

CITY OF MARCO ISLAND WATER AND SEWER DEPARTMENT



MANUAL OF STANDARDS AND SPECIFICATIONS

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REVISIONS**

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SECTION NO. 1

GENERAL REQUIREMENTS

1.1 INTRODUCTION

The purpose of this document is to provide technical and procedural requirements for design and construction of service connections, mains, and other water and sewer facilities connecting to or extending City of Marco Island Water and Sewer Department (CMI W&S DEPT.) facilities. This document provides requirements for Developers, Engineers, and Contractors. A deviation from these specifications requires specific approval from the CMI W&S DEPT. Engineering staff. A formal submittal is required for review by the CMI W&S DEPT. Engineering staff showing that the requested deviation will meet or exceed the requirements of the specifications and is "equal to" or exceeds the quality and serviceability of the specified product or methodology. All requests shall be submitted in writing, and shall not be approved for use in the CMI W&S DEPT. service area until approved in writing by CMI W&S DEPT.

The intent of this manual is to provide for uniformity in utilities construction, and represent MINIMUM standards acceptable to MI W&S DEPT. This manual is also intended to maintain consistency with all local, state, and federal regulations and does not preclude compliance with SFWMD, FDEP, USACOE, City of Marco Island Land Development Code and Right of Way Ordinance, and any other agency having jurisdiction. Any deviations with the technical specifications and details or conflicts with local codes and ordinances should be noted prior to submittal of plans.

Note: Go to <https://www.cityofmarcoisland.com/utilities/page/miu-technical-standards-manual> City of Marco Island Utilities tab for the latest revisions to the City of Marco Island Water and Sewer Department Manual of Standards and Specifications.

1.2 SERVICE AVAILABILITY

Water and sewer service is available in areas where infrastructure is currently in place or where Developer agrees to install such infrastructure in accordance with a CMI W&S DEPT. approved master plan. Completed infrastructure shall be dedicated to CMI W&S DEPT. in accordance with procedures outlined elsewhere in this document. Sewer service is available for domestic quality sewage only. The CMI W&S DEPT. sewer system is a manifold system, and sewer service shall not be available to customers proposing to install and maintain localized lift stations, unless approved by CMI W&S DEPT. Developer MAY ON A TEMPORARY BASIS be allowed or required to connect to the Sewer system utilizing a Developer maintained lift station (normally a grinder station). If approved, the Developer shall be required to abandon the temporary lift station, connect to central sewer system when available, and shall be responsible for their prorated share of central sewer system. Temporary private lift stations shall normally be considered for less than 2 years. Temporary septic systems in areas served by gravity sewer and/or force mains shall not be allowed.

1.3 PRELIMINARY PLANNING

Engineers and Developers are encouraged to submit a preliminary plan, and setup a meeting with CMI W&S DEPT. prior to submitting final construction plans. Preliminary planning can eliminate costly redesign of projects based on CMI W&S DEPT. comments. Master planning of large projects is required to determine the impact of those projects on CMI W&S DEPT. infrastructure, and for CMI W&S DEPT. infrastructure planning.

Project Engineer shall include in his submittal package:

1. Cover Letter
 - a. Request for preliminary review.
 - b. Type of units and number.
 - c. Projected water and wastewater demand.
 - d. Construction schedule.

2. Plans
 - a. Two sets of full-scale drawings (not less than 24 x 36 size) and one PDF electronic copy.
 - b. "Preliminary Plan" shall be clearly marked on front page.
 - c. Materials of construction and technical specifications.

1.4 FINAL PLANS

Construction Plans shall show proposed lines (location, size, type of pipe, etc.). The plans shall also show the location of all existing and proposed appurtenances, including valves, fire hydrants, air release valves, manholes, and other appurtenances. Plans shall also include the location of other proposed utilities and location of other existing utilities including gas, storm drains, electric (including transformers), irrigation lines, telephone, and any other utility or other obstruction that may conflict with the proposed CMI W&S DEPT. facilities. Plans shall be at a maximum of 50 scale (40 scale or larger preferred). Plans shall show plan and profile of all water, reclaimed water, and wastewater lines.

Plan approvals expire one year from the date of approval. Revised plans conforming to current CMI W&S DEPT. requirements shall be submitted on all projects whose approval has expired. Any changes to CMI W&S DEPT. specifications since the expiration of the project approval shall be resubmitted. Fees shall also be applicable for resubmittals due to expiration of approval.

1.5 CONSTRUCTION

A preconstruction conference is required for all projects. A CMI W&S DEPT. representative shall attend the pre-construction conference. A five-day notice is required to schedule a pre-construction conference. A copy of all City of Marco Island, FDEP, and other agency approvals and permits shall be provided at the preconstruction conference.

In the event that project approvals were received more than one year prior to pre-construction, new submittals and reviews are required as noted above. Changes made subsequent to CMI W&S DEPT. approvals shall be appropriately indicated, and re-approval of the changes is required prior to construction of those changes. A licensed underground utility contractor shall be utilized for all utility work to be dedicated to CMI W&S DEPT. The Developer Engineer of Record and Utility Contractor representatives shall attend the preconstruction conference.

1.6 SURVEY DATUM

Use North American Vertical Datum of 1988 (NAVD 88) for vertical survey control based on local National Geodetic Survey (NGS) Benchmarks. Horizontal survey control shall be based on North American Datum 1983 (NAD 83) State Plane Coordinate System, Florida East Zone FIPS 0901.

1.7 GLOBAL POSITIONING SYSTEM

The contractor shall hire a Professional Land Surveyor to provide As-Built coordinates, based on the Florida State Plane Coordinate System, East Zone for horizontal datum (2-foot accuracy) and NAVD 88 for vertical datum (0.1-foot accuracy). The contractor shall provide as-built coordinates for all underground utilities installed including, but not limited to, water, sanitary sewer and reclaimed water as follows: every 50 feet; at each thrust block; each change of direction; each service lateral tap and cleanout; each valve; each manhole; and at every junction structure (tee or wye).

1.8 DESIGN CONSIDERATIONS

The Engineer shall comply with the design and construction requirements as provided by the CMI W&S DEPT., Manual of Standards and Specifications, and the design shall be in accordance with Florida Department of Environmental Protection (FDEP) requirements. Conflicts between the FDEP requirements, specifications, and the standard details, shall be resolved in favor of the higher authority and clearly documented for CMI W&S DEPT. review and concurrence.

Hydraulic calculations shall be submitted for plan approval. Entry node(s) pressures and/or hydraulic model for water and force mains shall be provided by Engineer. Modeling software shall be WaterCad distributed by Haestad Methods, or other software as approved by CMI W&S DEPT.

Standard details included in this manual must be included in plan sets without alteration. If supplementary details are required, they must be included on additional sheets. CAD files will not be provided to any outside firm or company. Vertical and horizontal separation requirements of all mains and services shall be in accordance with FDEP requirements.

A. Flow Demands

Flow demands for design shall be calculated on the basis of full development as known or projected. Contact Building Department for residential, or Finance Department for commercial, for determining the current levels of service required per Equivalent Residential Connection (ERC) and to determine appropriate peaking demand factors. Flow demands for commercial, industrial, and special type developments shall be established utilizing the current Ordinance. Approval of CMI W&S DEPT. is required for flow per unit from these types of projects.

B. Water Size Determination

1. Water distribution system shall be sized to provide ample capacity for the required peak flow rates. Design computations shall be provided for system design. All water mains shall be looped in a manor approved by CMI W&S DEPT.
2. The minimum allowable size for any water main shall be 4-inches. The preferred minimum is 8-inches (which is the absolute minimum if there will be any fire hydrants connected to the main). The recommended size main for commercial and industrial developments shall be 12-inches.
3. Selection of pipe diameter and flow capacity shall consider minimum distribution system node pressures of 20 psi under peak hourly flow and maximum day plus fire flow conditions.

C. Water Main Design Considerations

1. Water mains shall be designed to have a minimum cover of 36-inches. Maximum allowable cover shall be 6-feet unless specifically approved by CMI W&S DEPT.
2. Fire flow capacity used for sizing system components shall comply with the requirements of the fire department having jurisdiction. Documentation of the review and concurrence of the fire flow demand by the fire department having jurisdiction must be submitted prior to CMI W&S DEPT. review. Hydrant flow testing within the City of Marco Island Fire Department jurisdiction shall be completed by a certified third party approved by the Fire Department. Flow testing shall be coordinated and witnessed by a representative of the Fire Department. All applicable fees shall apply and be paid by the developer.
3. Wet taps shall be made with AISI Type 316 stainless steel tapping sleeves, and fusion bonded epoxy coated valves.

4. The location and spacing of fire hydrants shall comply with the requirements of the fire department having jurisdiction. The design fire flow demands, and the location and spacing of fire hydrants must be reviewed and approved by the fire department having jurisdiction prior to CMI W&S DEPT. review. Documentation of fire department review is required.
5. Valves shall be located at all intersecting mains (two per tee and three per cross), at the end of all lines to be extended, at all fire hydrants, on both sides of all water or wetland crossings, at both ends of all jack and bores and directional drills, at a minimum of 1000-feet along water mains, and at all other locations deemed appropriate by CMI W&S DEPT.
6. Dead end lines shall be avoided wherever possible, and the use of dead-end lines must have specific CMI W&S DEPT. approval if permitted. If allowed, an automatic flushing assembly (CMI W&S DEPT.) shall be required at the end of dead-end lines as directed by CMI W&S DEPT. An automatic flushing assembly shall be required at the end of all permanent dead-end lines and lines that may not be extended for more than two years. A temporary flushing assembly shall be provided at dead ends that will be extended within two years.
7. Air Release and Vacuum Valves.

Where the profile of the water mains larger than 8-inches is such that air pockets or entrapment could occur, provisions for air release shall be provided. Automatic air release assemblies shall be installed on all water mains larger than 8-inches where the deflection is four times the diameter of pipe or greater, and at a spacing along the water main of 1500-feet minimum. At all profile break points on water mains greater than 8-inches, such as localized high points, combined air release and vacuum valve assemblies shall be provided. If only one-way flow is expected in the main, the air release assembly shall be placed on the upstream side of conflict crossings. Air and vacuum valves and/or air release valves shall be suitably housed in pedestal mounts. Engineer shall provide computations to support location and size of air release valves with each submittal.

8. Service connections and other infrastructure shall be located with minimum off-set distances from power feeders and transformers as prescribed by the electric utility company. At no time shall the horizontal spacing from power feeders or transformers be less than 5-feet without prior approval from CMI W&S DEPT.

D. Sanitary Sewer Size Computation

Sanitary sewer shall be sized to provide ample capacity for the required peak flow rates. The minimum allowable size for any gravity sewer main, other than lateral

service connections, shall be 8-inches in diameter. The minimum size for laterals shall be 6-inches in diameter. All sewers shall be designed at slopes providing minimum velocities of not less than 2 feet-per-second (fps) when flowing full, based on Manning's formula.

The following minimum slopes shall be used as a design guideline:

<u>SANITARY SEWER PIPE DIAMETER (Inches)</u>	<u>MINIMUM SLOPE (Feet per 100 Feet)</u>
8"	0.40
10"	0.28
12"	0.22
15"	0.15
18"	0.12
21"	0.10
24"	0.08
30"	0.058
36"	0.046

Minimum slopes less than those indicated shall not be considered.

E. Sanitary Sewer Design Considerations

1. Sanitary gravity sewers shall be installed with straight alignment and grade between manholes with manhole spacing not to exceed 400 feet.
2. Manholes (see details) shall be constructed at all changes in size, direction, or termination of sanitary sewers. Service laterals shall not be connected at manholes. Sewer cleanouts shall be provided at the edge of the right-of-way or easement for all service connections. Laterals shall not exceed 150 feet in total length including cleanouts.
3. Flow direction changes greater than 90-degrees shall not be allowed without special approval. A line drop of 0.1-feet shall be provided across each manhole.
4. Sanitary gravity sewer line size changes shall occur only at manholes. Where different pipe sizes join in a manhole, the pipes are to be placed at elevations where the 0.8 depth points are equal, unless higher points are required.
5. Special attention shall be given to gravity lines or lift station wet wells that receive flow from sanitary sewer force mains. Care shall be taken in these areas to ensure excessive flow rates do not create surcharge conditions downstream. If the force main velocity is greater than 2.5 feet-per-second at the termination, the force main pipe size shall be increased one pipe size

for the last two pipe joints to help dampen the velocity. Receiving manhole shall be coated with an approved product. This shall include both new and existing manholes.

Force mains shall enter the terminal facility (gravity sewer manhole or lift station wet well) at a point equal to the operational water level of the receiving structure. Should an elevation drop be required to obtain the outlet connection, the prior downslope of the force main shall not exceed 45 degrees and adequate air venting shall be provided at the profile breakpoint. Discharge end shall be designed so pipe remains full at all times. Force mains into lift stations will be dropped to six inches above the floor. The connection between the manhole and lift station requires additional details and must be approved by the Collection and Distribution Manager, otherwise the connection will not be allowed. Detail shall be submitted to CMI W&S DEPT. for approval.

6. Where pipes are to extend into or through structures, flexible, watertight joints shall be provided at the wall face.
7. Gravity system overflow pipes shall be installed from terminal manhole to terminal manhole, as directed by CMI W&S DEPT. At least one overflow pipe shall be provided for each lift station area.
8. Service connections shall be a minimum of 6-inches in diameter. Service connections shall typically be located at lot corners and shall be extended to the property line or easement limits. Multiple service connections will not be acceptable without specific approval. Multi-family or commercial buildings two-stories and higher shall have a manhole at the property line or easement line (see details).
9. All connections to existing mains shall be made under the direction of CMI W&S DEPT. Valves separating the mains being installed from existing mains shall be operated by or under the direction of CMI W&S DEPT.
10. Any private wastewater system connecting to MI W&S DEPT.'s sanitary sewer shall be tested and inspected to assure compliance with the Manual of Standards and Specifications. In no case shall substandard private systems generating excessive inflow or infiltration be allowed to connect into the CMI W&S DEPT. system.
11. Wet taps shall be made with stainless steel tapping sleeves and valves.
12. Work on CMI W&S DEPT. lines or any other utilities resulting in MI W&S DEPT.'s customers being without water or sanitary sewer service shall submit service interruption form. CMI W&S DEPT. shall be notified 72 hours in advance so customer(s) can be notified.

13. Grease interceptors are not required for private residences. However, one or more grease interceptors are required where grease waste is produced in quantities that could otherwise cause line stoppage or hinder sewage disposal. The design of grease interceptors shall be based on standards found below. In addition, the following general requirements found below, apply when determining the proper use and installation of a grease interceptor used as a component of an onsite sewage treatment and disposal system.
 - a. Grease interceptors shall be capable of supporting HS-20 highway loading.
 - b. Grease interceptors shall be located so as to provide easy access for routine inspection, cleaning, and maintenance. Manholes shall be provided over the inlet and outlet of each grease interceptor and be brought to finished grade.
 - c. Where a grease interceptor is required or used; only kitchen wastewater from food preparation shall pass through the grease interceptor and then be discharged into the CMI W&S DEPT. system.
 - d. Requirement, specifications, and sizing of grease interceptors shall be based on the Florida Building Code (Plumbing) and the Plumbing and Drainage Institute (PDI) G101 and signed by a Florida licensed Engineer or approved manufacturer.
 - e. Grease Interceptor Cleaning Record is to be displayed so it is accessible to CMI W&S DEPT. Inspectors. See Appendix C for inspection sheet form used.
 - f. An Annual Grease Discharge Permit shall be obtained from the City of Marco Island prior to any grease inceptor being placed in service or the opening/reopening of any establishment.

14. Sewage Force Mains

- a. Force main systems shall be of adequate size to efficiently transmit the total ultimate peak operational flow to the effluent point. Consideration shall be given to possible future connecting lift stations, and this probability shall be reviewed with CMI W&S DEPT. Capacity computations shall be coordinated with the proposed pumping system and future flow requirements, if applicable. In order to provide adequate pipeline cleansing, force main flow velocity shall not be less than 2 feet-per-second nor greater than six feet-per-second at ultimate design minimum pumping capacity. However, with multiple lift station systems or phased development, this

requirement may not be possible, and the system design shall receive special attention regarding cleaning and maintenance.

- b. In addition to initial capital expenditure, long-term lift station operational costs shall also receive consideration when sizing force main systems. Should a pipe size option be available within the design limits, the cost of sewage pumps and motors, force main system and pump operating power (computed for design average daily flow rate for 10 years at existing electricity cost), shall be compared to like amounts for the alternate designs. The final force main size selection shall be directed towards the system with the least long-range capital and operational cost. Said cost analysis shall be subject to review and approval by CMI W&S DEPT.
- c. Valves shall be installed on all subsidiary force mains at the point of connection to the major main and on the upstream side of the major main in order to isolate said pipeline for maintenance. Where force mains are to be extended, valves shall be placed at the future collection point to preclude line shutdown at the time of extension. At future connection branches or ends, the valves shall be restrained per the specifications in order to facilitate said connection without system shutdown. All mains shall have "inline" valves at a minimum of 1500-foot intervals.
- d. Force mains that are susceptible to sedimentation clogging created by depressed crossings or extended low flow and low velocity periods, shall be provided with suitable pressure clean-out connections and pigging stations. Clean-out connections and pigging stations shall be located to facilitate maintenance operations, and shall be subject to review and approval by MI W&S DEPT.
- e. Force mains shall be designed to have 36-inch minimum cover. Maximum allowable cover shall be 5-feet unless specifically approved by MI W&S DEPT.

15. Air Release and Vacuum Valves

Where the pressure main profile is such that air pockets or entrapment could occur, provisions for air release shall be provided. Automatic air release assemblies shall be installed on all pressure mains where the deflection is four times the diameter of pipe or greater, and at a spacing along the pressure mains of 1500-feet minimum. At all profile break points on pressure mains, such as localized high points, where free flow will occur during operation or after pumping stops, combined air release and vacuum valve assemblies shall be provided. If only one-way flow is expected in the

main, the air release assembly shall be provided at high points and on the upstream side of conflict crossings.

Engineer shall provide computations to support location of air release valves with each submittal.

16. Lift Stations

a. General

- i. Lift stations may not be permitted when an existing station is in hydraulic proximity. Developer may be required to update an existing station to facilitate the proposed flow. CMI W&S DEPT. shall solely determine the limit of hydraulic proximity.
- ii. For lift stations with a design maximum flow of 1500 GPM or less, a minimum of two pump units shall be provided. Where the peak design flow exceeds 1500 GPM, three or more units shall be provided, such that the design maximum flow can be pumped with the largest unit out of service. The selected sewage pump system shall be capable of pumping the design maximum flow at the maximum computed system total head requirements. Additionally, final selection shall be based upon optimum operational costs.
- iii. Re-pump stations and non-residential waste generators must provide pretreatment and appropriate odor control. Odor control may be required elsewhere by CMI W&S DEPT. Odor control units shall be sized for the design flow and anticipated odor control requirements.
- iv. For lift stations with a design peak flow of 350 GPM or more, a flow meter shall be provided that has the capability to measure, indicate, totalize, and record flow for the lift station. The flow meter shall follow applicable guidelines in the CMI Standards Manual and the Approved Product List. Flow meters shall be connected to the CMI W&S DEPT. SCADA system for monitoring and recording of flow for the lift station.

b. Hydraulic Computations

Head capacity curves shall be prepared for the proposed pumping system in order to determine the various operational conditions. Hydraulic computations shall be in accordance with standard engineering formulas with pipe friction loss calculated by the Hazen-Williams Formula, using standard friction factors based on the

material utilized. The system head capacity analysis shall provide the following and be subject to review by CMI W&S DEPT.:

- i. System operation under peak flow conditions with one pump or multiple parallel pumping as designed. Should the receiving force main systems be interconnected to additional lift stations; hydraulic design conditions shall also include said pumping systems operating at rated capacity.
- ii. Pumping capability with one pump running, all units operating in parallel and other combinations, if applicable.
- iii. For multiple lift station force main systems, the one pump maximum capacity under minimum flow contribution conditions from the other connected facilities shall be calculated.

c. Wet Well Design

- i. The wet well structure shall have design capacity to allow a maximum of four starts per hour under normal operating conditions. The minimum diameter of the wet well shall be 8-feet.
- ii. Low water levels shall be set to provide adequate submergence for facilities to preclude inlet vortexing and air binding. In general, the normal operational water level shall provide positive suction head for the pumps. Maximum water levels shall not exceed the invert elevation of the lowest influent pipe with the high water alarm no higher than 0.8 feet below the invert of said pipe. There shall be a minimum distance of 3-feet from high water alarm (i.e., 0.8-feet below lowest influent invert) to the low-level shutoff. Pump size may increase this distance.

d. Types of Lift Station Construction

- i. Submersible Facilities
Submersible (package) sewage lift stations shall be provided where the peak design flow is less than 2000 gallons per minute unless otherwise required by CMI W&S DEPT. These facilities shall be manufactured in accordance with all applicable provisions of this standard. The Contractor and manufacturer shall assume responsibility for the satisfactory installation and operation of the entire pumping system including pumps, motors, hatch covers, and controls as

specified. The minimum diameter of the wetwell for a package lift station shall be 8-feet. Smaller wetwells, if needed to address space limitations, must be specifically approved by CMI W&S DEPT.

ii. Built-In-Place Facilities

Structural built-in-place sewage lift stations may be required to be constructed where the peak design flow exceeds 2000 gallons per minute or as directed by CMI W&S DEPT. Additionally, where the peak flow requirement is more than 1500 gallons per minute three pumping units shall be included. These facilities shall be constructed in accordance with all applicable provisions of this standard. Preliminary design submittals are required for facilities of this type.

e. Site Design Considerations

Lift Stations shall be installed in dedicated easements outside the right-of-way within readily accessible sites unless otherwise approved by CMI W&S DEPT. and shall have adequate area provided for operation and maintenance of the facility. A site 20-feet by 20-feet is adequate for normal size lift station facilities. The site shall be well drained and accessible for maintenance. The site shall meet current FDEP requirements for withstanding flood damage and interruption of service. As a minimum, pumping stations shall be designed to remain fully operational and accessible during a 25-year flood. All non-immersible, mechanical equipment and electrical controls must be elevated or otherwise protected from damage during a 100-year flood. Site preparation shall include pavement and walkways for good, all-weather operations. Submit drawings of landscape and electrical plans, for approval if different from CMI W&S DEPT. standard details.

17. Key Marco Service Area

The Key Marco Community Development District, due to its unique characteristics, shall utilize a residential grinder pump system for connection to the CMI W&S DEPT. system. The grinder pump system, as further specified in the Technical Specification, shall consist of a grinder pump/wet well with control panel and force main discharge. Connection to the CMI W&S DEPT. system shall be at the road right of way. All connections to the CMI W&S DEPT. system shall be made by the property owner as witnessed by CMI W&S DEPT. An isolation valve including valve box and pad shall be provided prior to the connection at the right of way. All ownership, operation and maintenance of the grinder pump station and force main to the right of way shall be the responsibility of the property owner.

1.9 COMPLETION-DEDICATION

Completion-Dedication data to be submitted by the Engineer of Record are included in Appendix E. Service shall not be provided until all items are complete. All infrastructure shall be designed for ultimate dedication to CMI W&S DEPT. Gravity sewer lines will be cleaned and televised at the eleventh month following acceptance by CMI W&S DEPT. to determine if warranty repairs are required.

SECTION NO. 2

TECHNICAL SPECIFICATIONS

2.1 GENERAL

All materials must meet or exceed appropriate standards including, but not limited to, AWWA, ASTM, NSF, and ANSI standards. For potable water systems, all material or equipment shall conform to the requirements of NSF 61.

The Contractor shall obtain from the pipe manufacturers, a certificate of inspection to the effect that the pipe and fittings supplied to the CMI W&S DEPT. service area have been inspected at the plant, and that they meet the requirements of these specifications. All pipe and fittings shall be subjected to visual inspection at time of delivery and also just before they are lowered into the trench to be laid, and pipe joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor. The entire product of any manufacturer may be rejected when, in the opinion of CMI W&S DEPT., the methods of the manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.

Contractor's/Developer's Engineer shall provide copies of all submittals and shop drawings for all projects to CMI W&S DEPT. Submittal or shop drawing data is recommended to be sent to CMI W&S DEPT. as approvals on the project are made by the Engineer but shall be required to be included in the turnover documents submitted for project completion.

2.2 PRESSURE MAINS

Pressure mains shall be PVC meeting the requirements of AWWA C900. Pressure mains 14-inch diameter and greater shall meet the requirements of AWWA C905 with rubber gasketed pipe with bell and spigot ends or may be HDPE meeting the requirements of AWWA C906 with butt heat fusion joints. Minimum pressure main size shall be 4-inch diameter. The minimum size of water mains serving fire hydrants shall be 8-inch diameter when the serving main is larger than 6-inch diameter and 6-inch diameter when the serving main is six inches.

PVC fire mains shall be DR 14 pipe, and HDPE fire mains shall be DR 11 pipe. Use of HDPE pipe shall be approved by CMI W&S DEPT. prior to construction. Equivalent PVC and HDPE are shown below:

PVC Standards	PVC Nomenclature	Equivalent HDPE AWWA C906 (PE 4710)
AWWA C900 DR 14	Pressure Class 200 psi	HDPE DR 11
AWWA C900 DR 18	Pressure Class 150 psi	HDPE DR 13.5
AWWA C905 DR 18	Pressure Class 235 psi	HDPE DR 9

PVC and HDPE pipe shall have ductile iron OD and shall be colored for water (blue or blue lined), sewer (green or green-lined), and irrigation (purple or purple lined). Polywrap to designate pipe color shall be used only with specific approval from the CMI W&S DEPT. Engineering Department.

Directional drilling, if approved by CMI W&S DEPT. shall require the use of HDPE DR 11 pipe meeting AWWA C906 with butt heat fusion joints. If a casing pipe is required, both the casing and carrier pipe shall be DR 11 HDPE pipe.

2.3 PIPE FITTINGS

All polyvinyl chloride pipe and ductile iron pipe shall be installed with ductile iron fittings. The allowable coatings for ductile iron fittings are as follows:

Water	Sewage	Reuse	Raw Water
Fusion Bonded Epoxy	P 401 Epoxy	Fusion Bonded Epoxy	Cermature PL90
Cement Lined (if not available infusion bonded epoxy)			
Hymax for pipe transition to AC Pipe			

All HDPE pipe fittings shall be electrofusion or butt heat fusion joints conforming to specifications.

All PVC pressure pipe fittings shall be ductile iron with restraints. Fittings shall conform to the requirements of AWWA C907. Refer to the Approved Product List for acceptable C907 fittings and restraints. All fittings shall have a minimum pressure rating of 150 psi.

All ductile iron fittings shall be mechanical joint type with a minimum pressure rating of 250 psi and shall conform to the requirements of ANSI Standard A21.10. Ductile iron fittings shall be fusion bonded epoxy coated on the interior and outside in accordance with AWWA standard C116. Ductile iron fittings installed below grade shall be wrapped in polyethylene.

Fittings for HDPE pressure mains shall have electrofusion joints, or butt heat fusion joints. All electrofusion joint fittings shall have ISO 9001 certification. Refer to the Approved Product List for acceptable fitting manufacturers. All butt heat fusion joint fittings shall conform to AWWA C906 and ASTM D 3261. Polyethylene fittings may be molded or fabricated. All fittings shall be in accordance with ASTM D3261.

Electrofusion jointing shall be allowed only for those manufacturers approved by CMI W&S DEPT. All electrofusion processors shall be equipped with bar code capability as well as manual operations. The processors shall be capable of printing out all fusion

procedures made on the machine with complete information for total quality and installation control.

Each day the machine operator shall supply CMI W&S DEPT. with a complete printout of the day's activity along with a construction log of all the fusion conducted on fittings or taps. Only individuals trained and certified by FS/AWWA (Florida Section of AWWA) on fusion procedures on HDPE shall be approved for installation of electrofusion fittings. Taps to electrofusion mains shall use 316 Stainless Steel service saddles.

Gravity sewer fittings shall be PVC and shall conform to the requirements of ASTM D-3034 standard with minimum wall thickness of SDR26. Fittings 8-inch and smaller shall be molded in one piece with elastomeric joints with "locked in" design and minimum socket depths as specified in ASTM D-3034. Any molded fittings without the molded locked in design will be rejected. Fittings 10-inch and larger shall be molded or fabricated in accordance with ASTM D-3034, with manufacturers standard bells and gaskets. Gaskets shall have minimum cross-sectional area of 0.20 sq. in. and conform to ASTM F-477 Standard. PVC material shall have a cell classification of 12454-8 as defined in ASTM 0-1784. PVC sewer fittings and gaskets material shall conform to all ASTM standards stated in the *above* specification as well as ASTM D-3212.

2.4 GATE VALVES

Gate valves shall be installed in the vertical position only. Gate valves shall be resilient seat conforming to or exceeding the requirements of ANSI/AWWA C509 and C515. Gate valves for potable water service shall be certified to meet the requirements of ANSI/NSF 61. All external bolts, fasteners and hardware shall be Type 316 stainless steel. Ductile iron components shall be protected internally and externally by fusion bonded epoxy coatings meeting or exceeding the requirements of AWWA C550. All gate valves 30-inch and larger shall have a concrete slab placed under the valve to help distribute the total weight of the valve and reduce line sagging.

2.5 PLUG VALVES

Plug valves shall be of the tight closing, resilient faced, non-lubricating variety. Valve pressure ratings shall be as follows and shall be established by hydrostatic tests as specified by ANSI B16.1-1967. Valves shall be drip-tight in both directions (bi-directional) at rated pressure of 175 psi through 12-inch diameter, and 150 psi for 14-inch diameter and above. Plug valves shall be 100% port opening. The valve shall be provided with a 2-inch square operating nut. Above grade valves (4" - 6") shall be lever operated and 8" and larger gear and handwheel. Plug valves shall be tested in accordance with AWWA C504 Section 5. Each valve shall be performance tested in accordance with AWWA C504 Section 5.2 and shall be given a leakage test and hydrostatic test as described in AWWA C504 Paragraphs 5.3 and 5.4. The leakage test shall be applied to the face of the plug tending to unseat the valve. The Manufacturer shall furnish certified copies of reports covering proof of design testing as described in AWWA C504 Section 5.5. For corrosion protection, the interior ferrous surfaces of all plug valves shall have a 2-part epoxy internal

coating to a minimum of 20 mils thickness. All hardware shall be 316 stainless steel. All plug valves 30-inch and larger shall have a concrete slab placed under the valve to help distribute the total weight of the valve and reduce line sagging. Sufficient plug valves shall be provided to allow for zone isolation of wastewater transmission areas in order to limit the impact of line breaks. In-line plug valves shall be provided at no greater than 1,000-foot intervals.

2.6 PIPE JOINTING

Materials and methods shall be in strict accordance with the recommendations of the respective pipe manufacturer.

All exposed piping shall be flanged ductile iron pipe with an operating pressure of 250 psi and shall be manufactured in accordance with ANSI/AWWA C110/A21.10-1992. All bolting shall be 316 stainless steel. Isolation washers shall be used at all dissimilar materials.

All buried joints for PVC pressure mains shall be mechanical joints, push-on, or restrained type and shall conform to ANSI/AWWA C111/A21.11-1990. All buried joints for HDPE pressure mains shall be butt heat fusion joints and shall conform to AWWA C906 and ASTM 03261.

Mechanical joints consisting of bell, socket, gland, gasket, bolts, and nuts shall conform to ANSI Standard A21.11. Bolts shall be high strength annealed, steel T-head type having hexagonal nuts. Bolts and nuts shall be machined through, and nuts shall be tapped at right angles to a smooth bearing surface.

Single sealed gasket push-on type joints shall conform to the requirements of ANSI A21.11. Refer to the Approved Product List for approved push-on joints.

Gaskets shall be elastomeric and conform to AWWA Standards and ASTM F477. Gaskets shall have clean tips unless otherwise specified.

PVC pipe shall have provisions for expansion and contraction provided in the joints. All joints except threaded joints shall be designed for push-on makeup connections. Push-on joint may be a coupling manufactured as an integral part of the pipe barrel consisting of a thickened section with an expanded bell with a groove to retain a rubber sealing ring of uniform cross section.

Threaded joints shall be used only with Schedule 80 pipe or better. At threaded joints between PVC and metal pipes, the metal shall contain a socket end in PVC side of spigot. A metal spigot shall not, under any circumstances, be screwed into a PVC socket.

2.7 RESTRAINTS

Fitting and joint restraints for all pipe types specified shall conform to the Approved Product List materials or CMI W&S DEPT. approved equal. Restraints on HDPE pipe joints and fittings are not required for butt heat fusion joints conforming to specifications. Where specified, mechanical restrained type joints for pipe shall be factory type and fabricated at the factory. Field welding for joint fabrication is not acceptable. Approved restrained type joints shall be as approved by CMI W&S DEPT. Acceptable restrained joint types can be found in the Approved Product List, or CMI W&S DEPT. approved equal. One manufacturer shall supply all components of the restraining method and accessories.

2.8 COATING AND LININGS

This section includes materials and application of painting and coating systems for the following materials:

1. Submerged Metal
2. Exposed Metal
3. Buried Metal
4. Concrete and Masonry
5. Exposed Plastic Piping
6. Ductile Iron Piping

Table 2.8A, Representative Coating Schedule (non-inclusive) is provided following. Coatings for water storage tanks and any water storage or conveyance systems not specifically identified herein shall be as recommend by the engineer and submitted for approval by CMI W&S DEPT. on an individual basis.

Coatings for concrete in contact with potable water will be project specific as recommend by the engineer and approved by CMI W&S DEPT.

Coating systems for new or existing concrete structures will be project specific depending on the application and as recommended by the engineer and approved by CMI W&S DEPT.

Ductile Iron Pipe

- A. All ductile iron pipe and fittings used in sewage and wastewater applications shall be bituminous coated on the exterior and P401 epoxy coated on interior.
- B. All ductile iron pipe used in potable water and reclaimed water applications shall be bituminous coated on the exterior and cement lined on the interior. All ductile iron fittings shall be coated exterior and interior with fusion bonded epoxy. Coatings used for potable water applications shall be ANSI/NSF 61 certified.

C. All ductile iron pipe and fittings used in raw water applications shall be bituminous coated on the exterior and Cermature PL90 on the interior.

Thickness of all linings shall be uniform.

A. COATING SYSTEMS/SCHEDULE

The following table summarizes approved coating systems by application and type.

System No.	Application	Type
Ferrous Metal Submerged		
1.	Raw Water and Wastewater	Cycloaliphatic Epoxy
2.	Potable or Non-potable Clean Water	High Solids Epoxy Certified to ANSI/NSF 61
Ferrous Metal Exposed		
3.		Epoxy / Zinc / Polyurethane
Ferrous Metal Buried		
4.	Buried Metal Fabrication and Fittings	Fusion Bonded Epoxy (water) / CoalTar Epoxy (wastewater)
5.	Buried Metal Machined Parts and Fasteners	Corrosion resisting grease
Concrete and Masonry Corrosive Environments		
6.	Exposed Concrete and Masonry, Non-Corrosive Environment	Acrylic Emulsion
7.	New Submerged Concrete, Raw Water or Wastewater; Concrete Repair, Renovation, Structural Restoration	Structural High Build Epoxy Polyurethane Liner, or Calcium Aluminate
Exposed PVC, CPVC, and FRP Piping		
8.	Coating for Ultraviolet Exposure or Color Coding	Polyamidoamine Epoxy / Aliphatic Acrylic Polyurethane

These systems are specified in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses. No coatings are required on stainless steel or aluminum unless needed for color coding. Buried valves shall be supplied with a factory applied finish coating suitable for the intended application.

A. Submerged Metal

1. Type: Polyamidoamine Epoxy (Epoxy / Epoxy / Epoxy), System 1.

Service Condition: For use with metal pipes, valves, supports and fabricated metal submerged in raw sewage or raw water or exposed to raw sewage and vapors in wet wells.

Surface Preparation: SSPC SP-10 / NACE 2 (near white metal sandblast).

Prime Coat: Tnemec Series N69 Hi-Build Epoxoline, DFT 3.0 to 5.0 mils.

Intermediate Coat: Tnemec Series 104 H.S. Epoxy, DFT 4.0 to 10.0 mils.

Finish Coat: Tnemec Series N69 Hi-Build Epoxoline II, DFT 4.0 to 6.0 mils; or, Series 104 H.S. Epoxy, DFT 4.0 to 10.0 mils.

Total Dry Film Thickness 11.0 to 25.0 mils.

Equivalent painting systems by Devoe, Ameron, and Carboline are acceptable subject to CMI W&S DEPT. approval.

2. Type: Polyamidoamine Epoxy system certified in accordance with ANSI/NSF 61 for contact with potable water, System 2.

Service Condition: For use with metal pipes, valves, supports, steel tanks, and fabricated metal submerged in potable or non-potable clean water.

Surface Preparation: SSPC SP-10 / NACE 2 (near white metal sandblast).

Prime Coat: Tnemec Series N140 Pota-Pox Plus Hi-Build Epoxoline, DFT 4.0 to 6.0 mils.

Finish Coat: Tnemec Series N140 Pota-Pox Plus Hi-Build Epoxoline, DFT 4.0 to 6.0 mils.

Total Dry Film Thickness 10.0 to 12.0 mils.

Equivalent painting systems by Devoe, Ameron, and Carboline are acceptable subject to CMI W&S DEPT. approval.

B. Exposed Metal

1. Type: Epoxy / Zinc / Polyurethane, System 3.

Service Condition: For use with above grade and non-submerged metal structures, tanks, piping systems, and equipment.

Surface Preparation: SSPC SP- 6 / NACE 3 (commercial sandblast).

Prime Coat: Tnemec Series N69 Hi-Build Epoxoline, DFT 3.0 to 5.0 mils; or, Series 90-97 Tneme-Zinc, DFT 2.5 to 3.0 mils.

Intermediate Coat: Tnemec Series N69 Hi-Build Epoxoline or Series 27 Typoxy, DFT 2.5 to 3.0 mils.

Finish Coat: Tnemec Series 73, 1074, or 1075 Endura-Shield, DFT 2.0 to 5.0 mils.

Total Dry Film Thickness 7.0 to 13.0 mils for Epoxy / Polyurethane or 6.5 to 11.5 mils for Epoxy / Zinc/ Ployurethane.

Equivalent painting systems by Devoe, Ameron, and Carboline are acceptable subject to CMI W&S DEPT. approval.

C. Buried Metal

1. Type: Polyamide Epoxy Coal-Tar, System 4.

Service Condition: Direct bury metal products, wastewater fittings, and metal fabrication.

Surface Preparation: SSPC SP-10 / NACE 2 (near white metal sandblast).

Prime Coat: Tnemec Series N69 Hi-Build Epoxoline, DFT 3.0 to 5.0 mils.

Finish Coat: Tnemec Series 46H-413 Hi-Build Tneme-Tar, DFT 14.0 to 20.0 mils.

Total Dry Film Thickness 17.0 to 25.0 mils.

Equivalent painting systems by Devoe, Ameron, and Carboline are acceptable subject to CMI W&S DEPT. approval. Fittings for buried water mains shall have factory applied fusion bonded epoxy coatings.

2. Type: Corrosion resisting anti-seize lubricant used to protect irregular fittings, System 5.

Service Condition: Buried metal parts and fasteners, such as bolts, bolt threads, tie rods, and nuts (including stainless steel unless furnished Teflon coated).

Surface Preparation: clean dry and free of foreign substances (power tool or commercial blast if needed SSPC SP-3 or SP-6).

Coating: NO-OX-ID GG-2 as manufactured by Sanchem, Inc. Apply a minimum thickness of 1/4 inch per manufacturer's directions.

D. Concrete and Masonry

1. Hi-build, water based, Acrylic Emulsion, System 6

Service Conditions: Exposed concrete and masonry.

Surface Preparation: SSPC SP 13 / NACE 6 clean and dry

Prime Coat: Tnemec Series 180 or 181 (sand texture) Tneme-Crete, DFT 4.0 to 8.0 mils.

Finish Coat: Tnemec Series 180 or 181 (sand texture) Tneme-Crete, DFT 4.0 to 8.0 mils.

Total Dry Film Thickness 8.0 to 16.0 mils.

Equivalent painting systems by Devoe, Ameron, and Carboline are acceptable subject to CMI W&S DEPT. approval.

2. Type: Solvent free 100% solids ultra-high build epoxy 100% VOC-free . See the approved product list for approved products, System 7.

Service Conditions: Concrete wetted or submerged in raw water or raw sewage and structures exposed to moist hydrogen sulfide such as interiors of manholes and sewage pumping station wet wells. Also used for concrete repairs, rehabilitation, and structural restoration.

Surface Preparation: Provide a uniform, clean, neutralized surface as directed by the manufacturer's instructions. Concrete and masonry surfaces must have a surface profile equivalent to CSP3 to

CSP5 in accordance with ICRI. All interior manhole surfaces must be initially sandblasted and then pressure washed to remove dust/debris from the sandblasting material. Care shall be taken to capture all debris within existing manholes. All new concrete shall be cured for a minimum of 28 days. Any deteriorated concrete shall be removed to solid. Any exposed reinforcing steel shall be coated, and the concrete surface restored to its original configuration. Manufacturer's approved repair materials shall be utilized.

Installation shall be by a certified installer authorized by the manufacturer. Installer shall follow the manufacturer's explicit recommendations for application.

Upon completion of the coating application, the coating shall be cured in accordance with the manufacturer's recommendation prior to be placed in service.

Total minimum applied coating thickness will be 125 mils for new manhole structures, 250 mil for existing manholes, and 250 mils for new or existing lift station wet wells and valve vaults.

3. Type: 100% Calcium Aluminate mortar mix. See the approved product list for approved products, System 7.

Service Conditions: Concrete wetted or submerged in raw water or raw sewage and structures exposed to moist hydrogen sulfide such as interiors of manholes and sewage pumping station wet wells. Also used for concrete repairs, rehabilitation, and structural restoration.

Surface Preparation: Provide a uniform, clean, neutralized surface as directed by the manufacturer's instructions. Concrete and masonry surfaces must have a surface profile equivalent to CSP3 to CSP5 in accordance with ICRI. All interior manhole surfaces must be initially sandblasted and then pressure washed to remove dust/debris from the sandblasting material. Care shall be taken to capture all debris within existing manholes. All new concrete shall be cured for a minimum of 28 days.

Any deteriorated concrete shall be removed to solid. Any exposed reinforcing steel shall be coated, and the concrete surface restored to its original configuration. Manufacturer's approved repair materials or additional coats of the approved material may be used.

Installation shall be by a certified installer authorized by the manufacturer. Installer shall follow the manufacturer's explicit recommendations for application.

Upon completion of the coating application, the coating shall be cured in accordance with the manufacturer's recommendation by use of moist curing or a curing compound prior to being placed in service.

Total minimum applied coating thickness will be 125 mils for new manholes structures, 250 mil for existing manholes, and 250 mils for new or existing lift station wet wells and valve vaults.

E. Exposed or Color-Coded PVC, CPVC, and FRP

1. Type: Polyamidoamine Epoxy / Aliphatic Acrylic Polyurethane, System 8.

Service Conditions: Color coding of PVC, CPVC or FRP or any non-metallic piping exposed to sunlight (except HDPE piping).

Surface Preparation: SSPC SP-1 (solvent clean). Lightly abrade the surface with medium-grain sandpaper.

Prime Coat: Tnemec Series N69 Hi-Build Epoxoline, International 7510. Apply to a minimum dry-film thickness of 2.0 mils.

Finish Coat: Tnemec Series 1075 Endura-Shield, International Interthane 990HS, Apply to a minimum dry-film thickness of 2.0 mils.

Total Dry Film Thickness 4.0 to 6.0 mils.

Equivalent painting systems by Devoe, Ameron, Sherwin Williams, PPG, and Carboline are acceptable subject to CMI W&S DEPT. approval.

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Table 2-8A
 REPRESENTATIVE COATING SCHEDULE (non-inclusive)

Surface or Item	Coating System No.
Pumps (exposed components)	3
Pumps (submerged components)	1
Exposed ferrous piping	3
Submerged ferrous piping	1
Exposed ferrous valves	3
Submerged valves	1
Non-Corrosive Concrete Surfaces	6
Standard Concrete Manholes - Exterior surfaces	4
Standard Concrete Manholes - Interior surfaces	7
Concrete Wet Well - Exterior surfaces	4
Concrete Wet Well - Interior surfaces	7
Concrete Valve Vault - Exterior surfaces	4
Concrete Valve Vault - Interior surfaces	7
Exposed PVC, CPVC & FRP	8

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2.9 LOCATOR TAPE NEAR SURFACE AND BALL MARKERS

A. General

Plastic locator tape, impregnated with metallic filings, shall be placed in the pipe trench in and labeled "water main", "force main", or "reuse main", as appropriate. Locator tape is to be placed approximately 18 inches above the pipe.

Locator balls shall be 3M™ ScotchMark 4-inch ball markers. Ball markers shall be model: 1423-XR/ID (blue) for water; 1424-XR/ID (green) for wastewater; 1428-XR/ID (purple) for reuse; 1422-XR/ID (red) for electric. For wastewater cleanouts, install LDL™ Clean-Out Plug & Smart Plug assembly incorporating 3M™ EMS Near-Surface Marker color coded for wastewater (green). Ball markers are laid approximately 12 inches below final grade but no deeper than 5 feet below grade. Ball markers are placed at each change in direction, valve or fitting, service connections, and every 50 feet on straight runs.

Pipe installed by directional drilling or jack and bore shall utilize 3M™ Electronic Marker System (EMS) near surface markers to mark the piping. See approved product list.

B. Pressure Mains

Place locator tape and locator balls in accordance with CMI W&S DEPT. Standard Details.

C. Gravity Sewer Mains

Place locator tape in accordance with CMI W&S DEPT. Standard Details. Locator balls are not required above gravity sewer mains.

D. Gravity Sewer Laterals

Place locator tape in accordance with CMI W&S DEPT. Standard Details. Place locator balls in accordance with CMI W&S DEPT. Standard Details.

2.10 VALVE BOXES

For 2-inch and larger valves, valve boxes shall be approved standard Buffalo type, cast iron, adjustable shaft valve boxes having a minimum shaft diameter of 5' 1-inches. The castings shall be coated with two coats of coal-tar pitch varnish. The lids of all boxes shall bear the word "WATER" or the letter "W", the word "FIRE" for fire hydrants and fire protection systems, the word "SEWER" for valves in wastewater system, and the word "REUSE" for valves in reclaimed water system. Lids for water shall be painted blue, for

fire systems shall be painted red, for sewer systems shall be painted green, and for reuse systems shall be painted purple. Extension sections shall be cast iron only. Every valve box shall be installed with a debris cap.

Valve boxes are not to be installed in curb. All valve boxes shall be made in USA. See the Approved Product List for a listing of acceptable valve boxes.

2.11 CARRIER PIPE (for jack and bore)

All pipe inside casing will be restrained. Pipe and fittings shall comply with the applicable provisions of these Standards.

2.12 CASING PIPE AND SPACERS (for jack and bore and directional drilling)

Casing pipe shall be new prime steel pipe conforming to the requirements of ASTM Designation A-139. The minimum casing pipe size and wall thickness shall be as shown in the following table, for carrier pipe size indicated and FDOT requirements as applicable. For sizes not included, or for special design considerations, approval shall be obtained from CMI W&S DEPT. The following table shows the requirements for steel casings. Note that the casing pipe diameter shown in the following table is a minimum diameter and final casing diameter will be determined by the Engineer.

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Carrier Pipe Nominal Size (inches)	Casing Pipe Outside Diameter (inches)	Casing Pipe Wall Thickness (inches)
4	14	0.250
6	16	0.250
8	18	0.250
10	20	0.250
12	24	0.312
14	28	0.312
16	30	0.312
18	34	0.375
20	36	0.375
24	42	0.500

All casing spacers shall be made of stainless steel with a 10-mil to 16-mil factory applied fusion bonded polyvinyl chloride coating. All casing spacers larger than 36-inch shall be factory designed, taking in consideration the weight of the carrier pipe filled with water. All casing spacers shall have design compression strength of not less than 18,000 psi, with full 2-inch-wide runners. Wooden skids and polyethylene runners will not be accepted. All calculations and drawings shall be submitted to CMI W&S DEPT. for review and approval. .

Casing pipe for HDPE directional drilling shall have a minimum 2-inch larger inside diameter than the outside diameter of the HDPE carrier pipe. Casing pipe ends for HDPE directional drilling shall be sealed per jack and bore requirements. Casing spacers are not required for directional drilling.

2.13 CORROSION PROTECTION

Corrosion protection is required for underground ductile iron pipe and fittings. This shall be accomplished by the installation of polyethylene encasement. Polyethylene encasement shall be four mil high-density cross laminate meeting AWWA C105 and as approved by CMI W&S DEPT. Steel pipe will not be allowed for carrier pipe unless specifically approved by CMI W&S DEPT. Steel pipe if used shall be cathodically protected.

2.14 ROAD CROSSINGS-PAVED AREAS

All pressure mains that are placed under a road or parking lot shall be PVC DR 14 C900 or HDPE DR11 C906. PVC DR18 or HDPE DR17 may be accepted in low traffic areas with prior approval with CMI W&S DEPT. Pipe larger than 12-inch diameter shall be C905 PVC DR18 or C906 HDPE DR11. Pipe crossing of roadways or under pavement shall be extended five feet off edge of roadway. CMI W&S DEPT. may require further extension in locations where future widening is anticipated.

2.15 AIR RELEASE VALVES

Polytubing shall be used for connection to the main and shall be 2-inches minimum. Main line ARV's shall be isolated with a ball valve. Air release valves shall be housed in enclosures; blue for water, green for wastewater, and purple for reclaimed or irrigation water; with "Contact Marco Island Utilities in Case of Emergency (239) 394-3168" imprinted on the side of the enclosure. See approved product list.

2.16 PIPE SUPPORTS

Pipe supports including all anchors and fasteners were used for bridge crossings shall be fabricated of Type 316 stainless steel. Material used for fabrication of the pipe supports shall not be less than 0.25 inches thick. The details shall be coordinated with and approved by CMI W&S DEPT. and FDOT if an FDOT bridge. The supports and the anchor system shall be designed by Florida registered professional engineer. Signed and sealed design calculations and anchor details shall be submitted to CMI W&S DEPT. The design of pipe hanger system shall consider thermal expansion. Exposed piping shall be DI pipe or stainless-steel pipe. Expansion joints shall be provided for exposed spans over 80 feet in length or as determined by the engineer. The maximum spacing of supports shall consider the weight of the pipe full of water and shall be determined by the engineer and shall be coordinated with the bridge structure and generally shall not be greater than 10 foot spacing except as specifically designed by the engineer and approved by CMI W&S DEPT.

2.17 CONCRETE

General purpose cast-in-place concrete shall have a minimum compressive strength of 3,000 pounds per square inch (psi) unless otherwise noted.

2.18 POTABLE WATER SERVICE MATERIAL SPECIFICATIONS

A. General

All pipe and pipe fittings shall contain no lead pursuant to the Reduction in Lead in Drinking Water Act. All pipe and pipe fittings installed shall be color coded or marked in accordance with the Manual of Standards. All pipe and pipe fittings that come into contact with potable water shall conform to ANSI/NSF Standard 61.

B. Gate Valves

Gate valves shall be resilient wedge vertically oriented gate valves with a vertical operating system. Resilient wedge gate valves shall conform to ANSI/AWWA Standard C509 and C515. Valves for potable water service shall be certified for compliance with ANSI/NSF 61. Valves shall have 316 stainless steel external fasteners with fusion bonded epoxy coating. Refer to the Approved Product List for acceptable valve manufacturers.

Valves must be installed not further than three feet from the tee which valve is serving, unless a deviation is specifically approved by CMI W&S DEPT.

C. Automatic Flushing Assembly and Bacteriological Sample Valves

1. Automatic flushing assemblies shall be constructed in accordance with the standard details.
2. Temporary flushing assemblies shall be constructed in accordance with the standard details.
3. Bacteriological sample valves shall be constructed in accordance with the standard details. Connection shall be 1 1/2-inches in size and shall be connected to the main with a 1 1/2-inch brass corporation stop, as shown on the details.

D. Backflow Preventers

Backflow preventers shall be provided as required by the FDEP. However, all Backflow Preventers must be Reduced Pressure Zone regardless of hazard. Backflow preventers shall generally be in compliance with standard details, and design shall be provided to CMI W&S DEPT. for approval prior to construction. See approved product list.

E. Service Drops

Service drops shall be run to all lots. Drops should be to lot corners wherever possible. Double services shall be utilized whenever practical.

Service drops for PVC, AC, and Ductile Iron pipe shall include full body stainless steel tapping sleeve, minimum 2-inch resilient seat gate valve or corporation stop (1-1/2 inch or 2 inch), service line, curb stop, and meter box. Tapping saddles are required for HDPE service connections. Contractor shall be responsible for relocation in the event of grade changes for meter and meter box. The minimum size service line shall be 1-1/2 inch reducing to one 1-inch or two 1-inch services to each lot. No more than two 1-inch meters may be served by a 1-1/2-inch service line. Components of the service drops shall be a combination of stainless steel and lead-free brass (ANSI/ NSF 61).

All service lines that go under a road shall be placed inside of a PVC casing. The minimum size casing shall be 2-inch and shall be schedule 80, class 160 PVC pipe.

All services crossing under a 4-lane road or two lanes of a 4-lane road that are 1-1/2 inch or 2 inch shall be 4-inch pipe with 4-inch fusion bonded epoxy gate valve and stainless-steel full body tapping sleeve that reduces to 1-1/2 inch or 2 inch once pipe has cleared the roadway by a minimum of 2 feet.

No services shall be in conflict with pad mount electric power transformers. In the case of services going under the roadway, at the point where casing comes past edge of pavement, the water service is to be a minimum of 5-feet off the corner of pad mounted electric transformers.

F. Service Tapping Sleeves

Tapping sleeves shall be full body 316 stainless steel for PVC, ductile iron, and AC pipe.

For services less than 1 inch (5/8 and 3/4 inch) use a 1-1/2-inch Ball Corporation Stop reduced to the meter size.

See approved product list.

G. Corporation Stops

Ball Corporation Stops shall be 1-1/2 inch with AWWA taper iron pipe thread on the inlet side and pack joint outlet for polyethylene tubing. Corporation Stops shall thread directly into tapping saddle. All corporation stops that come into contact with potable water shall conform to ANSI/NSF Standard 61. See approved product list.

H. HDPE Electrofusion Bonded Service Taps

Tapping saddles for HDPE pipe shall be fabricated of Type 316 stainless steel with 316 stainless steel bolts incorporating a pressure activated gasket and shall be designed specifically for HDPE pipe applications. See approved product list.

I. Meters

Meters shall read in gallons, with radio read, and main case of lead -free high-copper alloy. Water meters shall meet or exceed the latest AWWA Standard C700 standard and shall be ANSI/NSF 61 certified. City shall provide all meters 2-inch and smaller. All other meters shall be provided by the owner. See approved product list.

J. Brass Fittings

All brass fittings shall be manufactured with lead free brass complying with AWWA Standard C800 and ANSI/NSF 61 certified for contact with potable water. See approved product list.

K. Service Tubing

Service tubing will be PE 3408, DR-9 polyethylene with ultra-violet inhibitors and lifetime warranty. See approved product list.

L. Meter Boxes

Refer to the Approved Product list for accepted meter box manufacturers.

M. Fire Hydrants

Fire hydrants shall comply with AWWA C502 and ANSI/NSF Standard 61. Fire hydrants shall be of the compression type, closing with the line pressure. Hydrants shall have internal cast flanges. The lower stem shall be located below the top of the lower barrel. The upper barrel will be fluted and ribbed above the safety flange. The seat ring shall be bronze and thread into a bronze bushing located between the lower barrel and the shoe. The lower barrel shall be designed so the barrel can be removed from hydrant while under pressure. Hose and pumper nozzles shall be threaded with "O" ring seals and retained by stainless steel screws. Hydrants will be cast marked or outside design shall be such that visible identification can be made as to type and design.

Hydrants shall have 5-1/4-inch main valves. The Valve seat removal wrench shall be a short pattern design and fit all depth of buries.

Hydrants shall deliver a minimum of 750 gpm based on five feet bury with 6-inch diameter supply.

Depth of bury for hydrants shall be of the same as that specified for the pipe. Hydrants shall have a valve between the hydrant and the main. Two valves shall be required if distance from hydrant to main exceeds fifty feet. Hydrants are to be covered from the time of installation until the jumper assembly is removed and hydrant can be placed into service. Hydrant services will be subject to bacteriological testing. No hydrant will be turned on until bacteriological tests are satisfied.

The manufacturer shall provide certification of these fire hydrants standards to CMI W&S DEPT.

Please refer to the Approved Product List for approved hydrant manufacturers.

N. Fire Lines

Fire lines shall be tapped directly into water main, and a backflow preventer shall be installed (see backflow preventer standard details). CMI W&S DEPT. personnel are required to be present at time of tap. All fire lines will be bacteriologically tested from main valve on utility main to the backflow preventer. Fire line backflow preventers and valves must be tagged UL approved per the applicable fire district. Final inspections, plan review and acceptance, and pressure testing shall be monitored and approved by the applicable fire district. Separate main taps shall be required.

O. Water for Construction

Contractor shall install an in-line meter that is larger than 2" and CMI W&S DEPT. will install meter if 2-inch and smaller for metering water used during construction. The meter shall be furnished by CMI W&S DEPT. at a cost to be paid by the Contractor at the current rate established by Customer Services. Contractor shall contact customer service for connection fees, deposits, and water rates.

Construction meter may be utilized under the following circumstances:

1. Potable water exists, and water is needed for construction (sewer connection will not be made until construction is complete).
2. Potable waterline has been constructed; bacteriological testing has passed (no connection to sewer)
3. In extensive projects (construction may take years to complete), at CMI W&S DEPT.'s discretion, permanent meters may be placed, but classified as construction. Certain conditions may be required including, but not limited to, no water being introduced into the sewer system; or whether the sewer system is complete or not. Letter will be required from Developer/Owner and Contractor stating no water shall be introduced into the sewer system.

Tap for construction meter will be made by CMI W&S DEPT. up to 2-inch in size. Tap for construction meter will be made by Contractor for any meters larger than 2". Tap will be made by Contractor hired by Developer/Owner with the following conditions: Taps 2 inch and smaller that are under North and South Collier Blvd. will be placed by Contractor.

1. Tap will be size required for permanent meter (whether larger or smaller).
2. Tap will be done at location of permanent meter.
3. CMI W&S DEPT. will witness tap.
4. Reduced pressure zone backflow prevention device is required, and shall be provided by the Contractor, for all construction and permanent meters.
5. Contractor to arrange and pay for a Florida licensed backflow tester/repairer to test or repair the reduced pressure zone backflow prevention device and provide test report to CMI W&S DEPT.,
6. No construction water is to be introduced into the sewer system, whether sewer is complete or not.

2.19 WASTEWATER SERVICE MATERIAL SPECIFICATIONS

A. Valves

All valves utilized on pressure mains for in-line installation shall be of the plug type. All valves utilized on lift station sites shall be of the plug type. All valves shall be internally epoxy lined. Hot taps may be permitted by CMI W&S DEPT. If permitted, plug valves must be installed after tapping valve, and the tapping valve shall be buried in the open position with no access to the ground surface. Valves shall be tested and certified by the manufacturer at 100 psi in both flow directions.

All buried valves shall have 2-inch operating nut. Valves for buried service shall be equipped with extended actuator mounting, such that the hand wheel or lever operator is at a convenient height from grade for ease of operation. All valves and operators shall be designed for suitable operation at the pressure requirements dictated by the working pressure of the system, the pressure of the suspended solids, and other such considerations affecting its proper operation and normal life expectancy. The valves shall be designed for not less than 150 psi working pressure. All external bolts, fasteners and hardware shall be Type 316 stainless steel.

B. Gravity Sewer Fittings

Gravity sewer fittings shall be PVC and shall conform to the requirements of ASTM D-3034 standard with minimum wall thickness of SDR26. Fittings 8-inch and smaller shall be molded in one piece with elastomeric joints with "locked in" design and minimum socket depths as specified in ASTM D-3034. Any molded fittings without the molded locked in design will be rejected. Fittings 10-inch and larger shall be molded or fabricated in accordance with ASTM D-3034, with manufacturers standard bells and gaskets. Gaskets shall have minimum cross-sectional area of 0.20 sq. in. and conform to ASTM F-477 Standard. PVC material shall have a cell classification of 12454-8 as defined in ASTM D-1784. PVC sewer fittings and gaskets material shall conform to all ASTM standards stated in the *above* specification as well as ASTM D-3212.

C. Castings

Castings for manhole frames, covers and other items shall conform to the ASTM Designation A48, Class 30. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects in positions which would impair their strength, or otherwise make them unfit for the service intended. The seating surfaces between frames and covers shall be machined to fit true so the frames and covers do not shift under traffic conditions or permit entry of storm water from flooding. Lifting or "pick" holes shall be provided but shall not penetrate the cover. All manhole frames and covers shall be traffic bearing unless otherwise specified. All manholes will have an inflow dish.

