MINIMUM DESIGN & CONSTRUCTION STANDARDS

TECHNICAL SERVICES DIVISION

MARTIN COUNTY UTILITIES AND SOLID WASTE DEPARTMENT

Revised August 2016

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SECTION I - GENERAL

The requirements set forth in this document are intended to provide a basis for design and construction. Applicable state environmental laws and regulations should be considered concurrently with this text. Any variation from standards is to be approved in advance by the Utilities Director or his designated representative hereinafter known as "Department". It is intended that the requirements of this section shall be applicable in all cases where the facilities being constructed or to be constructed shall be owned and/or operated and maintained by Martin County. These requirements shall also be applicable to those portions of facilities which will lie within public rights-of-way of Martin County.

The Department's responsibility for ownership, operation and maintenance of water mains and appurtenances or water service lines shall end at and include the meter. Fire sprinkler lines shall be owned by the County up to the meter or backflow device. Proper easements and testing are required for all these lines. The Department will not be responsible for maintaining sewer services outside the right-of-way or easement without written agreement by the Department. The Department will not operate, maintain or acquire ownership of any sewage facilities that are not constructed to County standards. Responsibility for non-standard lines or lift stations will reside with the developer and assigns. It shall be the responsibility of the Developer's Engineer to provide proper existing line information, plan layout, size facilities and prepare plans, all in accordance with these MINIMUM STANDARDS. These standards may be exceeded at the Developers and/or Engineer's discretion with specific Department concurrence.

All construction plans shall be approved by the Department prior to commencement of construction. No construction shall start prior to a pre-construction meeting. No changes shall be made on approved plans without specific written Department concurrence. The Department will enforce the approved construction plans to a level equal to that of our MINIMUM STANDARDS, plus any additional requirements of the Engineer shown on the plans with our concurrence. Every effort will be made to ascertain that the plans and specifications equal or exceed these MINIMUM STANDARDS. Construction will be enforced to at least these MINIMUM STANDARDS.

1. Easements

a) General

Easements for water, reclaimed and sewage mains and appurtenances shall be provided when the water, reclaimed and sewage facilities are installed outside of road rights-of-way under Martin County control. The easements may be either shown on the plat or granted to the County by a separate easement deed. The description for the easement shall be supplied by the Developer's Engineer or Surveyor and indicated on the record drawings (OR Book and Page No). In lieu of an easement over a specific portion or portions of the property, a blanket easement may be provided by the Owner of the land. Easements shall be in a form suitable and acceptable to the County. Prior to installation of permanent

water meter(s) easements shall be reviewed and approved by Martin County Property Management and the Martin County Legal Department, Martin County Utilities, and shall be submitted to Martin County Board of County Commissioners for review and acceptance.

b) Location of Easements

Easements shall be provided in a manner so that the water or sewage main is generally centered within the easement. Easements shall be accessible by construction equipment and shall not be isolated by ditches, landscaping, walls or buildings.

c) Easement Width

Easement widths shall comply with Table I below:

TABLE I

TYPE	DEPTH OF COVER	MIN. EASEMENT WIDTH
Water Mains 8-inch or less	30-inches	10 feet
Water Mains 10-inch or more	36-inches	15 feet
Sewage Force Mains	48-inches	15 feet
Gravity Sewage Mains	2.5 feet -10 feet	20 feet
	10 feet - 15 feet	25 feet or larger
		If conditions warrant

2. Contractor's Responsibility for Underground Utility Installation in Existing Developed Areas:

The Contractor is responsible for the protection and restoration (if damaged) of all existing structures (i.e. sidewalks, curb and gutter, pavement, mailboxes, driveways, etc.), and any landscaping (i.e. trees, shrubs, sod, hedges, etc.), which results from his completion of the project work. This will also include, but not be limited to, damage to underground and above ground utilities, irrigation systems, drainage systems, and any other existing surface or subsurface improvements.

The Contractor is responsible for restoration of existing properties to equal or better than existing conditions before commencement of the project.

All rubble and unsuitable material must be removed from the project and disposed of properly by the Contractor at the Contractor's expense.

The Contractor shall provide to the Department a pre-construction audio video recording of all Martin County Utilities Projects unless informed otherwise. The video shall be

taken by a professional commercial videographer who is an established enterprise who routinely provides these services. A pre-construction audio video recording shall show all salient features within the construction limits of the project. These features shall include but not be limited to property addresses, driveways, roadway, plantings, trees, poles, mailboxes, drainage structures, visible piping, utilities, ditches and condition of lawns and general grading. The audio portion shall describe condition of the features along with the location i.e., which side of the road, names of side streets, business names. A complete written video log shall be supplied to insure quick access to the various project locations shown on the tape. Optical image stabilization shall be utilized to insure unwanted image motion. The highest shutter speed compatibility shall be used with the maximum depth of field to provide clear still frame capability and the highest resolution possible.

Two (2) copies of the DVD(s) shall be provided and labeled with the name of the project and the date(s) the video was taken.

SECTION II - DESIGN GUIDELINES

The Design Engineer should supply the following prior to making a utility construction plan submission to this Department:

1. All design and construction drawings shall comply with the Ten State Standards or the FDEP standards, whichever is more stringent, unless approved by the Department.

2. Prepare plans on 24" X 36" sheets, appropriate scale (no less than 1"=30', 1”=40’ is not acceptable). Upon completion of the project, one (1) as-built DVD and three (3) sets of as-built prints shall be submitted to the Department. The prints shall be signed and sealed by a professional surveyor licensed by the State of Florida. The signed and sealed prints shall be submitted within two (2) weeks of water main bacterial testing in order to receive FDEP approval for the main. Additional bacterial testing required because of late submittal will be at the Developers or Engineers' expense. Sewer and reclaimed water main as-builts shall be submitted within two (2) weeks of completing the work.

3. Obtain and submit Fire Marshall approval of fire protection system.

4. Submit paving and drainage plan, preliminary plat, master utility plan for multi-phase project, key sheet, cover sheet with relevant location sketch, lift station calculations, two (2) copies of the preliminary FDEP forms.

5. Show appropriate clear phase lines and match lines.

6. Re-use previously approved detail sheets to minimize comments.

7. Provide all applicable detail drawings.

8. Avoid placing water mains under storm drains or sewers.

9. Call out interferences and minimum separations with conflicting pipes with indication of "over" or "under" on plan sheet.

10. Place sewer data including manhole influent and effluent inverts and rim elevations on profile and plan sheets with 0.1 foot drop across manhole.

11. Profile sheets are required for all gravity sewers and force mains (show all crossings).

12. Avoid placing piping out of rights-of-way.

13. Avoid placing manholes and sewer lines out of pavement areas.

14. Avoid design of excessive slopes for larger flows at right angle turns.

15. Specifically address meter and service line requirements.

16. Provide material information/specifications for all proposed work.

17. Carefully check specifications to establish that County standards are not exceeded, unless intentionally doing so. The approved plans will be enforced.

18. All road crossing and pavement cuttings shall be in accordance with requirements of the particular authority governing the area.

19. Specify details for all connections to existing facilities.

20. A pre-construction meeting between the design engineer, the contractor, the Utility Contractor (subcontractor), a department representative, and when appropriate, representatives of FDOT. and/or the Martin County Engineering Department must be held prior to construction.

21. Shop drawings are to be submitted by Engineer of Record (EOR) as one electronic PDF file including a cover sheet on the EOR's letterhead containing the Engineer of Record's (EOR) name, license number, date, and signature. The sheet shall also include contact information of the Utility Contractor and of the Material Supplier including email addresses. Project specific components on each sheet shall be clouded if there are multiple options.

    The PDF document shall include bookmarks for each of the following (as applicable): water main, gravity sanitary, force main, structures, lift station, reclaimed, and vacuum sanitary. If the PDF file exceeds 10 Mb, it shall be broken into multiple files keeping the sections above intact in any file.

    The shop drawing submittal file shall be "clean" with no redlines by Contractor or Engineer of Record (EOR). Any deviations must be through appropriate cut sheets from supplier. Martin County Utilities will reject packages marked "approved as noted" or the equivalent. Martin County Utilities will require updated cut sheets for any rejected components for the approval package.

    Shop drawing file must be submitted a minimum of one (1) week prior to the request for a preconstruction meeting in the field.

22. Design shall take into consideration the Martin County Code provisions that govern water and sewer and other regulatory requirements that may apply.

23. The design engineer shall provide a hydraulic analysis of the water and wastewater transmission systems including a fire flow analysis. Network modeling of pressure

pipe systems shall be provided using WaterCad/WaterGEMS by Bentley, Inc., Version 8.0 for Windows. If a WaterCad file is provided, the presentation file must be included with it for use with WaterGEMS. Higher versions may be accepted upon department approval. Submittals shall include two (2) copies each of the input and output data for each scenario and 24"x 36" plots of each scenario showing a scale layout of the project including annotated lots, road right-of-ways and names, phase lines, multifamily and commercial/industrial use boundaries and proposed equivalent residential connections, color coded and annotated pipe sizes and pressure contours, nodes and node numbers, legend, north arrow, scale, scenario description and date. Scenarios shall include but not be limited to average daily flow, maximum daily flow plus fire flow and peak hour flow. A copy of the WaterCad/WaterGEMS file(s) shall be submitted on DVD.

24. No landscaping shall be planted in a manner that it affects the installation, operation, or maintenance of the Utilities. Landscaping plans shall be submitted as part of the submittals for review and approval. Trees shall not be planted within the utility easement area as described under Section I(1)(c).

SECTION III - POTABLE WATER SYSTEMS

1. Design

Water main size shall be based on hydraulic analysis of maximum day plus fire flow requirements or peak hour demand, whichever is greater, while maintaining a residual twenty (20) psi pressure throughout the system. Minimum size is 6-inches in looped systems and 8-inches on dead ends.

The following fire suppression water flow is the minimum for the specified use:

Residential	
Single family homes/duplexes (<5,000 sf)	1,000 gpm
Mercantile/business	
3000 sq. ft or less	750 gpm
3000-15,000 sq. ft	1,000 gpm
Greater than 15,000 sq. ft	1,500 gpm
Industrial	
Less than 7000 sq. ft	750 gpm
Greater than 7000 sq. ft	1,500 gpm
Warehouse/storage	
Less than 7000 sq. ft	750 gpm
Greater than 7000 sq. ft	1,500 gpm

These are the minimum requirements for the specified uses with a minimum residual pressure of twenty (20) psi. Additional water flow may be required to supplement fire sprinkler systems or to support other hazardous uses. The developer is responsible to meet any additional flow requirement beyond that which is within the capacity of the utility provider. [NFPA 1 and NFPA 101]

(These are minimum requirements. The local fire ordinance shall govern.)

2. Backflow Prevention/Cross Connection Control

There shall be no physical connection between a safe water supply and a questionable water supply, a reclaimed water supply, or a sanitary or storm sewage system which would allow unsafe water to enter the safe water system by direct pressure, vacuum gravity or any other means. All potable water services within sewage facilities shall be provided with an approved backflow prevention device. See Section XV, Manual of Cross Connection Control and Backflow Prevention.

3. Minimum Cover

Minimum cover to finished grade over water mains shall be 30-inches up to 8-inch diameter; 10-inch or larger shall have a 36-inch cover or greater to provide a minimum 18-inch cover over operating nut of gate valves.

4. Parallel/Horizontal Separation

Sanitary sewers, force mains, reclaimed water mains and storm sewers should cross under potable water mains whenever possible. Sanitary sewers, force mains, reclaimed water mains and storm sewers crossing water mains shall be in accordance with drawing 1E.

All Ductile Iron Pipe (DIP) shall be Pressure Class 350 or higher. Adequate protective measures against corrosion shall be as determined by the design engineer and the Department.

Horizontal separation of fifteen (15) feet to buildings, top of banks of lakes and canals and other structures shall be maintained, if possible. An absolute minimum of ten (10) feet may be allowed only when unavoidable and only with Ductile Iron Pipe (DIP). Horizontal separation of a minimum of three (3) feet to power poles, light poles, or other utilities shall be maintained.

5. Layout

Permanent dead ends, especially on hydrant lines, will not be approved unless they are reasonably unavoidable. Dead ends shall be equipped with a blow off for flushing purposes as required by the Florida Department of Environmental Protection (FDEP). Temporary dead-ends shall have a gate valve. The gate valve shall be mechanically restrained for a minimum of two (2) joints and three (3) full lengths of pipe.

Water Mains should be placed in right-of-way whenever possible. Placement of the water main on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable or when necessary for looping. Water mains will not be allowed on rear property lines of lots.

6. Water Main Material

All components that come into contact with potable water shall contain less than 0.25% lead as per NSF/ANSI Standard 61, Annex G and NSF/ANSI 372.

Water Mains 2-inch in diameter shall be polyethylene as defined by A.S.T.M. D2737 SDR9 copper tube size.

Polyvinyl Chloride (PVC) Water Mains 4-inch to 12-inch in diameter shall be DR-18 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with

AWWA Standard C900. The pipe shall have an integral bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe shall be approved by the National Sanitation Foundation for use as a potable water main. The pipe color shall be blue.

Polyvinyl Chloride (PVC) Water Main 14-inch to 20-inch in diameter shall be DR-18 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C905. The pipe shall have an internal bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe shall be approved by the National Sanitation Foundation for use as a potable water main. The pipe color shall be blue.

High Density Polyethylene (HDPE) water mains 4-inch to 16-inch in diameter shall be DR-11 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C901 and C906, latest revision and ASTM F714. The pipe will be extruded from resin meeting specifications of ASTM D-3350 with a cell classification of type III, class C, category 5, grade P34 polyethylene compound. The pipe shall be approved by the National Sanitation Foundation for use as a potable water main. The pipe color shall be blue or co-extruded blue color stripes. For all size connections, fused mechanical joint adapters shall be used. Stainless steel inserts will not be allowed.

Ductile Iron Pipe (DIP) shall be a minimum of Pressure Class 350. The Department reserves the right to require a different thickness class for unusual or non-standard laying conditions.

Ductile Iron Pipe (DIP) shall conform to latest standards of ANSI/AWWA C150/A21.50 for the thickness design of Ductile Iron Pipe (DIP) and ANSI/AWWA C151/A21.51 for Ductile Iron Pipe (DIP) centrifugally cast in metal molds or sand-lined molds.

Joints for Ductile Iron Pipe (DIP) shall conform to the latest standard of ANSI/AWWA C111/A21.11 for rubber gasket joints and ANSI/AWWA C115/A21.15 for threaded flanges.

Cement-lined Ductile Iron Pipe (DIP) shall conform to the latest standards of ANSI/AWWA C104/A21.4

Ductile Iron Pipe (DIP) shall be required in the following circumstances:

A) Water main 24-inches in diameter and larger.

B) Within six (6) feet horizontally of sewage facilities or pipes.

C) Within fifteen (15) feet of buildings, canals or lakes.

D) Crossings under sewage or storm pipes in accordance with Item 4 of this Section.

E) Crossings over sewage or storm pipes in accordance with Item 4 of this Section.

F) Carrier pipe for jack and bores (restrained joints).

G) Aerial crossings.

H) Ductile Iron Pipe (DIP) may be mandated by the Department in any instance of off-site or on-site construction where future abuse to the line is possible due to location or circumstances, extensive length under pavement, or in private property away from County rights-of-way.

7. Water Main - Size

The Water Main (WM) shall be sized by the Developer's Engineer as required and as approved by the Department. The minimum size of water main shall normally be 6-inches. 4-inch mains may be proposed for non-fire lines serving discrete areas where additional development will not occur (i.e. cul-de-sacs). The Engineer will be required to demonstrate the adequacy of such sizing.

Where fire flow is provided, all fire hydrants shall be placed on 8-inch minimum sized water mains or 6-inch minimum sized water mains where the mains are looped. Delivered flows should meet maximum day plus fire flow requirements as mandated by the County and FDEP. The residual pressure under fire flow conditions shall not be less than twenty (20) psi.

8. Valves and Fittings

Gate valves shall be Ductile Iron, resilient seat type with mechanical joints conforming to AWWA C-515, latest revision. Valves shall be designed for a working pressure of not less than two-hundred (200) psi. Each valve shall have the pressure rating cast into the body and manufacturer's name or initial cast into the body or bonnet.

Valving of all systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. Generally, the number of valves at an intersection shall be one (1) less than the number of pipes forming the intersection.

Valves shall generally be installed at intervals of not more than 1,500 LF. In high density areas, valves shall be installed as necessary to minimize the number of persons affected by a break.

In all instances, effectiveness of placement shall be primary criteria in determining valve locations. Valves shall not be placed in swales or ditches.

All pressure pipe fittings of size 4-inch and larger shall be Ductile Iron fittings, with mechanical joints, unless plans call specifically for flanged, restrained joint fittings. Mechanical joints fittings shall be used for buried installations; flanged fittings shall be used for above ground installations. Mechanical joint fittings shall conform to ANSI/AWWA C-153/A21.53.

All valves, bends, tees, crosses and dead ends shall be mechanically restrained. Clearance of 18-inches shall be maintained between all fittings (bells, valves, flanges, etc.), unless otherwise specified. Temporary dead ends shall be terminated with a gate valve with a mechanical joint plug and flushing hydrant.

All valve boxes shall be two (2) piece cast iron construction with screw type riser sections. The valve box lid shall carry the word "WATER" and be the deep skirt type. Valve boxes must have a minimum inside diameter of 5-1/4-inch. A square concrete collar that is 24"x24"x6" thick shall be poured at the top of each valve box at finished grade. Valve box lids that are to be located in pavement must have a minimum 4" skirt are listed in Section XVI Approved Product List.

Height adjustments to valve boxes will require a screw type, cast iron extension. Valve boxes and extensions are listed in Section XVI Approved Product List.

When the gate valve is deeper than 36-inches an extension will be required to bring the operating nut within 24-inches of finished grade. A ¼"x3" 316 stainless steel roll pin will be inserted through the valve operating nut to secure the extension stem.

9. Water Sampling Stations

With any new construction of water distribution mains, of 6-inch diameter or greater, less than or equal to 5,280 linear feet in combined length, one permanent sample station shall be installed. One additional water sampling station shall be installed for each additional 5,280 linear feet of water main or portion thereof. Martin County will determine the permanent sampling station locations during final plan review.

