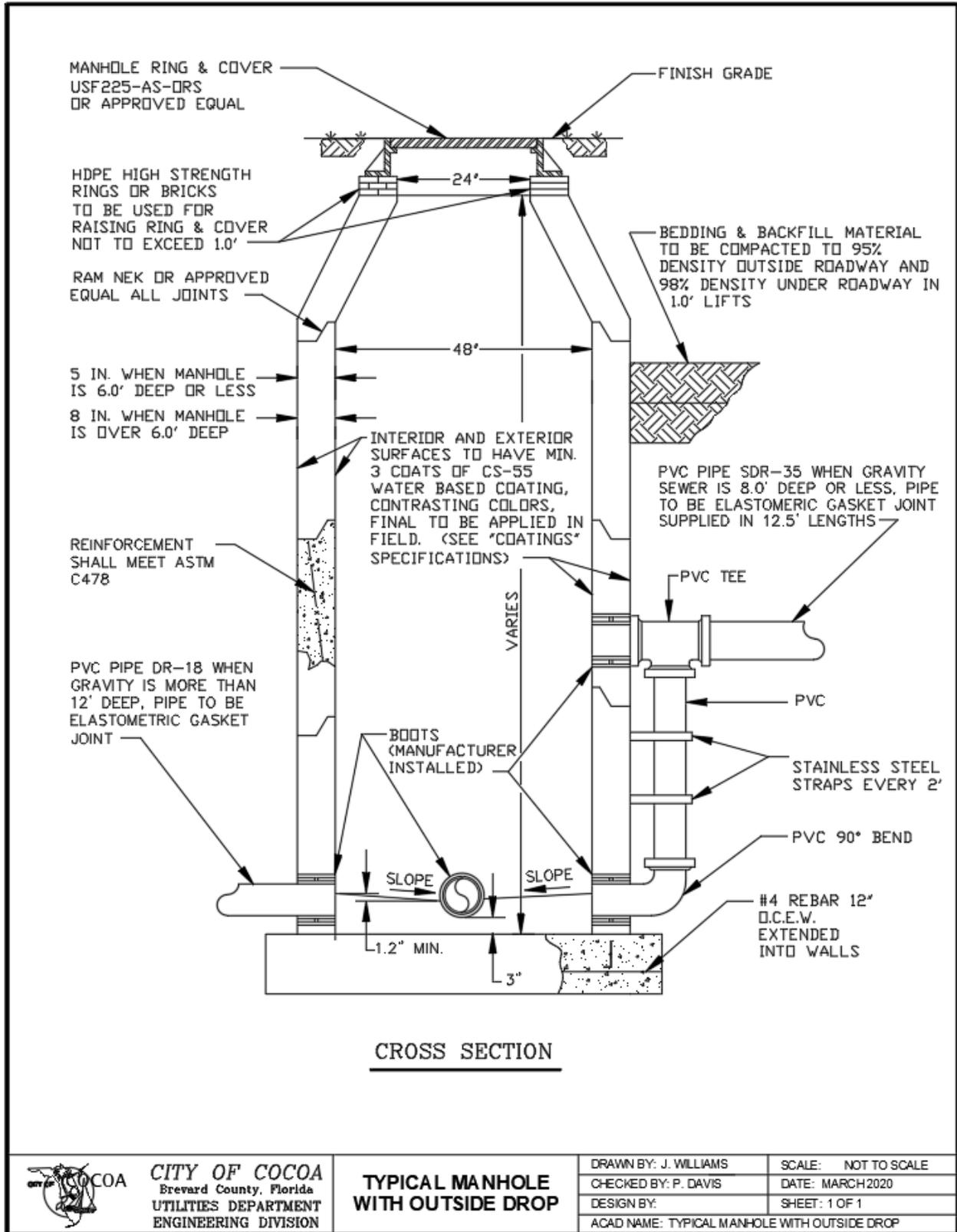


CITY OF COCOA
Brevard County, Florida
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TYPICAL MANHOLE

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL MANHOLE	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

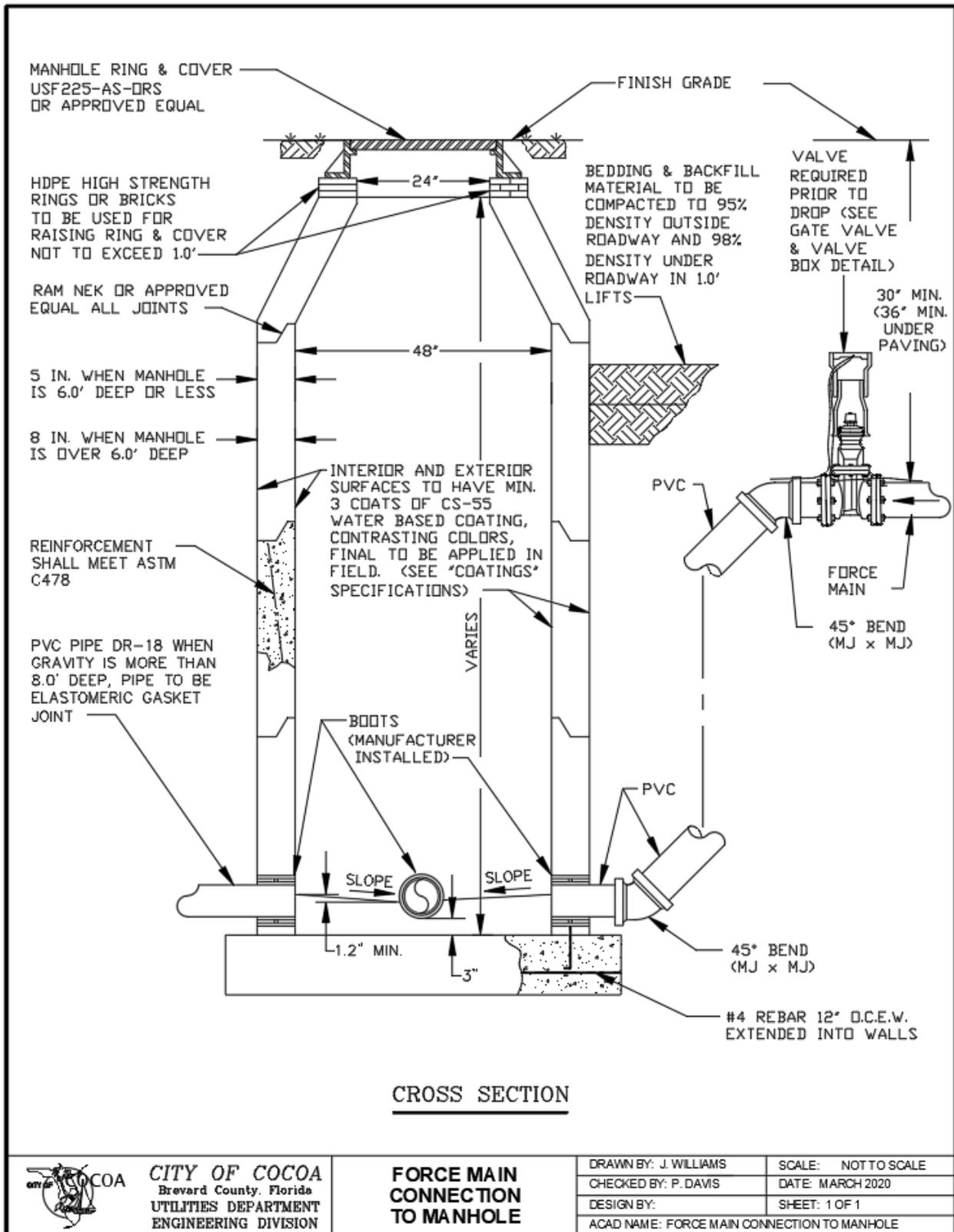


CITY OF COCOA
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ENGINEERING DIVISION

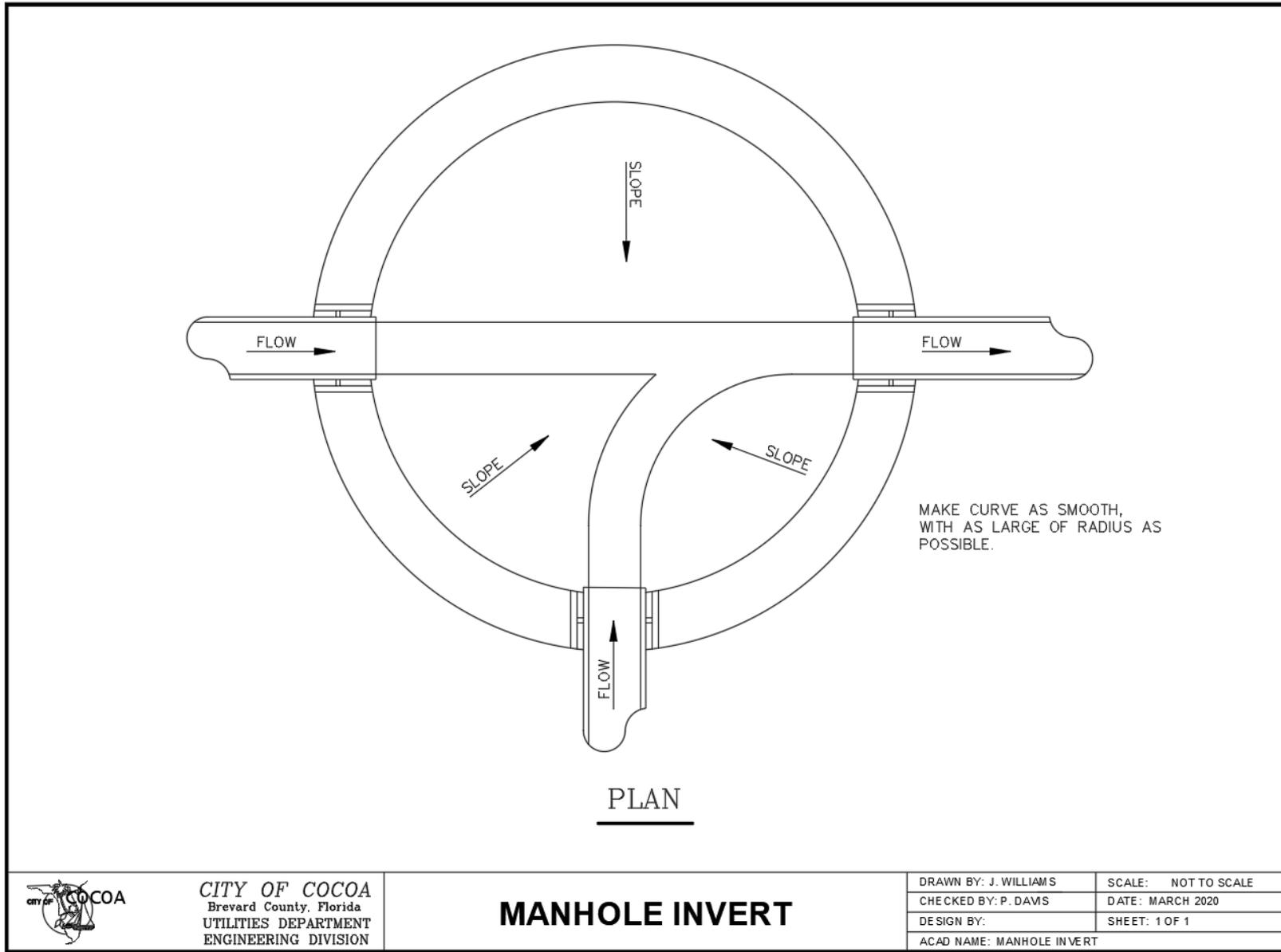
TYPICAL MANHOLE WITH OUTSIDE DROP

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL MANHOLE WITH OUTSIDE DROP	

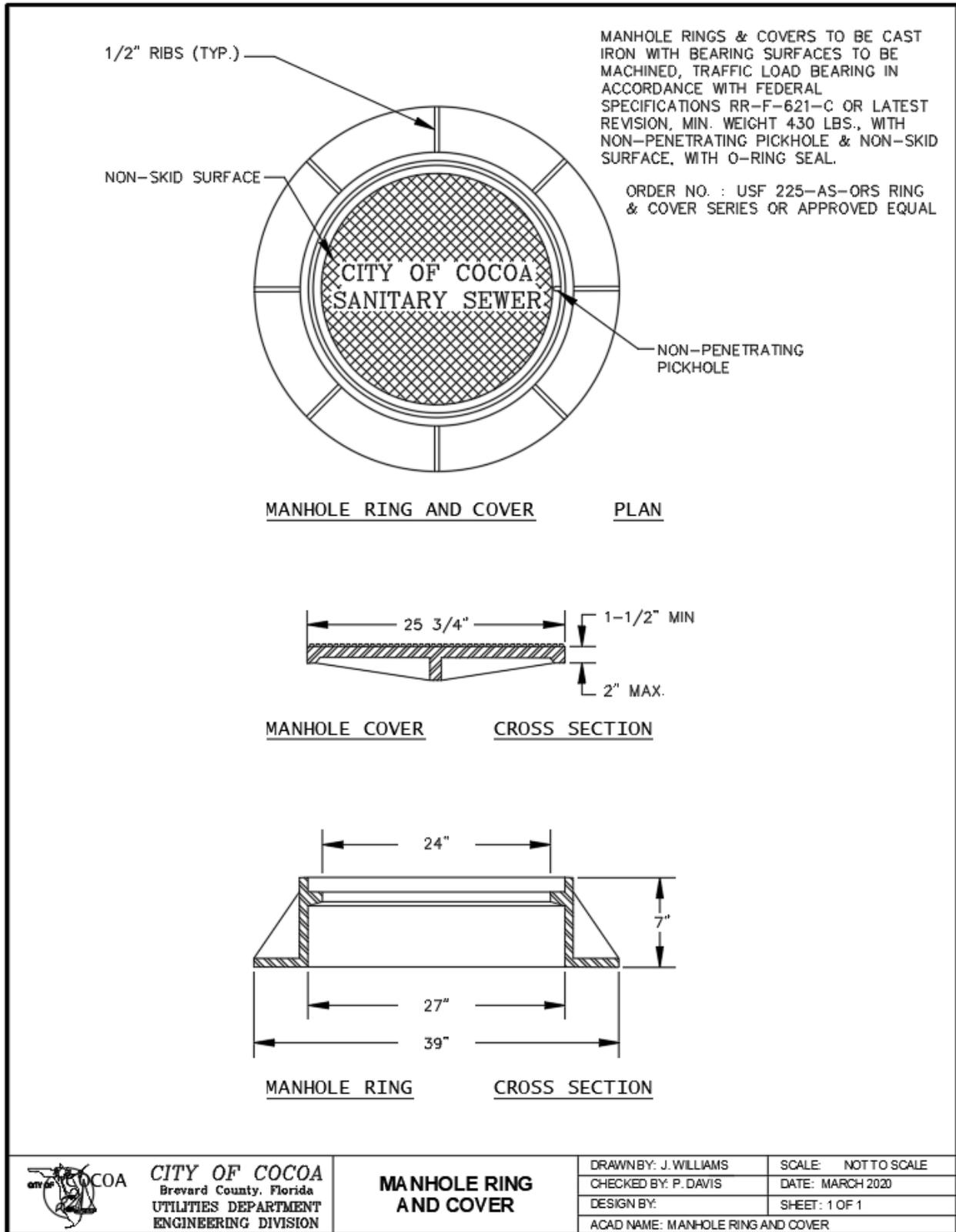
APPENDIX B. APPROVED DRAWINGS AND DETAILS



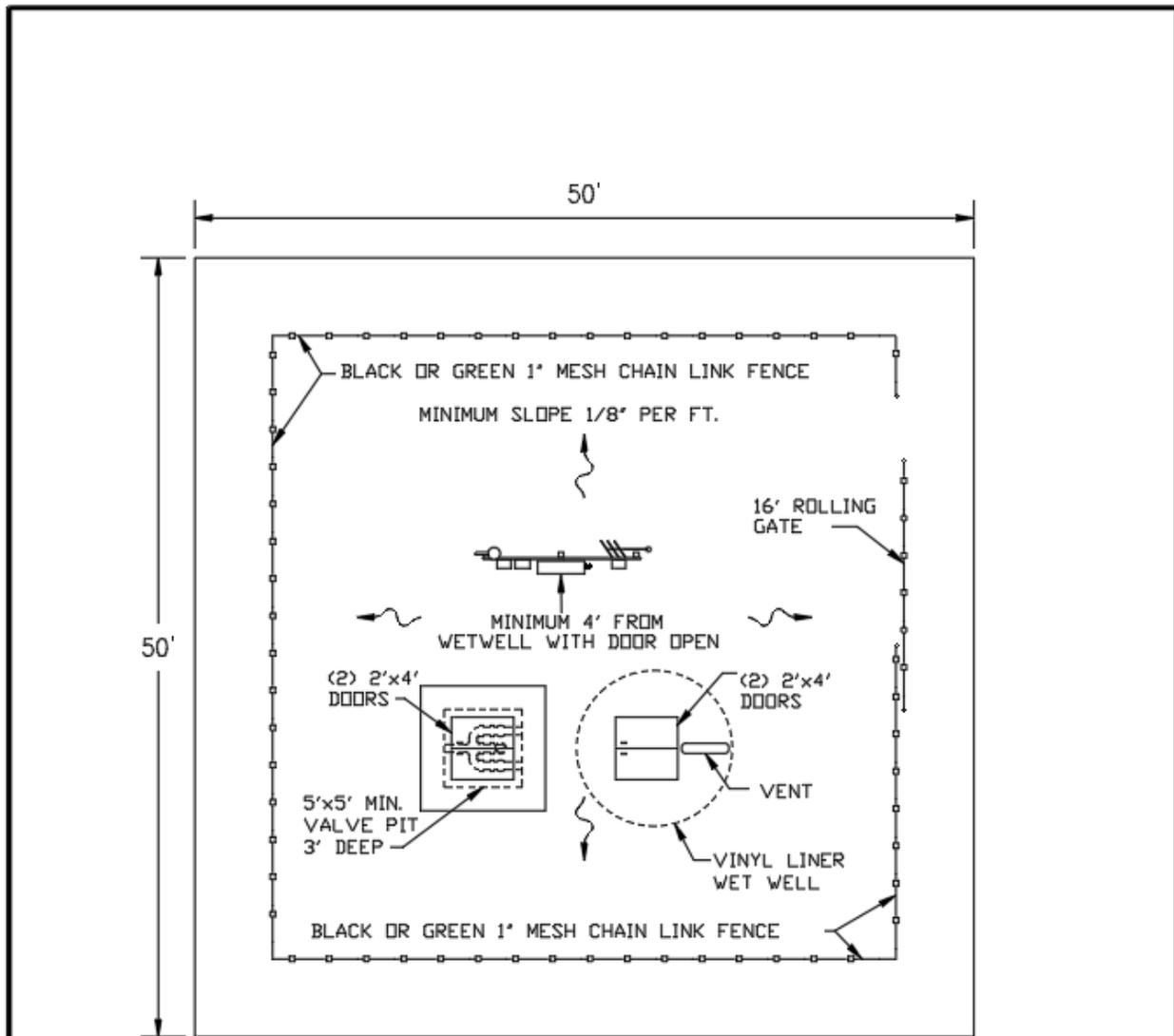
APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