Frames and covers shall be fully bedded in mortar to the correct finish grade elevation with adjustment rings installed in conformance with the standard details.

D. Manholes

Manholes shall conform to the requirements of ASTM Designation C478, with reinforcement of Grade 40 and the following modifications:

1. The minimum wall thickness shall be 8-inches.
2. All concrete shall be Type 2 Portland cement and shall attain a maximum compressive strength of 4000 psi in 28 days.
3. Reinforcing steel shall be intermediate grade new billet stock with deformations conforming to ASTM A305-53-7 and A15-54T. Reinforcing steel shall be clean and free from loose scale, rust, dirt, and oil. Reinforcing steel shall be placed in accordance with the ACI Manual of Detailing, and all bars shall be lapped 24 bar diameters unless otherwise noted. All reinforcing steel shall have a minimum of 3-inches of clearance from edge of concrete. Spacing dimensions shown in the standard details are from centerline of bars.
4. Joining Manhole Sections: Join precast sections using plastic joint sealing compound and trimmed prior to grouting. The first construction joint shall be not less than 2 feet above the base slab. Use tongue and groove joints suitable for the flexible gasket. Use non-shrink grout inside and outside for sealing between manhole precast sections then seal each outside section with an approved seal material. See the Approved Product List for acceptable products.
5. All grout used for sealing around pipe openings and joints shall be Avanti or approved equal and designed for use in water.
6. Lifting holes through the structure are not permitted.
7. The design of the structure shall include a precast base of not less than 8 inches in thickness poured monolithically with the bottom section of the manhole walls. Bottom section shall be a minimum of 8-feet or appropriate height if total manhole is less than 8-feet.
8. Manhole tops shall terminate at such elevations as will permit laying upgrade rings under the manhole frame to make allowances for future street grade adjustments. Adjustment to street grade shall be made with HDPE riser rings or approved equal, with a maximum allowable adjustment with riser rings of 12-inches.
9. Drop connections, where required on precast manholes, shall be manufactured with the manhole elements at the casting yard. Drop manholes shall be constructed per the standard details. Field construction

of drop manholes shall be allowed only with specific prior approval from CMI W&S DEPT.

10. Lift stations shall be coated utilizing a CMI W&S DEPT. approved coating product in accordance with the coating schedule. All manholes upstream of lift station shall be coated on interior. Coating shall be in accordance with a CMI W&S DEPT. approved product. The warranty for lining or coating on the lift station and manholes shall be 10 years. Surface for any coating shall be prepared by sand blasting prior to initial coating. Surface shall be clean and dry and shall be inspected for leaks prior to painting. See the approved product list for approved coatings.
11. All new or existing manholes shall be coated in accordance with the coating schedule. Surface for any coating shall be prepared by sand blasting prior to initial painting. Surface shall be clean and dry and shall be inspected for leaks prior to painting. See the approved product list for approved coatings.
12. All flow line channels shall have a minimum of 2-inches thickness of poured concrete or 2-inch grouted finish. Filler in the bottom of the manhole shall be concrete. Gravel, sand, or brick filler in the bottom of manholes shall not be allowed.
13. Contractor shall furnish flexible rubber sleeve with stainless steel clamp to provide a leak proof joint between the concrete manhole and all pipes entering the manhole.
14. All manholes will have internal waterproof, urethane coating on top three feet of manhole chimney. The seal shall be applied in accordance with the manufacturer's specifications. See the Approved Product List for acceptable products.

2.20 CONVENTIONAL LIFT STATION MATERIAL SPECIFICATIONS

A. Sewage Pumps and Motors

1. General
 - a. Sewage pumping units shall be capable of handling raw, unscreened sewage and shall be capable of passing a sphere of at least three inches in diameter.
 - b. Pumps shall be electric motor driven and of a proven design that has been in sewage service under similar conditions for at least five years.

- c. Pumps shall provide the required peak design performance requirements and be suitable for operation within the total hydraulic range of operation without overloading the motors.
- d. Pump motors shall be 230/460 volts, 3-phase, 60 cycle electric motors. Pumps motors greater than 20 horsepower shall be 3-phase 480volt electric motors when 480V service voltage is available. Contractor shall verify local voltage prior to placement of order for pumps.
- e. All lift stations shall be grounded with a minimum of two 10-foot copper ground rods no less than 6-feet apart and shall have a measurement of five ohms or less.

2. Submersible Pumps

The pump units shall be non-clog, mechanical seal, submersible sewage pumps as manufactured by ABS or CMI W&S DEPT. approved equal. Certified pump curves shall be furnished with the pumps. See approved product list for pumps, control panels, and components.

- a. Pumps shall be capable of handling raw, unscreened sewage. The design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service requiring no bolts, nuts, or other fastenings to be removed for this purpose and no need for personnel to enter pump well. Each pump shall be fitted with a 3/8-inch Series 316 stainless steel chain a minimum of 18-inches long attached to a 1/4-inch minimum Series 316 stainless steel wire rope which is to be hung on a rack at the top of the wet well.
- b. The stator casing, oil casing and impeller shall be of gray iron construction with all parts coming into contact with sewage protected by a coat of rubber asphalt paint. All external bolts and nuts shall be of stainless steel. A wear ring designed for abrasion resistance shall be installed at the inlet of the pump to provide protection against wear to the impeller. The impeller shall be of a single vane, non-clog design, capable of passing solids, fibrous material, and heavy sludge, and constructed with a long throughway with no acute turns.
- c. A sliding guide bracket is to be an integral part of the pumping unit and the pump casing shall have a machined connecting flange to connect with the cast iron discharge connection, which shall be bolted to the floor of the sump and so designed as to receive the pump connecting flange without the need of any bolts or nuts.

- d. Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit guided by no less than two stainless steel 316, schedule 40 guide bars to and pressing tightly against the discharge connection; no portion of the pump shall bear directly on the floor of the sump and no rotary motion of the pump shall be required for sealing. Sealing at the discharge connection by means of a diaphragm, O-ring or similar method of sealing will not be accepted as an equal to a metal contact of the pump discharge and mating discharge connection specified and required.
- e. Pump motors shall be housed in an air-filled watertight casing and shall have Class F insulated windings, which shall be moisture resistant. The motor shall be NEMA Design B rated 155°C maximum. Pump motors should have cooling characteristics suitable to permit continuous operation in a totally, partially, or non-submerged condition. The pump shall be capable of running dry continuously in a totally dry condition. Cable junction box and motor shall be separated by a stator lead sealing gland or terminal board which shall isolate motor from any water or solids gaining access through pump top.
- f. Pump motor cable shall be suitable for submersible pump applications, and this shall be permanently indicated on the cable.
- g. The pump manufacturer shall perform the following tests on each pump before shipment from the factory:
 - i. Megger the pump for insulation breaks or moisture.
 - ii. Prior to submergence, the pump shall be run dry and checked for correct rotation.
 - iii. Pump shall be run for 30 minutes in a submerged condition.
 - iv. Pump shall be removed from test tank, meggered immediately for moisture; oil plugs shall be removed for checking lower seal; inspection plug shall be removed for checking of upper seal and possible water intrusion of stator housing.
 - v. A written certified test report giving the above information shall be supplied with each pump at the time of shipment.
 - vi. All ends of pump cables will then be fitted with a rubber shrink fit boot to protect cable prior to electrical insulation.

- h. The pump manufacturer shall warrant the pumps being supplied to CMI W&S DEPT. against defects in workmanship and materials for a period of five years under normal use, operation, and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear on a progressive schedule of cost for a period of five years; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units.

B. Pump Controls

1. Each lift station control system shall include level floats, which shall sense the sewage level in the wet well and provide appropriate signals to the PLC circuits to produce the required mode of operation for the pumping facilities. Capability shall be provided for manual start-stop control for all pumping units as well as the normal automatic control from the liquid level floats and PLC. An automatic alternator shall change the starting sequence on each pump cycle. A high-water level alarm system shall be provided. Each sewage pump shall be provided with an elapsed time meter to indicate pump running time. Alternator relays shall be ATC Diversified Electronics or approved equal.
2. Electric panel enclosures shall be Type 316 stainless steel with NEMA 4X rating, shall be UL rated and certified, and shall be equipped with all components recommended by the pump manufacturer and shall be compatible with the requirements of the pumping operation. All electrical panels shall be installed in the telescopic enclosure if required to position above the 100-year flood elevation while being accessible. Electrical panels not required to be telescopic will be installed in an CMI W&S DEPT. non-telescopic enclosure. Panel enclosures shall be mounted on a 6 ft by 6 ft by 24-inch-thick steel reinforced concrete pad of 4,000 psi concrete.
3. Electric Panel shall include phase monitoring and TVSS Square D, APT D120VIP surge suppression, or approved equal.
4. Electric Panel shall include 100 or 200 ampere Russell Stowe generator receptacle with angle adapter.
5. Liquid Level float switches shall be Roto-Float Model S40 normally open. Each liquid level float switch shall be provided with 40-feet of electrical cable unless otherwise noted by CMI W&S DEPT.

C. Variable Speed Pump Control Systems

The requirement for variable speed controlling of sewage pumps shall be considered for all large capacity pumps for major installations; when the hydraulic conditions indicate a necessity for variable speed control and when single phase conversion panels are used. The requirement for variable speed pump controls shall receive prior review with CMI W&S DEPT. Should a variable speed control system be necessary, the facility shall be equal to existing variable speed control units, or as approved by CMI W&S DEPT. Where applicable, SCADA shall include instantaneous pump flow and totalized flow.

D. SCADA System

All sewage lift stations shall be required to be equipped for and connected with the master CMI W&S DEPT. remote SCADA system. The installation shall be compatible with the existing CMI W&S DEPT. SCADA system and must monitor pump on/off, communications failure, loss of power, and pump failure. Pump control by SCADA is required.

CMI W&S DEPT. shall provide and install the SCADA system components included by the lift station at the Developer/Owner's expense. The cost to the Developer/Owner shall be at cost, which shall be billed to the Developer/Owner by CMI W&S DEPT. upon receipt of Turnover Documents.

Emergency Bypass Pump Connections

All sewage lift stations whether equipped with stationary standby power generators or not, shall have connections provided for emergency auxiliary pumping through an additional bypass pipe and valve with Cam-Lok fittings housed in an in-ground enclosure

E. Emergency Generators

Portable emergency generators are required at sewage lift stations based on size, flow, and retention time and all re-pump stations. Type and size shall be determined in consultation with CMI W&S DEPT. Said installation shall be an engine-generator, diesel operated of adequate size to automatically start and operate the pumps required for design flow conditions, lights, controls, and other critical items. All alarm and control shall be provided with SCADA points. The engine-generator sizing for the application and the installation shall be in accordance with all applicable manufacturers' requirements. All lift stations shall be provided with emergency generator receptacles approved by CMI W&S DEPT.

F. Odor Control

Re-pump stations and non-residential waste generators must provide pretreatment and appropriate odor control. Odor control may be required elsewhere by CMI W&S DEPT. Odor control units shall be sized for the design flow and anticipated odor control requirements. Type and size shall be determined in consultation with CMI W&S DEPT.

G. Access Hatches and Guides

The pump manufacturer, to ensure unit responsibility, shall supply access hatches and guides. Access frames and covers shall have a 1/2-inch-thick one-piece, mill finish, extruded aluminum frame, incorporating a continuous concrete anchor. Door panel shall be 1/4-inch aluminum diamond plate, reinforced to withstand a live load of 300 psf. Door shall open to 90° and automatically lock with a stainless-steel hold open arm with aluminum release handle. Door shall close flush with the frame. Doors shall have CMI W&S DEPT. approved method to eliminate vibration of the doors when pumps activate. Lifting handle, hinges and all fastening hardware shall be stainless steel. Unit shall lock with a noncorrosive locking bar. Unit shall be guaranteed against defects in material and/or workmanship for a period of 10 years.

H. Wet Wells

1. The structure shall be circular and shall be constructed of poured-in-place concrete or precast concrete sections (ASTM C478) placed on a poured bottom foundation base. The top slab shall be suitable for AASHTO H20 traffic loading where needed and the wet well shall be designed to prevent floatation.
2. All joints shall have a "Ram-Neck" gasket. Joints shall be constructed with EZ wrap, Wrapid Seal or approved equal on exterior. All joints shall have non-shrink grout on interior and exterior.
3. Lift station shall be coated with a coating system as stated in these specifications or as approved by CMI W&S DEPT. Existing or rehabilitated wet wells must meet these specifications. The warranty for lining or coating on the lift station and entry manhole shall be 10 years. Surface for any coating shall be prepared by sand blasting prior to initial painting. Surface shall be clean and dry and shall be inspected for leaks prior to coating. Spark testing of coatings will be required and shall be performed by the Contractor as applicable. See the approved product list for approved coatings.
4. Lift station piping shall include a 4-inch (minimum) HDPE SDR 11 header pipe (see details for dimensions). Header pipe shall have a flange adapter

to connect to the pump foot piece. Flange adapter shall be epoxy lined. The connection to the foot piece shall also have a JCM 230 stainless steel insert. The header pipe shall have an air release valve attached to the HDPE pipe with a stainless-steel saddle. See the approved product list.

5. Piping shall also include 4-inch iron body plug valve with non-lubricated nickel iron, neoprene coated plug, 100 percent opening (80 percent port), complete with wrench; a 4-inch flanged lever and weight check valve.

I. Lift Station Water System

1. All sewage lift stations shall be provided with a station water system with adequate capacity and pressure for wash-down utilization. The lift station water supply shall be completely separated from the potable supply by use of reduced pressure type back-flow preventers. Hose bibs and hose shall be provided at convenient locations to facilitate maintenance. Potable water with meter and RPZ backflow preventer shall be required.
2. Flow meters shall be required for developments with private water systems connected to the CMI W&S DEPT. sewer system. See the Approved Product List for acceptable meter manufacturers.

2.21 Key Marco Service Area Grinder Pump Station

A. General

All new and replacement grinder pump stations installed in the Key Marco Community Development District shall meet the following minimum requirements. All installation, operation and maintenance of the pump station and discharge force main to the isolation valve immediately located at the CMI W&S DEPT. force main shall be the responsibility of the property owner. All connections to the CMI W&S DEPT. system shall be made by the property owner and witnessed by the CMI W&S DEPT.

B. Package Grinder Pump System

The package grinder pump system shall be the E-One Model DH071 or DR071. No alternates shall be allowed. It shall be a complete unit consisting of a grinder pump, check valve, HDPE (high density polyethylene) tank, controls, and alarm panel. At the property owner's discretion, a duplex pump system or greater volume wet well may be provided meeting the E-One system requirements.

1. Grinder pump shall be a 1 horsepower, 1725 RPM, high torque, capacitor start, thermally protected 120/240 V, 60 Hz, 1 phase unit. The pump shall have the following discharge characteristics.

15 Gallons Per Minute at 0 psig
11 Gallons Per Minute at 40 psig
7.8 Gallons Per Minute at 80 psig

2. Inlet connection shall be a minimum 4 inlet grommet standard for DWV pipe. All inlets shall be factory installed.
3. Pump discharge shall be a minimum 1.25-inch NPT female thread which shall attach to the force main between the pump station and CMI W&S DEPT. connection point. Force main shall be sized by the property owner to allow proper pump operation.
4. A E-One uni-lateral stainless steel check valve shall be installed between the pump station and CMI W&S DEPT. isolation valve. Check valve shall be in accessible location.
5. Wet well shall be integral with the pump station and shall provide a minimum of 70 gallons of capacity. The height of the enclosure above the inlet shall be determined by the property owner and shall be a standard unit as provided by E-One. A gasketed HDPE lid shall be provided.
6. A standard E-One Control/Alarm panel shall be provided and installed. It is not required, but the optional Sentry Simplex Protect is recommended to protect the grinder pump system for Low Voltage, Run Dry and High System Pressure Protection.
7. The property owner shall obtain all Building and Electrical Permits as may be required for installation.

SECTION NO. 3

CONSTRUCTION SPECIFICATIONS

3.1 GENERAL

The term "local standards" as used in connection with the Construction Specifications, means the standards of City of Marco Island Water and Sewer Department (CMI W&S DEPT.). Prior to any construction, the Contractor shall contact CMI W&S DEPT. and arrange a pre-construction meeting. A pre-construction meeting is mandatory for all line extensions within the CMI W&S DEPT. service area, or changes to existing lines.

3.2 EXISTING IMPROVEMENTS

The Contractor shall maintain in operating condition all active utilities, sewers, gutters, and other drains encountered in the utility installation. The Contractor shall repair to the satisfaction of the owner, any surface or sub-surface improvement damaged during the course of the work (unless such improvement is shown to be abandoned or removed), whether or not such improvement is shown on the drawings.

3.3 CONNECTIONS TO EXISTING MAINS

1. Contractor shall make all required connections larger than 2 inches to existing pressure mains, arranging with CMI W&S DEPT. to have supervision during the connections. All such connections shall be pressure taps or mechanical joint tees for water mains.
2. All water main taps or tees shall be subject to sampling and testing.
3. CONNECTIONS WILL NOT BE MADE WITHOUT PROPER CERTIFICATIONS BY THE ENGINEER OF RECORD.

3.4 EXCAVATION, TRENCHING, BACKFILLING, AND RESTORATION

A. General

The provisions set forth in this Section shall be applicable to all underground gravity sewers, force mains, and water piping installations regardless of location. Special design considerations will require approval from the CMI W&S DEPT.

B. Sheeting and Bracing

In order to prevent damage to property, injury to persons, erosion, cave-in or excessive trench width, adequate sheeting and bracing shall be provided

per regulations of the Federal Occupational Safety and Health Administration and/or as directed by the Owner or Engineer. Contractor shall comply with local regulations or, in the absence thereof, with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. This work shall be performed in accordance with accepted standard practice when design consideration warrants due to *adverse* soil condition, proximity of existing utilities, maintenance, and protection of traffic. Sheeting shall be removed when the trench has been backfilled to at least one-half its depth or when removal would not endanger the construction of adjacent structures. When required to eliminate excessive trench width or other damage, shoring or bracing shall be left in place and the top cut off at an elevation 2.5-feet below finished grade, unless otherwise directed.

C. Protection of Pipe Laid in Fill Areas

The underground utilities specified shall not be laid in areas of fill prior to the actual performance of the grading operation unless the depth of the cover over such utilities below existing ground surface is at least 36-inches. Such depth of cover requirement may be reduced provided the pipe is protected by concrete cradling, encasement, or other manner satisfactory to the CMI W&S DEPT. Lines in excess of 6-feet deep upon completion of fill operation shall not be permitted.

D. Workmanship

1. Trench Dimensions

- a. The minimum width of the trench shall be equal to the outside diameter of the pipe at the joint plus 8-inches for unsheeted trench or 12-inches for sheeted trench.

2. Trench Grade

- a. Perform final grading of trench bottoms by hand tools, carry machine excavation only to such depth that soil bearing for pipes will not be disturbed. Grade the bottom of trenches evenly to insure uniform bearing for all pipes. Cut holes as necessary for joints and joint making.
- b. As an alternate method, optional with the Contractor, excavate trenches to at least 4 inches below the required bottom levels and refill to the proper grade with #57 stone firmly compacted.

- c. In rock, cemented gravel, old masonry, or other hard non cushioning material, excavate to at least 4 inches below the pipe at all points and refill to grade with sand or #57 stone firmly compacted.
- d. In fill containing refuse, organic matter, or similar substances, remove such material to a depth of at least 6-inches below the pipe at all points and refill with #57 stone to spring line of pipe. Fill to grade with good clean dirt, sand, base rock, and asphalt, as required. Nothing larger than #57 stone shall be used for pipe bedding.
- e. Soil unsuitable for a proper foundation encountered at or below trench grade, such as muck or other deleterious material, shall be removed for the full width of the trench and to the depth required to reach suitable foundation material, unless special design considerations receive prior approval from CMI W&S DEPT. Backfilling below trench grade shall be in compliance with the applicable provisions. Unless otherwise specified or directed, backfill layers shall not exceed 6 inches in thickness for the full trench width and compaction shall equal 95% of maximum density, as determined by AASHTO Specification T-180. Compaction density tests shall be made at all such backfill areas with spacing not to exceed 50-feet apart.

E. Excavated Material

Excavated material to be used for backfilling shall be neatly deposited at the sides of the trenches where space is available. Where stockpiling of excavated material is required, the Contractor shall be responsible for obtaining the sites to be used and shall maintain his operations to provide for natural drainage and not present an unsightly appearance.

F. Material Disposal

Excess, unsuitable, or cleared and grubbed material resulting from utility installation shall be immediately removed from the work site and disposed of at a location secured by the Contractor.

G. Fill Material

Should there be insufficient material from the excavations to meet the requirements for fill material. Fill Material shall be obtained from pits secured and tested by the Contractor and approved by CMI W&S DEPT. Copies of all test results shall be submitted to CMI W&S DEPT.

H. Rock Excavation

Rock excavation shall be defined as excavation of any hard natural substance, which requires the use of explosives and/or special impact tools such as jackhammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.

I. Dewatering

1. Water shall not be allowed in the trenching while the pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of CMI W&S DEPT. If surface water is encountered, the Contractor shall use approved means to dewater the excavation. A well point system or other approved equipment shall be installed if necessary to maintain the excavation in a dry condition for placing of concrete and setting pipelines. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which work is occurring. In no case shall the pipelines being installed be used as drains for such water and the ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers, and not improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstruction matter into the pipelines. If on completion of the work any such material has entered the pipelines, they shall be cleaned so that the entire system will be left clean and unobstructed.
2. Contractor shall be responsible for all applicable state and local regulations regarding offsite discharge of water and turbidity control per Engineer's instructions.

J. Obstructions

1. It shall be the Contractor's responsibility to acquaint themselves with all existing conditions and to locate all structures and utilities along the proposed utility alignment in order to avoid conflicts. Where actual conflicts are unavoidable, work shall be coordinated with the facility owner and performed so as to cause as little interference as possible with the service rendered by the facility to be disturbed. Facilities or structures damaged in the prosecution of the work shall be repaired and/or replaced immediately, in conformance with current standard practices of the industry, or according to the direction of the owner of such facility, at the Contractor's expense.

2. All water pipes, storm drains, force mains, gas or other pipe, telephone or power cables or conduits, curbs, sidewalks, all house services, and all other obstructions, whether or not shown on drawings or marked by underground locating services, shall be temporarily removed from, or supported across utility line excavations.
3. Rules and Regulations governing the respective utilities shall be observed in executing all work. Active utilities if encountered shall be protected in accordance with written instructions of the Engineer. Inactive and abandoned utilities encountered in trenching operation shall be removed, plugged, or capped. In absence of specific requirements, plug or cap such utility lines at least 3 feet from utility line to be installed or as required by local regulations.
4. Underground sprinkler system piping encountered (public or private) within the work area and interfering with swale grading or other work requirements, shall be capped-off and removed by the Contractor in such a manner as to not render the system unusable, if possible. Prior to sod placement, the system shall be repaired and/or replaced by the Contractor.
5. Existing materials in the work area are to remain the property of the affected property owner(s) and if removed, shall be surrendered that property owner.
6. Where it is necessary to temporarily interrupt house services, the Contractor shall notify the CMI W&S DEPT. Project Manager and submit the completed "Service Interruption Form" for scheduling a service interruption. 72 hours in advance of proposed work. Termination of services will be permitted during the week prior to holidays or City of Marco Island designated days off. The Contractor shall be responsible for any damage to any such pipes, conduits, or cables, and shall restore them to service promptly.
7. Approximate locations of known water, sanitary, drainage, power, gas, and telephone installations along the route of new pipelines or in the vicinity of new work should be shown on the plans but must be verified in the field by the Contractor. The Contractor shall uncover these pipes, ducts, cables, etc., carefully, by hand, prior to installing new utility lines. Any discrepancies or differences found shall be brought to the attention of the Engineer in order that necessary changes may be made to permit installation of new pipe.

8. Where fences, walls, or other man-made obstructions exist illegally in the public right-of-way or easement, the Property Owner shall have them removed upon adequate prior notice by the City of Marco Island.

K. Tree Protection

Exercise care to protect the roots of trees to remain. Within the branch spread of such trees, perform all trenching by hand. Open the trench only when the utility can be installed immediately. Prune injured roots cleanly and backfill as soon as possible. Perform all this work under direction of the Engineer.

L. Backfilling

1. General: Backfill material shall be clean earth fill composed of sand, clay and sand, sand and rock, crushed rock, or an approved combination thereof. Backfilling shall be accomplished under two specified requirements: First Lift, from trench grade to spring line of pipe; and, Second Lift, from the top of the First Lift to the ground surface. Where structures, encasements, or other below grade concrete work have been installed, backfilling shall not proceed until the concrete has obtained sufficient strength to support the backfill load.
2. First Lift: #57 stone or approved material shall be carefully placed and tamped around the lower half of the utility. Backfilling shall be carefully continued in layers not exceeding 6-inches in thickness for the full trench width, until the fill is at spring line of pipe. The material for these first layers of backfill shall be lowered to within 2-feet above the top of pipes before it is allowed to fall, unless the material is placed with approved devices that protect the pipes from impact. The "First Lift" shall be thoroughly compacted and completed before the "Second Lift" is placed.
3. Second Lift. The remainder of the trench, above the "First Lift", shall be backfilled in layers not exceeding 9-inches. The maximum dimension of a stone, rock, or pavement fragment shall be 4 inches. When trenches are cut in pavements or areas to be paved, compaction, as determined by ASSHTO Specification T-180 shall be equal to 95% of maximum density, with compaction in other areas not less than 90% of maximum density. Under roadways the compaction shall be to not less than 98% of maximum density. The use of flowable fill maybe required to achieve required density.

4. Compaction Methods

- a. The above specified compaction shall be accomplished using accepted standard methods (powered tampers, vibrators, etc.), with exception that the first two feet of backfilling over the pipe shall be compacted by hand-operated tamping devices.
- b. Hydraulic compaction, i.e., flooding the trench with water, shall be allowed with project specific approval from CMI W&S DEPT., with the exception of the first two feet of backfilling over the pipe as noted above. Density requirements for hydraulic compaction are the same as other compaction methods.

5. Density Tests

A testing Laboratory approved by CMI W&S DEPT. shall make density tests for determination of the above specified compaction, at the expense of the Contractor. Test locations will be determined by CMI W&S DEPT., but in any case, shall be spaced not more than 300 feet apart where the trench cut is continuous in pavements or areas to be paved. Tests shall also be made where a trench crosses a paved roadway or future paved roadway. A minimum of two tests shall be taken at all roadway crossings. If any test results are unsatisfactory, the Contractor shall re-excavate and re-compact the backfill at his expense until the desired compaction is obtained. Additional compaction tests shall be made to each side of an unsatisfactory test, as directed, to determine the extent of re-excavation and re-compactation necessary.

M. Protective Concrete Slab

Protective concrete slabs shall be installed over the top of trenches; where required, to protect the installed utility against excessive loads, or when insufficient cover exists.

N. Restoration

1. Existing sidewalks and driveways removed, disturbed, or destroyed by construction, shall be replaced, or repaired. The finished work shall be equal in all respects to the original in accordance with the City Right-of-Way Ordinance and shall be approved by CMI W&S DEPT.
2. Pavement or roadway surfaces cut or damaged shall be replaced by the Contractor in equal or better condition than the original, in accordance with the City Right-of-Way Ordinance, including

stabilization, base course, surface course, curb and gutter or other appurtenances.

- a. The Contractor shall obtain the necessary permits prior to any roadway work. Additionally, the Contractor shall provide advance notice to the appropriate authority, as required, prior to construction operations.
- b. Roadway restoration (within Marco Island jurisdiction) Restoration shall be in accordance with the requirements set forth in the "Marco Island Development Standards," City Right-of-Way Ordinance, and these Standards. The materials of construction and method of installation, along with the proposed restoration design for items not referred or specified herein, shall receive prior approval from the City of Marco Island. Where existing pavement is to be removed, the surfacing shall be mechanical saw cut prior to trench excavation, leaving a uniform and straight edge parallel to the utility, with minimum disturbance to the remaining adjacent surfacing. The width of cut for this phase of existing pavement removal shall be minimal.
- c. Immediately following the specified backfilling and compaction, a temporary sand seal coat surface shall be applied to the cut areas. This temporary surfacing shall provide a smooth traffic surface with the existing roadway and shall be maintained until final restoration. Said surfacing shall remain for ten (10) days in order to assure the stability of the backfill under normal traffic conditions. Following this period and prior to fifteen (15) days after application, the temporary surfacing shall be removed and final roadway surface restoration accomplished, unless otherwise directed by CMI W&S DEPT.
- d. In advance of final restoration, the temporary surfacing shall be removed, and the existing pavement mechanically sawed straight and clean, 12-inches outside of ditch line minimum. Following the above operation, the Contractor shall proceed immediately with final pavement restoration in accordance with the requirements set forth by City of Marco Island.
- e. Roadway Restoration (outside City of Marco Island jurisdiction). Work within the rights-of-way of public thoroughfares which are not under jurisdiction of the City of Marco Island, shall conform to the requirements of the Governmental agency having jurisdiction. Specifically, work within State Highway right-of-way shall be in full compliance with all requirements of the permit drawings, and to the satisfaction of the Florida Department of Transportation.

f. All drainage should be restored to its original conditions unless directed by the appropriate Regulatory Agency.

3. Protection and Restoration of Property

a. During the course of construction, the Contractor shall take special care and provide adequate protection in order to minimize damage to vegetation, surfaced areas, and structures within the construction right-of-way, easement, or site, and take full responsibility for the replacement or repair thereof.

b. The Contractor shall immediately repair any damage to private property created by encroachment thereon. Should the removal or trimming of valuable trees, shrubs, or grass be required to facilitate the installation within the designated construction area, this work shall be done in cooperation with the City of Marco Island and/or local communities which the work takes place. Valuable vegetation, removed or damaged, shall be replanted, if possible, or replaced by items of equal quality, and maintained until growth is re-established.

c. Topsoil damaged in the course of work shall be replaced with at least a 4-inch layer of suitable material. Following construction completion, the work area along the route of the installation shall be finish grade to elevations compatible with the adjacent surface, with grassing or hand raking required within developed areas.

4. Cleanup

Work site cleanup and property restoration shall follow behind construction operation without delay. In order to facilitate an acceptable construction site, debris and waste materials shall be removed from the site immediately and daily trenching length versus pipe laying shall be coordinated to provide the minimum overnight trench opening. Construction site maintenance, along with on-going cleanup and final property restoration acceptance, shall be as directed by CMI W&S DEPT.

3.5 PIPE INSTALLATION

A. Pipe Cleanliness

The interior of the pipes shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during laying

operations by means of plugs or other approved methods. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

B. Pipe Gradient

Lines shall be laid straight, and depth of cover shall be maintained uniform with respect to finish grade, whether grading is completed or proposed at the time of pipe installation.

C. Pipe Laying

Under no circumstances shall pipe or appurtenances be dropped or dumped into the trench. All pipes shall have a uniform bearing on the trench bottom. No trench water or dirt shall enter the pipe or joints space during pipe laying. A water-tight plug shall be inserted in the open end of the piping when pipe laying is not in progress. Pipe shall be cut as necessary to locate fittings and valves in the positions shown on the Drawings. The pipe shall be cut squarely and neatly and without damage to the pipe. Plugs shall be set in openings that are left for branches to be installed later.

D. Identification with Marking Tape

A double layer of marking tape shall be provided with the first layer being 12-inches above the top of the pipe and the second layer being between 6" to 12" below the final grade (in accordance with standard detail). Marking tape shall be installed during backfill operations per standards outlined in the FDEP rules and regulations, AWWA Standards, or Ten State Standards. Wire/tape shall be tied to provide continuity. Any previously installed tape damaged during excavation shall be re-tied and repaired or replaced. After backfilling, detection tests will be conducted every 1000 feet.

E. Pipe Joint Deflection

Whenever it is desirable to deflect pipe, the amount of deflection shall not exceed the maximum limits as shown in AWWA Standard C600 and the manufacturer's recommended maximum limit. Pipe joint deflection shall not be allowed without prior approval of CMI W&S DEPT.

F. Rejects

Any pipe found defective shall be immediately removed and replaced with sound pipe at the Contractor's expense.

G. Polyvinyl Chloride Pipe and HDPE Pipe

Polyvinyl chloride pipe and HDPE may be damaged by prolonged exposure to direct sunlight and the Contractor shall take necessary precautions during storage and installation to avoid this damage. Pipe shall be stored under cover and installed with sufficient backfill to shield it from the sun.

H. Joints

1. The particular joint used shall be approved by CMI W&S DEPT. prior to installation.
2. Where shown on plans or where, in the opinion of CMI W&S DEPT., settlement or vibration is likely to occur, pressure main pipe joints shall be restrained. Approved restrainer glands will be permitted for restraint of ductile iron, PVC, and HDPE pipe.
3. Mechanical Joints. All types of mechanical joint pipes shall be laid and jointed in full conformance with manufacturer's recommendations, which shall be submitted to CMI W&S DEPT. for review and approval before work is begun. Torque wrenches set as specified in AWWA Specifications C111 shall be used; or spanner type wrenches not longer than specified therein may be used with the permission of CMI W&S DEPT.
4. Push-On Joints. Push on joints shall be made in strict, complete compliance with the manufacturer's recommendation. Lubricant, if required, shall be an inert, non-toxic, water-soluble compound incapable of harboring, supporting, or culturing bacterial life. Manufacturer's recommendations shall be submitted to the Engineer for review and approval before work is begun, and the manufacturer shall ensure that the Contractor has been advised of his recommended methods of installation.
5. Polyvinyl Chloride Pipe Joints. The joints of all PVC pipelines shall be made in conformity with the recommendations of the pipe manufacturer. No sulfur base compound joints shall be used.
6. HDPE Pipe Joints. Heat fusion or electro fusion joints for HDPE pipe shall conform to the requirements AWWA C906.
7. Ductile iron pipe cutting for new installation or repair:
 - a. Grinding of ductile pipe will not be allowed.
 - b. Contractor will replace section of pipe if inspector finds ground ductile pipe.

- c. Ductile pipe must be cut within 2' of the bell or spigot end. This will ensure all fittings (tees, 90°, 45, mechanical joints) fit together according to manufacture specifications.
- d. When tees, elbows, and mechanical joints still do not fit properly, jacking of pipe end to receive fittings or mechanical joints will be allowed provided the manufactures recommendations are followed.

I. Cover

Pressure mains shall have an allowable minimum cover of 36-inches and a maximum allowable cover of 6-feet.

3.6 VALVE AND VALVE BOX INSTALLATION

A. Valves

- 1. Valves shall be carefully inspected, opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Where 316 stainless steel bolts and fasteners are specified confirm that 316 stainless steel bolts and fasteners are installed.
- 2. Valves, unless shown otherwise, shall be set with their stems vertically above the centerline of the pipe. Set valves and stops with stems plumb and at the exact locations shown.
- 3. Valve and service boxes shall be plumb, centered over valves, and with tops at finished grade.
- 4. Any valve that does not operate correctly shall be removed and replaced.
- 5. All valves shall be installed vertical. Side actuators if used must be specifically approved by CMI W&S DEPT.

B. Valve Boxes

- 1. Valve boxes shall be set plumb and carefully centered over the operating nuts of the valves so as to permit a gate wrench to be fitted easily to the operating nut.
- 2. Care shall be taken to prevent earth and other material from entering the valve box.

3. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug out and reset.
4. Valves boxes shall not be installed in curb.
5. Trench backfill shall be tamped thoroughly for a distance of 3-feet on each side of boxes.
6. Valve boxes shall be set to conform to the level of the finished surface and held in position by a square of concrete placed under the support flange as shown on the drawings. The valve box shall not transmit surface loads to the pipe or valve. Before final acceptance of the work, all valve boxes shall be adjusted to finish grade.

3.7 SERVICE CONNECTIONS, MANHOLES, ENCASEMENT

A. Service Connection

1. Service connections shall be installed at the locations shown on the approved drawings and per CMI W&S DEPT. standard details. Generally, sewer service connections shall be at the center of the lot, and water service connections shall be on the property line between two adjoining lots. Owner shall be responsible for relocation in the event of grade changes. Locator balls are required at all services and taps, and for cleanouts with LDL cap and "Near Surface" locator.

B. Manholes

1. Manhole trench shall be excavated in accordance with EXCAVATION, TRENCHING, BACKFILLING, AND RESTORATION section of these specifications. Manhole base section shall be placed on compacted base of gravel or approved material.
2. Manhole sections will be placed and joined using ram-neck and trimmed prior to grouting. Non-shrink grout shall be inside and outside for sealing between manhole precast sections. Non shrink grout shall be approved by CMI W&S DEPT. and be designed for use in water.
3. Apply Wrapid Seal,EZ Wrap heat shrink seal or approved equal on each outside manhole joint section, as shown on the MI W&S DEPT. standard details.
4. Manhole tops shall terminate at such elevation to allow laying upgrade rings under manhole frame and cover to make allowance for street grade or final

ground elevation. Manhole frame and cover shall be installed above grade rings.

5. Channel shall be constructed and formed with concrete or grout in the bottom of manholes to direct flow in the manhole. Channels shall be sloped smoothly and evenly, and a concrete bench to a height of the crown of the highest pipe.
6. Pipes shall be cut flush with the inside wall of the manhole. Pipe shall extend through manhole wall 4" as a minimum and no more than 12" at a maximum.
7. Coat manholes in accordance with these specifications. Coatings shall be applied in strict conformance with the manufacturer's requirements. Manholes shall be sandblasted, cleaned, and dried prior to installation of coatings. Coatings shall be applied by a company with a minimum of 10 years' experience installing coatings in manholes. Entry manholes and lift station wet wells coatings shall have a warranty of ten years on all workmanship and products and shall protect the structure for a minimum of ten years from all leaks or failure from exposure to corrosive gases.
8. Provide manhole cover inserts as specified in the Approved Product List for each manhole to reduce stormwater inflow.
9. Manhole Testing
 - a. Manholes shall be visually inspected for leakage. Any leakage shall be sealed and resealed until leakage is eliminated.
 - b. Manholes shall be vacuum tested for water tightness in accordance with ASTM C1244. Vacuum testing shall be done in accordance with the following table:

Manhole Depth (Ft)	Min. Test Time (sec) (4-foot Dia. Manhole)
4	10
6	15
8	20
10	25
12	30
14	35

- c. Procedure: Induce a back pressure of 5.0 psi, equivalent to 10-inch Hg (Mercury). Allowable loss is less than 1" Hg for the length of the time specified.

- d. Spark testing of coatings shall be performed when required by CMI W&S DEPT.

C. Concrete Encasement

- 1. Flowable Fill/Concrete encasement shall be constructed in accordance with details for the following instances: with CMI W&S DEPT. approval:
 - a. The waterline crosses under, or at a depth that provides less than 18 inches clear distance from sewer lines. Encasement shall extend a minimum of 10-feet on each side of the point of crossing. Either pipe may be encased.
 - b. The Engineer has ordered the line encased.
- 2. LCEC transmission line crossing a CMI W&S DEPT. line shall have a minimum 18-inch separation vertically and 5-foot (minor feed) to 10-foot (major feed) separation horizontally from the LCEC line, or flowable fill/concrete encasement shall be provided. Any LCEC lines crossing a pressure main, or service connections shall be protected by concrete slab and brass information tag as approved by CMI W&S DEPT.
- 3. The points of beginning and ending of pipe encasement shall be not more than 6-inches from a pipe joint, to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.
- 4. Encasement of any pipes will require special written permission from CMI W&S DEPT.

3.8 JACK AND BORE

A. General

The provisions of this section shall represent the minimum standards for the installation of casing pipe by the jacking and boring method for water and sewer pressure mains.

Water and sewer pressure mains to be placed under CITY OF MARCO ISLAND Department of Transportation and Florida State of Transportation roadways, and railroads shall be installed in a casing to be bored and jacked under the pavement. The steel casing and jacking procedures shall conform to the requirements of FDOT as outlined in the "Utility Accommodation Manual" Section 3.16.9 and all applicable standards referenced within; all work and materials shall be subject to inspection by City of Marco Island, FDOT or affected railroads. The property and

surface conditions shall be restored to the original condition in keeping with the specifications and standards. Specific crossing requirements shall be obtained in advance from the authority having jurisdiction.

It shall be the responsibility of the Contractor to submit the necessary permit documents and data to the appropriate authority and receive approval thereof.

The Contractor shall maintain traffic on the roadway and shall keep all workmen and equipment clear of the pavement during the work. All safety regulations of the Department shall be complied with.

B. Casing Pipe Installation

Casing pipes crossing under roadways shall be located at suitable approved alignments in order to eliminate possible conflict with existing or future utilities and structures, with a minimum of 36 inches depth of cover between the top of the casing pipe and the surface of the roadway.

1. For casing pipe crossings under roadways, railroads, or other installations not within the jurisdiction of the City of Marco Island, the Contractor shall comply with the regulations of said authority in regard to design, specifications, and construction. State Highway casing installations shall be as specified in the FDOT, "Utility Accommodation Guide".
2. The boring and jacking operations shall be done simultaneously, with continuous installation until the casing pipe is in final position. Correct line and grade shall be carefully maintained. Add-on sections of casing pipe shall be full-ring welded to the preceding length, developing water-tight total pipe strength joints. The casing installation shall produce no upheaval, settlement, cracking, movement or distortion of the existing roadbed or other facilities.

Casings weld joints will bevel at a 45° angle with 1/16" land on the bevel face. The weld joint will be butted together with no gap. Weld joint to be tack welded at 12, 6, 3 and 9 o'clock positions (more if required), tack is to be ground free of flux and porosity to 1/16" below face of joint. A root pass shall be performed first to join two pipes together. Grind or wire brush to remove trapped flux and porosity. The cover pass is to properly seal and provide the proper strength needed to support pipe. Cover pass will extend 1½ times the diameter of the weld rod past the weld joint on each side. Weld height can be no more than ⅛ and no less than flush with weld joint. When weld joint is complete, remove all flux, wire brush weld, grind to remove any defects or areas that are not smooth such as starts, stops, weld spatter, and arc strikes. Welding electrodes shall be compatible with the base metal.

3. Casing pipe holes shall be mechanically bored through the soil by a cutting head on a continuous auger mounted inside the pipe. The auger shall extend a minimum distance beyond the end of the casing pipe to preclude formation of voids outside of the pipe shell.
4. The casing pipe shall be adequately protected to prevent crushing or other damage under jacking pressures. Backstops shall be provided for adequately distributing the jack thrust without causing deformation of the soil or other damage. Should the casing pipe be damaged, such damaged portion, if not in the hole, shall be replaced; however, if inserted, the encasement pipe shall be abandoned in place, suitably plugged, grouted, and an alternate installation made, as directed by the City of Marco Island and CMI W&S DEPT.
5. Required boring or jacking pits or shafts shall be excavated and maintained to the minimum dimension. Said excavation shall be adequately barricaded, sheeted, braced, and dewatered.

C. Carrier Pipe

Casing spacers shall provide support of the carrier pipe within the casing. Pipe shall be restrained, and casing spacers attached prior to push carrier pipe through casing. One spacer shall be placed within 2-feet from each end of the casing. One spacer shall be placed on the spigot end of each segment of pipe at the line marking the limit of insert into the bell of the joint so that the spacer pushes the joint and relieves compression within the joint. Subsequent spacers shall be placed at 8-foot intervals, or spacers shall be placed in accordance with the manufacturers' specification if less distance apart than the above spacing. Following placement of the carrier pipe within the steel casing, end seals are to be installed at the casing ends.

3.9 DIRECTIONAL DRILLING

A. General

All directional drilling shall require special approval by the CMI W&S DEPT. Engineering Department in writing. Directional drilling shall be performed by an experienced Contractor (10 years minimum experience shall be required). Directional drilling with HDPE casing and carrier pipe shall be allowed for road crossings with prior CMI W&S DEPT., City of Marco Island, Collier County, and/or FDOT approval. Directional drilling shall also be considered on a case-by-case basis for gravity sewer and pressure mains to facilitate installation in areas where restoration would be difficult or in areas with limited space for construction

equipment. Directional drilling will not be permitted on holidays, Fridays or on days the City of Marco Island is closed.

3.10 FLUSHING, TESTING, AND STERILIZATION OF WATER MAINS

A. General

The Contractor shall flush all mains upon completion of the water distribution system. All valves shall be tested to ensure their full opening, the system shall be flushed out progressively by opening blow-offs and building outlets, and before final acceptance of the work further tests shall be made from blowoffs and outlets to ascertain that the lines are clear. All mains 8-inches” and larger are required to be pigged and swabbed. All mains or service lines 6-inches or smaller shall be scheduled with CMI W&S DEPT. with 24 hours’ notice prior to flushing.

B. Hydrostatic (Pressure) Testing

1. The Contractor shall perform hydrostatic testing of the system as set forth herein, and shall conduct tests in the presence of representatives from CMI W&S DEPT.; at least 48 hours advance notice shall be provided to CMI W&S DEPT.
2. Piping and appurtenances to be tested shall be within sections between valves unless alternate methods have received prior approval from CMI W&S DEPT. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.
3. Hydrostatic testing of water mains shall be performed at 100 pounds per square inch pressure unless otherwise approved by the CMI W&S DEPT. Test period shall be not less than one (1) hour. Testing shall be in accordance with the applicable provisions as set forth in AWWA Standard C600. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = (SD\sqrt{P}) / 133,200$$

Where:

L = Allowable leakage in gallons per hour
S = Length of section tested in feet
D = Nominal diameter of the pipe in inches

P = Average test pressure maintained during the leakage test in pounds per square inch.

4. The testing procedure shall include the continued application of the specified pressure to the test system, for the one-hour period, by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container.
5. Should the test fail, the Contractor shall accomplish necessary repairs, and the test repeated until results are within the established limits. The Contractor shall furnish the necessary labor, water, pumps, and gauges at specified location(s) and all other items required to conduct the required water distribution system testing and perform necessary repairs.

C. Sterilization of Mains

1. Sterilization of Water Distribution System: As soon as the water distribution system has been flushed out as above specified, it shall be sterilized in accordance with the requirements of FDEP. NO WATER IS TO BE USED DURING BACTERIOLOGICAL TESTING OR UNTIL BACTERIOLOGICAL TEST RESULTS HAVE BEEN RECEIVED BY MI W&S DEPT. OR RE-CHLORINATION WILL BE NECESSARY.
2. Introduce chlorine or a solution of calcium or sodium hypochlorite, filling the lines slowly and applying the sterilizing agent at a rate of 50 parts per million of chlorine, as determined by residual chlorine tests at the ends of the lines. Open and close all valves and hydrants while the system is being chlorinated.
3. After the sterilizing agent has been applied for 24 hours, test for residual chlorine at the ends of the lines. If less than 5 ppm is indicated, repeat the sterilization process.
4. When tests show at least 5 ppm of residual chlorine, flush out the system until chlorine level is that of distribution system.
5. The City of Marco Island reserves the right to test the water again at any time prior to final acceptance of the work and, if found unsafe bacteriologically, the City of Marco Island shall require the Contractor to re chlorinate the system until the water is proven equal to that supplied by the public system.
6. Re-chlorination of systems shall be done by adding 50 ppm of chlorine, not by flushing with CMI W&S DEPT. water.

3.11 FLUSHING AND TESTING OF GRAVITY SEWER & FORCE MAINS

A. General

CMI W&S DEPT. reserves the right to require Contractor to conduct any combination of the following procedures for gravity sewers and force mains.

B. Flushing

All mains shall be flushed to remove all sand and other foreign matter. The velocity of the flushing water shall be at least 4-feet per second. Flushing shall be terminated at the direction of the Engineer. The Contractor shall dispose of the flushing water without causing a nuisance or property damage. Pigs will be required where pipeline diameter is greater than 8-inches.

C. Hydrostatic (Pressure) Testing

1. The Contractor shall perform hydrostatic testing of the system as set forth in the following, and shall conduct said tests in the presence of representatives from CMI W&S DEPT.; 48 hours advance notice shall be provided to CMI W&S DEPT.
2. Piping and appurtenances to be tested shall be within sections between valves unless alternate methods have received prior approval from CMI W&S DEPT. Testing shall not proceed until restraining devices are installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.
3. Hydrostatic testing of force mains shall be performed at 100 pounds per square inch pressure unless otherwise approved by the CMI W&S DEPT. Test period shall be not less than one (1) hour. Testing shall be in accordance with the applicable provisions as set forth in AWWA Standard C600. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = (SD\sqrt{P}) / 133,200$$

Where:

L = Allowable leakage in gallons per hour

S = Length of section tested in feet

D = Nominal diameter of the pipe in inches

P = Average test pressure maintained during the leakage test in pounds per square inch

4. The testing procedure shall include the continued application of the specified pressure to the test system, for the one-hour period, by way of a pump taking supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container.
5. Should the test fail, the Contractor shall accomplish necessary repairs, and the test repeated until results are within the established limits. The Contractor shall furnish the necessary labor, water, pumps, and gauges at specified location(s) and all other items required to conduct the required water distribution system testing and perform necessary repairs.

D. Limits of Infiltration and Exfiltration for Gravity Sewers

1. General It is imperative that all sanitary sewers and associated service lines be constructed watertight to prevent infiltration and/or exfiltration. To that end, all new sanitary sewer mains will be subject to rigid testing. Lines shall be television inspected and copies of videotapes provided.
2. Exfiltration Each test section of sewer shall be tested between successive manholes by closing the lower end of the sewer to be tested, and the inlet sewer of the upper manhole with stoppers. The pipe and manhole shall be filled with water to a point 4 feet above the invert of the sewer at the center of the upper manhole; or if ground water is present, 4 feet above the average adjacent ground water level.
3. Infiltration If, in the opinion of the Engineer or the CMI W&S DEPT., excessive ground water is encountered in the construction of a section of the sewer, the infiltration test for leakage shall be used. The end of the sewer at the upper structure shall be closed sufficiently to prevent the entrance of water and pumping of ground water shall be discontinued for at least 3 days, after which the section shall be tested for infiltration. The infiltration into each individual reach of sewer between adjoining manholes shall not exceed that allowed by the formula shown. Unless otherwise specified, infiltration will be measured by the Engineer in the presence of CMI W&S DEPT. representative.
4. The allowable leakage will be computed by the formula:

$$E = 0.0001 L \times D H$$

Where:

L = length of sewer and house connections tested, in feet.

E = the allowable leakage in gallons per minute of sewer tested.

D = the internal diameter of the pipe in inches.

H (exfiltration) = the difference in elevation between the water surface in the upper manhole and the invert of the pipe at the lower manhole; or if ground water is present above the invert of the pipe in the lower manhole, the difference in elevation between the water surface in the upper manhole and the ground water at the lower manhole.

H (infiltration) = the difference in the elevation between the ground water surface and the invert of the sewer at the downstream manhole.

5. The Contractor shall, at its expense, furnish all water, materials, and labor for making the required test. All tests shall be made in the presence of the Engineer and a CMI W&S DEPT. representative. A period of one hour shall be allowed for absorption prior to the test.

E. Low Pressure Air Testing

1. CMI W&S DEPT. may require air testing of gravity sewer, in lieu of exfiltration testing for 24-inch diameter and smaller pipe.
2. Recommended practice can be found in Recommended Practice for Low Pressure Testing of Installed Sewer Lines (UNI-B-6-98) by Uni-Bell PVC Pipe Association. Gravity sewer pipes shall be air tested as follows:
 - a. The sewer main shall be flushed and cleaned prior to the air test.
 - b. The section of gravity main to be tested shall be isolated with air filled stoppers or plugs suitable for air testing.
 - c. The services shall be capped and weighted to preclude blowing off during the test.
 - d. Air shall be added slowly to the test section so that the test pressure equals 4.0 psig.
 - e. Test air pressure shall be maintained within 0.5 psig of the test pressure by regulating the air supply for a period of two (2) minutes to stabilize the temperature.
 - f. After two (2) minutes, the air supply shall be disconnected and the pressure in the pipe adjusted to 3.5 psig.

- g. Measure the time required for a one (1) psig drop in pressure using a stopwatch.
- h. Compare the recorded time with the allowable time in the following table:

Length of Test Section (feet)	Test Time (minutes: seconds)	
	10" Dia. Pipe	8" Dia. Pipe
<150	7:34	9:26
150-175	7:34	9:26
176-200	7:34	9:26
201-225	7:34	9:53
226-250	7:34	9:53
251-275	7:35	11:52
276-300	7:35	11:52
Length > 325 < 500	8:50	13:50

- i. If the recorded time is less than allowable loss, replace the defective fittings and pipe and re-test until a satisfactory test is achieved.

F. Mandrel Testing

1. Mandrel testing shall be completed in all gravity sewer mains. The mandrel shall be a rigid, nonadjustable, odd-numbering-leg (nine legs minimum) mandrel having an effective length not less than its nominal diameter.
2. The mandrel shall have a minimum diameter at any point along the full length as follows:

Pipe Material (inches)	Nominal Size (inches)	Minimum Mandrel Diameter (inches)
PVC-ASTM D 3034 (SDR 26)	6	5.33
	8	7.11
	10	8.87
	12	10.55
	15	12.90
PVC-ASTM D 3034 (SDR 35)	6	5.619
	8	7.524
	10	9.405
	12	11.191
	15	13.849

PVC-ASTM F 679 (T-1 Wall)	18	16.924
	21	19.952
	24	22.446
	27	25.297

3. The mandrel shall be fabricated of steel, be fitted with pulling rings at each end; be stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size, and mandrel outside diameter (e.g., PVC, 0 3034-8"-7.524"); and be furnished in a carrying case labeled with the same data as stamped or engraved on the mandrel.
4. Following placement and compaction of backfill and prior to placing permanent pavement, ball, and mandrel the pipe to measure for obstructions (excessive deflections, joint offsets, and lateral pipe intrusions).
5. Test installed pipe to ensure that vertical deflections for plastic pipe do not exceed the maximum allowable deflection. Maximum allowable deflections shall be governed by the mandrel requirements stated herein and shall nominally be:

Nominal Pipe Size	Percentage
Up to and including 12 inches	5.0
Over 12 inches	4.0

6. The maximum average inside diameter shall be equal to the average outside diameter per applicable ASTM standard minus two minimum wall thicknesses per applicable ASTM standards. Manufacturing and other tolerances shall not be considered for determining maximum allowable deflections.
7. Perform deflection tests not sooner than 30 days after completion of placement and compaction of backfill. Clean and inspect the pipe for offsets and obstructions prior to testing.
8. Pull a mandrel through the pipe by hand to verify that maximum allowable deflections have not been exceeded. Prior to use, the mandrel shall be certified by an independent testing laboratory. Use of an uncertified mandrel or a mandrel altered or modified after certification will invalidate test. If the mandrel fails to pass, the pipe will be deemed to be over deflected.
9. Uncover any over deflected pipe and, if not damaged, reinstall. Remove damaged pipe from the site. Any pipe subjected to any method or process

other than removal, which attempts, even successfully, to reduce or cure any over deflection, shall be uncovered, removed from the site, and replaced with new pipe.

10. All costs incurred by the Contractor attributable to mandrel and deflection testing, including any delays, shall be borne by the Contractor at no cost to the Owner.

G. Televising

1. All sanitary sewer mains shall be televised at the Contractor's expense and a videotape of the subject mains provided prior to acceptance by CMI W&S DEPT.
2. The Developer is required to pay MI W&S DEPT. for warranty televising in the eleventh month after dedication for all gravity lines. This fee is to be paid at the time of construction application.

3.12 FINAL INSPECTION

A. General

At the time of final inspection of the work performed under the contract, the utilities to be dedicated to CMI W&S DEPT. shall be complete in every respect and in perfect operating condition. All surplus materials of every character resulting from the work shall be removed. Any defects discovered in the utilities subsequent to this inspection shall have been corrected. Final inspection will be done as a walk-through with CMI W&S DEPT., Engineer, and Contractor personnel present.

B. Record Drawings

Provide three sets of printed record drawings, and one electronic copy of the record drawing files. Record drawings showing location of all valves, hydrants, manholes, piping, lift stations and other appurtenances shall be sent to CMI W&S DEPT. before final approval. Record drawings shall include field surveyed elevations on all manholes, lift stations, and other appurtenances necessary to verify completion of construction, and to provide for future connections or extensions. Elevation data shall at a minimum include inverts and tops of manholes and lift stations including drop connection inverts. Record drawings shall also show final grades over the top of all gravity and pressure mains, including landscape berm elevations.

C. Warranty Inspection

Warranty inspection to be done eleven months after turnover, and corrections required at that time shall be made by the person or company that provided the turnover warranty to CMI W&S DEPT.

3.13 OTHER INFORMATION

A. Traffic Control

All traffic control signs will be set up in accordance with state, City, or County DOT regulations, whichever one has jurisdiction of right-of-way being worked in.

B. Other Permits

Utilities approval does not obviate the need for obtaining applicable state, county, or health department permits.

C. Protections

Where LCEC lines cross the top of any pressurized main, a concrete slab, 4-inches thick and 3-feet wide shall be centered over the main or approved equal with brass tag mounted in concrete describing conflict.