The water sampling station shall be installed on a minimum of 6-inches inside diameter pipe of a water distribution main. The sampling stations shall be constructed as shown in the Utility Detail Drawings.

The water sampling stations shall be no closer than five (5) feet from the edge of any street or paved area and/or back of curb, and must be within a maximum fifteen (15) feet from an operating fire hydrant.

When open, the station shall require no key for operation, and water will flow in an all stainless steel waterway.

All working parts shall be of stainless steel and serviceable from above ground with no

digging or replacement needed. All stations shall be enclosed in a lockable housing unit, non-removable aluminum housing. All opening shall be hinged. Water sampling stations shall have 1-inch bury, with ½-inch MIP inlet, and 7/16-inch unthreaded blow off, and a ¼-inch unthreaded sampling point.

10. Fire Hydrants/Fire Service Mains

Fire Hydrants shall conform to latest AWWA Specifications C502, and shall be of the traffic-model type. Inlet connection shall be for a 6-inch pipe and main valve opening shall be a minimum of 5 ½-inches. Hydrant bonnet shall have two (2) 2 ½-inch hose connections and one (1) 4 ½-inch pumper connection. Working pressure for hydrant shall be a minimum of one-hundred fifty (150) psi.

All working parts shall be of cast iron and high grade bronze. All hose threads shall be ANSI B26 Standard threads. The 2 ½-inch nozzles shall have sixty (60) degree V-threads, 7 ½-inch threads per inch and a 3 1/16-inch outside diameter male thread. The 4 ½-inch nozzle shall have four (4) threads per inch outside diameter male thread.

316 Stainless Steel bolts shall be required for all bolts above finished grade.

Nozzle caps with gaskets shall be provided for all outlets to provide tight closure for nozzles. Caps shall be securely chained to barrel of hydrant. Cap nuts shall have same dimensions as operating nut of hydrant.

Hydrant shall be traffic model, 3-way. All hydrants to be installed with hydrant tees, gate valve, the required lengths of 6-inch diameter Ductile Iron Pipe (DIP) (hydrant nipple), restrainer glands, 6-inch anchor fittings, a 6"x 36"x 36" concrete pad at bury line.

Fire hydrants shall be installed with the center of the streamer nozzle 18 to 24-inches above finished grade. Hydrants shall not be placed in sidewalks. It will be the responsibility of the Developer and Contractor to move hydrants placed in the sidewalk.

Hydrant barrel color to be OSHA Yellow and bonnet to be OSHA Yellow. Drain holes shall be deleted or plugged with appropriate brass set screws. Fire Hydrants shall come to jobsite factory coated, they shall be sand blasted at the factory to SSPC-10 and factory coated in OSHA yellow. The finish coat shall meet the following ASTM standards:

Hardness: Shall Meet ASTM D3363, H – H2
Direct Impact: Shall meet ASTM D2794, 120 – 160
Chip Resistance: Shall meet ASTM D3170, 9C – 10A

Coatings shall be applied to the following mil requirements:

1) Primer: 3.0 to 5.0 mils DFT

2) Finish Coat: 2.0 to 3.0 mils DFT

Any damage to the coating shall be repaired to factory specifications.

Fire hydrants shall be provided in all water mains, transmission, and distribution systems. Fire hydrants shall be spaced as required. A Fire Marshall approved plan is required with all preliminary plan submissions.

Fire hydrant branches (from main to hydrant) shall be not less than 6-inches inside diameter. Each branch shall be provided with a gate valve located as close as possible to the main. Valve box top shall be set to grade. Hydrants shall be located near road lines with pumper discharge nozzle facing the roadway. Hydrants shall be laid as to minimize their vulnerability to traffic. Hydrants shall be placed in line with the lot side lines unless otherwise approved by the Department.

Fire hydrant extensions shall not be allowed.

Hydrants shall be placed within fifteen (15) feet of the street of paved area when possible (except as required by FDOT), and shall be no closer than five (5) feet from the edge of the street or paved area and/or back of curb and shall not be placed in a ditch area. The height of the hydrant above grade shall be acceptable to the Fire Marshall and Department.

A detector check valve and other appurtenances as may be required will be specified on fire sprinkler lines and privately owned and maintained fire hydrant lines.

The fire hydrant and fire hydrant valve shall be provided by the same manufacturer.

11. Water Service Lines and Taps

Water service taps on the main shall be spaced at a minimum distance of 18-inches apart. A minimum distance of 18-inches from all joints and fittings must be maintained. All service line taps shall be installed in accordance with the construction details of this manual. Services shall have a minimum of 30-inches cover including at ditches. All service crossings under roadways shall be installed in a casing not less than 36-inches between the top of the pavement and the top of the casing. Water service taps shall not be placed under pavement including roads, driveways, parking lots and sidewalks.

Services shall not exceed one-hundred (100) feet to the meter. Meters should generally be placed at the property line. In developments where the property line is not clearly defined (such as at condominiums) the meter should be placed for ready access. Meters shall not be placed in areas that can be fenced, such as backyards, under any circumstances. Services crossing under parking lots shall have their meters placed prior to the crossing so that the Department is not responsible for the service lines.

All valves shall be placed according to plan unless relocation is mutually agreed to. Record As-built drawings shall reflect the actual location and size of all mains, fittings, hydrants, services and valves.

12. Connection to Existing System

A) Tapping Tees, Sleeves and Valves

Tapping sleeves shall be 304 stainless steel with flanged outlets. Tapping valves shall be resilient seat type with a flanged joint on the inlet side and a mechanical joint on the discharged side of the valves. Tapping valves shall have a 2-inch operating nut. Working pressure rating shall not be less than two-hundred (200) psi. Gaskets between the flange faces of the tapping sleeve and tapping valve shall be 1/8" minimum thickness of BUNA N gasket material.

B) Size on Size Taps

Taps may be made on the same size main only when the main to be tapped is AWWA C900, C905 or Ductile Iron Pipe (DIP).

C) Installation

A Department representative shall approve each tapping location before the tapping sleeve is installed. Tapping sleeves shall not be installed within 18-inches of any joint or fitting. Before installation of tapping tee, the area to be tapped and the tapping tee shall be cleaned with potable water. After all sand, dirt and debris have been removed from the main, the tapping tee, the tapping valve and the area where the tapping tee is to be installed on the existing main shall be swabbed with a chlorine or bleach solution with at least one-hundred (100) ppm of chlorine.

After the tapping tee is attached to the main, the gate valve shall be closed and tapping tee and gate valve assembly shall be pressured tested at a minimum of one-hundred fifty (150) psi for a minimum of fifteen (15) minutes with water. A Department representative shall witness the pressure test. No visible leaks or loss of pressure shall be evident. After pressure testing, the main may be tapped. Only shell type cutters shall be used. The coupon from the hole that is cut shall be delivered to the Department.

13. Meters/Backflow Prevention Devices

Construction plans shall include a typical meter installation for each size meter to be installed (see attached Standard Details). Dual metering of a single building service (i.e., two (2) 1-inch meters instead of one (1) 2-inch meter) shall not be permitted. The proper sizing of meters and service lines is the responsibility of the Developer's Engineer, subject

to the Department's approval of the sizing. Meters will be available in the following sizes only: 5/8-inch, 1-inch, 1 ½-inch, 2-inch, 3-inch, 4-inch, and larger sizes as necessary. Electronic radio read meters of sizes 5/8-inch through 2-inch are listed in Section XVI Approved Product List. Meter boxes for 2-inch and smaller meters are standard and must be installed to finished grade by utility contractor.

Meters 3-inches and larger shall be installed above ground. The backflow prevention device shall be installed above ground close to the meter on the customer side. No taps or connections are allowed between the meter and the backflow prevention device. All meters must be in accordance with the Approved Product List. Electronic radio read meters of sizes 2-inch and smaller are listed in Section XVI Approved Product List. Meters 2-inches and smaller will be paid by the Developer, Martin County Utilities shall provide the meter and shall be installed by the Martin County Utilities. Meters 3 to 6-inches are listed in Section XVI Approved Product List and will be provided by the developer and installed by the Developer.

All above ground piping and meters shall be coated with blue paint as follows:

Sandblast and remove all paint and any loose material in accordance with NAPF 500-03. Do not paint or coat any nameplates, brass or stainless steel surfaces. Contractor shall use the following paint system as specified in Section XVI Approved Product List or equal.

Meter boxes shall be kept out of pedestrian walkways and out of driveway areas. For shopping centers, Developer's Engineer shall give special consideration to meter layout so as to satisfy these requirements. Final approval of meter location will be by the Department.

Once a service connection is made to Martin County Utilities' water system, disconnection from the water system is prohibited.

14. Locator for Water Pipe

For all open cut construction, ten (10) gauge THWN insulated, stranded copper wire shall be used. For all directional drill construction, see Section XVI Approved Product List for the wire to be used. Wire shall be laid and secured on top of pipe. Wire shall be continuous from valve box to valve box, wrapped two (2) times around each joint of the pipe and extended inside each tracer box to enable location device to be attached without digging up the valve box (see Drawing No. 18).

Service wire shall be laid in the trench with all services, connected to the main wire and wrapped around the service piping or tubing. Wire for potable water shall be blue in color.

All wire connections shall be made with Dri-Splice wire connectors, fittings filled with waterproof silicone sealant or approved equal for open cut construction. All wire connections shall be made with the system recommended by the locate wire supplier for directional drill construction. All splices shall be inspected by the Department before burial. Locate wires shall be connected at the surface in a magnetized tracer box (see Section XVI Approved Product List) and shall have a blue cover as per APWA color code.

A location ball (see Section XVI Approved Product List) shall be installed at each fitting and every one-hundred (100) feet of separation.

15. Cleaning and Pigging

After its installation, the complete water system (including all mains, services, hydrants, blow-offs, air release valves and all other appurtenances) shall be thoroughly cleaned to remove all foreign matter. The Department shall be notified at least forty-eight (48) hours in advance of any cleaning activities. Failure to provide advance notification of cleaning may result in the Contractor not being allowed to clean the mains. Water used for filling and cleaning shall be from an approved potable water source.

The cleaning of piping systems shall be accomplished by the controlled and pressurized passage through the system of a series of hydraulic or pneumatic polyurethane plugs. A poly pigging plan shall be approved by the Department and all pigging of lines shall be witnessed by a representative of the Department. The poly pigs shall be removed or discharged from the system at a point as near to the end of the system as is logistically and mechanically feasible. The contractor must demonstrate to the satisfaction of the Department that this work will be performed by experienced and knowledgeable supervisors and personnel who have properly, safely and effectively provided for the cleaning of comparable systems in other similar applications.

16. Pressure Testing

All mains shall be tested for leakage. Water shall be supplied to the main and pumped to the required one-hundred fifty (150) psi pressure. The main tested shall either be isolated from presently potable lines or protected from leakage by a double valve arrangement.

The Department shall be notified at least forty-eight (48) hours in advance of any testing procedures. After flushing is completed, line pressure shall be applied to the water system to determine if any major defects are present. The complete water system shall then be tested at a pressure of one-hundred fifty (150) psi for a period of not less than two (2) hours. The Department may, at its discretion, increase the period to four (4) hours. Maximum length of line to be tested at one (1) time shall not exceed fifteen-hundred (1500) linear feet. An oil filled pressure gauge up to two-hundred (200) psi at two (2) pound increments shall be used for all pressure tests. No visible movement of the

system shall occur and leakage shall not exceed:

$$L = \frac{ND\sqrt{P}}{7400}$$

Where L = Leakage in gallons
N = Number of joints in test section
P = Test pressure in psi.
D = Diameter of pipe in inches

All leakage and pressure testing work must meet the requirements of AWWA C605 and Rule 62.555.330 F.A.C.

17. Disinfection and Bacteriological Testing

After successful pressure testing, the complete water system shall be chlorinated to achieve a minimum combined chlorine residual of at least seventy-five (75) parts per million. The chlorine solution shall remain in the water system for at least twenty-four (24) hours. The complete water system shall then be flushed to remove the strong chlorine solution.

Test samples for bacterial analysis shall be taken by the Department or an approved testing laboratory. If testing is required to be done through the Department a fee of $25.00 per sample will be charged for testing of each initial and all required repeat sample tests. All disinfection work shall meet all requirements of the latest version of AWWA C651 standard and Rule 62.555.340 F.A.C.

18. Installation

A) Installation and testing of water system pipe and fittings shall be in accordance with AWWA Specification C-600 Latest Revision and Department's Construction Standards and Specifications.

B) Any pavement cut shall be replaced in accordance with requirements of the agency of jurisdiction, or the plans, whichever is more stringent.

C) All loading or unloading of pipe, fittings, valves and accessories shall be done in such a manner so as to avoid damage. The pipe shall not be skidded or rolled against pipe already unloaded. Special precautions shall be taken to avoid damage to cement lined fittings and pipe. The interior of all pipe, fittings and other appurtenances shall be kept free of dirt and foreign matter at all times.

D) All valves, bends, tees, crosses, fittings and dead ends shall be restrained with an approved mechanical restrained joint system. Where proprietary

restrained joints are not used, tie rods and megalugs are the recommended system. (See Section XVI for Approved Product List.)

E) Tie rods used as a method of joint restraint shall be by means of steel tie back bolts, nuts, washers and all thread rods shall be 316 stainless steel. Tie rods and nuts shall be equal in diameter to the tee bolts and nuts which were supplied with the applicable fittings. Two (2) tie rods per joint are required for sizes 4-inch diameter through 10-inch diameter, four (4) tie rods per joint for sizes 12-inch diameter through 16-inch and six (6) tie rods per joint for sizes 18-inches through 24-inches.

F) Fire hydrants shall be designed to relieve air at high point except at aerial crossings where automatic air release valves shall be designed. Installation of air release valves to correct high points caused by improper installation of pipe (not at design grade) will not be permitted. (See Section XVI for Approved Product List.)

G) All pipe shall be laid to line in a clean dry trench on line and grade with valves and hydrant stems plumb. All pipe shall have a minimum cover of 30-inches and a maximum cover of 48-inches unless otherwise noted on the plans or required by permit.

H) The trench at the top of the pipe shall be kept to a maximum width of 24-inches plus the pipe diameter. The trench shall have a flat bottom, cut true and even, so that the barrel of the pipe shall bear its full length. Pipe bells will be placed in small pockets specifically excavated to receive the bell. All excavations must be in compliance with OSHA regulations.

I) No rocks larger than 2-inches in diameter or other items that may damage the pipe will be permitted over the pipe. In the event pipe is installed in rock excavation, 6-inches of granular material will be provided for bedding under the pipe. All pipe joints, conflicts and service connections shall be left exposed until visually inspected and approved by a Department representative.

J) All tapping assemblies installed on existing water mains shall be pressure tested and witnessed by a Department's representative prior to the actual tap of the main. The pipe coupon shall be carefully preserved and submitted to the Department's representative. All tapping sleeves shall be installed a minimum of 18-inches from pipe joints or fittings.

K) All field cuts on pipe shall require careful repair of the particular lining damaged in strict accordance with the manufacturer's recommendations.

L) Fire hydrants shall be installed true and plumb. Hydrant extensions shall not be permitted in new construction.

M) Do not exceed 50% of the manufacturer's recommended maximum joint deflection.

19. Horizontal Directional Drilling

The following standards pertain to the design and construction of horizontal directional drilling of water mains in the Martin County Utilities service area.

A) Pipe sizes and material: Horizontal directional drilled utility pipe shall be High Density Polyethylene (HDPE) pipe (SDR9 minimum for 2-inch and SDR 11 minimum for 4-inch or greater). If the directional drilled pipe is to be used as a casing for a small diameter service line (up to 2-inch diameter), DR 18 pipe is acceptable. Pipe and couplings shall be free from voids, cracks, inclusions, and other defects and shall be uniform in color throughout the installation.

B) Design Requirements: The Engineer shall inquire with the Department about approval of a horizontal directional drilling procedure for a pipe installation. With the Department's concurrence, the Engineer shall submit a signed and sealed pilot bore plan for review and approval. The Engineer shall provide Signed and Sealed pullback calculations demonstrating a factor of safety for the pipe of two (2) against buckling and pull back stress for the proposed pipe materials considering the materials, bore hole path, and equipment used for each installation. Pipe selection shall meet pull back calculations to reflect factor of safety is met. The plan shall be submitted on a 24" x 36" sheet to a maximum 1" = 20' horizontal and 1" = 2' vertical scale (1" = 10' horizontal, 1" = 1' vertical scale preferred). The plan must show:

- Finished grade and surface improvements
- Locations of drill set-up
- Length of bore
- Deflection and radii of the pilot bore
- Locations of existing utilities and underground structures
- Minimum horizontal and vertical clearances from underground structures, conduits, piping systems (the proposed clearances must exceed the Departments standards plus the guidance system accuracy tolerance) Pipe size and specifications
- Proposed pilot bore pipe deflection limits (not to exceed 50% of the maximum deflection allowed by the pipe manufacturer nor 100% of the drill pipe stem maximum allowable radius)
- Limits of directional bore installation Limits of pressure testing Connection to existing utilities
- Rights-of-way limits, utility easements and temporary

construction easements

C) Preconstruction Meeting: Upon approval of the pilot drill plan by the Department and obtaining all necessary permits for the directional drilling, the Engineer shall schedule a preconstruction meeting with the Department. If the construction requires any field welding/fusion of High Density Polyethylene (HDPE) pipe and/or fittings, a Certificate of Completion of a pipe fitting manufacturer approved training program is required. The Engineer and the Contractors performing the utility work shall attend the meeting.

D) Pilot Bore: The Engineer shall schedule the beginning of work with the Department a minimum of three (3) days in advance. The drill path shall be accurately surveyed and plotted to create an "As-Built" drawing (same scale as the pilot drill plan). The Engineer shall evaluate the As-Built data and confirm the compliance with the design parameters. Deviation beyond approved parameters (depths, deflection radius, separation to other utilities or structures) shall be brought to the attention of the Department. The signed and sealed pilot bore As-Built drawing shall be submitted to the Department for review and approval.