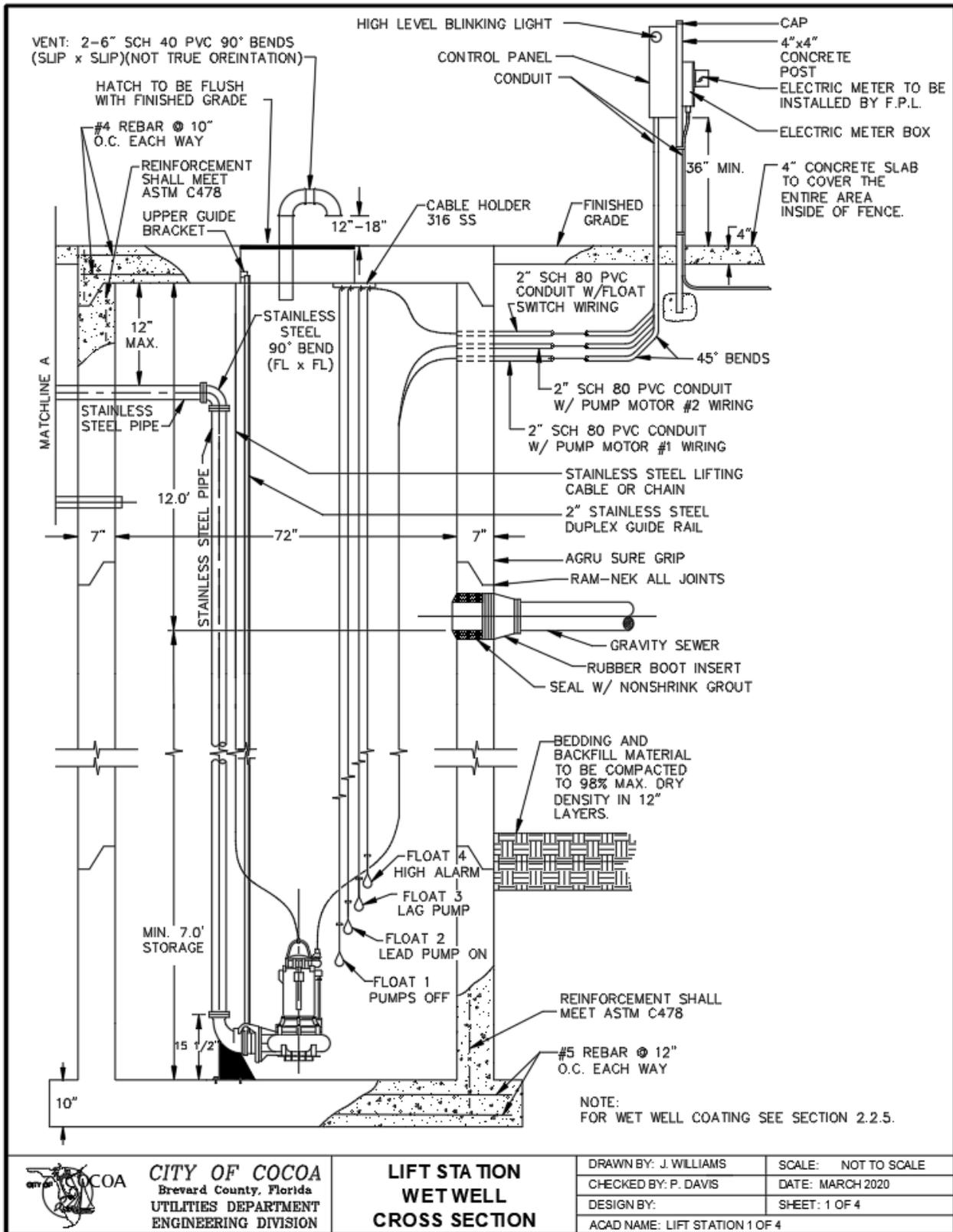


NOTES:

1. CONTROL PANEL DOOR WHEN OPEN SHALL BE NO MORE THAN 4 FEET FROM WET WELL.
2. GRAVEL DRIVEWAY (NOT PICTURED) REQUIRED FROM STREET TO WET WELL.
3. EXACT SITE LAYOUT, INCLUDING DRIVEWAY AND GATE, WILL BE SITE SPECIFIC.

 CITY OF COCOA Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	LIFT STATION SITE PLAN (TYP)	DRAWN BY: R. HALL	SCALE: NOT TO SCALE
		CHECKED BY: P. DAVIS	DATE: MARCH 2020
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: LIFT STATION SITE PLAN	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

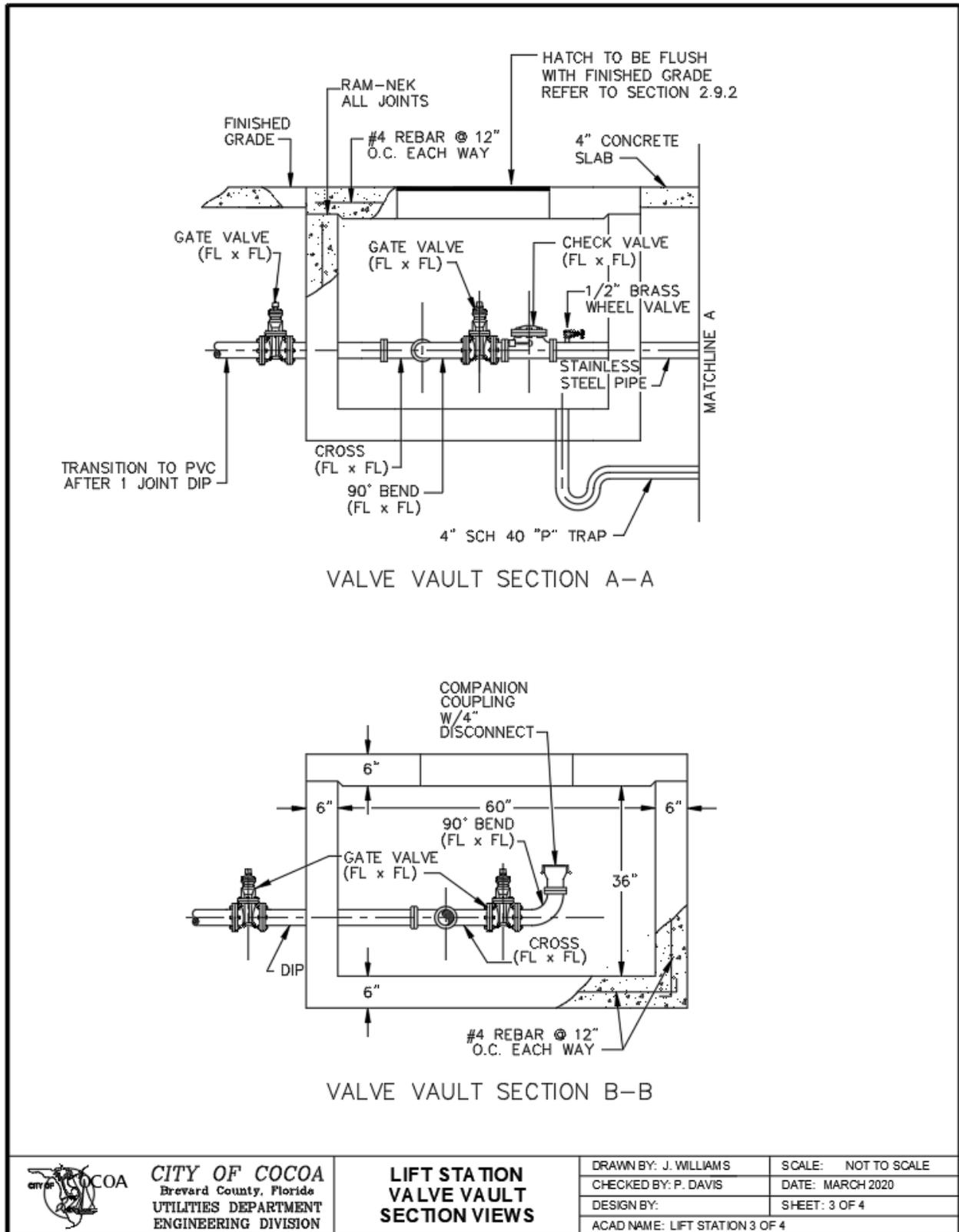


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

**LIFT STATION
WET WELL
CROSS SECTION**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 4
ACAD NAME: LIFT STATION 1 OF 4	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

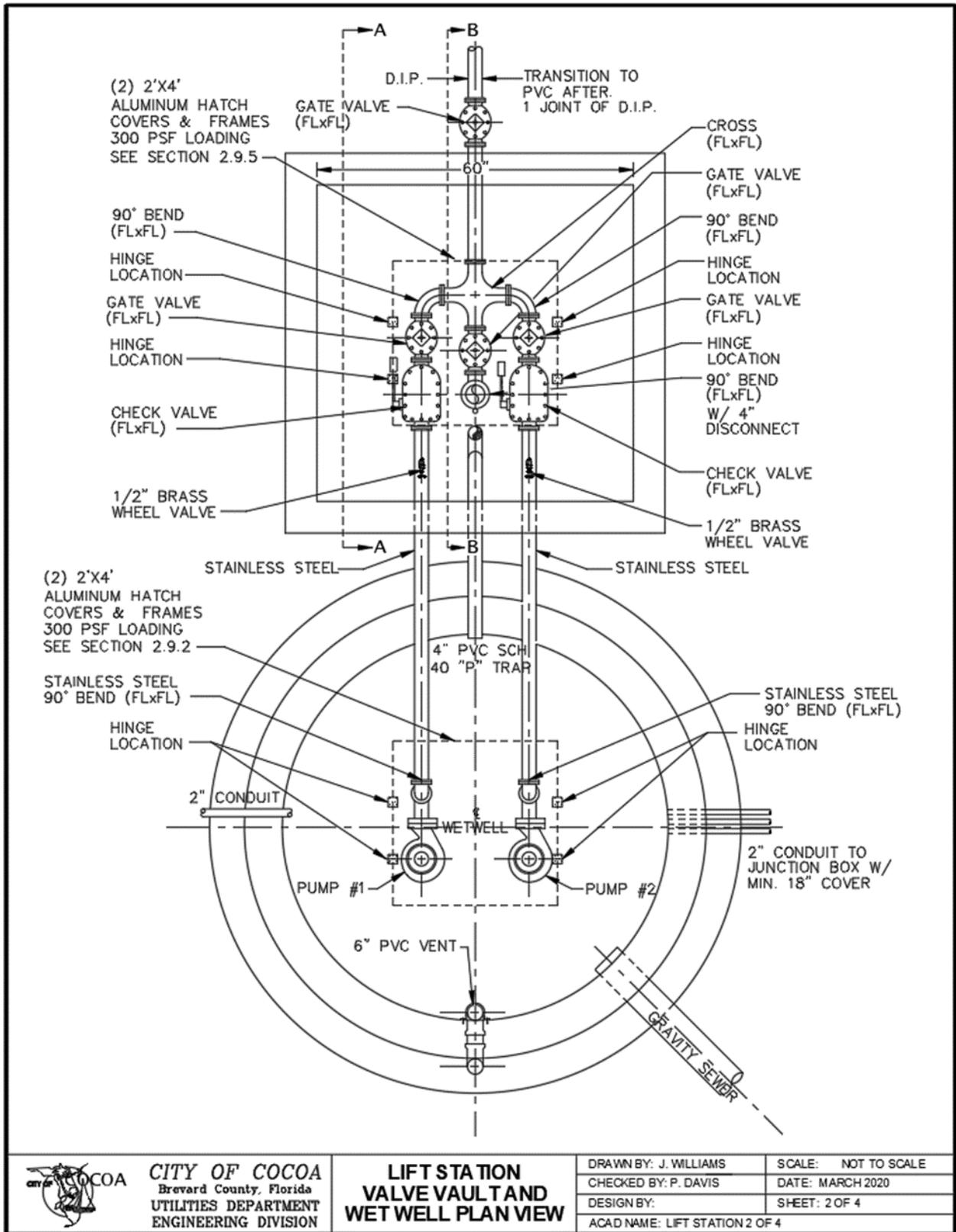


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

**LIFT STATION
 VALVE VAULT
 SECTION VIEWS**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 3 OF 4
ACAD NAME: LIFT STATION 3 OF 4	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

**LIFT STATION
 VALVE VAULT AND
 WET WELL PLAN VIEW**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 2 OF 4
ACAD NAME: LIFT STATION 2 OF 4	

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

FENCE SPECIFICATIONS:

- 1) FABRIC 9-GA, HOT DIPPED GALVANIZED BLACK OR GREEN SMALL MESH.
- 2) CORNER POSTS AND GATE POSTS TO BE 3" O.D., SCHEDULE 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.

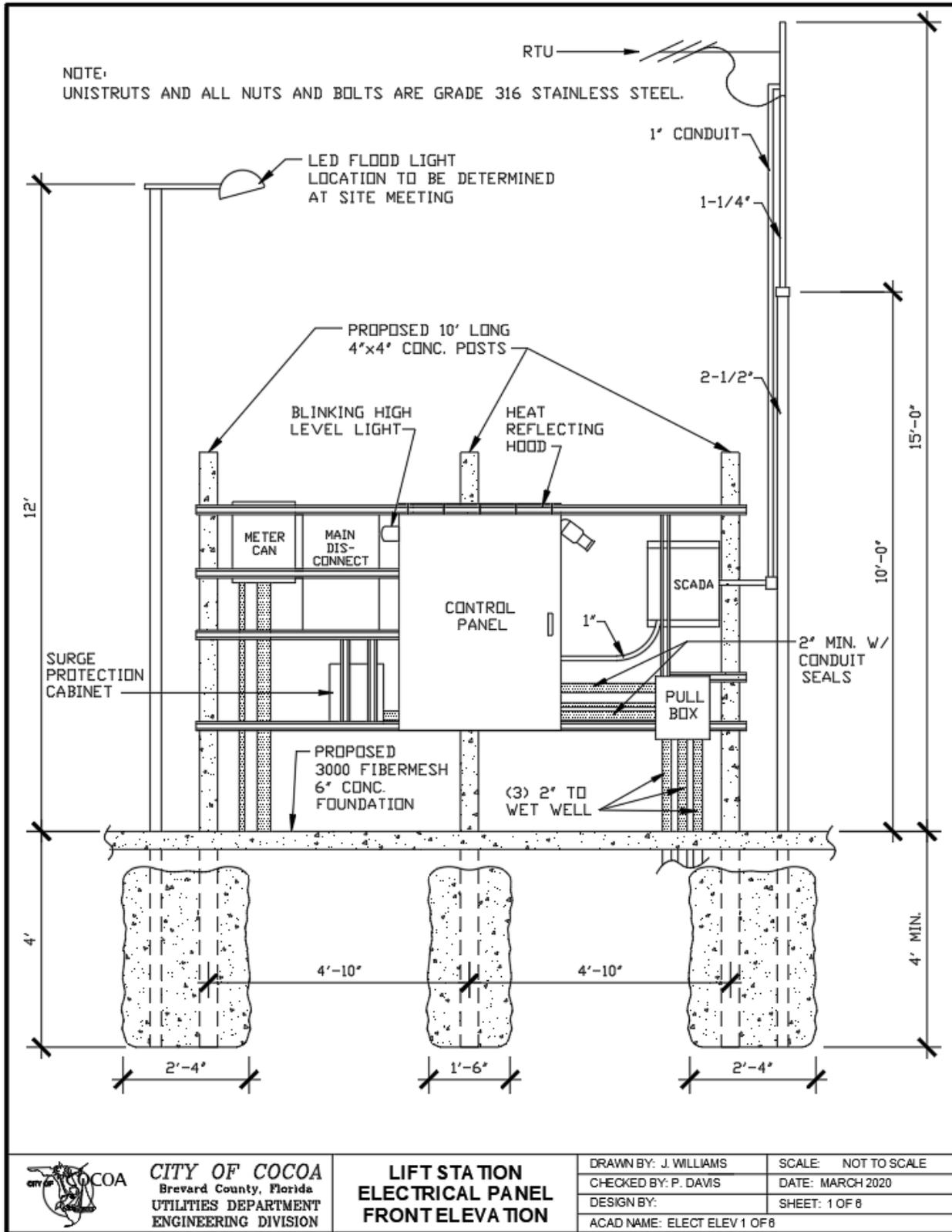


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Brevard County, Florida
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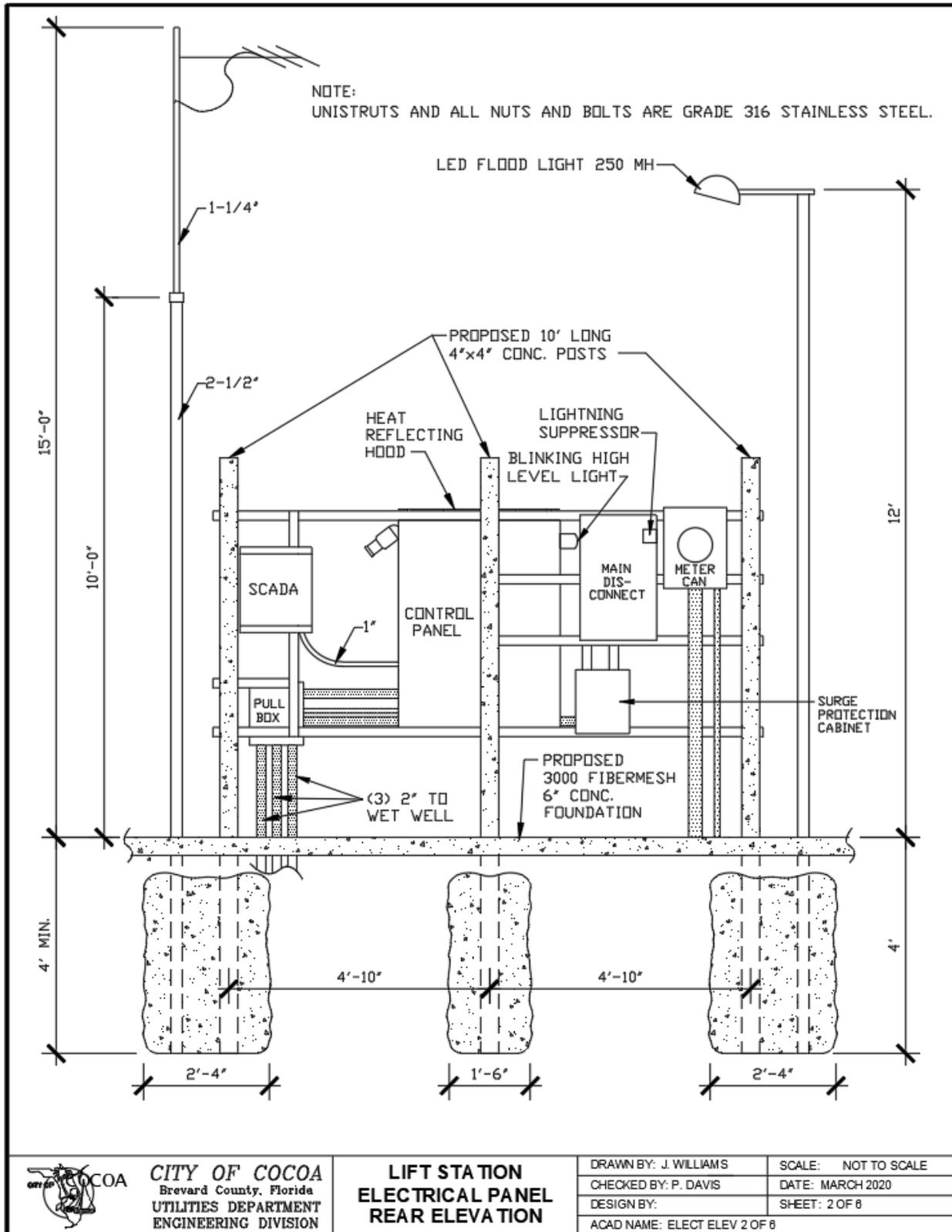
LIFT STATION SPECIFICATIONS AND NOTES

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 4 OF 4
ACAD NAME: LIFT STATION 4 OF 4	