SECTION NO. 4

STANDARD DETAILS

- 4A COMBINATION DETAILS
- 4B SANITARY SEWER DETAILS
- 4C WASTEWATER PUMP STATION DETAILS
- 4D WATER DETAILS
- 4E BACKFLOW ASSEMBLY DETAILS

SECTION NO. 4A

COMBINATION DETAILS

CB-1	RESTRAINT TABLE
CB-2	THRUST RESTRAINING
CB-3	TYPICAL THRUST BLOCKS
CB-4	DEAD END THRUST RETRAINING FOR AC PIPE
CB-5	PIPE SEPARATION DETAIL
CB-6	MINIMUM TRANSFORMER SEPARATION
CB-7	OFFSET AIR RELEASE VALVE
CB-8	DUCTILE IRON TRANSITION COUPLING
CB-9	PVC PRESSURE LINE CONFLICT ADJUSTMENT FITTINGS
CB-10	PIPE CONFLICT DETAILS
CB-11	THRUST BLOCK DETAIL FOR EXISTING AC PIPE
CB-12	CONFLICT ADJUSTMENT MJ
CB-13	AC AND CLAY PIPE REPLACEMENT/REPAIR
CB-14	UNPAVED AREA TRENCH BACKFILL DETAIL
CB-15	TRENCH AND PAVING RESTORATION
CB-16	DUAL PIPELINE TRENCH AND PAVING RESTORATION
CB-17	TRENCH AND PAVING RESTORATION WITH FLOWABLE FILL – HIGH VOLUME ROADS
CB-18	ASPHALT OVERLAY
CB-19	LOCATOR TAPE AND MARKERS FOR PRESSURE MAINS
CB-20	JACK AND BORE
CB-21	VALVE PAD
CB-22	GUARD POST
CB-23	TYPICAL HORIZONTAL DIRECTIONAL DRILL
CB-24	TYPICAL SUBAQUEOUS HORIZONTAL DIRECTIONAL DRILL (HDD)

SECTION NO. 4B

SANITARY SEWER DETAILS

SS-1	PRECAST MANHOLE – CONCENTRIC
SS-2	PRECAST MANHOLE – ECCENTRIC
SS-3	TYPICAL DROP MANHOLE
SS-4	MANHOLE AND DROP MANHOLE – SCHEDULE AND GENERAL NOTES
SS-5	SHALLOW MANHOLE
SS-6	OFFSET MANHOLE RECONSTRUCTION
SS-7	FLOW LINE CHANNELS
SS-8	FORCE MAIN CONNECTION TO MANHOLE WITH INSIDE DROP
SS-9	FORCE MAIN CONNECTION TO GRAVITY SANITARY SEWER DETAIL
SS-10	MANHOLE RING AND COVER
SS-11	CLEANOUT ASSEMBLY
SS-12	SEWER CONNECTION FOR DEPTHS OVER 8 FEET
SS-13	CUSTOMER SANITARY LATERAL TRENCH RESTORATION
SS-14	PRIVATE FORCE MAIN CONNECTION TO CITY FORCE MAIN
SS-15	SINGLE SEWER SERVICE CONNECTION

SECTION NO. 4C

WASTEWATER PUMP STATION DETAILS

WW-1	PUMP STATION DETAIL – PROFILE
WW-2	PUMP STATION NOTES
WW-3	PUMP STATION DETAIL – PLAN
WW-4	PUMP STATION AND WASTEWATER DETAILS
WW-5	PUMP CONTROL PANEL PAD DETAILS
WW-6	PUMP STATION HOSE BIB
WW-7	PUMP STATION AND WASTEWATER DETAILS
WW-8	PUMP STATION CONTROL PANEL DETAIL
WW-9	PUMP STATION LIGHTNING PROTECTION DETAILS
WW-10	KEY MARCO PUMP STATION DETAIL
WW-11A	TELESCOPING PUMP STATION PANEL
WW-11B	TELESCOPING PUMP STATION PANEL

SECTION NO. 4D

WATER DETAILS

W-1	CONSTRUCTION JUMPER ASSEMBLY (OPTIONAL)
W-2	FIRE HYDRANT ASSEMBLY
W-3	FIRE HYDRANT ASSEMBLY WITH GRADE-LOK ADAPTER
W-4	FIRE HYDRANT LOCATIONS/CLEARANCE
W-5	TYPICAL FIRE HYDRANT INSTALLATION WITH BOLLARDS
W-6	AUTOMATIC FLUSHING ASSEMBLY (SPRINKLER TYPE)
W-7	AUTOMATIC FLUSHING ASSEMBLY
W-8	AUTOMATIC WATER MAIN FLUSHING ASSEMBLY
W-9	TEMPORARY FLUSHING ASSEMBLY
W-10	PERMANENT BACTERIOLOGICAL SAMPLE POINT
W-11	WATER MAIN FLUSHING ASSEMBLY
W-12	VALVE INSTALLATION
W-13	16-INCH AND LARGER VALVE INSTALLATION
W-14	1-INCH TO 30-INCH TAPPING SLEEVE AND VALVE FOR 1-INCH TO 30-INCH SERVICES
W-15	HYPOCHLORITE INJECTION DETAIL
W-16	TYPICAL WATER SERVICE METER FOR CONNECTION TO WATER MAIN
W-17	SERVICE CONNECTION SIZING CHART

SECTION NO. 4E

BACKFLOW ASSEMBLY DETAILS

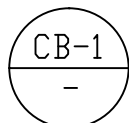
BF-1	STANDARD METER BACKFLOW ASSEMBLY
BF-2	CONTINUOUS SERVICE BACKFLOW ASSEMBLY
BF-3	¾-INCH TO 2-INCH BACKFLOW ASSEMBLY – NEW INSTALLATIONS
BF-4	DEDICATED FIRE FLOW BACKFLOW ASSEMBLY
BF-5	4-INCH TO 10-INCH COMPACT FIRE SYSTEM DETECTOR CHECK ASSEMBLY
BF-6	3-INCH AND LARGER NON-POTABLE AND RAW WATER METER ASSEMBLY
BF-7	NON-POTABLE WATER SIGN

RESTRAINT TABLE

PIPE SIZE	HORIZONTAL BENDS				VERTICAL OFFSETS		DEAD ENDS Lr (FT.)	REDUCERS (SEE NOTES)			TEES			
	90° BENDS Lr (FT.)	45° BENDS Lr (FT.)	22.5° BENDS Lr (FT.)	11.25° BENDS Lr (FT.)	45° BENDS (SEE NOTE 2) Lhs (FT.) Lis (FT.)			SIZE	L(A) (FT.)	L(B) (FT.)	RUN SIZE	BRANCH SIZE	Lrn (FT.)	Lbr (FT.)
4"	27	11	5	3	31	8	60	6 x 4	64	43	4"	4"	10	11
6"	37	15	7	4	43	11	84	8 x 6	60	46	6"	4" OR LESS	10	34
8"	48	20	10	5	57	15	110	8 x 4	153	79			10	FITTING ONLY
10"	57	24	11	6	68	17	131	10 x 8	55	44	8"	8" OR LESS	10	59
12"	57	24	11	6	68	19	131	10 x 6	133	81			10	17
16"	58	24	12	6	55	19	106	12 x 10	46	38	10"	6" OR LESS	10	80
20"	70	29	14	7	67	23	129	12 x 8	104	69			10	45
24"	81	33	16	8	78	27	150	16 x 12	61	45	12"	12" OR LESS	10	79
								16 x 10	103	63			10	49
								20 x 16	58	45	10	15		
								20 x 12	139	81	16"	73		
24"	81	33	16	8	78	27	150	24 x 20	55	45	16"	8" OR LESS	10	38
								24 x 16	128	82			10	16
								20"	20"	10	95			
24"	81	33	16	8	78	27	150	20"	16"	10	63			
								12"	12"	10	24			
								10"	10"	10	FITTING ONLY			
24"	81	33	16	8	78	27	150	24"	24"	10	116			
								20"	20"	10	87			
								16"	16"	10	53			
10"	10"	10	10											

NOTES:

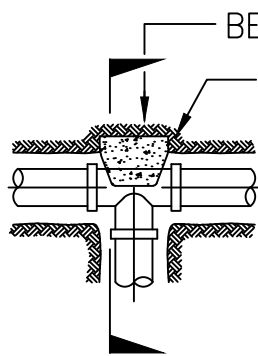
- LENGTHS SHOWN ON THIS TABLE ARE TO BE INTERPRETED AS FOLLOWS:
 Lhs = RESTRAINED LENGTH FROM HIGH SIDE FITTING OF A VERT. BEND
 Lis = RESTRAINED LENGTH FROM LOW SIDE FITTING OF A VERT. BEND
 Lr = RESTRAINED LENGTH ON BOTH SIDES FROM FITTING
 Lrn = MINIMUM LENGTH TO FIRST JOINT OF RUN ON BOTH SIDES
 Lbr = RESTRAINED LENGTH REQUIRED ON BRANCH FROM FITTING
 L(A) = LENGTH OF PIPE ON SMALL SIDE FREE OF FITTING
 L(B) = RESTRAINED LENGTH ON LARGE SIDE OF REDUCER
- A SAFETY FACTOR = 2.5 IS USED FOR VERTICAL OFFSETS TO COMPENSATE FOR SATURATED SOIL CONDITIONS.
 A SAFETY FACTOR = 2.0 IS USED FOR ALL OTHER CASES.
- L(A) AND L(B) ABOVE ARE TWO OPTIONS FOR PROVIDING THE REQUIRED THRUST RESTRAINT FOR THE FITTING. EITHER L(A) LENGTH OF PIPE FREE OF FITTINGS (BENDS, TEES, REDUCERS OR VALVES) ON THE SMALL SIDE OF THE REDUCER WILL PROVIDE THE REQUIRED RESTRAINT OR L(B) LENGTH CAN BE RESTRAINED ON THE LARGE SIDE OF THE FITTING.
- THE FOLLOWING ARE ASSUMED :
 4" – 10" PIPE HAS 30" MIN. COVER
 12" – 24" PIPE HAS 36" MIN. COVER
 4" – 24" PIPE IS PVC
- VALVES SHALL BE RESTRAINED ON EITHER SIDE OF THE FITTING AS A MINIMUM. IN LINE VALVES SHALL HAVE NO FITTINGS WITHIN THE LENGTHS SHOWN ON THIS TABLE FOR THE SAME SIZE DEAD END. IN CASES WHERE THIS LENGTH CAN NOT BE PROVIDED FREE OF FITTINGS, ADDITIONAL RESTRAINT SHALL BE REQUIRED AS APPROVED BY ENGINEER.
- ALL DEAD END LINES, PERMANENT OR TEMPORARY, SHALL BE RESTRAINED PER THE ABOVE RESTRAINT TABLE.



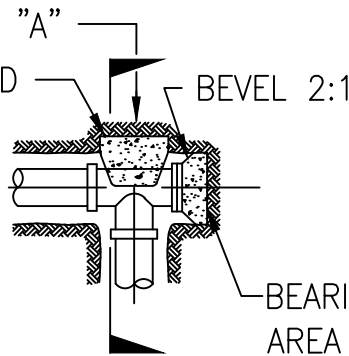
RESTRAINT TABLE

NOT TO SCALE

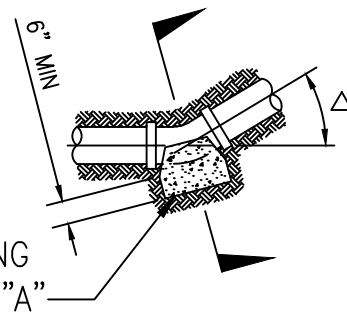
MARCO ISLAND UTILITIES 960 North Collier Blvd. MARCO ISLAND, FL 34145	SCALE: NOT TO SCALE
	DATE: MAY 2023
	DWG #: CB-1.DWG



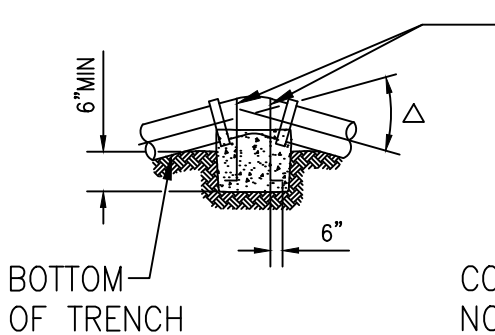
PLAN (TYPE-1)



PLAN (TYPE-2)



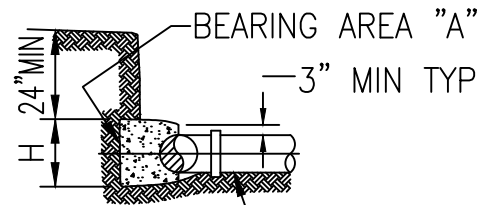
PLAN (TYPE-3, HORIZ BEND)



ELEV (TYPE-4, VERT BEND)

REBAR SIZES		
PIPE SIZE (IN)	Δ	REBAR
6-12	0-90°	#4
20-42	0-22.5°	#4
20-36	45°	#5
20-30	90°	#6
36-42	45°-90°	#7

COAT REBAR WITH SYSTEM
NO 23 PER SECTION 099000

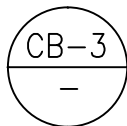


SECTION

NOTES:

1. BASED ON OD OF PIPE AT GASKET
2. CHECK SIZE OF FITTING TO VERIFY AVAILABLE AREA FOR BEARING ON CONCRETE
3. DO NOT USE THIS DETAIL WITH VERTICAL THRUST BLOCKS FOR PIPE SIZES AND BENDS NOT SHOWN IN THE TABLES
4. TEST PRESS = 100 PSI
SOIL BRG PRESS = 2000 LB/SF
5. FOR RESTRAINING EXISTING UNRESTRAINED PIPE ONLY.
6. ALL NEW BURIED COUPLINGS AND EXISTING DUCTILE IRON FITTINGS AND VALVES EXPOSED DURING CONSTRUCTION TO BE PLOYETHYLENE ENCASED IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.

PIPE DIA (IN)	TEE OR DEAD-END	BEARING AREA "A" (SF)				VERTICAL THRUST BLOCK VOL OF CONCRETE (CY)			
		$\bar{t}=11.25'$	$\bar{t}=22.5'$	$\bar{t}=45'$	$\bar{t}=90'$	$\bar{t}=11.25'$	$\bar{t}=22.5'$	$\bar{t}=45'$	$\bar{t}=90'$
6	1.9	1.0	1.0	1.4	2.7	0.2	0.4	0.7	1.3
8	3.3	1.0	1.3	2.5	4.6	0.3	0.6	1.2	2.3
10	5.4	1.1	2.1	4.1	7.6	0.5	1.0	2.0	3.8
12	7.6	1.5	3.0	5.8	10.7	0.7	1.5	2.9	5.3
14	10.3	2.0	4.0	7.9	14.6	1.0	2.0	3.9	7.2
16	13.4	2.6	5.2	10.3	19.0	1.3	2.6	5.1	9.4
18	17.2	3.4	6.7	13.1	24.3	1.7	3.3	6.5	12.0
20	21.3	4.2	8.3	16.3	30.2	2.1	4.1	8.1	—
24	30.8	6.0	12.0	23.6	43.5	3.0	5.9	11.6	—



TYPICAL THRUST BLOCKS

NOT TO SCALE

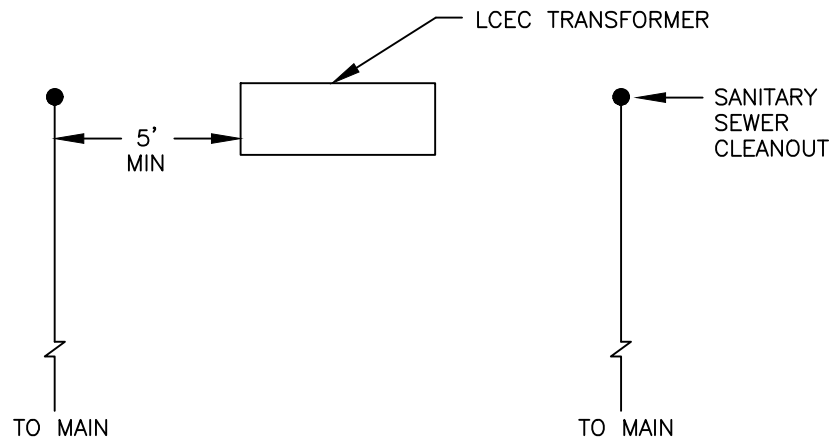
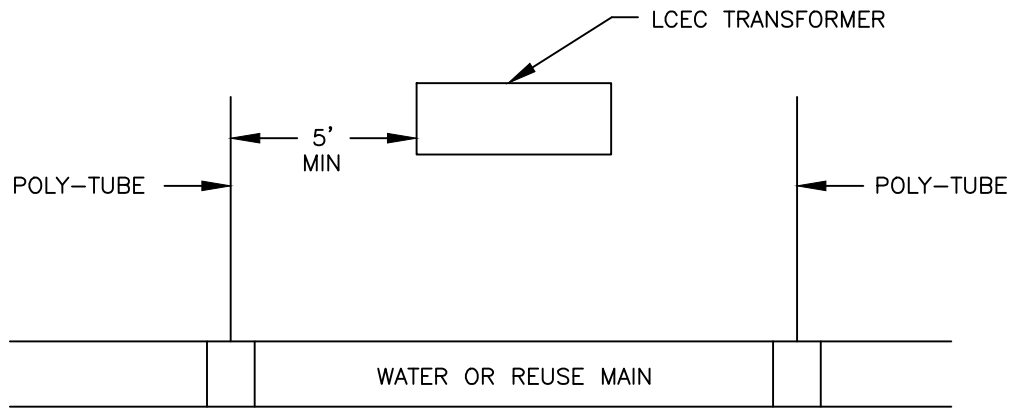
MARCO ISLAND UTILITIES

960 North Collier Blvd.
MARCO ISLAND, FL 34145

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DATE: MAY 2023

DWG #: CB-3.DWG



CB-6
 -

 MINIMUM LCEC TRANSFORMER SEPARATION
 NOT TO SCALE

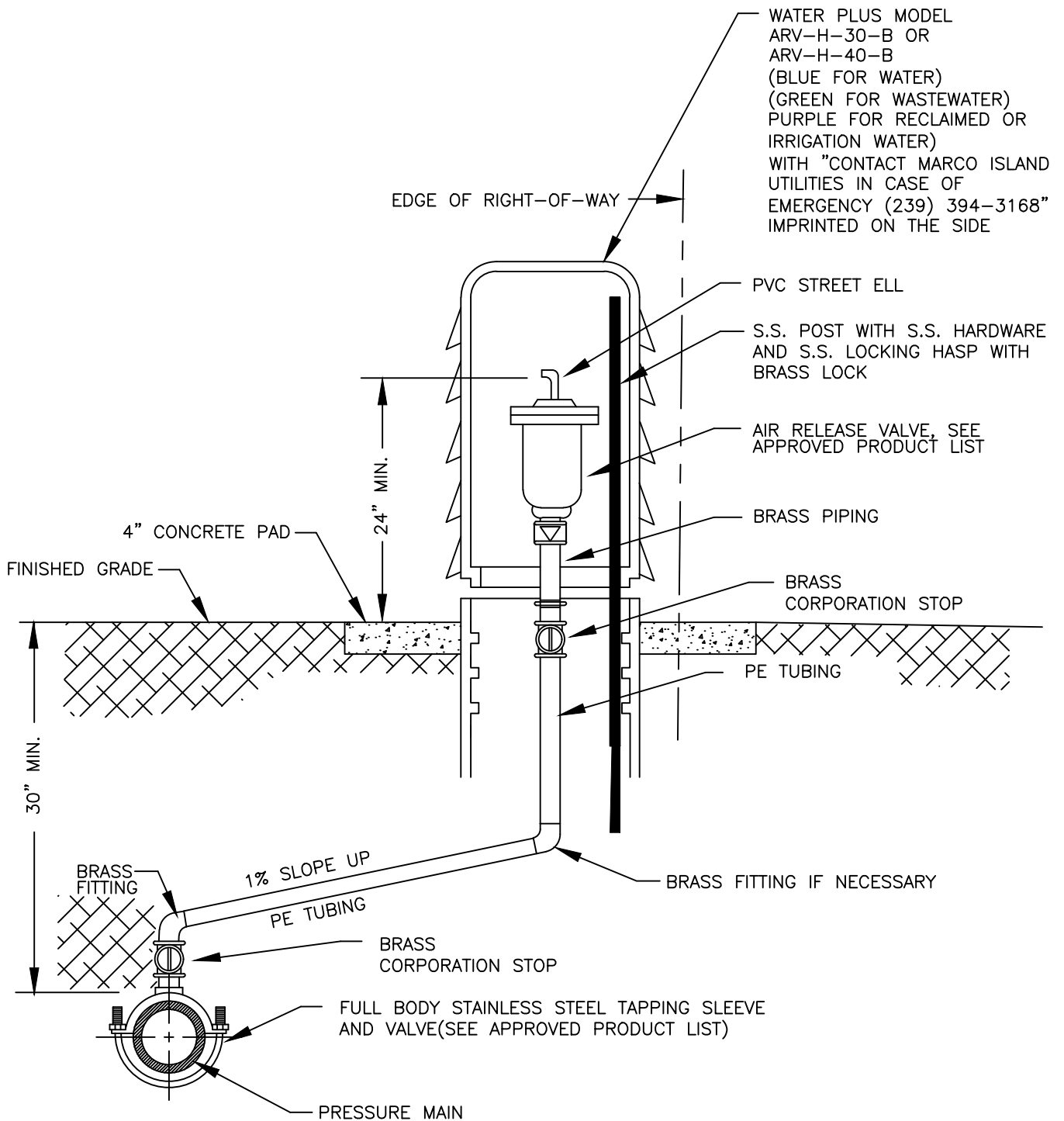
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 MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: CB-6.DWG



CB-7 OFFSET AIR RELEASE VALVE
NOT TO SCALE

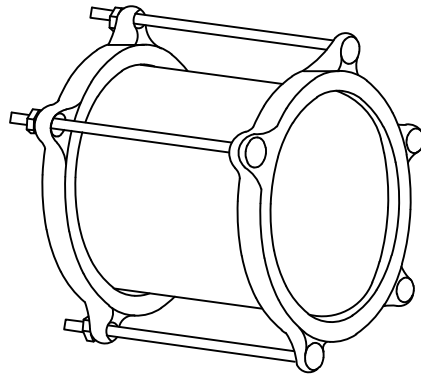
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UTILITIES**

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MARCO ISLAND, FL 34145

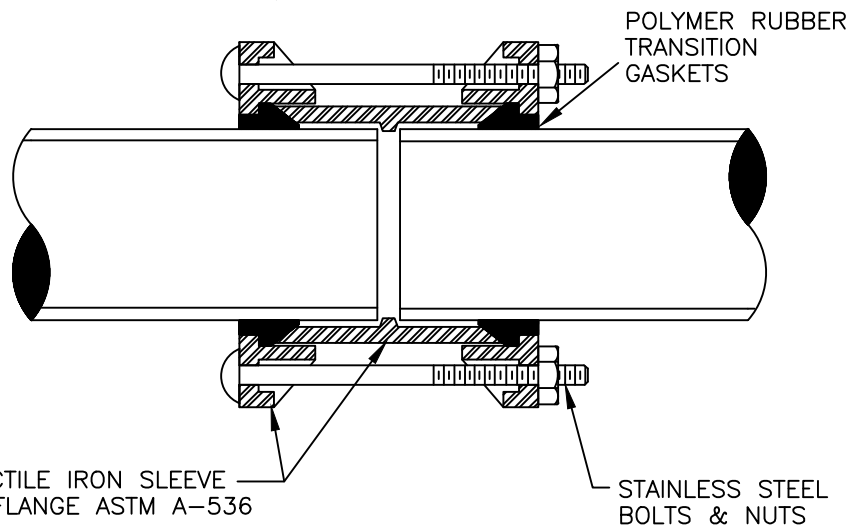
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DATE: MAY 2023

DWG #: CB-7.DWG



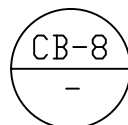
DUCTILE IRON TRANSITION
COUPLING OR APPROVED EQUAL



JOINS CAST IRON, DUCTILE IRON, ASBESTOS-CEMENT, C-900
BY MECHANICAL JOINT COMPRESSION PRINCIPAL

NOTES:

1. NON RESTRAINED COUPLING CAN ONLY BE USED IN STRAIGHT RUNS OF PIPE, A MINIMUM OF 60' FROM ANY FITTING THAT HAS A CHANGE OF DIRECTION MUST BE MAINTAINED.
2. DUCTILE IRON COUPLING WILL BE EPOXY 401 LINED FOR SEWER AND CEMENT LINED FOR POTABLE WATER.
3. HYMAX TYPE COUPLING ARE APPROVED FOR WATER AND SEWER BUT MUST HAVE STAINLESS STEEL NUTS AND BOLTS, SEE APPROVED PRODUCT LIST.
4. ALL BURIED DUCTILE IRON FITTINGS AND VALVES MUST BE POLYETHYLENE ENCASED PER MI W&S DEPT. STANDARD SPECIFICATIONS.



DUCTILE IRON TRANSITION COUPLING

NOT TO SCALE

**MARCO ISLAND
UTILITIES**

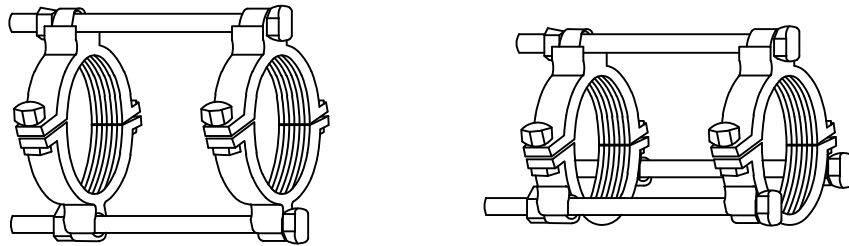
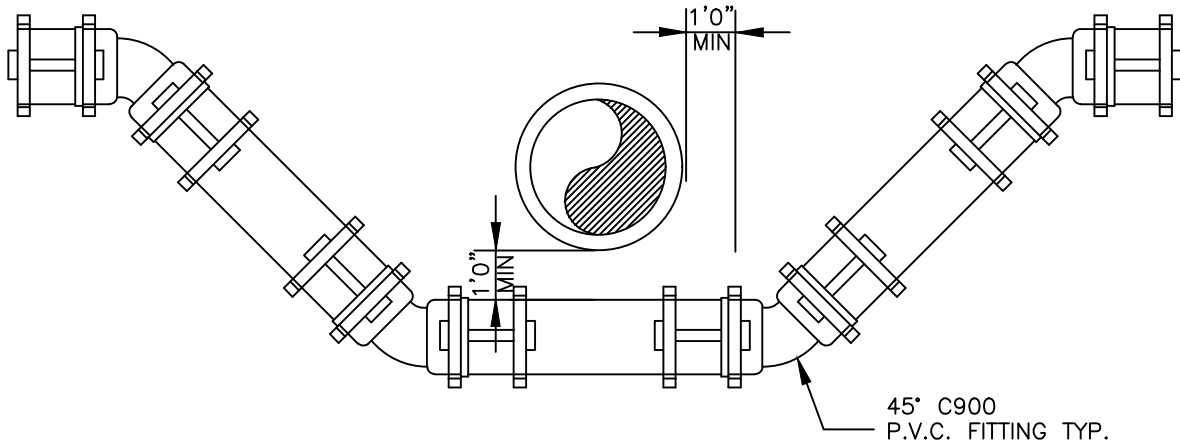
960 North Collier Blvd.
MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: CB-8.DWG

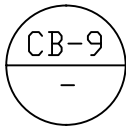
RESTRAINT SYSTEM FOR PUSH ON
P.V.C. FITTINGS & PIPING
SIZE AND TYPE AS SPECIFIED ON PLAN



RESTRAINT DETAIL FOR ADJUSTING
PVC PRESSURE LINE DUE TO CONFLICTS

NOTE:

1. ALL NUTS, BOLTS AND ALL THREAD MUST BE STAINLESS STEEL.
2. ALL BURIED DUCTILE IRON FITTINGS AND VALVES MUST BE POLYETHYLENE ENCASED PER MI W&S DEPT. STANDARD SPECIFICATIONS.



PVC PRESSURE LINE CONFLICT ADJUSTMENT FITTINGS

NOT TO SCALE

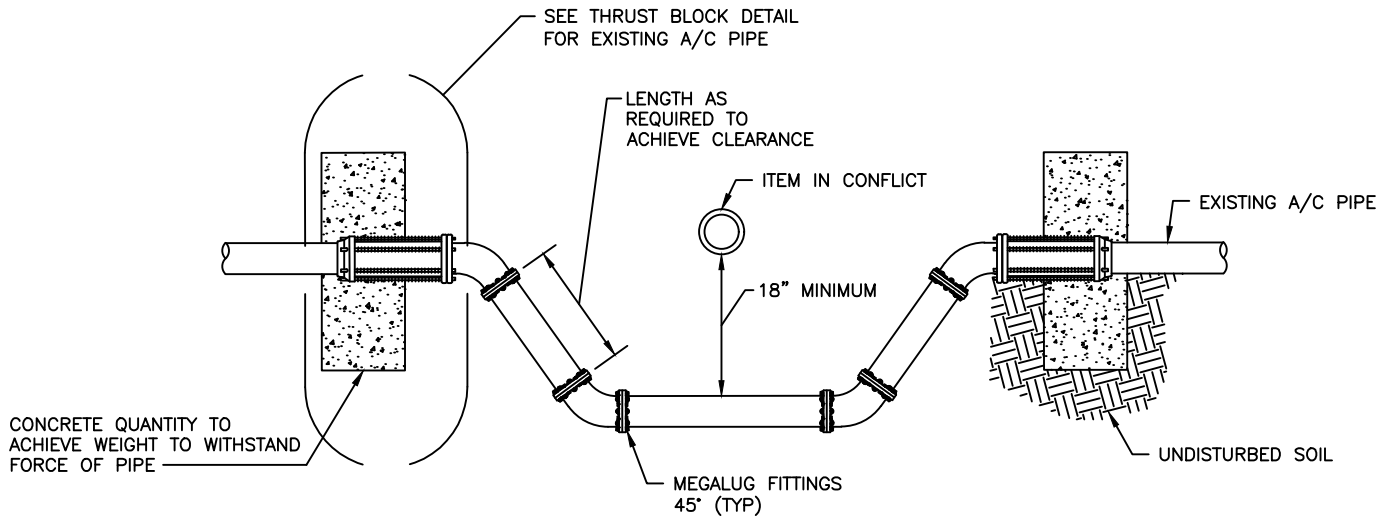
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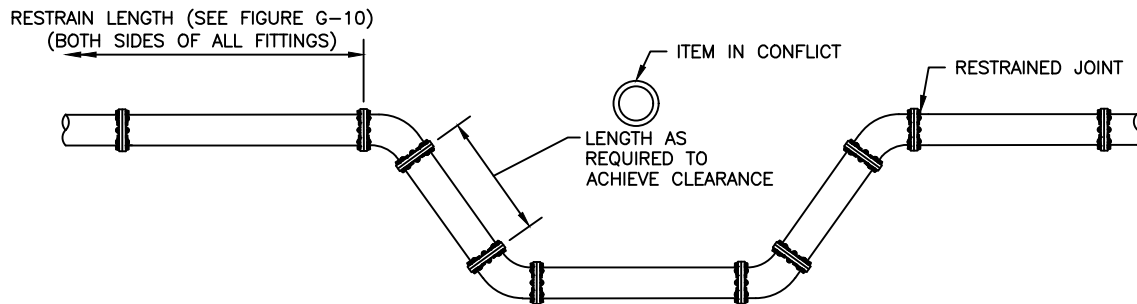
DWG #: CB-9.DWG



EXISTING A/C PIPE – HEADWALL

NOTE:

1. SEE DETAILS CB-2 AND CB-3 FOR HEADWALL/THRUST BLOCK DETAILS.



NEW & EXISTING PIPE – RESTRAINED JOINT

CB-10 PIPE CONFLICT DETAILS

— NOT TO SCALE

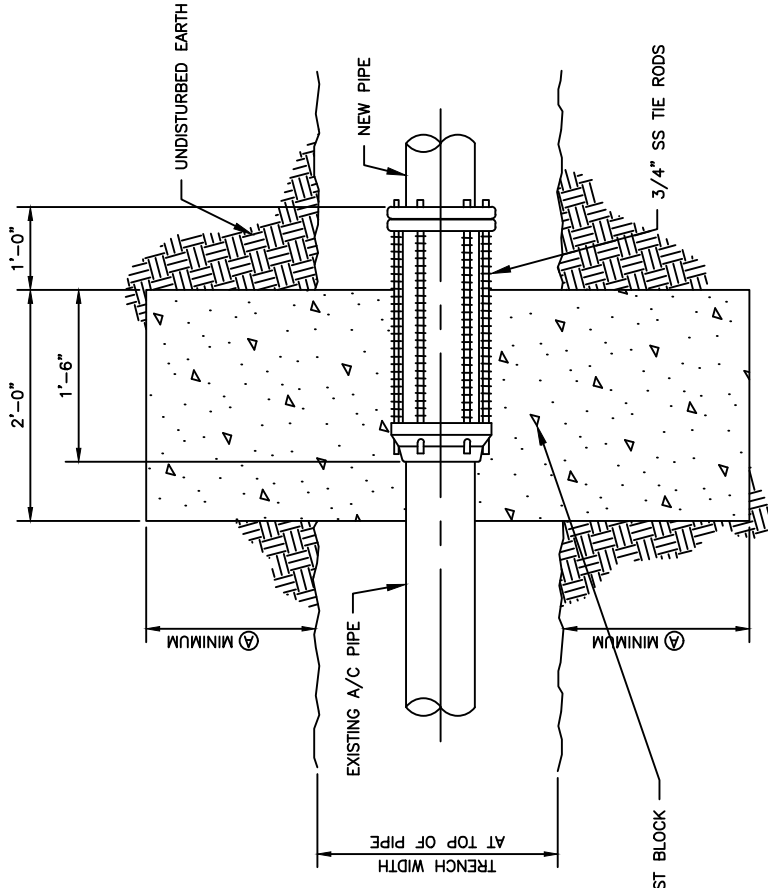
MARCO ISLAND UTILITIES

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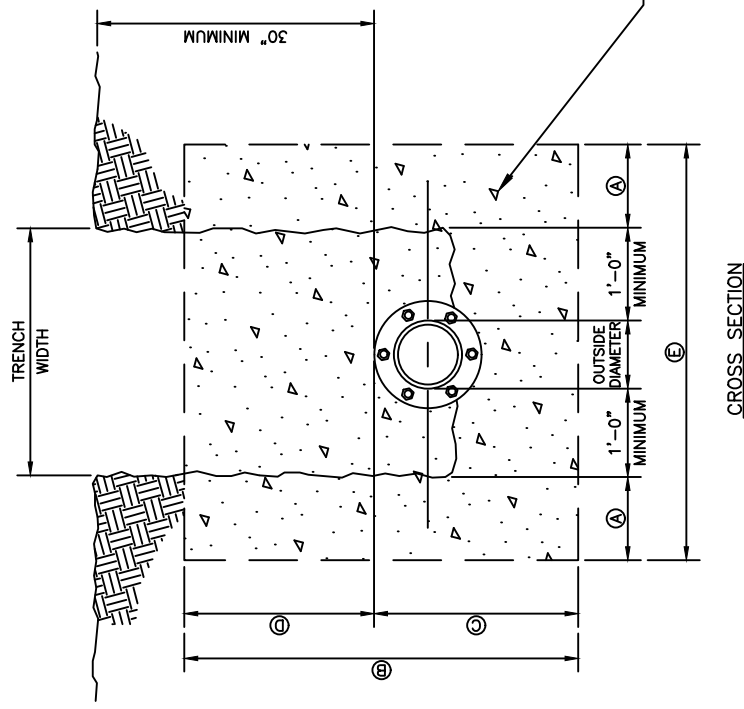
DWG #: CB-10.DWG



PLAN VIEW

$$\text{CUBIC YARDS (CY)} = \left(\frac{\text{B} \times \text{E}}{12} \right) \times 2$$

$$= \frac{27}{27}$$



CROSS SECTION

PIPE DIAMETER	A	B	C	D	E	NUMBER OF TIE RODS REQUIRED	CY.
4"	9"	36"	20"	16"	3'-10"	2	.85
6"	12"	36"	21"	15"	4'-6"	2	1.00
8"	12"	36"	22"	14"	4'-8"	2	1.04
10"	12"	36"	23"	13"	4'-10"	2	1.07
12"	18"	36"	24"	12"	6'-0"	2	1.33
16"	18"	36"	32"	4"	6'-4"	4	1.41

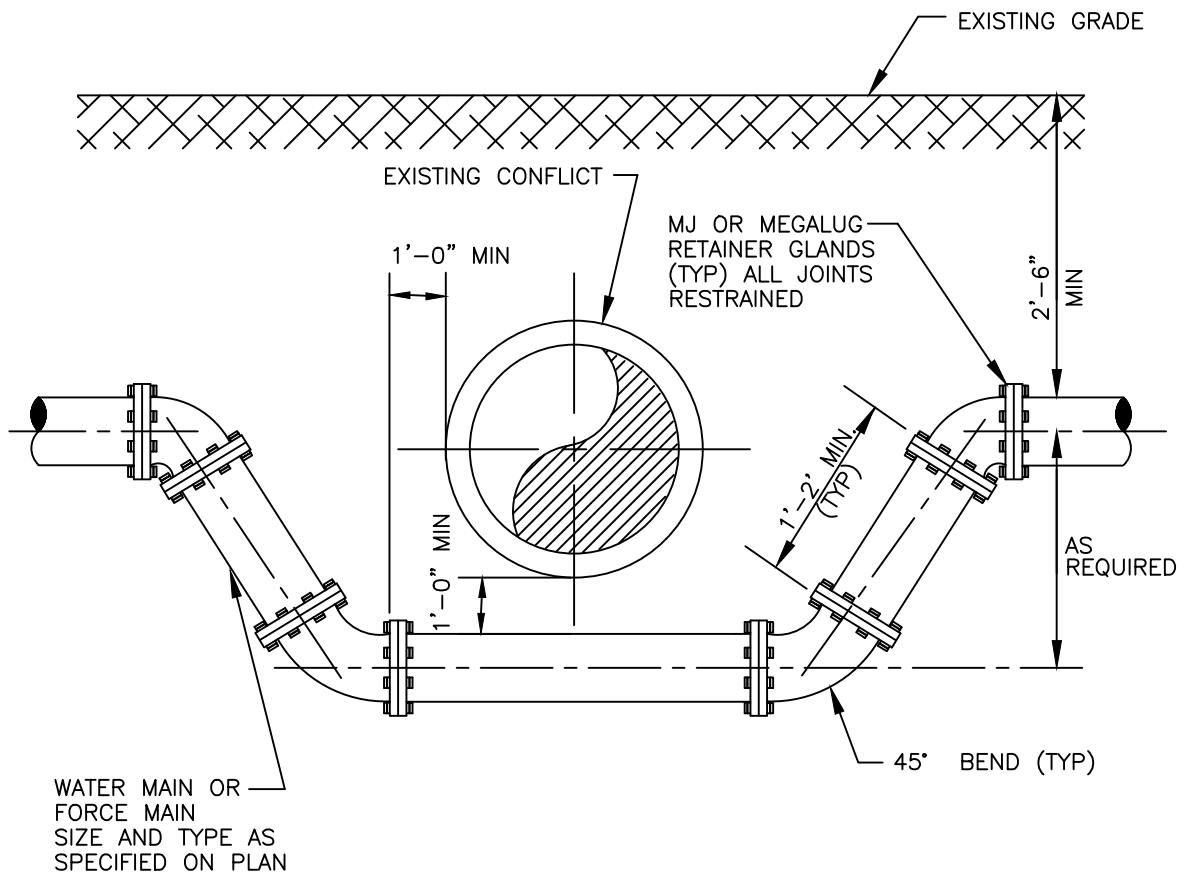
DESIGN ENGINEER SHALL VERIFY ABOVE DIMENSIONS AND THE NUMBER OF TIE RODS.

CB-11 THRUST BLOCK DETAIL FOR EXISTING A/C PIPE

NOT TO SCALE

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 960 North Collier Blvd.
 MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE
 DATE: MAY 2023
 DWG #: CB-11.DWG



NOTE:

1. ALL BURIED DUCTILE IRON FITTINGS AND VALVES MUST BE POLYETHYLENE ENCASED PER MI W&S DEPT. STANDARD SPECIFICATIONS.

CB-12 CONFLICT ADJUSTMENT MJ
 - NOT TO SCALE

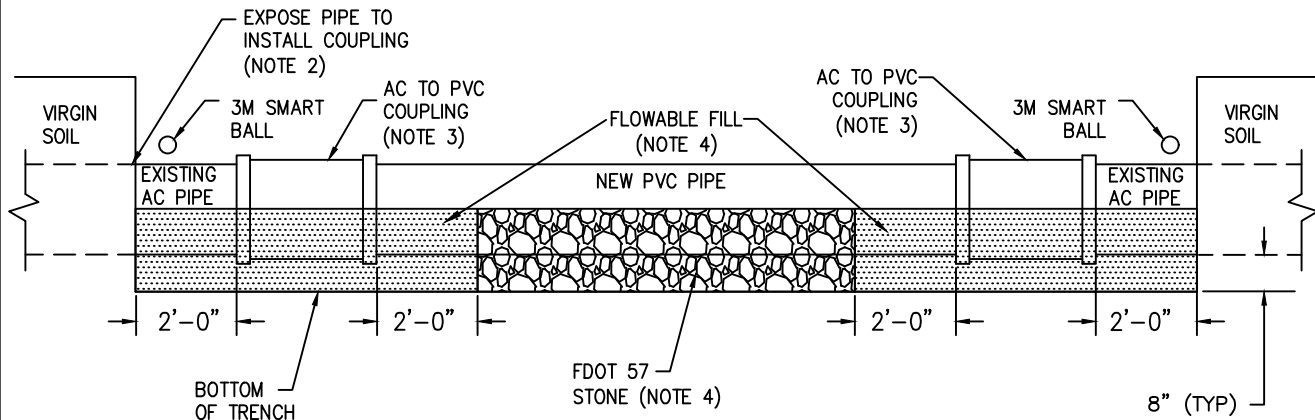
MARCO ISLAND UTILITIES

960 North Collier Blvd.
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SCALE: NOT TO SCALE

DATE: MAY 2023

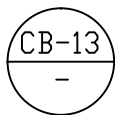
DWG #: CB-12.DWG



SECTION

NOTE:

1. AC PIPE REPLACEMENT/REPAIR WHICH REQUIRE MODIFICATION TO THE WATER MAIN, SHALL BE COORDINATED WITH MINIMUM 72 HOURS ADVANCED NOTICE TO MIU. CONSTRUCT AC PIPE REPLACEMENT/REPAIR AFTER COORDINATION WITH MIU.
2. EXPOSE TOP OF EXISTING AC PIPE 10 FEET BEYOND EDGE OF PAVEMENT TO VERIFY AC COUPLING LOCATIONS. INSTALL AC TO PVC COUPLING 5 FEET FROM EDGE OF PAVEMENT. AC PIPE SEGMENT CONNECTED TO AC TO PVC COUPLING TO BE 5 FEET IN LENGTH MINIMUM. EXPOSE AC PIPE TO NEXT COUPLING AND REPLACE WITH PVC PIPE IF AC PIPE SEGMENT IS LESS THAN 5 FEET IN LENGTH.
3. ALL NEW BURIED COUPLINGS AND EXISTING DUCTILE IRON FITTINGS AND VALVES EXPOSED DURING CONSTRUCTION TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
4. BACKFILL UP TO THE SPRING LINE OF THE PIPE IS TO BE FDOT 57 STONE HAUNCHED OR SLICED, ROCK SUPPORTS UNDERSIDE OF PIPE AND VOIDS ARE FILLED. BACKFILL UP TO THE SPRING LINE OF REPAIR COUPLINGS IS TO BE EXCAVATABLE FLOWABLE FILL PER FDOT SECTION 121 OR BAGS OF SAKCRETE WITH MIU APPROVAL, EXTENDING TO EXCAVATION VIRGIN SOIL AND 2 FEET BEYOND COUPLING IN EACH DIRECTION.
5. TRENCH RESTORATION ABOVE THE SPRING LINE OF THE PIPE IS TO BE IN ACCORDANCE WITH MI W&S DEPT. STANDARD DETAILS CB-14 THROUGH CB-17.
6. INSTALL DETECTABLE WARNING TAPE ABOVE NEW PIPE SEGMENT AND LOCATOR BALLS ABOVE PIPE AT EACH END OF NEW PIPE SEGMENT IN ACCORDANCE WITH DETAILS CB-14 THROUGH CB-17.



AC AND CLAY PIPE REPLACEMENT/REPAIR

NOT TO SCALE

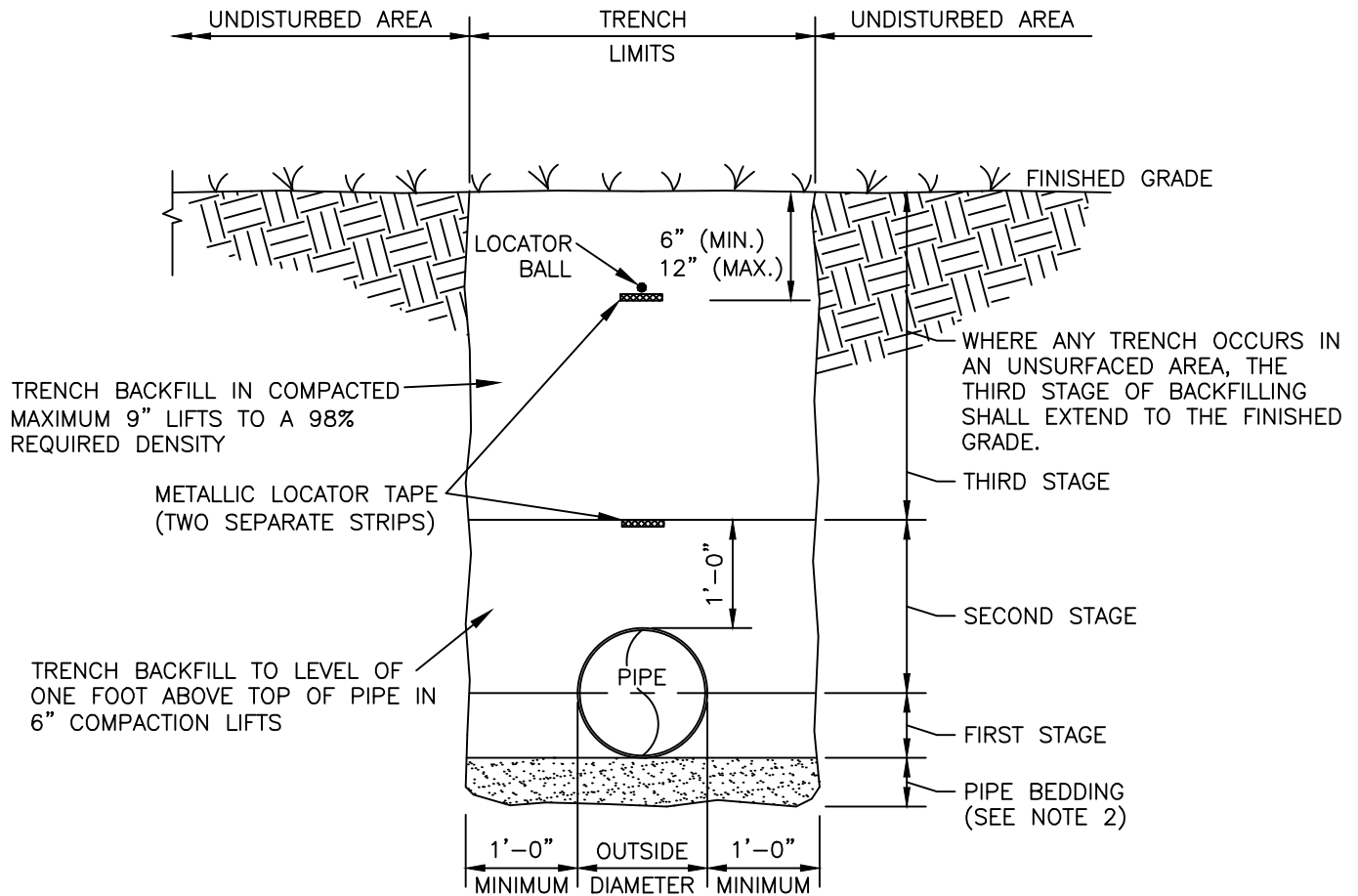
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DATE: MAY 2023

DWG #: CB-13.DWG



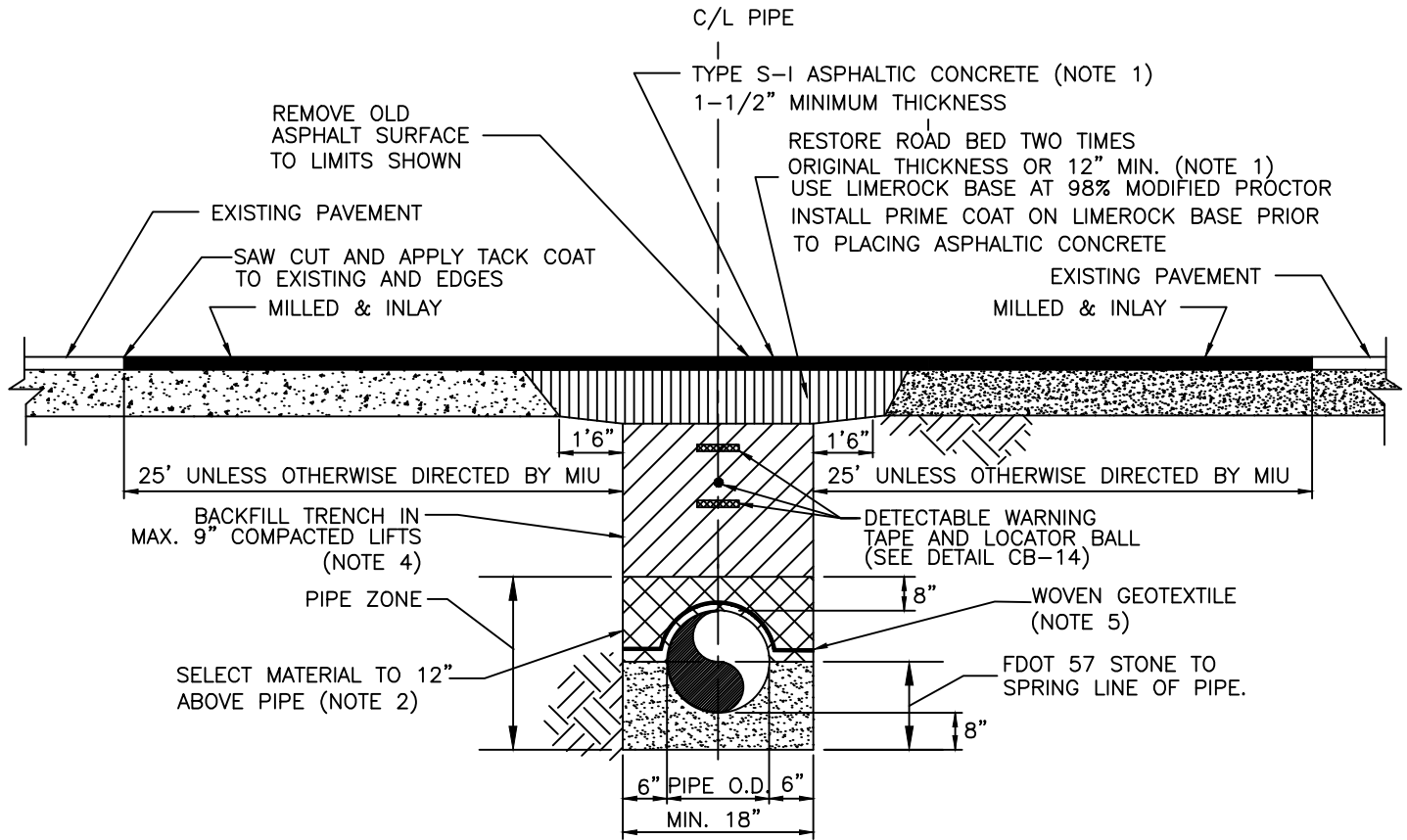
NOTES:

1. BACKFILL SHALL BE OF SUITABLE MATERIAL REMOVED FROM EXCAVATION EXCEPT WHERE OTHER MATERIAL IS SPECIFIED. BACKFILL MATERIAL SHALL CONSIST OF EARTH, LOAM, SANDY CLAY, GRAVEL, CRUSHED LIMESTONE, OR OTHER APPROVED MATERIAL. REFER TO TECHNICAL SPECIFICATIONS FOR DETAIL REQUIREMENTS.
2. IF TRENCH BOTTOM CONTAINS ROCK, THEN A MINIMUM OF A 8" PIPE BEDDING SHALL BE USED.
3. BACKFILL ABOVE THE SPRING LINE OF THE PIPE SHALL BE GRANULAR SELECT MATERIAL. SELECT MATERIAL IN THIS AREA MAY BE NATIVE MATERIAL AS LONG AS THE MATERIAL WILL PASS THROUGH A 3/8-INCH SIEVE, AND BE FREE OF ROCKS, CLAY AND ORGANIC MATERIAL.
4. IN UNPAVED AREAS, CONSTRUCT BACKFILL TO BOTTOM OF SOD. INSTALL SOD IN AREAS DISTURBED BY CONSTRUCTION. MATCH EXISTING GRADE.
5. MATERIAL ABOVE THE PIPE ZONE TO THE BOTTOM OF THE PAVEMENT ZONE SHALL BE SELECT BACKFILL CONSISTING OF NATIVE MATERIAL FREE OF ROCKS, CLAY AND ORGANIC MATERIAL. MATERIAL SHALL PASS THROUGH A 3-INCH SIEVE. MILLED ASPHALT AND ROAD BASE MATERIAL THAT PASSES A 2-INCH SIEVE MAY BE BLENDED WITH THE SELECT BACKFILL AND USED IN THIS TRENCH ZONE. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 98% MODIFIED PROCTOR DENSITY WITH A MINIMUM OF ONE TEST PERFORMED PER LIFT.

CB-14
 -

UNPAVED AREA TRENCH BACKFILL DETAIL
NOT TO SCALE

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	DATE: MAY 2023
	DWG #: CB-14.DWG

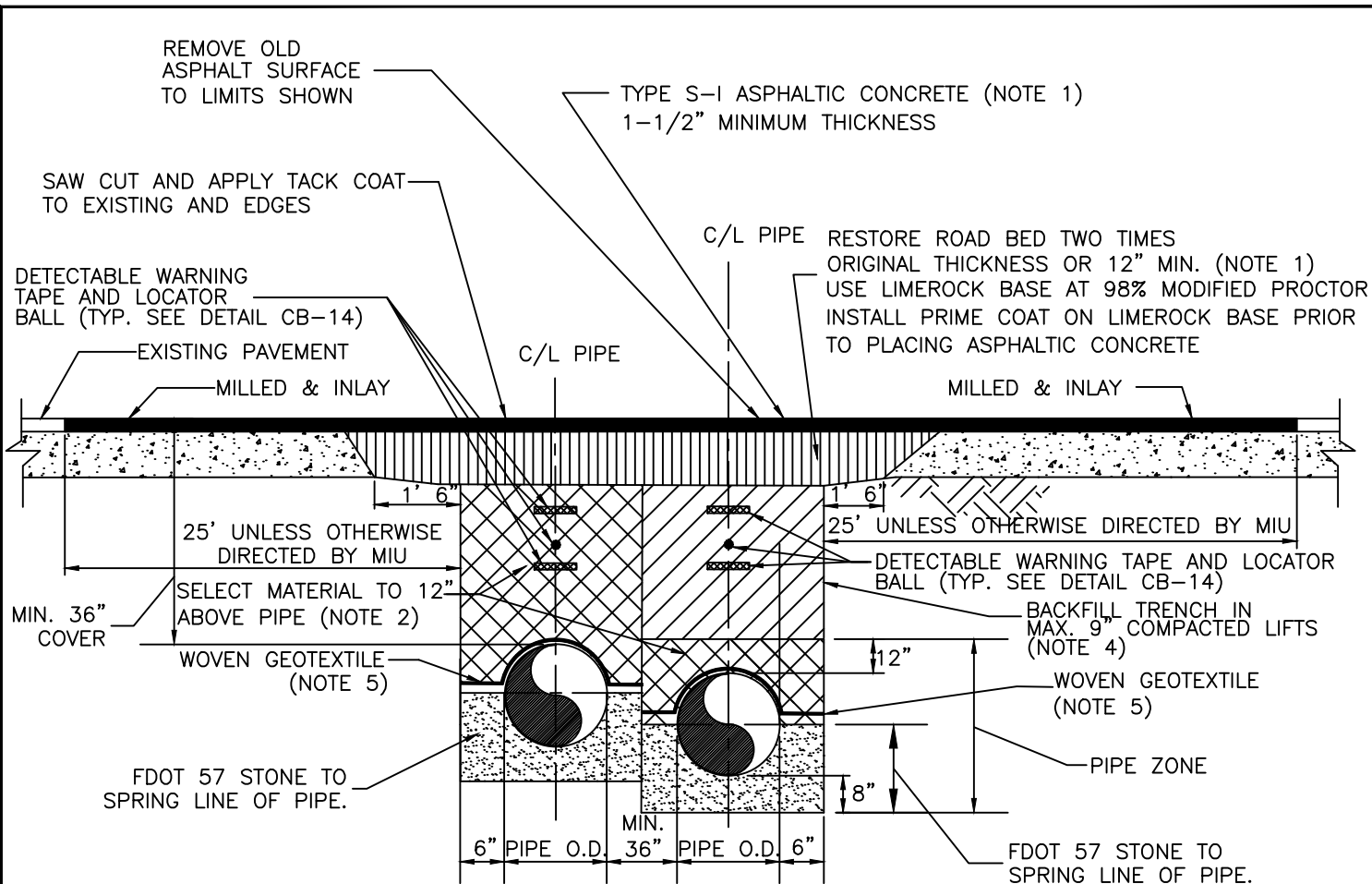


NOTES:

1. IN LIEU OF LIMEROCK FOR TRENCH BASE RESTORATION, ONE OF THE FOLLOWING TWO OPTIONS MAY BE SELECTED, WITH PRIOR MIU APPROVAL: (1) PROVIDE 12 INCHES MINIMUM THICKNESS OF EXCAVATABLE FLOWABLE FILL PER FDOT SPECIFICATIONS OR (2) PROVIDE 6 INCHES MINIMUM OF TYPE ABC-3, BASE COURSE ASPHALT CONCRETE, PER FDOT SPECIFICATIONS. SELECT ONE OF THE THREE OPTIONS FOR USE THROUGHOUT THE ENTIRE PROJECT.
2. BACKFILL ABOVE THE SPRING LINE OF THE PIPE SHALL BE GRANULAR SELECT MATERIAL. SELECT MATERIAL IN THIS AREA MAY BE NATIVE MATERIAL AS LONG AS THE MATERIAL WILL PASS THROUGH A 3/8-INCH SIEVE, AND BE FREE OF ROCKS, CLAY AND ORGANIC MATERIAL.
3. IN UNPAVED AREAS, CONSTRUCT BACKFILL TO BOTTOM OF SOD. INSTALL SOD IN AREAS DISTURBED BY CONSTRUCTION. MATCH EXISTING GRADE.
4. MATERIAL ABOVE THE PIPE ZONE TO THE BOTTOM OF THE PAVEMENT ZONE SHALL BE SELECT BACKFILL CONSISTING OF NATIVE MATERIAL FREE OF ROCKS, CLAY AND ORGANIC MATERIAL. MATERIAL SHALL PASS THROUGH A 3-INCH SIEVE. MILLED ASPHALT AND ROAD BASE MATERIAL THAT PASSES A 2-INCH SIEVE MAY BE BLENDED WITH THE SELECT BACKFILL AND USED IN THIS TRENCH ZONE. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 98% MODIFIED PROCTOR DENSITY WITH A MINIMUM OF ONE TEST PERFORMED PER LIFT.
5. INSTALL GEOTEXTILE ALONG ENTIRE LENGTH AND WIDTH OF TRENCH, MIRAFI FW402 OR PRE-APPROVED EQUAL.
6. ALL ROADWAY RESTORATION ON CITY OF MARCO ISLAND ROADWAYS SHALL BE PERMITTED BY MARCO ISLAND. THOSE IN STATE RIGHT-OF-WAY SHALL BE PERMITTED BY FDOT.

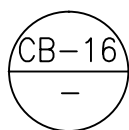
CB-15
TRENCH AND PAVING RESTORATION
-
NOT TO SCALE

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	DATE: MAY 2023
	DWG #: CB-15.DWG



NOTES:

1. IN LIEU OF LIMEROCK FOR TRENCH BASE RESTORATION, ONE OF THE FOLLOWING TWO OPTIONS MAY BE SELECTED: (1) PROVIDE 12 INCHES MINIMUM THICKNESS OF EXCAVATABLE FLOWABLE FILL PER FDOT SPECIFICATIONS OR (2) PROVIDE 6 INCHES MINIMUM OF TYPE ABC-3, BASE COURSE ASPHALT CONCRETE, PER FDOT SPECIFICATIONS. SELECT ONE OF THE THREE OPTIONS FOR USE THROUGHOUT THE ENTIRE PROJECT.
2. BACKFILL ABOVE THE SPRING LINE OF THE PIPE SHALL BE GRANULAR SELECT MATERIAL. SELECT MATERIAL IN THIS AREA MAY BE NATIVE MATERIAL AS LONG AS THE MATERIAL WILL PASS THROUGH A 3/8-INCH SIEVE, AND BE FREE OF ROCKS, CLAY AND ORGANIC MATERIAL.
3. IN UNPAVED AREAS, CONSTRUCT BACKFILL TO BOTTOM OF SOD. INSTALL SOD IN AREAS DISTURBED BY CONSTRUCTION. MATCH EXISTING GRADE.
4. MATERIAL ABOVE THE PIPE ZONE TO THE BOTTOM OF THE PAVEMENT ZONE SHALL BE SELECT BACKFILL CONSISTING OF NATIVE MATERIAL FREE OF ROCKS, CLAY AND ORGANIC MATERIAL. MATERIAL SHALL PASS THROUGH A 3-INCH SIEVE. MILLED ASPHALT AND ROAD BASE MATERIAL THAT PASSES A 2-INCH SIEVE MAY BE BLENDED WITH THE SELECT BACKFILL AND USED IN THIS TRENCH ZONE. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 98% MODIFIED PROCTOR DENSITY WITH A MINIMUM OF ONE TEST PERFORMED PER LIFT.
5. INSTALL GEOTEXTILE ALONG ENTIRE LENGTH AND WIDTH OF TRENCH, MIRAFI FW402 OR PRE-APPROVED EQUAL.
6. ALL ROADWAY RESTORATION ON CITY OF MARCO ISLAND ROADWAYS SHALL BE PERMITTED BY MARCO ISLAND. THOSE IN STATE RIGHT-OF-WAY SHALL BE PERMITTED BY FDOT.