E) Pull back of carrier pipe: Upon approval of the pilot bore location by the Department, the pullback operation of the required carrier pipe shall begin. The Contractor shall select the proper reamer type with the final hole opening to be a minimum of 1.5 times the outside diameter of the largest component system.

The open borehole shall be stabilized by means of bentonite drilling slurry. The slurry shall be contained at the entry or the exit side of the bore in pits or holding tanks.

The pipe sections shall be joined together in accordance with the manufacturer's specifications. The ends of the pipe, gaskets, and couplings shall be inspected for cleanliness. Chipped, scratched, scraped, cracked, or excessively deformed pipe or couplings shall be rejected.. Two (2) locate wires (see Section XVI for Approved Product List) shall be used on directional drill portions of pipe construction shall be attached to pipe being installed (500 LF or longer and at water crossings only), and extended to nearest valve boxes, Locate wires shall be connected at the surface in a magnetized tracer box (see Section XVI for Approved Product List) and shall have a blue cover as per APWA color code. The pipe shall be elevated to the approximate angle of entry and supported by roller arms or equivalent. Any field welding/fusion of High Density Polyethylene (HDPE) pipe and fittings may be performed only by personnel certified through a pipe/fitting manufacturer approved training program.

F) Testing: Installed pipe shall be flushed and pressure tested using potable water. Pressure testing shall be conducted at one-hundred fifty (150) psi (or higher if required) for a minimum of two (2) hours. No leakage is acceptable. Installed services, tees, and stub-outs shall be pressure tested together with the main. Pressure testing is not required if the installed pipe is intended to be used as a casing. If the pipe successfully passes the pressure test, a connection to the existing pipe system may be performed. For potable water mains, bacteriological testing and final pressure testing are required. On all Horizontal Directional Drill (HDD) crossings the project will not be considered Substantially Complete and will not be accepted by Martin County Utilities until tracer wire continuity is demonstrated using Department approved locator to the satisfaction of the Martin County Utilities Department Inspectors.

All Horizontal Directional Drill (HDD) water crossings, the Horizontal Directional Driller will not leave the site until the pipe has passed the pressure test and locate wire continuity is confirmed.

SECTION IV - SEWAGE SYSTEMS AND GRAVITY SEWERS

Gravity sewers, pumping stations and force mains shall be designed to deliver peak flows under the following conditions:

1. Flow

Residential sewage systems shall be designed on the basis of an average flow of not less than one-hundred (100) gallons per capita per day of sewage for ultimate tributary population. Commercial/Industrial flow shall be based on actual records of similar institutions or as required by the Department and as established by F.A.C. 64E-6.008. Lateral sewers shall be designed with capacities when running full of not less than four (4) times the average flow. Trunk sewers shall have capacities under the same conditions of not less than 2.5 times the average flow. Special allowance shall be made in each case for sewage from industrial plants.

Industrial wastes from service station wash racks, lubrication racks and shop floor drains shall not be connected into the sanitary sewer system without pre-treatment specifically approved by the Department and preferably should be disposed of separately. Caustic wastes and all other manufacturing wastes shall not be connected into the sanitary sewage system without pre-treatment approved by the Department.

All installations where foods are prepared, processed or served shall have a grease trap of adequate capacity with a solids retention device installed through which the wastewater from the preparation area shall pass before entering the sanitary sewer system.

2. Size

The minimum allowable size for any gravity sewer main shall be 8-inches in diameter. See Standard Details for service laterals. Increasing the diameter of sewer lines to reduce slopes will not be permitted unless justified by calculated flow.

3. Slopes

All sewers shall be designed with hydraulic slopes sufficient to give velocities, when flowing full or half full, of not less than 2.0 feet per second, based on an acceptable formula.

The following minimum grades shall be used for design:

4 and 6-inch laterals	1.00%
8-inch sewers	0.40%
10-inch sewers	0.28%
12-inch sewers	0.22%

The maximum design velocity shall not exceed 8.0 feet per second.

4. Parallel/Horizontal Separation

Gravity sanitary sewers, separation shall be in accordance with drawing 1E.

5. Installation

Gravity sewer mains shall be laid accurately to both line and grade. The Department will generally not accept any line laid with a slope of less than minimum gradients. The Department reserves the right to independently verify questionable survey results. Visible leakage, deflections, horizontal misalignment, significant bowing, non-consistent slopes between manholes and sagging joints shall each be grounds for rejection of lines.

Minimum gradients shall be not less than 90% of design minimum grades. For specific example, the minimum acceptable slope on an 8-inch line shall be .36%, if the design called for .40%.

The absolute minimum cover on a Polyvinyl Chloride (PVC) sanitary sewer shall be 36-inches to the top of the pipe. C-900 Polyvinyl Chloride (PVC) pipe shall be used for all lengths with less than 36-inches of cover to the top of the pipe.

Absolute minimum cover for C-900 Polyvinyl Chloride (PVC) shall be kept at 30-inches at all places not 36-inches to the top of the pipe unless the Engineer provides design criteria verifying load carrying capacity acceptable to the Department. The Engineer shall demonstrate the load carrying capacity of all pipes with less than 36-inches of cover.

All pipes shall be laid in trenches having a dry and stable bottom. Backfill shall be clean suitable fill. Pipe shall be fully supported along its entire length. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid on line and grade as designed. Excavated material not suitable for backfill must be removed from the site. The pipe barrel shall be uniformly supported along its entire length on undisturbed soil or bedding material. Proper bedding shall be supplied if the existing material includes rock, organic material or other sharp or unstable material.

6. Increasing Size, Joining Sewers, Repairs

When sewers are increased in size, or when a smaller sewer joins a larger one, this shall occur at a manhole and the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient (i.e., match crowns of pipe).

All construction material shall be first quality, not previously used. Repair clamp use must be approved on a case-by-case basis by the Department before installation. Damaged or faulty pipe and materials must be properly replaced.

7. Alignment

Sewers of all sizes shall be designed with uniform slope and alignment between manholes.

8. Gravity Sewer Pipe

A) Polyvinyl Chloride (PVC) sanitary sewer gravity pipe shall meet the requirements of ASTM Specification D 3034 for SDR 26 (pipe to be green in color). Pipe bell shall consist of an integral wall section with a solid cross-section rubber ring, factory assembled, securely locked in place to prevent displacement during assembly. Minimum pipe stiffness (F/Y) at 5% deflection shall be one-hundred fifteen (115) psi for all sizes when tested in accordance with ASTM D 2412. All fittings and service laterals shall be SDR 26.

B) When cover is less than thirty-six (36) inches or greater than twelve (12) feet and for the last run of pipe from a manhole into a lift station wetwell, use C-900 Polyvinyl Chloride (PVC) DR 14 (minimum thickness). The entire run length shall be the same type of pipe.

9. Manholes

Manholes shall be set according to construction plans and shall be pre-cast in accordance with approved shop drawings and Standard Detail drawings accompanying this text. The manhole invert shall be carefully shaped to conform to the pipe flow channel. All manholes shall have a minimum of 0.1 foot drop across manhole. Flow channels within the manholes involving changes of direction of side drops shall smoothly direct the flow in accordance with detail drawings. All concrete irregularities shall be plastered with cement mortar in such a manner as to give a neat and watertight job. Manholes shall be pre-cast concrete with at least the lower three (3) feet of the riser or barrel cast integrally with the base.

Adjustment to proper grade shall be made with a combination of concrete pre-cast rings and bricks per the Standard MCU Drawings.

A) Location. Manholes shall be installed at the end of each sewer; at every change in grade, size or alignment; at all sewer intersections; and at distances not greater than Four-hundred (400) feet apart. Manholes shall be placed in accessible locations, preferable in pavement, always flush to the surface. Manholes shall not be placed in low lying areas where storm water infiltration may occur. A concrete collar shall be placed around manholes in grassed areas as shown on Standard Details. The interior and exterior of all manholes shall be painted with two (2) coats of water based epoxy as noted on construction Standard Detail Drawings.

B) Drop Manholes. A drop pipe shall be provided for a sewer entering a manhole at an invert elevation of two and a half (2.5) feet or more above the outgoing manhole channel invert. Sewer slopes shall be designed so that a drop connection of more than two (2) feet shall not occur. There is no limit on the length of a drop pipe. Drops shall be constructed of Polyvinyl Chloride (PVC) pipe inside the manhole, unless otherwise authorized by the Department. Interior will be coated with a system specified in Section XVI Approved Product List.

C) Flow Channel. The manhole floor shall have a flow channel with sloping fillets made to conform in shape and carrying capacity to that of the sewers.

D) Service Connections. One (1) collector service connection may be directed into an end manhole with approval of the Department. This is permissible only if it is treated as a sewer line (i.e., provided elevation and flow channel). Service connections shall not be allowed into other manholes.

The allowable length of service connections will be limited for Departmental maintenance and inspection control over the gravity sewer system. The Department shall not generally maintain services. The maximum length between clean outs shall be seventy-five (75) feet and no more than two (2) clean outs shall be in the entire pipe run. A clean out shall be installed at the property line to delineate ownership of the lateral.

Manholes shall be core-drilled to provide pipe opening when pre-cast hole is not available.

Ram-nek or approved equivalent shall be used at all riser joints. After the sections are assembled, the remaining space shall be grouted with dense cement mortar inside and outside. All connections of Polyvinyl Chloride (PVC) sewer pipe to manholes shall be made with a Polyvinyl Chloride (PVC) manhole adapter or a pre-cast rubber boot (shop drawings required).

E) Bases, Cones, Joints: Wet wells and manholes shall have pre-cast, monolithic pour bases. Alternative methods for constructing wet well bases will be considered only if the size and depth of the well is excessive. All manholes shall have pre-cast cones. Ram-nek or approved equivalent shall be placed at joints.

10. Inspection and Testing

A color video recording (DVD) of all new gravity sewer lines must be made by the contractor or the developer. Video-recording of the complete sewer system will occur after completion of the backfilling operation and the placement and compaction of the roadway base (just prior to laying of asphalt). The video-recording will determine that the lines have been laid to accurate line and grade. At time of video-recording the lines shall be cleaned with sufficient water having been introduced into each segment of line to show any sags or dips present. The video camera shall have a depth gauge attached to the camera skid and in front of the camera that will show depth of water in the line at dips. Video shall be narrated. A final lamping with a Department Representative present will be performed after the roadway is completed to verify that the system has not been damaged. All lines and appurtenances not meeting specifications and these MINIMUM STANDARDS shall be repaired or replaced.

The original video recording report and a set of "as-built" record drawings will be submitted to and become the property of the Department. The recording, report and record drawings must clearly show:

A) Project name, date & time of video recording, segment of line being recorded (i.e., MH #1 to MH #2) including street name, and direction of recording process (i.e., with the flow or against the flow). Linear foot indicator on video recording.

B) All lateral sizes, locations and orientation.

C) Depth of any sags/dips found in the line. No more than ½-inch of sag will be allowed.

D) Entire length of line between manholes.

E) Video Pauses at problem areas with clear audible sound voice report describing deficiency.

F) A manhole video inspection and report shall be required for all manholes.

Any sand, rock, dirt or debris found in the lines shall be removed by the Contractor. All leaking joints or fittings shall be replaced or sealed from the inside with grout as determined by the Department. All cracked or defective pipe shall be replaced by the Contractor. Any cleaning, repair or replacement of lines must be video-recorded again. The Contractor and/or Developer will be responsible for all inspection and reinspection costs.

Department personnel must be notified at least 48 hours in advance and be present for all video-recording inspections.

11. Infiltration/Exfiltration Tests

The sewer main, house laterals and manholes shall be subjected to infiltration and exfiltration tests (method to be agreed upon by Engineer and Department). The allowable leakage shall not exceed fifty (50) gallons/day/inch of diameter/mile.

12. Service Connections

Magnetic markers shall be placed at the end of each sewer lateral. See Section XVI approved product list for markers. A location ball (see Section XVI for Approved Product List) shall be installed at each fitting. or every one-hundred (100) feet of separation. Locate wires shall be connected at the surface in a magnetized tracer box (see Section XVI for Approved Product List) and shall have a green cover as per APWA color code.

Once a service connection is made to Martin County Utilities' sewage system, disconnection from the sewage system is prohibited.

SECTION V - VACUUM SEWER SYSTEMS

1. General

All Materials, fittings and appurtenances intended for use in pressure pipe systems shall be designed and constructed for a minimum working pressure of one-hundred fifty (150) psi unless the specific application dictates a higher working pressure requirement.

All construction material shall be first quality, not previously used. Damaged or faulty pipe and materials must be properly replaced.

The accompanying Standard Detail Drawings indicate specific material requirements. In general, material requirements will be guided by the latest revisions of the specifications of AWWA, ANSI, ASTM and NSF.

2. Pipe Material

A) Vacuum Main

All buried vacuum mainlines, branch lines and service laterals (3-inch, 4-inch, 6-inch, 8-inch, and 10-inch) shall be SDR21 pressure rated Polyvinyl Chloride (PVC) pipe, conforming to ASTM D-2241.

All Pipe Joints shall conform to ASTM D-3139 Using elastomeric seals. Manufacturer is required to submit a certification that the pipe seal will operate at 22-inches of mercury vacuum and withstand a vacuum test at 22-inches of mercury vacuum with no leakage after one (1) hour with joints deflected as per ASTM D3139.6.1.1. Elastomeric joints shall be "Rieber Style" or approved equal.

Pipe Fittings shall be Polyvinyl Chloride (PVC) Schedule forty (40) or SDR-21 pipe fittings (for solvent cement joints) and be as produced by Spears Manufacturing Company (or approved equal) from a Polyvinyl Chloride (PVC) compound having a cell classification of 12454 conforming to ASTM D-1784. All Polyvinyl Chloride (PVC) fittings shall be injection molded in accordance with ASTM D-2466 with the exception of wye fittings. The wye fittings may be fabricated provided that fitting dimensions do not deviate significantly from those shown on the standard details. Wye fitting sockets shall be made in accordance with ASTM D-2466. Manufacturer shall submit a certification that the fittings will operate at and withstand a vacuum test at 22-inches of mercury vacuum.

Primer shall conform to ASTM F-656 Solvent Cement shall conform to ASTM 2564; cement shall not be same color as primer.

Wye fittings: 45° Ells shall be used throughout.

B) Gravity Sewer Pipe (Stub-out pipes and House Laterals)

All valve pit stub-out pipes and gravity laterals installed in the public right-of-way shall be pressure rated pipe: SDR21 or Schedule forty (40) Polyvinyl Chloride (PVC). Non- pressure rated pipe and foam core pipe is not acceptable.

SDR21 Pipe shall conform to ASTM D2241. Schedule forty (40) Pipe shall conform to ASTM D1784.

Stub-outs shall be either 4-inches or 6-inches in diameter and shall be a minimum of 72-inches long or the length necessary to extend service to the property line. A stop coupling shall be solvent bonded around the gravity line as shown in the standard details.

Any gravity house lateral pipe that is connected to the valve pit stub-out shall be of the same pipe material as the stub-out.

3. Valves and Appurtenances

Valves shall conform to AWWA C-515, Standard for Resilient Seated Gate Valves, as manufactured by Waterous Company or approved equal.

Wedge shall be constructed of ductile iron, fully encapsulated in synthetic rubber except for guide and wedge nut areas.

Wedge rubber shall be molded in place and bonded to the ductile iron portion, and shall not be mechanically attached with screws, rivets, or similar fasteners.

Wedge shall seat against seating surfaces arranged symmetrically about the centerline of the operating stem, so that seating is equally effective regardless of direction of pressure unbalance across the wedge.

All seating surfaces in body shall be inclined to the vertical at a minimum angle of 32° (when stem is in a vertical position) to eliminate abrasive wear of rubber sealing surfaces.

Stem shall be sealed by at least two (2) O-Rings; all stem seals shall be replaceable with valve wide open and while subjected to full rated pressure.

Waterway shall be smooth and shall have no depressions or cavities in seat area where foreign material can lodge and prevent closure or sealing.

Valve body and bonnet shall be coated, inside and out, with fusion-bonded epoxy. Coating shall conform to AWWA C550-81 and NSF-61, Standard for Protective Interior Coating for Valves and Hydrants.

Mechanical joint connections with transition to Polyvinyl Chloride (PVC) gaskets shall be provided. Two (2) tee keys shall be provided for each valve size required.

Buried valves shall be provided with valve boxes and the operating nut shall be extended to within 9-inches, plus or minus 6-inches, of the finished grade. The valve box cover shall have the words "SEWER" and "OPEN" with a directional arrow cast on it.

Manufacturer shall provide a full ten-year money back warranty.

4. Wire Locator for Vacuum Main

On all pipe construction, ten (10) gauge, THWN insulated, stranded copper wire shall be laid on top of pipe. Wire shall be continuous from Valve Box to Valve Box, wrapped two (2) times around each joint of pipe and extended into the Polyvinyl Chloride (PVC) threaded box located at each concrete pad around valve boxes to enable location devices to be attached without digging up the valve box. A location ball (3M, EMS 4-inch Ball Marker, Item Number 1404-XR) shall be installed at each fitting or every one-hundred (100) feet of separation. Locate wires shall be connected at the surface in a magnetized tracer box as produced by Copperhead Industries, LLC or approved equal, model to be determined by MC Utilities Field Inspector as determined by placement location and shall have a green cover as per APWA color code. All wire connections shall be made with Dri-Splice wire connectors or shall be encased with fittings filled with waterproof silicone sealant. All splices shall be inspected by the Department before burial.

Wire for Vacuum Mains shall be brown in color.

5. Valve Pits - General

Valve pit types: Valve pits shall be provided in the following types and depths as shown in the ENGINEER's plans.

One (1) Piece Valve Pits				
AIRVAC Model No.	**Overall Depth**	**Depth to invert of gravity inlet - 4” stub-out**	**Depth to invert of gravity inlet - 6” stub-out**	**Sump capacity**
VP3030WT	5 ft	3.71 ft	3.71 ft	57 gal
VP4830WT	6 ½ ft	5.21 ft	5.21 ft	115 gal
VP4842WT	7 ½ ft	6.21 ft	6.21 ft	115 gal

Two (2) Piece Valve Pits				
AIRVAC Model No.	**Overall Depth**	**Depth to invert of gravity inlet 4" stub-out**	**Depth to invert of gravity inlet 6" stub-out**	**Sump capacity**
VP3042H	6 ft	4.74 ft	4.74 ft	85 gal
VP3054H	7 ft	5.74 ft	5.74 ft	85 gal
VP5442H	8 ft	6.74 ft	6.74 ft	158 gal
VP5454H	9 ft	7.74 ft	7.74 ft	158 gal
VP7842H	10 ft	8.74 ft	8.74 ft	158 gal

Separating barrier: All valve pits shall incorporate a physical barrier, part of the collection sump, that separates the valve chamber from the collection sump.