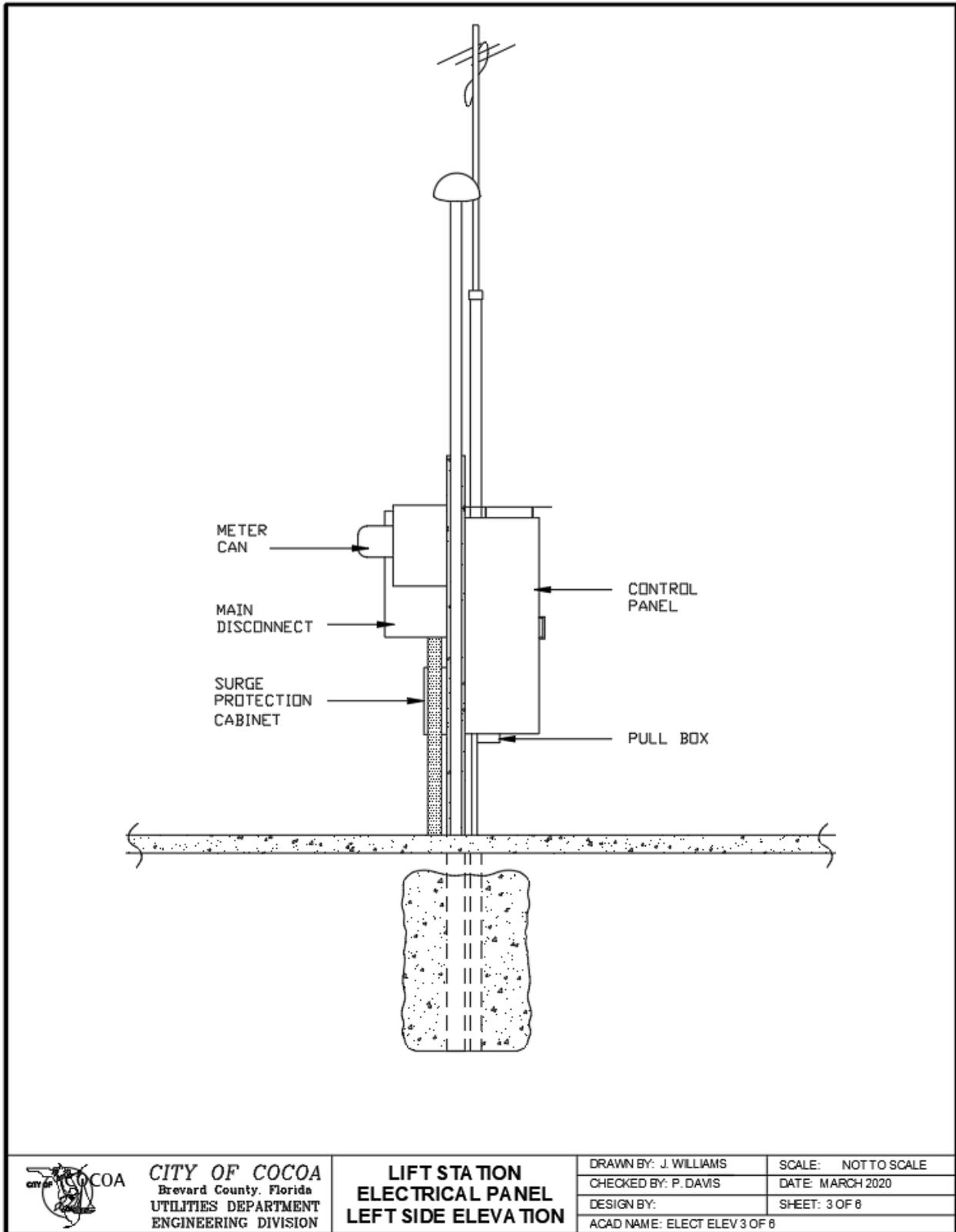
APPENDIX B. APPROVED DRAWINGS AND DETAILS



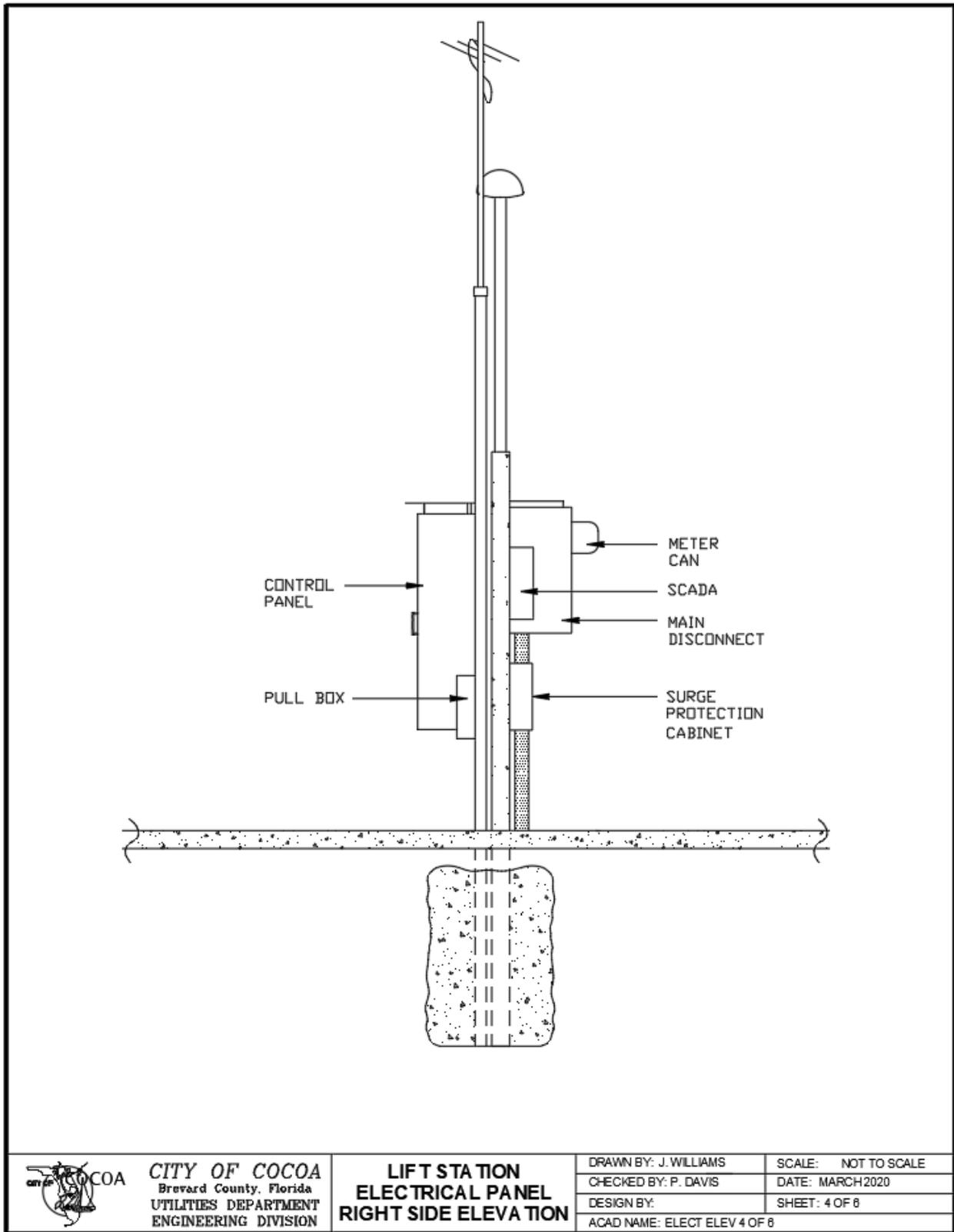
APPENDIX B. APPROVED DRAWINGS AND DETAILS



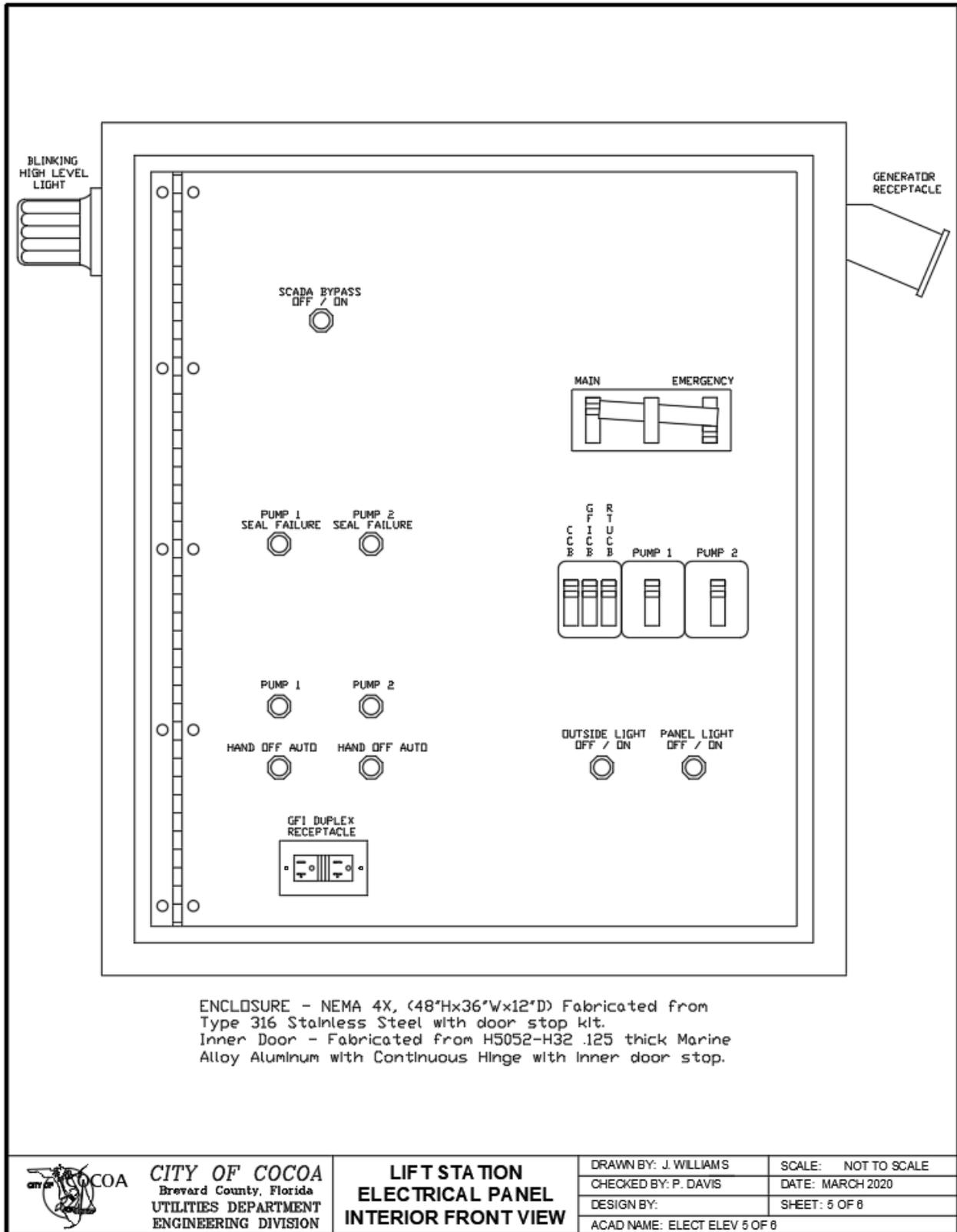
APPENDIX B. APPROVED DRAWINGS AND DETAILS



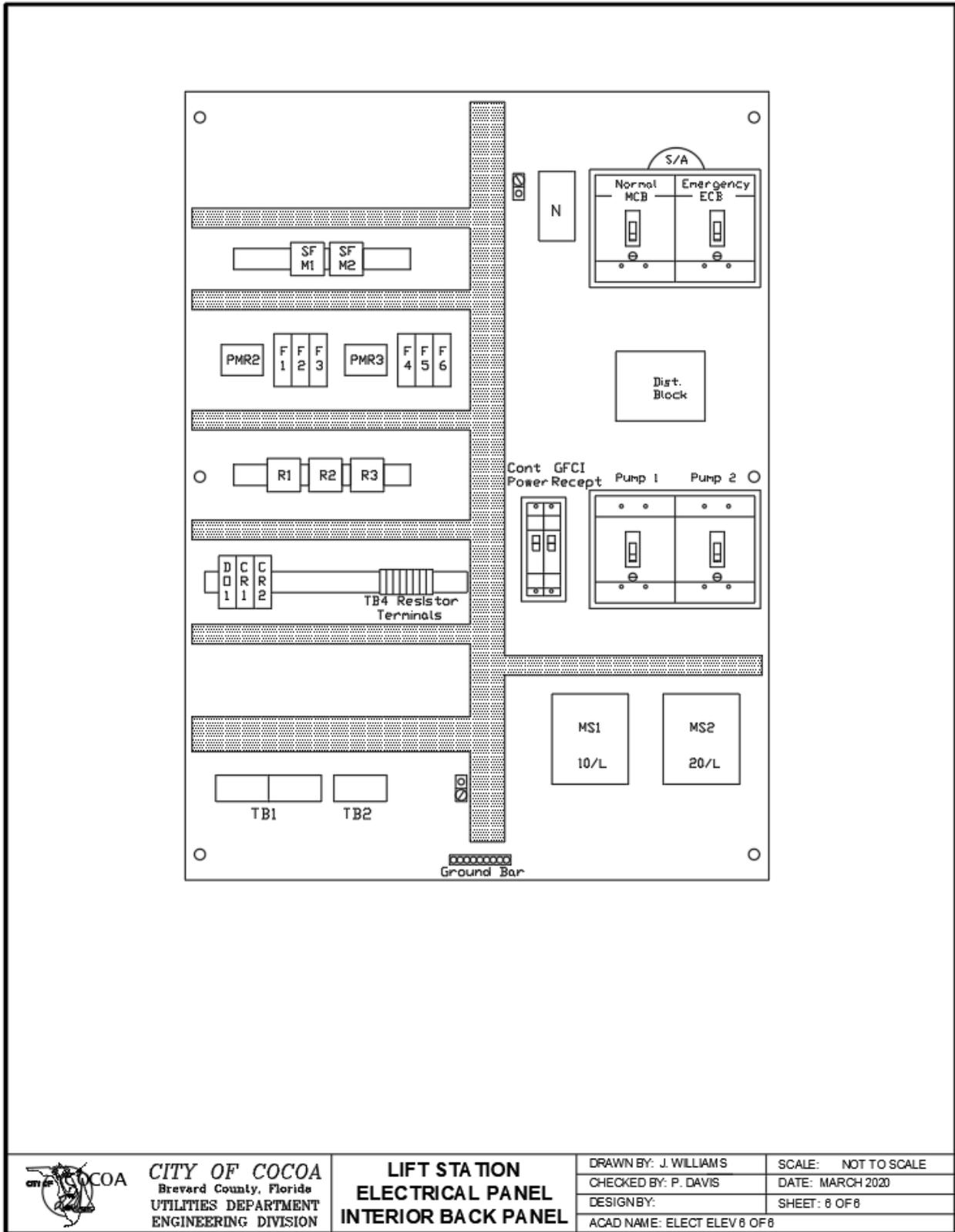
APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

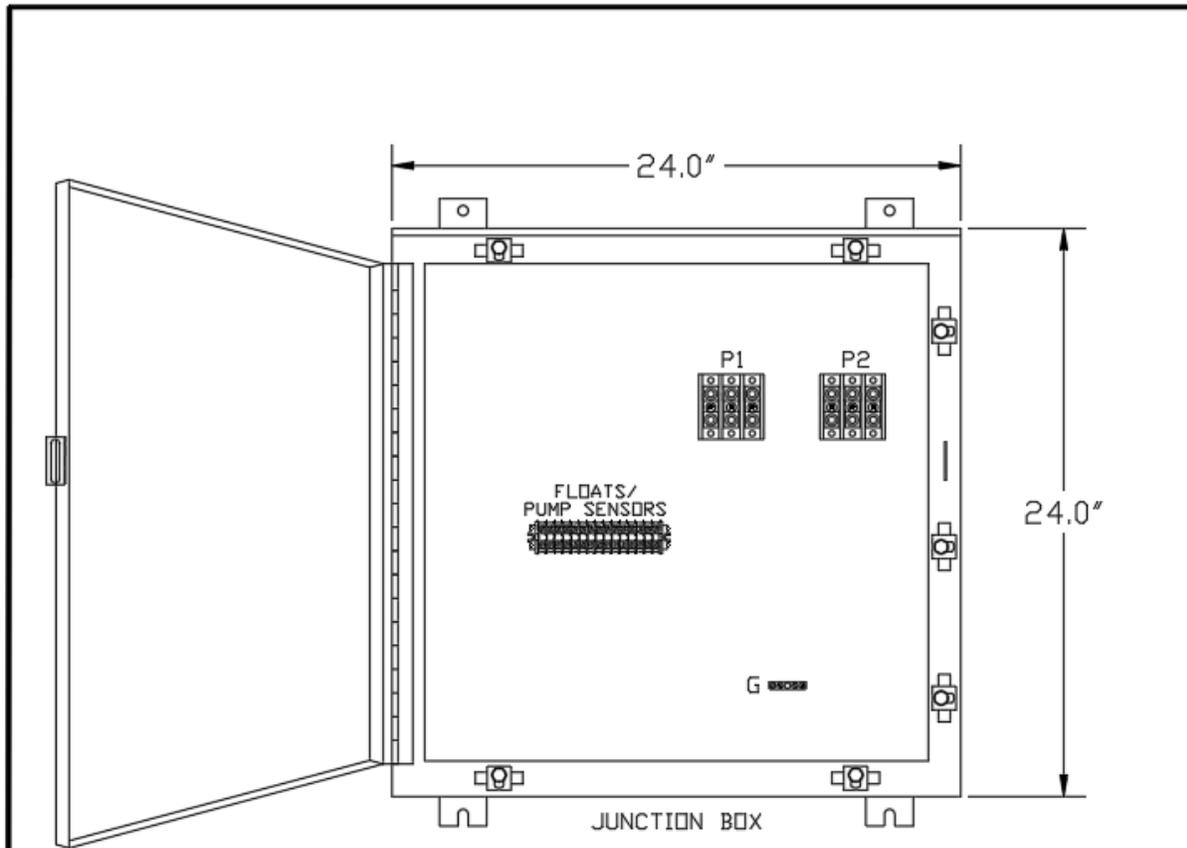


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

**LIFT STATION
 ELECTRICAL PANEL
 INTERIOR BACK PANEL**

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 8 OF 8
ACAD NAME: ELECT ELEV 8 OF 8	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



BILL OF MATERIALS			
QTY.	ABBR.	DESCRIPTION	MANUFACTURER, PART#
1	J-BOX	JUNCTION BOX, 316SS N4X	SCHAEFER'S, SPN4SS6-24246
30		CONTROL TERMINALS	PHOENIX CONTACT #3044102
2		MOTOR POWER BLOCKS	NFI INDUSTRIES, #AS-K1-K1
1		GROUNDING BAR	EATON, GBK5
2		END BLOCKS	PHOENIX CONTACT, #1201442

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

PUMP JUNCTION BOX INTERIOR DETAIL (FOR DUPLEX SET-UP)