DUAL PIPELINE TRENCH AND PAVING RESTORATION

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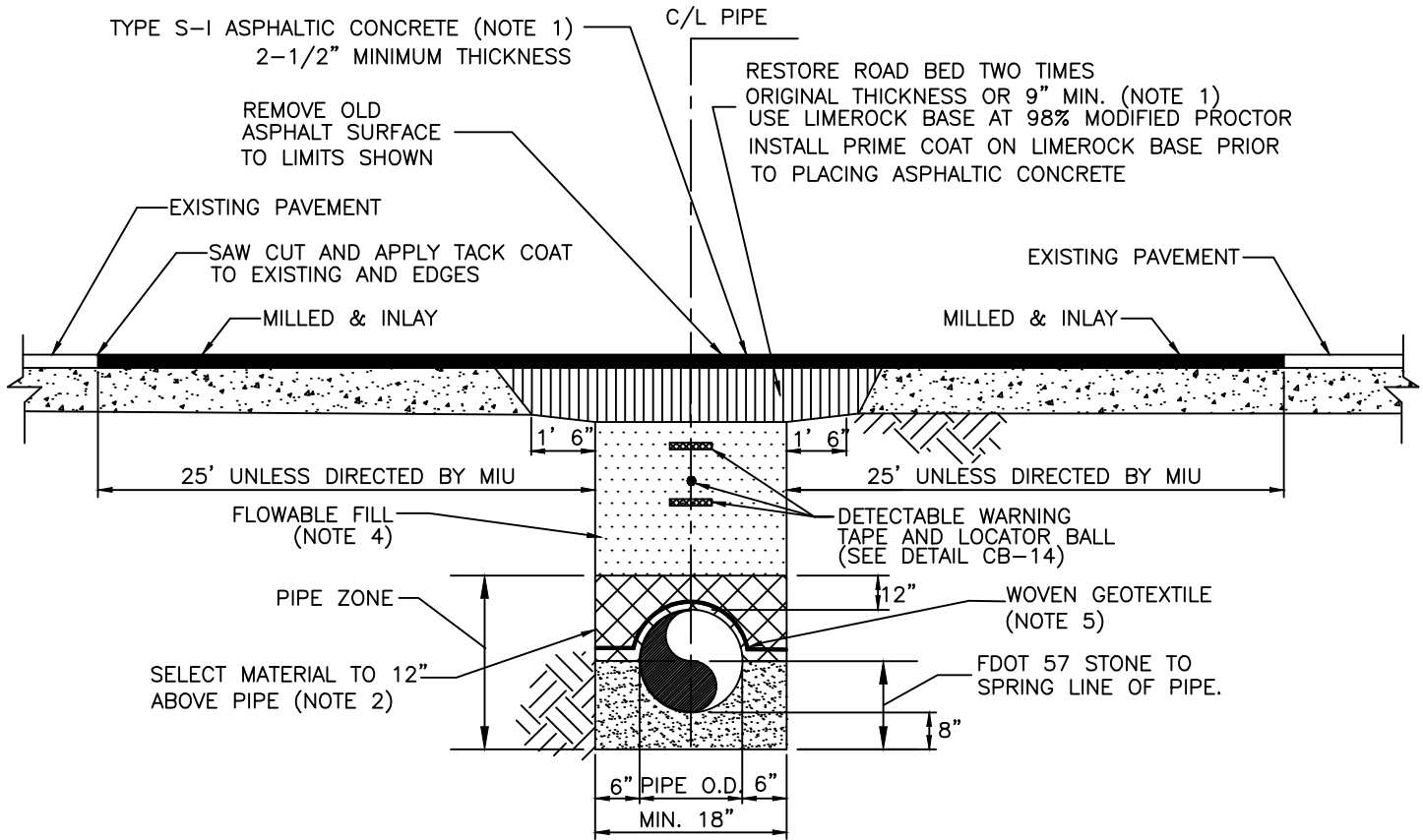
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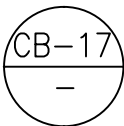
DATE: MAY 2023

DWG #: CB-16.DWG



NOTES:

1. IN LIEU OF LIMEROCK FOR TRENCH BASE RESTORATION, ONE OF THE FOLLOWING TWO OPTIONS MAY BE SELECTED: (1) PROVIDE 12 INCHES MINIMUM THICKNESS OF EXCAVATABLE FLOWABLE FILL PER FDOT SPECIFICATIONS OR (2) PROVIDE 6 INCHES MINIMUM OF TYPE ABC-3, BASE COURSE ASPHALT CONCRETE, PER FDOT SPECIFICATIONS. SELECT ONE OF THE THREE OPTIONS FOR USE THROUGHOUT THE ENTIRE PROJECT.
2. BACKFILL ABOVE THE SPRING LINE OF THE PIPE SHALL BE GRANULAR SELECT MATERIAL. SELECT MATERIAL IN THIS AREA MAY BE NATIVE MATERIAL AS LONG AS THE MATERIAL WILL PASS THROUGH A 3/8-INCH SIEVE, AND BE FREE OF ROCKS, CLAY AND ORGANIC MATERIAL. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 98% MODIFIED PROCTOR DENSITY WITH A MINIMUM OF ONE TEST PERFORMED PER LIFT.
3. IN UNPAVED AREAS, CONSTRUCT BACKFILL TO BOTTOM OF SOD. INSTALL SOD IN AREAS DISTURBED BY CONSTRUCTION. MATCH EXISTING GRADE.
4. MATERIAL ABOVE THE PIPE ZONE TO THE BOTTOM OF THE PAVEMENT ZONE SHALL BE EXCAVATABLE FLOWABLE FILL PER FDOT SECTION 121.
5. INSTALL GEOTEXTILE ALONG ENTIRE LENGTH AND WIDTH OF TRENCH, MIRAFI FW402 OR PRE-APPROVED EQUAL.
6. ALL ROADWAY RESTORATION ON CITY OF MARCO ISLAND ROADWAYS SHALL BE PERMITTED BY MARCO ISLAND. THOSE IN STATE RIGHT-OF-WAY SHALL BE PERMITTED BY FDOT.



TRENCH AND PAVING RESTORATION WITH FLOWABLE FILL

NOT TO SCALE

HIGH VOLUME ROADS

(FOR USE AS DIRECTED BY MI W&S DEPT.)

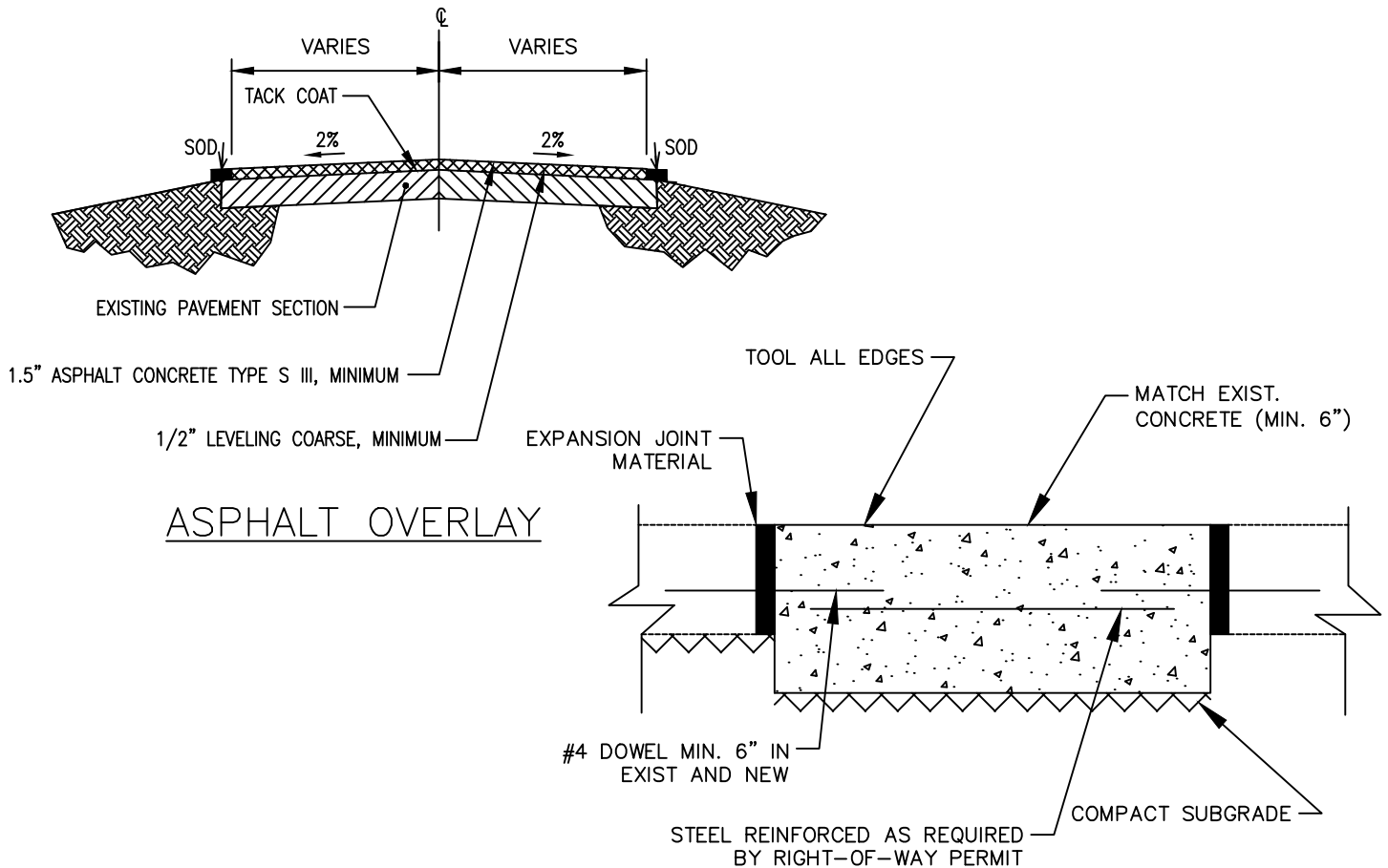
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DATE: MAY 2023

DWG #: CB-17.DWG



ASPHALT OVERLAY

SIDEWALK/DRIVEWAY RESTORATION

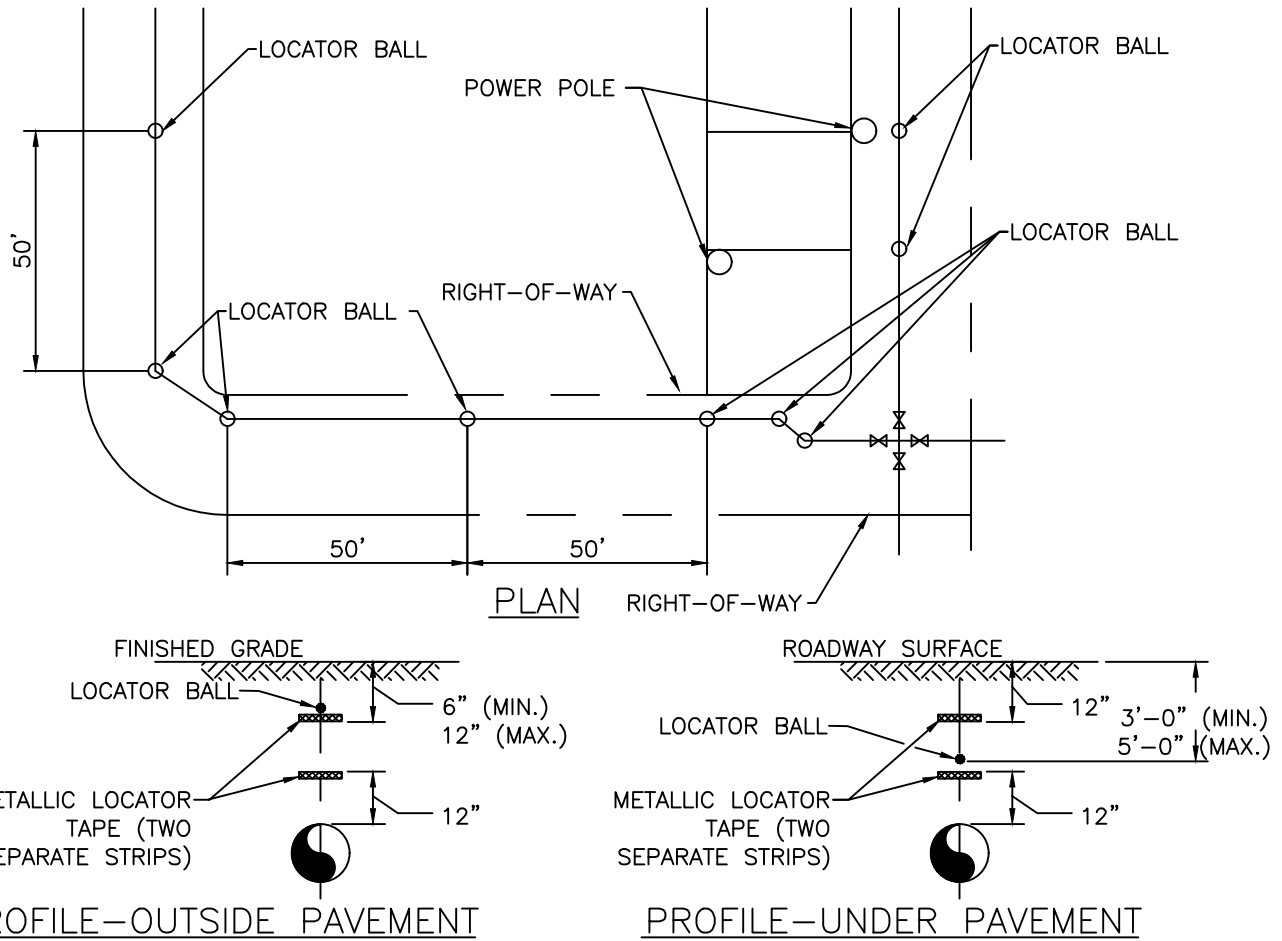
NOTES:

1. TOP OF SOD MUST MATCH EXISTING GRADE AND BE BELOW EDGE OF PAVEMENT.
2. CONSTRUCT BACKFILL TO BOTTOM OF SOD, INSTALL SOD IN AREAS DISTURBED BY CONSTRUCTION.
3. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 98% MODIFIED PROCTOR DENSITY WITH A MINIMUM OF ONE TEST PERFORMED PER LIFT.
4. ALL ROADWAY RESTORATION ON CITY OF MARCO ISLAND ROADWAYS SHALL BE PERMITTED BY MARCO ISLAND. THOSE IN STATE RIGHT-OF-WAY SHALL BE PERMITTED BY FDOT

CB-18
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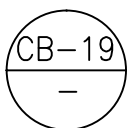
 RIGHT-OF-WAY RESTORATION DETAILS
 NOT TO SCALE

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	DATE: MAY 2023
	DWG #: CB-18.DWG



NOTES:

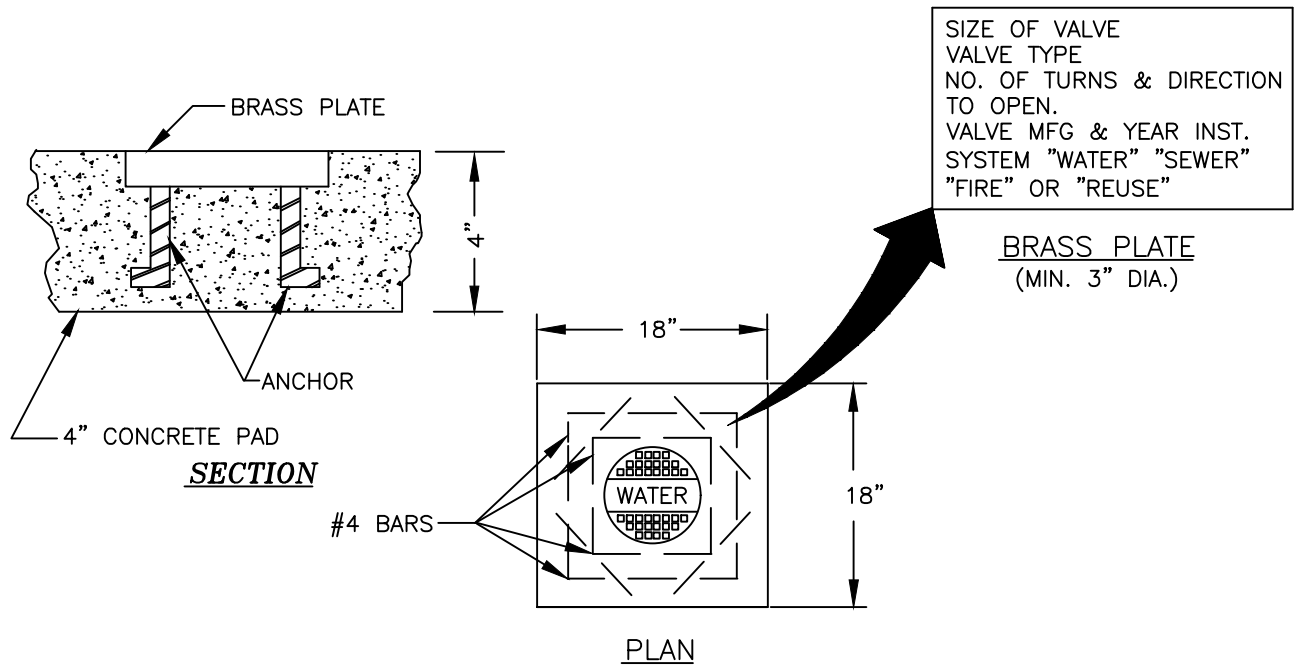
1. LOCATOR MARKERS ARE TO BE 4" BALL MARKER PER APPROVED PRODUCT LIST, BLUE FOR WATER, GREEN FOR WASTEWATER AND PURPLE FOR REUSE WATER.
2. PRESSURE MAINS CROSSING ROAD: LOCATE BALLS TO BE PLACED NO MORE THEN 2'-0" FROM OUTSIDE EDGE OF PAVEMENT.
3. MARKERS ARE TO BE INSTALLED AT ALL CHANGE OF DIRECTIONS AND FITTINGS ABSENT OF ANY VALVE. ON STRAIGHT RUNS, MARKERS ARE TO BE INSTALLED EVERY 50'.
4. PROVIDE CONSTRUCTION RECORD DRAWINGS SHOWING THE LOCATION OF PRESSURE MAIN LOCATOR BALLS, AND NEAR SURFACE MARKERS, AND THE BAR CODE FOR EACH.
5. METALLIC LOCATOR TAPE IS REQUIRED ABOVE GRAVITY SEWER MAINS. LOCATOR BALLS ARE NOT REQUIRED ABOVE GRAVITY SEWER MAINS, BUT IS REQUIRED FOR SEWER LATERALS. SMART PLUGS WITH LOCATOR REQUIRED FOR CLEANOUTS.
6. NEAR SURFACE MARKERS SHALL BE INSTALLED AT ALL JACK & BORE AND HORIZONTAL DIRECTIONAL DRILL LOCATIONS. TO BE PLACED AT NO MORE THAN 2'-0" FROM OUTSIDE OF PAVEMENT AND AT ALL CHANGES IN DIRECTION AND 50' ON CENTER ON STRAIGHT RUNS.



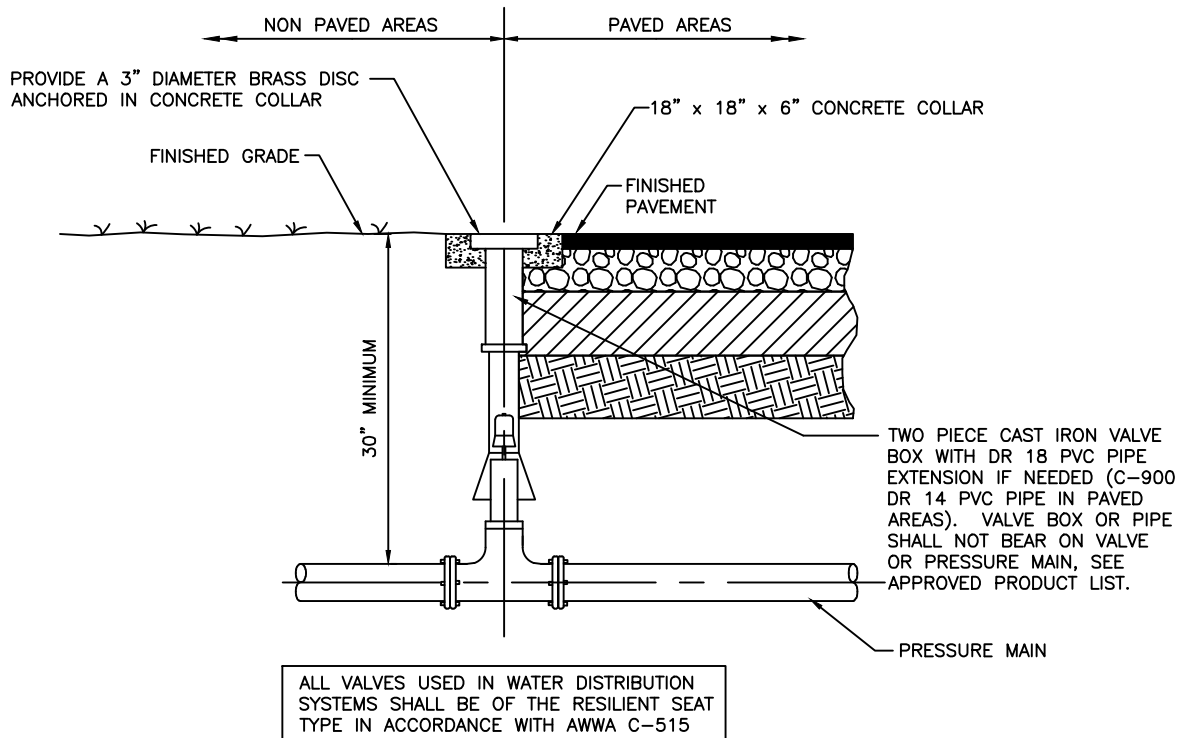
LOCATOR TAPE AND MARKERS FOR PRESSURE MAINS

NOT TO SCALE

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	DATE: MAY 2023
	DWG #: CB-19.DWG



- NOTES:**
 1. ALL VALVE BOX LIDS IN TRAFFIC AREAS ARE TO BE TYLER PIPE LOCKLID OR MIU APPROVED EQUAL.



CB-21 VALVE PAD
 - NOT TO SCALE

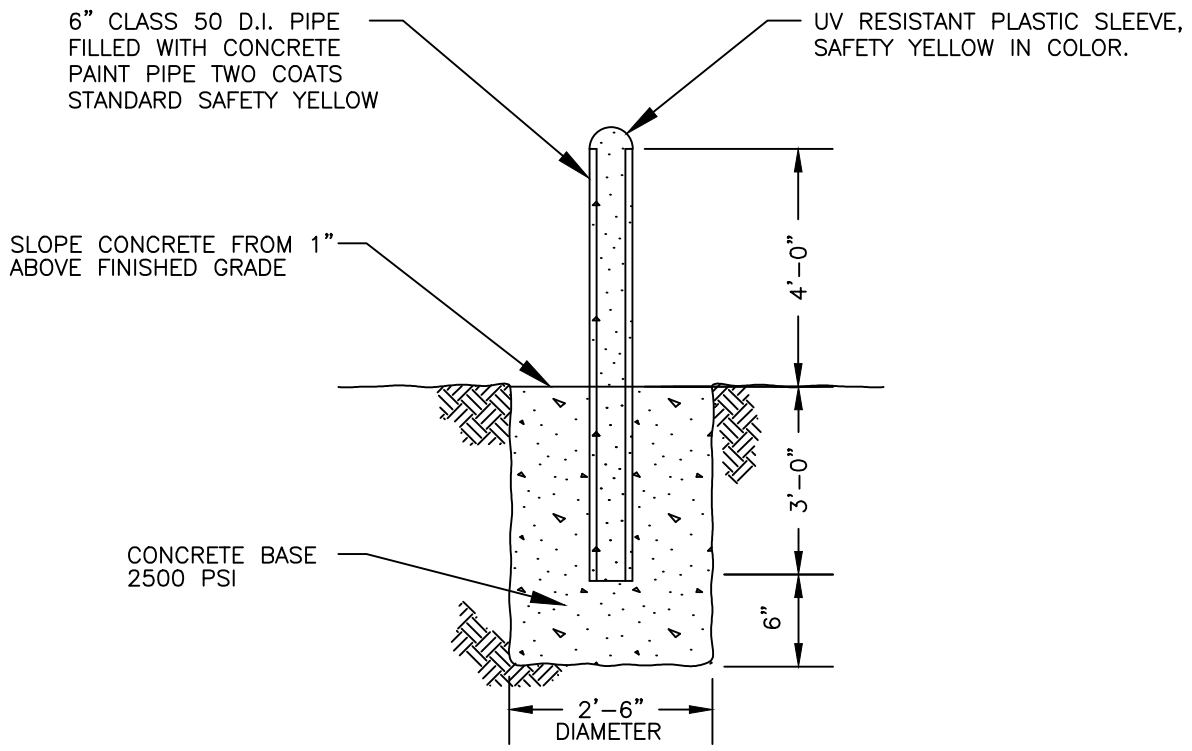
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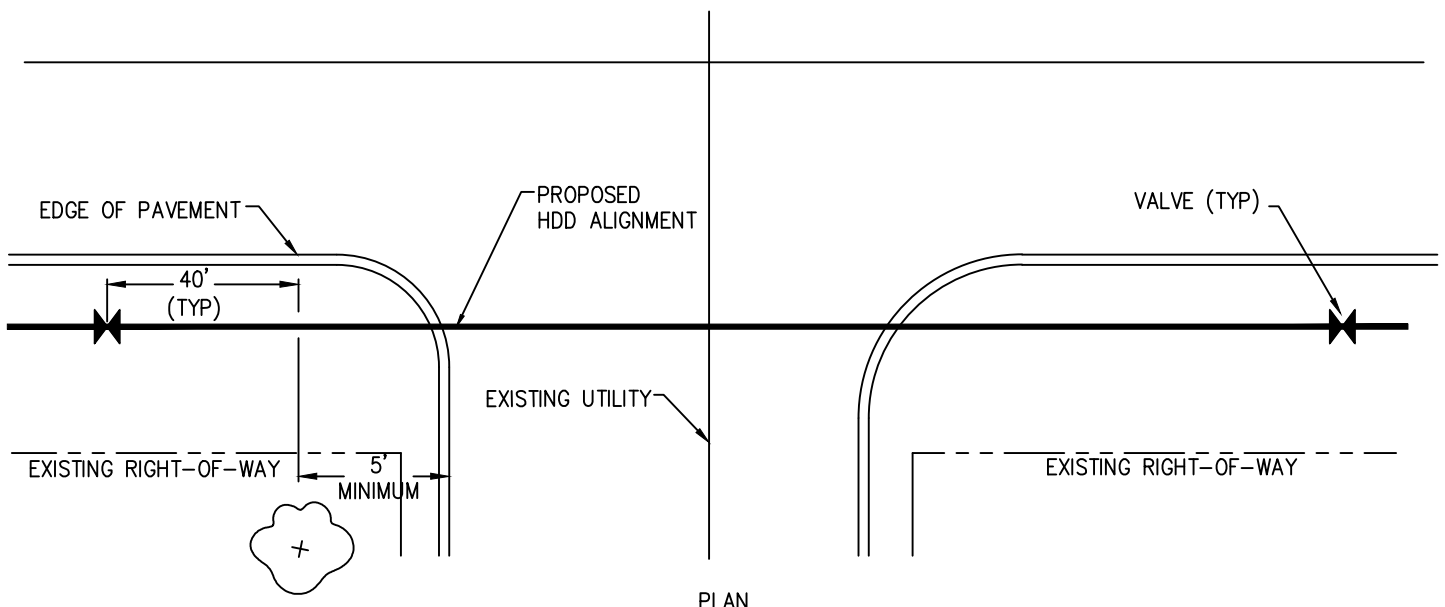
DATE: MAY 2023

DWG #: CB-21.DWG

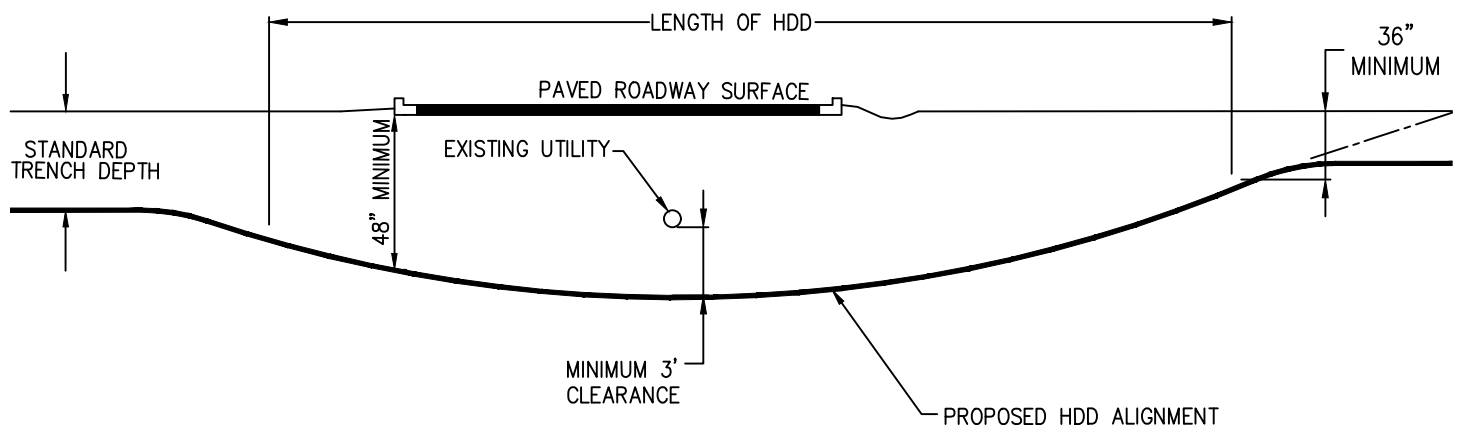


CB-22 GUARD POST
- NOT TO SCALE

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	DATE: MAY 2023
	DWG #: CB-22.DWG



PLAN
HORIZONTAL MINIMUM CLEARANCES



PROFILE
VERTICAL MINIMUM CLEARANCES

HDD INSTALLATION NOTES:

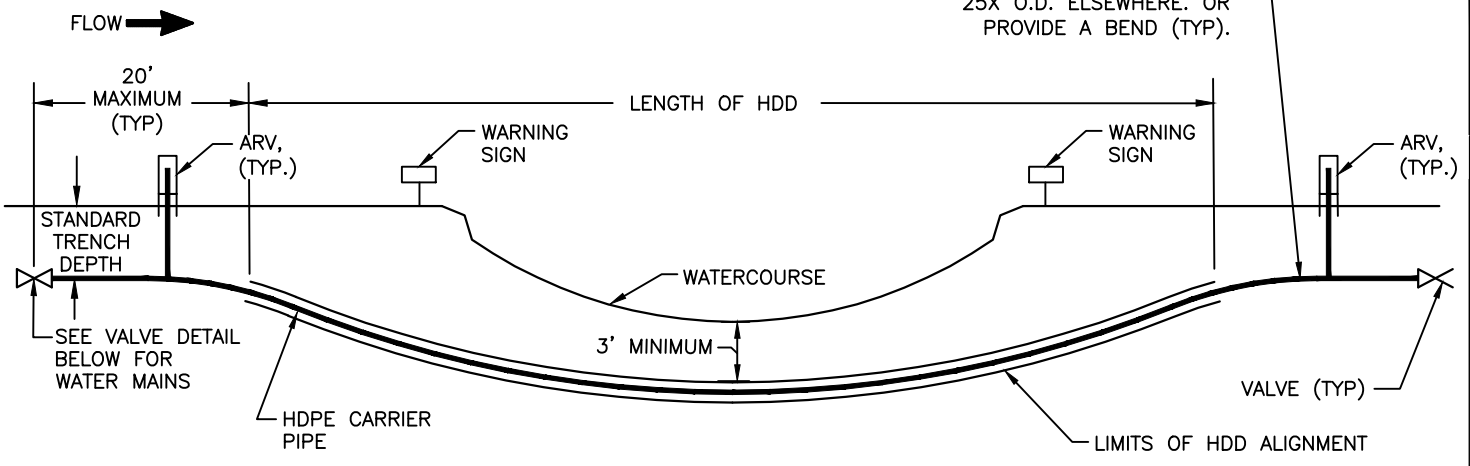
1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFICATION OF AFFECTED AGENCIES AND COORDINATION WITH ALL UTILITIES PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MATERIALS, INCLUDING DRILLING FLUID, SHALL BE REMOVED FROM THE SITE PRIOR TO RESTORATION OF DISTURBED AREAS.
4. ALL RESTORATION WORK SHALL BE IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
5. HORIZONTAL DIRECTIONAL DRILL INSTALLATION IN STATE RIGHT-OF-WAYS SHALL MEET FDOT REQUIREMENT AND SHALL HAVE FDOT CONSTRUCTION PERMIT.
6. SEE DETAIL CB-19 FOR NEAR SURFACE LOCATORS.

CB-23
-

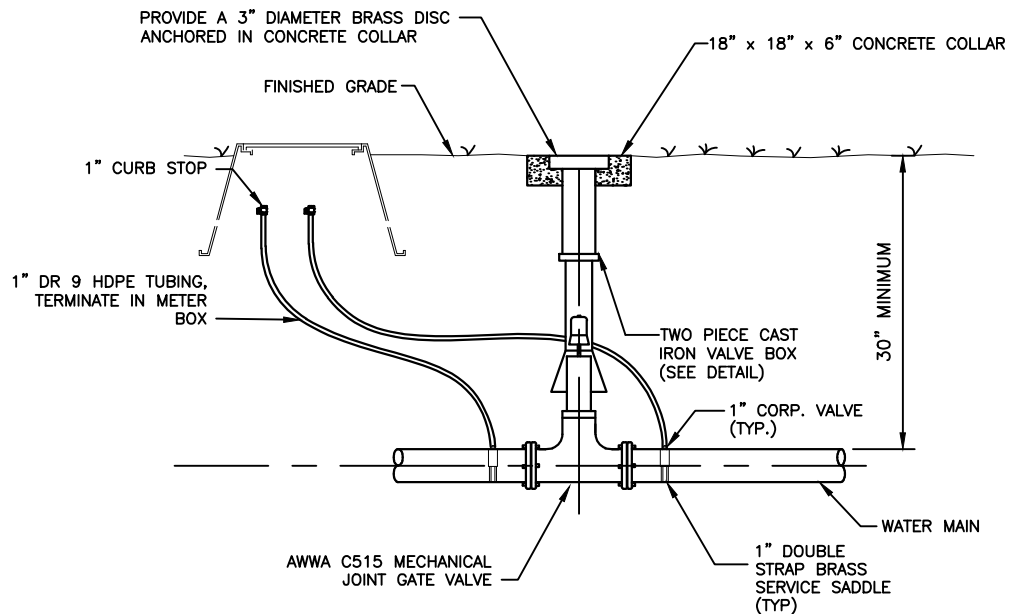
 TYPICAL HORIZONTAL DIRECTIONAL DRILL
 NOT TO SCALE

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	DATE: MAY 2023
	DWG #: CB-23.DWG

MAINTAIN MIN. BEND RADIUS OF 100X O.D. WITHIN 5X O.D. OF A VALVE OR FITTING AND 25X O.D. ELSEWHERE. OR PROVIDE A BEND (TYP.).



PROFILE



WATER MAIN VALVE DETAIL

HDD INSTALLATION NOTES:

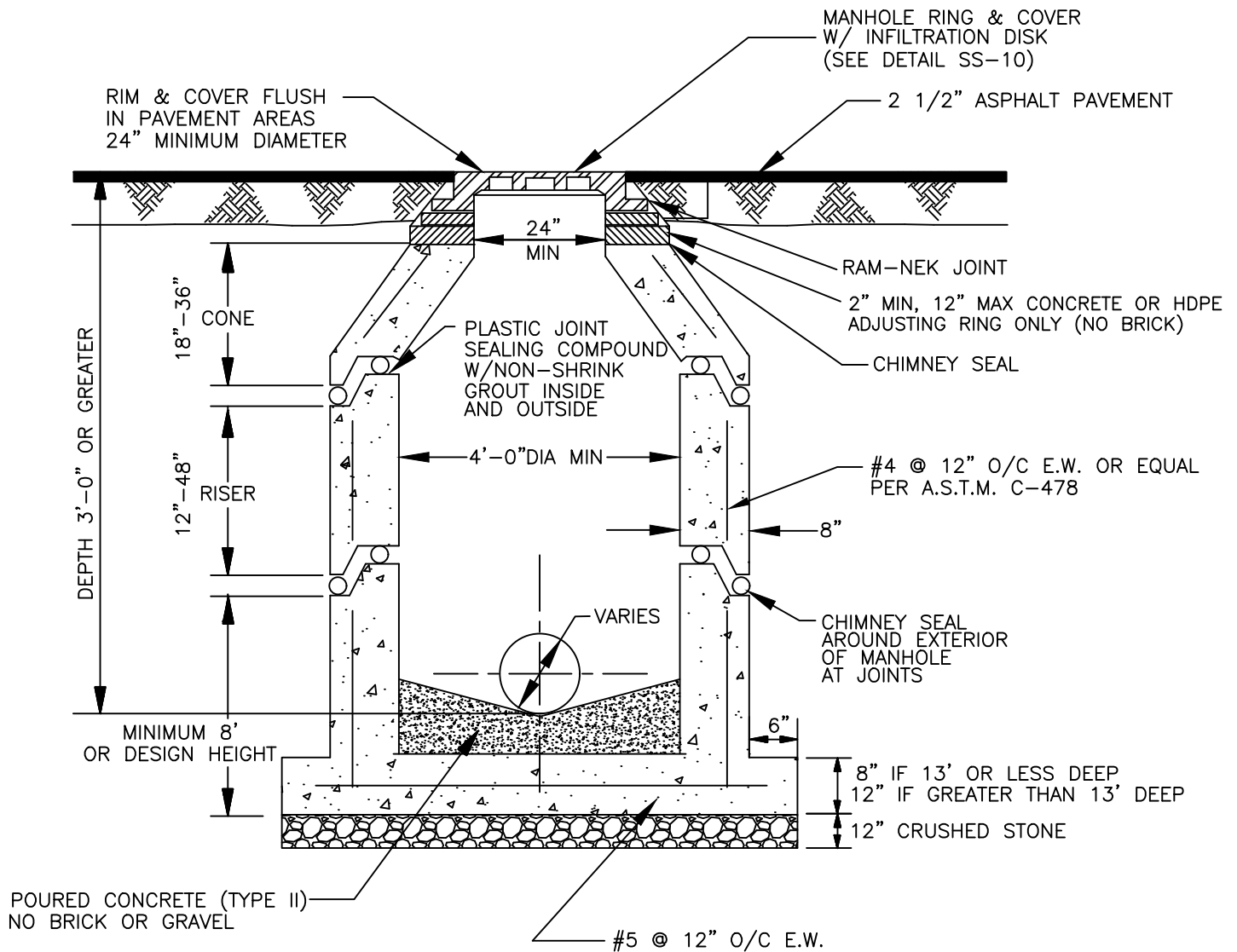
1. PROVIDE VALVES AT BOTH ENDS OF SUBAQUEOUS CROSSING. FOR WATERMAIN CROSSINGS, TWO 1" SERVICE TAPS AND SADDLES SHALL BE PROVIDED ON BOTH SIDES OF THE VALVE CLOSEST TO THE WATER SUPPLY AND TERMINATED INTO A METER BOX. SEE DETAIL.
2. PLACE ARV ON UPSTREAM SIDE. WHEN BIDIRECTIONAL FLOW CONDITIONS EXIST, AN ARV WILL BE REQUIRED AT EACH END OF THE HDD.
3. ALL SUBAQUEOUS CROSSINGS SHALL BE DISCUSSED AT A PLAN PRE-SUBMITTAL CONFERENCE WITH REPRESENTATIVES OF THE WATER OR WASTEWATER DEPARTMENTS. SUBAQUEOUS WATER MAINS SHALL REQUIRE APPROVAL BY THE WATER OR WASTEWATER DEPARTMENT.
4. WARNING SIGNS SHALL BE PLACED ALONG BANKS OF WATERWAY TO CLEARLY IDENTIFY SUBAQUEOUS CROSSING. SIGNS SHALL INDICATE TYPE OF PIPELINE AND DEPTH OF PIPELINE BELOW BOTTOM OF WATER BODY.
5. VALVES SHALL BE INSTALLED WITHIN 20' OF THE END OF ALL DIRECTIONAL DRILLS.
6. DEPTH OF COVER BENEATH THE WATERCOURSE SHALL BE A MINIMUM OF 3' OR AS REQUIRED BY ACOE, SFWMD, OR OTHER APPLICABLE REGULATORY AGENCY.

CB-24
-

TYPICAL SUBAQUEOUS HORIZONTAL DIRECTIONAL DRILL (HDD)

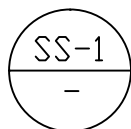
NOT TO SCALE

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	DWG #: CB-24.DWG



NOTE:

1. COAT INTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM.
2. COAT EXTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM.



PRECAST MANHOLE - CONCENTRIC

NOT TO SCALE

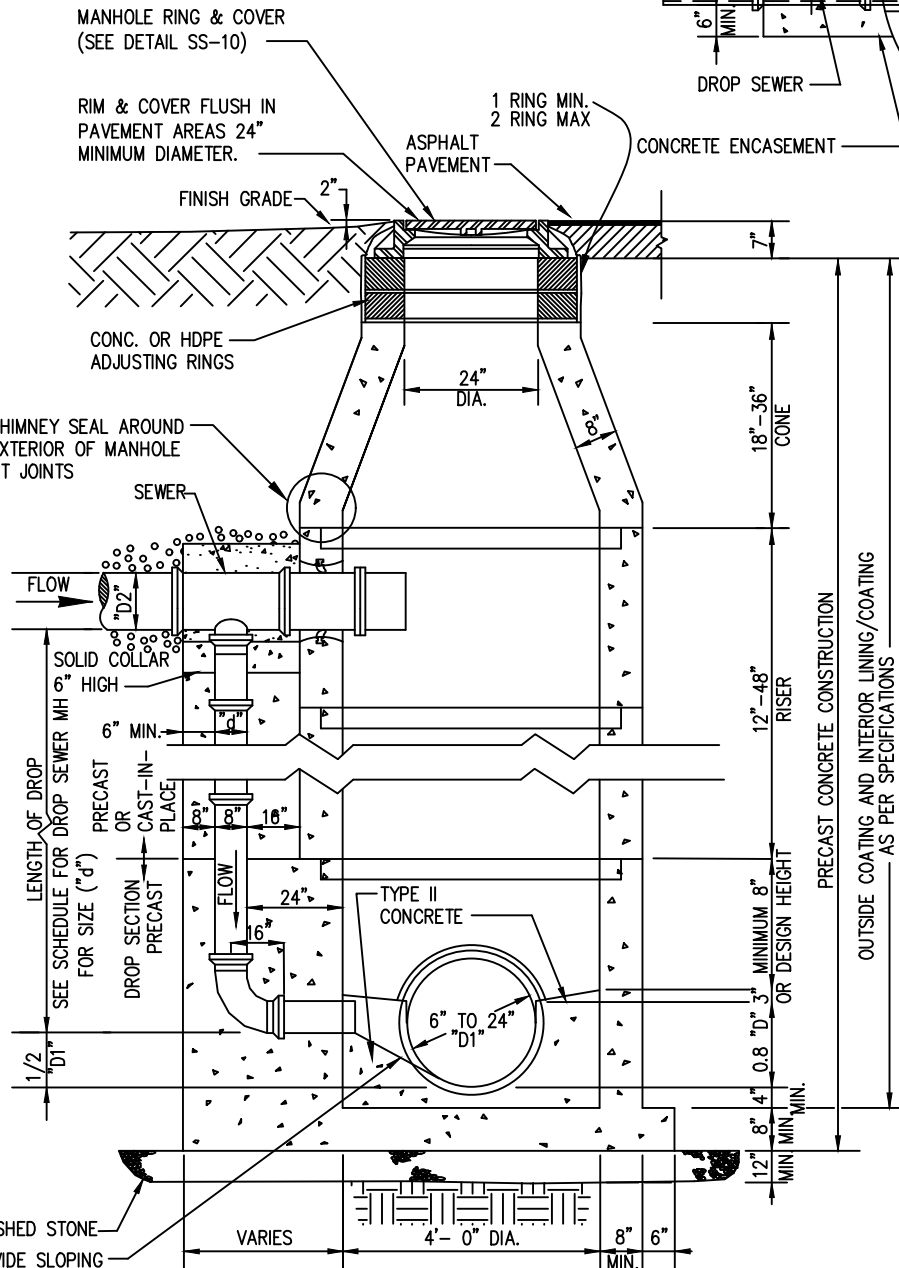
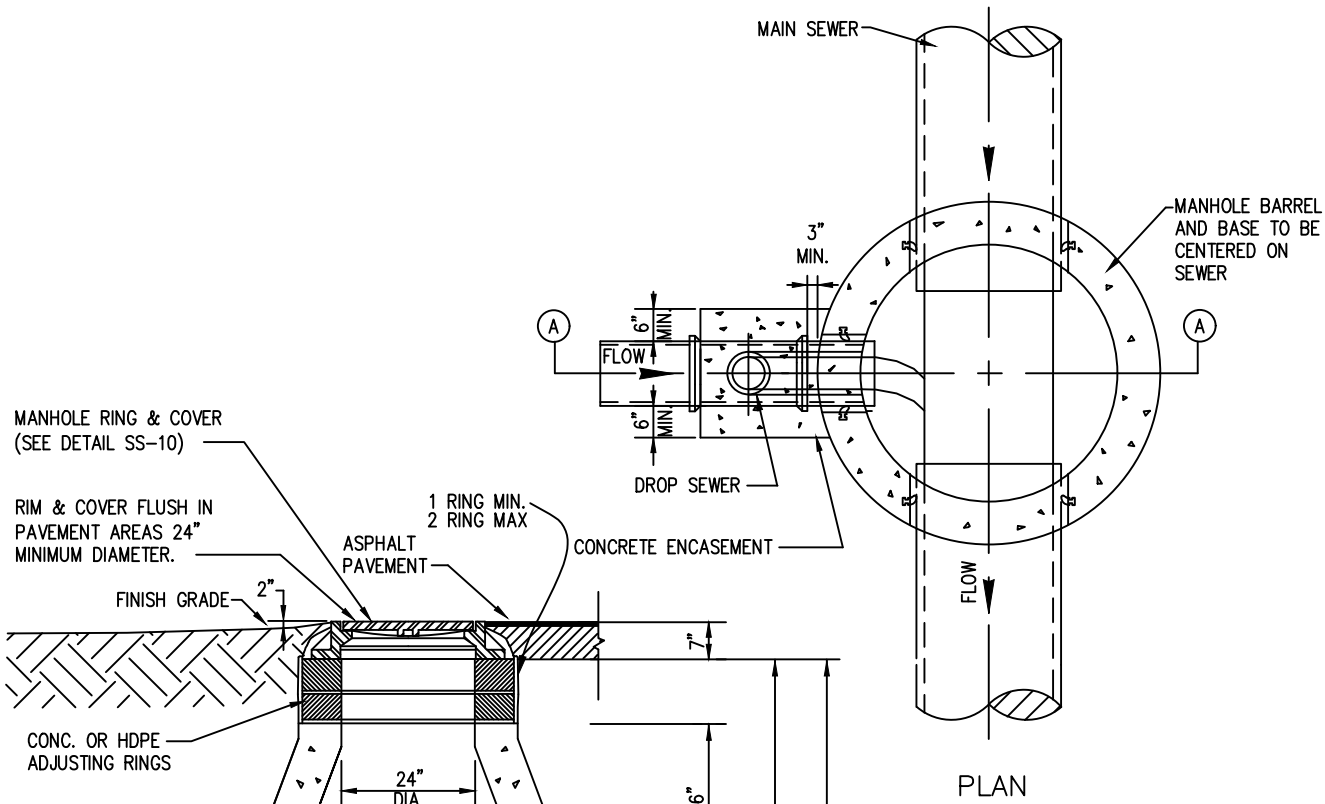
**MARCO ISLAND
UTILITIES**

960 North Collier Blvd.
MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: SS-1.DWG



- NOTE:**
1. SEE DROP MANHOLES SCHEDULE FOR INVERT CHANNEL DIMENSIONS
 2. DIFFERENCE BETWEEN INVERTS MUST BE 2.01' OR GREATER TO BE CONSIDERED A DROP MANHOLE.
 3. COAT INTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM
 4. COAT EXTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM

SS-3 TYPICAL DROP MANHOLE
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	DWG #: SS-3.DWG

SCHEDULE FOR DROP MANHOLE

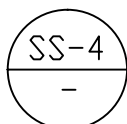
INLET PIPE I.D. DIAMETER "D2"	DROP PIPE DIAMETER "d"
6"	6"
8"	8"
10"	8"
12"	10"
15"	12"
18"	16"
21"	18"
24"	18"

STANDARD MANHOLE SCHEDULE OF INVERT CHANNEL DIMENSIONS

PIPE SIZE	ANGLE Δ	MH DIA.	R	X
6" TO 15"	0° TO 90°	4'-0"	1'-8"	0" TO 10"
8"	90° TO 120°	6'-0"	2'-0"	0" TO 10"
18", 21" & 24"	0° TO 60°	4'-0"	2'-0"	0" TO 4"
18" & 21"	60° TO 90°	5'-0"	2'-0"	4" TO 12"
30"	0° TO 60°	5'-0"	2'-0"	0" TO 6"
24" & 30"	60° TO 90°	6'-0"	2'-0"	6" TO 12"
OTHERS ENGINEER APPROVED OR EQUAL				

MANHOLE GENERAL NOTES:

1. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A MINIMUM OF ONE INCH/FT. BUT A MINIMUM 3 INCH DIFFERENCE SHALL BE MAINTAINED FROM THE 0.8 POINT OF THE CHANNEL TO THE WALL.
2. THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 0.8 OF THE LARGEST DIAMETER SEWER IN THE MANHOLE.
3. MANHOLE SECTIONS SHALL BE JOINED TOGETHER WITH DOUBLE PLASTIC JOINT SEALING COMPOUND.
4. ALL INSIDE/OUTSIDE SECTIONS FILL WITH NON-SHRINK GROUT.
5. ALL OUTSIDE SECTION SHALL BE SEALED WITH CHIMNEY SEAL.
6. ALL MANHOLES TO BE CONSTRUCTED OF PRECAST CONCRETE (BASES, BARRELS AND ECCENTRIC CONES) WITH FLEXIBLE RUBBER MANHOLE SLEEVES, PER ASTM C-923. PROVIDE COATING ON ALL INSIDE AND OUTSIDE WALLS AND BASES IN ACCORDANCE WITH SPECIFICATIONS. NO BRICK MANHOLES WILL BE ACCEPTED. ALL CONCRETE SHALL BE TYPE II PORTLAND CEMENT.
7. SEE SPECIFICATIONS FOR MATERIAL REQUIREMENTS AND PLACEMENT AND COMPACTION OF PIPE BEDDING AND CRUSHED STONE (SEE TYP. BEDDING DETAILS).
8. REINFORCING FOR PRE-CAST MANHOLES AS PER ASTM C-478 (TYPICAL).
9. CONCRETE FOR MANHOLE STRUCTURE SHALL HAVE A COMPRESSIVE STRENGTH OF NO LESS THAN 4,000 PSI @ 28 DAYS.



MANHOLE AND DROP MANHOLE SCHEDULE AND GENERAL NOTES

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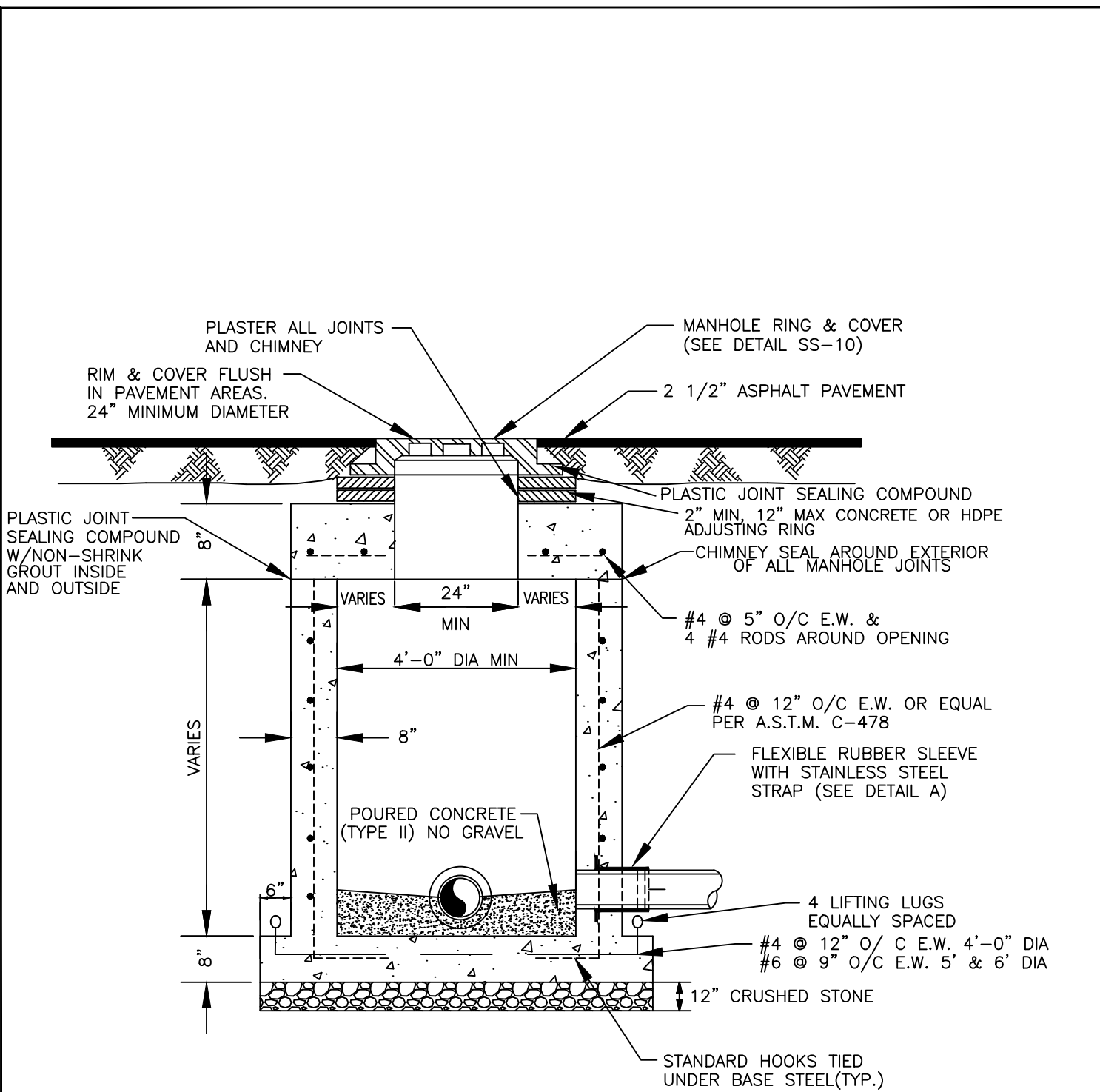
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DWG #: SS-4.DWG

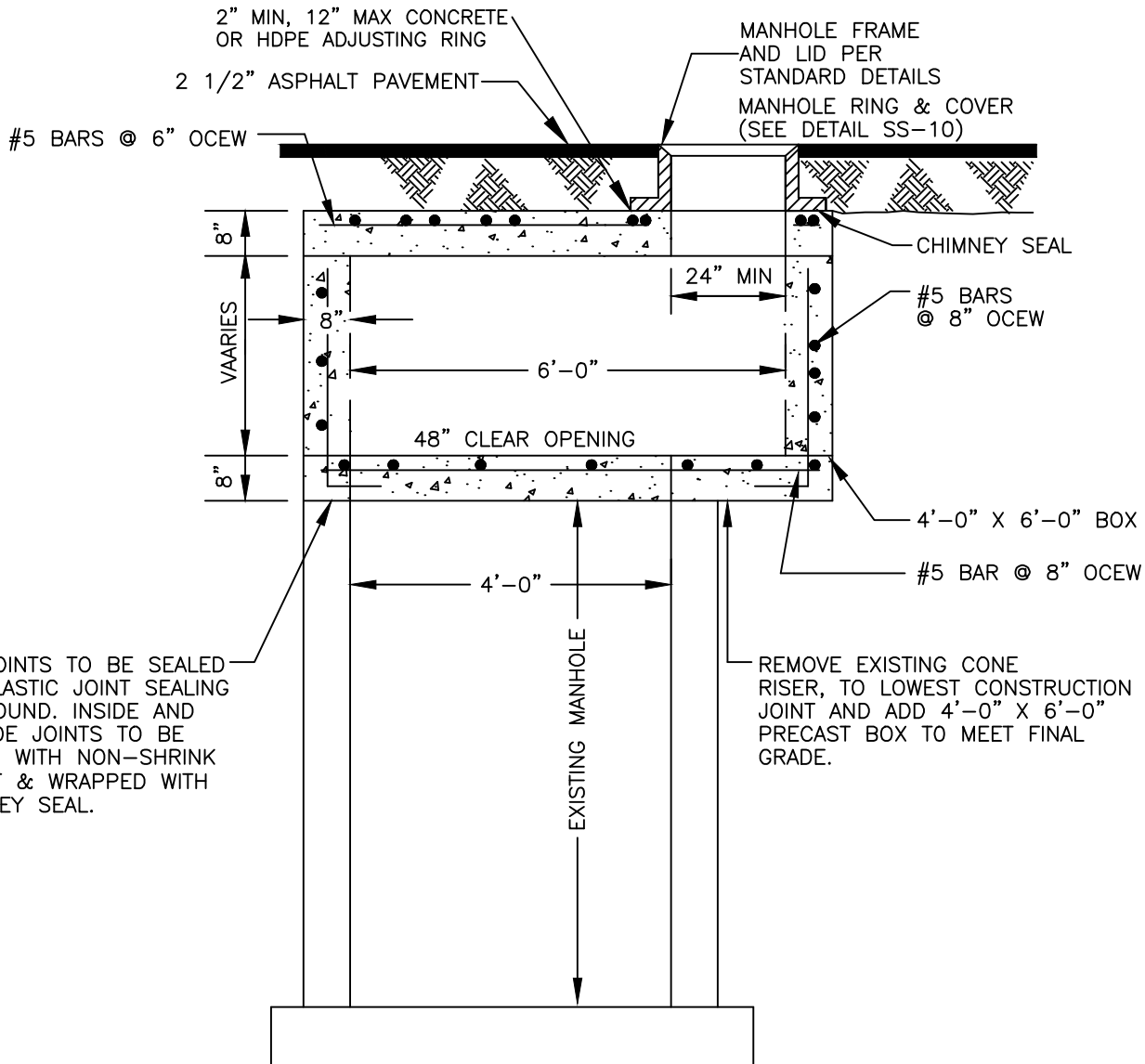


NOTE:

1. COAT INTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM.
2. COAT EXTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM.

SS-5 SHALLOW MANHOLE
NOT TO SCALE

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ALL JOINTS TO BE SEALED W/ PLASTIC JOINT SEALING COMPOUND. INSIDE AND OUTSIDE JOINTS TO BE FILLED WITH NON-SHRINK GROUT & WRAPPED WITH CHIMNEY SEAL.

REMOVE EXISTING CONE RISER, TO LOWEST CONSTRUCTION JOINT AND ADD 4'-0" X 6'-0" PRECAST BOX TO MEET FINAL GRADE.

NOTE:

1. COAT INTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM.
2. COAT EXTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM.