Traffic Rated: All valve pits shall be H20 traffic rated. An independent laboratory certification shall be provided that the entire valve pit assembly is rated for H20 traffic wheel loads. Calculated data is not acceptable.

In-sump breather: All valve pits shall include an internal "in-sump" breather. No external breather piping or tubing will be acceptable.

Grommet and twist lock hole seal lubricant. Type of lubricant used shall be as follows:

Type of Lubricant	**Permitted**	**Where used**
Pipe lubricant per ANSI/NSF Standard #61	Either water soluble or non-water soluble is permitted	Grommets for gravity stub-outs and vacuum service laterals (both 1-piece & 2-piece pits)
Liquid dishwashing detergent diluted 10-20% in water	Pipe lubricant not permitted	Grommets for suction & sensor pipes and in-sump breather (2-piece pits only)
Pipe lubricant per ANSI/NSF Standard #61, Sub-Aqueous Type, non-water soluble for underwater use	Only non-water soluble is permitted	Twist lock hole seal for suction pipe and combined sump breather/sensor pipe (1-piece pits only)

Manufacturer: Valve pits and accessories as manufactured by AIRVAC.

6. Valve Pits – 2-Piece Type

Described below is the Model VP3042H valve pit. The other 2-piece models differ only by dimensions relating to depth.

A) Type: Valve pit shall have two (2) major components: 1) the valve pit cone; and 2) the collection sump as well as associated pipes, connectors, seals and grommets. Overall depth of the unit shall be 72-inch nominal.

B) Valve pit cone: The valve pit cone shall be manufactured by filament winding fiberglass process with a 36-inch inside diameter at bottom and conically shaped to allow fitting a 26 ¾-inch frame with a 23 ½-inch inch diameter clear opening cast iron cover. The valve pit cone shall have a depth of 42-inch and a wall thickness of 3/16-inch.

C) Collection sump: The collection sump and integral pit bottom shall be manufactured by the rotational molding process using polyethylene (PE). It shall be tapered with the upper rim designed to accept the valve pit cone as described in paragraph B above. The collection sump shall have an overall height of 30-inch nominal with a capacity of eighty-five (85) gallons. The collection sump shall be designed to allow up to (4) homes to be connected with either 4-inch or 6-inch Polyvinyl Chloride (PVC) pipe (see Part 2 Products for approved materials).

D) Suction and Sensor Pipes: Suction and sensor pipes shall be Sch 40 Polyvinyl Chloride (PVC). Lubricant shall be as specified in Part 2.

E) Anti-buoyancy collar: Anti-buoyancy collars shall be manufactured from reinforced fiberglass and shall be designed to prevent floatation of the valve pit assembly when ground water is present at grade. Anti-buoyancy collar shall be a minimum of 53-inch square with rounded corners and a minimum ½-inch thick.

F) Grommets: Holes for the house gravity line connections into the collection sump shall be field located and cut. EPDM Rubber grommets as manufactured by AIRVAC shall be used to make a watertight seal.

G) Connectors and seals: A roll of butyl shall be provided for use between the valve pit cone and collection sump.

H) Manufacturer: Valve pit model VP3042H as manufactured by AIRVAC.

7. Valve Pits – 1-Piece Type

Described below is the Model VP3030WT valve pit. The other one (1) piece models differ only by dimensions relating to depth. VP4830WT and VP4842WT are also available.

Type: Valve pit shall be manufactured by the rotational molding process using High Density Polyethylene (HDPE); with integral upper valve chamber, lower collection sump, separating plate between the upper and lower chamber, and an integral anti-buoyancy collar. The wall thickness shall be ½-inch. Overall depth of the unit shall be 60-inches.

Upper chamber: The valve chamber shall be 36-inches inside diameter at the bottom and conically shaped to allow fitting a 26 ¾-inch frame with a 23 ½-inch diameter clear opening cast iron cover. It shall have a depth of 30-inches. The upper chamber shall include a 3-inch vacuum service lateral pipe support with rubber o-ring seal to insure proper pipe alignment with the suction pipe.

Separating plate: The valve pit separating plate shall be provided with twist lock holes to mate with the suction pipe and combined sump breather/sensor pipe unit and shall be supplied with rubber seals.

Lower chamber: The collection sump shall have a 30-inch depth and a fifty-five (55) gallon capacity. The collection sump with the VP4830WT shall have a 44-inch depth and a one-hundred fifteen (115) gallon capacity. The lower chamber includes four (4) stabilizing embosses to support the valve pit. The lower chamber is designed to allow up to four (4) homes to be connected with either 4-inch or 6-inch Polyvinyl Chloride (PVC) pipe.

Suction and Sensor Pipes: The suction pipe shall be High Density Polyethylene (HDPE) and shall have a twist lock mechanism to mate with the holes in the separating plate. The sensor pipe shall be incorporated into the sump breather, which shall also have a twist lock mechanism to mate with the holes in the separating plate. Lubricant shall be as specified.

An integral anti-buoyancy collar, made of High Density Polyethylene (HDPE), shall be provided. The anti- buoyancy collar shall be factory-installed.

Grommets: Holes for the house gravity line connections into the lower chamber shall be field located and cut. Rubber grommets shall be used to make a watertight seal.

Manufacturer: Valve pit model VP3030WT and VP4830WT as manufactured by AIRVAC.

8. 1-Foot Extension for VP4842WT – 1-Piece Pits

Extension piece: The extension piece shall be manufactured by the rotational molding

process using polyethylene and allow fitting a 26¾-inch frame with a 23½-inch inch diameter clear opening cast iron cover. It shall have a depth of 12-inch.

Mating gasket: The 1-foot extension shall include a mating gasket located between the upper chamber of the 5-foot pit and the 1-foot extension piece.

Manufacturer: Extension piece is used to create the VP4842WT as manufactured by AIRVAC.

9. Flexible Connector

Flexible connector: Flexible connector shall be 3-inches in diameter with an overall length of 7’10 1/4 (+/- ¾”). The flexible connector shall incorporate a 4' 2-inches long piece of flexible pipe that is specially manufactured for AIRVAC. The flexible pipe shall have the proper outside diameter for solvent welding into Polyvinyl Chloride (PVC) fittings. One (1) end of the flexible pipe shall be joined to a 3' 8-inches long piece of 3-inch Schedule forty (40) Polyvinyl Chloride (PVC) pipe with a 3-inch Schedule forty (40) Polyvinyl Chloride (PVC) coupling. The opposite end of the flexible pipe shall be fitted with a 3-inch Schedule forty (40) Polyvinyl Chloride (PVC) coupling.

Manufacturer: Flexible connectors as manufactured by AIRVAC.

10. Valve Pit Covers

Valve pit covers: Valve pit covers shall be designed for H-20 loading. Castings shall meet ASTM A-48, Class thirty (30) gray cast iron.

Identification markings: The words "AIRVAC SEWER" shall appear on top of cover in 1-inch tall lettering.

Pick holes: Covers for the one-piece valve pit shall have elastomer seals and a concealed pick hole. Covers for the three-piece valve pit shall have an open pick hole and no elastomer seal.

Concrete collars (2-piece pits): Concrete collars are required for all AIRVAC 2-piece valve pits located in traffic areas. See Engineer’s drawings and/or specifications for definition of ‘traffic areas’ as well as the design details of the collar.

Concrete Collars (1-piece pits): Concrete collars are required for all AIRVAC 1-piece valve pits. Weight of collar varies according to overall pit depth and ground water conditions. See ENGINEER’s drawings and/or specifications for weight required as well as the design of the collar.

Manufacturer: Model R5900 by Neenah Foundry, US Foundry, or equal.

11. Vacuum Valve and Valve Pit Interdependence

Interdependence: The vacuum valve and valve pit shall be designed to function together as a complete system. Valve, valve pits and accessories shall be by the same manufacturer.

Manufacturer: Vacuum valves, valve pits, and accessories as manufactured by AIRVAC.

12. Vacuum Valve

Design conformance: Vacuum valves shall be designed such that head loss through the valve is at minimum. The “Cv” factor for these valves shall be 268 or higher. An Independent laboratory certificate shall be supplied upon request.

Type: Internal breather; Type F as manufactured by AIRVAC.

Valve Construction: Full-port 3-inch diameter valve capable of passing a 3-inch diameter solid while matching the outside diameter of 3-inch SDR 21 Polyvinyl Chloride (PVC) pipe. Valve to be vacuum operated on opening and spring assisted on closing; valve configuration arranged so that the sewer vacuum ensures positive valve seating. Valve plunger and shaft arranged to be completely out of the flow path when valve is in an open position.

Vacuum Operator: Self-lubricating, rolling diaphragm type; diameter sufficient to open valve fully using line vacuum to overcome sealing force; equipped with elastomer seal where shaft enters housing; vacuum drain connected to housing to return seal leakage to sewer when valve cycles.

Operation: Valve and sensor / controller require no outside power service.

The valve shall be manufactured such that small objects may be removed from the valve seat area by means other than complete valve removal and disassembly.

The valve and sensor/controller shall be capable of operation when submerged in water to a depth of two (2) feet above the upper most component.

Materials: Valves shall be chemically resistant to sewage and sewage gases. The valves shall be constructed from materials described in the following table.

COMPONENT	MATERIAL
Valve Body	Glass Filled Polypropylene
Valve Shaft	316 Stainless Steel
Valve Shaft Seal	Buna N Rubber
Valve O-Rings	Buna N Rubber

Valve Spring	304 Stainless Steel
Valve Plunger	Polypropylene
Valve Seat	EPDM Rubber
Valve Piston Cup	Polypropylene
Valve Bearing	Acetal

Furnished: Vacuum valves shall be furnished by the CONTRACTOR.

Installed: Vacuum valves shall be installed by the OWNER.

Manufacturer: Vacuum valve and accessories as manufactured by AIRVAC.

13. Vacuum Valve Sensor /Controller

The valve as described in subsection 3 shall be equipped with a sensor-controller which shall rely on atmospheric air and vacuum pressure from the downstream side of the valve for its operation, thereby requiring no other power source. Rising liquid within the holding sump shall initiate the opening of the valve when sufficient head pressure is reached in the holding sump. The activation point shall equate to approximately ten (10) gallons of liquid. The controller shall apply line vacuum from the downstream side of the vacuum valve and apply it to the actuator chamber and fully open the valve.

The controller shall be capable of maintaining the valve fully open for a fixed period of time. This shall be field adjustable over a range of three (3) to ten (10) seconds. After this time period has elapsed, the controller shall apply atmospheric air to the actuator chamber permitting spring assisted closure of the valve.

The controller shall be serviceable by factory-trained personnel and shall be removable from the valve by means of a sliding key device. There shall be no tools required to remove and replace the controller from the vacuum valve with the exception of tubing clamp nut drivers.

The entire body shall be constructed to allow visual inspection of the internal mechanism without disassembly. The controller shall be equipped with external test ports for bench testing of various chambers during re-build.

Each vacuum valve controller shall be equipped with a port for connecting a portable, self-contained valve cycle counter.

The controllers shall be chemically resistant to sewage and sewage gases. Controllers shall be constructed from materials described in the following table.

COMPONENT	MATERIAL
Controller Body	Clear Nylon 11
Controller Shaft	Acetal

Controller Springs	Stainless Steel
Controller O-Rings	Buna N Rubber
Controller Tubing	Polyurethane
All Fasteners	304 Stainless Steel

Manufacturer : Vacuum valve controller as manufactured by AIRVAC.

14. In-Sump Breather

With the exception of the individual house 4-inch gravity line air intake (or the 6-inch Air Terminal, if used), there shall be no other external sources of air necessary or permitted as a part of this assembly.

A factory provided internal sump breather unit arrangement shall connect the controller to its air source and provide a means of assuring no liquid can enter the controller during system shut downs and re-starts.

The internal sump breather shall be arranged to prevent sump pressure from forcing the valve to open during low vacuum conditions and provide positive sump venting regardless of traps in the home gravity service line.

Manufacturer: In-sump breather as manufactured by AIRVAC.

15. 6-inch Molded Air-Terminal

When used: When specified by the ENGINEER, this item is to be used in-lieu of individual 4-inch air-intakes that are normally provided by the homeowner's plumber.

Complete Air-Terminal: One 6-inch air-terminal assembly as shown on the standard details shall be connected to each valve pit sump through one of the four (4) sump openings provided. Connecting any gravity inlet piping to the air-terminal is not permitted.

Height: The air-terminal's slotted door shall be above the highest expected water level as shown on the standard details. The molded air-terminal is intended to be installed flush with the ground, but may be partially buried up to a maximum of 12-inches.

Piping: 6-inch Polyvinyl Chloride (PVC) pipe as described Subsection 2 "Products" shall be used to connect the air terminal to the valve sump.

Molded Air-Terminal: Molded polyethylene construction with approximately 3/16-inch wall thickness. Equipped with a 6-inch pipe grommet for sealing against ground water intrusion and a 6.4-inch x 8.8-inch hinged door. Standard color Simulated Brown Stone.

Support: This product is intended to be self-supporting but may also be attached to a

permanent structure is so desired.

Options (only if specified by the ENGINEER): Other colors (utility green or gray granite) may be available upon request. The air-terminal may also be equipped with an optional cycle counter and/or other AIRVAC devices. Air terminal also available without the hinged door (model AT1000-4)

Manufacturer: Molded air-terminal AT1000-1 as manufactured by AIRVAC.

16. Vacuum Sewer Main Installation

All vacuum sewers shall be laid to the line and grade with the use of construction laser beam equipment. All pipe which has been designed to slope downward shall be installed to slope continuously downward. There shall be no abrupt sags or bellies in the line. The maximum deviation from planned elevations shall not exceed 0.05-feet in any one-hundred (100) feet of length. This plus or minus tolerance applies to all pipe sizes.

Installation by the Horizontal Directional Drilling (HDD) method is not acceptable, unless prior, written approval is obtained from the ENGINEER. Approval would be on a case-by-case basis. Request to use Horizontal Directional Drilling (HDD) is a major deviation requiring different pipe materials, joints, etc. Should ENGINEER approve the use of Horizontal Directional Drilling (HDD), the same installation tolerances specified above for open-cut would apply, no abrupt sags or bellies would be allowed and the CONTRACTOR would be required to verify such through electronic means while the pipe is being installed. The Engineer shall provide Signed and Sealed pullback calculations demonstrating a factor of safety for the pipe of two against buckling and pull back stress for the proposed pipe materials considering the materials, bore hole path, and equipment used for this installation. Pipe selection shall meet pull back calculations to reflect factor of safety is met.

Use proper tools and appliances for handling and laying of pipe and fittings.

Prevent entrance of dirt or foreign matter or damage to pipe lining or coating. Plug the pipe any time that work is stopped.

Do not allow trench water to enter the pipe at any time.

No defective pieces are permitted. Defective pieces discovered after use will be removed and replaced with a sound piece.

Fully bare pipe along its entire length.

Lay and join pipe in accordance with manufacturer's instructions to insure pipe thermal expansion and contraction. Lay pipe with spigot end downstream.

Place compacted fill in entire space between the fitting and the trench walls. Use temporary plugs in end of pipes when work is not in progress.

Provide pipe through casing with support skids to hold pipe to center of casing as shown on Detail Drawings. Alternate support methods acceptable contingent upon ENGINEER's review.

Bed pipe as specified in section describing trenching.

Verify pipe grade and elevation at each change in grade and record in notebook in a manner acceptable to the ENGINEER.

17. Division Valve and Gauge Tap installation

Division valves shall be resilient seat gate valves. Furnish and install valves under provisions of Subsection 3 of this section. Install gauge tap adjacent to division valve as shown on the standard detail. Provide concrete collar around each division valve and gauge tap.

18. Valve Pit Installation - General

The end of the stub-out pipe that passes through the valve pit grommet shall be beveled. A stop ring shall be used to ensure the pipe does not protrude more than 4-inches inside the collection sump with an allowable tolerance of 1/8”±.

All pipes that penetrate the valve pit through grommets shall be Schedule forty (40) SDR twenty-six (26), or SDR twenty-one (21) pressure rated Polyvinyl Chloride (PVC) pipe. No other pipe is acceptable.

The type of lubrication used with AIRVAC grommets shall be as specified.

Dedicated 6-inch air intake structures shall be installed a minimum of 18-inches into the ground and the above ground portion shall be installed plumb and true. Water-soluble soap or silicone spray shall be used when installing Polyvinyl Chloride (PVC) pipes through AIRVAC grommets. Use of petroleum lubricant or pipe lube is prohibited.

19. Valve Pit Installation (2-Piece Pit)

Valve pits shall be assembled in accordance with manufacturer’s instructions.

Valve pits shall be installed using the following procedures:

1. Install the suction and sensor pipes.

2. Determine proper location and alignment with vacuum main and wye connection.

3. Determine grade elevation for the top of the pit package.

4. Determine the gravity line depth from the home to the pit package and verify that adequate slope exists between the house and the sump inlet. If sufficient fall does not exist, consult the ENGINEER or inspector prior to completing the valve pit installation.

5. Determine which raised flat area of the sump will require a gravity line stub out. Mark and cut the holes in the raised flat area as required. Each coupon shall be removed from the hole saw and hung inside the upper chamber as proof of its removal.

    a) For 4-inch laterals, a 5-inch opening is required with the centerline of the opening 18-inches from the outside bottom of the sump.

    b) For 6-inch laterals, a 6-7/8-inch opening is required with the centerline of the opening 19-inch from the outside bottom of the sump.

6. Install the appropriate size AIRVAC rubber grommets into the field cut holes.

7. Excavate and prepare the bedding for the valve pit package as shown on construction plans or as field instructed.

8. Lower the collection sump assembly into the prepared excavated hole, taking care that no material enters the collection sump.