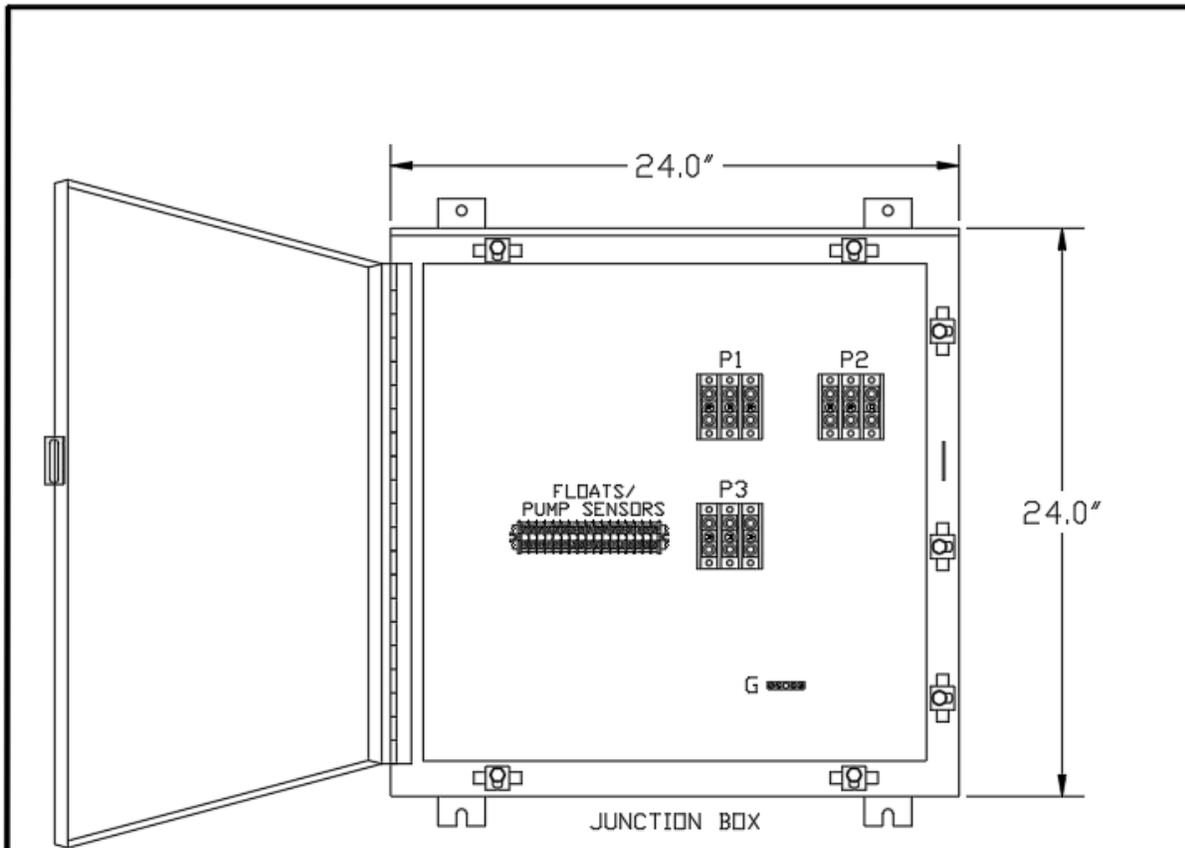


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

**PUMP JUNCTION BOX
INTERIOR DETAIL
(FOR DUPLEX SET-UP)**

DRAWN BY: P. DAVIS	SCALE: NOT TO SCALE
CHECKED BY: K. JOSEPH	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: DUPLEX PUMP JUNCTION BOX	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



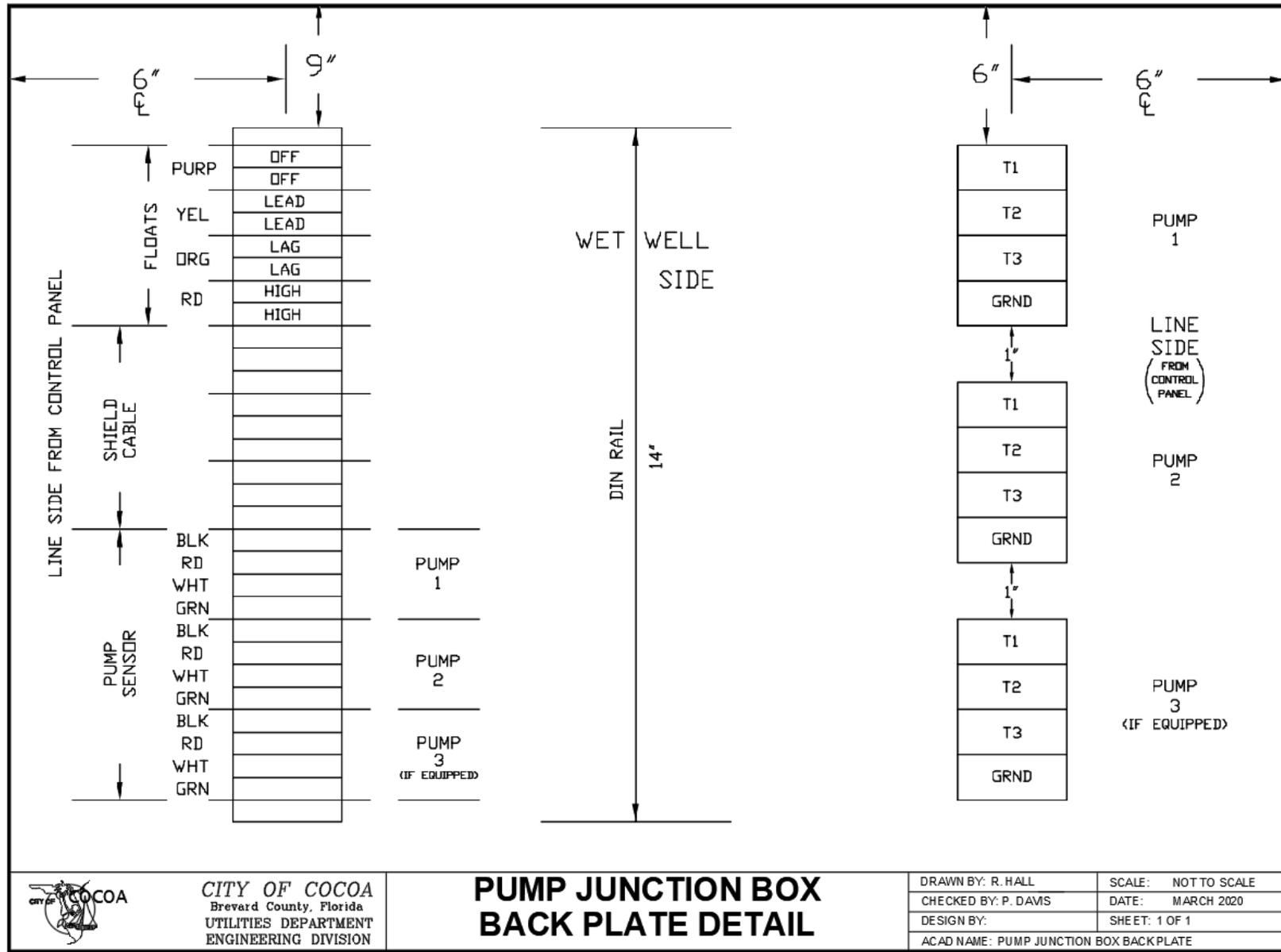
BILL OF MATERIALS			
QTY.	ABBR.	DESCRIPTION	MANUFACTURER, PART#
1	J-BOX	JUNCTION BOX, 316SS N4X	SCHAEFER'S, SPN4SS6-24246
34		CONTROL TERMINALS	PHDENIX CONTACT #3044102
3		MOTOR POWER BLOCKS	NFI INDUSTRIES, #AS-K1-K1
1		GROUNDING BAR	EATON, GBK5
2		END BLOCKS	PHDENIX CONTACT, #1201442

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

PUMP JUNCTION BOX INTERIOR DETAIL (FOR TRIPLEX SET-UP)

 CITY OF COCOA Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	PUMP JUNCTION BOX INTERIOR DETAIL (FOR TRIPLEX SET-UP)	DRAWN BY: P. DAVIS	SCALE: NOT TO SCALE
		CHECKED BY: K. JOSEPH	DATE: MARCH 2020
		DESIGN BY:	SHEET: 1 OF 1
		ACAD NAME: TRIPLEX PUMP JUNCTION BOX	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

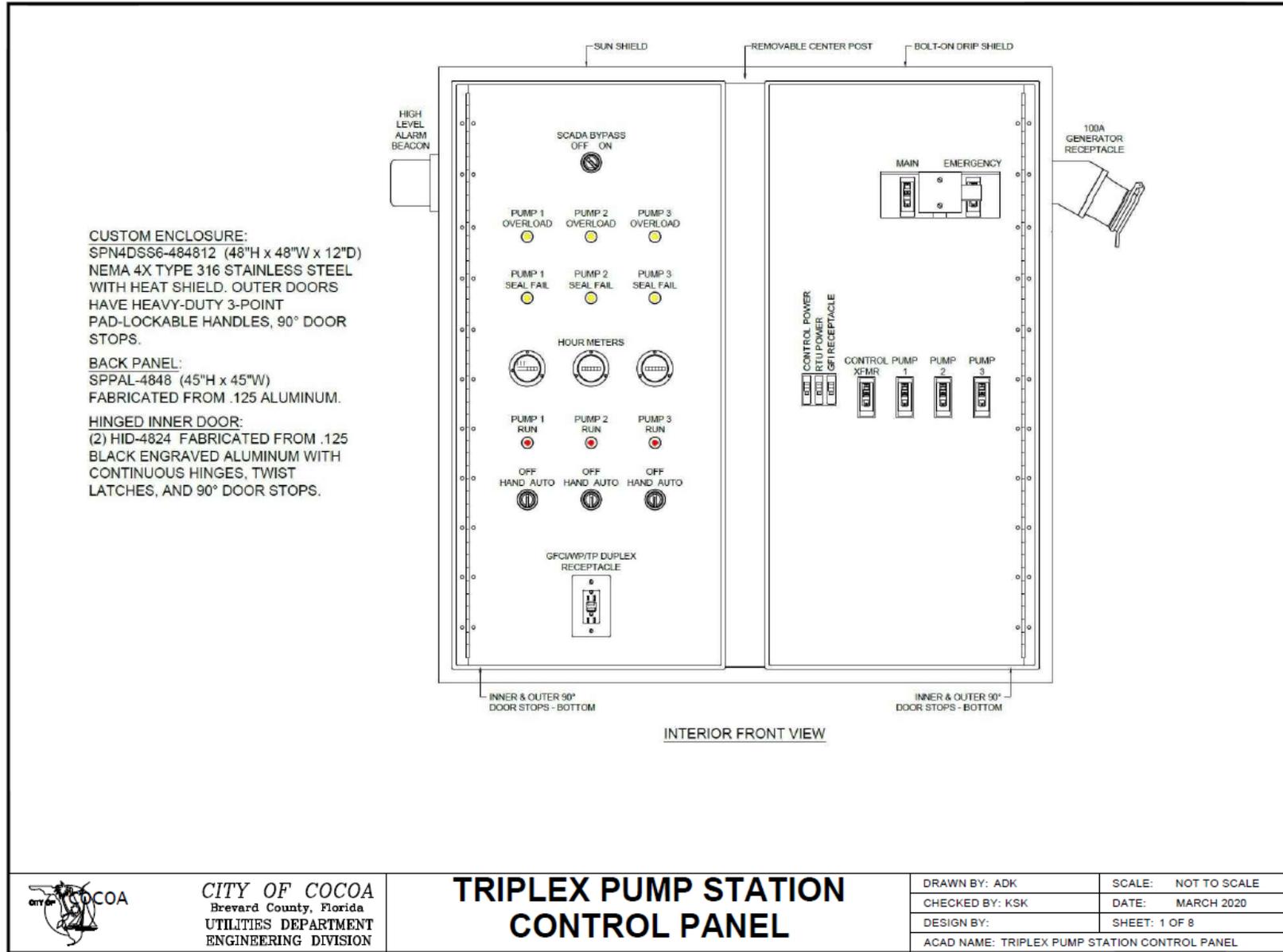


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

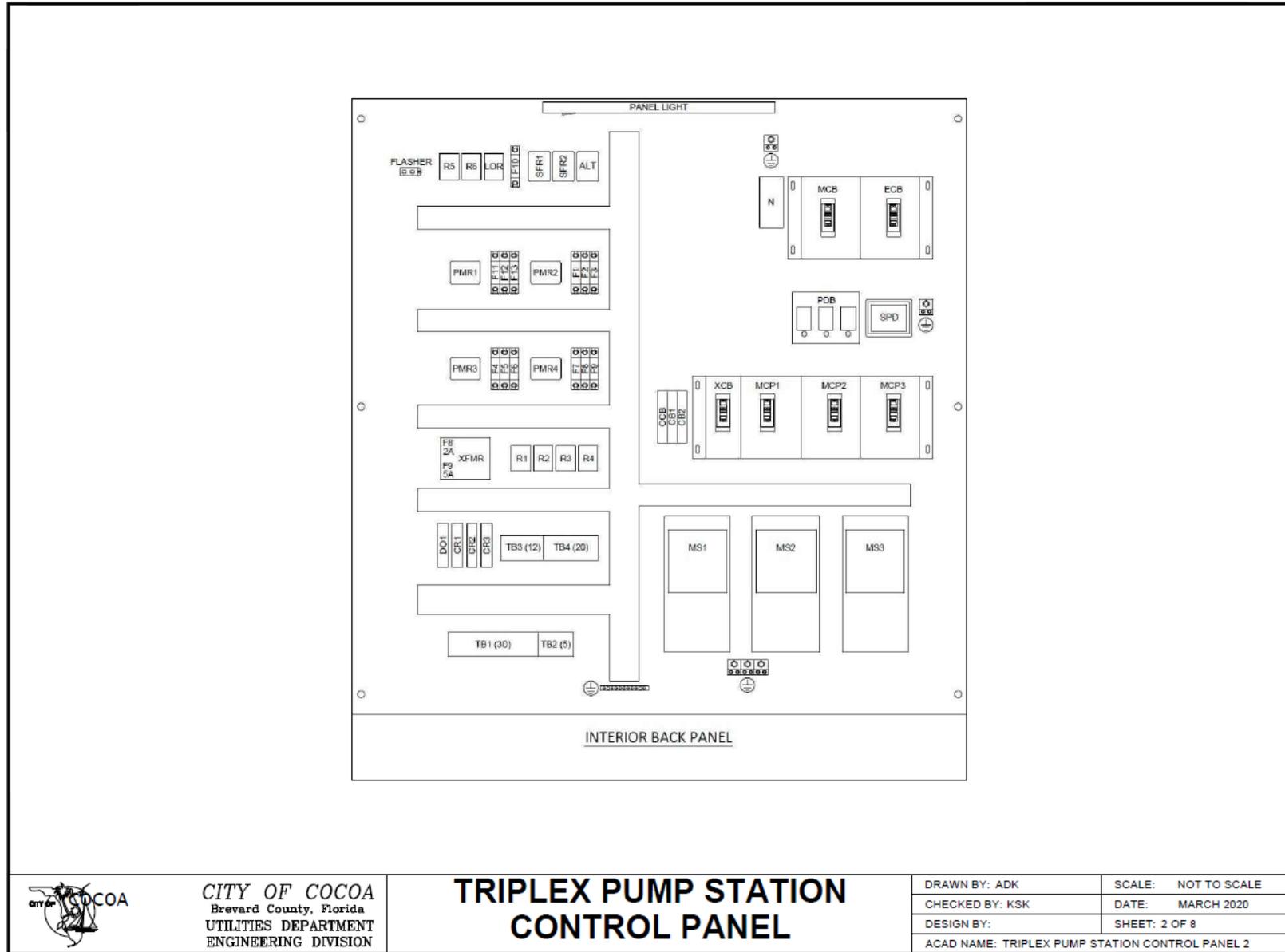
PUMP JUNCTION BOX BACK PLATE DETAIL

DRAWN BY: R. HALL	SCALE: NOT TO SCALE
CHECKED BY: P. DAMS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: PUMP JUNCTION BOX BACK PLATE	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

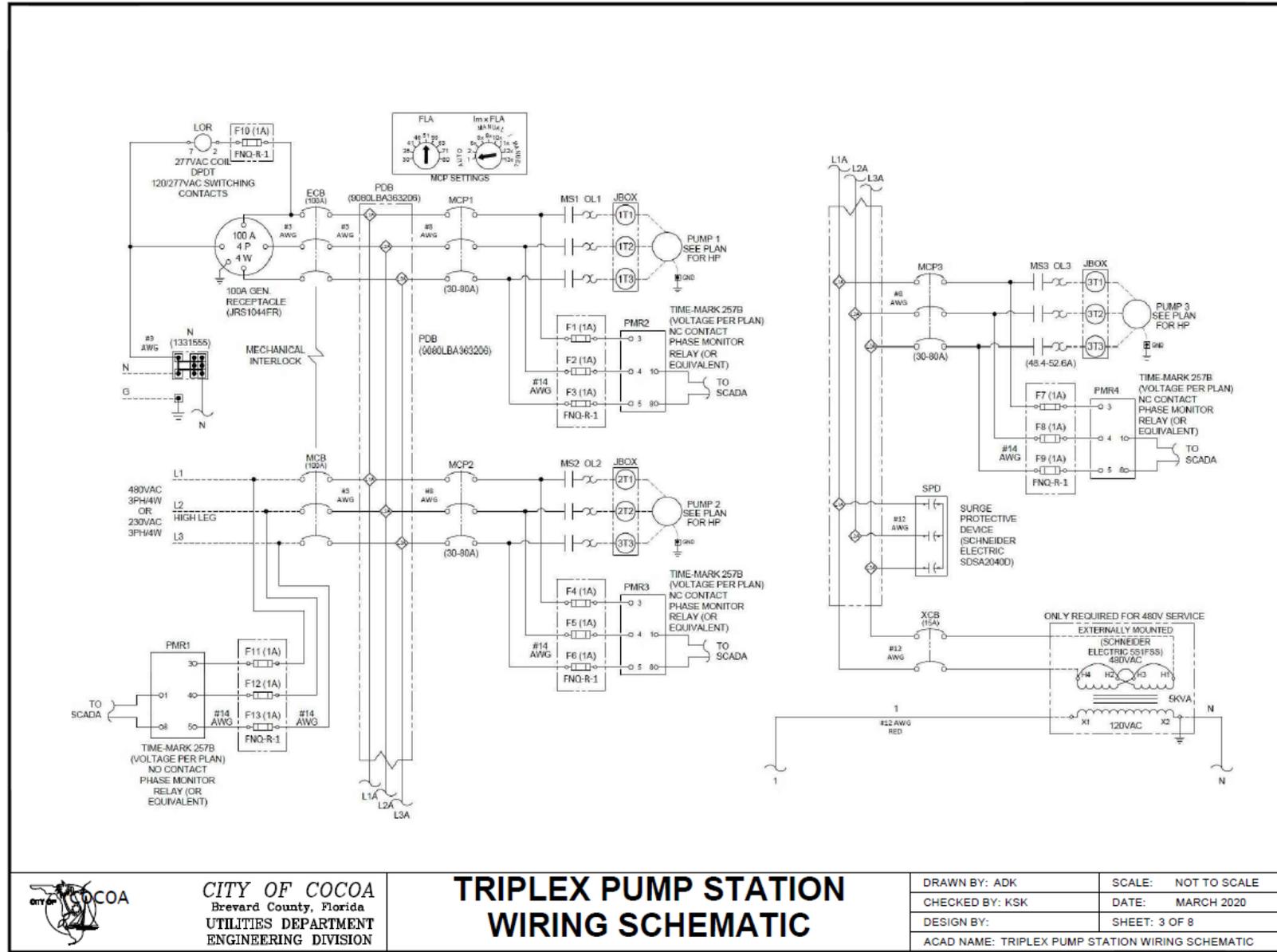


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

TRIPLEX PUMP STATION CONTROL PANEL

DRAWN BY: ADK	SCALE: NOT TO SCALE
CHECKED BY: KSK	DATE: MARCH 2020
DESIGN BY:	SHEET: 2 OF 8
ACAD NAME: TRIPLEX PUMP STATION CONTROL PANEL 2	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