SS-6 OFFSET MANHOLE RECONSTRUCTION
 - NOT TO SCALE

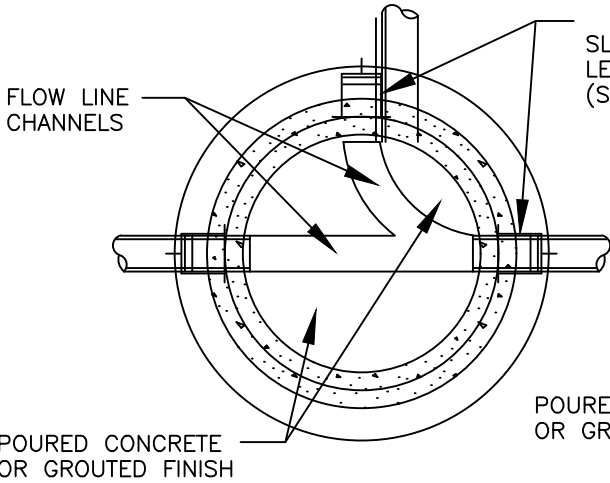
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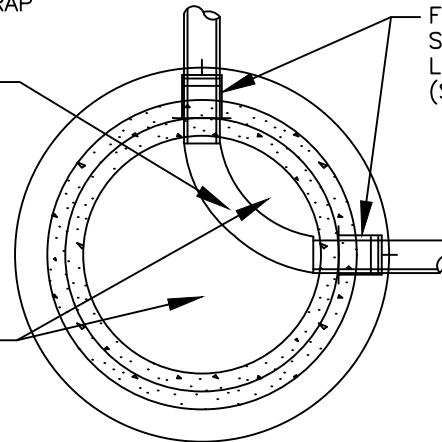
DATE: MAY 2023

DWG #: SS-6.DWG



FLEXIBLE RUBBER SLEEVE WITH STAIN-LESS STEEL STRAP (SEE DETAIL A)

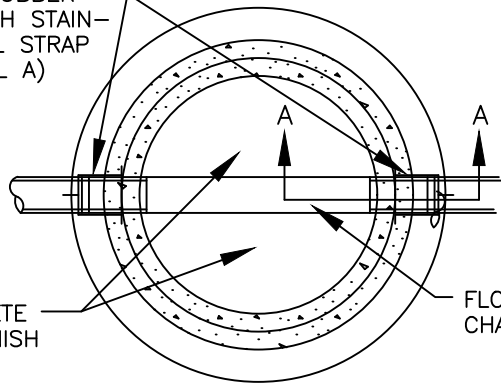
FLOW LINE CHANNEL



FLEXIBLE RUBBER SLEEVE WITH STAIN-LESS STEEL STRAP (SEE DETAIL A)

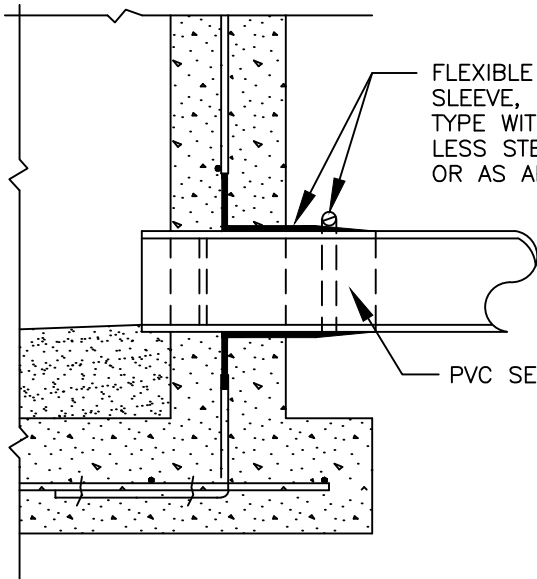
POURED CONCRETE OR GROUTED FINISH

FLEXIBLE RUBBER SLEEVE WITH STAIN-LESS STEEL STRAP (SEE DETAIL A)

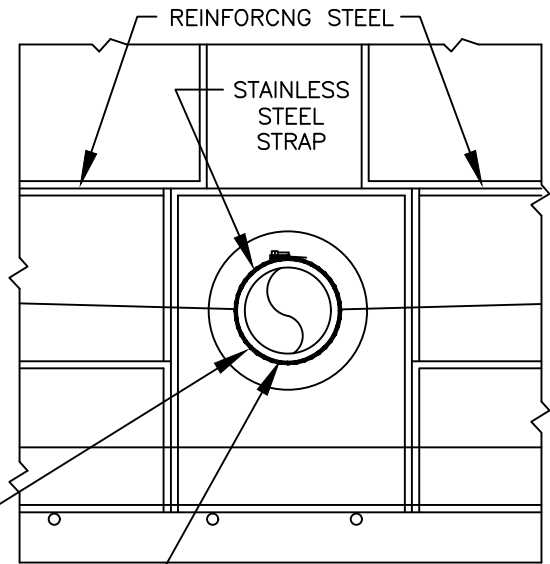


POURED CONCRETE OR GROUTED FINISH

FLOW LINE CHANNEL

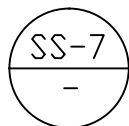


SECTION



ELEVATION

DETAIL A



FLOW LINE CHANNELS

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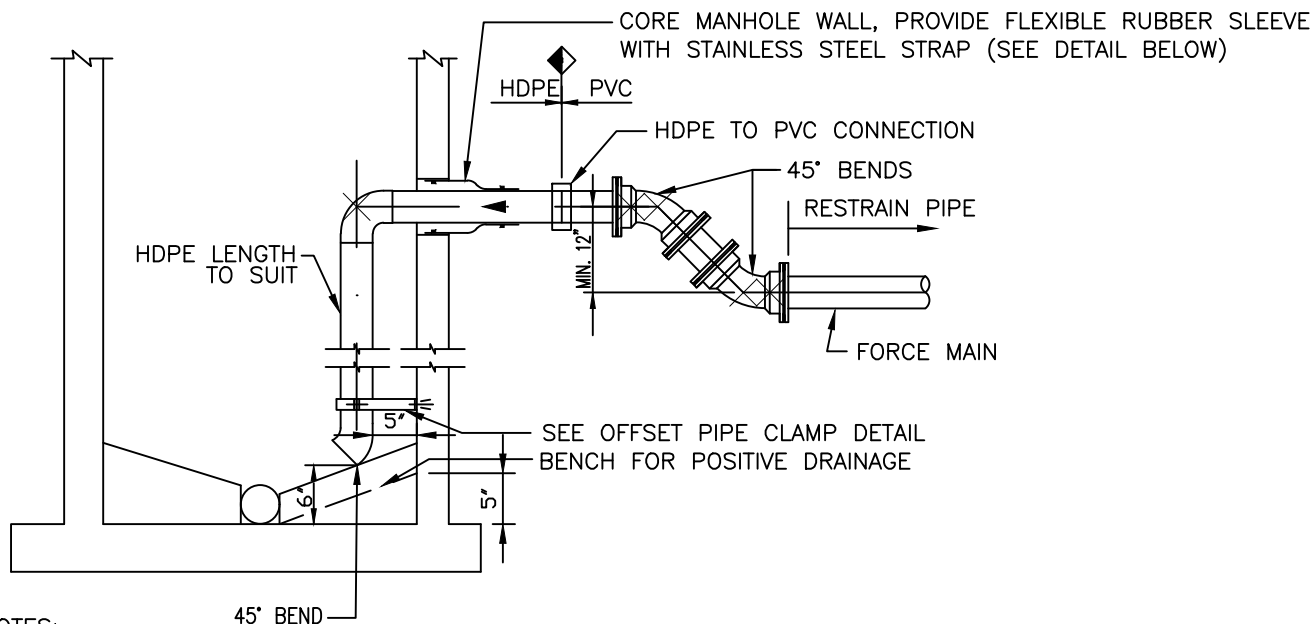
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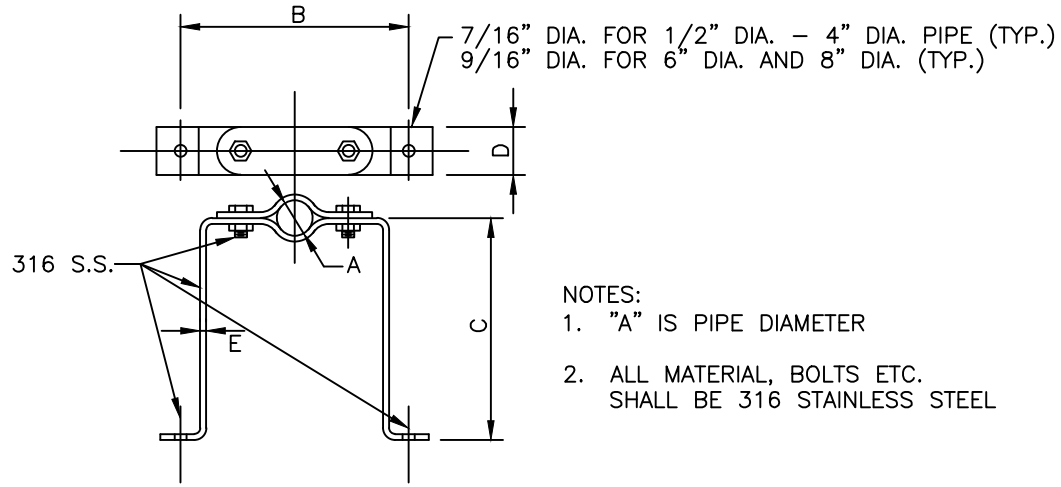
DATE: MAY 2023

DWG #: SS-7.DWG



NOTES:

1. ALL PIPE INSIDE THE MANHOLE WILL BE HDPE OR PVC
2. RESTRAIN PIPE PER RESTRAINT JOINT SCHEDULE DETAIL.
3. COAT INTERIOR OF MANHOLE WITH APPROVED COATING SYSTEM
4. SEE MANHOLE DETAILS FOR ADDITIONAL INFORMATION



NOTES:

1. "A" IS PIPE DIAMETER
2. ALL MATERIAL, BOLTS ETC. SHALL BE 316 STAINLESS STEEL

DIM.	PIPE SIZE			
A	1/2"-2"	2"-4"	4"-6"	8"
B	6 1/4"	10"	14"	19"
C	5"+B/2	5"+B/2	5"+A/2	5"+A/2
D	1 1/4"	2"	3"	3"
E	3/16"	5/16"	3/8"	3/4"
C/C SPACING	4'-0"	6'-0"	8'-0"	8'-0"

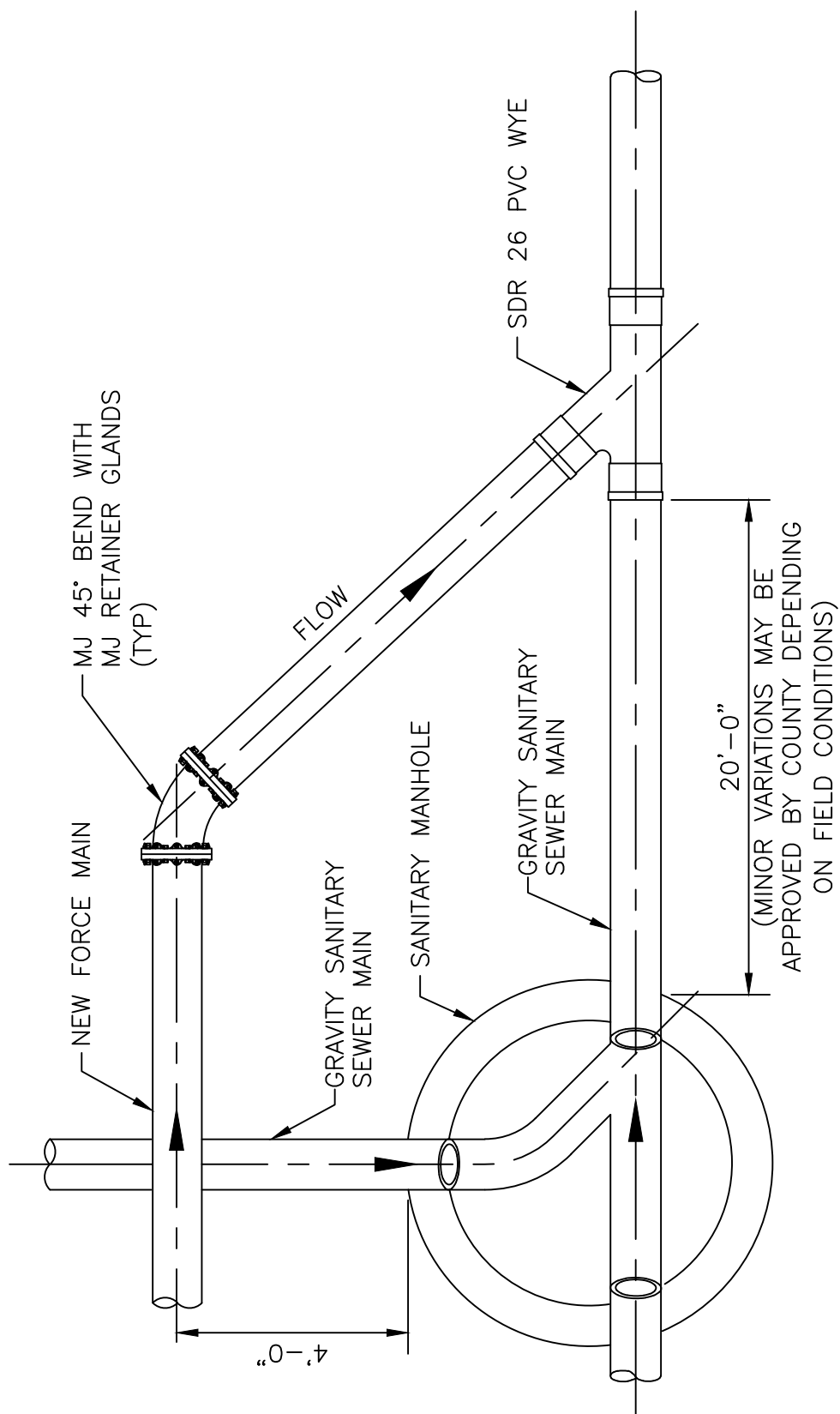
OFFSET PIPE CLAMP DETAIL

SS-8
-

FORCE MAIN CONNECTION TO MANHOLE WITH INSIDE DROP

NOT TO SCALE

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	DATE: MAY 2023
	DWG #: SS-8.DWG

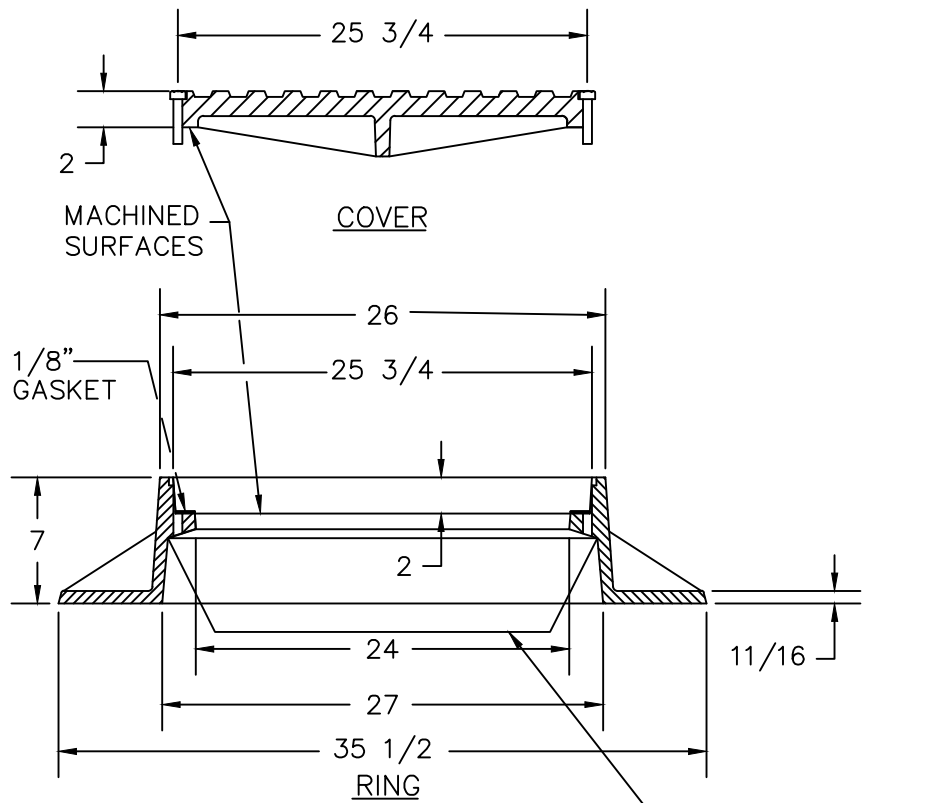


SS-9
-

FORCE MAIN CONNECTION TO GRAVITY SANITARY SEWER

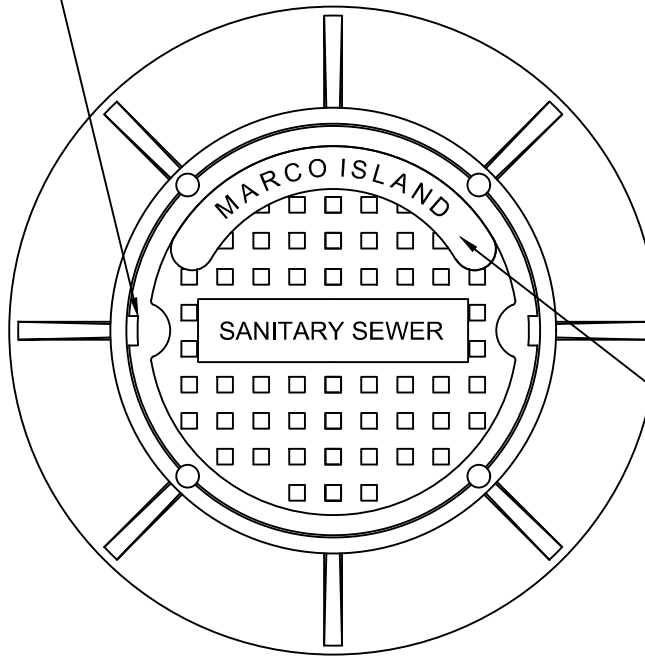
NOT TO SCALE

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	DWG #: SS-9.DWG



2 NON PENETRATING PICKHOLES

INFILTRATION DISK
SEE APPROVED
PRODUCT LIST

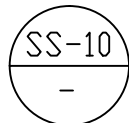


SPECIFY LETTERING
AS "MARCO ISLAND"
OR LEAVE BLANK IF
PRIVATELY OWNED

PLAN

NOTES:

1. USF 227 RING AND AS-1 COVER.
2. GREY CAST IRON ASTM - A48 CLASS 35B ASHTO M306.
3. SEE MANHOLE DETAILS FOR ADDITIONAL INFORMATION.



MANHOLE RING & COVER

NOT TO SCALE

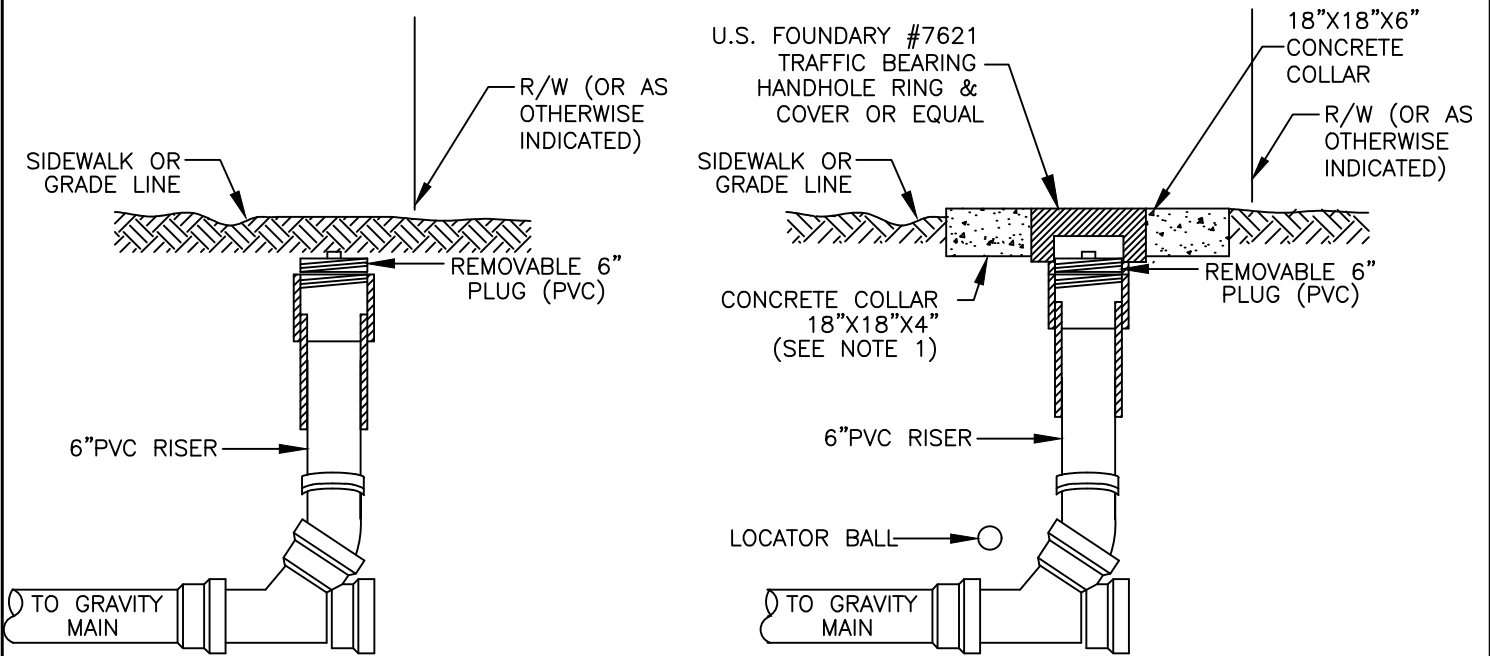
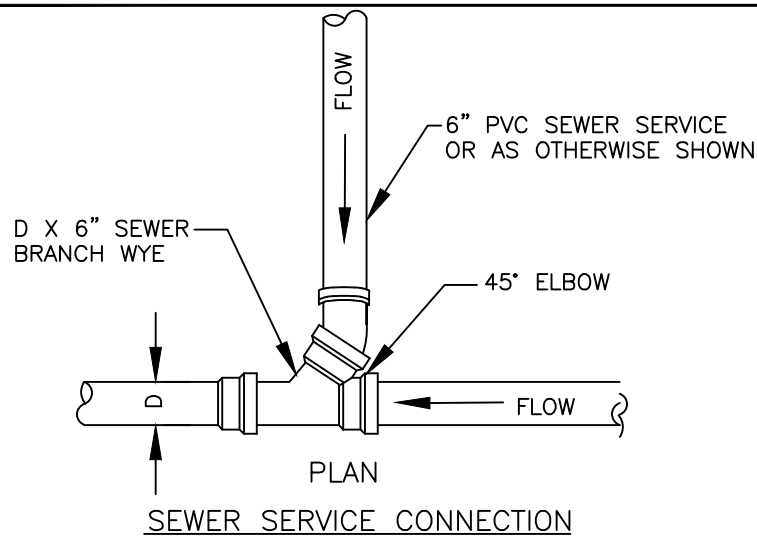
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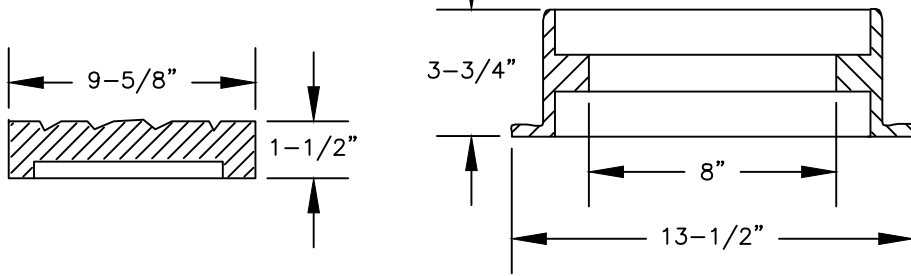
DATE: MAY 2023

DWG #: SS-10.DWG

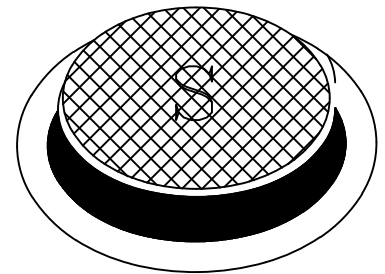


OCCUPIED & VACANT LOT SERVICE
 PROVIDE COPY AT
 VACANT LOTS

SERVICE AT HARD PAVEMENT LOCATIONS
 (SIDEWALKS, DRIVEWAYS ETC.)



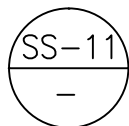
HANDHOLE RING & COVER



COVERS MARKED WITH "S"

NOTES:

1. FURNISH AND INSTALL SMART PLUG IN EACH CLEANOUT ASSEMBLY. SEE APPROVED PRODUCT LIST.
2. CONCRETE COLLAR TO BE INSTALLED AT HARD PAVEMENT AREAS ONLY (SIDEWALKS, DRIVEWAYS ETC.) AS DIRECTED BY OWNER.



CLEANOUT ASSEMBLY

NOT TO SCALE

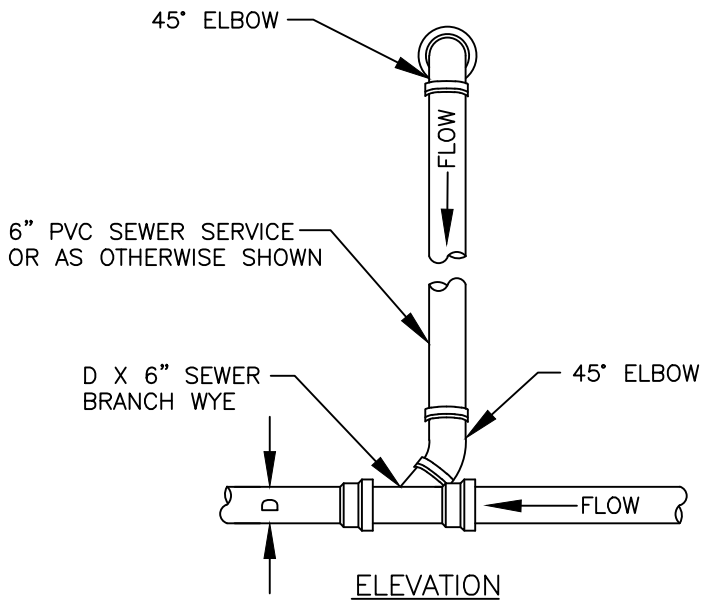
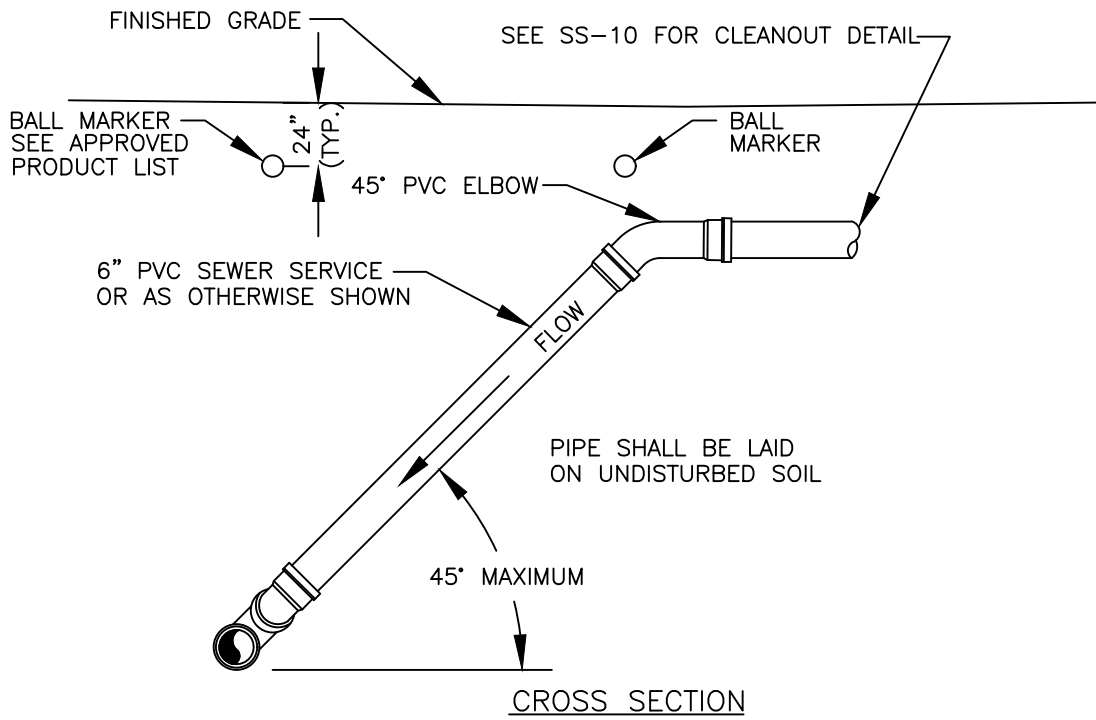
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DATE: MAY 2023

DWG #: SS-11.DWG



SS-12
-

SEWER CONNECTION FOR DEPTHS OVER 8 FEET

NOT TO SCALE

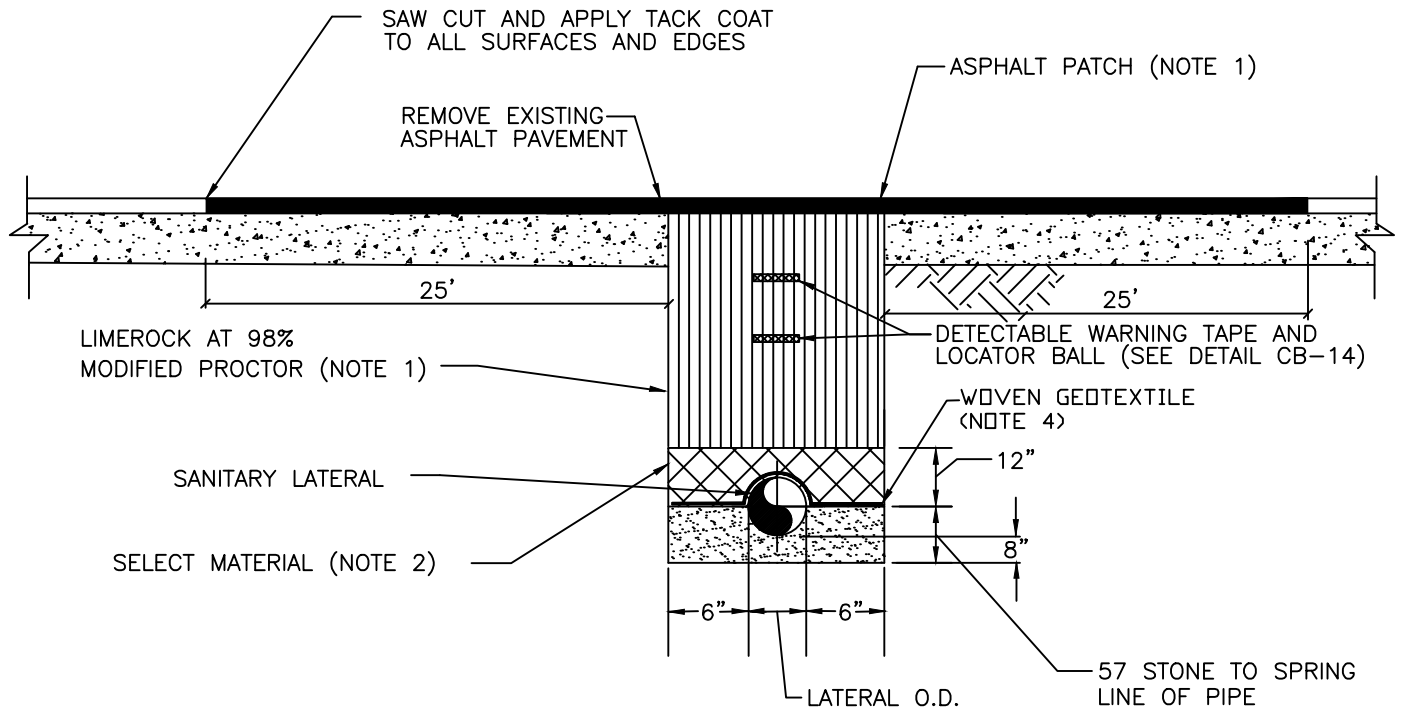
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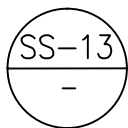
DATE: MAY 2023

DWG #: SS-12.DWG



NOTES:

1. IN LIEU OF LIMEROCK AND ASPHALT CONCRETE FOR TRENCH BASE RESTORATION, ONE OF THE FOLLOWING TWO OPTIONS MAY BE SELECTED: (1) PROVIDE 12 INCHES MINIMUM THICKNESS OF EXCAVATABLE FLOWABLE FILL PER FDOT SECTION 121 OR (2) PROVIDE 6 INCHES MINIMUM OF TYPE ABC-3, BASE COURSE ASPHALT CONCRETE, PER FDOT SECTION 331. SELECT ONE OF THE TWO OPTIONS FOR USE THROUGHOUT THE ENTIRE PROJECT.
2. COMPACTED GRANULAR SELECT MATERIAL FREE OF ROCKS, CLAY, AND ORGANIC MATERIAL. MATERIAL SHALL PASS THROUGH A 3/8" SIEVE.
3. IN UNPAVED AREAS, CONSTRUCT BACKFILL TO BOTTOM OF SOD. INSTALL SOD IN AREAS DISTURBED BY CONSTRUCTION. MATCH EXISTING GRADE.
4. INSTALL GEOTEXTILE IN PAVED AREAS ALONG THE ENTIRE LENGTH AND WIDTH OF TRENCH. MIRAFLI FW402 OR PRE-APPROVED EQUAL.



CUSTOMER SANITARY LATERAL TRENCH RESTORATION

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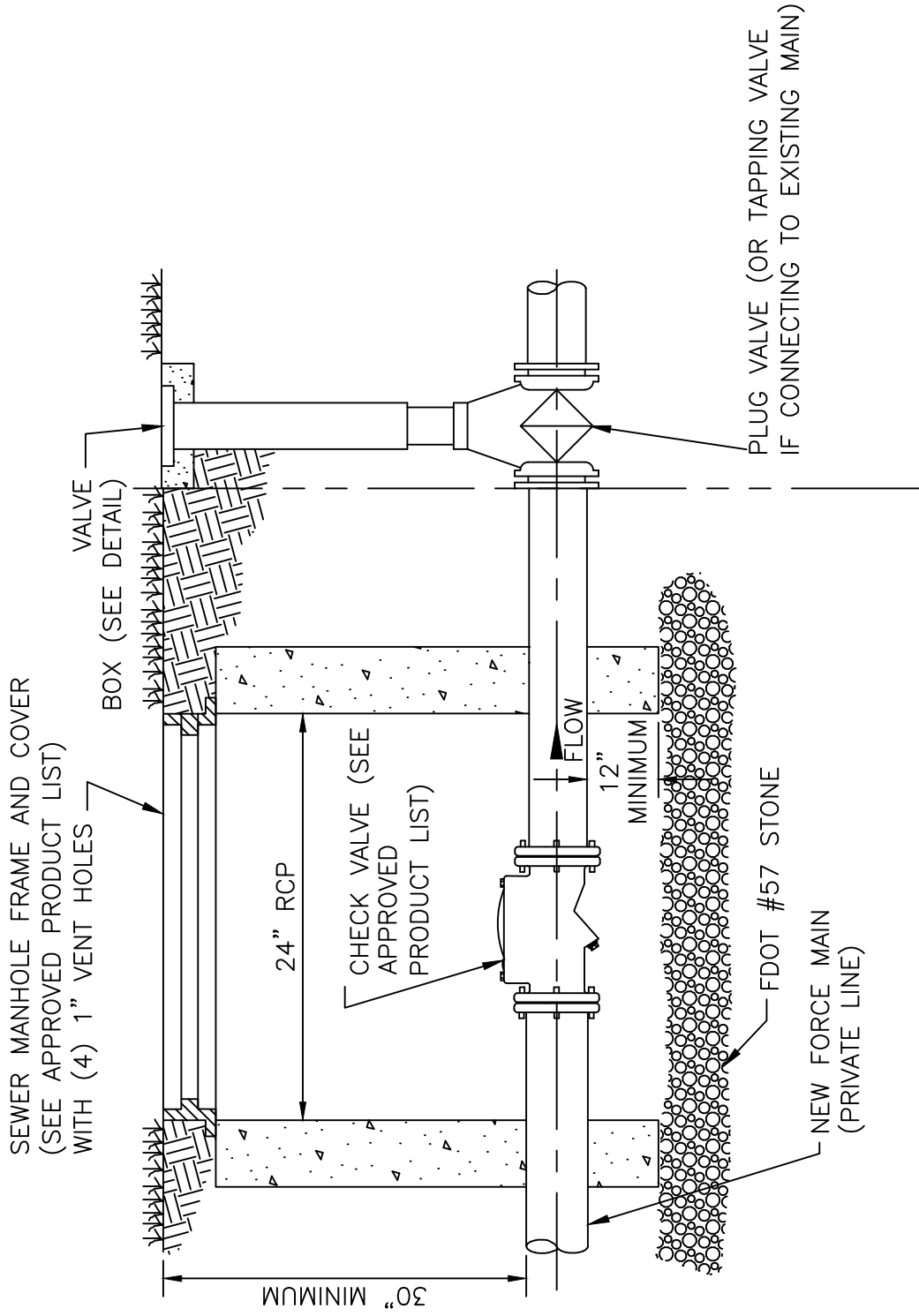
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DWG #: SS-13.DWG

PRIVATELY OWNED SITE

CITY RIGHT-OF-WAY



PRIVATE FORCE MAIN CONNECTION
TO CITY FORCE MAIN

SS-14

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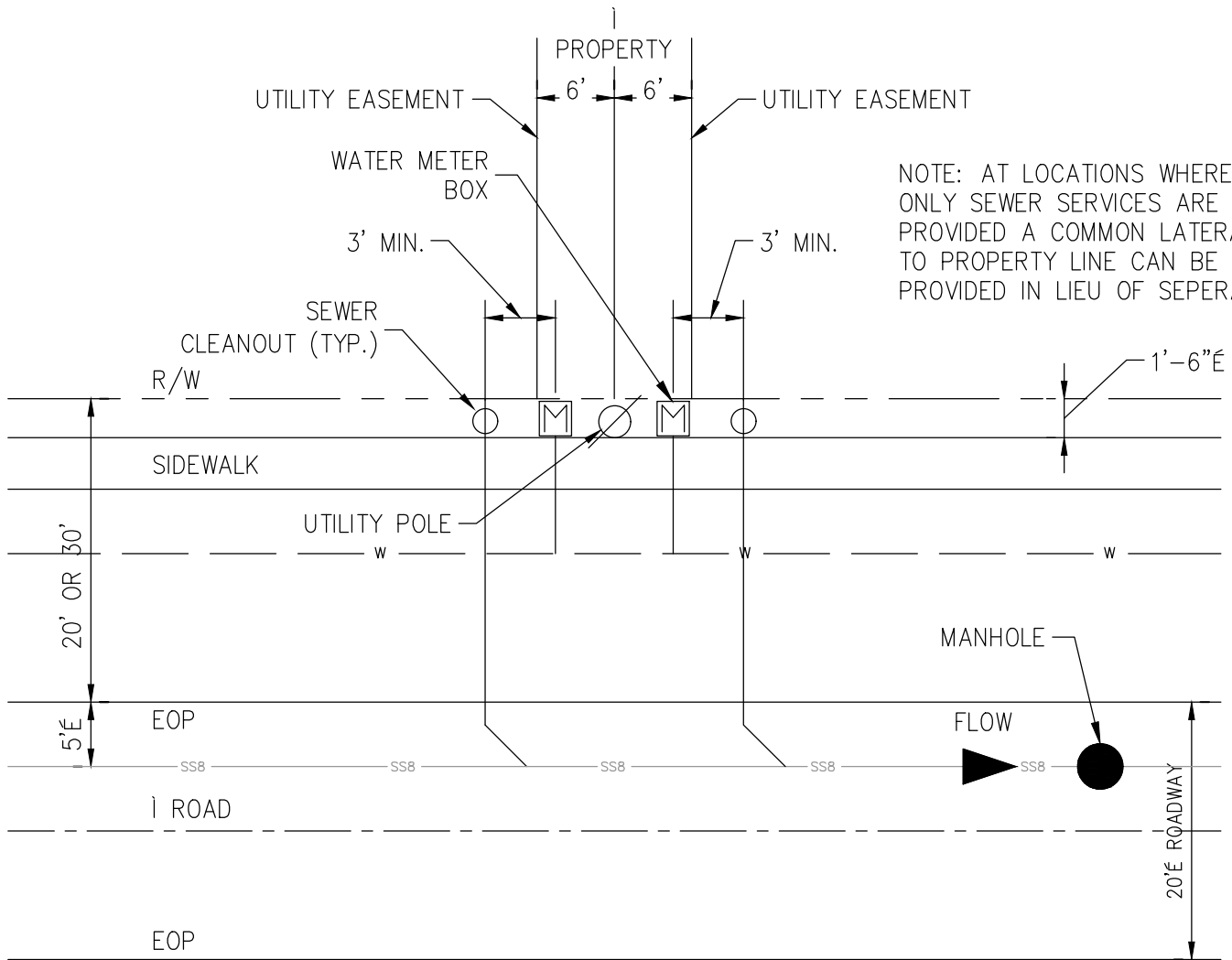
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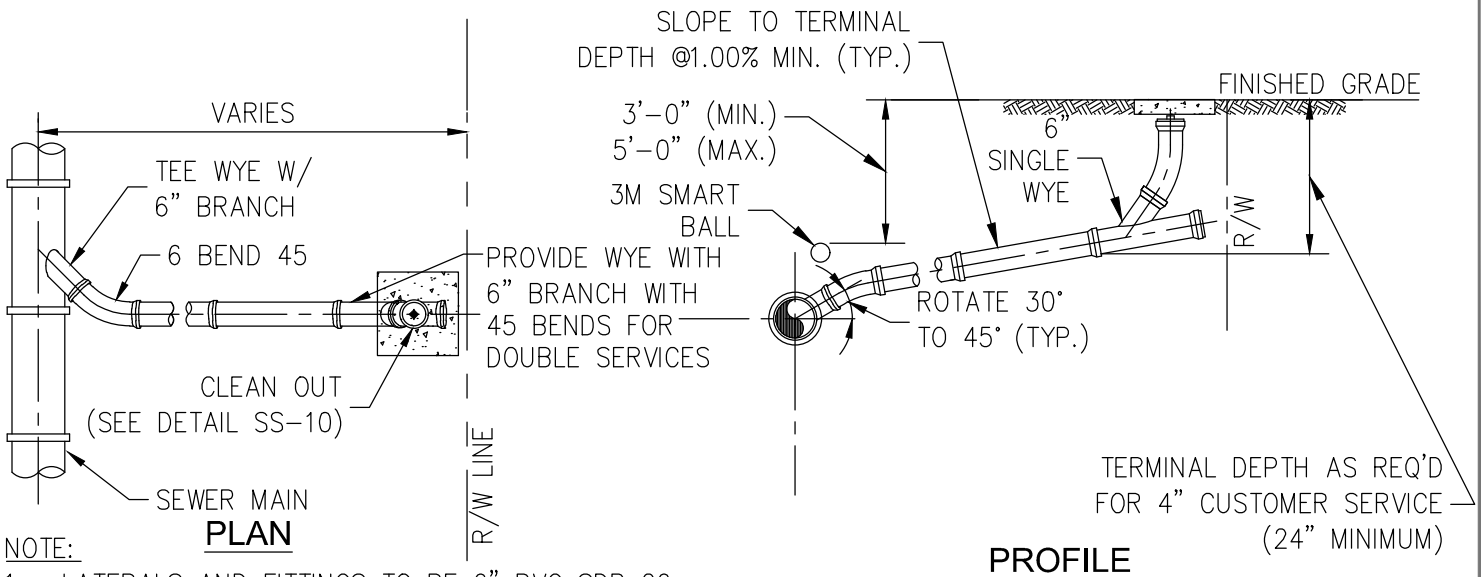
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DWG #: SS-14.DWG



NOTE: AT LOCATIONS WHERE ONLY SEWER SERVICES ARE PROVIDED A COMMON LATERAL TO PROPERTY LINE CAN BE PROVIDED IN LIEU OF SEPERATE



NOTE:

1. LATERALS AND FITTINGS TO BE 6" PVC SDR 26.
2. INSTALL METALLIC LOCATOR TAPE ABOVE ALL LATERALS IN ACCORDANCE WITH DETAIL CB-14.
3. PROVIDE CONSTRUCTION RECORD DRAWINGS SHOWING THE LOCATION OF LOCATOR BALLS, THE BAR CODE, AND STREET ADDRESS FOR LOT FOR WHICH THE LATERAL AND LOCATOR BALLS WERE INSTALLED.



SINGLE SEWER SERVICE CONNECTION

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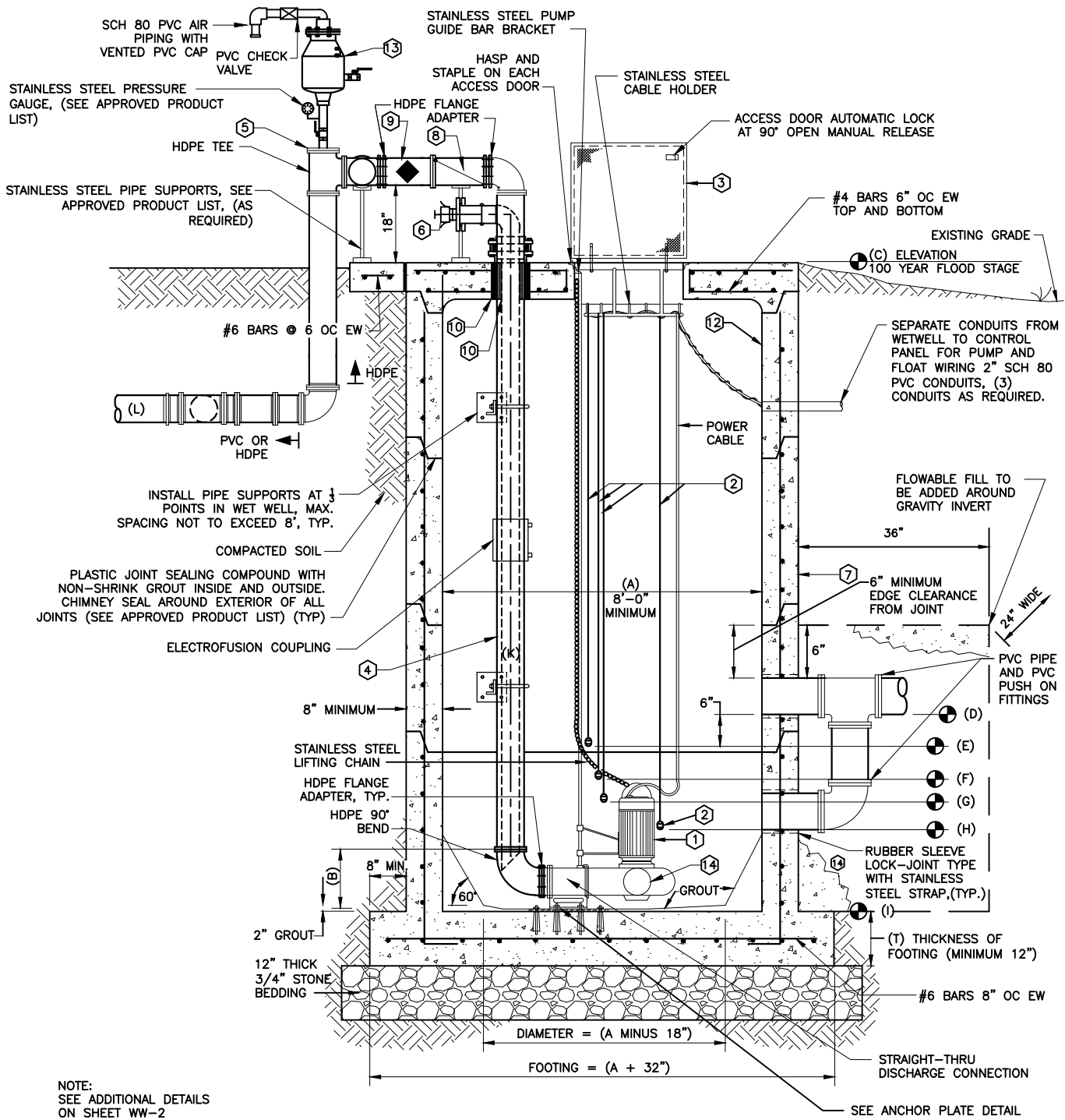
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DATE: MAY 2023

DWG #: SS-15.DWG



NOTE:
SEE ADDITIONAL DETAILS
ON SHEET WW-2

WW-1
—

 PUMP STATION DETAIL — PROFILE
 NOT TO SCALE

MARCO ISLAND UTILITIES	SCALE: NOT TO SCALE
960 North Collier Blvd. MARCO ISLAND, FL 34145	DATE: MAY 2023
	DWG #: WW-1.DWG

DIMENSION
TABLE

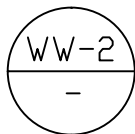
(A)	WETWELL INSIDE DIAMETER	
(B)	DISTANCE B/W WETWELL FLOOR AND TOP OF DISCH. CONNECTION	
(C)	TOP OF WETWELL ELEVATION	
(D)	INFLUENT PIPE ELEV.	
(E)	HIGH WATER ALARM ELEV.	
(F)	LAG PUMP ON ELEV.	
(G)	LEAD PUMP ON ELEVATION	
(H)	ALL PUMPS OFF ELEVATION*	
(I)	TOP OF WETWELL FOOTING	
(K)	DIAMETER OF DISCHARGE RISER	
(L)	DIAMETER OF DISCHARGE FORCE MAIN	
(T)	THICKNESS OF FOOTING (MINIMUM 12")	

*SET ELEVATION H SO THAT THE MINIMUM SUBMERGENCE OF THE PUMPS IS 18", OR THE DEPTH RECOMMENDED BY THE MANUFACTURER, WHICHEVER IS GREATER

MARK

NOTES

- ① DUPLEX ____ INCH DISCHARGE SUBMERSIBLE SEWAGE PUMPS EQUIPPED WITH 230/460 VOLT OR 480 VOLT MOTORS. EACH PUMP SHALL HAVE THE CAPACITY AND RANGE SET FORTH ON THIS SHEET AS THE "REQUIRED PUMP PERFORMANCE CURVE". VERIFY PUMP LOCAL VOLTAGE PRIOR TO PLACEMENT OF PUMP ORDER.
 - ② LIQUID LEVEL REGULATORS (SEE APPROVED PRODUCT LIST), EACH PROVIDED WITH 60 FEET OF ELECTRICAL CABLE.
 - ③ ACCESS DOOR (SEE APPROVED PRODUCT LIST) WITH HINGED AND HASP EQUIPPED COVER, TWO UPPER GUIDE HOLDERS, CHAIN HOLDERS AND CABLE HOLDERS.
 - ④ ALL PIPING IN THE WET WELL AND ABOVE GRADE SHALL BE HDPE. ALL HDPE FITTINGS SHALL BE MOLDED. CONNECTIONS TO FLANGED PIPING, VALVES, AND FITTINGS SHALL BE MADE WITH HDPE FLANGE ADAPTERS WITH STAINLESS STEEL BOLTING RINGS AND BOLTS.
 - ⑤ TAPPED STAINLESS STEEL BLIND FLANGE OR COMPANION FLANGE FOR ARV CONNECTION. PROVIDE STAINLESS STEEL BALL VALVE AND STAINLESS STEEL PIPE NIPPLES TO CONNECT TO ARV.
 - ⑥ COMBINATION SUCTION PIPE AND WETWELL VENT WITH 4" STAINLESS STEEL QUICK CONNECT COUPLING UNIT WITH 2-HANDLE STAINLESS STEEL LOCKING CAP. SEE DETAIL. SUCTION PIPE TO BE SET 1' ABOVE WETWELL BOTTOM.
 - ⑦ WETWELL, REINFORCED CONCRETE PIPE CONFORMING TO TABLE II, WALL B OF ASTM C-76. O-RING JOINTS SHALL CONFORM TO ASTM C-443 WETWELL CONSTRUCTION. SEE APPROVED PRODUCT LIST FOR EXTERIOR COATING.
 - ⑧ CHECK VALVE, (K") (SEE APPROVED PRODUCT LIST).
 - ⑨ PLUG VALVE (SEE APPROVED PRODUCT LIST), (K") COMPLETE WITH WRENCH.
 - ⑩ STAINLESS STEEL WALL PENETRATION ASSEMBLY, BLACK, SEE DETAIL. ALL PENETRATIONS SHALL BE CORED IN THE FIELD.
 - ⑪ 4" STAINLESS STEEL QUICK-COUPLING UNIT COMPLETE WITH 2-HANDLE STAINLESS STEEL LOCKING CAP.
 - ⑫ INTERIOR SHALL HAVE INTERNAL PROTECTION (SEE APPROVED PRODUCT LIST).
 - ⑬ 2" AIR RELEASE VALVE EQUIPPED WITH ONE WAY CHECK VALVE (SEE APPROVED PRODUCT LIST) MOUNTED ON 2" SCH 40 316 STAINLESS STEEL PIPING.
 - ⑭ VOLUTE PORT WITH BOLTED COVER FOR FUTURE MIX FLUSH SYSTEM (ONE PUMP ONLY).
- NOTE: ALL STAINLESS STEEL SHALL BE SERIES 316



PUMP STATION NOTES

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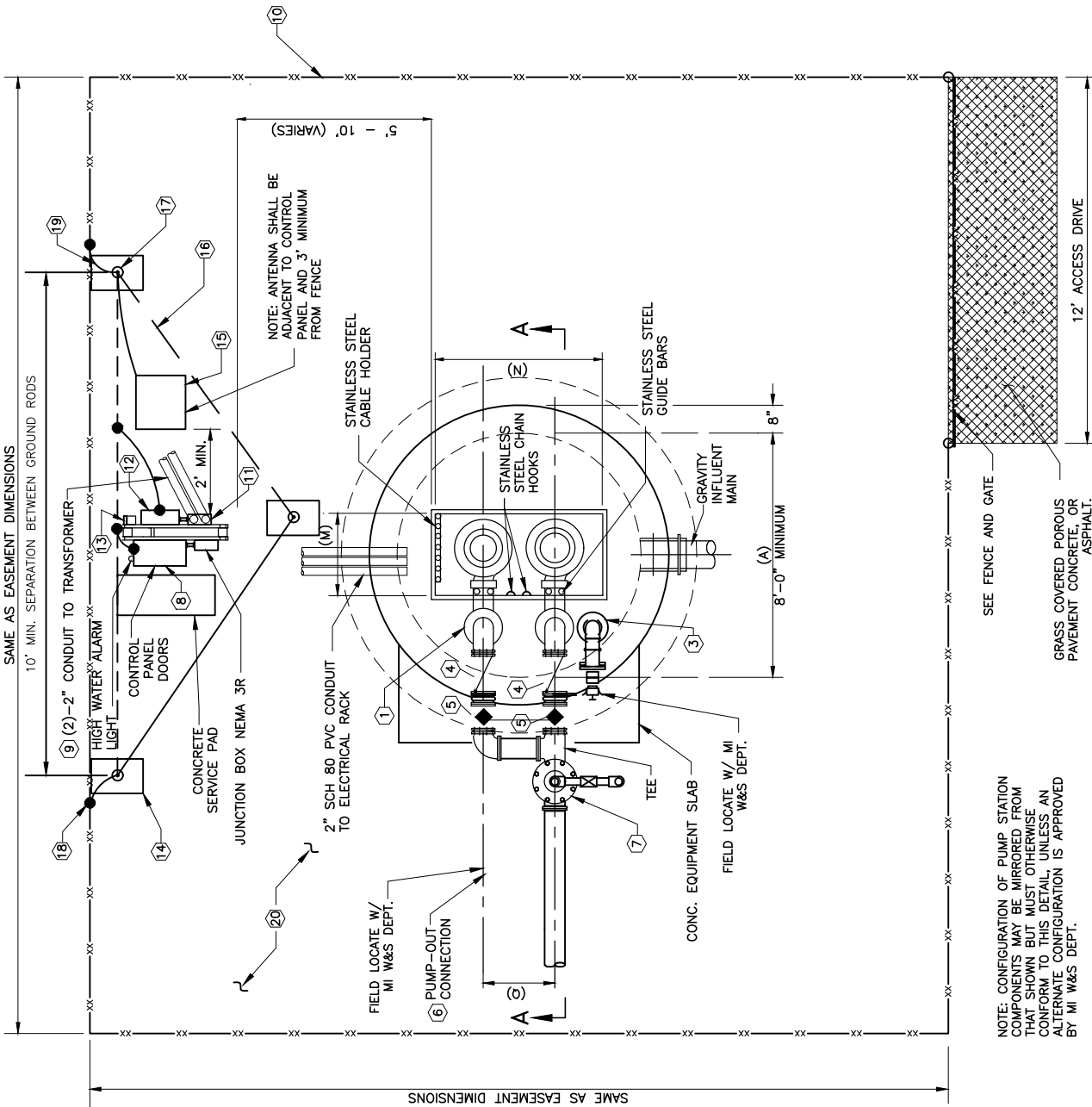
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DATE: MAY 2023

DWG #: WW-2.DWG

EQUIPMENT SPECIFICATIONS

- MARK
- 1 ALL PIPING IN THE WET WELL AND ABOVE GRADE SHALL BE HDPE. ALL HDPE FITTINGS SHALL BE MOLDED. CONNECTIONS TO FLANGED PIPING, VALVES, AND FITTINGS SHALL BE MADE WITH HDPE FLANGE ADAPTERS WITH STAINLESS STEEL BOLTING RINGS AND BOLTS.
 - 2 TAPPED STAINLESS STEEL BLIND FLANGE OR COMPANION FLANGE FOR ARV CONNECTION. PROVIDE STAINLESS STEEL BALL VALVE AND PIPE NIPPLES TO CONNECT TO ARV.
 - 3 COMBINATION SUCTION PIPE AND WETWELL VENT WITH 4" STAINLESS STEEL QUICK-CONNECT COUPLING UNIT WITH 2-HANDLE STAINLESS STEEL LOCKING CAP. SEE DETAIL.
 - 4 CHECK VALVE, (K") (SEE APPROVED PRODUCT LIST)
 - 5 PLUG VALVE (SEE APPROVED PRODUCT LIST), COMPLETE WITH WRENCH
 - 6 4" QUICK-COUPING UNIT COMPLETE WITH 2-HANDLE STAINLESS STEEL LOCKING CAP.
 - 7 2" AIR RELEASE VALVE EQUIPPED WITH ONE WAY CHECK VALVE (SEE APPROVED PRODUCT LIST) MOUNTED ON 2" STAINLESS STEEL PIPING.
 - 8 PUMP CONTROL PANEL: SEE SPECIFICATIONS AND DETAIL.
 - 9 ALL ELECTRICAL SERVICE TRANSFORMERS SHALL BE INSTALLED OUTSIDE OF PUMP STATION FENCE LINE
 - 10 6" HIGH CHAIN LINK FENCE AS PER CITY STANDARDS. FENCE SHALL HAVE GREEN SLATS TO SCREEN PUMP STATION FROM VIEW.
 - 11 POWER METER
 - 12 SERVICE ENTRANCE RATED CIRCUIT BREAKER DISCONNECT WITH PADLOCKABLE HINGE
 - 13 GENERATOR RECEPTACLE TO BE FIELD LOCATED W/ MI W&S DEPT. SEE DETAIL.
 - 14 SEE GROUND TEST WELL DETAIL FOR ADDITIONAL REQUIREMENTS (TYP.)
 - 15 TELEMETRY ANTENNA. SEE DETAIL. PROVIDE ANTENNA LIGHTNING ROD CABLETY AND DOWN CONDUCTOR PER DETAIL. ROUTE LIGHTNING ROD DOWN CONDUCTOR TO GROUND ROD AT BOTTOM OF TOWER. BOND GROUND ROD TO STATION GROUND MAT.
 - 16 #4/0 BARE COPPER. SEE GROUND MAT DETAIL FOR ADDITIONAL REQUIREMENTS (TYP.)
 - 17 3/4" X 20' COPPER-CLAD GROUND ROD (TYP.)
 - 18 EXOTHERMICALLY WELDED CONNECTION (TYP.)
 - 19 #2 SOLID TINNED COPPER JUMPER (TYP.)
 - 20 GROUND SURFACE WITHIN PUMP STATION FENCE SHALL CONSIST OF <1" DIA STONE, 4" THICK, WITH GEOTEXTILE FILTER FABRIC

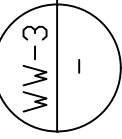


NOTE: CONFIGURATION OF PUMP STATION COMPONENTS MAY BE MIRRORED FROM THAT SHOWN BUT MUST OTHERWISE CONFORM TO THIS DETAIL, UNLESS AN ALTERNATE CONFIGURATION IS APPROVED BY MI W&S DEPT.