9. Install the prefabricated house gravity line stub-outs through the grommet into the collection sump tank with the stop coupling firmly against the grommet. Use lubricant as specified in Subsection 2 when installing the stub outs. Ensure that grommet remains in place after pipe stub is installed.

10. Level entire assembly.

11. Backfill to the top of the collection sump. Compact the soil per the ENGINEER’s requirements.

12. Conduct the sump pressure test as described in Subsection 21.

13. Keep all mating surfaces clean and dry. Place the valve pit on top of the sump.

14. Re-check level of valve pit package. Use of hydraulic machinery to obtain final level of valve pit may result in sump damage and is strictly prohibited.

15. Install the fiberglass flotation collar. (If specified.)

16. Insert the beveled end of the AIRVAC 3-inch flexible connector into the 3-inch pit opening hole. Push flexible connector all the way to the 3-inch suction elbow.

17. Use a 3-inch Polyvinyl Chloride (PVC) coupling to attach the end of the flexible connector to the suction elbow (do not glue) to insure proper alignment.

18. After bedding the flexible connector, backfill to the top of the valve pit package. Compact the soil per the ENGINEER's requirements.

19. Remove the 3-inch coupling and cut the Polyvinyl Chloride (PVC) end of the flexible connector to the center of the pit package (+/-1-inch). This is the only time the flexible connector may be cut during installation. The flexible connector must remain aligned concentrically with the suction pipe +/-1/2-inch after cutting.

20. Glue a Polyvinyl Chloride (PVC) cap onto the end of the 3-inch flexible connector inside the pit package. **NOTE:** It is important to glue the Polyvinyl Chloride (PVC) cap onto the end of the flexible connector prior to any vacuum being applied to the 3-inch vacuum service lateral. Failure to do this may result in the collapse of the lower collection sump.

21. Place the frame and cover on top of the valve pit assembly.

22. Pour a concrete ring, when required by ENGINEER.

23. Complete the installation of vacuum service piping from end of the flexible connector to the wye connection at vacuum main. Insure downward slope from pit to main and any lifts required meet design requirements.

24. Complete the back-fill of the service lateral (flexible connector to main line wye). Tamp or vibrate fill.

25. Record information on the Valve Pit Installation Form.

20. Valve Pit Installation (1-Piece Pit)

Valve pits shall be assembled in accordance with manufacturer's instructions. Valve pits shall be installed using the following procedures:

1. Excavate and prepare the bedding for the valve pit package as shown on construction plans or as field instructed.

2. Determine proper location and alignment with vacuum main and wye connection.

3. Determine grade elevation for the top of the pit package.

4. Determine the gravity line depth from the home to the pit package. And verify that adequate slope exists from the house to the sump inlet. If sufficient fall does not exist, consult the ENGINEER or inspector prior to completing the valve pit installation.

5. Determine which raised flat area of the sump will require a gravity line stub out. Mark and cut the holes in the raised flat area as required. Each coupon shall be removed from the hole saw and hung inside the upper chamber as proof of its removal.

   a) For 4-inch laterals, a 5-inch opening is required with the centerline of the opening 18-inches from the outside bottom of the sump.

   b) For 6-inch laterals, a 6-7/8-inch opening is required with the centerline of the opening 19-inches from the bottom of the sump.

6. Install the appropriate size AIRVAC rubber grommets into the field cut holes.

7. Lower the pit package into the prepared excavation hole.

8. Install the prefabricated house gravity line stub-outs through the grommet into the collection sump tank with the stop coupling firmly against the grommet. Use lubricant as specified when installing the stub outs. Ensure that grommet remains in place after pipe stub is installed.

9. Level the entire assembly.

10. Protect the top of the valve pit to prevent the entrance of soil and begin backfilling. Compact soil as instructed by the specifications. Keep pit package level and at desired top elevation. Stop backfilling just below the pit package outlet port.

11. Conduct sump test as described in Subsection 21 of this Section.

12. Lubricate the O-ring seal inside the 3-inch vacuum service lateral alignment port on the valve pit package with water soluble soap.

13. Insert the beveled end of the flexible 3-inch vacuum service lateral into the alignment port. Push beveled end in to the center of the pit package 1-inch±.

14. Review the rubber seal in the 3-inch vacuum service lateral alignment port to make sure it has not been pinched.

15. Glue a Polyvinyl Chloride (PVC) cap onto the end of the 3-inch flexible service lateral inside the pit package. NOTE: It is important to glue the Polyvinyl Chloride (PVC) cap onto the end of the flexible service lateral prior to any vacuum being applied to the 3-inch vacuum service lateral being installed. Failure to do this may collapse the lower collection sump.

16. Install the rubber U-seal provided over the top edge of pit package.

17. Set the cast iron ring (without cover) into position on top of the pit package. Caution must be taken when installing the ring to keep U-seal in position. Do not attempt to set the ring vertical on top of the pit package and pivot into position. Place the cast iron cover on the ring to keep foreign material out while backfilling.

18. Complete the installation of vacuum service piping from flexible service lateral to wye connection at vacuum main. Insure downward slope from pit to main and any lifts required meet design requirements.

19. Complete the back-fill. Tamp or vibrate fill.

20. Pour a concrete ring, when required.

21. Record information on the Valve Pit Installation Form.

21. AirVac Sump Testing (2-Piece Pit)

One sump test shall be performed. This test is performed after all holes have been field cut, grommets and stub-out pipes installed and the entire valve pit assembly installed in the ground. This test is done to test the grommets, the entire length of the stub-outs including any pipe in the public right-of-way, and the overall sump assembly.

Sump testing shall be done as follows:

1. Attach provided sump test assembly onto the end of the 3-inch suction pipe inside the valve pit with a 3-inch No-hub or Fernco coupling and Polyvinyl Chloride (PVC) test cap.

2. Secure 1/8-inch tubing to the HIGH port on a 0-50-inch magnehelic gauge, and then connect the other end to the tubing port on the Polyvinyl Chloride (PVC) test cap.

3. Install a test plug in the sump breather hole using the rubber seal provided. Apply water soluble soap to the rubber seal before installation. Turn ninety (90) degrees to make a tight seal.

4. Pressurize the collection sump though the air chuck on the Polyvinyl Chloride (PVC) test cap.

5. Test at 40-inch water gauge pressure. Leakage must be under 5-inch water gauge in one (1) minute.

6. If leak test fails the CONTRACTOR must locate the leak, repair it and retest.

22. AirVac Sump Testing (1-Piece Pit)

One (1) sump test shall be performed. This test is performed after all holes have been field cut, grommets and stub-out pipes installed and the entire valve pit assembly installed in the ground. This test is performed to test the grommets, stub- outs and the overall sump assembly.

Sump testing shall be done as follows:

1. Attach provided sump test assembly onto the end of the 3-inch suction pipe inside the valve pit with a 3-inch No-hub or Fernco coupling and Polyvinyl Chloride (PVC) test cap.

2. Secure 1/8-inch tubing to the HIGH port on a 0-50-inch magnehelic gauge, and then connect the other end to the tubing port on the Polyvinyl Chloride (PVC) test cap.

3. Install a test plug in the sump breather hole using the rubber seal provided. Apply silicone spray to the rubber seal before installation. Turn ninety (90) degrees to make a tight seal.

4. Pressurize the collection sump through the air chuck on the Polyvinyl Chloride (PVC) test cap.

5. Test at 40-inch water gauge pressure for a period of one (1) minute.

Leakage must be under 1-inch water gauge in one (1) minute.

6. If leak test fails the CONTRACTOR must locate the leak, repair it and retest.

23. Vacuum Line Testing – Daily Testing

A two (2) hour vacuum tightness test of all sewer mains and lateral connections shall be conducted daily as follows:

1. Plug all open connection with rubber stoppers or temporary caps, fitted to the pipe by "no-hub" couplings.

2. Apply a vacuum to 22-inches Hg to the pipes and allow the pressure to stabilize for fifteen (15) minutes.

3. There shall be no loss of vacuum in excess of 1% per hour for a two (2) hour test period.

4. There shall be absolutely no water allowed to be admitted into the piping network during this test.

5. As pipe is laid the new section shall be tested in addition to the previously laid pipe on that main.

6. The CONTRACTOR should leave uncovered the sewer main pipe joints until after the daily vacuum test is complete so that any leaks can be easily located and repaired.

If the CONTRACTOR successfully passes the daily two (2) hour test for seven (7) consecutive working days or two-thousand (2,000) feet of pipe, a request to modify the test procedures may be made to the ENGINEER. If so approved by the ENGINEER, the daily two (2) hour vacuum test procedure may by modified as follows:

1. The procedure may be altered to allow the trench to be covered as work progresses rather than being kept open all day as is the norm with the daily two (2) hour test.

2. Should a line fail the vacuum test while utilizing this test modification, the CONTRACTOR shall take whatever action necessary at his own expense to successfully pass the test including the re-excavation of the trench, leak detection, line repair, and additional cleanup as required by the ENGINEER.

3. After a failure, the CONTRACTOR must return to the standard testing procedures in order to "re-qualify" for the modified testing again.

4. This test modification is optional, and as such, the CONTRACTOR assumes all liability in its use, even if approved by the ENGINEER.

24. Vacuum Line Testing – Final Acceptance Test

A four (4) hour vacuum tightness test of the complete vacuum piping network, including all sewer mains and lateral connections shall be conducted as follows:

1. Subject the entire sewerage system to a vacuum of 22-inches Hg, allow to stabilize for fifteen (15) minutes.

2. There shall be no loss greater than 1% per hour over a four (4) hour test period.

3. There shall be absolutely no water allowed to enter the piping system or the vacuum station during this test.

CONTRACTOR to provide forty-eight (48) hours' notice to ENGINEER and Martin County Inspector prior to test. CONTRACTOR to assure all division valves are open prior to beginning of Final Acceptance test.

Final Acceptance Test shall be recorded on approved vacuum chart recorder. This chart will not be considered valid unless witnessed by ENGINEER on test equipment at beginning and the end of vacuum test period.

ENGINEER will sign and date chart to verify witness of test. This signature does not indicate acceptance of the system.

25. Line Flushing

After successful final four (4) hour acceptance testing, flush lines to remove debris and foreign materials that accumulated during construction.

Suggested procedure (In the absence of special test apparatus, this procedure will require the use of vacuum valves):

1. Place system under vacuum.

2. Add water and air in controlled amounts to valve pits at extreme ends of system.

3. Utilize system vacuum to transport water and debris to collection point.

4. Continue procedure until water entering at collection point is free of contamination or debris.

5. If the vacuum collection tank is used as the collection point, monitor volume of liquid in tank and pump out as necessary.

6. If debris is present, use other methods to empty collection tank.

7. At completion of flushing, clean collection tank of all collected debris

8. Use system sewage pumps only after verifying that all collected debris has been properly removed and disposed of by Contractor.

9. Seal system and make ready to place into operation.

Alternate flushing procedure subject to ENGINEER's review and approval.

26. Manufacturer's Field Representative Role and Duties

The Manufacturer's Field Representative role shall be to supplement the OWNER and/or ENGINEER's inspector with efforts directed toward insuring proper installation of the vacuum system by the INSTALLATION CONTRACTOR. The presence of the Manufacturer's Field Representative shall not, in any way, constitute the acceptance of work nor shall it relieve the INSTALLATION CONTRACTOR of their responsibility to comply fully with all requirements of the contract documents.

Contractor's duties relating to vacuum main installation include but are not limited to:

1. Check type of pipe, fittings and division valves to insure they are suitable for vacuum service.

2. Confirm that vacuum lines are installed as indicated on the construction plans by spot-checking grades, distances and elevations.

3. Observe trench conditions to insure adequate soil conditions exist, and that proper bedding and compaction are carried out in accordance with the contract documents.

4. Observe branch and service lateral installations to insure compliance with contract documents.

5. Maintain a neat, legible and accurate set of "Hydraulic Drawings" and field notes (for manufacturer's internal use only). If the Engineer is on-site full time, he shall provide OWNER with a copy of this information upon completion of the project. Otherwise, Contractor is responsible to provide.

6. Provide onsite training on use of the Trailer Mounted Vacuum Pump (TMVP).

7. Observe the daily vacuum testing of vacuum sewers to insure compliance with the contract documents.

8. Provide supervision of the final four (4) hour vacuum main test and line flushing.

Contractor's duties relating to valve pit installation shall include but are not limited to:

1. Insure sump testing is conducted in accordance with the contract documents.

2. Insure storage and handling procedures are followed to avoid loss or damage to AIRVAC products used at the project site.

3. Insure all field penetrations to AIRVAC products are neatly cut, reasonably circular and are located properly.

4. Insure valve pit assembly is placed in accordance with construction drawings or as otherwise directed.

5. Insure 3-inch service lateral is properly aligned with the 3-inch suction pipe.

6. Insure that depth is in accordance with contract documents as well as within AIRVAC limits.

7. Insure pit assembly is plumb and reasonably level.

8. Compile and maintain a complete and accurate set of valve pit installation forms, except when the Engineer has an onsite fulltime representative who will be responsible to provide these.

9. Observe testing and installation of gravity sewers to insure no infiltration exists

Manufacturer's Representative shall not be responsible for keeping construction as- built drawings. This shall be the responsibility of the INSTALLATION CONTRACTOR or other party so designated elsewhere in the Contract Documents.

Manufacturer's Representative shall not be responsible for compiling and maintaining the Valve Pit Installation Forms. This shall be the responsibility of the INSTALLATION CONTRACTOR unless the owner provides these by use of the fulltime onsite Engineer's approval by the County.

10. Valve Pit Installation Forms: Provide the OWNER with a complete set of Valve Pit Installation Forms. One (1) form is required for each valve pit installed. Each form must be signed by the CONTRACTOR certifying that all required pressure tests have been successfully completed and that all sump cut-outs (coupons) have been removed from the sump.

11. Final Inspection Form: Provide the OWNER with a signed copy of the Final Inspection Form.

12. Vacuum Valve Installation Forms (only required when CONTRACTOR is responsible to install the vacuum valve under this contract): Provide the OWNER with a complete set of Vacuum Valve Installation Forms certifying the proper installation and testing of each vacuum valve placed into service.

*The AIRVAC Specifications and Details may change over time. The latest Specifications and Details from AIRVAC shall be used.

SECTION VI - SEWAGE FORCE MAINS

1. General

All materials, fittings and appurtenances intended for use in pressure pipe systems shall be designed and constructed for a minimum working pressure of one-hundred fifty (150) psi unless the specific application dictates a higher working pressure requirement.

All construction material shall be first quality, not previously used. Damaged or faulty pipe and materials must be properly replaced.

Standard pressure pipe fittings of size 4-inch inner diameter (ID) and larger shall be Ductile Iron Pipe (DIP) fittings with mechanical joints. For sizes less than 4-inch inner diameter (ID), fittings shall be suitable to the pipe material and application and shall be approved by the Department. Only bolts furnished by the manufacturer for mechanical joints are acceptable.

Pipe gaskets shall be as supplied by the pipe manufacturers.

The accompanying STANDARD DETAIL DRAWINGS indicate specific material requirements. In general, material requirements will be guided by the latest revisions of the specifications of AWWA, ANSI, ASTM, and NSF.

2. Pipe Material

Polyvinyl Chloride (PVC) Sewer Main 4-inch to 12-inch diameter (4" - 12") shall be DR-18 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA Standard C900. The pipe shall have an integral bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color shall be white or green.

Polyvinyl Chloride (PVC) Sewer Main 14-inch to 20-inch diameter (14" - 20") shall be DR-18 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C905. The pipe shall have an internal bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color shall be white or green.

Polyvinyl Chloride (PVC) Sewer Main 20-inch diameter or greater (20" or greater) shall be DR-14 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C905. The pipe shall have an internal bell end gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color shall be white or green.

Sewer Main 2-inch in diameter shall be polyethylene as defined by A.S.T.M. D2737 SDR9 copper tube size.

High Density Polyethylene (HDPE) sewer main 4-inch to 16-inch in diameter (4" – 16") shall be DR-11 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C906, latest revision and ASTM F714. The pipe will be extruded from resin meeting specifications of ASTM D-3350 with a cell classification of type III, class C, category five (5), grade P34 polyethylene compound. The pipe color shall be green or co-extruded green color stripes.

Ductile Iron Pipe (DIP) shall conform to latest standards of ANSI/AWWA C150/A21.50 for the thickness design of Ductile Iron Pipe (DIP) and ANSI/AWWA C151/A21.51 for Ductile Iron Pipe (DIP) centrifugally cast in metal molds or sand-lined molds. The minimum thickness of the Ductile Iron Pipe (DIP) shall be Pressure Class 350 for pipes up to 20-inches and Pressure Class 250 for pipes larger than 20-inches.

Joints for Ductile Iron Pipe (DIP) shall conform to the latest standard of ANSI/AWWA C111/A21.11 for rubber gasket joints. All Ductile Iron Pipe (DIP) shall be "Protecto 401 lined" and shall conform to the latest standards of ANSI/AWWA C104/A21.4

Above ground Ductile Iron Pipe (DIP) shall be Protecto 401 lined flanged Pressure Class 53 with minimum wall thickness of 0.32 for 4-inch pipe and incremental increases of 0.02-inch thickness for each pipe diameter increase up to 14-inches. Ductile Iron Pipe (DIP) greater than 14-inches shall be submitted to the Department.

All above ground Ductile Iron Pipe (DIP) shall be coated with green paint as follows:

Sandblast and remove all paint and any loose material in accordance with NAPF-500-03. Do not paint or coat any nameplates, brass or stainless steel surfaces. Contractor shall use the paint system as specified in Section XVI the Approved Product List or equal.

Flanged fittings shall meet ANSI 21.20 and AWWA C110 standards.

All fittings shall be epoxy lined.

Pipe joints to be push on. The use of Ductile Iron Pipe (DIP) shall be allowed only where individually approved on a case by case basis.

3. Parallel/Horizontal Separation

Sanitary sewers, force mains, and storm sewers should cross under water mains whenever possible. Sanitary sewers, force mains and storm sewers crossing water mains shall be in accordance with drawing 1E.