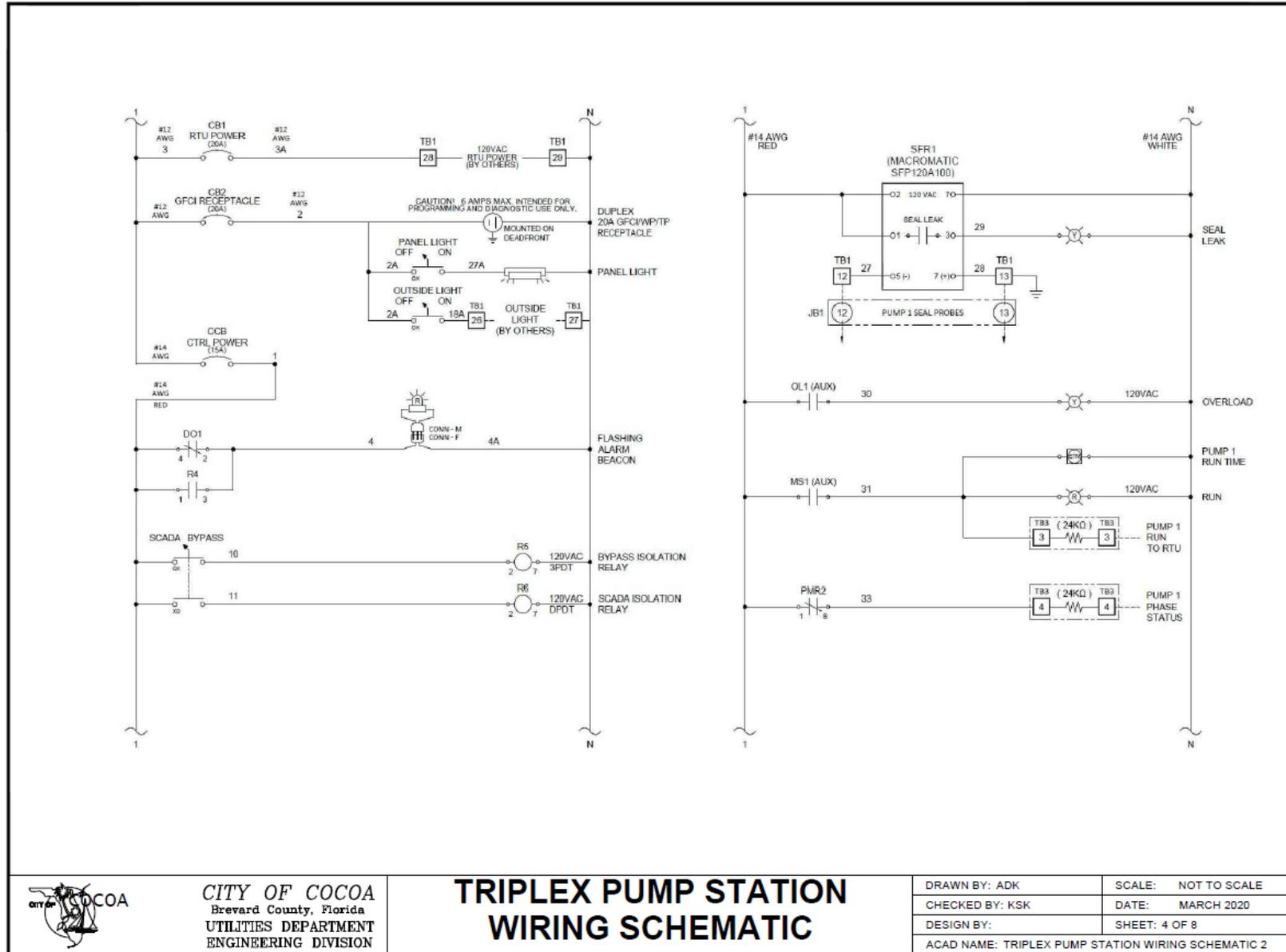


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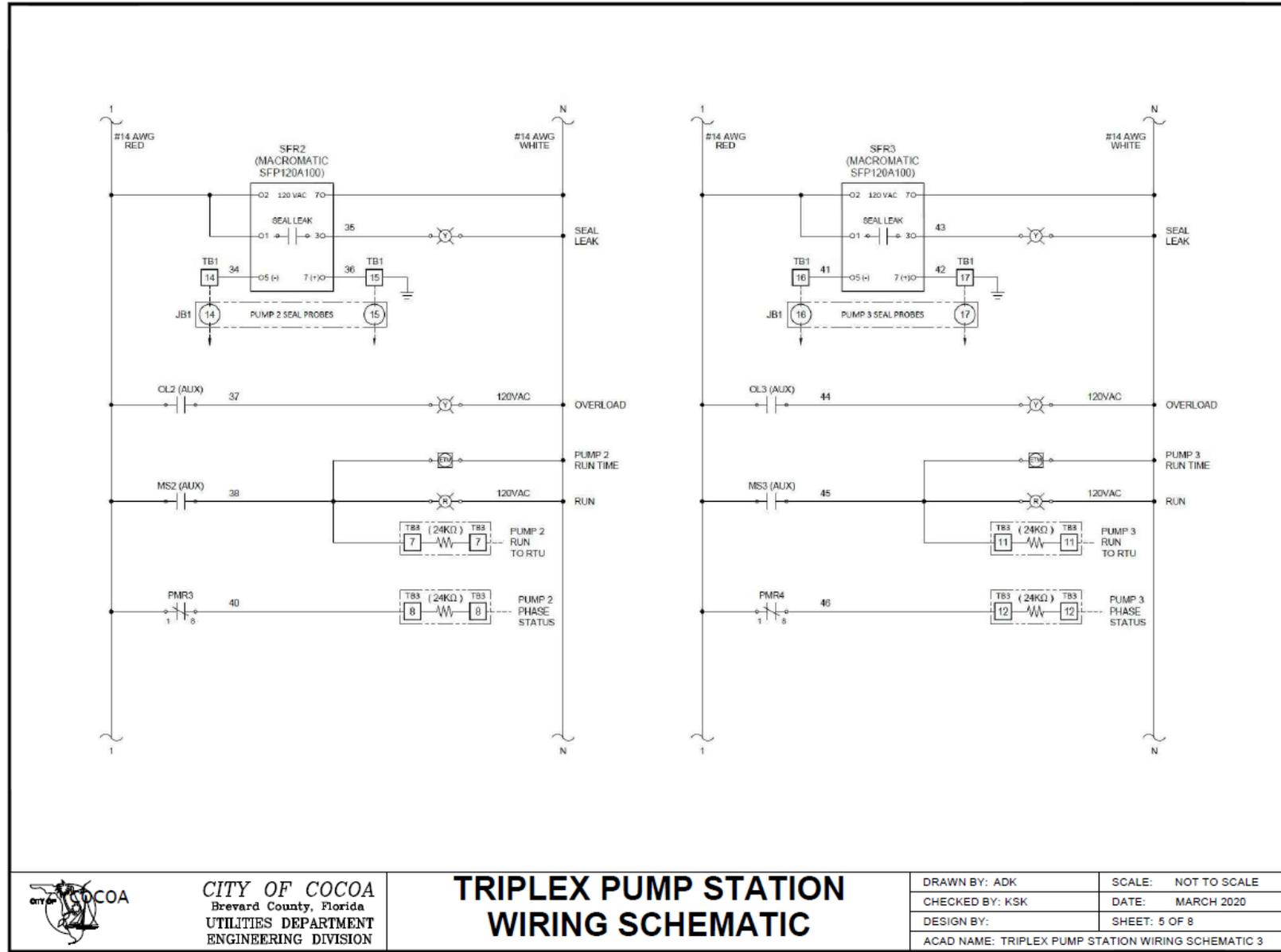
TRIPLEX PUMP STATION WIRING SCHEMATIC

DRAWN BY: ADK	SCALE: NOT TO SCALE
CHECKED BY: KSK	DATE: MARCH 2020
DESIGN BY:	SHEET: 3 OF 8
ACAD NAME: TRIPLEX PUMP STATION WIRING SCHEMATIC	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

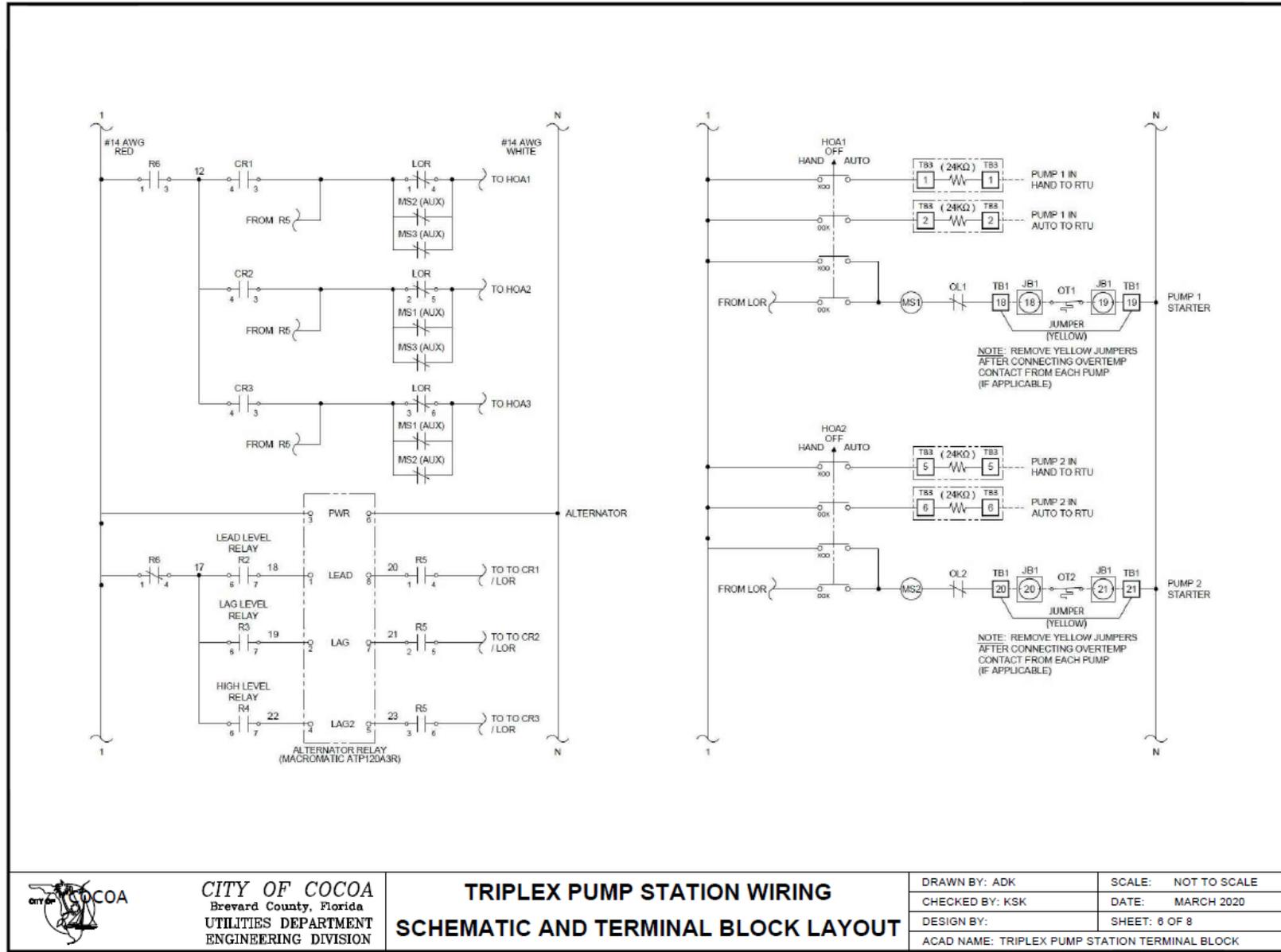


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

TRIPLEX PUMP STATION WIRING SCHEMATIC

DRAWN BY: ADK	SCALE: NOT TO SCALE
CHECKED BY: KSK	DATE: MARCH 2020
DESIGN BY:	SHEET: 5 OF 8
ACAD NAME: TRIPLEX PUMP STATION WIRING SCHEMATIC 3	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

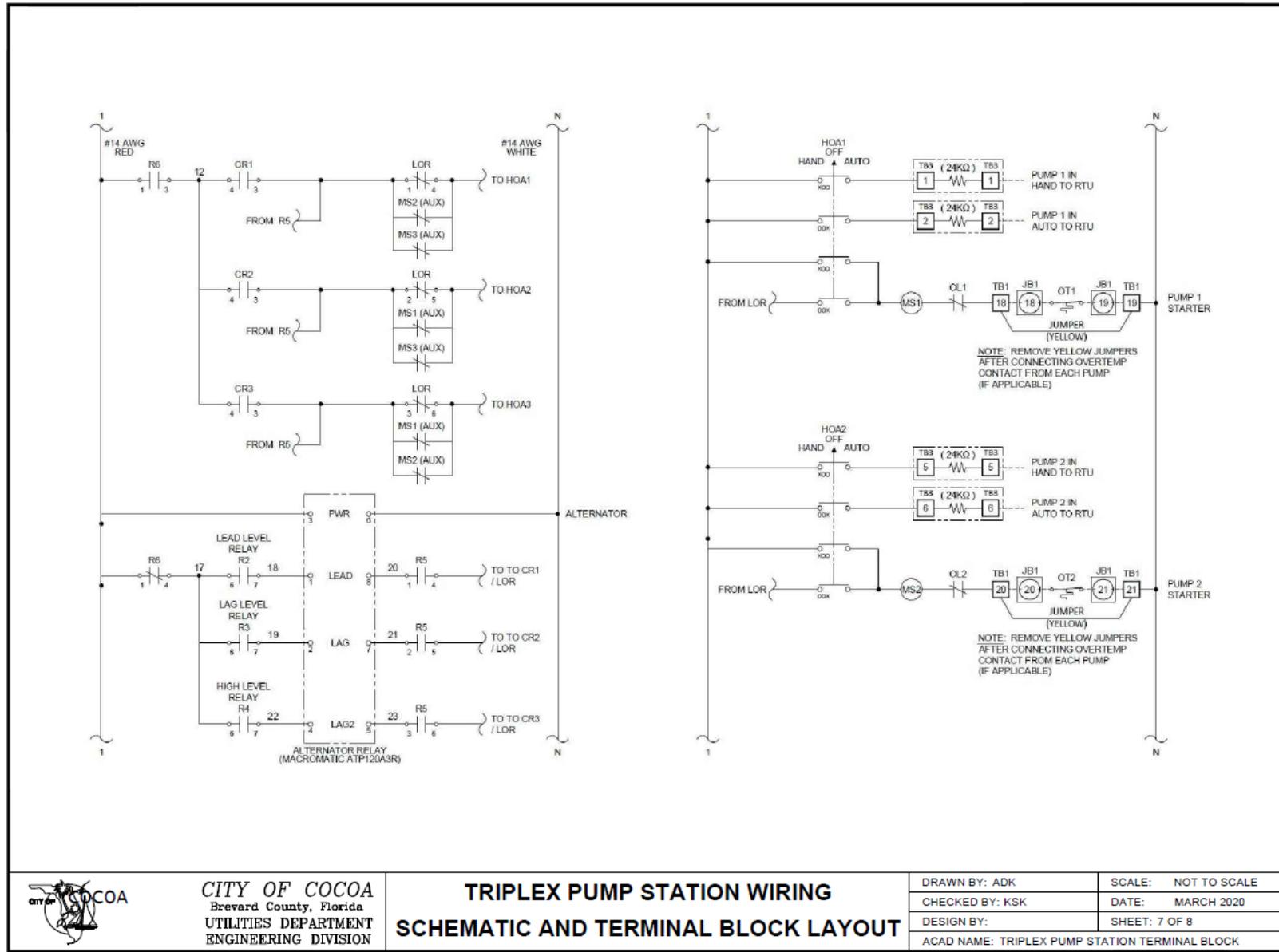


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

TRIPLEX PUMP STATION WIRING SCHEMATIC AND TERMINAL BLOCK LAYOUT

DRAWN BY: ADK	SCALE: NOT TO SCALE
CHECKED BY: KSK	DATE: MARCH 2020
DESIGN BY:	SHEET: 8 OF 8
ACAD NAME: TRIPLEX PUMP STATION TERMINAL BLOCK	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

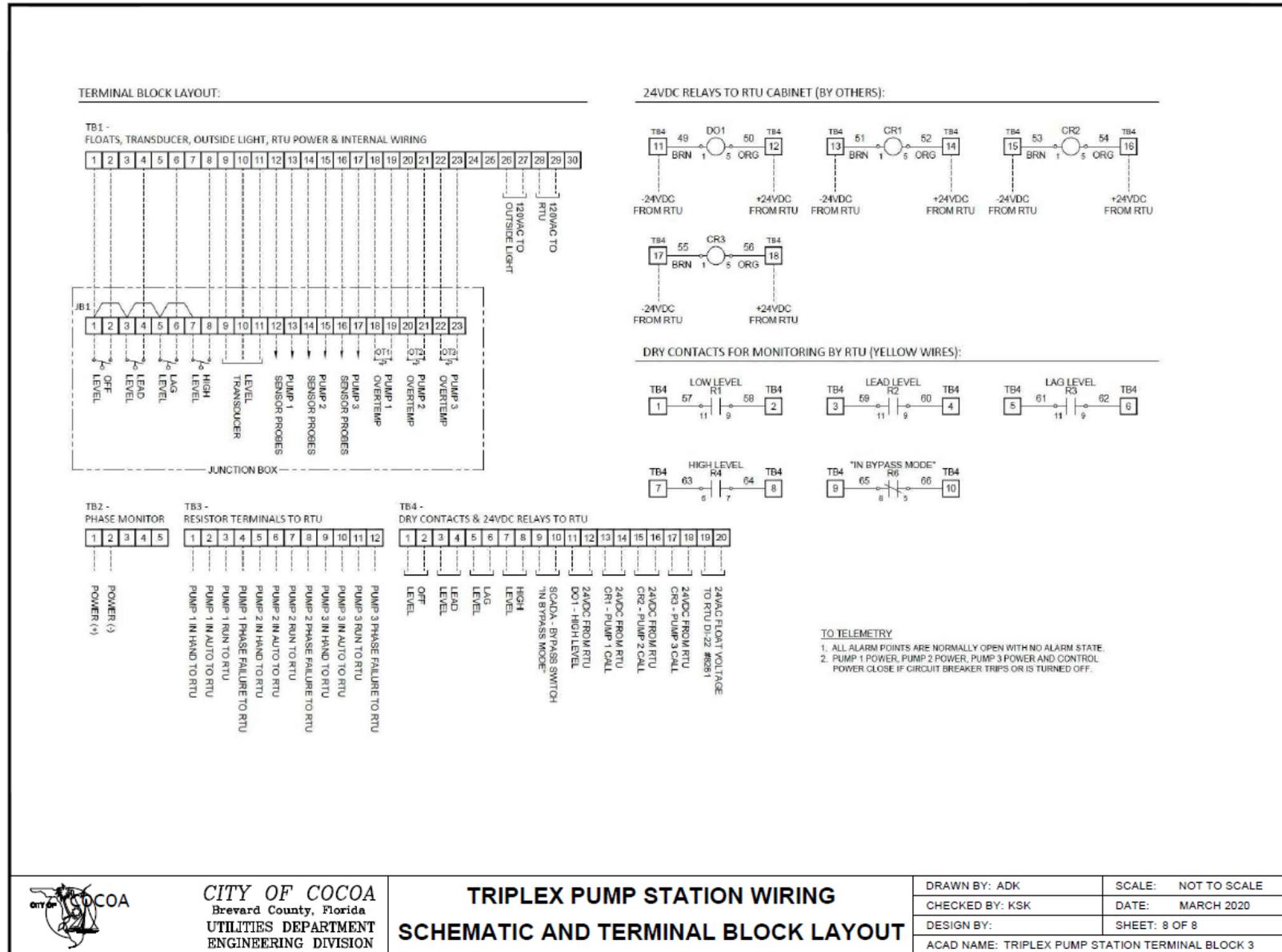


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

**TRIPLEX PUMP STATION WIRING
 SCHEMATIC AND TERMINAL BLOCK LAYOUT**

DRAWN BY: ADK	SCALE: NOT TO SCALE
CHECKED BY: KSK	DATE: MARCH 2020
DESIGN BY:	SHEET: 7 OF 8
ACAD NAME: TRIPLEX PUMP STATION TERMINAL BLOCK	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