DIMENSION TABLE

(A)	WETWELL INSIDE DIAMETER
(B)	WETWELL HATCH OPENING
(C)	WETWELL HATCH OPENING
(D)	SEPARATION OF DISCHARGE RISER PIPING

PUMP STATION DETAIL - PLAN



NOT TO SCALE

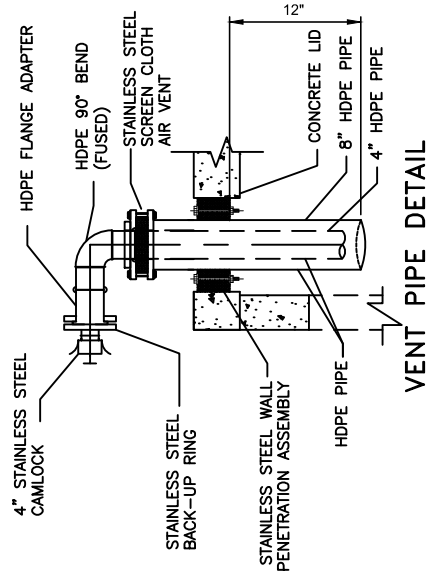
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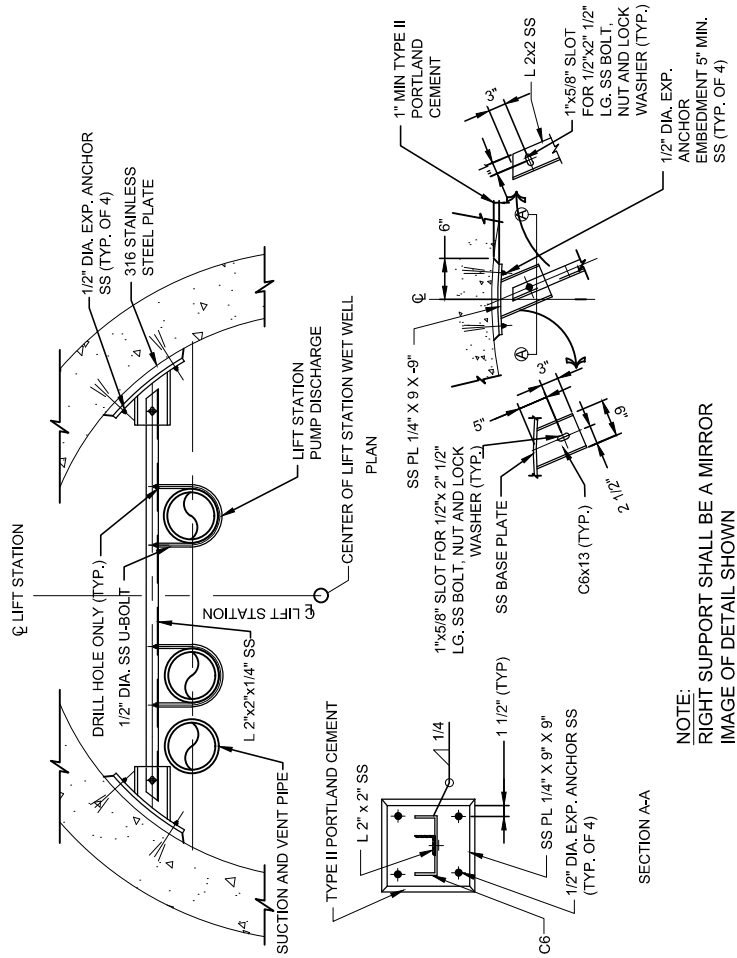
SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: WW-3.DWG

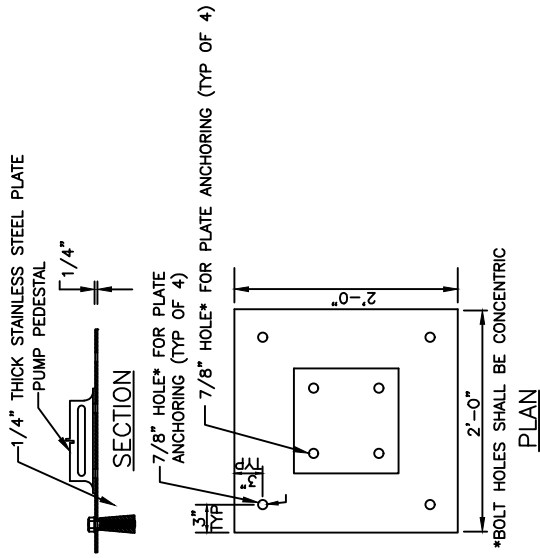


VENT PIPE DETAIL

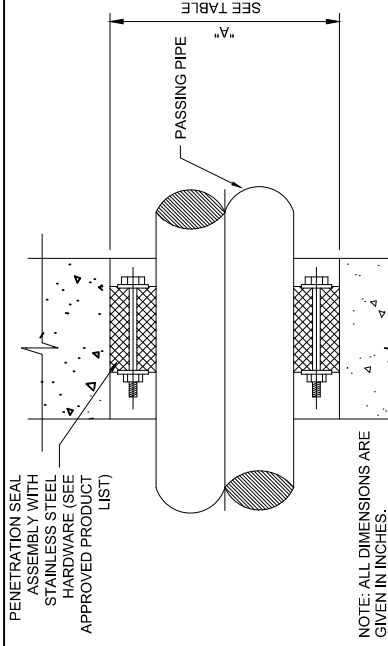


NOTE: RIGHT SUPPORT SHALL BE A MIRROR IMAGE OF DETAIL SHOWN

DISCHARGE PIPE SUPPORT DETAIL



ANCHOR PLATE DETAIL



PIPE SIZE	"A"	PIPE SIZE	"A"
2	4	14	18
4	8	16	20
6	10	18	24
8	12	20	26
10	14	24	28
12	16		

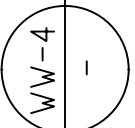
NOTE: VERIFY WITH PENETRATION SEAL USED

WALL PENETRATION DETAIL

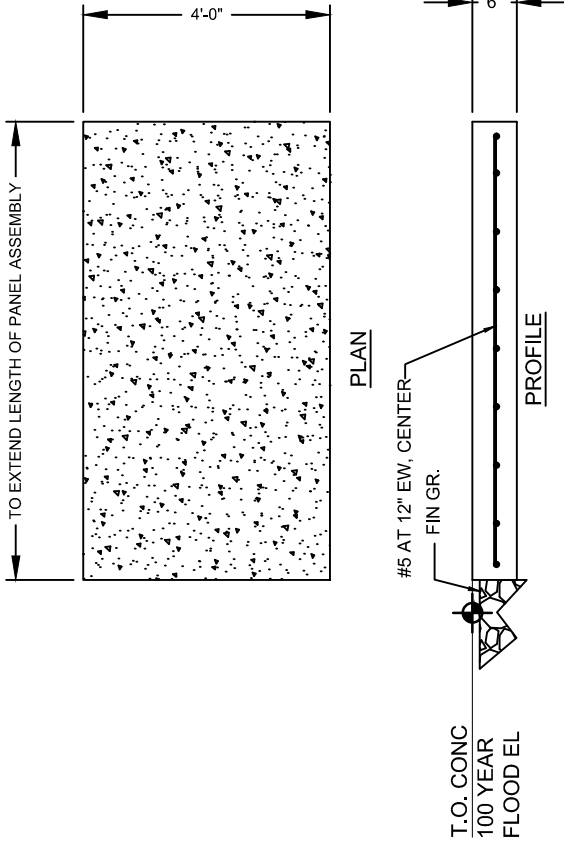
PUMP STATION AND WASTEWATER DETAILS

MARCO ISLAND UTILITIES
 960 North Collier Blvd.
 MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE
 DATE: MAY 2023
 DWG #: WW-4.DWG



NOT TO SCALE



PUMP CONTROL PANEL PAD (TYPICAL) -- N.T.S

STRUCTURAL NOTES:

1. ALL CONCRETE SHALL BE 4000 PSI MINIMUM COMPRESSIVE STRENGTH; W/C = 0.45, AIR CONTENT 6% (\pm) 1%; SLUMP = 4" BEFORE ADDING WATER REDUCING AGENT.
2. ALL STEEL SHALL BE ASTM A615, GR 60.
3. ALL DIMENSIONS SHOWN ARE TYPICAL ONLY. CONTRACTOR TO VERIFY OVERALL SLAB SIZE WITH EQUIPMENT MANUFACTURER AND ENGINEER PRIOR TO CONSTRUCTION.
4. ALL SLABS SHALL HAVE TOOLED EDGES ON ALL SIDES

WW-5

NOT TO SCALE

PUMP CONTROL PANEL PAD DETAILS

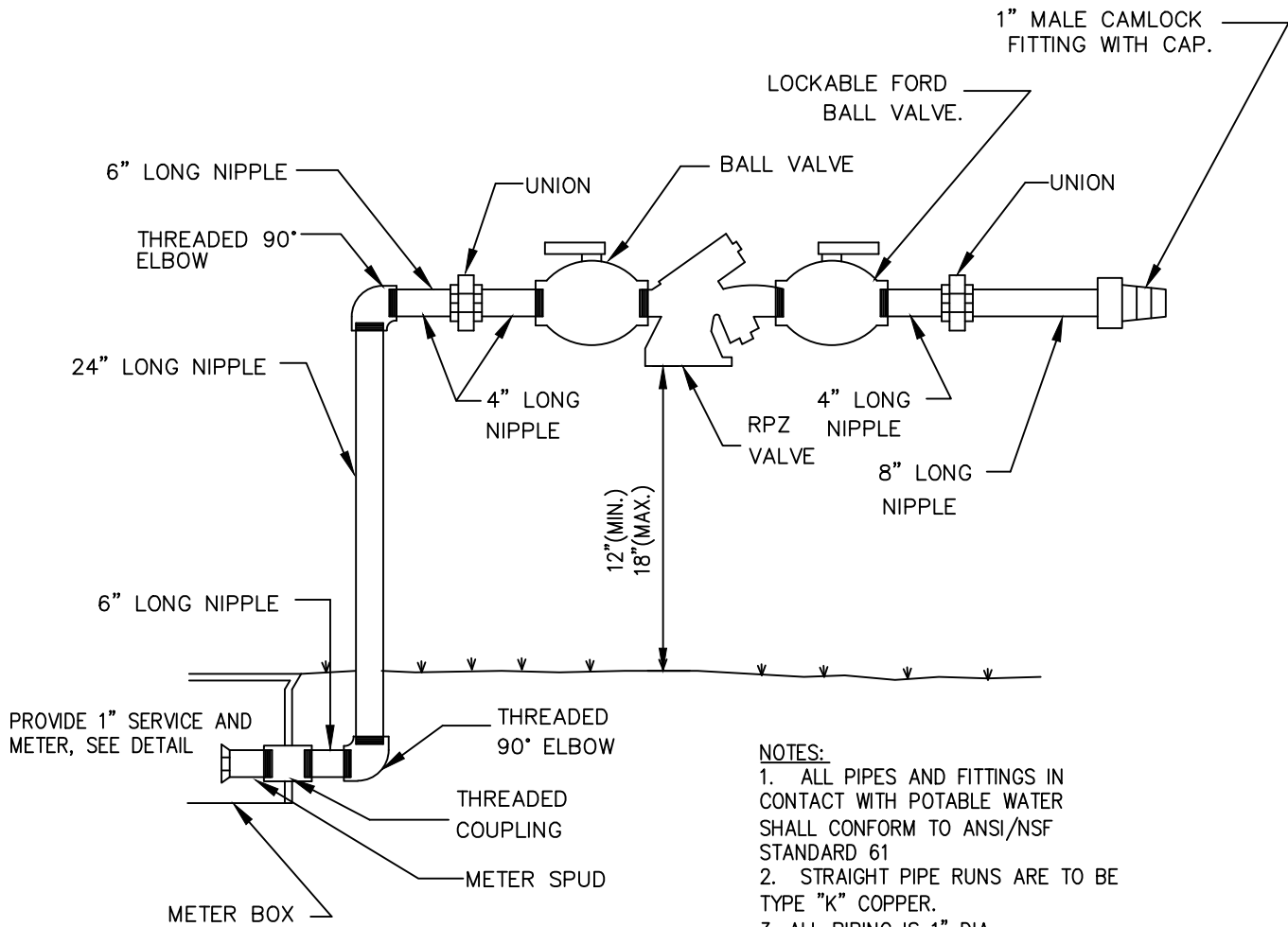
MARCO ISLAND UTILITIES

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MARCO ISLAND, FL 34145

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DATE: MAY 2023

DWG #: WW-5.DWG

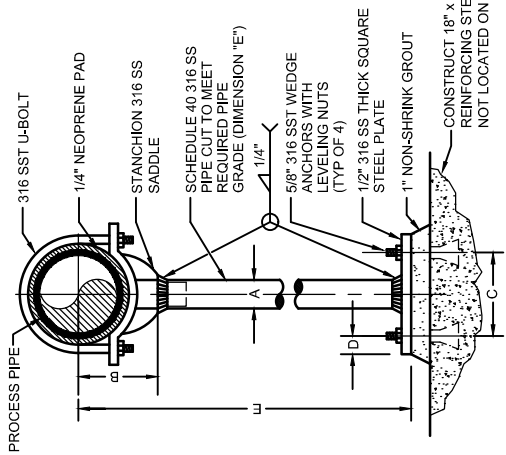


- NOTES:**
1. ALL PIPES AND FITTINGS IN CONTACT WITH POTABLE WATER SHALL CONFORM TO ANSI/NSF STANDARD 61
 2. STRAIGHT PIPE RUNS ARE TO BE TYPE "K" COPPER.
 3. ALL PIPING IS 1" DIA.

WW-6
 —

 LIFT STATION HOSE BIB
 NOT TO SCALE

MARCO ISLAND UTILITIES 960 North Collier Blvd. MARCO ISLAND, FL 34145	SCALE: NOT TO SCALE
	DATE: MAY 2023
	DWG #: WW-6.DWG



CONSTRUCT 18" x 18" x 6" CONC BASE WITH # 4 REINFORCING STEEL @ 5" OCEW IF SUPPORT IS NOT LOCATED ON AN EXISTING SLAB.

NOTES:

1. PIPE SUPPORT HEIGHT TO BE ADJUSTABLE.
2. SEE PLANS AND SECTIONS FOR PIPE GRADE REQUIREMENT (DIMENSION "E").
3. PIPE SUPPORT TO BE COMPATIBLE WITH HDPE PIPE.
4. ALL MATERIALS AND HARDWARE TO BE 316 SS.

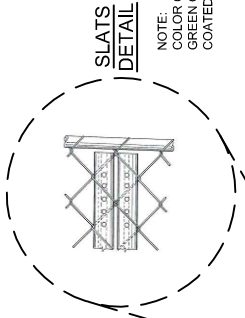
PIPE SUPPORT DETAIL

PIPE SIZE	A	B	C	D	E	
					MIN	MAX
4	3	4 3/16	7	1	18	30
5	3	4 13/16	7	1	18	30
6	3	5 7/16	7	1	18	30
8	3	6 15/16	7	1	18	30
10	3	8 7/16	7	1	18	30
12	3	9 15/16	7	1	18	30

* ALL DIMENSIONS IN INCHES.

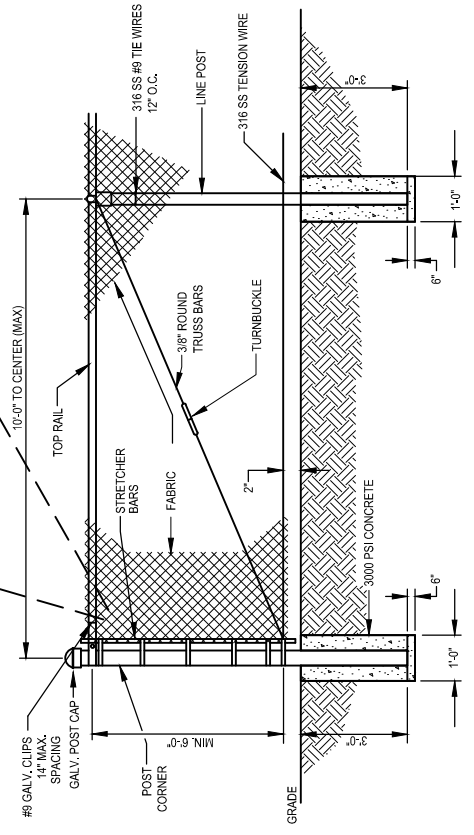
NOTES:

1. ALL FENCING COMPONENTS SHALL BE VINYL COATED GREEN OR BLACK AS APPLICABLE.

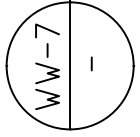


SLATS DETAIL

NOTE: COLOR OF THE SLATS SHALL BE GREEN OR BLACK TO MATCH VINYL COATED PARTS



CHAIN LINK FENCE DETAIL

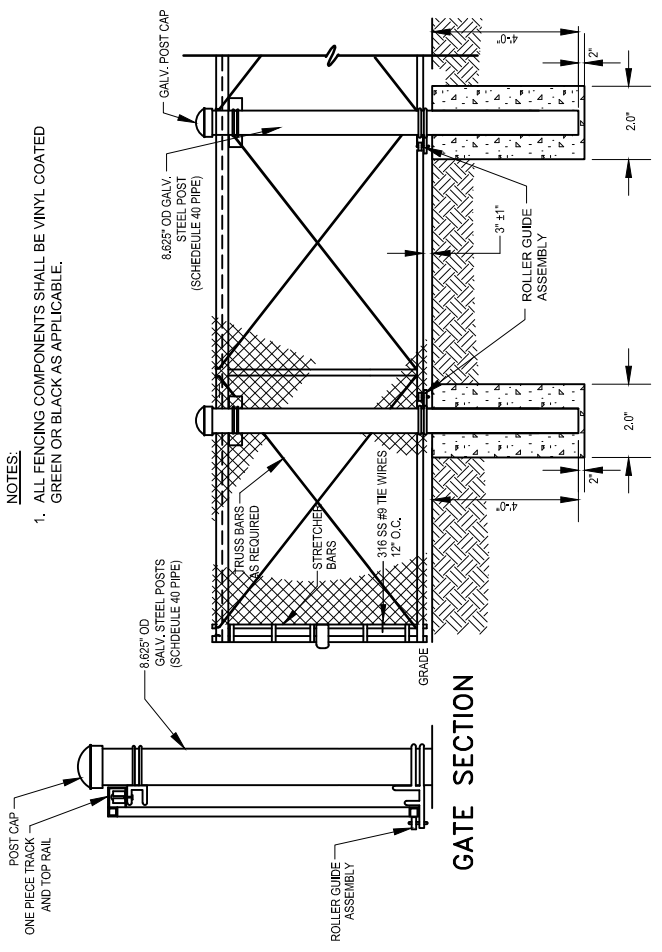


PUMP STATION AND WASTEWATER DETAILS

NOT TO SCALE

NOTES:

1. ALL FENCING COMPONENTS SHALL BE VINYL COATED GREEN OR BLACK AS APPLICABLE.



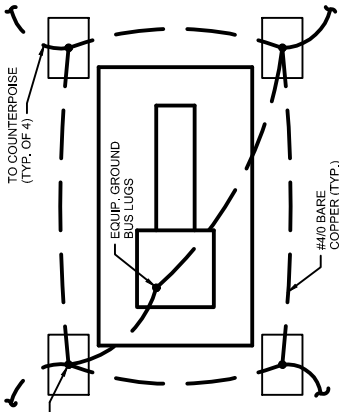
GATE SECTION

CHAIN LINK FENCE GATE DETAIL

MARCO ISLAND UTILITIES

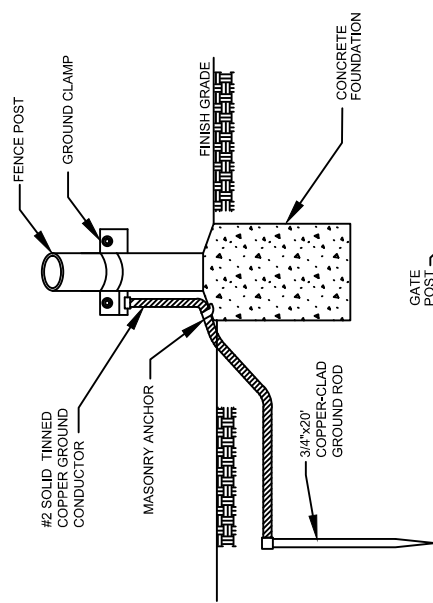
960 North Collier Blvd.
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SCALE:	NOT TO SCALE
DATE:	MAY 2023
DWG #:	WW-7.DWG

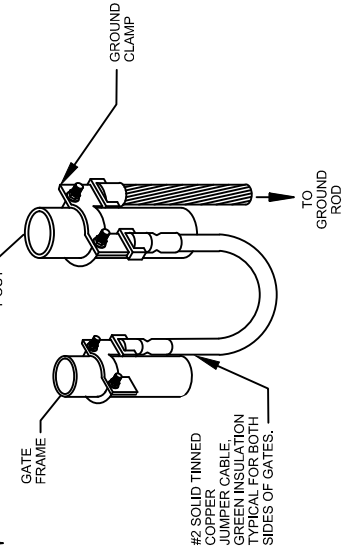


GROUND MAT DETAIL
NOT TO SCALE

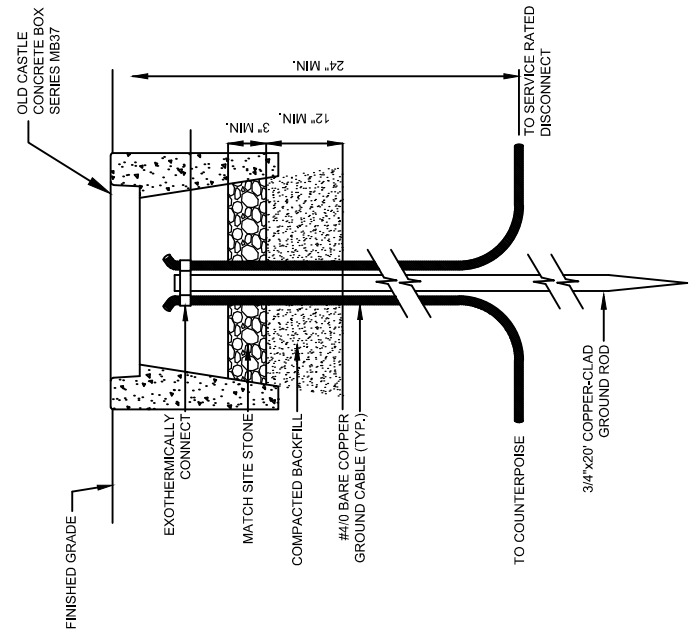
NOTES:
1. ADDITIONAL CONCENTRIC RINGS SHALL BE ADDED TO THE GROUND MAT TO PROVIDE THE SPECIFIED RESISTANCE. EACH RING TO HAVE FOUR (4) GROUND RODS MIN. AND SPACED TEN (10) FEET FROM THE INNER RING.



FENCE POST/GATE BONDING DETAIL
NOT TO SCALE



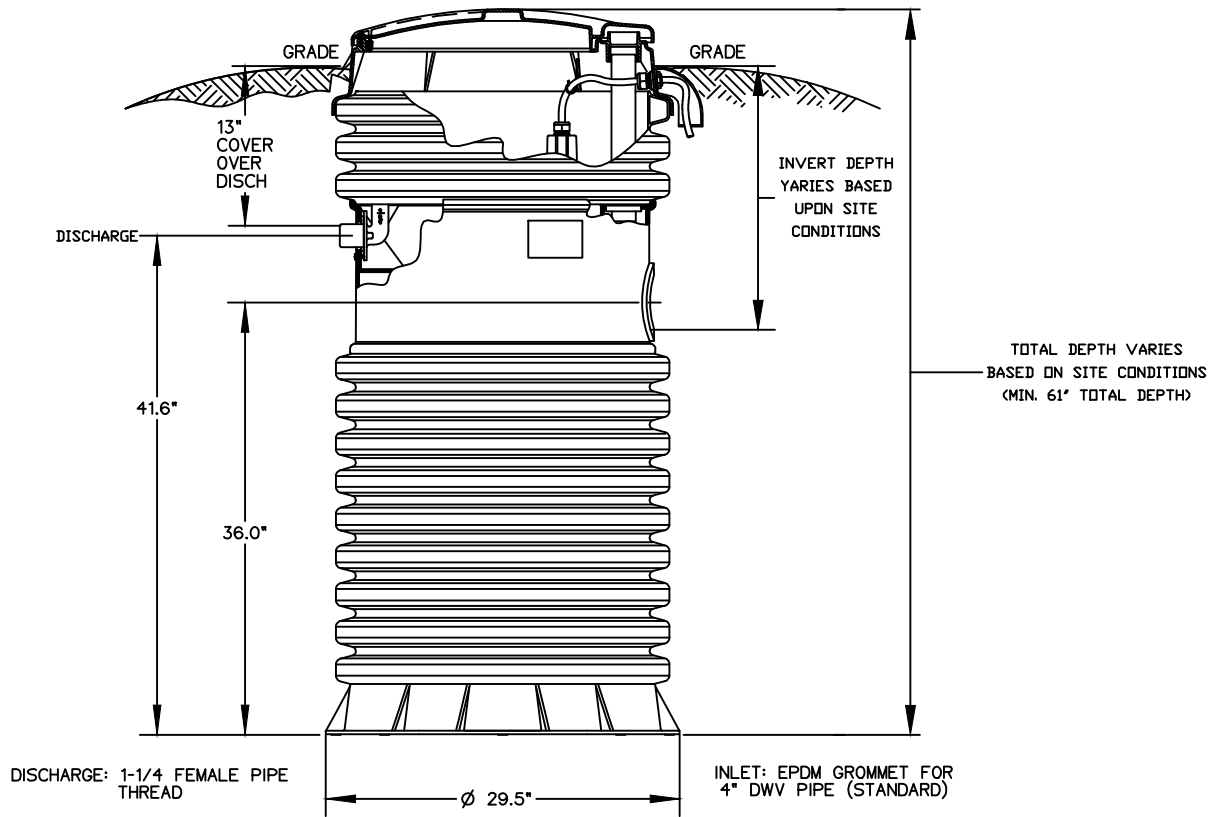
GROUND TEST WELL DETAIL
NOT TO SCALE



PUMP STATION LIGHTNING PROTECTION DETAILS

SCALE: NOT TO SCALE
DATE: MAY 2023
DWG #: WW-9.DWG

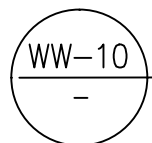
MARCO ISLAND UTILITIES
960 North Collier Blvd.
MARCO ISLAND, FL 34145



1. PUMP ASSEMBLY SHALL BE E-ONE MODEL DH071 OR DR071 (WIRED/WIRELESS CONTROLS). INSTALLATION SHALL BE BY PROPERTY OWNER/DEVELOPER.

2. CONCRETE BALLAST MAY BE REQUIRED SEE INSTALLATION INSTRUCTIONS FOR DETAILS.

3. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



KEY MARCO PUMP STATION DETAIL

NOT TO SCALE

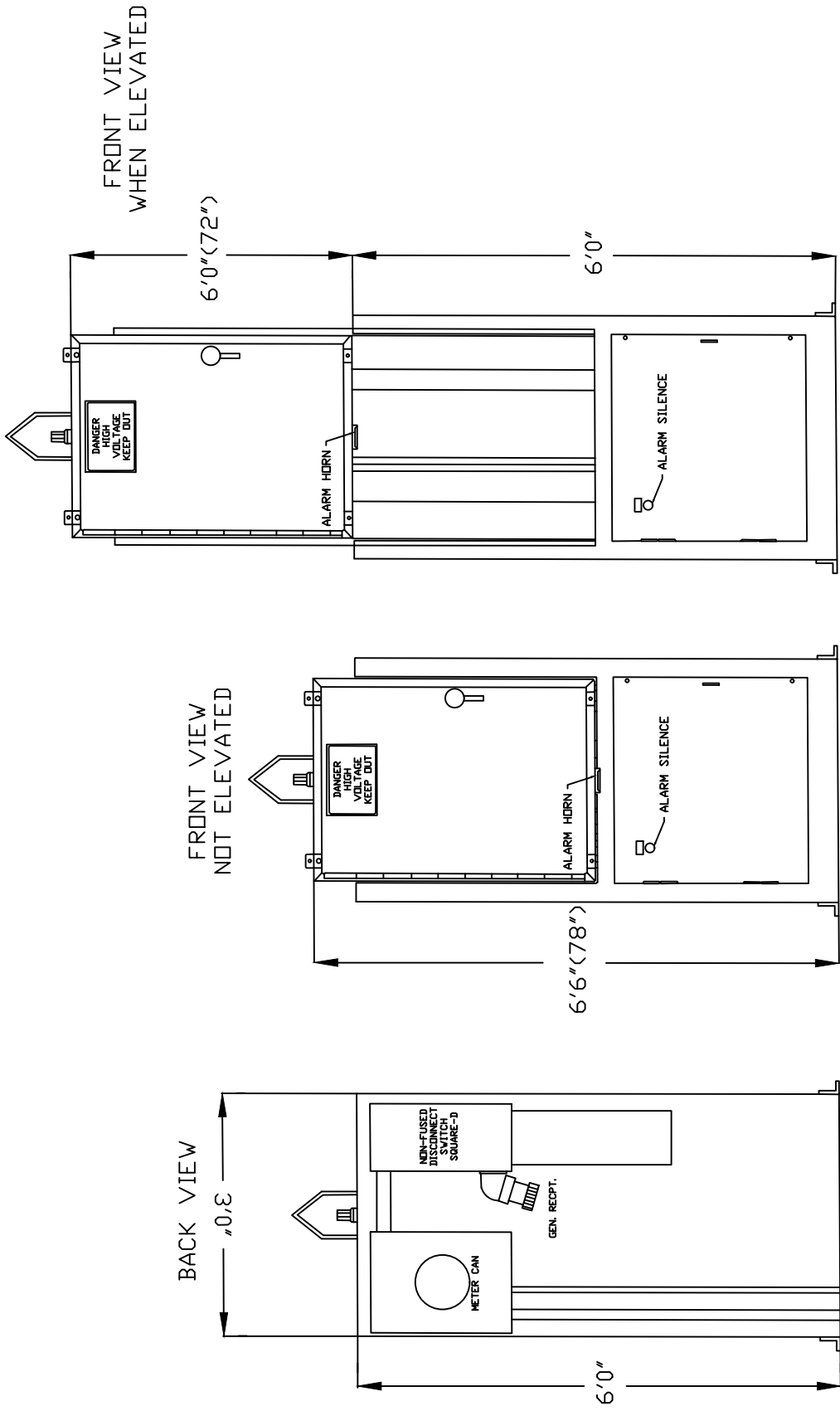
**MARCO ISLAND
UTILITIES**

960 North Collier Blvd.
MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: WW-10.DWG



NOTES:

1. PANELS BY PRIMEX AS REQUIRED BY POWER REQUIREMENT.
2. FOUNDATION DESIGN BY ENGINEER OF RECORD TO MEET FEMA FLOOD REQUIREMENTS, BUILDING CODE AND ASCE 7 & 24. RISK GROUP III OR IV AS DETERMINED BY CITY.
3. PROVIDE MIN. 3' CONCRETE AREA ON FRONT AND BACK SIDES.

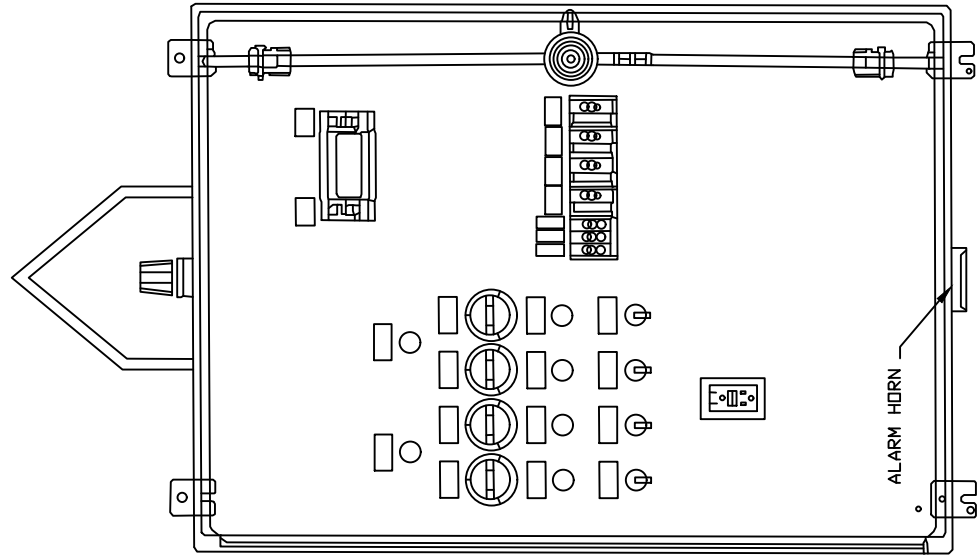
W/W-11A
-

TELESCOPING PUMP STATION PANEL

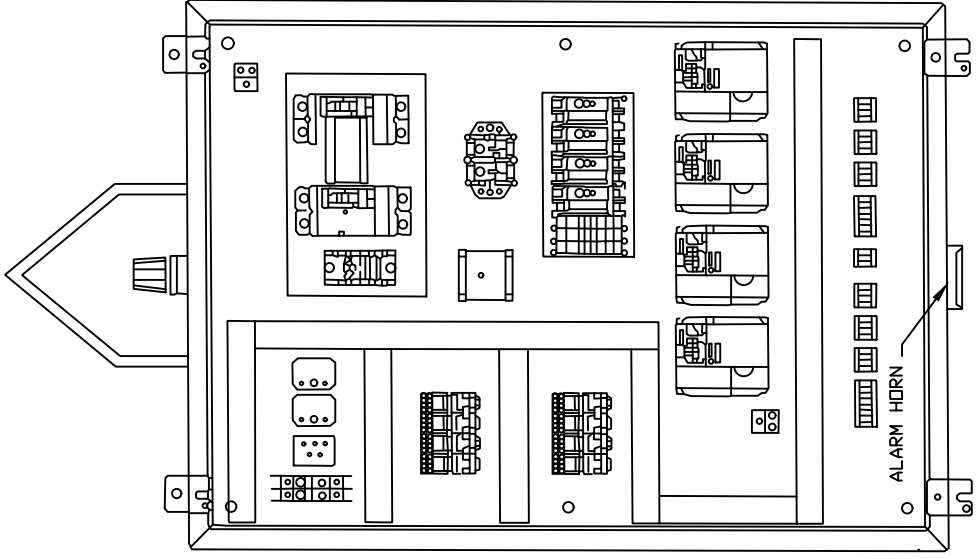
NOT TO SCALE

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SCALE: NOT TO SCALE
DATE: MAY 2023
DWG #: WW-11A.DWG



INNER DOOR FRONT VIEW



BACK PLATE FRONT VIEW

TYPICAL PANEL

WW-11B
-

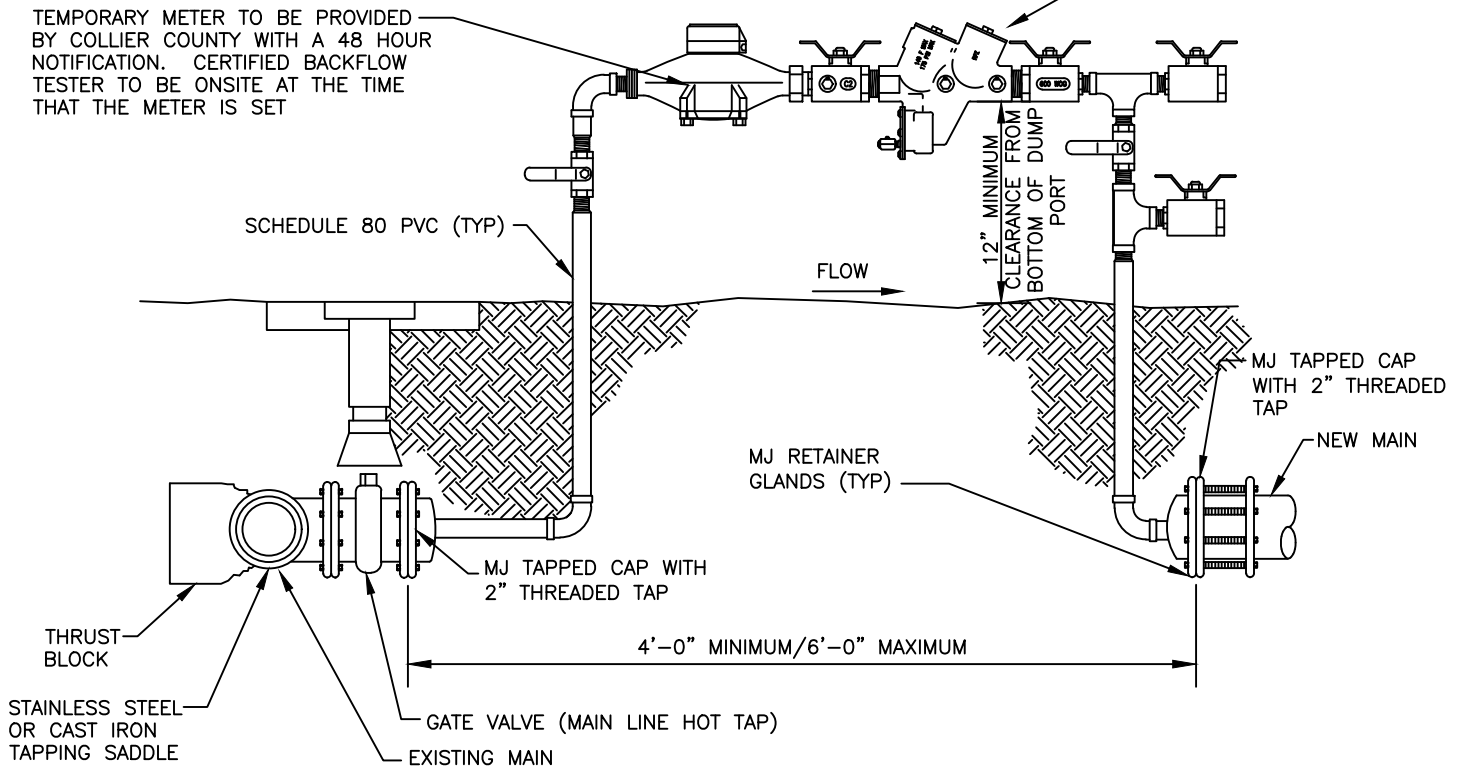
TELESCOPING PUMP STATION PANEL

NOT TO SCALE

MARCO ISLAND UTILITIES
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MARCO ISLAND, FL 34145

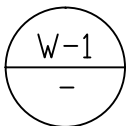
SCALE: NOT TO SCALE
DATE: MAY 2023
DWG #: WW-11B.DWG

REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER ASSEMBLY (PROVIDED BY CONTRACTOR) SUPPLIED WITH AMMONIA AND CHLORINE RESISTANT SEATS AND SILICONE RUBBER SEALS. INSTALLATION AS REQUIRED BY COUNTY ORDINANCE AND AWWA M-14 STANDARDS (SEE APPROVED BACKFLOW DEVICES, APPENDIX G)



NOTES:

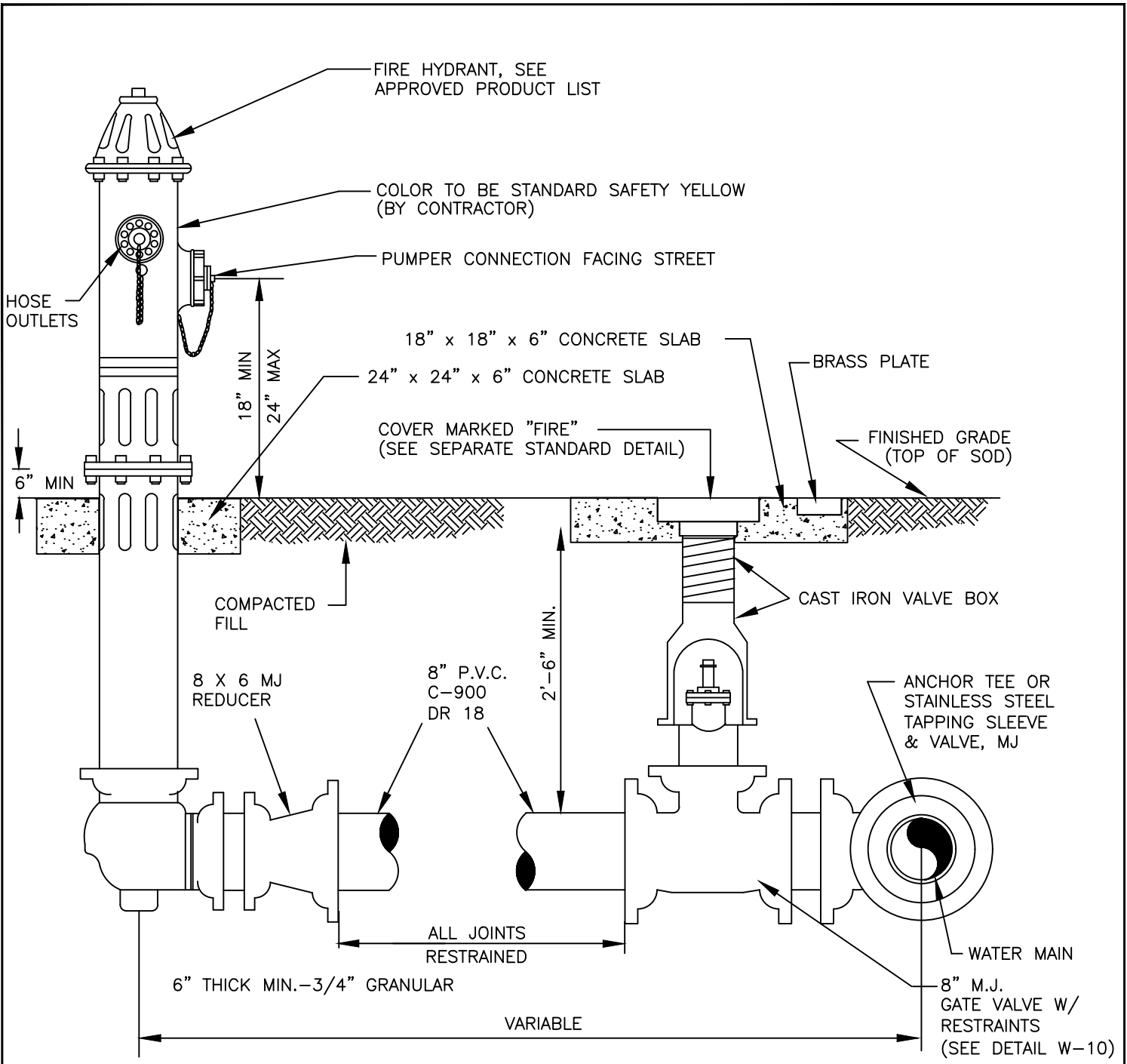
1. FINAL CONNECTION TO BE WITNESSED BY CITY OF MARCO ISLAND
2. ALL CAPS AND BLIND FLANGES TO BE PROPERLY RESTRAINED.
3. INSTALL JUMPER TAP SYSTEM FOR TEMPORARY METER DOWNSTREAM OF BLIND FLANGE FOR CONSTRUCTION WATER.
4. SEE APPROVED PRODUCT LIST FOR TAPPING SADDLES AND VALVES.
5. JUMPER ASSEMBLY MUST BE MINIMUM OF 18" ABOVE FINISHED GRADE.
6. BACKFLOW ASSEMBLY REQUIRES INITIAL CERTIFICATION BY CERTIFIED BACKFLOW TESTER.
7. THIS ASSEMBLY SHALL ONLY BE USED IF NO COMBUSTIBLES WILL BE ON SITE. IF COMBUSTIBLES ARE BROUGHT ON SITE, THEN THE TEMPORARY BACKFLOW PREVENTERS AND FIRE PROTECTION METER TIE-IN ASSEMBLY SHALL BE USED.
8. THIS ASSEMBLY IS NOT APPROVED TO PROVIDE FIRE PROTECTION WATER TO THE SITE DURING CONSTRUCTION. ASSEMBLY NOT TO BE REMOVED AND SPOOL PIECE INSTALLED FOR FINAL CONNECTION UNTIL AFTER TESTING, BACTERIAL CLEARANCE, FINAL INSPECTION AND CITY ACCEPTANCE.
9. GAP CONFIGURATION TO BE INSTALLED WITHIN 24 HOURS OR LESS.
10. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.
11. FOR INSTALLATIONS WHERE LESS THAN 20' OF NEW WATER MAIN IS BEING CONSTRUCTED BETWEEN THE PERMANENT BACKFLOW ASSEMBLY AND THE EXISTING MAIN, NO TEMPORARY JUMPER IS REQUIRED.



CONSTRUCTION JUMPER ASSEMBLY (OPTIONAL)

NOT TO SCALE

MARCO ISLAND UTILITIES 960 North Collier Blvd. MARCO ISLAND, FL 34145	SCALE: NOT TO SCALE
	DATE: MAY 2023
	DWG #: W-1.DWG

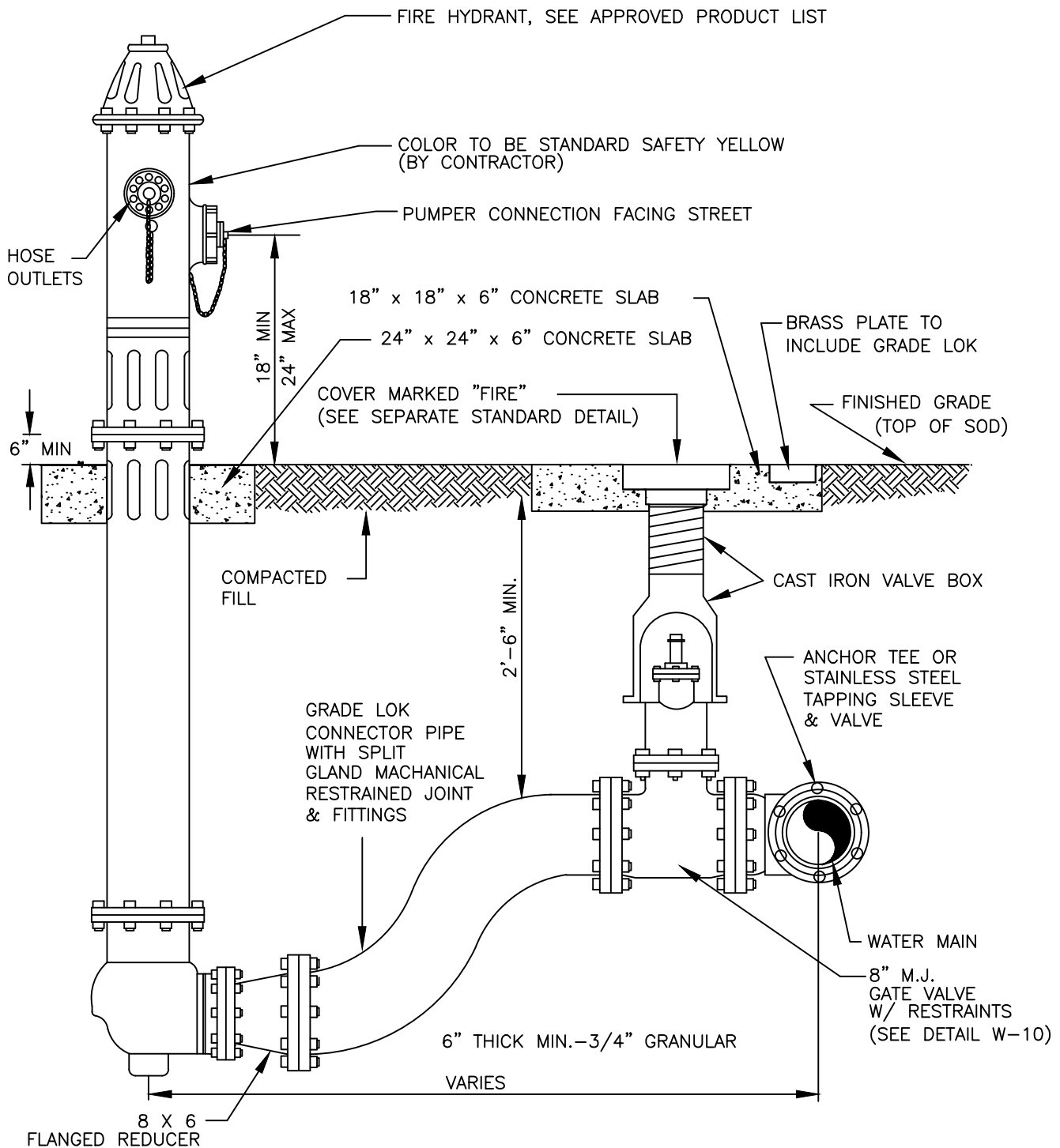


NOTES:

1. FIRE HYDRANT TO BE DRY OR WET BARREL IN ACCORDANCE WITH AWWA C502 OR AWWA C503.
2. IF EXISTING WATER MAIN IS 8-INCHES OR LARGER, DRAFT TUBE ASSEMBLY AND TEE MUST BE A MINIMUM OF 8-INCH REDUCING TO 6-INCH FOR HYDRANT CONNECTION AS SHOWN.
3. IF EXISTING MAIN IS 6 INCHES IN DIAMETER, DRAFT TUBE ASSEMBLY AND TEE IS REQUIRED TO BE 6 INCHES MINIMUM.
4. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MI W&S DEPT. STANDARD SPECIFICATIONS. WITH MIU STANDARD SPECIFICATIONS.
5. ALL BOLTS AND NUTS TO BE 316 STAINLESS STEEL EXCLUDING MECHANICAL JOINT TEE BOLTS AND NUTS.
6. ALL COMPONENTS THAT COME IN CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.

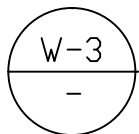
W-2
FIRE HYDRANT ASSEMBLY
-
NOT TO SCALE

MARCO ISLAND UTILITIES		SCALE: NOT TO SCALE	
960 North Collier Blvd. MARCO ISLAND, FL 34145		DATE:	MAY 2023
		DWG #:	W-2.DWG



NOTES:

1. IF EXISTING WATER MAIN IS 10-INCHES OR LARGER, DRAFT TUBE ASSEMBLY AND TEE MUST BE A MINIMUM OF 8-INCH REDUCING TO 6-INCH FOR HYDRANT CONNECTION AS SHOWN.
2. IF EXISTING MAIN IS 8 TO 6 INCHES IN DIAMETER, DRAFT TUBE ASSEMBLY AND TEE IS REQUIRED TO BE 6 INCHES MINIMUM.
3. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH SPECIFICATIONS.
4. ALL BOLTS AND NUTS TO BE 316 STAINLESS STEEL EXCLUDING TEE BOLTS AND NUTS.
5. ALL COMPONENTS THAT COME IN CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.



FIRE HYDRANT ASSEMBLY WITH GRADE-LOK ADAPTOR

NOT TO SCALE

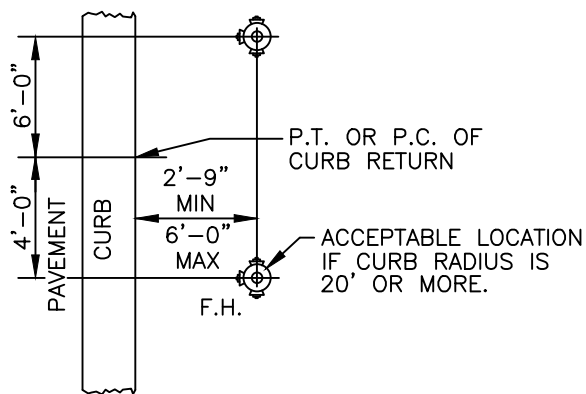
MARCO ISLAND UTILITIES

960 North Collier Blvd.
MARCO ISLAND, FL 34145

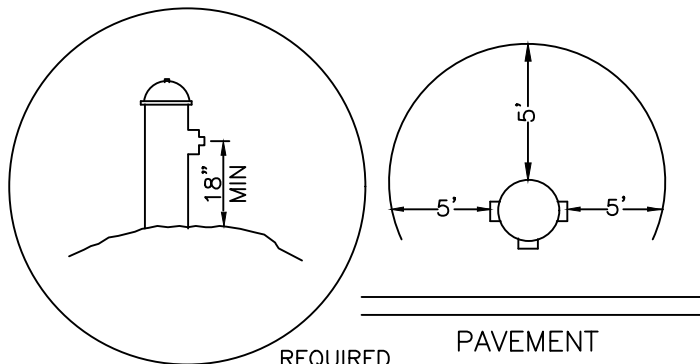
SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: W-3.DWG



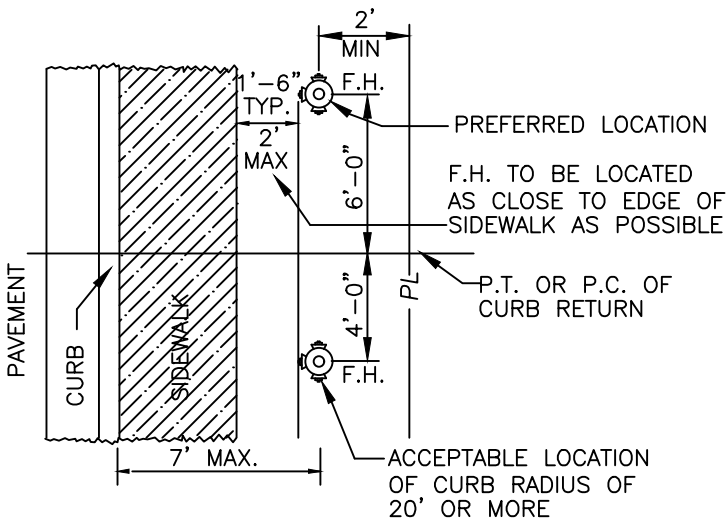
PARKWAY AREA OR
NO SIDEWALK



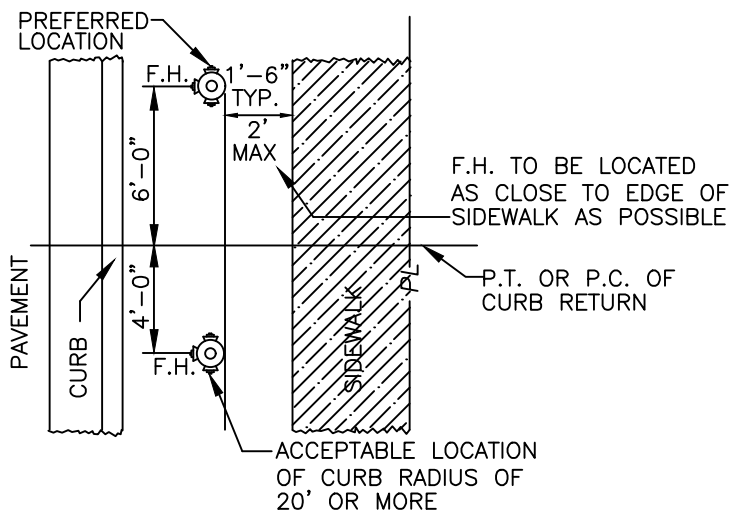
REQUIRED
HYDRANT
CLEARANCE

PAVEMENT

AUTOMATIC

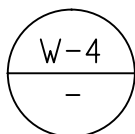


AUTOMATIC



NOTES:

1. HYDRANT SHALL BE INSTALLED PLUMB AND TRUE IN UNOBSTRUCTED LOCATION (5 FEET CLEARANCE ON ALL SIDES).
2. THE SAME MODEL HYDRANT SHALL BE USED THROUGHOUT PROJECT HYDRANTS MUST BE ORDERED SAFETY YELLOW IN COLOR, WITH FINISHED EPOXY COAT APPLIED BY THE HYDRANT MANUFACTURER. HYDRANT SHALL BE FACTORY EQUIPPED WITH PLUGGED DRAIN HOLES.
3. VALVE SHALL BE PLACED ADJACENT TO MAIN AND RESTRAINED WITH MEGALUGS OR EQUAL.
4. ANCHOR TEES ARE PERMITTED.
5. HYDRANTS SHALL NOT BE PLACED IN SIDEWALKS, ROADWAYS, OR BIKE PATHS.
6. ON RUNS LONGER THAN 50 FEET ANOTHER VALVE IS REQUIRED.
7. PAINT SAFETY YELLOW, IF REQUIRED, SEE APPROVED PRODUCT LIST.
8. BOLLARDS ARE REQUIRED FOR HYDRANTS WITH LESS THAN 10 FEET TO EDGE OF PAVEMENT, SEE DETAIL.
9. HYDRANT HARDWARE SHALL BE STAINLESS STEEL (TYPE 316 OR TYPE 316 BOLTS/TYPE 316 NUTS).
10. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MI W&S DEPT. STANDARD SPECIFICATIONS.
11. BLUE REFLECTIVE MARKER REQUIRES IN MIDDLE OF ROAD LANE CLOSEST TO HYDRANT FOR EASY IDENTIFICATION OF HYDRANT.



FIRE HYDRANT LOCATIONS/CLEARANCE

NOT TO SCALE

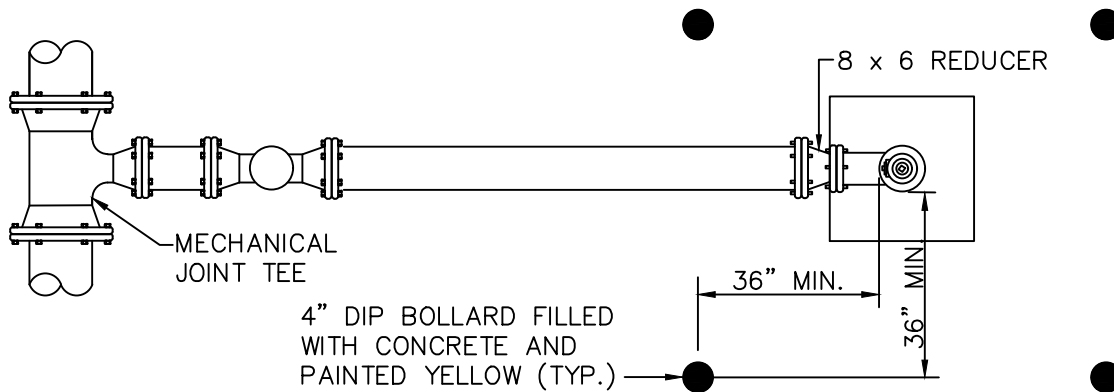
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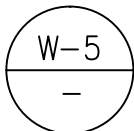
DATE: MAY 2023

DWG #: W-4.DWG



NOTES:

1. HYDRANT SHALL BE INSTALLED PLUMB AND TRUE IN UNOBSTRUCTED LOCATION (5 FEET CLEARANCE ON ALL SIDES).
2. THE SAME MODEL HYDRANT SHALL BE USED THROUGHOUT PROJECT HYDRANTS MUST BE ORDERED SAFETY YELLOW IN COLOR, WITH FINISHED EPOXY COAT APPLIED BY THE HYDRANT MANUFACTURER. HYDRANT SHALL BE FACTORY EQUIPPED WITH PLUGGED DRAIN HOLES.
3. VALVE SHALL BE PLACED ADJACENT TO MAIN AND RESTRAINED WITH MEGALUGS OR EQUAL.
4. ANCHOR TEES ARE PERMITTED.
5. HYDRANTS SHALL NOT BE PLACED IN SIDEWALKS, ROADWAYS, OR BIKE PATHS.
6. ON RUNS LONGER THAN 50 FEET ANOTHER VALVE IS REQUIRED.
7. PAINT SAFETY YELLOW, IF REQUIRED, SEE APPROVED PRODUCT LIST.
8. BOLLARDS ARE REQUIRED FOR HYDRANTS WITH LESS THAN 10 FEET TO EDGE OF PAVEMENT, SEE DETAIL.
9. HYDRANT HARDWARE SHALL BE STAINLESS STEEL (TYPE 316 OR TYPE 316 BOLTS/TYPE 316 NUTS).
10. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MI W&S DEPT. STANDARD SPECIFICATIONS.
11. BLUE REFLECTIVE MARKER REQUIRES IN MIDDLE OF ROAD LANE CLOSEST TO HYDRANT FOR EASY IDENTIFICATION OF HYDRANT.

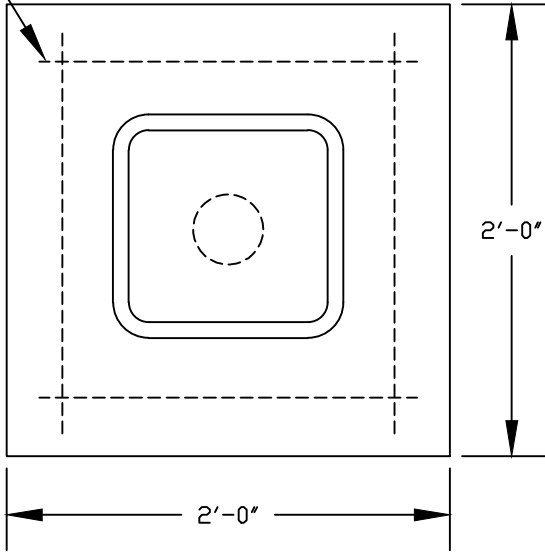


TYPICAL FIRE HYDRANT INSTALLATION WITH BOLLARDS

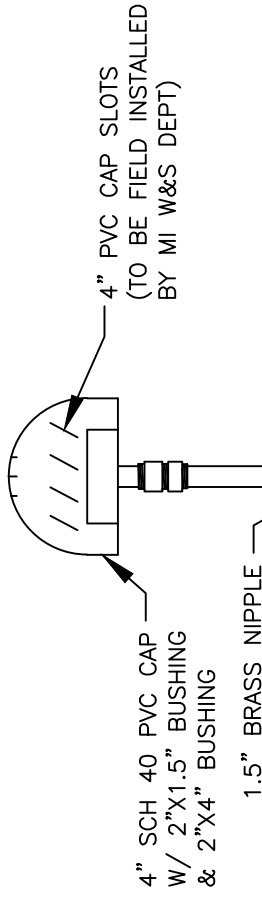
NOT TO SCALE

MARCO ISLAND UTILITIES 960 North Collier Blvd. MARCO ISLAND, FL 34145	SCALE: NOT TO SCALE
	DATE: MAY 2023
	DWG #: W-5.DWG

(4) #4 BARS
3" OVERLAP EACH CORNER



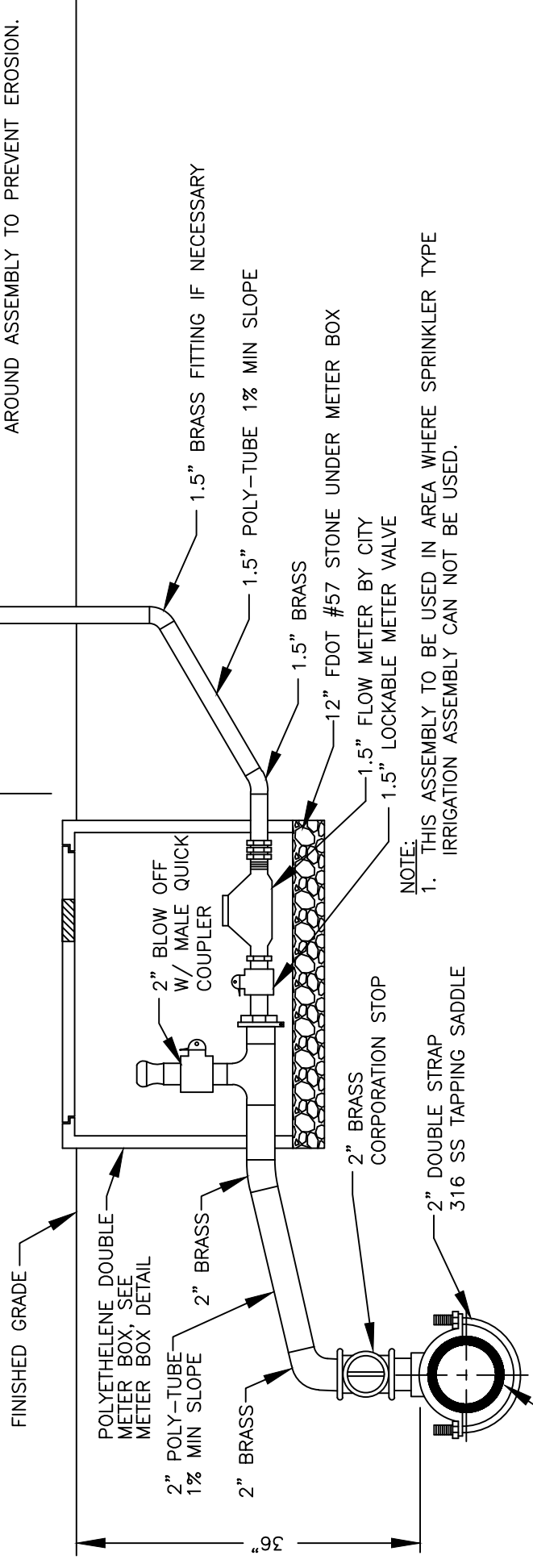
PLAN VIEW



NOTES:

1. AUTOMATIC FLUSHING DEVICE SHALL BE SHUT OFF UNTIL MAIN LINE HAS BEEN APPROVED FOR SERVICE.
2. ALL PIPING AND VALVES IN CONTACT WITH POTABLE WATER SHALL CONFORM TO ANSI/NSF STANDARD 61.
3. LANDSCAPING SHALL BE INSTALLED AROUND ASSEMBLY TO PREVENT EROSION.