All Ductile Iron Pipe (DIP) shall be pressure class 350. Adequate protective measures against corrosion shall be as determined by the design engineer and the Department.

Horizontal separation of fifteen (15) feet to buildings, top of banks of lakes and canals and other structures shall be maintained, if possible. An absolute minimum of ten (10) feet may be allowed only when unavoidable and only with Ductile Iron Pipe (DIP). Horizontal separation of three (3) feet minimum to power poles, light poles, or other utilities shall be maintained.

4. Design Requirements

Design standards for force mains will generally be the same as the water mains. Force mains shall not be less than 4-inches inside diameter and with a flow velocity of not less than two (2) feet per second except 2-inch force mains may be allowed to maintain minimum velocity of two (2) feet per second at the Department's determination. Force mains shall never enter a manhole from a direction contrary to the direction of flow out of the manhole. All private force mains entering County right-of-way shall be built to these MINIMUM STANDARDS past the right-of-way line. A valve shall be placed at the right-of-way line to delineate the change in maintenance responsibilities. The Department shall control said valve.

5. Valves and Appurtenances

Gate Valves shall be ductile iron, resilient seat type with mechanical joints conforming to AWWA C-515, latest revision. Valves shall be designed for a working pressure of not less than two-hundred (200) psi. Each valve shall have the pressure rating cast into the body and manufacturer's name or initial cast into body or bonnet.

Valving of all systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. Generally, the number of valves at an intersection shall be one (1) less than the number of pipes forming the intersection.

Valves shall generally be installed at intervals of not more than fifteen-hundred (1,500) linear feet on transmission mains and on all primary branches connected to these lines. In high density areas, valves shall be installed at closer intervals as necessary to minimize the number of persons affected by a break.

In all instances, effectiveness of placement shall be primary criteria in determining valve locations. Valves shall not be placed in swales or ditches.

All valves, bends, tees, crosses and dead ends shall be restrained.

Clearance of 18-inches shall be maintained between all fittings (bells, valves, flanges, etc.). Dead ends that may be extended in future shall have a gate valve with a mechanical joint plug at the termination point. The valve shall be restrained a minimum of two (2) full joints back.

All pressure pipe fittings of size 4-inch and larger shall be ductile iron fittings, with mechanical joints, unless plans call specifically for flanged, restrained joint fittings. Mechanical joint fittings shall be used for buried installations; flanged fittings shall be used for above ground installations. Mechanical joint fittings shall conform to ANSI/AWWA C-153/A21.53.

All valve boxes shall be two (2) piece cast iron construction with screw type riser sections. The valve box lid shall carry the word "SEWER" and be the deep skirt type. Valve boxes must have a minimum inside diameter of 5-1/4-inch. A square concrete collar that is 24"x24"x6" thick shall be poured at the top of each valve box at finished grade. Valve box lids that are to be located in pavement must have a minimum 4-inch skirt are listed in Section XVI Approved Product List.

Height adjustments to valve boxes will require a screw type, cast iron extension. Valve boxes and extensions are listed in Section XVI Approved Product List.

When the gate valve is deeper than 36-inches an extension will be required to bring the operating nut within 24-inches of finished grade. A ¼"x3" 316 stainless steel roll pin will be inserted through the valve-operating nut to secure the extension stem.

6. Minimum Cover

Minimum Cover to finished grade over force main shall be 48-inches.

7. Wire Locator For Force Main

For all open cut construction, ten (10) gauge THWN insulated, stranded copper wire shall be used. For all directional drill construction, see Section XVI Approved Product List for the wire to be used. Wire shall be laid and secured on top of pipe. Wire shall be continuous from valve box to valve box, wrapped two (2) times around each joint of the pipe and extended inside each tracer box to enable location device to be attached without digging up the valve box (see Drawing No. 18).

Service wire shall be laid in the trench with all services, connected to the main wire and wrapped around the service piping or tubing. Wire for potable water shall be green in color.

All wire connections shall be made with Dri-Splice wire connectors, fittings filled with waterproof silicone sealant or approved equal for open cut construction. All wire connections shall be made with the system recommended by the locate wire supplier for directional drill construction. All splices shall be inspected by the Department before burial. Locate wires shall be connected at the surface in a magnetized tracer box (see Section XVI Approved Product List) and shall have a green cover as per APWA color code.

A location ball (see Section XVI Approved Product List) shall be installed at each fitting and every one-hundred (100) feet of separation.

8. Connections for Pressure Systems

Tapping Tees and Valves. Tapping sleeves shall be 304 stainless steel with flanged outlets. Tapping valves shall be resilient seat type with a flanged joint of the inlet side and a mechanical joint on the discharged side of the valves. Tapping valves shall have a 2-inch operating nut. Working pressure rating shall not be less than two-hundred (200) psi. Gaskets between the flange faces of the tapping sleeve and tapping valve shall be 1/8-inch minimum thickness of neoprene rubber.

Size on size taps. Taps may be made on the same size main only when the main to be tapped is AWWA C900, C905 or Ductile Iron Pipe (DIP).

Installation. A Department representative shall approve each tapping location before the tapping sleeve is installed. Tapping sleeves shall not be installed within three (3) feet of any joint or fitting. Before installation of tapping tee, the area to be tapped and the tapping tee shall be cleaned with potable water. After all sand, dirt and debris have been removed from the main, the tapping tee, the tapping valve and the area where the tapping tee is to be installed on the existing main shall be swabbed with a chlorine or bleach solution with at least one-hundred (100) ppm of chlorine.

After the tapping tee is attached to the main, the gate valve shall be closed and tapping tee and gate valve assembly shall be pressured tested at a minimum of one-hundred fifty (150) psi for a minimum of fifteen (15) minutes with water. A Department representative shall witness the pressure test. No visible leaks or loss of pressure shall be evident. After pressure testing, the main may be tapped. Only shell type cutters shall be used. The coupon from the hole that is cut shall be delivered to the Department.

9. Cleaning and Pigging

After its installation, the complete force main system (including all mains, air release valves and all other appurtenances) shall be thoroughly cleaned to remove all foreign matter. The Department shall be notified at least forty-eight (48) hours in advance of any cleaning activities. Failure to provide advance notification of cleaning may result in the Contractor not being allowed to clean the mains. Water used for filling and cleaning shall be from an approved water source.

The cleaning of piping systems shall be accomplished by the controlled and pressurized passage through the system of a series of hydraulic or pneumatic polyurethane plugs (poly pigs). The poly pigs shall be entered into the system by the use of a pig launching assembly. The poly pigs shall be removed or discharged from the system at a point as near to the end of the system as is logistically and mechanically feasible. The contractor must demonstrate to the satisfaction of the Department that this work will be performed by experienced and knowledgeable supervisors and personnel who have properly, safely and

effectively provided for the cleaning of comparable systems in similar applications.

10. Pressure Testing

All mains shall be tested for leakage. Water shall be supplied to the main and pumped to the required one-hundred fifty (150) psi pressure.

The Department shall be notified at least forty-eight (48) hours in advance of any testing procedures. After flushing is completed, line pressure shall be applied to the complete system to determine if any major defects are present. The complete system shall then be tested at a pressure of one-hundred fifty (150) psi for a period of not less than two (2) hours. The Department may, at its discretion, increase the period to four (4) hours. The maximum length of pipe to be tested at one (1) time shall not exceed Fifteen-hundred (1500) linear feet. An oil filled pressure gauge up to two-hundred (200) psi at two (2) pound increments shall be used for all pressure tests. No visible movement of the system shall occur and leakage shall not exceed:

$$L = \frac{ND\sqrt{P}}{7400}$$

Where L = Leakage in gallons
N = Number of joints in test section
P = Test pressure in psi.
D = Diameter of pipe in inches

11. Installation

A) Installation and testing of Ductile Iron Pipe (DIP) force main pipe and fittings shall be in accordance with AWWA Specification C-600 Latest Revision and Department's Construction Standards and Specifications.

B) Any pavement cut shall be replaced in accordance with requirements of the agency of jurisdiction.

C) All loading or unloading of pipe, fittings, valves and accessories shall be done in such a manner so as to avoid damage. The pipe shall not be skidded or rolled against pipe already unloaded. Special precautions should be taken to avoid damage to lined fittings and pipe. The interior of all pipes, fittings and other appurtenances shall be kept free of dirt and foreign matter at all times.

D) All valves, bends, tees, crosses, and dead ends shall be restrained with an approved mechanical restrained joint system. Where proprietary restrained joints are not used, tie rods and megalugs are the recommended system. (See Section XVI Approved Product List.)

E) Tie rods used as a method of joint restraint shall be by means of steel tie back bolts, nuts, washers and all thread rods shall be stainless steel. Tie rods and nuts shall be equal in diameter to the tee bolts and nuts which were supplied with the applicable fittings. Two (2) tie rods per joint are required for sizes 4-inch diameter through 10-inch diameter, four (4) tie rods per joint for sizes 12-inch diameter through 16-inch and six (6) tie rods per joint for sizes 18-inch through 24-inch.

F) Air relief valves shall be at the design high points. Installation of air release valves to correct high points caused by improper installation of pipe (not at design grade) will not be permitted. (See Section XVI Approved Product List.)

G) All pipes shall be laid to line in a clean dry trench on line and grade with valves plumb. All pipe shall have a minimum cover of 48-inches and a maximum cover of 60-inches unless otherwise noted on the plans or required by permit.

H) The trench at the top of the pipe shall be kept to a maximum width of 24-inches plus the pipe diameter. The trench shall have a flat bottom, cut true and even, so that the barrel of the pipe shall bear its full length. Pipe bells will be placed in small pockets specifically excavated to receive the bell. All excavations must be in compliance with OSHA regulations.

I) No rocks larger than 2-inches in diameter or other items that may damage the pipe will be permitted over the pipe. In the event pipe is installed in rock excavation, 6-inches of granular material will be provided for bedding under the pipe. All pipe joints, thrust blocks, conflicts and service connections shall be left exposed until visually inspected and approved by a Department representative.

J) All tapping assemblies installed on existing force mains shall be pressure tested and witnessed by a Department's representative prior to the actual tap of the main. The pipe coupon shall be carefully preserved and submitted to the Department's representative. All tapping sleeves shall be installed a minimum of 18-inches from pipe joints or fittings.

K) All field cuts on pipe shall require careful repair of the particular lining damaged in strict accordance with the manufacturer's recommendations.

L) Do not exceed 50% of the manufacturers recommended maximum joint deflection.

12. Horizontal Directional Drilling (HDD)

The following standards pertain to the design and construction of horizontal directional drilling of force mains in the Martin County Utilities service area.

A) Pipe sizes and material: Horizontal directional drilled utility pipe shall be High Density Polyethylene (HDPE) pipe (SDR 9 minimum for 2-inch and SDR 11 minimum for 4-inch or greater). If the directional drilled pipe is to be used as a casing for a small diameter service line (up to 2-inch diameter), DR 18 pipe is acceptable. Pipe and couplings shall be free from voids, cracks, inclusions, and other defects and shall be uniform in color throughout the installation.

B) Design Requirements: The Engineer shall inquire with the Department about approval of a horizontal directional drilling procedure for a pipe installation. With the Department's concurrence, the Engineer shall submit a signed and sealed pilot bore plan for review and approval. The Engineer shall provide Signed and Sealed pullback calculations demonstrating a factor of safety for the pipe of two (2) against buckling and pull back stress for the proposed pipe materials considering the materials, bore hole path, and equipment used for this installation. Pipe selection shall meet pull back calculations to reflect factor of safety is met. The plan shall be submitted on a 24" x 36" sheet to a maximum 1" = 20' horizontal and 1" = 2' vertical scale (1" = 10' horizontal, 1" = 1' vertical scale preferred). The plan must show:

- Finished grade and surface improvements
- Locations of drill set-up
- Length of bore
- Deflection and radii of the pilot bore
- Locations of existing utilities and underground structures
- Minimum horizontal and vertical clearances from underground structures, conduits, piping systems (the proposed clearances must exceed the Departments standards plus the guidance system accuracy tolerance) Pipe size and specifications
- Proposed pilot bore pipe deflection limits (not to exceed 50% of the maximum deflection allowed by the pipe manufacturer)
- Limits of directional bore installation Limits of pressure testing Connection to existing utilities
- Rights-of-way limits, utility easements and temporary construction easements

C) Preconstruction Meeting: Upon approval of the pilot drill plan by the Department and obtaining all necessary permits for the directional drilling, the Engineer shall schedule a preconstruction meeting with the Department. If the construction requires any field welding/fusion of High Density Polyethylene (HDPE) pipe and/or fittings, a Certificate of Completion of a pipe fitting manufacturer approved training program is required. The Engineer and the Contractors performing the utility work shall attend the meeting.

D) Pilot Bore: The Engineer shall schedule the beginning of work with the Department a minimum of three (3) days in advance. The drill path shall be accurately surveyed and plotted to create an "As-Built" drawing (same scale as the pilot drill plan). The Engineer shall evaluate the As-Built data and confirm the compliance with the design parameters. Deviation beyond approved parameters (depths, deflection radius, separation to other utilities or structures) shall be brought to the attention of the Department. The signed and sealed pilot bore As-Built drawing shall be submitted to the Department for review and approval.

E) Pull back of carrier pipe: Upon approval of the pilot bore location by the Department, the pullback operation of the required carrier pipe shall begin. The Contractor shall select the proper reamer type with the final hole opening to be a minimum of 1.5 times the outside diameter of the largest component system.

The open borehole shall be stabilized by means of bentonite drilling slurry. The slurry shall be contained at the entry or the exit side of the bore in pits or holding tanks.

The pipe sections shall be joined together in accordance with the manufacturer's specifications. The ends of the pipe, gaskets, and couplings shall be inspected for cleanliness. Chipped, scratched, scraped, cracked, or excessively deformed pipe or couplings shall be rejected. Two (2) locate wires (see Section XVI Approved Product List) shall be used on directional drill portions of pipe construction shall be attached to pipe being installed (500 linear feet or longer and at water crossings only for two (2) locate wires, one (1) elsewhere) and extended to the nearest valve boxes. Locate wires shall be connected at the surface in a magnetized tracer box (see Section XVI Approved Product List) and shall have a blue cover as per APWA color code. The pipe shall be elevated to the approximate angle of entry and supported by roller arms or equivalent. Any field welding/fusion of High Density Polyethylene (HDPE) pipe and fittings may be performed only by personnel certified through a pipe/fitting manufacturer approved training program.

F) Testing: Installed pipe shall be flushed and pressure tested using potable water. Pressure testing shall be conducted at one-hundred fifty (150) psi (or higher if required) for a minimum of two (2) hours. No leakage is acceptable. Installed services, tees, and stub-outs shall be pressure tested together with the main. Pressure testing is not required if the installed pipe is intended to be used as a casing. If the pipe successfully passes the pressure test, a connection to the existing pipe system may be performed. On all Horizontal Directional Drill (HDD) non-water crossings the project will not be considered substantially complete and will not be accepted by Martin County Utilities until continuity of

the tracer wire is demonstrated to the satisfaction of the Martin County Utilities Department Inspectors.

All Horizontal Directional Drill (HDD) water crossings, the Horizontal Directional Driller (HDD) will not leave the site until the pipe has passed the pressure testing and locate wire continuity is confirmed.

SECTION VII - SEWAGE PUMPING STATION DESIGN AND CONSTRUCTION

(See Standard Detail drawings for additional specific requirements).

1. Type

Sewage pumping stations shall be of below ground design with submersible pumps. All stations shall be designed for not less than 230 volt, three (3) phase, sixty (60) cycle electric service when available.

2. Structures

Station structures, including the wet well and the box containing the valves, shall be of pre-cast concrete (Class II, 28 day compressive strength of 3500 psi. minimum) and meet the requirements of ASTM C-76. Joints shall be assembled with "Ram-Neck" sealant or equal and overlaid with grout on the inside and outside of the wet well. Grout shall be non-shrinking waterproof cement mortar. Bottom and lower wall section shall be cast as one (1) unit. Wet well structures shall have a minimum inside diameter of six (6) feet for Type "A" and four (4) feet for Type "B". Wall thickness shall be a minimum of 8-inches. Rebar shall meet the requirements of ASTM A-185. The entire wetwell shall be designed to handle H-20 truck loading at any location of the wetwell structure. Interior will be coated with a system as specified in Section XVI Approved Product List.

Tremie installations will be approved by the Department on a case-by-case basis. Buoyancy calculations for all wet well installations shall be submitted to the Department for approval.

3. Access Covers

Covers for the wet well and the valve box shall be of diamond plate aluminum with a minimum thickness of ¼-inch. The covers shall have hinges, frames, locking hasps, a flush lifting handle, and a hold-open bracket all constructed of aluminum or stainless steel. Wet well aluminum cover shall be hinged on side closest to electrical panel. Valve box hinges will be placed on side furthest from electrical panel. Covers must be positioned to allow easy removal of the pumps and to allow easy access to the valve wheels. All covers shall be designed to handle a minimum of three-hundred (300) pounds per square foot loading.

The access opening shall have a permanently installed fall-through protection grate system (see Section XVI Approved Product List) that when closed provides fall through protection and when open acts as a vertical barrier. The grate system shall be designed to withstand a minimum load of 300 pounds per square foot. All hinges and hardware shall be 316 stainless steel. The grate shall be powder-coated with an OSHA safety orange to increase visual awareness of the safety hazard.

4. Location

Pumping stations shall be located so that they will be accessible by maintenance vehicles. All stations shall be provided with asphalt or concrete driveways suitable for truck access and designed for H-20 truck loading.

5. Pumps

At least two (2) pumps with alternating controls shall be provided. They shall be of the same type and capacity and shall each be capable of handling the peak hourly flow unless a tri-plex station is approved by the Department. The peak hourly flow shall be determined by multiplying the average daily flow by a minimum factor of 2.5 or as determined by ten (10) State Standards. Pumps shall be capable of passing a minimum of 3-inch solids. Complete pump curves and pump specifications shall be submitted to the Department before approval and installation of the pumps. The pumps shall be non-overloading at any point on the pressure, volume, characteristic curve. All submersible pump motors shall be explosion proof rated.

If project is constructed by phase, master lift stations that will have minimal flows for a considerable time shall be equipped with temporary pumps with reduced capacity, though not less than 50% of a permanent pump capacity.