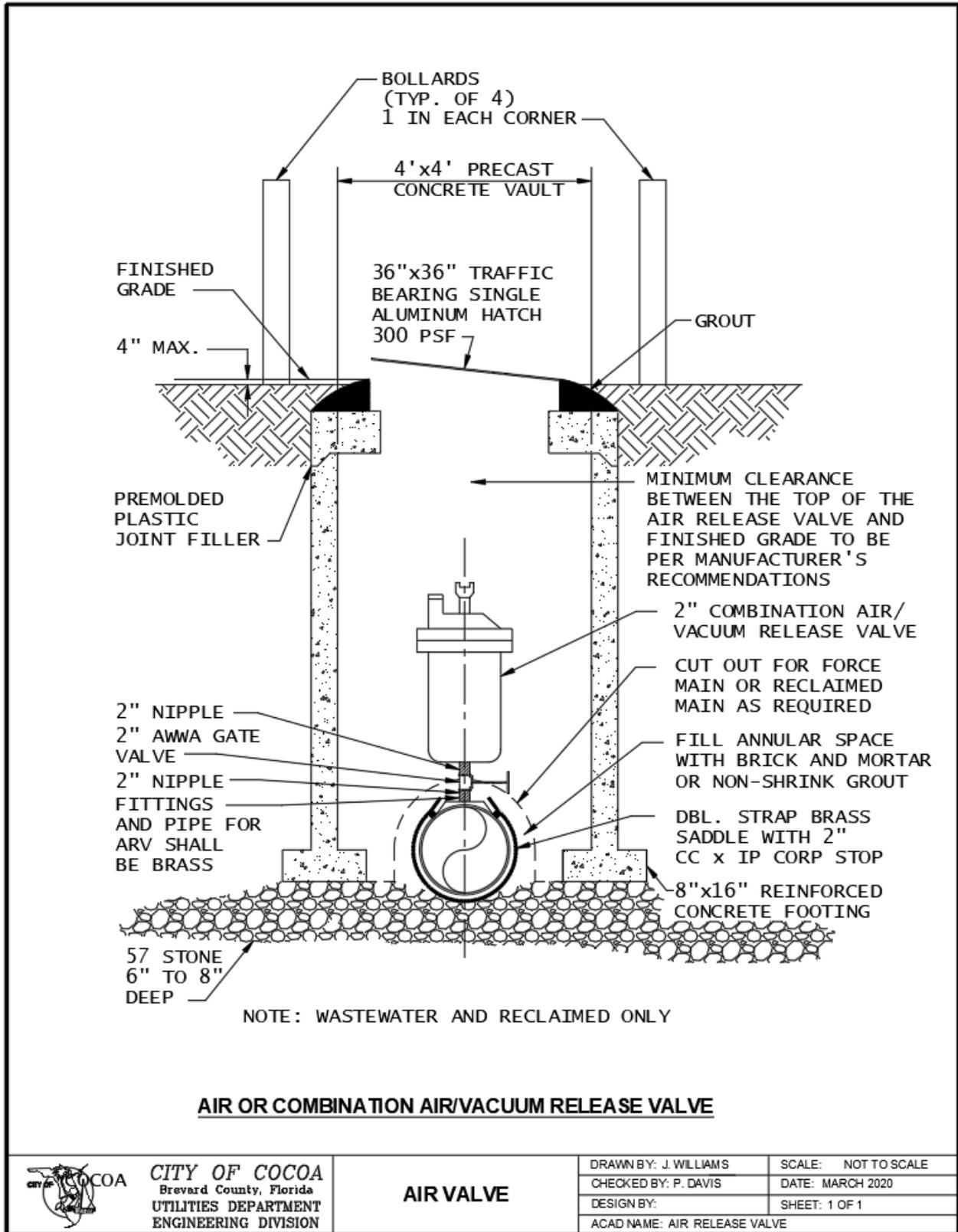


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

TRIPLEX PUMP STATION WIRING SCHEMATIC AND TERMINAL BLOCK LAYOUT

DRAWN BY: ADK	SCALE: NOT TO SCALE
CHECKED BY: KSK	DATE: MARCH 2020
DESIGN BY:	SHEET: 8 OF 8
ACAD NAME: TRIPLEX PUMP STATION TERMINAL BLOCK 3	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

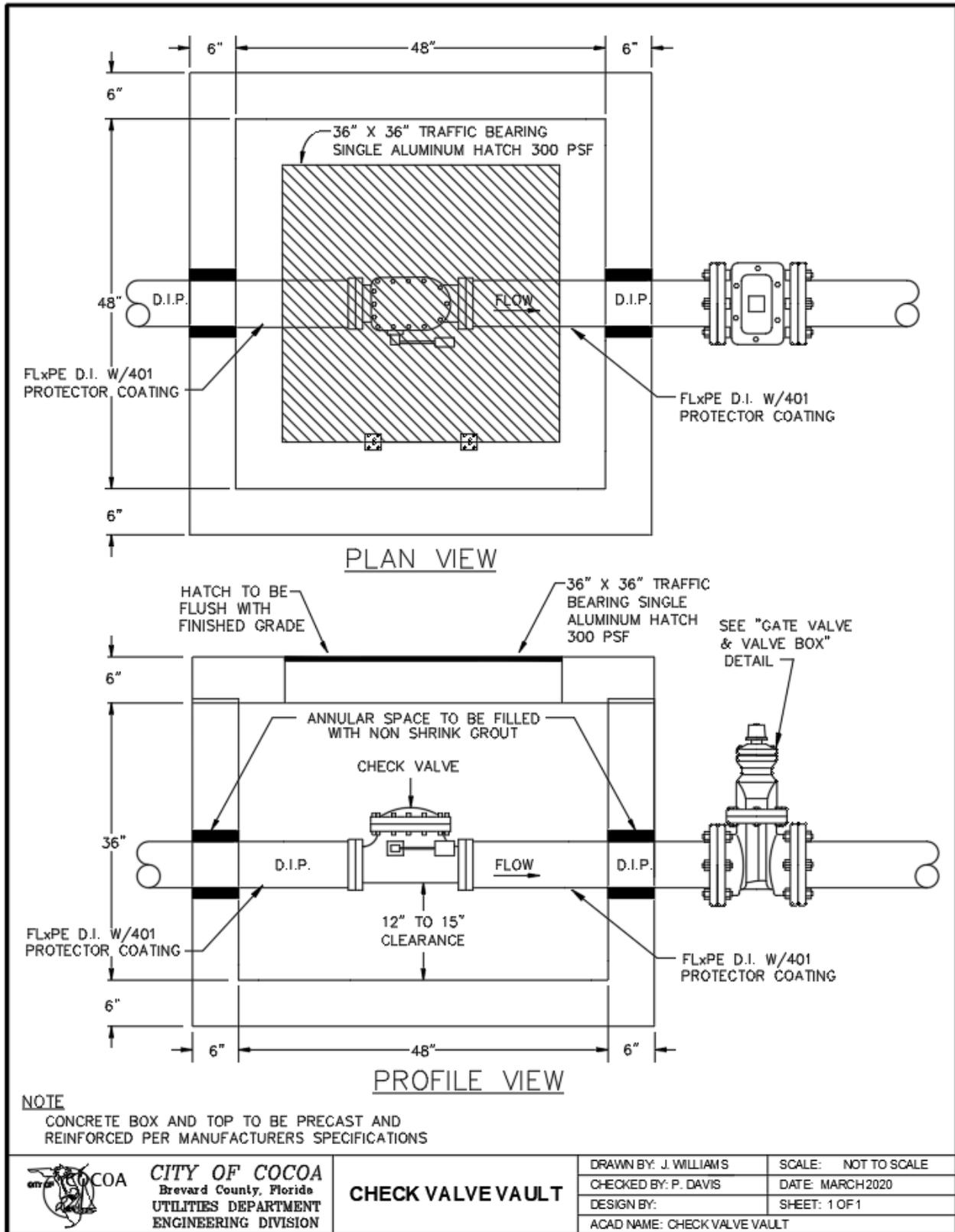


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

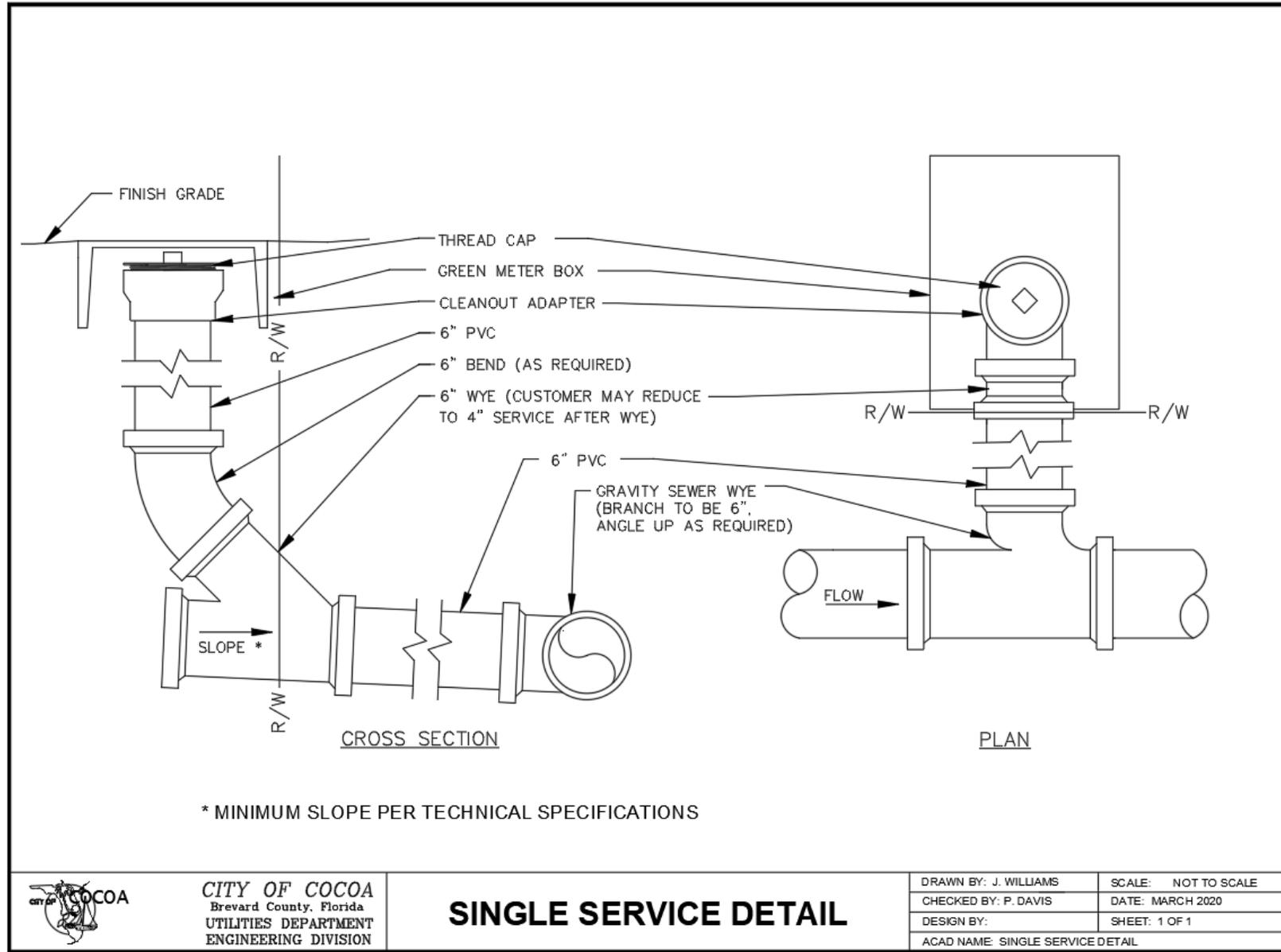
AIR VALVE

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: AIR RELEASE VALVE	

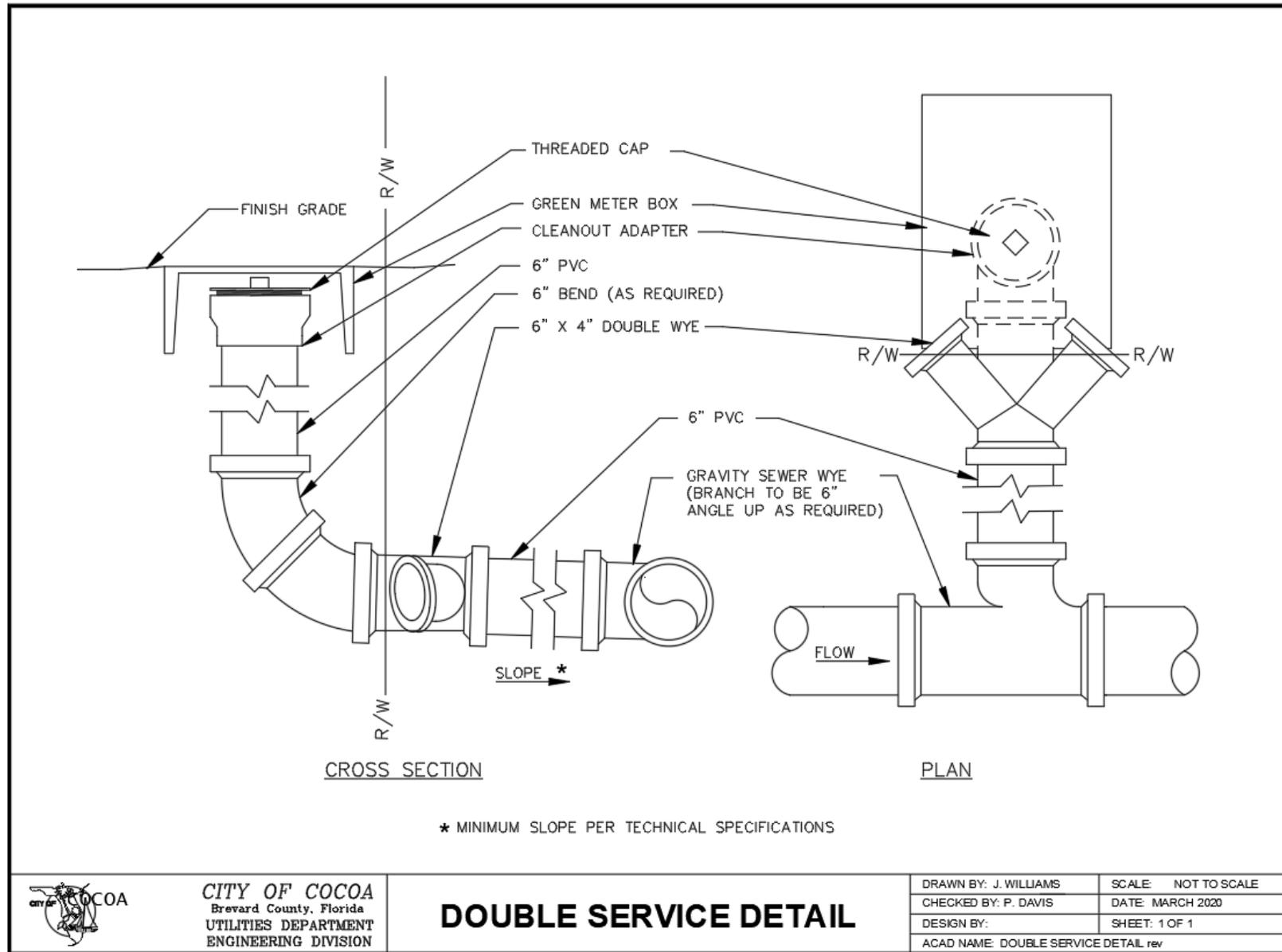
APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

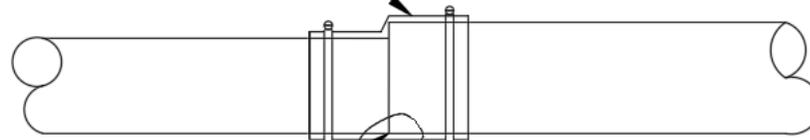


APPENDIX B. APPROVED DRAWINGS AND DETAILS

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

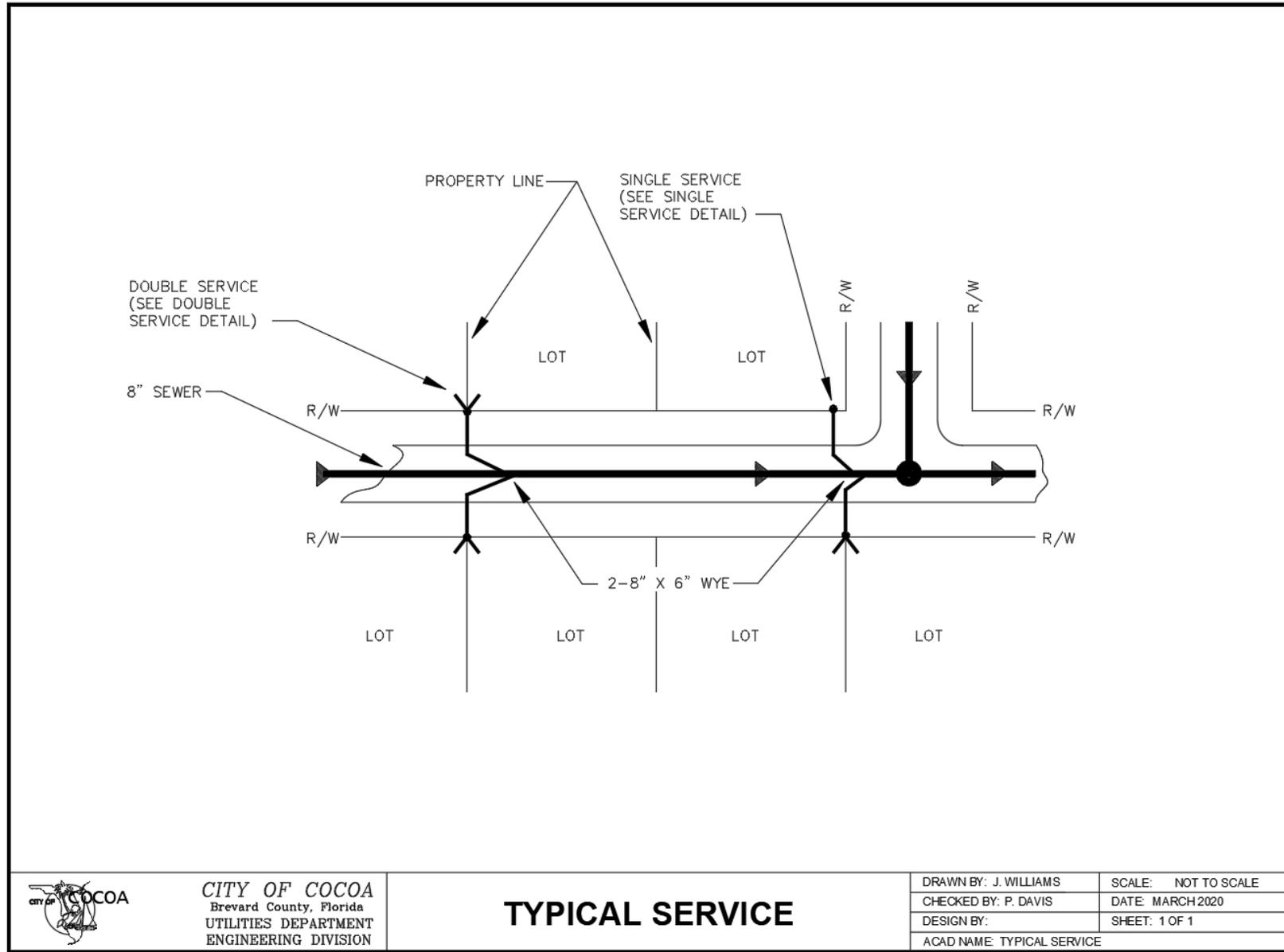


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

TRANSITION COUPLING

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TRANSITION COUPLING	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