BY DEVELOPER
BY CITY OF MARCO ISLAND



NOTE:

1. THIS ASSEMBLY TO BE USED IN AREA WHERE SPRINKLER TYPE IRRIGATION ASSEMBLY CAN NOT BE USED.

PRESSURE MAIN

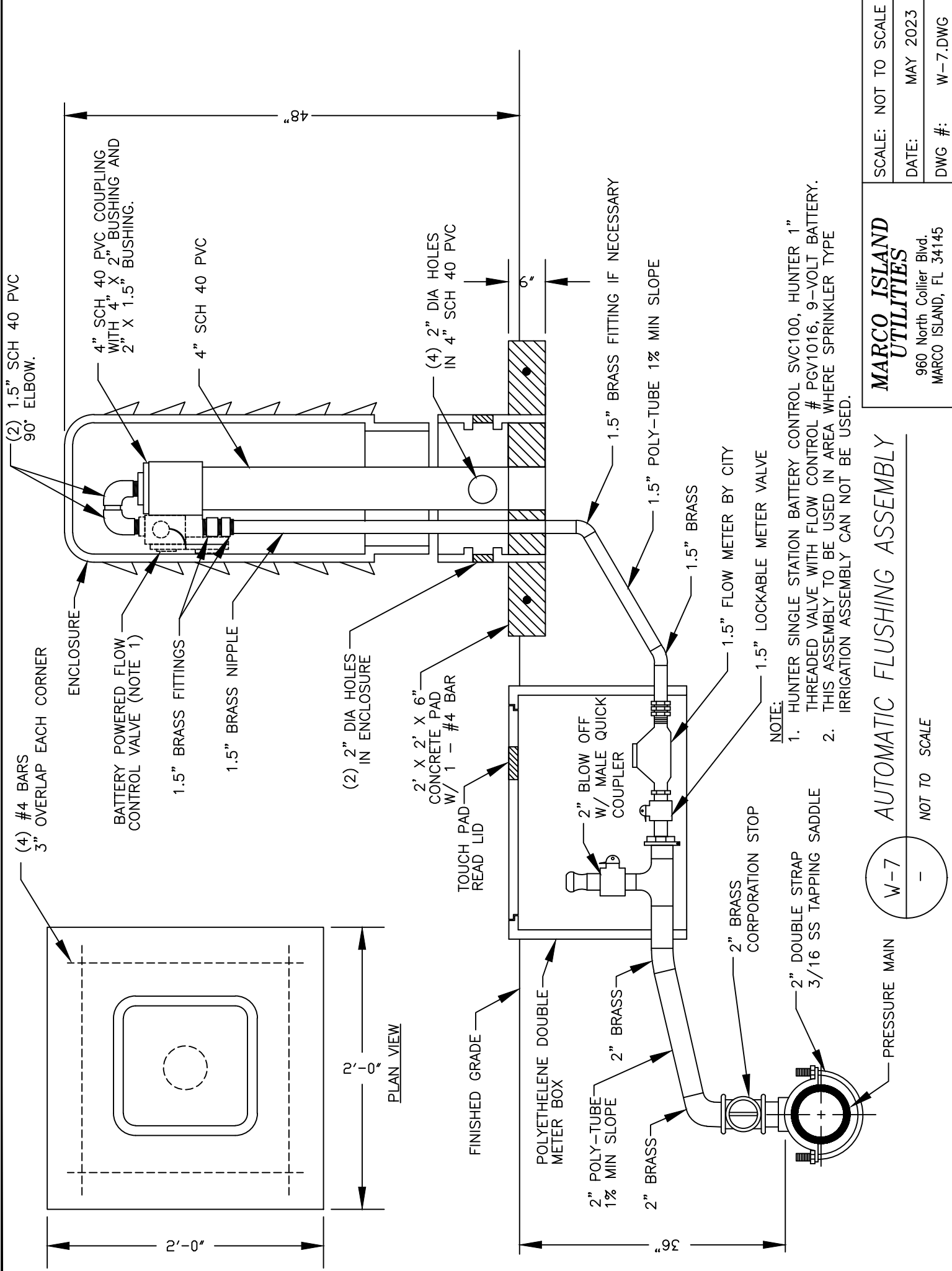
W-6

AUTOMATIC FLUSHING ASSEMBLY (SPRINKLER TYPE)

NOT TO SCALE

MARCO ISLAND UTILITIES
960 North Collier Blvd.
MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE
DATE: MAY 2023
DWG #: W-6.DWG



(2) 1.5" SCH 40 PVC
90° ELBOW.

(4) #4 BARS
3" OVERLAP EACH CORNER

4" SCH 40 PVC COUPLING
WITH 4" X 2" BUSHING AND
2" X 1.5" BUSHING.

4" SCH 40 PVC

(4) 2" DIA HOLES
IN 4" SCH 40 PVC

1.5" BRASS FITTING IF NECESSARY

1.5" POLY-TUBE 1% MIN SLOPE

1.5" BRASS

1.5" FLOW METER BY CITY

1.5" LOCKABLE METER VALVE

(2) 2" DIA HOLES
IN ENCLOSURE

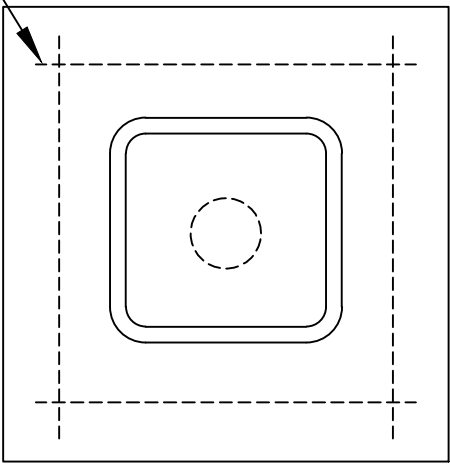
2' X 2' X 6"
CONCRETE PAD
W/ 1 - #4 BAR

TOUCH PAD
READ LID

2" BLOW OFF
W/ MALE QUICK
COUPLER

NOTE:

- HUNTER SINGLE STATION BATTERY CONTROL SVC100, HUNTER 1" THREADED VALVE WITH FLOW CONTROL # PGV1016, 9-VOLT BATTERY.
- THIS ASSEMBLY TO BE USED IN AREA WHERE SPRINKLER TYPE IRRIGATION ASSEMBLY CAN NOT BE USED.



2'-0"

PLAN VIEW

48"

FINISHED GRADE

POLYTHELENE DOUBLE
METER BOX

2" POLY-TUBE
1% MIN SLOPE

2" BRASS

2" BRASS
CORPORATION STOP

2" DOUBLE STRAP
3/16 SS TAPPING SADDLE

PRESSURE MAIN

W-7

AUTOMATIC FLUSHING ASSEMBLY

NOT TO SCALE

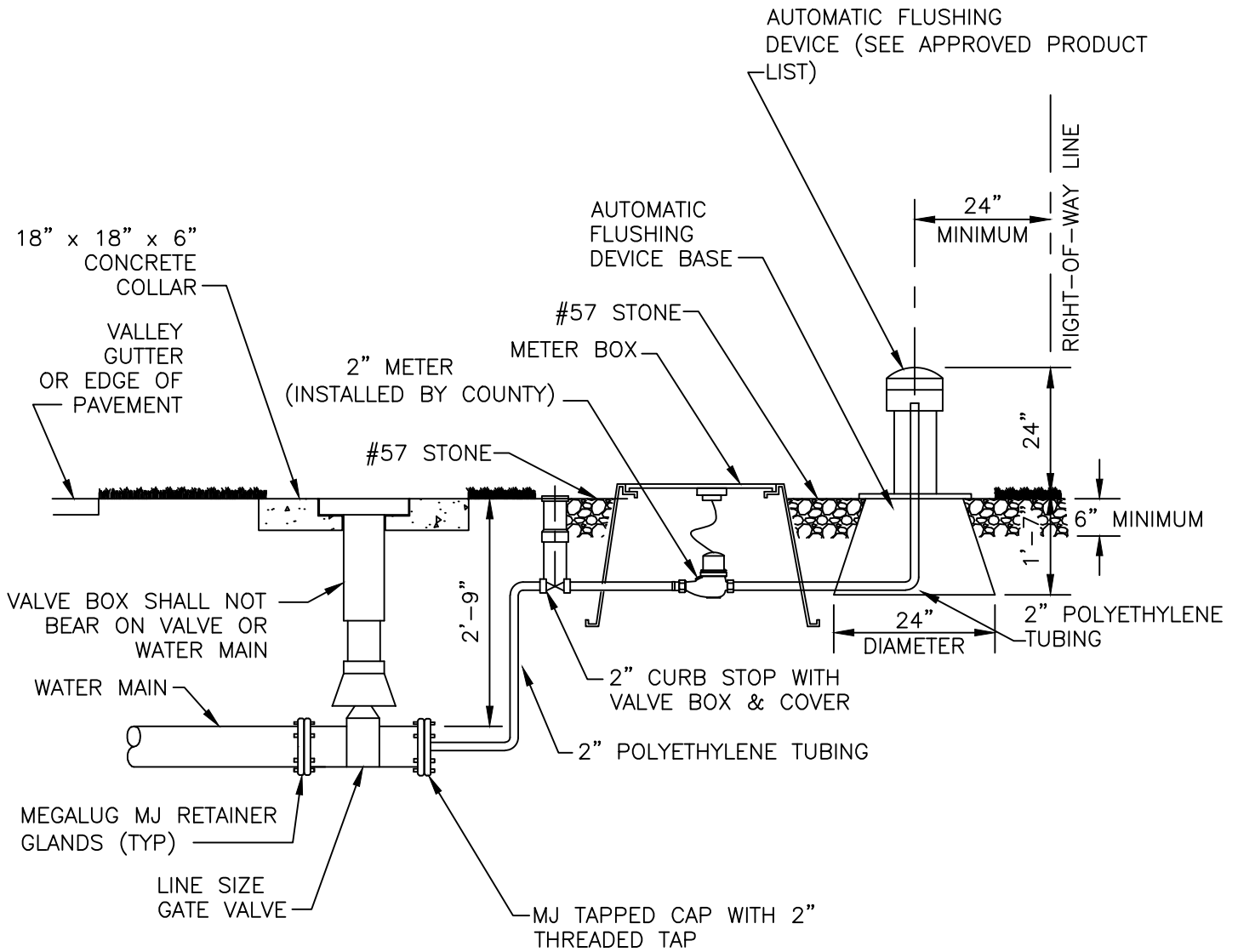
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MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE

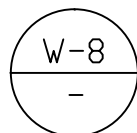
DATE: MAY 2023

DWG #: W-7.DWG



NOTES:

1. PIPING SHALL BE INSTALLED UP TO 2" CURB STOP WITH VALVE BOX AND COVER AT TIME OF MAIN INSTALLATION.
2. AUTOMATIC FLUSHING DEVICE SHALL BE SHUT OFF UNTIL MAIN LINE HAS BEEN BACTERIOLOGICALLY TESTED.
3. SEE APPROVED PRODUCT LIST AND DETAIL FOR GATE VALVE AND VALVE BOX REQUIREMENTS.
4. AT TIME OF ACCEPTANCE, WATER DEPARTMENT WILL INSTALL 2" METER.
5. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.



AUTOMATIC WATER MAIN FLUSHING ASSEMBLY

NOT TO SCALE

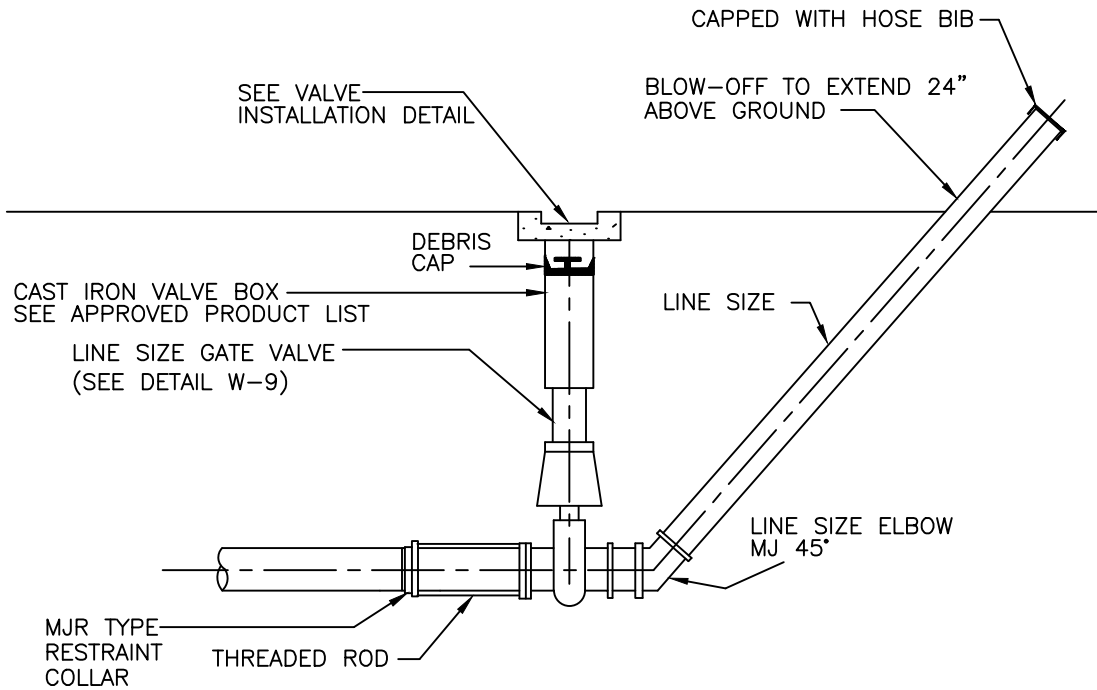
MARCO ISLAND UTILITIES

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SCALE: NOT TO SCALE

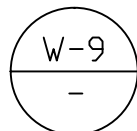
DATE: MAY 2023

DWG #: W-8.DWG



NOTES:

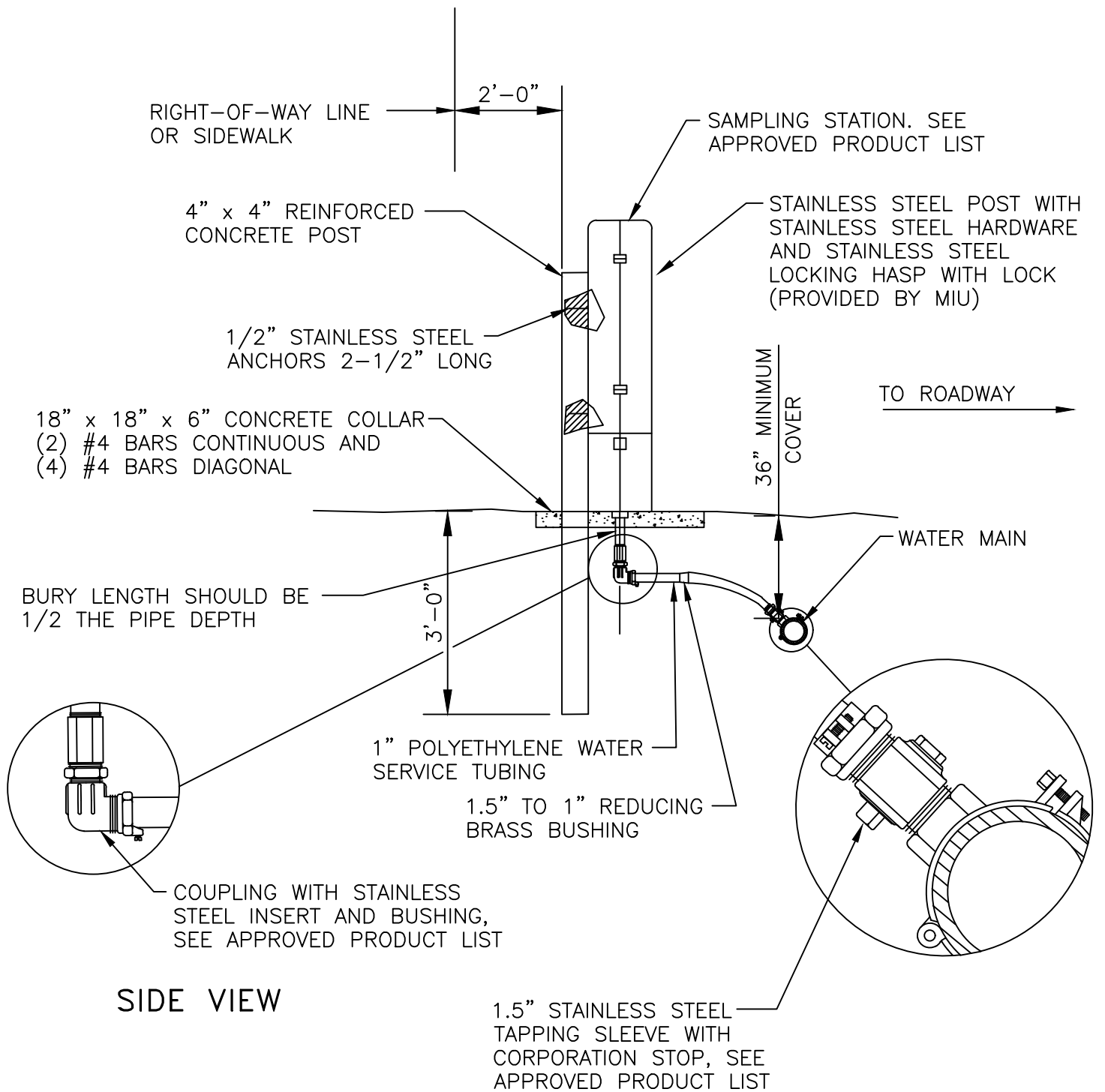
1. VALVE BOX RISER SHALL NOT BEAR ON THE VALVE OR PIPE.
2. SEE VALVE INSTALLATION DETAIL FOR VALVE SUPPORT.
3. TEMPORARY BLOW-OFF TO REMAIN IN PLACE UNTIL DISTRIBUTION SYSTEM HAS BEEN FLUSHED.
4. AFTER CLEARANCE IS OBTAINED REFER TO PERMANENT BLOW-OFF DETAIL FOR FINAL BLOW-OFF CONFIGURATION.
5. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
6. ALL COMPONENTS THAT COME IN CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.



TEMPORARY FLUSHING ASSEMBLY

NOT TO SCALE

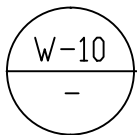
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	DATE: MAY 2023
	DWG #: W-9.DWG



SIDE VIEW

NOTE:

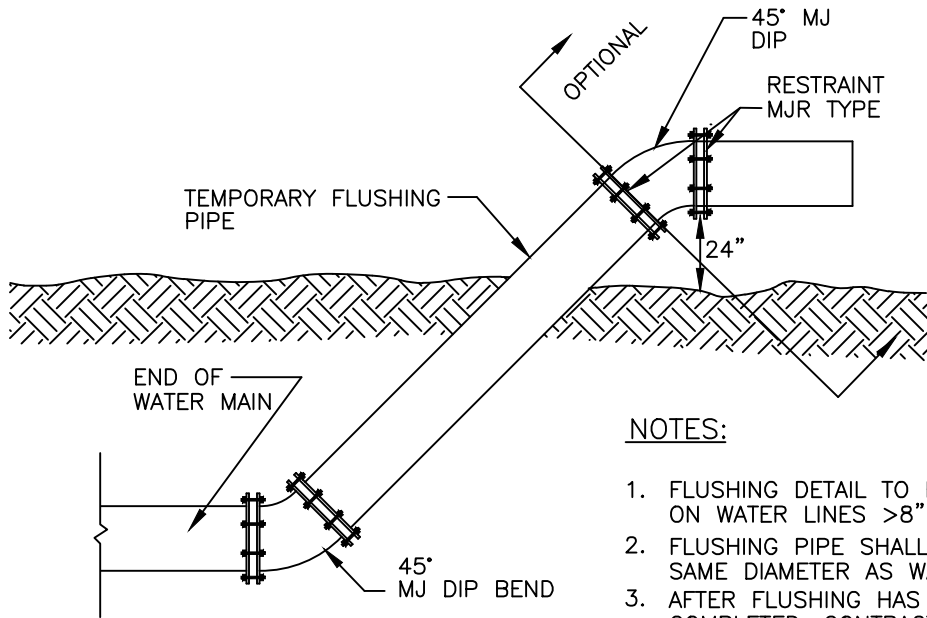
1. ALL COMPONENTS THAT COME IN CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.



PERMANENT BACTERIOLOGICAL SAMPLE POINT

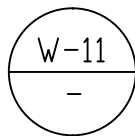
NOT TO SCALE

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	DWG #: W-10.DWG



NOTES:

1. FLUSHING DETAIL TO BE USED ON WATER LINES >8" DIAMETER.
2. FLUSHING PIPE SHALL BE THE SAME DIAMETER AS WATER MAIN.
3. AFTER FLUSHING HAS BEEN COMPLETED, CONTRACTOR SHALL INSTALL BLOW OFF PER STANDARD DETAIL.
4. CONTRACTOR SHALL PROVIDE ADEQUATE DRAINAGE FOR FLUSHED WATER.



WATER MAIN FLUSHING ASSEMBLY

NOT TO SCALE

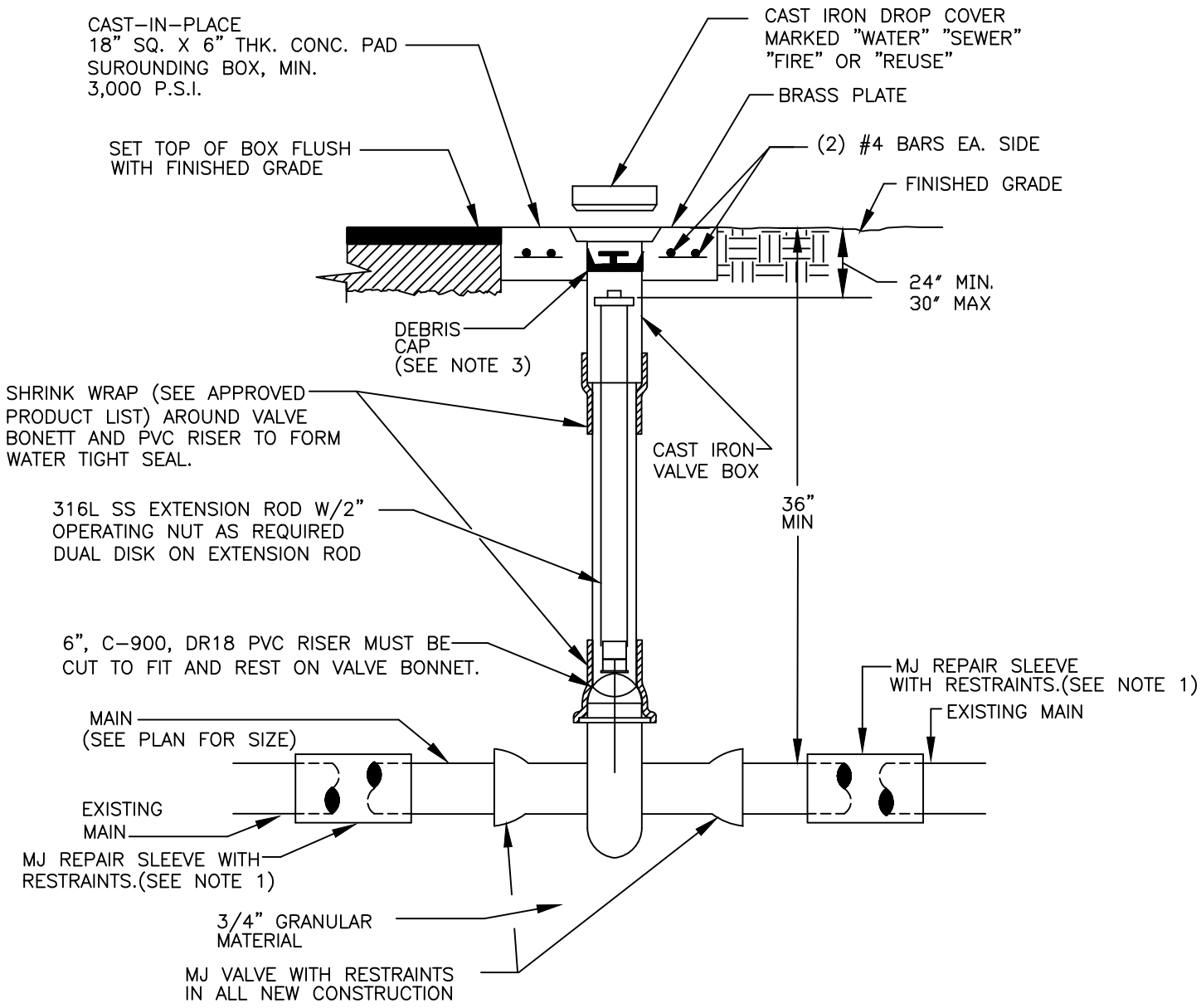
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DATE: MAY 2023

DWG #: W-11.DWG

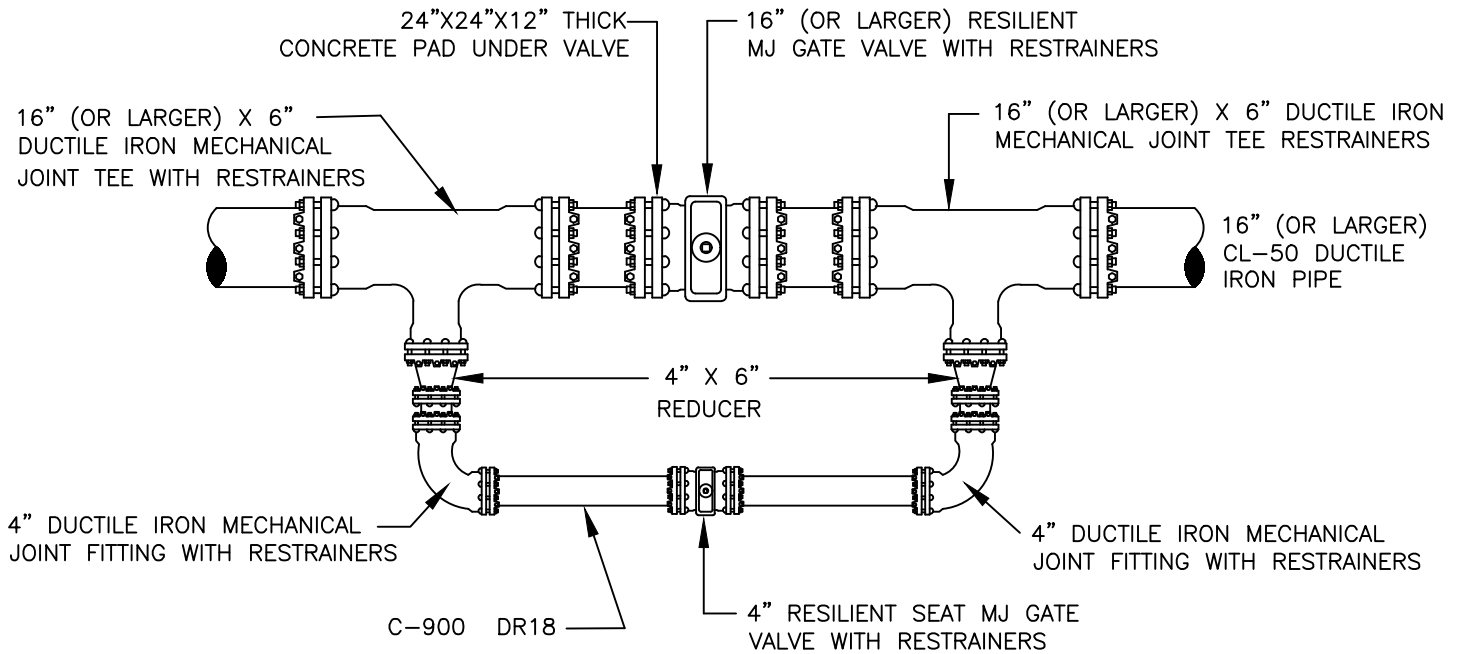


NOTES:

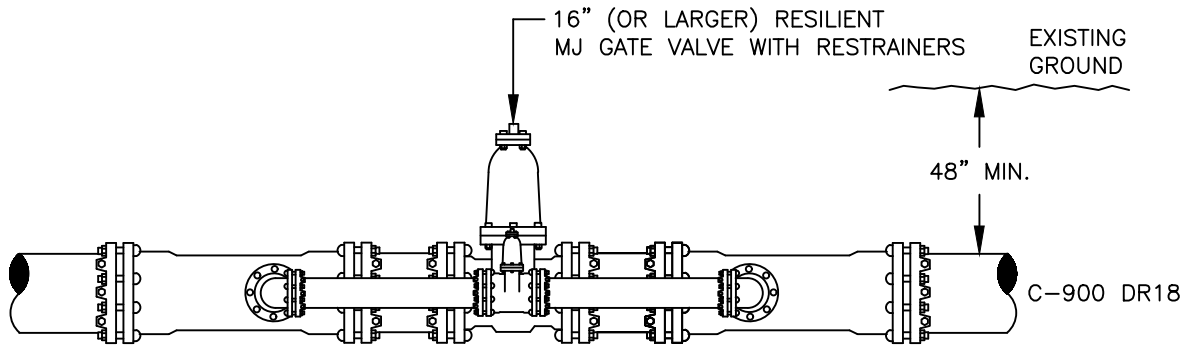
1. WHEN INSTALLING A VALVE IN AN EXISTING MAIN USE TWO DI REPAIR SLEEVES (MJ) ONE AT EACH END OF THE CUT.
2. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
3. CAST IRON VALVE RISER MUST BE ADJUSTED TO ACCEPT DEBRIS CAP.
4. PROVIDE VALVE OPERATOR EXTENSION (DETAIL W-16) WHEN DEPTH TO TOP OF PIPE IS 48" OR GREATER.
5. ALL PIPING AND VALVES IN CONTACT WITH POTABLE WATER SHALL CONFORM TO ANSI/NSF STANDARD 61.

W-12
VALVE INSTALLATION
-
NOT TO SCALE

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	DATE: MAY 2023
	DWG #: W-12.DWG



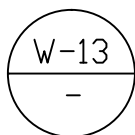
PLAN



PROFILE

NOTES:

1. THIS DETAIL USED WITH 16" AND LARGER GATE VALVES.
2. ALL 16" VALVES AND LARGER (REGARDLESS OF TYPE) REQUIRE BYPASS.
3. ALL GATE VALVES TO BE RESILIENT SEAT.
4. GEAR REDUCTION MAY BE REQUIRED ON ALL VALVES 16" AND LARGER.
5. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
6. GEAR REDUCTION CASING, EXTERNAL NUTS AND BOLTS MUST BE STAINLESS STEEL.
7. ALL GATE VALVES: GATE MUST OPEN AND CLOSE IN VERTICAL POSITION AFTER INSTALLED, NO SIDE OPENING VALVES WILL BE ACCEPTED.
8. ALL PIPING AND VALVES IN CONTACT WITH POTABLE WATER SHALL CONFORM TO ANSI/NSF STANDARD 61.
9. ALL 16" VALVES AND LARGER REQUIRE 24"x24"x12" THICK CONCRETE PADS.



16" AND LARGER VALVE INSTALLATION

NOT TO SCALE

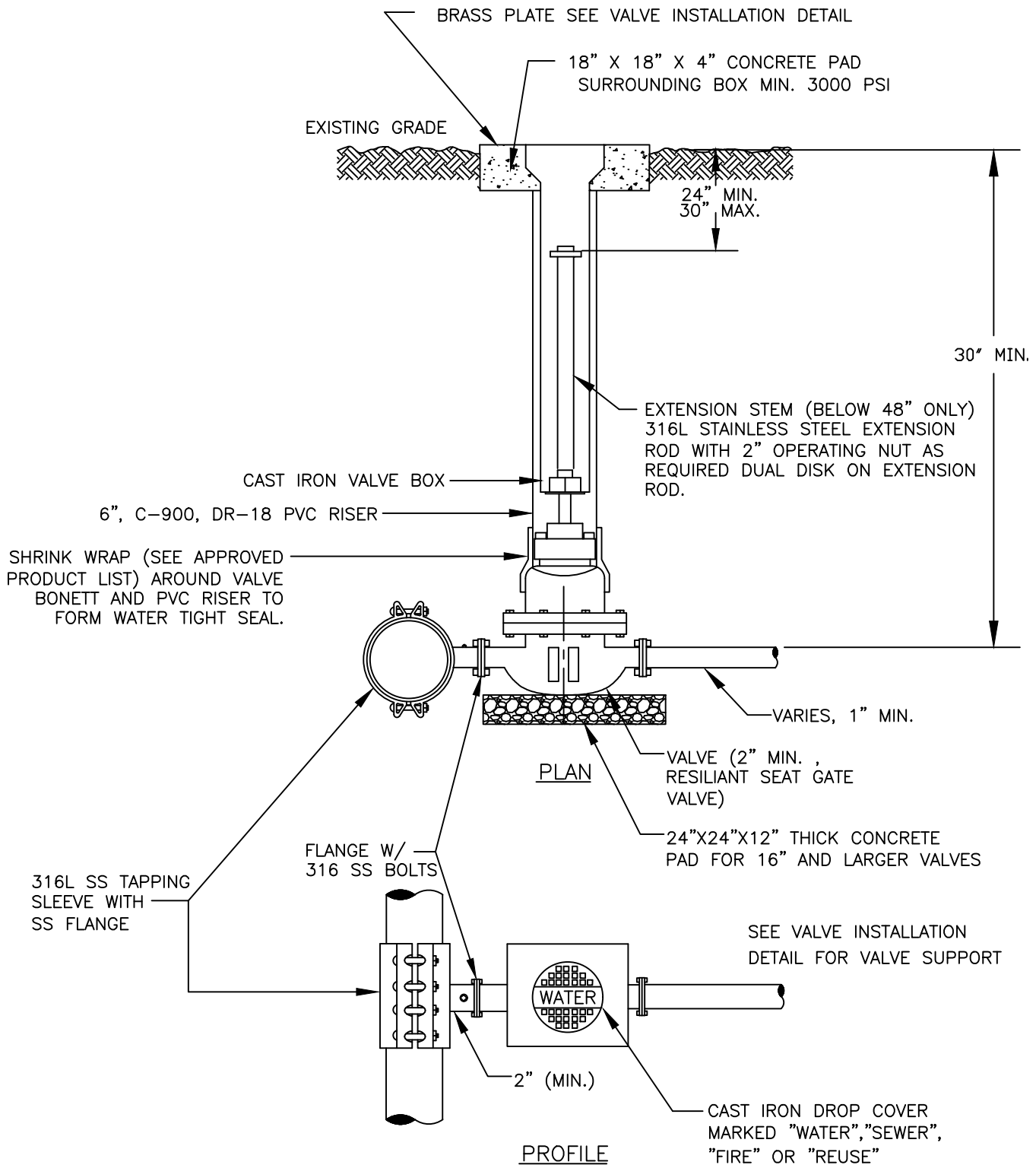
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DATE: MAY 2023

DWG #: W-13.DWG



- NOTE:
1. ALL BURIED DUCTILE IRON FITTINGS AND VALVES TO BE POLYETHYLENE ENCASED IN ACCORDANCE WITH MIU STANDARD SPECIFICATIONS.
 2. ALL GATE VALVES: GATE MUST OPEN AND CLOSE IN A VERTICAL POSITION AFTER INSTALLED, NO SIDE OPENING VALVES WILL BE ACCEPTED.
 3. ALL PIPING AND VALVES IN CONTACT WITH POTABLE WATER SHALL CONFORM TO ANSI/NSF STANDARD 61.
 4. ALL 16" VALVES AND LARGER SHALL BE PROVIDED WITH 24"X24"X12" THICK CONCRETE PAD.

1" - 30" TAPPING SLEEVE AND VALVE FOR 1" TO 30" SERVICES

W-14
-

NOT TO SCALE

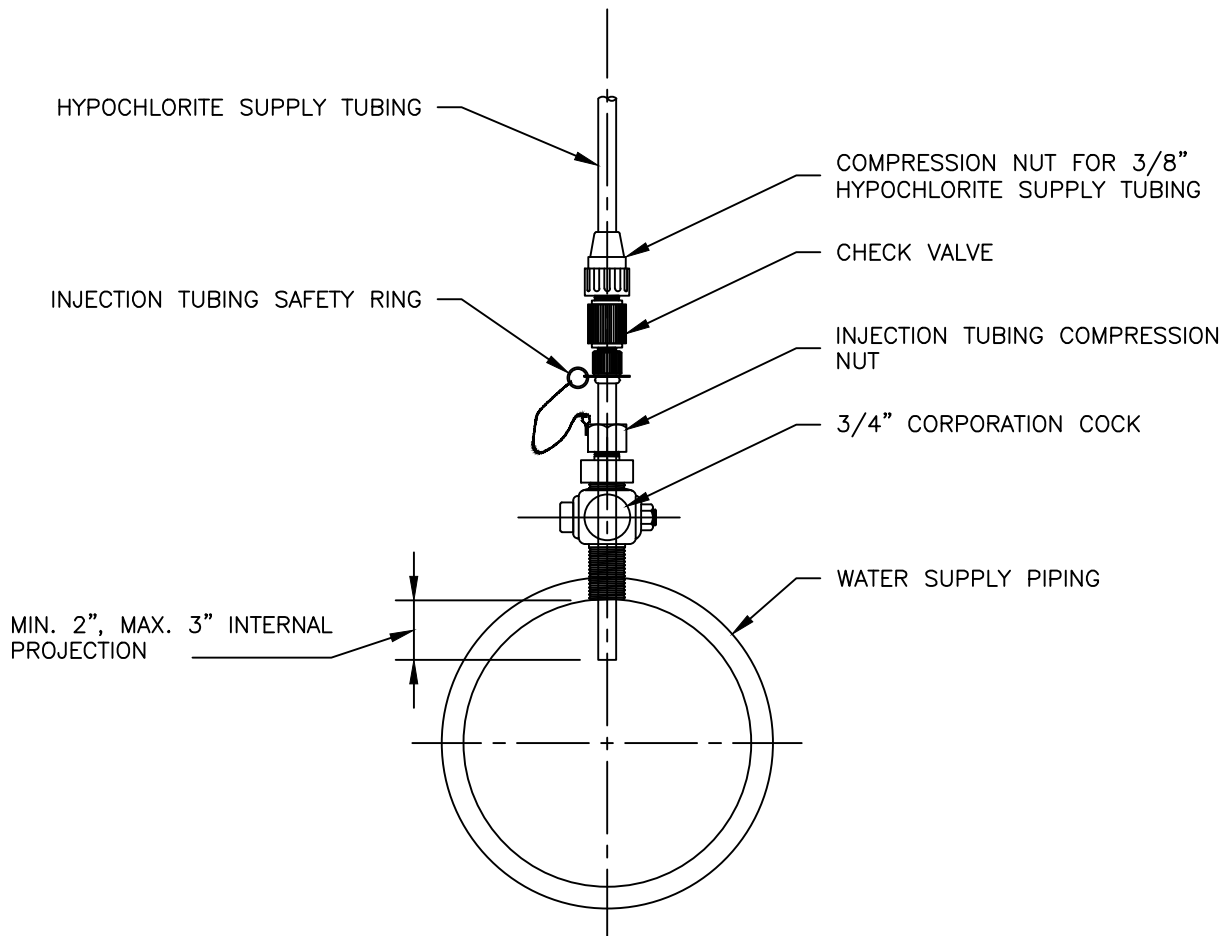
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SCALE: NOT TO SCALE

DATE: MAY 2023

DWG #: W-14.DWG



W-15 *HYPOCHLORITE INJECTION DETAIL*

- NOT TO SCALE

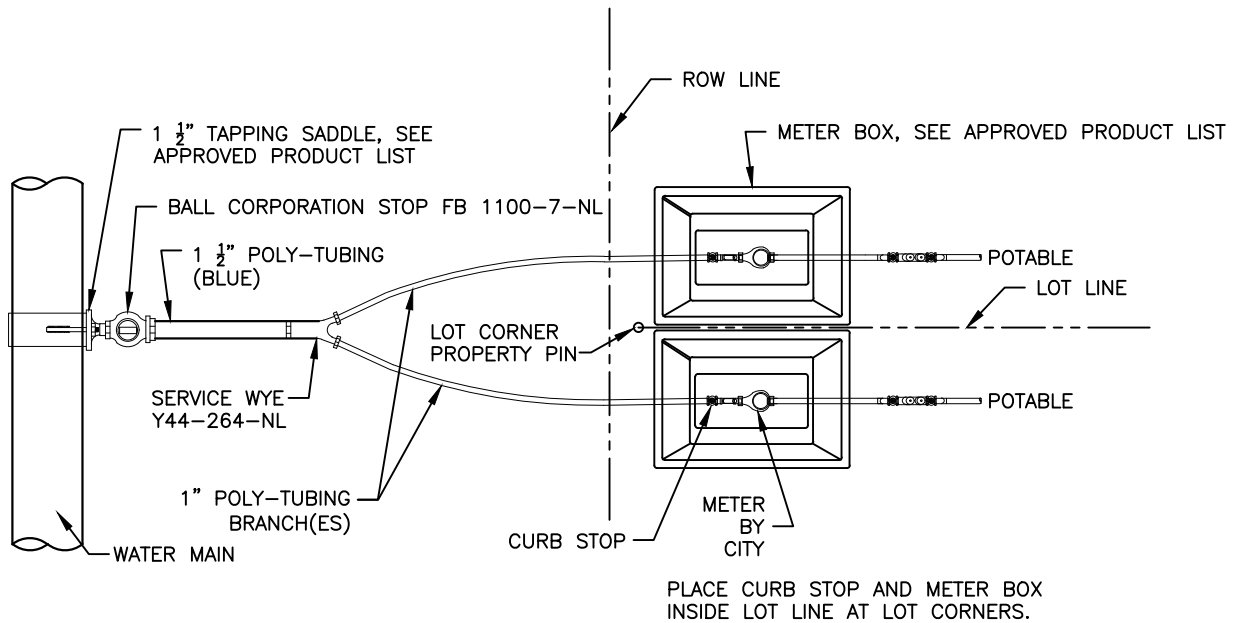
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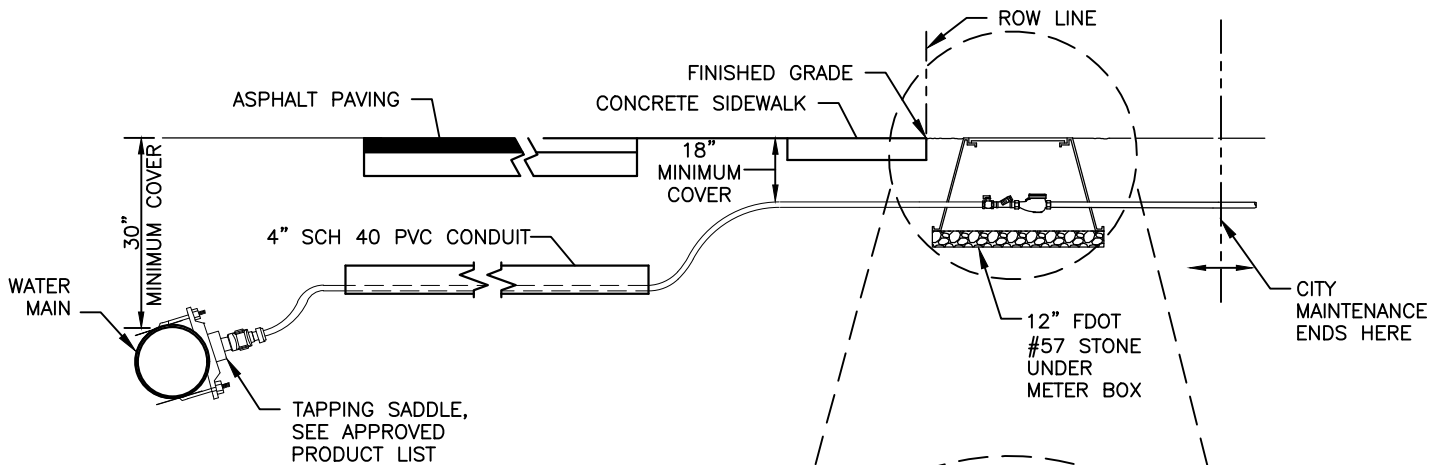
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DATE: MAY 2023

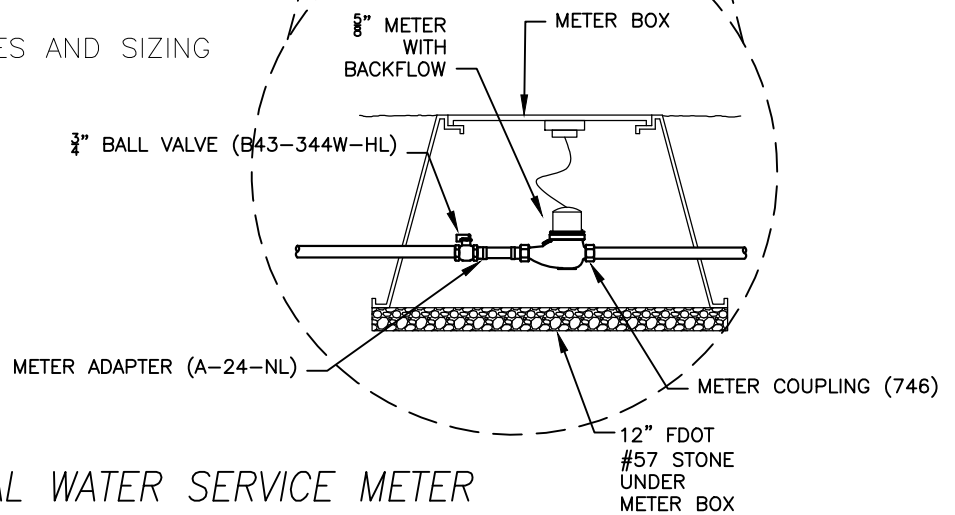
DWG #: W-15.DWG



PLACE CURB STOP AND METER BOX
INSIDE LOT LINE AT LOT CORNERS.



NOTE: FOR TYPICAL RESIDENTIAL DOUBLE SERVICE
SEE W-17 FOR ADDITIONAL NOTES AND SIZING



TYPICAL WATER SERVICE METER
FOR CONNECTION TO WATER MAIN

W-16
-

NOT TO SCALE

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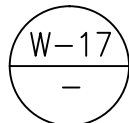
DWG #: W-16.DWG

SERVICE CONNECTION SIZING CHART

SINGLE SERVICE	CONNECTION TO MAIN	DOUBLE SERVICE	CONNECTION TO MAIN	BRANCH SIZE
$\frac{3}{4}$ " METER	1- $\frac{1}{2}$ "	(2) $\frac{3}{4}$ " METERS	1- $\frac{1}{2}$ "	1"
1" METER	1- $\frac{1}{2}$ "	(2) 1" METERS	1- $\frac{1}{2}$ "	1"
1- $\frac{1}{2}$ " METER	1- $\frac{1}{2}$ "			
2" METER	2"			

NOTES:

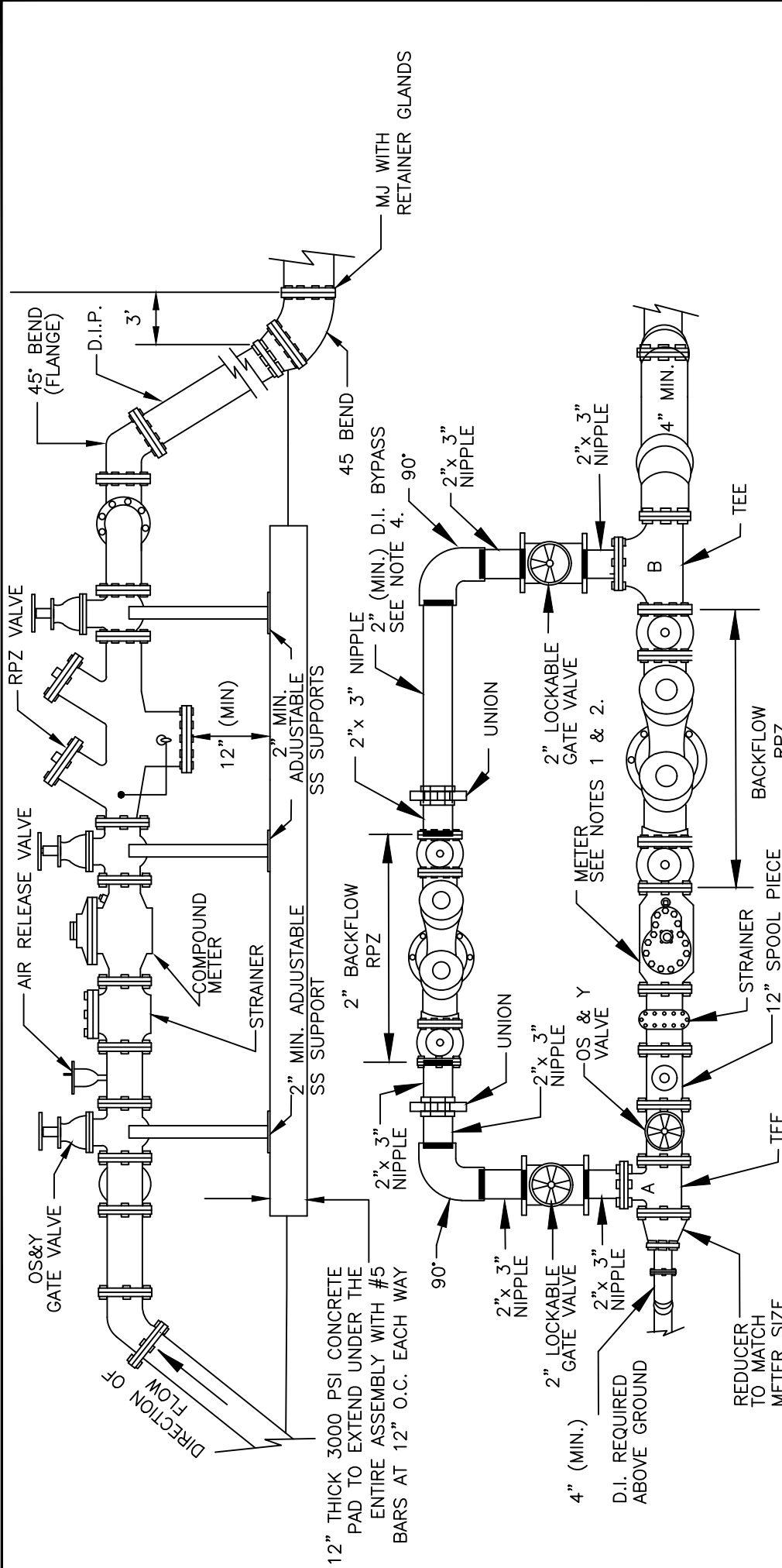
1. 1- $\frac{1}{2}$ " AND LARGER METERS SHALL BE SERVED BY SINGLE SERVICES ONLY.
2. WYE CONNECTORS (SEE APPROVED PRODUCT LIST) SHALL BE USED FOR MULTI-SERVICE. SUCCESSIVE TAPS INTO WATER MAIN WILL BE NO CLOSER THAN 24" APART.
3. ALL CASING PIPE SHALL EXTEND A MINIMUM OF 5' BEYOND THE EDGE OF PAVEMENT, WITH A CASING DIAMETER TO BE NO LESS THAN 4". CONDUIT SHALL BE MARKED WITH A ELECTRONIC MARKER (SEE COUNTY APPROVED PRODUCT LIST, APPENDIX F).
4. TAPPING SADDLE, CORPORATION STOP, POLY TUBING, CURB STOP, AND METER BOXES SHALL BE INSTALLED BY CONTRACTOR AT THE TIME OF WATER MAIN INSTALLATION.
5. ALL PLANTINGS SHALL BE A MINIMUM 3' FROM METER BOX, AND SHALL PROVIDE A 3' ACCESS OPENING.
6. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61 AND THE REDUCTION OF LEAD IN DRINKING WATER ACT AMENDING THE SAFE DRINKING WATER ACT.
7. ALL CONNECTIONS ARE FORD PRODUCT MODEL NUMBERS, SEE APPROVED PRODUCT LIST.



SERVICE CONNECTION SIZING CHART

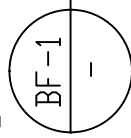
NOT TO SCALE

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	DATE: MAY 2023
	DWG #: W-17.DWG



STANDARD METER BACKFLOW ASSEMBLY

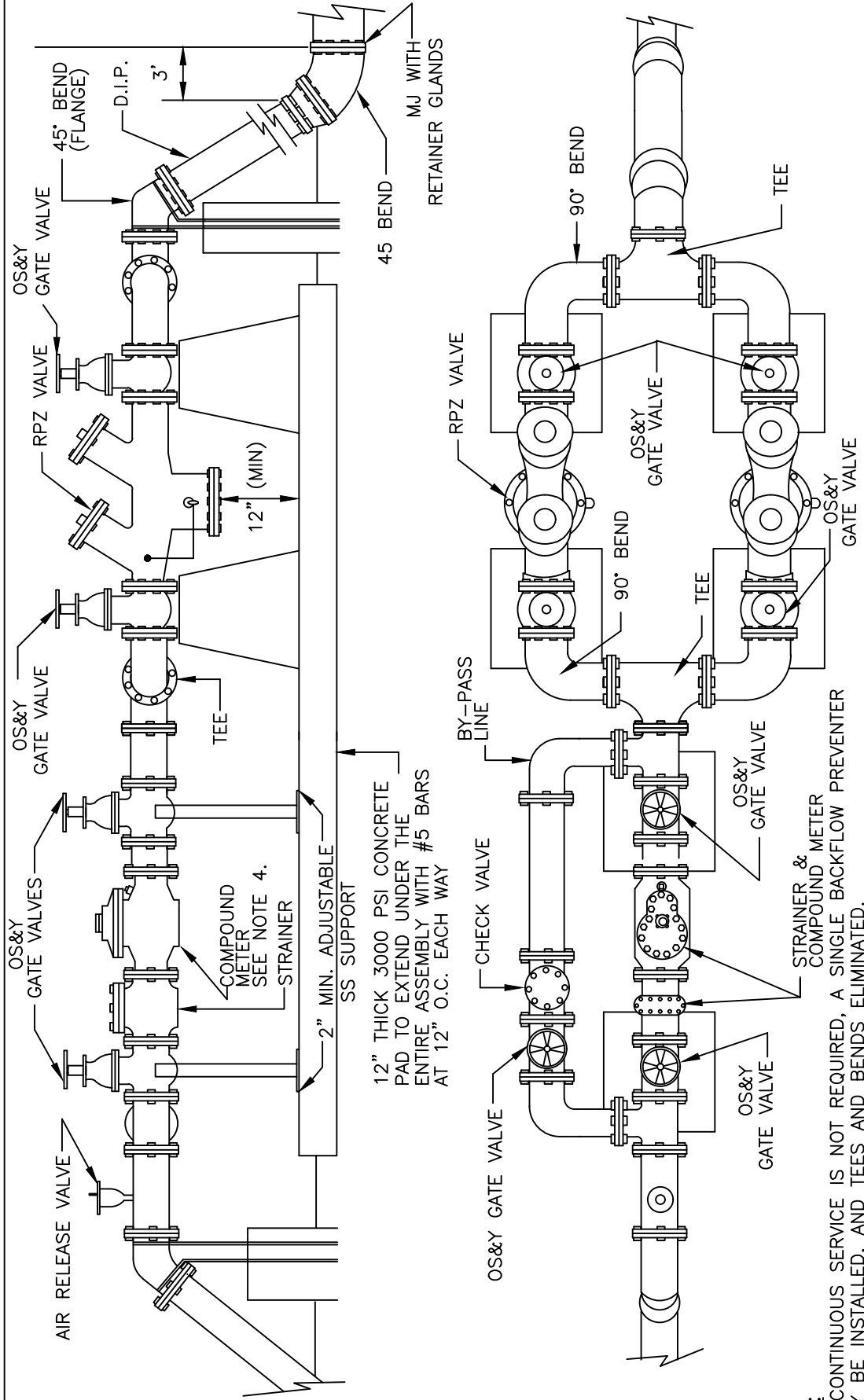
NOT TO SCALE



NOTES:

1. METER SIZE DETERMINES CONFIGURATION SIZE BETWEEN TEE "A" & "B".
2. METER TO BE NEPTUNE RADIO READ ONLY TOUCH PAD READ REGISTER ONLY.
3. ENTIRE APPARATUS TO BE PAINTED WITH UV RATED PAINT. (EXCEPT METER), RED FOR FIRE SERVICE AND BLUE FOR POTABLE SERVICE.
4. BYPASS TO BE A MAXIMUM OF ONE PIPE DIAMETER SMALLER THAN MAIN LINE.
5. NO. 1 VALVE ON MAIN LINE TO BE CHAIN LOCKED IN OPEN POSITION THROUGH YOKE AND HANDWHEEL. NO. 1 VALVE ON BYPASS TO BE CHAIN LOCKED IN CLOSED POSITION THROUGH YOKE AND HANDWHEEL. LOCKS TO BE FURNISHED BY MIU.
6. SUPPORTS TO BE 2" MIN., 316 SS, ADJUSTABLE, ATTACHED TO PAD WITH 316 SS ANCHOR BOLTS.
7. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT SEAT, HAND WHEEL, OUTSIDE STEM & YOKE (OS&Y) TYPE, SEE APPROVED PRODUCT LIST.
8. ALL BRASS FITTINGS TO BE LEAD FREE OR NO LEAD. SEE APPROVED PRODUCT LIST. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61
9. DEPENDING ON LOCATION OF ASSEMBLY, A FENCE MAY BE REQUIRED AROUND IT FOR SAFETY.

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960 North Collier Blvd. MARCO ISLAND, FL 34145		DATE: MAY 2023
		DWG #: BF-1.DWG



NOTE:

1. IF CONTINUOUS SERVICE IS NOT REQUIRED, A SINGLE BACKFLOW PREVENTER MAY BE INSTALLED, AND TEES AND BENDS ELIMINATED.
2. SUPPORTS TO BE 2" MIN. 316 SS, ADJUSTABLE, ATTACHED TO PAD WITH 316 SS ANCHOR BOLTS.
3. METER TO BE NEPTUNE RADIO READ ONLY. USE COMPOUND METER IF ASSEMBLY IS FOR POTABLE WATER ONLY.
4. NO. 1 VALVE ON MAIN LINE TO BE CHAIN LOCKED IN OPEN POSITION THROUGH YOKE AND HANDWHEEL. NO. 1 VALVE ON BYPASS TO BE CHAIN LOCKED IN CLOSED POSITION THROUGH YOKE AND HANDWHEEL. LOCKS TO BE FURNISHED BY MIU.
5. METER SIZE DETERMINES CONFIGURATION SIZE BETWEEN TEE "A" & "B".
6. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT SEAT, HAND WHEEL, OUTSIDE STEM & YOKE (OS&Y) TYPE, SEE APPROVED PRODUCT LIST.
7. ENTIRE APPARATUS TO BE PAINTED WITH UV RATED PAINT. (EXCEPT METER), RED FOR FIRE SERVICE AND BLUE FOR POTABLE SERVICE.
8. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.