Only pump brands approved by the Department are acceptable. Approved pumps are listed in Section XVI Approved Product List in these MINIMUM STANDARDS.

6. Guide Bars, Lifting Chains, Hardware

Submersible pumps shall be installed with guide rails, discharge connections, and lifting chains or lifting cables. Guide bars or rails shall be Schedule forty (40), 316 stainless steel pipe. The discharge connection shall be firmly attached to the bottom of the wet well with 316 stainless steel bolts. Lifting chains or cables shall be 316 stainless steel. All nuts, bolts, washers and other hardware inside the wet well shall be 316 stainless steel.

7. Piping and Valves

Each pump shall have a gate valve and a check valve. Piping and fittings shall meet force main standards in these MINIMUM STANDARDS with 316 stainless steel bolts, nuts and hardware inside the wet well. Piping shall be a minimum of 4-inches in diameter for Type “A” and 2-inches for Type “B” and all piping and valves shall be flanged. Check valves shall be cast iron, swing check type with levers and weights. A valved emergency pump connection with a gate valve shall be installed downstream of the valves. A male aluminum cam-lock fitting shall be provided on the emergency pump connection with a female cap. Piping shall be adequately restrained to prevent pipe movement through the wall of the wet well. All piping and fittings inside the wet well shall be coated with the Department approved wetwell coating systems. The tap on the

piping shall be through the use of a tapping saddle only.

Private Lift Stations and Private Grinder Pump Stations shall have a gate valve and check valve at the Right-Of-Way (ROW).

All above ground piping shall be coated with black paint as follows:

Sandblast and remove all paint and any loose material in accordance with NAPF 500-03. Do not paint or coat any nameplates, brass or stainless steel surfaces. Contractor shall use the painting system as specified in Section XVI Approved Product List.

8. Level Sensors

A) Float Switches

All float switches shall be rated for a minimum of ten (10) amps at 250 volts, installed as approved by the Department, and shown in Section XVI Approved Product List.

B) Level Transducers

Any lift stations with a design capacity exceeding 250 gpm shall be fitted with a level transducer. Level transducers shall be submersible pressure transducers. Level transducers shall be loop-powered devices operating on twelve (12) VDC and providing an analog 4-20 mA signal to the pump controller and installed as approved by the Department.

9. Power Supply and Pump Control Panels

A) Control Panel

Pump control panel shall respond to wet well float switches to automatically start and stop pumps. The pump control panel shall be fabricated by a qualified controls manufacturer. Electrical power to be furnished to the panel shall be 120/240 volt, three (3) phase, four (4) wire or 120/240 volt one (1) phase, three (3) wire as indicated in the contract drawings. When available higher voltages may be required for larger stations.

Single phase shall be allowed only on a case-by-case basis as approved by the Department. Single phase installations shall utilize a VFD for each motor to enable the use of standard 3-phase motors. VFDs shall be Yaskawa Model, sized as required. Control panel wiring and parts shall conform to Department standard drawing for Lift Station Control panels, Standard Details.

The control panel shall be designed so that electrical systems and components in raw wastewater wells comply with National Electric Code requirements for Class one (1) Group D Division one (1) locations. This shall be achieved through the use of explosion proof equipment, intrinsically safe circuitry or other approved method. Ground Fault interruption protection shall be used to de-energize the pump motors in the event of any failure in the electrical integrity of motor power conductors.

Each control panel shall have a Main and Emergency circuit breaker. A mechanical interlock between the Main and Generator circuit breakers shall be provided. The interlock shall not allow one (1) breaker to be turned on without the other being in the off position. The interlock mechanism shall be professionally machined from aluminum plate and securely fastened to the interior door of the control panel. The control panel will be UL listed as a complete unit. All nuts, bolts, washers and mounting hardware related to mounting the panel shall be 316 stainless steel.

B) Private lift stations shall have a placard indicating contact information.

Private lift stations must have contact information as follows on the front of their electrical panel: All information must be on a placard with red letters on a white background with a minimum of 2-inch, maximum 3-inch letters. First line shall state “For 24-hour service call”, second line and (third line if needed), shall include the name of the plumber or underground contractor that will service the lift station. The final line will include the 24- hour telephone number with area code. Martin County staff will number the lift station.

Owner is responsible to have regular inspections of the wet well, pumps, check valves and electrical components quarterly for single family homes and monthly for multi-family homes by the plumber of record. Station should also be cleaned to the bottom of the wet well once a year. All activity should be put in a bound composition book kept in the electrical panel box for inspection if needed.

All stations may be visited quarterly for Compliance by Martin County staff. Yearly letters will be sent to update contractor and owner information so both can be reached in case of emergency. Should information change during the year please contact Martin County at (772-221-1442), so we can update our records.

C) Generator Power Receptacle, Convenience Receptacle and Breakers

To insure operation of lift stations during disaster events, Type “A” lift stations shall be furnished with auto-start, vacuum assisted pumps. One (1) Auto-start, vacuum assisted pump per lift station shall be provided to Martin County for all lift stations that are constructed and dedicated to Martin

County. This auto-start, vacuum assisted pump will be dedicated to the lift station it is being provided for. Each auto-start, vacuum assisted pump shall conform to specifications as outlined on Drawing No. 55 through 55D of the Standard Details section of this manual.

Each pump motor shall be protected and controlled by a thermal-magnetic circuit breaker, melting alloy overload relay and motor starter contractor. Two (2) 15-ampere circuit breakers for control power and convenience outlet power shall be provided. A GFI type 15- ampere convenience outlet shall be provided on the dead-front door of the control panel.

D) Alarms and Shut-off

High level alarm and pump shut-off and turn-on shall be accomplished by float type liquid level switches or a liquid level transducer in conjunction with the control components of the pump control system. The liquid level control system shall continuously monitor wet well liquid level in and conjunction with the pump control system shall control the operation of the pumps.

E) Seal Leak Detection

Seal leak detection shall be provided using high sensitivity relays, on pick-up, shall cause a "Seal Leak" indicator on the interior door to light and send a signal to the Remote Telemetry Unit (RTU). Normally closed thermal switches in submersible pump motors shall, through the pump control panel's control circuitry, shut down the affected pump and send a signal to the Remote Telemetry Unit (RTU).

F) Pump Control Panel Housing

The pump control panel housing shall be a NEMA Type 12/3R with rain-shield and three (3) point padlockable latch, dead front enclosure, constructed of not less than fourteen (14) gauge 316 stainless steel. The minimum panel housing shall be 12-inch deep x 30-inch wide x 36-inch high. The enclosure shall be equipped with an exterior door, interior “dead front” door and shall incorporate a removable 1/8-inch thick aluminum back panel on which control components shall be mounted. The front door shall be secured to the enclosure with a continuous stainless steel piano hinge and be equipped with a padlocking three point latching mechanism. The handle of the three point latching mechanism shall be fabricated of heavy gauge stainless steel. The back panel shall be secured to the enclosure with collar studs.

G) Fastenings and duct work

All motor branch circuit breakers, motor starter contactors, overload relays,

control transformer and control relays shall be securely fastened to the removable back panel with cadmium plated steel screws and lock washers. The back panel shall be tapped to accept the component mounting screws. Self-tapping screws shall not be used to mount any component.

H) Contactors and Switches

An open frame, across-the-line, NEMA rated, magnetic motor contactors with 120 volt, 60Hz coils shall be furnished for each pump motor shall be supplied in approved single phase installations. Contacts and coil shall be easily replaceable without removing the contactor from its mounted position. All operating controls and instrument shall be securely mounted on the control compartment interior dead-front door. All controls and instruments shall be clearly labeled using engraved plastic plates to indicate function. Trouble light switch shall be NEMA 4.

I) Primary Disconnect

The primary disconnect shall be a re-settable primary circuit breaker located in the circuit prior to the control panel. Amperage rating and stainless steel enclosure type to be specified by Engineer. Lightning arresters and surge protectors shall be installed.

J) Interior

The following components shall be mounted on the interior dead-front door:

Access to Primary and Generator circuit breaker and interlock mechanism
Access to Pump and secondary breakers. Trouble light On-Off switch.
"Run in Backup" indicator light.

Two (2) each of the following:

1. Hands Off Auto (HOA) switches
2. Green Pump Run indicator lights
3. Amber "Seal Fail" indicator lights
4. Green "Power On" indicator light
5. Red "Running in Backup" indicator light
6. Overload reset buttons

Wire Markers shall be machine printed heat-shrink tubing or clip-on, chevron cut, type. Wire markers shall be manufactured by manufacturer listed in Section XVI Approved Product List.

Cable ties shall be type PRT as manufactured by manufacturer listed in Section

XVI Approved Product List or approved equal.

Four (4)-way adhesive back mounts shall be made of heat stabilized nylon with an adhesive backing protected with a peel back paper covering. The mounts to be used are listed in Section XVI Approved Product List.

Engraved plastic plates shall be of laminated plastic with black surface and white 1/8-inch high letters secured with stainless steel screws.

Plastic wiring duct shall be Polyvinyl Chloride (PVC) with restricted slot openings and slotted mounting holes. Wiring duct shall be complete with a matching solid Polyvinyl Chloride (PVC) cover. Plastic wiring duct shall be type E as manufactured by Panduit.

The wire number shall be installed as designated on the submittal schematic at each termination end of every control wire using wire markers. If minor changes need to be made during panel fabrication, these changes shall be made to the schematic for the Operation and Maintenance manual. Panel wiring shall be done in a neat and professional manner using cable ties, adhesive back mounts, and plastic wiring ducts as required. Wiring bundles and duct shall be run horizontal or vertical only. Diagonal runs shall not be allowed.

Wires shall be carefully stripped of insulation when making terminations using a wire stripper which does not cut off wiring strands during the stripping process. Wiring terminations shall be made to lift or barrel type terminal or compression applied spade lugs. Wires shall not be wrapped under screw terminals when making an electrical termination. Control panel wiring shall be with eighteen (18) AWG, 600 volt rated, tinned, stranded copper conductor UL 1007 and UL 1569 type hook-up wire.

K) Stand-by Power

Standby power receptacles and phase monitors shall be provided at all pumping stations. Lift stations shall be equipped for auxiliary generator power supply. The following plug and receptacle shall be used as listed in Section XVI Approved Product List.

L) Enclosures

All lift stations shall be enclosed by vinyl coated black posts and wire mesh fencing (chain link, six (6) feet high) with a twelve (12) foot wide gate centered on the wet well. Decorative fencing may be used at the Developer's expense in addition to the chain link fencing. The high water light shall be extended above the decorative fencing. Direct vehicle access will be provided for maintenance purposes. A 6-inch thick concrete slab shall be placed over the

entire area within the fenced portion of the station.

M) Access

Easements of sufficient size or right-of-way is necessary for access. An easement or deed will be required for the lift station property. The exterior top of the wet well shall generally not be more than one (1) foot above the road grade adjacent to the station but in all cases shall be above the one-hundred (100) year flood zone elevation. The layout of the station should be such to provide easy access without interference. The fenced area shall be laid with 6-inch thick concrete.

Access road from paved street to the lift station shall be ten (10) feet wide with a minimum curve radius of seventy-five (75) feet, maximum incline of ten (10) percent and maximum cross-section incline of fifteen (15) percent. Swale crossings require culverts of proper design.

Access road shall be constructed in accordance with FDOT specifications. For materials and thickness refer to typical lift station layout detail.

10. Pump Station Start-Up

Developer or Engineer shall provide the following items on pump station start-up.

a. Deed to property or plant showing easement.

b. Operation and Maintenance Manuals (three (3) sets required).

c. Pump data and technical information concerning pump operation, maintenance and repair shall be supplied at the time of completion of lift station construction. Parts lists, warranties, and all other pertinent information is also required. All equipment shall be warranted by the manufacturer for one (1) year from the date of start-up.

d. Individual schematic wiring diagrams and information concerning Control Panel operation and parts replacement.

e. Verification of operational approval by Manufacturer's Representative and Engineer in writing to include actual operating conditions (total gpm at tdh, impeller size, hp, rpm, voltage, current, discharge size).

A certified factory trained representative shall be provided by the contractor for the start-up.

No start-up can begin without the Department representative on site. Submersible pumps shall be pulled to the surface and put on the ground, then reinstalled on the guide rails and

lowered in place by the manufacturer's representative prior to testing of the pumps.

11. Certified Backflow Assembly

Backflow assemblies shall be certified complete by a technician certified by TREEO of the University of Florida, by the Florida Water and Pollution Control Operators Association, or by an equivalent certified forty (40) hour program.

12. Lift Station Telemetry

Telemetry is required for all lift stations maintained by the Department. Construction plans shall include the typical Remote Telemetry Unit (RTU) Motorola installation for each lift station to be constructed.

The Developer and/or Contractor shall provide and install a Remote Telemetry Unit (RTU) which will communicate with an existing telemetry system by cellular radio. The Remote Telemetry Unit (RTU) shall be provided by DCR Engineering Services, Revere Control Systems, Star Controls, CC Controls, Curry Controls, or approved alternative provider.

The new Remote Telemetry Unit (RTU) equipment shall be housed in a NEMA 4, 316 stainless steel enclosure, acid dipped and painted white, equipped with lightning protection, Remote Telemetry Unit (RTU) with cellular modem, and battery back-up. Enclosure shall include a padlock hasp.

Each of the main components of the Remote Telemetry Unit (RTU) shall be as specified below:

A) Remote Terminal Unit (RTU). The Remote Telemetry Unit (RTU) module shall be a microprocessor-based controller designed for use with the existing telemetry systems. The Remote Telemetry Unit (RTU) shall control up to three (3) pumps and interface with up to six (6) floats, four (4) analog signals and up to fifteen (15) other discrete inputs. As a minimum the Remote Telemetry Unit (RTU) module shall have the following features:

1. Local automatic control from floats and level transducer.

2. Local manual control provided by Hands Off Auto (HOA) switches on the pump control panel. The Hands Off Auto (HOA) switches shall function with the floats to provide extra operational flexibility (one (1) pump can be taken out of service for repair by the Hands Off Auto (HOA) switch and the floats will control the remaining pump(s)).

3. Remote control from the central site computer shall provide individual pump overrides, station and alarm disables, if programmed at the central site.

4. Triplex/Duplex/Simplex configurable.

5. Triplex configuration shall use emergency high, lag 2, lag 1, lead, and all off float.

6. Duplex configuration shall use emergency high, lag, lead, and all off float.

7. The alternator function shall alternate around pumps that don't run when called. The alternator shall allow the operator to override a pump on or off with the Hands Off Auto (HOA) switches and the alternator will still provide alternator control over the remaining pump(s).

8. Remote alarm horn disable from central site computer.

9. Float alarm reporting back to central site computer when floats are operating out of sequence.

10. Pumps/Starter/Breaker Fault alarms shall be reported back to central site computer. The alarms shall be activated when a pump is called to run, but fails to run, or if the pump is turned off by the Remote Telemetry Unit (RTU) module, but continues to run.

11. Hands Off Auto (HOA) switch alarms shall be reported back to central site computer. Alarms shall indicate that a Hands Off Auto (HOA) switch has been left in the HAND or OFF position.

12. Pump run status shall be reported back to central site computer. Pump run times shall be recorded with two (2) second accuracy.

13. Remote Telemetry Unit (RTU) Power Status shall be reported back to central site computer.

B) Cellular Modem

4G LTE Verizon Modem

Manufacturer	Sierra Wireless
Model	GX450 or current equivalent Part # 1102360 / with extended warranty Part # 9010027

C) Antenna.

Low profile antenna

Manufacturer	Laird Antenna
Model	TRA6927M3NWN-001 or current equivalent

D)	Mount	¾ NMO mount, 0-2500 MHz Stainless Steel or Brass Connection

The Contractor shall supply all necessary components for a fully functional Remote Telemetry Unit (RTU). Any appurtenance not specifically detailed above, but required for proper operation shall be provided.

The Contractor shall be responsible for all installation and start-up and testing of the Remote Telemetry Unit (RTU), including mounting of the panel, wiring, supports, etc. Martin County Utilities to provide Remote Telemetry Unit (RTU) programming and HMI modifications.

13. Grease Traps/Lint Traps

A) Grease Traps. Restaurants and other food service businesses, service stations and vehicle repair garages.

1. Grease, oil, and sand interceptors shall be provided on drains leading to sewer pipes when, in the opinion of the Director, they are necessary for the proper handling of wastewater containing excessive amounts of grease and oil, or sand; except that such interceptors shall not be required for residential users. All interception units shall be of type and capacity, and constructed based upon the standards set forth in FAC Chapter 64E-6.013 (minimum 750 gallons/maximum 1250 gallons), as well as, the latest version of the Martin County Utilities Minimum Design and Construction Standards.

B) Lint Traps. Lint screens are required on drains leading to sewer pipes from commercial laundries. Filtering apparatus should be sized to handle flow rate of laundry discharge through a minimum of three (3) screens two-¼-inch mesh size and one-1/8-mesh size. Metal fabric must be used for filtering. No toxic metal fabrics will be allowed.

C) Existing restaurants that change ownership and/or type of food prepared onsite will be required to submit a letter stating the number of seats in the restaurant and/or meals served per day for use in sizing the Grease Interceptor, based on FAC 64E-6.013 requirements.

D) All newly constructed restaurants will be required to submit a Grease Trap Questionnaire indicating the size of the Grease Interceptor required to support the number of seats and/or meals served per day, signed and sealed by a Professional Engineer, and a diagram indicating the proposed location of the Grease Interceptor. See Standard Detail Drawing No. 72 which indicates generation rates for ordinary restaurants at 16 gpd per seat.

SECTION VIII – RESIDENTIAL SEWAGE GRINDER PUMPING STATION DESIGN AND CONSTRUCTION

(See Standard Detail drawings for additional specific requirements).

1. Type

This section covers simplex grinder sewage pumping stations for residential uses installed by the owner and maintained by Martin County. For duplex, triplex, and quadraplex residential buildings, each unit will be required to have their own station with electrical power supplied by the corresponding unit. Stations shall be of below ground design with submersible pumps and wall-mounted control panel.