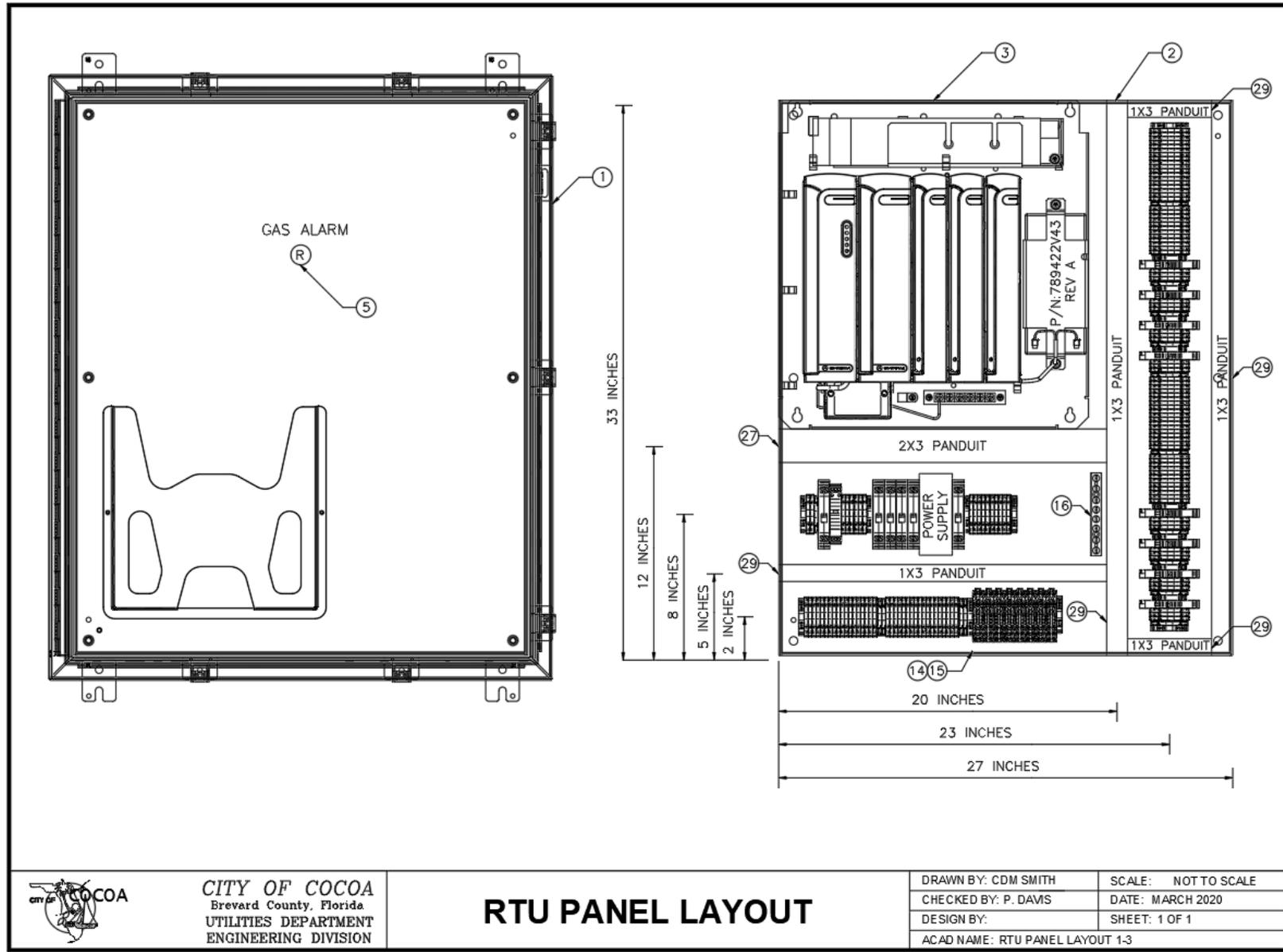


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

TYPICAL SERVICE

DRAWN BY: J. WILLIAMS	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: TYPICAL SERVICE	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

RTU PANEL LAYOUT

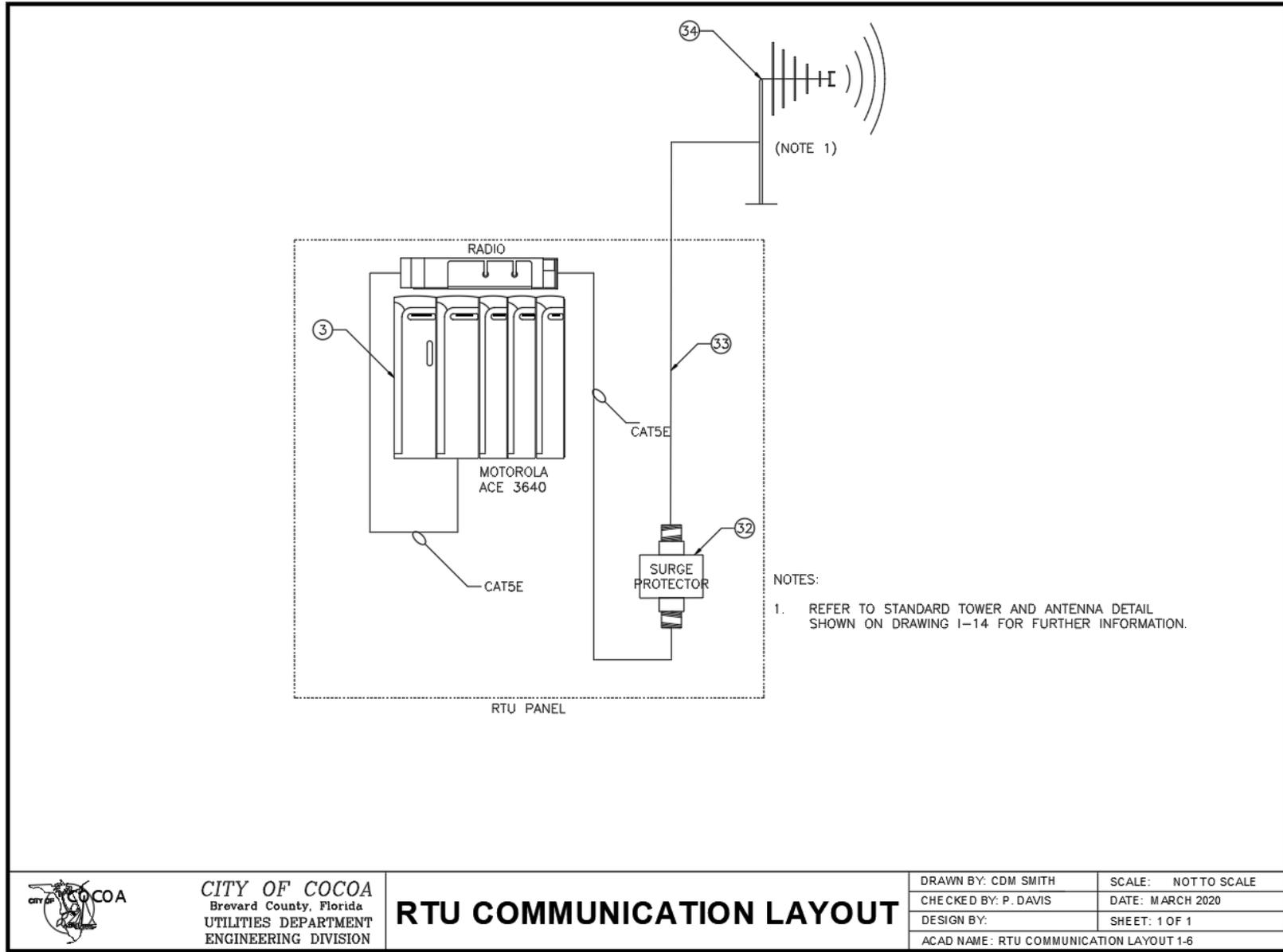
DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RTU PANEL LAYOUT 1-3	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

ITEM#	PART#	DESCRIPTION	MANUFACTURER	QTY
1	S363012N4X	Enclosure: 36H x 30W x 12D	E-Box Enclosures	1
2	3630P	Backplane	E-Box Enclosures	1
3	ACE3640	ACE3600 RTU Package: City of Cocoa Standard	Motorola	1
4				
5	855PB-B10SE422	Alarm Light: Panel Mount, 30mm, Red	Allen-Bradley	1
6	2905228	Plugtrab Mains Surge Protector	Phoenix Contact	1
7	SDN 5-24-100C	Power Supply: 24VDC, 5A	Sola	1
8	M9F43115	1-Pole Circuit Breaker: 15A	Square D	1
9	M9F43105	1-Pole Circuit Breaker: 5A	Square D	2
10	M9F43102	1-Pole Circuit Breaker: 2A	Square D	2
11	M9F43101	1-Pole Circuit Breaker: 1A	Square D	1
12	926224	Surge Protection: Blitzductor BSP M2 BE 24	DEHN	8
13	920300	Surge Protection: Base	DEHN	8
14	RXG22B7	Interface Relay: 24VAC coil, 5A contacts, LED	Square D	8
15	RGZE1S48M	Interface Relay Socket	Square D	8
16	PK15GTA	Ground Bar	Schneider Electric	1
17	1492-J4	Terminal Block: Grey, 600V, 35A, 22-10AWG	Allen-Bradley	132
18	1492-J4-W	Terminal Block: White, 600V, 35A, 22-10AWG	Allen-Bradley	6
19	1492-JG4	Grounding Terminal Block	Allen-Bradley	15
20	1492-WFB424	Fused Terminal Block: 10-57VDC, with blown fuse indicator	Allen-Bradley	8
21	1492-EBJ3	End Barrier	Allen-Bradley	14
22	1492-EBJ16	Partition Plate	Allen-Bradley	4
23	1492-EAJ35	End Anchor	Allen-Bradley	8
24	1492-CJJ6-10	Center Jumper	Allen-Bradley	1 lot
25	1492-MR6X12	Marking Tags: Blank, snap-in	Allen-Bradley	128
26	199-DR1	Din Rail, 35mm	Allen-Bradley	1 Lot
27	F2X3WH6	Wire duct: 2"W x3"H, white	Panduit	1 Lot
28	C2WH6	Wire duct cover: 2", white	Panduit	1 Lot
29	F1X3WH6	Wire duct: 1"W x3"H, white	Panduit	1 Lot
30	C1WH6	Wire duct cover: 1", white	Panduit	1 Lot
31				
32	IS-50NX-C2	Antenna Surge Protector	Polyphaser	1
33		Antenna Cable		1
34		Antenna : Yagi		1

	CITY OF COCOA Brevard County, Florida UTILITIES DEPARTMENT ENGINEERING DIVISION	RTU PANEL BILL OF MATERIALS	DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
			CHECKED BY: P. DAVIS	DATE: MARCH 2020
			DESIGN BY:	SHEET: 1 OF 1
			ACAD NAME: RTU PANEL BILL OF MATERIALS 1-5	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

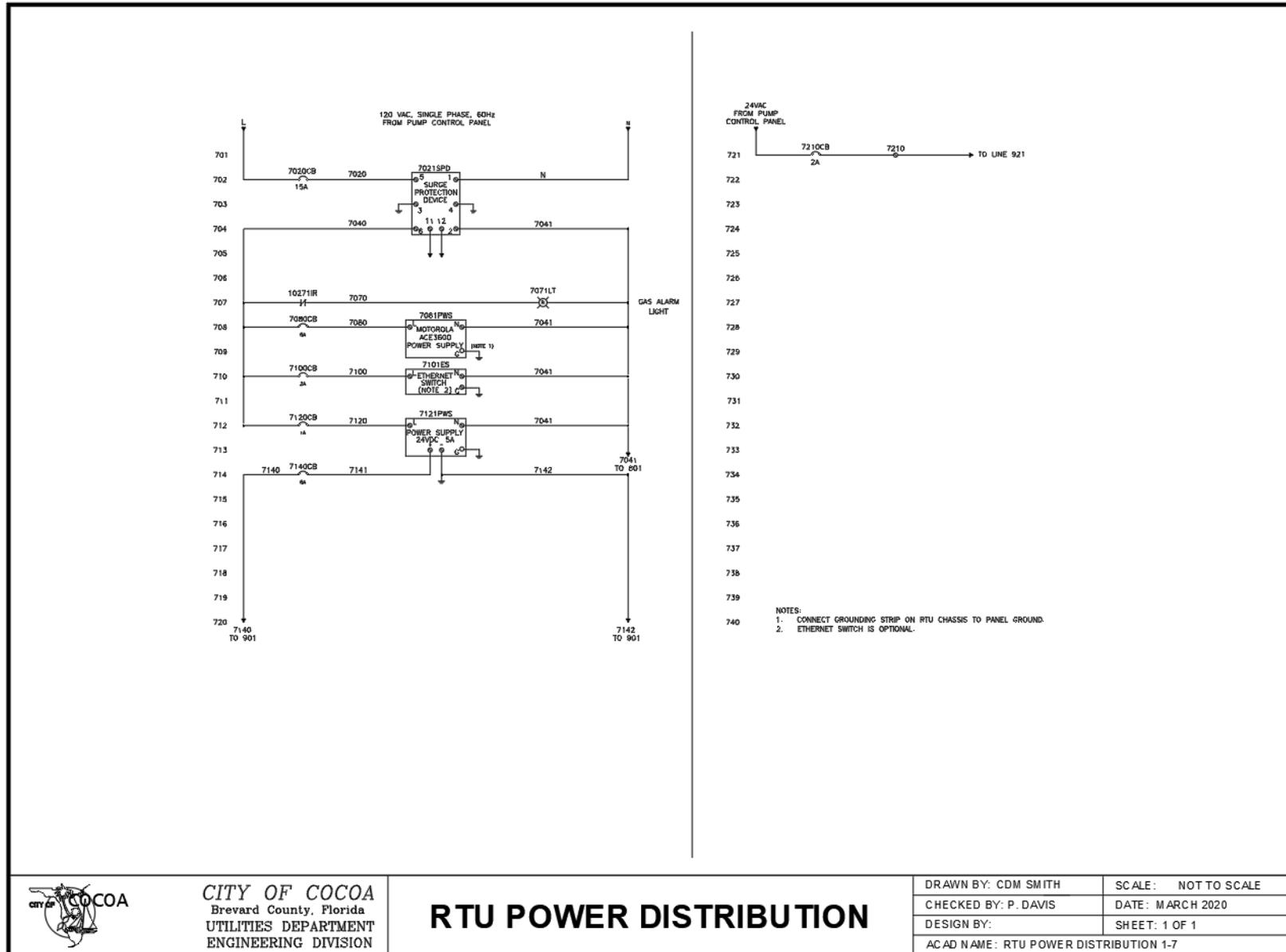


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

RTU COMMUNICATION LAYOUT

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RTU COMMUNICATION LAYOUT 1-6	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

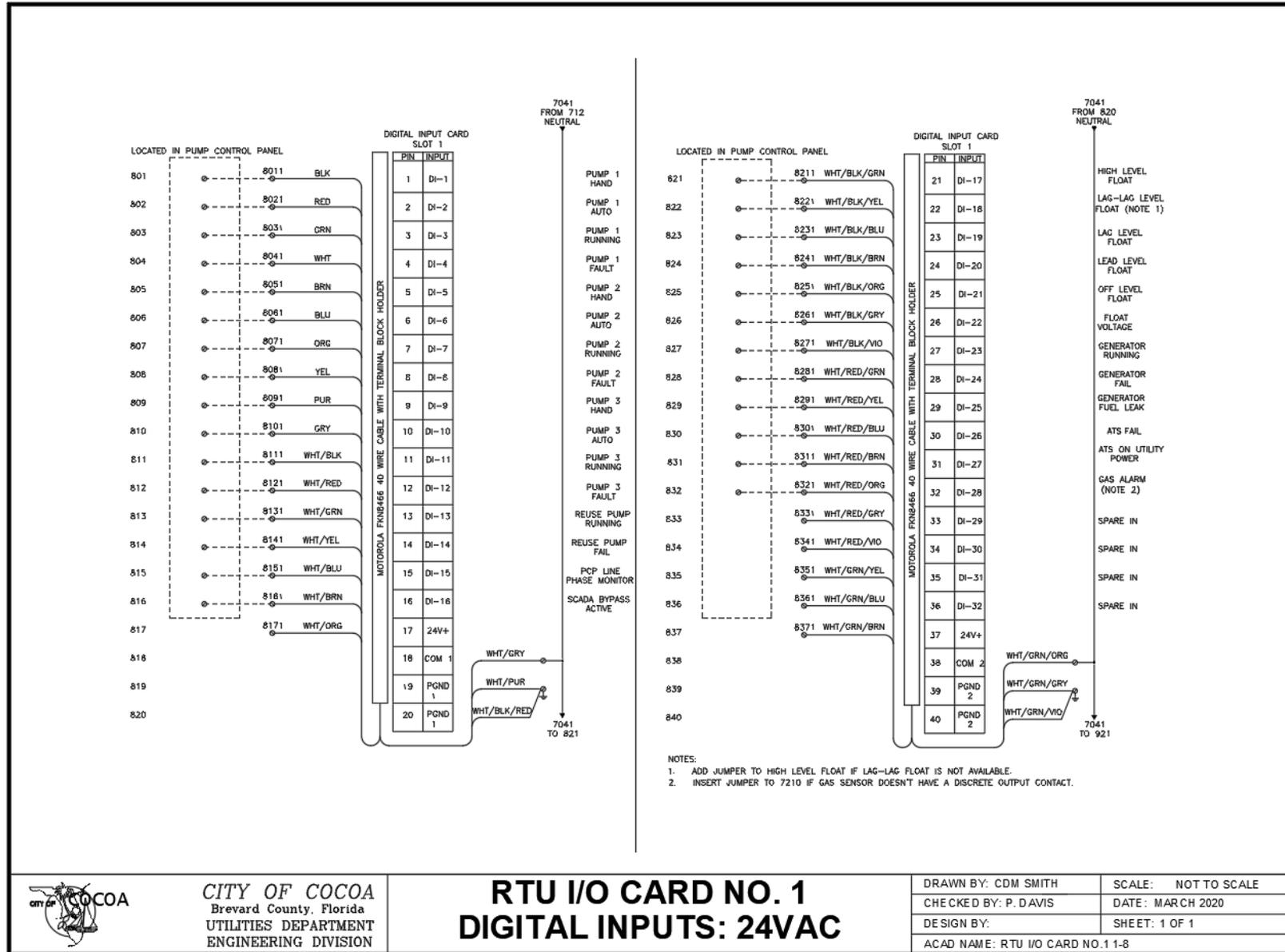


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

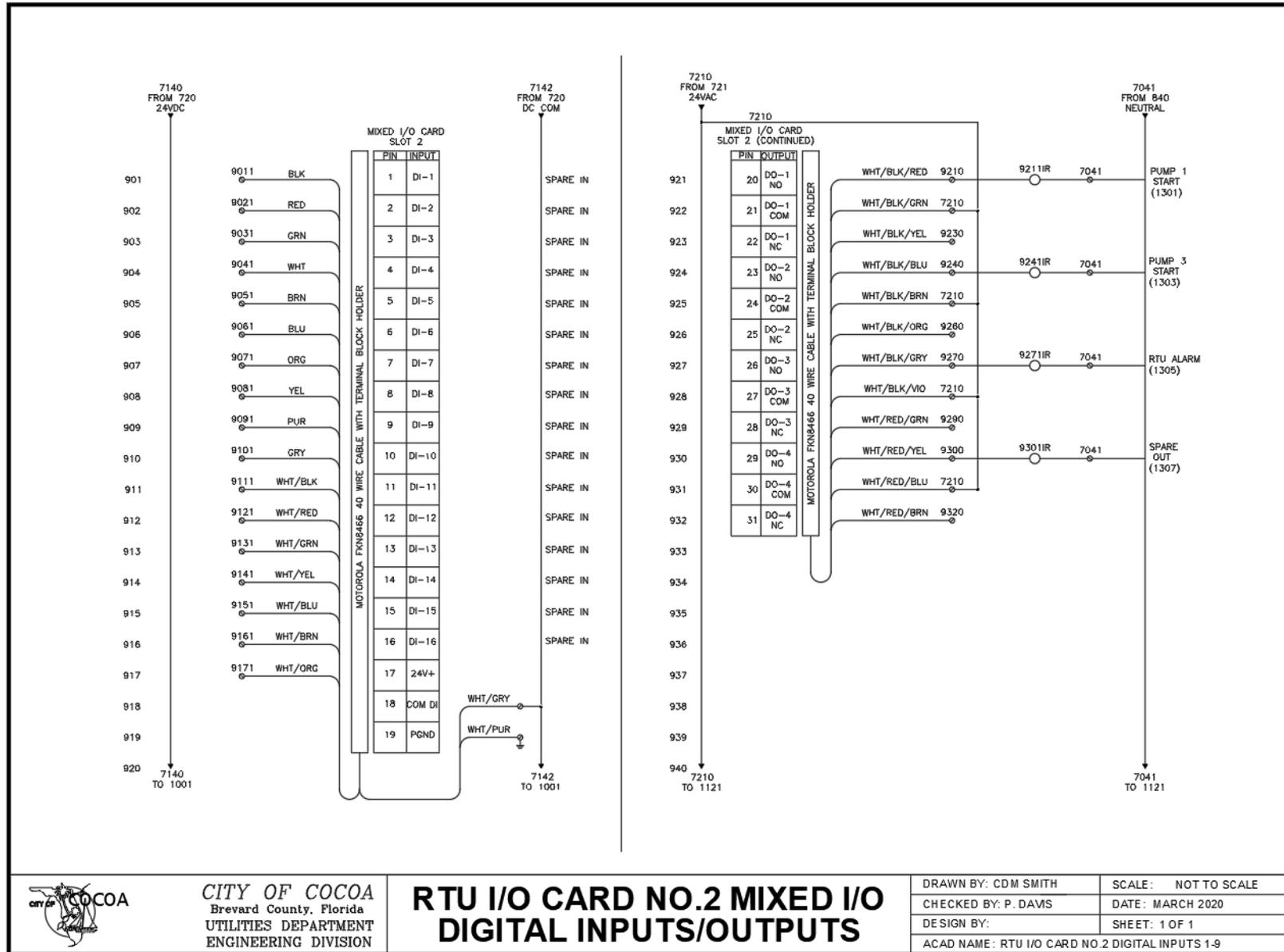
RTU POWER DISTRIBUTION

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RTU POWER DISTRIBUTION 1-7	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