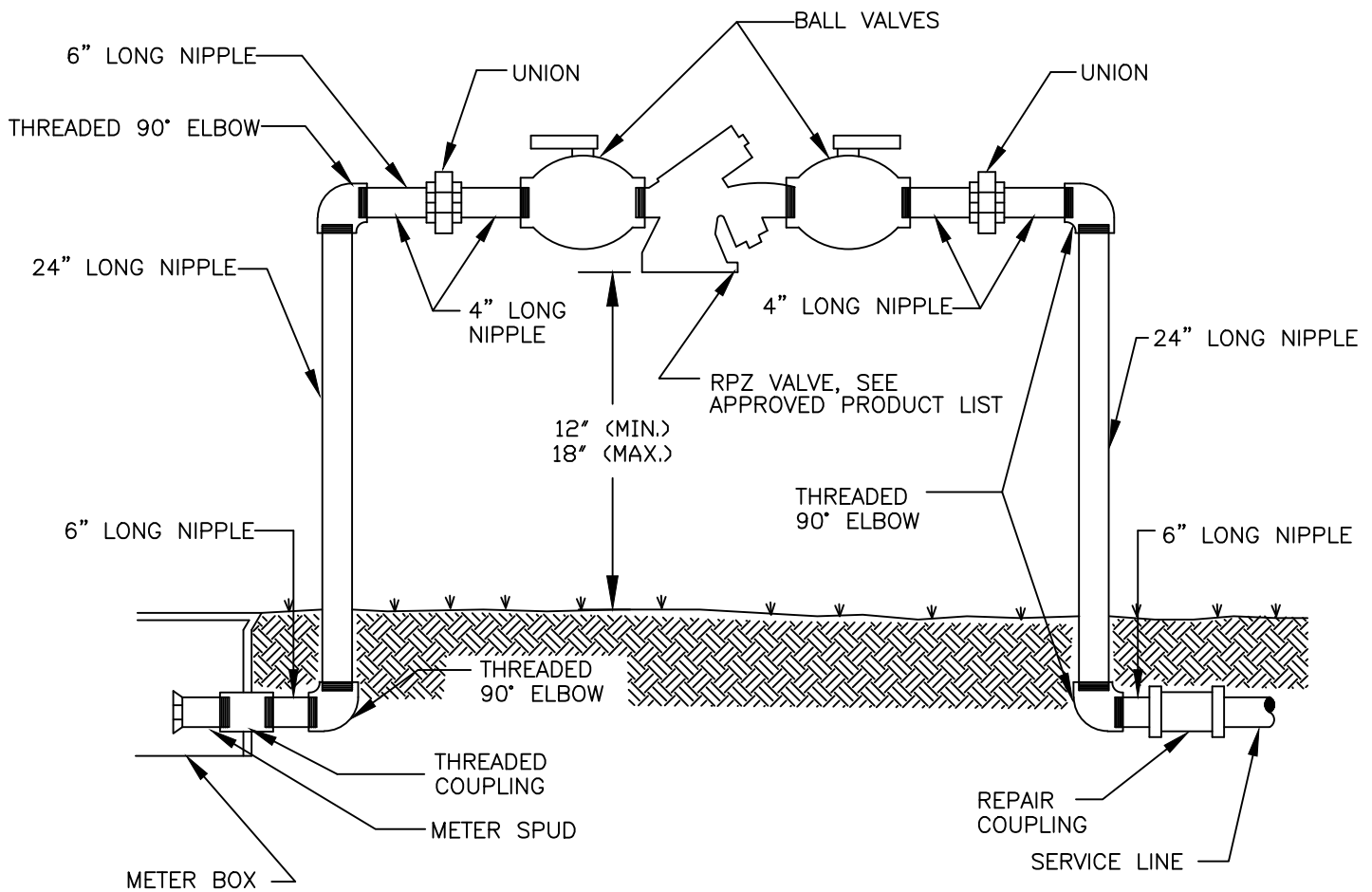
BF-2

NOT TO SCALE

(ONLY WITH MI WAS DEPT. PRIOR APPROVAL)

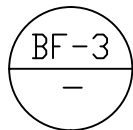
MARCO ISLAND UTILITIES
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SCALE: NOT TO SCALE
 DATE: MAY 2023
 DWG #: BF-2.DWG



NOTES:

1. FITTINGS ARE TO BE LEAD FREE OR NO LEAD BRASS.
2. STRAIGHT PIPE RUNS ARE TO BE TYPE "K" COPPER.
3. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO ANSI/NSF STANDARD 61.



3/4" - 2" BACKFLOW ASSEMBLY

NEW INSTALLATIONS (EXCEPT FOR BACKFLOWS ON FIRELINES)
NOT TO SCALE

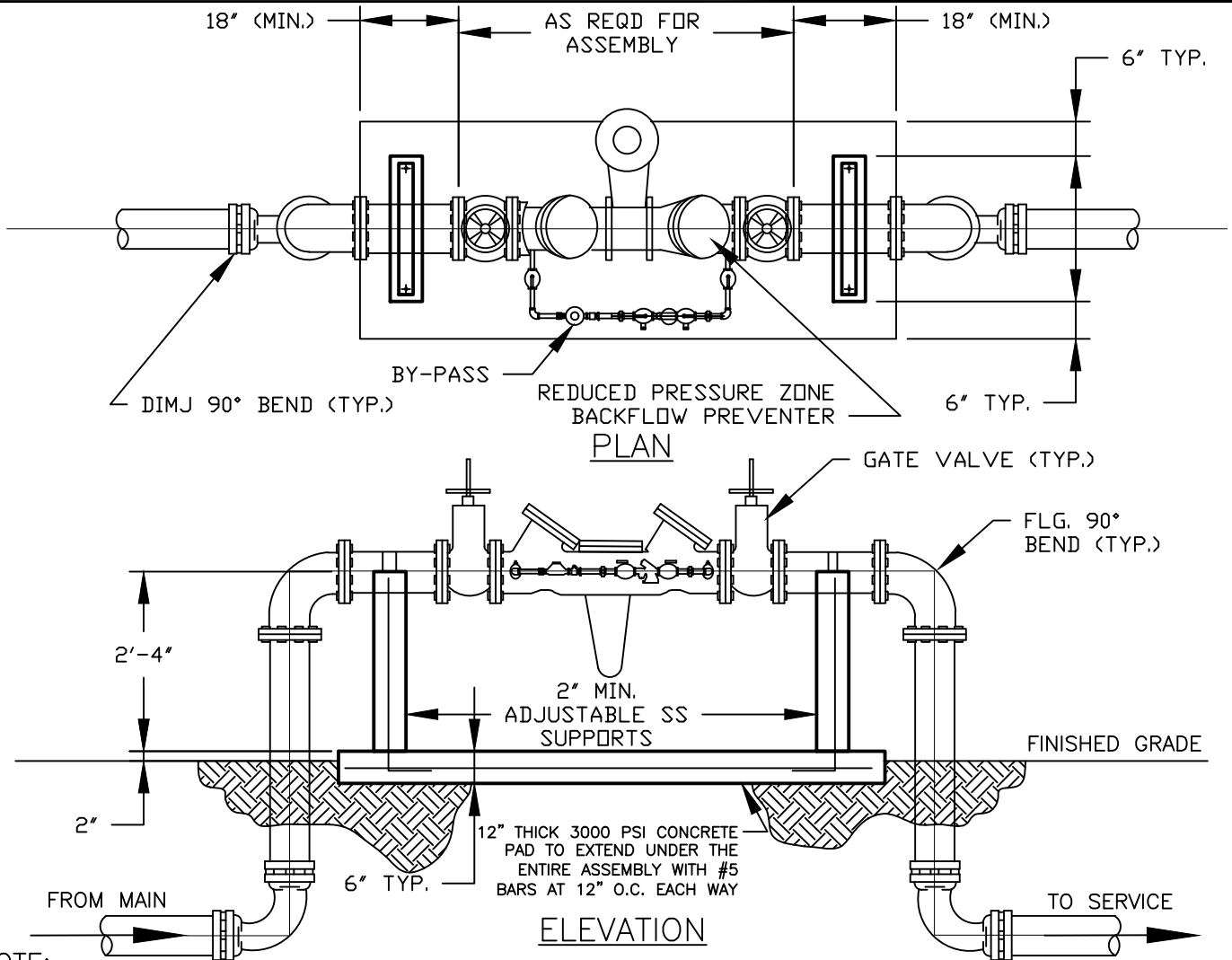
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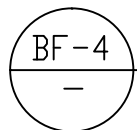
DATE: MAY 2023

DWG #: BF-3.DWG



NOTE:

1. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT SEAT, HAND WHEEL, OUTSIDE STEM & YOKE (OS&Y) TYPE, SEE APPROVED PRODUCT LIST.
2. ALL ABOVE GRADE PIPING 3 INCHES IN DIA. & LARGER SHALL BE DUCTILE IRON WITH FLANGED ENDS, CLASS 53. ALL BELOW GRADE PIPING SHALL BE DIMJ W/ RESTRAINING TYPE DEVICES, MEGA-LUG OR APPROVED EQUAL.
3. BY-PASS LINE SHALL CONSIST OF A TOTALIZING NEPTUNERADIO ONLY METER (REGISTERING IN GALLONS) AND REDUCED PRESSURE ZONE BACKFLOW ASSEMBLY. METER & PIPING SHALL BE BRASS AND BYPASS VALVES MUST HAVE A LOCKING MECHANISM.
4. DEPENDING ON LOCATION, A FENCE MAY BE REQUIRED AROUND ASSEMBLY FOR SAFETY.
5. FIRE MAIN SHALL BE IN ADDITION TO CUSTOMER SERVICE/SUPPLY MAIN.
6. OWNER SHALL TEST ASSEMBLY AND SUBMIT TEST REPORTS TO MIU ANNUALLY.
7. SUPPORTS TO BE 2" MIN., 316 SS, ADJUSTABLE, ATTACHED TO PAD WITH 316 SS ANCHOR BOLTS.
8. NO. 1 VALVE ON MAIN LINE TO BE CHAIN LOCKED IN OPEN POSITION THROUGH YOKE AND HANDWHEEL. NO. 1 VALVE ON BYPASS TO BE CHAIN LOCKED IN CLOSED POSITION THROUGH YOKE AND HANDWHEEL. LOCKS TO BE FURNISHED BY MIU.
9. ENTIRE APPARATUS TO BE PAINTED WITH RED UV RATED PAINT. (EXCEPT METER).
10. ALL BRASS FITTINGS TO BE LEAD FREE OR NO LEAD. SEE APPROVED PRODUCT LIST. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.



DEDICATED FIRE FLOW BACKFLOW ASSEMBLY

NOT TO SCALE

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960 N. COLLIER BLVD.
MARCO ISLAND, FL 34145

SCALE: NOT TO SCALE

MAY 2023

DWG #: BF-4.DWG

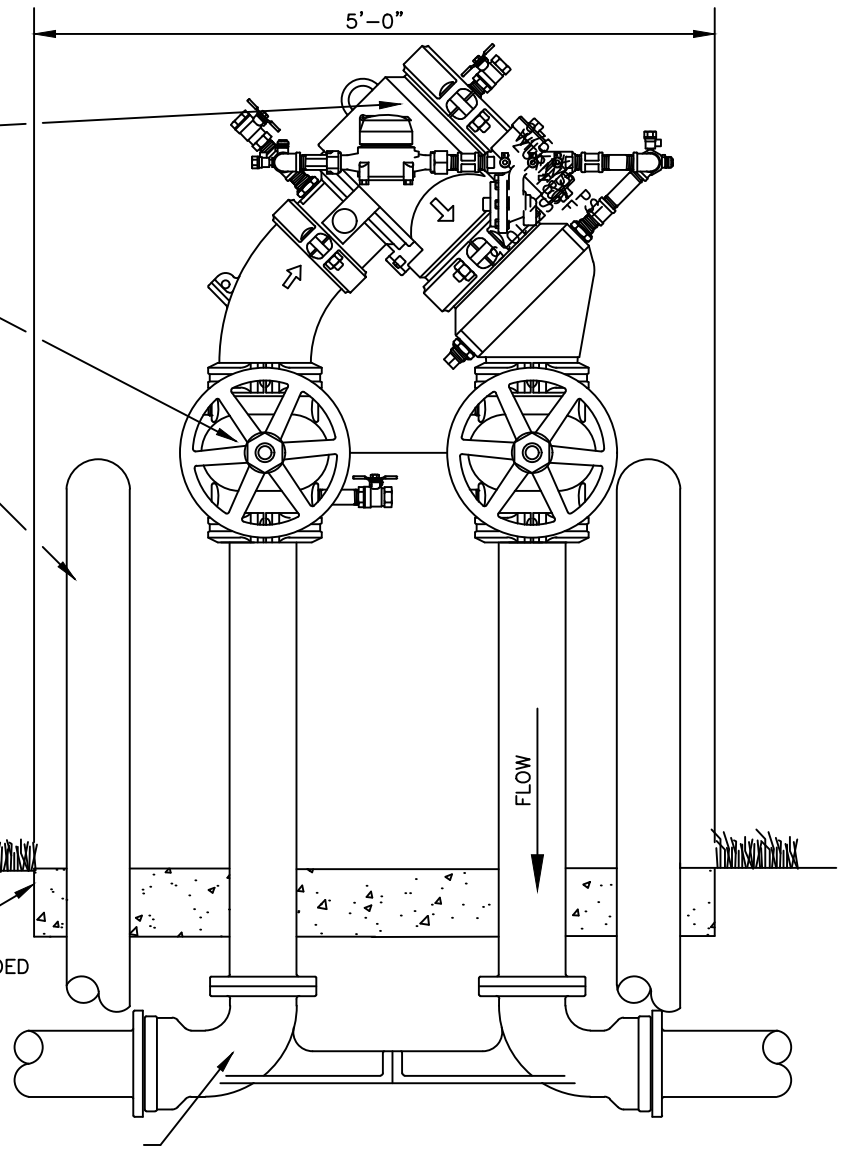
REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY (SEE APPROVED BACKFLOW DEVICES, APPENDIX G)

FLANGED GATE VALVE WITH RISING STEM AND RESILIENT SEAT (TYP)

VEHICULAR GUARD POST (TYP)

CONCRETE FOUNDATION (TYP)
4' WIDE x 5' LONG, 6" THICK;
REINFORCED 6 x 6 10/10 WELDED WIRE MESH

VALVE SETTER (SEE APPROVED PRODUCT LIST)



NOTES:

1. ALL ABOVE GROUND PIPE WILL HAVE FLANGED END DUCTILE IRON PIPE, PRESSURE CLASS 350. ALL NUTS AND BOLTS SHALL BE STAINLESS STEEL.
2. (4) VEHICULAR GUARD POSTS TO BE INSTALLED AROUND METER. CONFIGURATION TO BE ILLUSTRATED ON CONSTRUCTION DOCUMENTS SUBMITTED FOR REVIEW AND APPROVAL.
3. ASSEMBLY WILL BE OWNED AND MAINTAINED BY PROPERTY OWNER, STARTING AFTER MASTER METER.
4. BACKFLOW DEVICE REQUIRES INITIAL CERTIFICATION BY AN APPROVED CERTIFIED TESTER WITH RESULTS AND ANNUAL TEST RESULTS SUBMITTED TO THE CITY.
5. ALL PLANTING SHALL BE A MINIMUM OF 1.5' FROM THE EDGE OF SLAB, AND SHALL PROVIDE A 3' ACCESS OPENING.
6. ALL ABOVE GROUND PIPING INCLUDING ASSEMBLY SHALL BE PAINTED RUSTOLEUM FEDERAL SAFETY RED.
7. ALL COMPONENTS THAT COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF STANDARD 61.

4" - 10" ONLY COMPACT FIRE SYSTEM ASSEMBLY
W/ NEPTUNE DETECTOR METER

BF-5
-

NOT TO SCALE

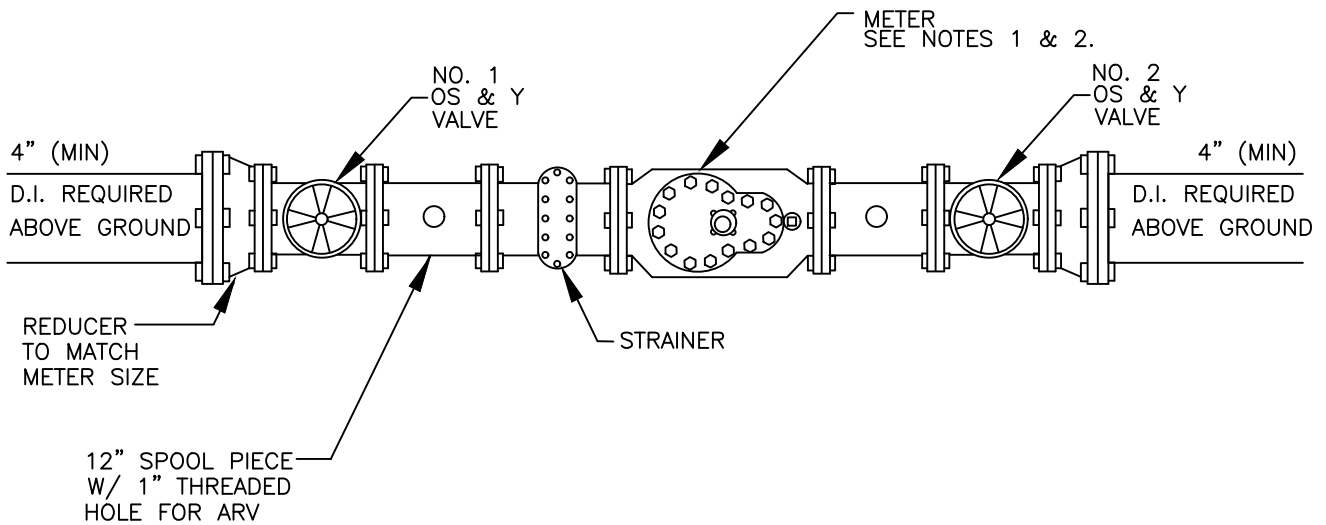
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DATE: MAY 2023

DWG #: BF-5.DWG



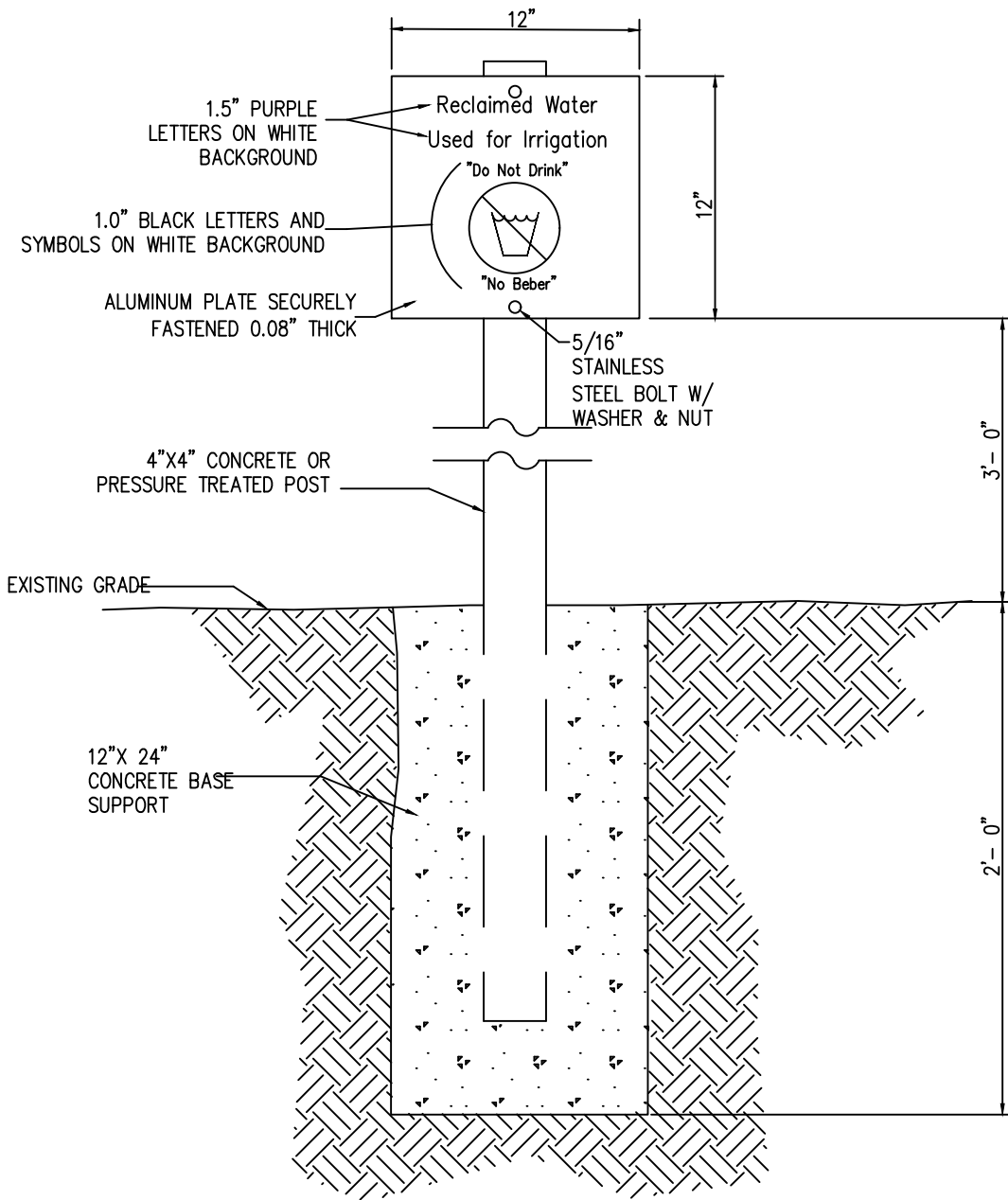
NOTES:

1. METER SIZE DETERMINES CONFIGURATION SIZE BETWEEN NO. 1 AND NO. 2 VALVE.
2. METER TO BE NEPTUNE RADIO READ REGISTER ONLY.
3. ENTIRE APPARATUS TO BE PAINTED WITH UV RATED PAINT. (EXCEPT METER), PURPLE FOR NON-POTABLE SERVICE.
4. NO. 1 VALVE ON MAIN LINE TO BE CHAIN LOCKED IN OPEN POSITION THROUGH YOKE AND HANDWHEEL. LOCK TO BE FURNISHED BY MIU.
5. SUPPORTS TO BE 316 SS, ADJUSTABLE.
6. ALL ABOVE GRADE GATE VALVES SHALL BE RESILIENT SEAT, HAND WHEEL, OUTSIDE STEM & YOKE (OS&Y) TYPE.
7. INSTALL NON-POTABLE WATER SIGN. (SEE DETAIL SS-20).
8. SEE DETAIL BF-4 FOR PIPE SUPPORT AND CONCRETE PAD DETAILS.

BF-6
 -

3" AND LARGER NON-POTABLE AND RAW WATER METER ASSEMBLY
NOT TO SCALE

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	DWG #: BF-6.DWG



BF-7 NON-POTABLE WATER SIGN
- NOT TO SCALE

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	DATE: MAY 2023
	DWG #: BF-7.DWG

APPENDIX A-1

PROJECT: _____

CHECKLIST FOR SANTIARY SEWER COLLECTION SYSTEM INSPECTIONS

GENERAL: All inspections are to be called for **24 hours in advance**. Contact CMI W&S DEPT.

All test results and other submittals are specified in the Utility Standards and shall be submitted to CMI W&S DEPT. within 5 days of contractor receipt.

PEOPLE ATTENDING SPECTIONS: A) Contractor's Representative
 B) Engineer's Inspector
 C) CMI W&S DEPT. Inspector

DESCRIPTION	CONSTRUCTION STANDARDS		DATE	COMMENTS
	PAGE	SECTION		
Clearing				
Materials				
Subgrade				
Wet Trenches				
Pipe Laying				
Services				
WYE Record				
Anchorage				
LD. Taping				
Final Lamping				

APPENDIX A-2

PROJECT: _____

CHECKLIST FOR SANITARY SEWER COLLECTION SYSTEM INSPECTIONS

PEOPLE ATTENDING SPECTIONS: A) Contractor’s Representative
 B) Engineer’s Inspector
 C) CMI W&S DEPT. Inspector

DESCRIPTION	CONSTRUCTION STANDARDS		DATE	COMMENTS
	PAGE	SECTION		
Manholes				
Concrete				
Infiltration				
Exfiltration				
Deflection				
Backfill Compaction				
Transition Details				
Submittals				

APPENDIX A-3

PROJECT: _____

CHECKLIST FOR SEWAGE LIFT STATION INSPECTION

GENERAL: All inspections are to be called for **24 hours in advance**.

PEOPLE ATTENDING SPECTIONS: A) Contractor's Representative
 B) Engineer's Inspector
 C) CMI W&S DEPT. Inspector

DESCRIPTION	CONSTRUCTION STANDARDS		DATE	COMMENTS
	PAGE	SECTION		
Clearing				
Dewatering				
Wet Well				
Main Connection				
Control Center Location				
Lift Station Punchlist				

APPENDIX A-4

PROJECT: _____

CHECKLIST FOR SANTIARY SEWAGE LIFT STATION INSPECTION

GENERAL: All inspections are to be called for **24 hours in advance**. Contact CMI W&S DEPT.

PEOPLE ATTENDING SPECTIONS: A) Contractor's Representative
 B) Engineer's Inspector
 C) CMI W&S DEPT. Inspector

	YES	NO
I. Prior to Inspection Time		
A. Utility Site Inspection Checklist Complete		
B. Ensure collection system flushed clean		
C. Ensure well is pumped clean and all debris removed by means other than permanent pumps.		
D. Have water and power available to test pump(s) and controls		
E. Have factory representatives for all major equipment present (include installing electrician, if necessary)		
F. Have necessary equipment (hoist) on hand for raising and lowering pumps.		
G. Have O&M literature, spare parts, record drawings, etc. for transmittal to owner representative.		
II. Well		
A. Grouting		
1. At base – infiltration? Slope plug all influent lines, pump dry, check for amount of infiltration over 24-hour period, if possible.		
2. At joints –		
Leakage (staining)		
Troweled smooth		
3. At cover		
Leakage		
Cover-to-well bond		
4. Painting		
B. Position		
1. Is base level?		
2. Walls plumb?		
3. Cover level – no ponding, above ground		

	YES	NO
III. Pumps – Are volutes clear?		
A. Run pump(s) individually on “Hand”		
1. Excessive vibration		
2. Discharge piping leakage		
3. Check electric “loading” on each pump circuit as tested		
4. Note indicator light operation and meters at panel		
B. Run pumps simultaneously on “hand”		
1. Excessive vibration		
2. Discharge piping leakage		
3. Check “loading” on circuits		
4. Note drawdown rate		
5. Allow pumps to run dry		
6. Note indicator light and meter operation at panel		
C. Raise pumps up and out of well (Manu. rep.)		
1. Are chains/cables of sufficient strength?		
2. Release pumps at discharge connection		
3. Smooth operation on guide rails		
4. Rails secure		
5. Pumps clear valves, etc., when raised and removed, cables free		
D. Pumps out of well		
1. Rotation correct		
2. Check/record plat information		
a. Serial Number		
b. G.P.M.		
c. Head		
d. H.P.		
E. Lower pumps into well		
1. Travel on rails		
2. Connection to discharge		
3. Seal at discharge		
4. Cables clean		
Raise floats from well, while testing, refill well		
IV. Equipment check-off list		
A. Pumps		
B. Rails		
C. Valves		
1. Shut-off		
2. Check		

	YES	NO
D. Control Panel		
1. Mount (concrete post)		
2. Enclosure		
3. Auxiliary power		
a. Receptacle		
b. Alternator		
4. Alarm		
a. Audio		
b. Visual (Flasher)		
5. Conduit Seal		
a. Pump Cables		
b. Control wires		
6. Power		
a. Overhead		
b. Underground		
E. Access Hatch		
1. Cover		
a. Fit		
b. Operation		
c. Lock		
d. Paint		
2. Frame		
a. Fit		
b. Grout		
c. Paint		
F. Rack for float controls cable.		
1. Excess cable stored neatly		
G. Hook for chain/cable at top		
H. Chain/cables for raising		
I. Conduit seal at well cover		
1. Pump cables		
2. Control cables		
J. Vent pipe through cover-goose-necked		
K. If valve box:		
1. Gravel in bottom		
2. Return to well		

	YES	NO
L. Telemetry		
1. Radio Signal		
2. Software interface		
V. BILLING		
1. Notify Customer Services of connection so they can begin billing process.		

APPENDIX B1

**PRESSURE TEST REPORT
CITY OF MARCO ISLAND WATER & SEWER DEPARTMENT**

Project: _____

Date: _____

Witnessed by: _____

Type of Line: _____ Water Main _____ Force Main

Diameter _____ inches (D)

Length _____ feet (S)

Test Pressure _____ PSI

TEST

Start _____ PSI @ _____ (time in minutes, or time zero) P1 @ T1

Stop _____ PSI @ _____ (time in minutes) P2 @ T2

Average Test Pressure (P) _____ PSI, $P = (P1 + P2) / 2$ (must be greater than 100 psi)

Test Time (T) = T2 – T1 (must be greater than 60 minutes)

Record water consumed during test (leakage) _____ gal (G)

Recorded leakage = $60 (G / T)$ = gallons per hour

Calculate Allowable Leakage per AWWA C600 (L)

$$L = (SD\sqrt{P}) / 133,200$$

= _____ gallons per hour

Passed ____ YES ____ NO (Pass if Recorded Leakage is less than Allowable Leakage)

APPENDIX B2

**LOW PRESSURE AIR TEST REPORT
CITY OF MARCO ISLAND WATER & SEWER DEPARTMENT**

Project: _____

Date: _____

Witnessed by: _____

Pipe Material: _____

Diameter _____ inches

Length of Test Section _____ feet

Recorded Time _____ minutes

Allowable Time _____ minutes (see table)

Length of Test Section (feet)	Test Time (minutes:seconds)	
	10" Dia. Pipe	8" Dia. Pipe
<150	7:34	9:26
150-175	7:34	9:26
176-200	7:34	9:26
201-225	7:34	9:53
226-250	7:34	9:53
251-275	7:35	11:52
276-300	7:35	11:52
Length > 325 < 500	8:50	13:50

Passed _____ YES _____ NO

APPENDIX D

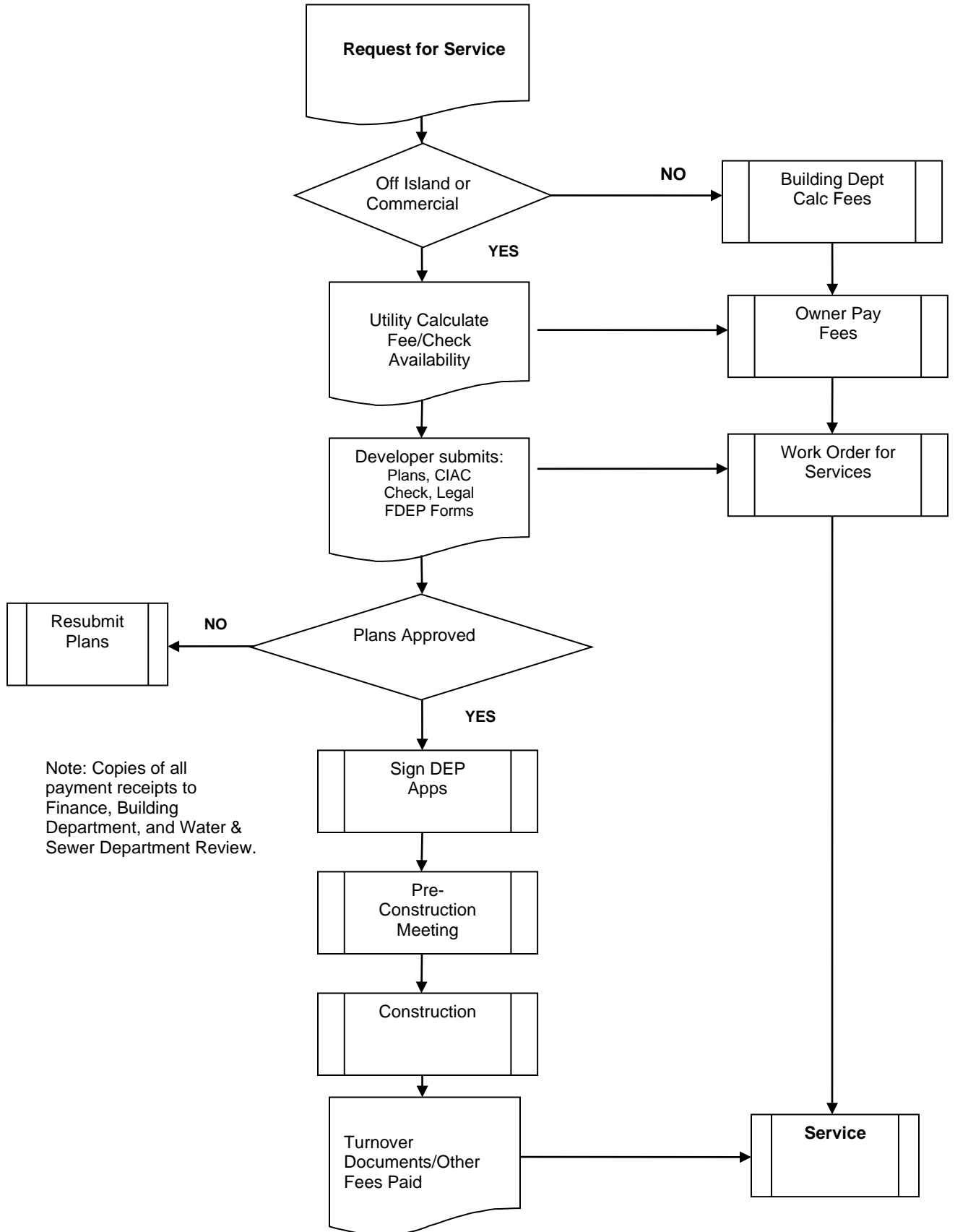
TURNOVER DOCUMENTS CHECKLIST CITY OF MARCO ISLAND WATER & SEWER DEPARTMENT

Item	Description	Check-Off
1	Electronic Record Drawings in AutoCAD 2010 or later edition (confirm with CMI W&S DEPT.), and three (3) hard copy sets of Record Drawings (24x36). Utilities shown in all proposed, final, and record plan sets are to be color coded, with existing utilities shown in black. Provide files in DWG and PDF format.	
2	Final plat on disk in AutoCAD 2006 minimum.	
3	Water: bacteriological, pressure and leakage test results as well as any other tests deemed necessary by City of Marco Island.	
4	Gravity Sewer: Leakage tests, TV report and results of mandrel test.	
5	Force Main: pressure and leakage test results.	
6	Easement(s) dedicated to City of Marco Island (notarized and recorded with the County).	
7	Contractor's Letter of Warranty for a period of one year after acceptance by City of Marco Island (signed and sealed by professional engineer).	
8	Contractor's Waiver & Release of Lien (recorded with the County).	
9	Developer's Engineer Letter of Certification (signed, sealed and dated).	
10	Bill of Sale for water and wastewater contributed property with accurate cost records establishing the construction cost of the completed additions (a copy of related construction contracts duly certified by a notary of the State of Florida as true and correct copies of the originals required).	
11	As-Built Inspection Records: Contractor is responsible for scheduling field inspection/site visits by CMI W&S DEPT.	
12	Backflow Prevention Inspection Report and Testing: Contractor is responsible for scheduling field inspection by CMI W&S DEPT.	
13	Start-up Report and O&M Manual on Pump/Lift Station: Contractor is responsible for scheduling field inspection by CMI W&S DEPT.	

APPENDIX E

NEW SERVICE PROCEDURES CITY OF MARCO ISLAND WATER & SEWER DEPARTMENT

1. New residential customers on the Island should complete the Application for Services and pay fees at the Building Department. If main extensions or laterals are required, procedures for commercial customers apply.
2. All non-resident customers and “off Island customers” should complete the application for services and return to the Department Review Section at the City of Marco Island Water & Sewer Department (CMI W&S Dept.). You will be notified by letter of availability and fees due.
3. All required new infrastructure shall be designed and constructed in accordance with the City of Marco Island Technical Standards Manual (Standards) latest edition. The improvements will be dedicated to the City of Marco Island unless otherwise noted in the approved plans.
4. After receipt of Availability Notification, submit three sets of plans and FDEP applications signed and sealed by a registered professional engineer, and a check for fees due. Plans will not be reviewed nor FDEP application executed until fees are paid.
5. When approved plans are received, please schedule a pre-construction meeting with the Utility Department.
6. City of Marco Island Water & Sewer Department will conduct periodic inspections and must be notified two days in advance of specific milestones as specified in the Standards.
7. Turnover documents and final payment of fees must be submitted before service connections are made. Mains are not to be tapped without CMI W&S Dept. representative present. FDEP approval letter is mandatory for final connections.
8. Water meters up to 2 inches will be supplied by CMI W&S Dept. for residential services. Developer is responsible for all commercial meters, and meter boxes, which are to be supplied in accordance with the Standards.
9. All backflow devices will be furnished, maintained and tested annually by a TRICO or FWPCOA licensed State tester in accordance with the Standards. Test results shall be reported to CMI W&S Dept. within 10 working days of installation, and repairs completed with 10 working days of annual inspection date to prevent termination of water service.
10. In the unlikely event that Standards conflict with regulations of higher authority such as FDEP or Health department or Fire Departments, please notify CMI W&S Dept. Regulations by higher authority supercede Standards and procedures referenced in this document.



APPENDIX F

REQUEST FOR TEMPORARY INTERRUPTION OF SERVICES

CITY OF MARCO ISLAND WATER & SEWER DEPARTMENT

Date of Request: _____

Company Name: _____

Person's Name Making Request: _____ Title: _____

Date of Proposed Event: _____

Describe why Temporary Interruption of Services is being requested in detail:

Requested Time Frame of Temporary Interruption of Service: Date: _____ to _____
Time: _____ AM to _____ PM

Type of service Interruption: Water main, Water Service, Force Main, Gravity Main, Left Station, Reuse, Raw Water, Power, Other: _____

Size of Pipe: _____ Depth of Pipe: _____ ‘ _____ “

Pipe Material: Asbestos Concrete, PVC, Clay, Ductile, Other: _____

Outside Diameter of Existing Pipe at Connection Points:

Have the correct pipe fittings been purchased? _____ List all fittings and diameter range of proposed fitting: _____

Are pumper trucks and/or portable generators required to perform job task? _____

Requests for Temporary Interruption Services will require a site visit by City of Marco Island Water & Sewer Department (CMI W&S Department) Collections and Distribution Manager, Field Supervisor, and Project Manager. Please submit a written alternative/ emergency plan with the "Request for Temporary Interruption of Services" to ensure that service(s) will be restored within the time frame specified above. Contractors are subject to any expenses incurred by CMI W&S Department beyond our control. CMI W&S Department reserves the right to terminate project at any time, at contractor's expense. At anytime work extends beyond scheduled time because of inadequate planning or preventable acts with contractor's control, contractor will be assessed CMI W&S Department expenses incurred as a result of the delay. By signing this document, the contractor and CMI W&S Department are in agreement with terms as listed in the document.

Collections and Distribution Manager _____ Date: _____

Field Supervisor _____ Date: _____

Project Manager _____ Date: _____

Contractor's Project Manager _____ Date: _____

Contractor's Job Foreman _____ Date: _____

APPENDIX G

LIST OF ABBREVIATIONS

List of Abbreviations

MIU	Marco Island Utilities Department
SFWMD	South Florida Water Management District
FDEP	Florida Department of Environmental Protection
USACOE	US Army Corps of Engineers
NAVD	North American Vertical Datum
NGS	National Geodetic Survey
NAD	North American Datum
NSF	National Science Foundation
GPM	gallons per minute
PSI	pounds per square inch
psig	pounds per square inch gage (relative to atmospheric)
ERC	Equivalent Residential Connection
AWWA	American Water Works Association
NSF	National Sanitation Foundation
HDPE	High-Density Polyethylene
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
VOC	Volatile Organic Compounds
USSI	US Seismic Systems Inc.
NEMA	National Electrical Manufacturers Association

SCADA Supervisory Control and Data Acquisition
FDOT Florida Department of Transportation
DFT Dry Film Thickness (for painting systems)

APPENDIX H

UTILITY DEVIATION REQUEST

Any request for a deviation from the City of Marco Island Water and Sewer Department Manual of Standards and Specifications must be submitted on the Utility Deviation Form and should include all required information for a faster and more efficient process. Please submit your request to the City of Marco Island Water and Sewer Department.

Please maintain one deviation per form and select the appropriate type(s) of deviation (Wastewater, Water, or Reclaimed/Irrigation Water). Ensure to select whether the deviation is on a private owner or City owner system. Include a drawing that has the area(s) of interest highlighted for quick referencing.

Please include any and all equipment specification information, pressures and velocities of flows, or other pertinent documentation and a cover letter to give additional information that may not be addressed on the form.

Typically, Utility Deviation requests are processed within 5-10 business days. You will be notified by email of the outcome of your deviation request. If the deviation is rejected, a meeting may be requested with the appropriate staff to discuss.



UTILITY DEVIATION FORM
Petitioners Request

Date: _____ Wastewater Water IQ Water

Land Use Application # _____ Privately Owned County Owned

Project Name: _____

Folio Number(s): _____

Petitioner's Name & Business Name: _____

Business Address: _____

Phone #: _____

Email: _____

REQUIRED INFORMATION

Cover Letter w/Pertinent Information

Site Drawings

Detail Specifications

Reason for Request: _____

How does this Request Differ from Standard: _____

Impact of this Request of Affected Area: _____

Impact of this Request on the Maintenance of the System: _____

Explain Benefits Request Will Have to the Operation/Maintenance of the City of Marco Island Water and Sewer Department

System: _____

Additional Comments: _____

APPENDIX I-1

VENDOR AND MANUFACTURER APPROVAL APPLICATION FORM

Please prepare the completed Approval Application Form along with all requested information and submit all documents to the City of Marco Island Water and Sewer Department as noted below. All documents must be in either PDF or WORD or EXCEL format. Other file formats will not be accepted. Faxes will not be accepted.

VENDOR AND MANUFACTURER APPROVAL APPLICATION FORM

Date: _____

A. Application Contact Name & Business:

Address _____

Phone # _____ Fax # _____

Email address _____

B. Manufacturer of Product

Address _____

Phone # _____ Fax # _____

Email address _____

C. Specific Location(s) of Product Manufacture and Assembly

Address _____

Phone # _____ Fax # _____

Email address _____

D. Identify specific City Detail(s) or Specification(s) on which approval is sought.

E. Is the applicant the product manufacturer? If not, describe the relationship of the applicant to the manufacturer.

Yes _____

No _____

F. Is the product available through more than one vendor? Describe who will provide sales and service to the City for the submitted product.

Yes _____ No _____

G. Is the product is manufactured in whole or in part outside of the United States?

Yes _____ No _____

H. If the answer to Item G is Yes, attach copy of ISO 9001 Quality Control current certification certificates for the manufacturer and the point of manufacture.

I. How long has the specific product or service being proposed been on the market for public purchase?

No. of Years _____

J. In the case of applicators or installers, for how long has work been commenced and completed using the specific product or service being proposed?

No. of Years _____

K. Provide a product or service customer reference list that identifies the organization, location, contact person, email address, phone number, date of first installation, date of completion, number of products used, and the specific application of the product with each reference. Applicators and installers must have at least three references using the specific product or service being proposed.

L. Provide a list identifying the public utility departments or organizations that have approved your product. Preference should be given to utility departments within the state of Florida. The list must include a contact name, email address and phone number at each public utility.

M. Attach legible copies of pertinent product data sheets, shop drawings and performance data to assist with the City’s review. All information must be submitted with the Application form. Clearly identify what product and product sizes are being proposed. Complete submittals are required with initial application, and supplemental submittals will not be accepted.

N. As applicable, provide copies of certifications that specific product being proposed meets the following standards:

UL Approval attached Yes_____ No _____

FM Approval attached Yes_____ No _____

NSF 61 Approval attached Yes_____ No _____

(NSF 61 approval is mandatory for all products that may be in contact with potable water.)

O. Summarize the advantages of the submitted product or service. Provide no more than one page of text.

P. Provide estimated unit cost for the submitted product or service.

Q. Provide separate estimated unit costs for the operation and the maintenance of the submitted product or service.

R. Based on the references identified above, identify the anticipated life of the submitted product or service before either replacement or major repair is needed.

S. Explain benefits this application will have to the operation and maintenance of the City Utility system:

The applicant hereby affirms the information provided with this Application Form is complete, accurate and current.

Submitted by _____

Signature _____

Firm name _____

Date _____

**APPENDIX I-2
City of Marco Island
Approved Product List
All Systems**

- Notes:**
1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal.
 2. If a product is not listed, refer to the Specifications for performance standards.

Item	Manufacturer	Model(s)/Comments
Casing Spacers Stainless Steel	Power Seal	4810
Casing Spacers Stainless Steel	Cascade Waterworks MFG Co.	CCS
Casing Spacer End Seals	Power Seal	EndSeal
Casing Spacer End Seals	Cascade Waterworks MFG Co	CCES
Electronic Markers (Shallow Burial)	3M Electronic Ball Marker (Programmable)	1423 – xRiD (Water Blue) 1424 – xRiD (Wastewater Green) 1428 – xRiD (Reclaimed Purple)
Electronic Markers (Jack & Bore and HDD)	3M Electronic Marker System (EMS) (Near Surface) (Programmable)	1434 – xRiD (Water Blue) 1435 – xRiD (Wastewater Green) 1438 – xRiD (Reclaimed Purple)
Geosynthetic Fabric	TenCate	Mirafi FW402
Joint Restraints (MJ Joints)	EBAA Iron	S.S. HDWE
	Sigma	S.S. HDWE
	Star	S.S. HDWE
	Romac	S.S. HDWE
Joint Restraints (Push-on)	EBAA Iron	S.S. HDWE, Minimum 4 Bolt
	Sigma	S.S. HDWE, Minimum 4 Bolt
	Star	S.S. HDWE, Minimum 4 Bolt
	Romac	S.S. HDWE, Minimum 4 Bolt
Metalized Tape (Locator)	Reef Industries, Inc. Houston, TX	Terra Tape
	Proline Safety Products	Detectable Tape (5.0 MIL)
Ductile Iron Pipe	American	
	McWane	
	U.S. Pipe	

**City of Marco Island
Approved Product List
All Systems**

- Notes:**
- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
 - 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
PVC Pipe	CertainTeed	AWWA C900, 14" Pipe Not Acceptable
	JM Eagle	
	National Pipe	
	Diamond Plastics	
Polyethylene Tubing	Performance Pipe	DriscoPlex 5100 Ultraline PE 3408
	Endot Industries	PE3408/PE4710
HDPE Pipe	WL Plastics – Performance Pipe – JM Eagle	DR11 DIS PE4710 (IPS Not Acceptable)
Pedestal Housings	Water Plus	Color to match Utility Standards Manual and be sized per the enclosed device.
	Channel	Color to match Utility Standards Manual and be sized per the enclosed device.
	Pencell	Color to match Utility Standards Manual and be sized per the enclosed device.
Fittings, Ductile Iron	McWane	See Specification for requirements.
	U.S. Pipe	
	NAAPCO	
	American	
	Tyler Union	
	Star Pipe Products	
Fittings, PVC	Multi Fittings	
	IPEX	

**City of Marco Island
Approved Product List
All Systems**

Notes:

- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
- 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Ductile Iron Pipe (Restrained)	U.S. Pipe	See Specifications for requirements.
	McWane	14" Pipe Not Acceptable
	American	
Valve Boxes	Tyler	
Expansion Joints	Mercer	
	Metraflex	
	EBAA Iron	
Flanged Adapter Connection	EBAA Iron	E2100 SERIES
	Victaulic	Vic Flange Style 741

**APPENDIX I-3
City of Marco Island
Approved Product List
Wastewater Systems - General**

- Notes:**
- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
 - 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Pipe-to-Manhole Connector	Trelleborg Pipe Seals	Kor-N-Seal I
Sewer Manhole Frame and Cover	US Foundry	USF 227-AS-ORS (Built Up) 24" Minimum
		USF 1295-AS-ORS (Slab Type) 24" Minimum
Sewer Clean Out Rim and Cover	US Foundry	USF 7621 – CI Traffic Cover
Sewer Manhole Riser Ring, HDPE/EPP	Ladtech/Cretex(EPP)	Riser Ring - Precast Concrete (No Brick)
Chimney Seal	Elasto-Shield	
	ElastaSeal	
Inflow Protector	USSI - SS	
Polymer Concrete Manholes	US Composite Pipe Inc.	
	Armorock	
Sewer Manhole Joining Material	K.T. Snyder Co.	Ramnek
	Conseal	CS102
	Hamilton Kent	Kent Seal
Sewer Manhole Wrap	EZ Wrap/Wrapid Seal	
Sewer Manhole Repair Grout	Avanti	
Tapping Sleeve, Fabricated Steel	JCM	6439 316 SS, Size on Size Flanged Outlet
	Ford	FTSS 316 SS, Size on Size Flanged Outlet
	Water Works	CST-EX 316 SS, Size on Size Flanged Outlet
	Mueller	H304 316 SS, Size on Size Flanged Outlet

**City of Marco Island
Approved Product List
Wastewater Systems - General**

- Notes:**
- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
 - 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Tapping Sleeve, MJ	Ford	FTSS 316 SS, Size on Size Flanged Outlet
	Water Work	CST-EX 316 SS, Size on Size Flanged Outlet
	Mueller	H304 316 SS, Size on Size Flanged Outlet
	JCM	439 316 SS, Size on Size Flanged Outlet
Valve, Tapping	Kennedy	950-X
	American Flow Control	Series 2500/2600
	Clow	F-5093
	Mueller	T-2360
Valve, Check (4” and larger)	Kennedy	1106 LW, 106 LW
	Mueller	A-2600-6, A2602
	Clow	F-5382
	Valmatic	Swing Flex

**City of Marco Island
Approved Product List
Wastewater Systems - General**

- Notes:**
1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal
 2. If a product is not listed, refer to the Specifications for performance standards.

Item	Manufacturer	Model(s)/Comments
Valve, Plug	Mueller	
	Dezurik	Series 100 Model PEC & PEF (MJ & Flange)
	Clow	F-5370, F5365
	Milliken Valve Co.	Model M600 Model M601 (MJ & Flange)
Valve, Air Release	A.R.I.	S-020 w/Check Valve
	Val Matic	48 SBWA w/Check Valve
	HTech	989 w/Check Valve
Repair Clamps	Hymax	EZ-MAX PLUS - 4000
Concrete Coatings	Gas Guard 1000 Polymer Concrete & Lining System Tenemec Epoxytech CPP Spray Liner System (PPG) Raven 405 Lining System Sewpercoat PG Lining System Vortex Quadex Alumina Liner Vortex Quadex Structure Guard	

APPENDIX I-4
City of Marco Island
Approved Product List
Wastewater Systems – Pump Stations

- Notes:**
- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
 - 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Access Hatch, Aluminum	U.S. Foundry	
	Bilco	
	Halliday	
Alarm Horn (AH)	Federal Signal	350-120-30-WB
Alarm Light (AL)	Federal Signal	141ST-120R
Control Panels (CP)	Best Controls	
Control Circuit Breaker	Westinghouse	
Control Circuit Transformer	Square D	
Duplex Receptacle/GFI (DR)	Redington	710-0016
	Hubbel	710-0016
Elapse Time Meter (ETM)		
Emergency Circuit Breaker	Square D	
Enclosure	Hoffman	
Flow Meter	Endress-Hauser	Promag W400
Fuses	Bussman	
	Gould-Shawmut	
Generator Circuit Breaker	Square D	
Generator Receptacles (GR) 230V, 100A, 3P, 4W	Russell Stoll	
Generator Receptacles (GR) 230V/460V, 100A, 3P, 4W	Russell Stoll	
Generator Systems	Onan (Cummins)	

**City of Marco Island
Approved Product List
Wastewater Systems – Pump Stations**

- Notes:**
- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
 - 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Hand-Auto-Off (HOA) Selector	Square D	
Horn Silence Switch	Square D	
Liquid Level Regulators (Float Switch)	Roto-Float	S40
Main Circuit Breaker (MCB)	Square D	
Main Circuit Transformer	Square D	
Moisture and Temperature Failure Light	Littelfuse	
Motor Automatic Megger	Automeg	
Motor Circuit Breaker (MB)	Square D	
Motor Starter (MS)	Square D	
Overload Heater (OL)	Square D	
Phase Monitor	Diversified	
Pilot Light	Littelfuse	
Pressure Gauges	Ashcroft	
Pressure Gauge Diaphragm Seal	Ashcroft	42/742
Pump Automatic Alternator (PAA)	Diversified	
Pump, Submersible	ABS	
Relay (R)	Potter Brumsfield	
	Eagle Signal	
Resistor (RE) 5-watt, 2500 ohm	Rockwood	
Run Indicator (RL)	Littelfuse	

**City of Marco Island
Approved Product List
Wastewater Systems – Pump Stations**

Notes:

- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
- 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Surge Protector (LA)	GE	
	EDCO	
Terminal Strip (TS)	Square D	
Biofiltration Odor Control System	Evoqua	Zabocs (pre-engineered)

**APPENDIX I-5
City of Marco Island
Approved Product List
Water Systems - General**

Notes:

1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal
2. If a product is not listed, refer to the Specifications for performance standards.

Item	Manufacturer	Model(s)/Comments
Automatic Flushing Device, Ground Mounted	Mueller/Hydro-Guard	HG-1
Automatic Flushing Device, Ground Mounted	Kupferle Foundry Company	Eclipse #9400-WC
Automatic Flushing Device, Hydrant Mounted	Mueller/Hydro-Guard	HG-6
Automatic Flushing Device, Hydrant Mounted	Kupferle Foundry Company	Eclipse #9700
Backflow Preventer Assembly	Febco	
	Watts	
	Conbraco	
	Wilkens	
Corporation Stops	Ford	FB-1100xxNL
Coupling	Ford	Model numbers vary by application
Curb Stop - Single Service	Ford	Single Service: B43-342W (Locking Nut)
	Mueller	
Curb Stop - Double Service	Ford	Double Service/Branch: BA13-232W/U48-43
	Mueller	
Hydrant	Clow	Medallion F-2545 SS HDWE
	American Darling	B84B 5 ¼ Darling SS HDWE
Meter Box, Single	Brooks	Automatic Read Type, Polyethylene
	DFW	

**City of Marco Island
Approved Product List
Water Systems - General**

Notes:

1. Substitutions for any item listed below shall be submitted using the "Vendor and Manufacturer Approval Application Form", Appendix I-1 and reviewed to be considered an equal
2. If a product is not listed, refer to the Specifications for performance standards.

Item	Manufacturer	Model(s)/Comments
Meter Box, Double	Brooks	Automatic Read Type, Polyethylene
	DFW	
Meter (5/8" and larger)	Neptune	Radio Read
PVC Pipe	National Pipe	AWWA C900, 14" Pipe Not Acceptable
	Diamond Plastics	
	Certain Teed	
	JM Eagle	
Repair Coupling	Hymax	Hymax-2000
Repair Clamps	Hymax	EZ-MAX-PLUS-4000
Sampling Station	Kupferle Foundry Company	Eclipse 88WC
	Water Plus Corp	301W
	GIL Industries	3/4"
Service Saddles	JCM	502 316 SS
	Powerseal	34124S 316 SS
	Ford	F5313 316 SS
Service Wye	Ford	Y44-xxx-NL
Tapping Sleeves	JCM	459 316 SS, Size On Size Flanged Outlet
	Ford	FTSS 316 SS, Size On Size Flanged Outlet
	Mueller	H304 316 SS, Size On Size Flanged Outlet
	Water Works	CST-EX 316 SS, Size On Size Flanged Outlet

**City of Marco Island
Approved Product List
Water Systems - General**

Notes:

1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal
2. If a product is not listed, refer to the Specifications for performance standards.

Item	Manufacturer	Model(s)/Comments
Tapping Sleeves, MJ	Mueller	H304 316 SS, Size on Size Flanged Outlet
	JCM	6439 316 SS, Size on Size Flanged Outlet
	Ford	FTSS 316 SS, Size on Size Flanged Outlet
	Water Work	CST-EX 316 SS, Size on Size Flanged Outlet
Valve, Air Release	A.R.I.	D-040 with Check Valve
Valve, Ball	Ford	
Valve, Gate Resilient Seat Only (Angle Valves require written permission from CMI)	Clow	
	Mueller	
	AWWA	C509-15, SS HDWE
	American Flow Control	Series 2500-1
	Mueller	
	Kennedy	

**City of Marco Island
Approved Product List
Water Systems - General**

Notes:

- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix I-1 and reviewed to be considered an equal**
- 2. If a product is not listed, refer to the Specifications for performance standards.**

Item	Manufacturer	Model(s)/Comments
Valve, Tapping, Gate Resilient Seat Only (Angle Valves require written permission from CMI)	Kennedy	950-X
	American Flow Control	Series 2500/2600
	AWWA	C509-15, SS HDWE
	Clow	F-5093
	Mueller	T-2360

APPENDIX I-6
City of Marco Island
Approved Product List
Water Systems – Backflow Prevention Devices

Notes:

1. All fire line backflow devices shall be UL or FM approved for fire service installation. Below is a sample list of acceptable backflow prevention devices, alternate products may be approved for use per the discretion of the CMI W&S DEPT.

Manufacturer	Size	Model	Type	Use
Ames/Watts	3/4"-2"	400B/919	RP	Residential or commercial potable water locations
Watts	3/4"-2"	909-009 Series	RP	Residential or commercial potable water locations
Wilkins	3/4"-2"	975	RP	Residential or commercial potable water locations
Ames/Watts	2.5"-10"	C-400/957	RP	Large size meter - potable water for residential or commercial applications
Watts	2.5"-10"	909	RP	Large size meter - potable water for residential or commercial applications
Wilkins	2.5"-10"	375	RP	Large size meter - potable water for residential or commercial applications
Ames	3/4"-2"	4000B-LBV 4000B-FP	RP	Combo services; fire and domestic lines
Watts	3/4"-2"	009LF	RP	Combo services; fire and domestic lines
Wilkins	3/4"-2"	975XL (w/OS&Y only)	RP	Combo services; fire and domestic lines
Ames/Watts	2.5"-10"	C-400 (w/OS&Y only)	RP	Combo services; fire and domestic lines
Watts	2.5"-10"	909 (w/OS&Y only)	RP	Combo services; fire and domestic lines
Wilkins	2.5"-10"	375	RP	Combo services; fire and domestic lines
Ames/Watts	2"	3000B	DCDA	Fire lines - Standard
Watts	2"-3"	007	DCDA	Fire lines - Standard
Wilkins	2"	950XLTDAF	DCDA	Fire lines - Standard
Ames/Watts	2.5"-10"	C300/M300	DCDA	Fire lines - Standard
Watts	3"-10"	709	DCDA	Fire lines - Standard
Wilkins	2.5"-12"	350	DCDA	Fire lines - Standard
Wilkins	4"-10"	450 (N-Shape)	DCDA	Fire lines - Standard

**APPENDIX I-7
City of Marco Island
Approved Product List
Reclaimed/Irrigation Systems**

Notes:

- 1. Substitutions for any item listed below shall be submitted using the “Vendor and Manufacturer Approval Application Form”, Appendix XX and reviewed to be considered an equal**
- 2. If a product is not listed, refer to the Specifications for performance standards.**
- 3. For those items not specifically identified in this section, see the Approved Product List for Water Systems**

Item	Manufacturer	Model(s)/Comments
Back Pressure Sustaining Valve	Ames	No. 920
Plate Strainer Top Access	Mars	
Level Transducer	Wika	
Meter Box	DFW	12" D1200 AMR Series, Light Duty
Meter Box	Carson	Light Duty
Flow Meter Magnetic	Endress+Hauser, Rosemount	W400
Meter Non-Potable Propeller	McCrometer	Water Specialties No. ML-04-X with 4-20 MA Output Transmitter, TR-16
Rain Gauge	ISCO	674
Service Wye	Ford	Y44-264-NL
Valve, Rising Stem Gate/ OS&Y	American Flow Control	AFC-2500 SERIES
Valve, V-Port Ball	DeZurik	VPB – flanged, type 317 stainless, and Teflon seat and bearings
Valve, V-Port Ball	Rotork	IQTM