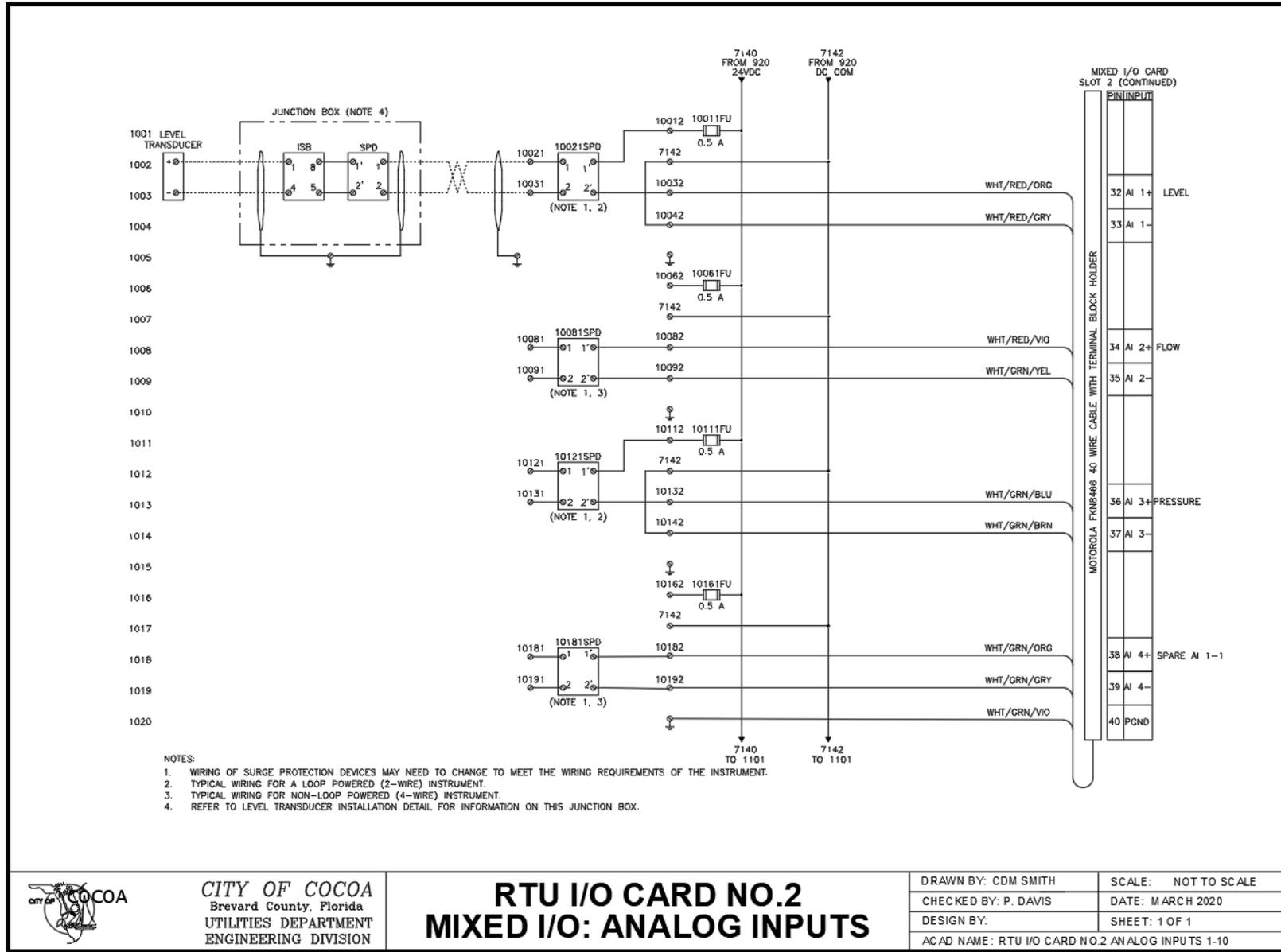


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

RTU I/O CARD NO.2 MIXED I/O DIGITAL INPUTS/OUTPUTS

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RTU I/O CARD NO.2 DIGITAL INPUTS 1-9	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

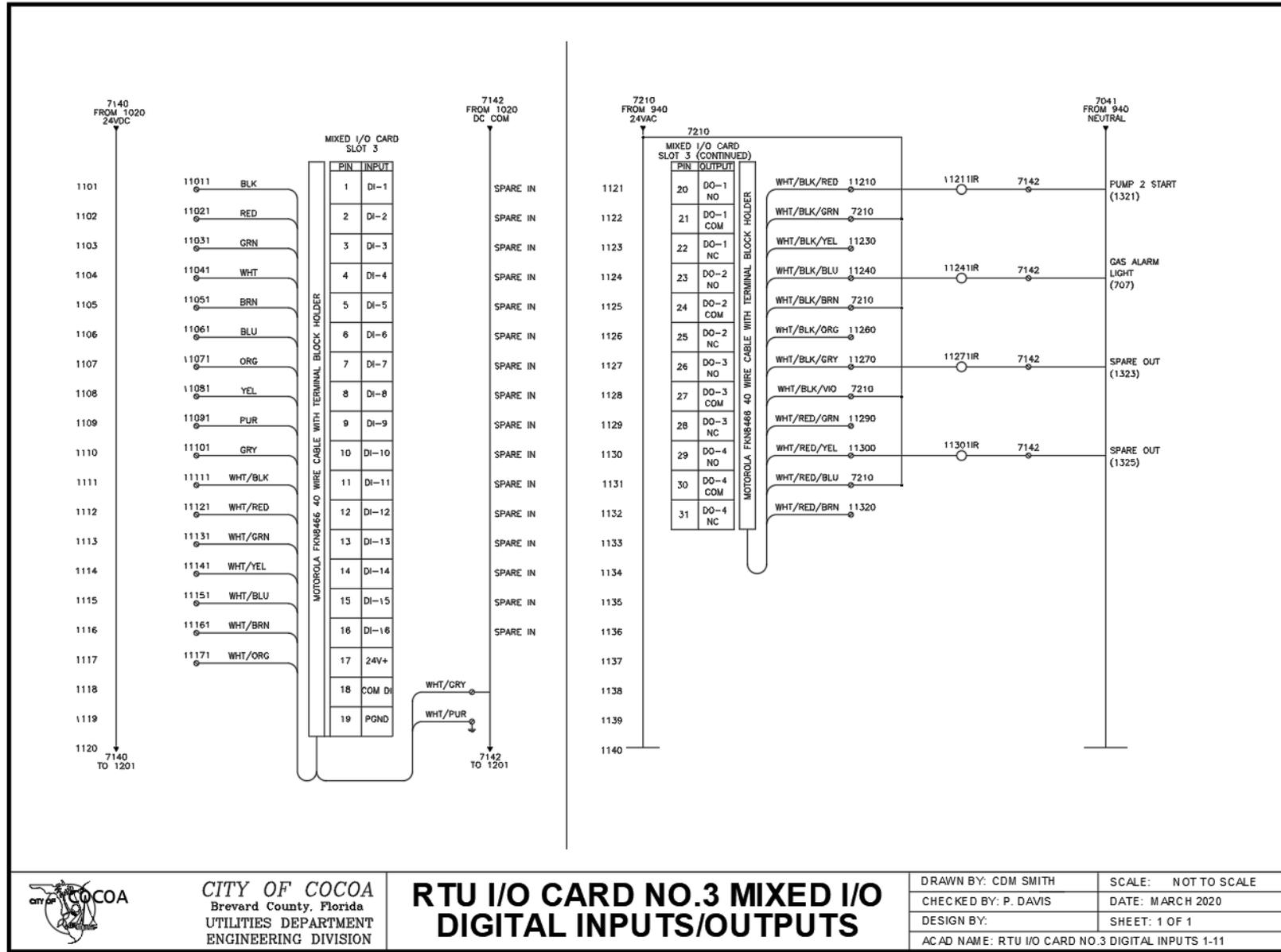


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

RTU I/O CARD NO.2 MIXED I/O: ANALOG INPUTS

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
AC AD NAME: RTU I/O CARD NO.2 ANALOG INPUTS 1-10	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

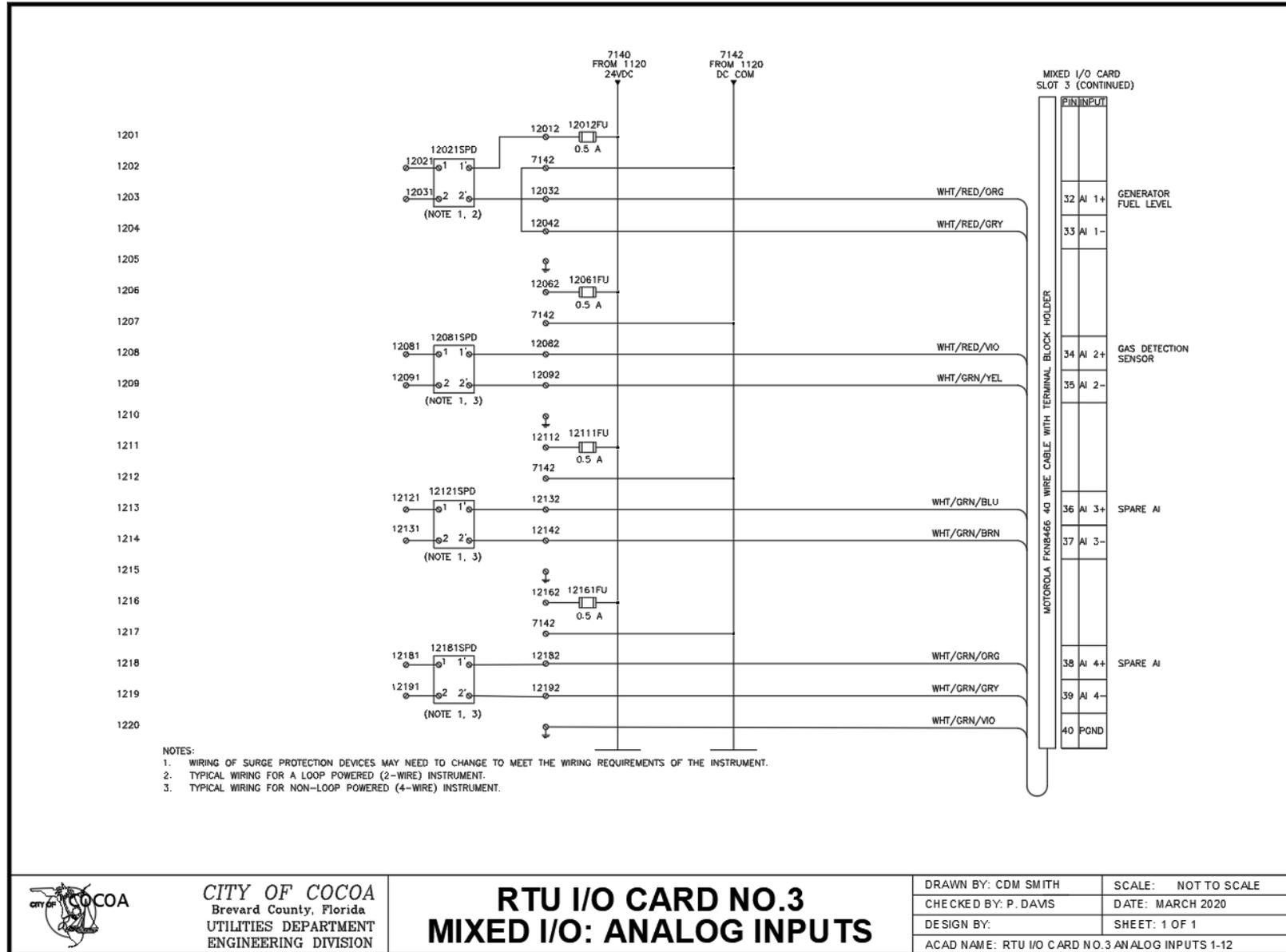


CITY OF COCOA
 Brevard County, Florida
 UTILITIES DEPARTMENT
 ENGINEERING DIVISION

RTU I/O CARD NO.3 MIXED I/O DIGITAL INPUTS/OUTPUTS

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
AC AD NAME: RTU I/O CARD NO.3 DIGITAL INPUTS 1-11	

APPENDIX B. APPROVED DRAWINGS AND DETAILS

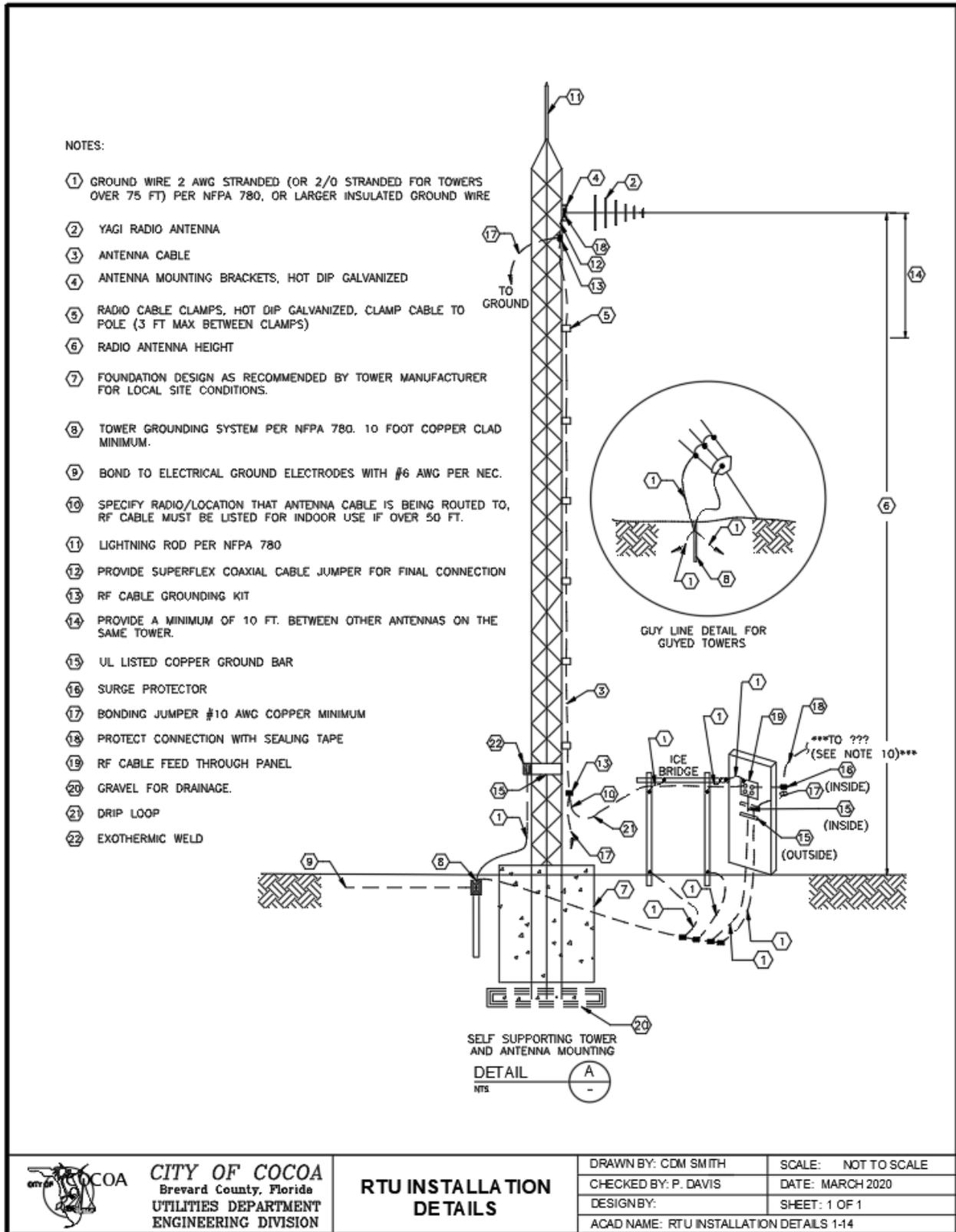


CITY OF COCOA
Brevard County, Florida
UTILITIES DEPARTMENT
ENGINEERING DIVISION

RTU I/O CARD NO.3 MIXED I/O: ANALOG INPUTS

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RTU I/O CARD NO.3 ANALOG INPUTS 1-12	

APPENDIX B. APPROVED DRAWINGS AND DETAILS



APPENDIX B. APPROVED DRAWINGS AND DETAILS

PROJECT SPECIFICATIONS

REFERENCE STANDARDS

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

GENERAL

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

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

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

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

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

ELECTRICAL SURGE PROTECTION

SURGE PROTECTION SHALL BE PROVIDED TO PROTECT THE ELECTRONIC INSTRUMENTATION SYSTEM FROM INDUCED SURGES PROPAGATING ALONG THE SIGNAL AND POWER SUPPLY LINES FROM LIGHTNING OR THE UTILITY SYSTEM. THE PROTECTION SYSTEMS SHALL BE SUCH THAT THE PROTECTIVE LEVEL SHALL NOT INTERFERE WITH NORMAL OPERATION, BUT SHALL BE LOWER THAN THE INSTRUMENT SURGE WITHSTAND LEVEL. PROTECTION SHALL BE MAINTENANCE FREE AND SELF RESTORING. DEVICES SHALL HAVE A RESPONSE TIME OF LESS THAN 50 NANoseconds AND BE CAPABLE OF HANDLING A DISCHARGE SURGE CURRENT (AT AN 8X20µS IMPULSE WAVEFORM) OF AT LEAST 8 KA.

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

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

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

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

PROVIDE COAXIAL GROUNDING KIT FOR EACH RADIO.

PROVIDE GROUNDING KITS, TWO FOR EACH ANTENNAE INSTALLATION (TOP AND BOTTOM).

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

ANTENNAS AND MASTS

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

ANTENNA CABLE ASSEMBLY

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

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

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

CABLE SIZE

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

CABLE INSTALLATION

THE CABLE SHALL BE GROUNDED AT THREE LOCATIONS:

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



CITY OF COCOA
 Brevard County, Florida
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RTU INSTALLATION SPECIFICATIONS

DRAWN BY: CDM SMITH	SCALE: NOT TO SCALE
CHECKED BY: P. DAVIS	DATE: MARCH 2020
DESIGN BY:	SHEET: 1 OF 1
ACAD NAME: RTU INSTALLATION SPECIFICATIONS 1-14	



Approved Tapping and Line Stop Contractors

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

* Approved for tapping City of Cocoa's concrete pressure pipe.

** Approved for tapping water mains only for their company.

*** Approved tapping and line stop contractor.

Revised 1/8/2020