2. Pumps and Plumbing

Pumps provided shall be a submersible, two (2) horsepower, progressive cavity grinder pump. The pump shall be capable of providing a minimum of five (5) GPM at one-hundred (100) psi and fourteen (14) GPM at twenty-four (24) psi head. The pump shall be provided by the manufacturer with thirty (30) foot long leads for connection to the controller. The pump plumbing shall include a check valve and knife gate quick disconnect assembly prior to discharging through the basin wall with a 1-1/4-inch bulkhead fitting.

Force main shall be 1-1/4-inch High Density Polyethylene (HDPE) DR-9 with a minimum of 24-inches and a maximum of 48-inches of cover. A 1-1/4-inch x 2-inch adapter, 2-inch brass flapper style check valve, and a 2-inch brass curb stop valve shall be installed in a stackable meter box at the right of way. Pipe between basin and valve box at the right of way shall be either continuous or fused without compression fittings. Any bends or deflections shall be installed with a smooth bend with a minimum radius of 25-inches for 1-1/4-inch pipe. A continuous #12 stranded tracer wire with green insulation shall be installed with force main from valve box to basin.

Gravity pipe between the building and basin shall be installed per the requirements within the locally adopted plumbing code.

3. Basin Structure and Location

The station basin structure shall be high density polyethylene with a watertight cover with provisions for a 4-inch gravity inlet hub. The basin shall have integral anti-flotation measures so concrete ballast is not required with a minimum internal volume of one-hundred twenty (120) gallons. Basin excavation shall be dewatered as needed with basin installed plumb on 6- inches of compacted #57 stone.

The basin and control panel locations must be approved by Martin County Utilities prior to installation. The preferred basin location is in the front yard within five (5) feet of the adjacent dwelling wall, or on the side of the home no greater than five (5) feet behind the

front plane of the building wall. The basin shall be installed with the top at least 3-inches but no more than 6-inches below finished floor elevation, and the surrounding grade 3 to 6-inches below the top of the basin.

The basin must be located entirely within a green space and outside of any driveways, sidewalks, patios, pavers, or other hardscaped areas. The basin must be no closer than ten (10) feet to any existing or proposed trees and no landscaping other than grass, groundcover, or mulch is permitted within five (5) feet of the basin. The routing of the force main must be centered within a five (5) foot wide path clear of any trees, shrubs, fences, walls, or other structures.

4. Electrical Service and Control Panel

The property owner shall provide single phase, two-hundred forty (240) volt, 4-wire electrical service, including neutral and ground, terminated within 18-inches of the station controller with a NEMA 3R disconnect. The service shall be protected at the building panel with a 2-pole 30A breaker, permitted and installed in accordance with the requirements of Martin County Building Department.

Minimum conduit size for electrical service between the controller and the basin shall be 1-1/4-inch with appropriate sweeps for any change in direction. Due to the length of the pump leads, the controller must be installed no further than five (5) feet from the basin and shall be wall mounted.

The control panel shall be equipped with integral breakers for pump and control circuits and a 4-wire, two-hundred forty (240) volt, flanged inlet generator receptacle L15-30P, compatible with a L15-30R cord. The control panel shall have a red flashing alarm light and buzzer with provisions for future network interface. The lockable, NEMA 4x enclosure shall include provisions to allow for wall mounting. A label shall be affixed to the outside of the enclosure with Martin County Utilities emergency contact information.

The station shall be provided with a 3-point solid state electronic level transducer. The transducer shall provide a signal indicating pumps off, pumps on, and alarm with a 6-inch interval between each setting.

5. Maintenance Obligations

The property owner and their tenants are responsible for ensuring that the waste stream discharging to the station does not negatively affect the system. These include plastics, flushable wipes, diapers, hair, grease or oils, sand, paint, chemicals, or other items not associated with normal sanitary wastes.

The property owner shall be responsible for the costs associated with the repair of the basin, controller, force main or valve box due to damage by vehicles, landscape maintenance, trenching, roots, etc. In the event of repeated abuse of the system, Martin

County has the right to terminate their maintenance obligations. The property owner shall also be required to maintain the gravity plumbing between the building and the basin, and the electrical service between the station control panel and the building electrical panel.

Except for damage and obligations described above, the County shall be obligated to maintain, repair, and replace the basin and related pumps, force main, and controller as needed.

6. Abandoning of Existing Septic Systems

If the grinder system is utilized to connect a building previously served by a septic system, the septic tank and drain field must be abandoned and properly permitted by Martin County Health Department in accordance with their standards and FAC 64E-6.011.

SECTION IX - RECLAIMED WATER SYSTEMS

1. General

The design, construction and operation of reclaimed water facilities shall abide by the criteria outlined in Chapter 62-610 of the Florida Administrative Code. Supplemental specifications for individual components of the reclaimed water system will be provided to the Engineer of Record at the plan review meeting.

The engineering report described in Rule 62.610.310 shall be submitted with each project. The abbreviated version described may be applicable.

Users of reclaimed water shall execute with the Department a binding agreement ensuring that construction, operation, maintenance, and monitoring meet the requirements of 62-600, 62-610, and 62-620, F.A.C. Such binding agreements are required for all Reclaimed sites not owned by the permittee.

The developer shall provide the Department plans, in addition to those of the meter station, a scale drawing of the site irrigation plan including pump facilities, storage reservoirs, mains, valves, controllers, individual lot irrigation systems, and irrigation schedules.

To aid in the prevention of cross connections, purple color-coded pipe and spray irrigation heads as specified, are mandatory throughout the irrigation system.

Reclaimed water services shall be located adjacent to sanitary service locations.

Reclaimed water users that utilize re-pump irrigation systems for areas such as residential lawns, park facilities, playing fields, common areas, medians, etc., shall utilize the “Amiad” EBS scanner type filter, with one-hundred (100) micron filtration and automatic backwash. These filters may not be necessary for bulk users that irrigate areas such as golf courses, nurseries, etc., with larger diameter sprinkler heads.

Locations for the installation of Public Notification Signage shall be sited on the drawings with details of the standard.

Use of reclaimed water through hoses, faucets, hose bibs, or couplers is prohibited.

Reclaimed water is prohibited inside buildings.

Temporary connections utilizing reclaimed water for use as make-up water for construction is prohibited unless explicit written permission from the Reclaimed Coordinator has been granted.

Installation of reclaimed water pipe and associated fittings shall be in accordance with current AWWA specifications and manufacturers requirements for their particular products.

Mechanical restraint shall be required at each fitting involving a change of direction and as specified in plan details.

All pipe shall be laid in trenches having a dry and stable bottom. Backfill shall be clean suitable fill. Pipe shall be fully supported along its entire length. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid on line and grade as designed.

A **surface aerator** shall be required in all unlined ponds. An air diffuser shall be required for all lined ponds. Aerator and diffuser types shall be as specified by Martin County Utilities Design & Construction Standards & Specifications.

A **surface aerator** shall be required when a bulk reclaimed water delivery pond has a depth of seven (7) feet or less from the top of bank. (These aerators work best in shallow ponds, and allow the oxygen to transfer into water more effectively.)

½ Acre pond	¾ HP standard	See Approved Product List
1 Acre pond	1 HP standard	See Approved Product List
2 Acres pond	2 HP standard	See Approved Product List
2 + Acres pond		

Design by Developers.
Engineer submit calculations to MCU& SW for approval

A **diffused aerator** shall be required when a bulk reclaimed water delivery pond has a depth of more than seven (7) feet from the top of bank. (These aerators work best in deeper ponds, and allow the oxygen to transfer into water more effectively.)

½ Acre pond	4 – 12” fine bubble diffusers	See Approved Product List
1 Acre pond	6 - 12” fine bubble diffusers	See Approved Product List
2 Acres pond	8 - 12” fine bubble diffusers	See Approved Product List
2 + Acres pond		

Design by Developers.
Engineer submit calculations to MCU & SW for approval.

Note: All aerators must have a twenty (24) hour control timer enclosed in a weather proof box. This box is to be installed inside a separate fenced and gated area along with the FPL power meter. This shall not be located in the Bulk Reclaimed Water Meter Station.

2. Backflow Prevention/Cross Connection Control

There shall be no physical connection between a safe water supply and a questionable water supply, a reclaimed water supply, or a sanitary or storm sewage system which would allow unsafe water to enter the safe water system by direct pressure, vacuum, gravity or any other means. All potable water services within sewage facilities shall be provided with an approved backflow prevention device. See Section XV, Manual of Cross Connection Control and Backflow Prevention.

3. Minimum Cover

Minimum cover to finished grade over reclaimed water mains shall be 30-inches up to 8-inches diameter; 10-inch or larger shall have 48-inch cover.

4. Parallel/Horizontal Separation

Sanitary sewers, force mains, reclaimed water mains and storm sewers should cross under potable water mains whenever possible. Sanitary sewers, force mains, reclaimed water mains and storm sewers crossing water mains shall be in accordance with drawing 1E.

All Ductile Iron Pipe (DIP) shall be Pressure Class 350 or higher. Adequate protective measures against corrosion shall be as determined by the design engineer and the Department.

Horizontal separation of fifteen (15) feet to buildings, top of banks of lakes and canals and other structures shall be maintained, if possible. An absolute minimum of ten (10) feet may be allowed only when unavoidable and only with Ductile Iron Pipe (DIP).

5. Layout

Permanent dead ends will not be approved unless they are reasonably unavoidable. Dead ends shall be equipped with a blow-off for flushing purposes. Temporary dead-ends shall have a gate valve with a mechanical joint plug. The gate valve shall be mechanically restrained for two (2) full joints of pipe.

Reclaimed water mains should be placed in right-of-way whenever possible. Placement of the water main on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable or when necessary for looping.

6. Reclaimed Water Main Material

Polyvinyl Chloride (PVC) reclaimed water mains 4-inch to 12-inch diameter (4" - 12") shall be DR-18 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA Standard C900. The pipe shall have an integral bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color along with all associated appurtenances shall be Purple Pantone 522.

Smaller diameter service lines (1/2-inch through 3-inch) shall be Polyethylene Pressure Pipe and Tubing or Polyvinyl Chloride (PVC) (schedule 40) and shall be manufactured in compliance with ANSI/AWWA C901, PE 3408, PC 200 and DR9. The pipe color shall be Purple Pantone 522 or co-extruded Purple Pantone 522 color stripes.

Polyvinyl Chloride (PVC) reclaimed water mains 14-inch to 20-inch diameter (14" - 20") shall be DR-18 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C905. The pipe shall have an internal bell end and gasket seal with the joint in compliance with the requirements of ASTM D3139. The pipe color shall be Purple Pantone 522.

High Density Polyethylene (HDPE) reclaimed water main 4-inch to 16-inch in diameter (4" – 16") shall be DR-11 manufactured to Ductile Iron Pipe (DIP) outside dimensions and in compliance with AWWA C906, latest revision and ASTM F714. The pipe will be extruded from resin meeting specifications of ASTM D-3350 with a cell classification of type III, class C, category five (5), grade P34 polyethylene compound. The pipe color shall be Purple Pantone 522 or co- extruded Purple Pantone 522 color stripes.

Ductile Iron Pipe (DIP) shall be a minimum of Pressure Class 350. The Department reserves the right to require a different thickness class for unusual or non-standard laying conditions. The pipe shall be color coded with four (4) 2-inch wide stripes along the length of the pipe at all four (4) quadrants painted Purple Pantone 522.

Ductile Iron Pipe (DIP) shall conform to latest standards of ANSI/AWWA C150/A21.50 for the thickness design of Ductile Iron Pipe (DIP) and ANSI/AWWA C151/A21.51 for Ductile Iron Pipe (DIP) centrifugally cast in metal molds or sand-lined molds.

Ductile Iron Pipe (DIP) shall be cement lined per ANSI/AWWA C104/A21.4, flanged Pressure Class 53 with minimum wall thickness of 0.32 for 4-inch pipe and incremental increases of 0.02-inch thickness for each pipe diameter increase up to 14-inches. Ductile Iron Pipe (DIP) greater than 14-inches shall be submitted to the Department.

All above ground Ductile Iron Pipe (DIP) shall be coated with Pantone Purple 522 paint as follows: Sandblast and remove all paint and any loose material in accordance with NAPF 500-03. Do not paint or coat any nameplates, brass or stainless steel surfaces. Contractor shall use the paint system specified in Section XVI Approved Product List.

Flanged fittings shall meet ANSI 21.20 and AWWA C110 standards.

Joints for Ductile Iron Pipe (DIP) shall conform to the latest standard of ANSI/AWWA C111/A21.11 for rubber gasket joints and ANSI/AWWA C115/A21.15 for threaded flanges.

Cement-lined Ductile Iron Pipe (DIP) shall conform to the latest standards of ANSI/AWWA C104/A21.4

Ductile Iron Pipe (DIP) shall be required in the following circumstances:

A) Main 24-inches in diameter and larger.

B) Within fifteen (15) feet of buildings, canals or lakes.

C) Crossings under potable water, sewage or storm pipes that cannot comply with subsection (1) or (2) of Drawing 1E

D) Crossings over potable water, sewage or storm pipes that cannot comply with subsection (1) or (2) of Drawing 1E

E) Carrier pipe for jack and bores (restrained joints).

F) Aerial crossings.

G) Deep piping.

H) Ductile Iron Pipe (DIP) may be mandated by the Department in any instance of off-site or on-site construction where future abuse to the line is possible due to location or circumstances, extensive length under pavement, or in private property away from County rights-of-way.

7. Reclaimed Water Main - Size

The reclaimed water mains shall be sized by the Developer's Engineer as required and as approved by the Department. The minimum size of reclaimed mains shall normally be 4-inches. The Engineer shall be required to demonstrate the adequacy of such sizing.

8. Valves and Fittings

Gate valves shall be ductile iron, resilient seat type with mechanical joints conforming to AWWA C-500, latest revision. Valves shall be designed for a working pressure of not less than two-hundred (200) psi. Each valve shall have the pressure rating cast into the body and manufacturer's name or initial cast into the body or bonnet. Valve box is to be Pantone Purple 522 in color.

Valving of all systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. Generally, the number of valves at an intersection shall be one (1) less than the number of pipes forming the intersection.

Valves shall generally be installed at intervals of not more than 1,500 LF. In high density areas, valves shall be installed as necessary to minimize the number of persons affected by a break.

In all instances, effectiveness of placement shall be primary criteria in determining valve

locations. Valves shall not be placed in swales or ditches.

All pressure pipe fittings of size 4-inch and larger shall be ductile iron fittings, with mechanical joints, unless plans call specifically for flanged, restrained joint fittings. Mechanical joints fittings shall be used for buried installations; flanged fittings shall be used for above ground installations. Mechanical joint fittings shall conform to ANSI/AWWA C-153/A21.53.

All valves, bends, tees, crosses and dead ends shall be mechanically restrained. Clearance of 18-inches shall be maintained between all fittings (bells, valves, flanges, etc.), unless otherwise specified. Temporary dead ends shall be terminated with a gate valve and mechanical joint plug. The valve shall be restrained a minimum of two (2) pipe joints.

Valve Boxes (for valves 4-inch or larger)

1. ASTM A48 class 30, grey cast iron

2. All valve boxes on 4-inch valves or larger, shall be 3-piece cast iron construction with screw type riser sections. The valve box lid shall carry the word "RECLAIMED" and be the deep skirt type. Valve boxes must have a minimum inside diameter of 5-1/4-inch. A square concrete collar that is 24"x24"x6" thick shall be poured at the top of each valve box at finished grade. Valve box lids that are to be located in pavement must have a minimum 4-inch skirt are listed in Section XVI Approved Product List.

3. Height adjustments to valve boxes will require a screw type, cast iron extension. Valve boxes and extensions are listed in Section XVI Approved Product List.

4. When the gate valve is deeper than 36-inches an extension will be required to bring the operating nut within 24-inches of finished grade. A ¼"x3" 316 stainless steel roll pin will be inserted through the valve-operating nut to secure the extension stem.

9. Reclaimed Water Service Lines and Taps

Reclaimed water service taps on the main shall be spaced at a minimum distance of 18-inches apart. A minimum distance of 18-inches from all joints must be maintained. All service line taps shall be installed in accordance with the construction details of this manual. Services shall have a minimum of 30-inches cover including at ditches. All service crossings under roadways shall be installed in a casing not less than 36-inches between the top of the pavement and the top of the casing. Service taps shall not be placed under pavement including roads, driveways, parking lots and sidewalks.

Services shall not exceed one-hundred (100) feet to the meter. Meters should generally be placed at the property line. In developments where the property line is not clearly defined (such as at condominiums) the meter should be placed for ready access. Meters shall not

be placed in areas that can be fenced, such as backyards, under any circumstances. Services crossing under parking lots shall have their meters placed prior to the crossing so that the Department is not responsible for the service lines.

All valves shall be placed according to plan unless relocation is mutually agreed to. Record or as built drawings shall reflect the actual location and size of all mains, services and valves. All taps must be at least 18-inches from a fitting or bell.

10. Connection To Existing System

a) Tapping Tees, Sleeves and Valves

Tapping sleeves shall be 304 stainless steel with flanged outlets. Tapping valves shall be resilient seat type with a flanged joint on the inlet side and a mechanical joint on the discharged side of the valves. Tapping valves shall have a 2-inch operating nut. Working pressure rating shall not be less than two-hundred (200) psi. Gaskets between the flange faces of the tapping sleeve and tapping valve shall be 1/8-inch minimum thickness of neoprene rubber.

b) Size on size taps

Taps may be made on the same size main only when the main to be tapped is AWWA C900, C905 or Ductile Iron Pipe (DIP).

c) Installation

A department representative shall approve each tapping location before the tapping sleeve is installed. Tapping sleeves shall not be installed within three (3) feet of any joint or fitting. Before installation of tapping tee, the area to be tapped and the tapping tee shall be cleaned with potable water. After all sand, dirt and debris have been removed from the main, the tapping tee, the tapping valve and the area where the tapping tee is to be installed on the existing reclaimed main shall be swabbed with a chlorine or bleach solution with at least one-hundred (100) ppm of chlorine.

After the tapping tee is attached to the main, the gate valve shall be closed and tapping tee and gate valve assembly shall be pressured tested through the test port at one-hundred eighty (180) psi for a minimum of fifteen (15) minutes with water. A Department representative shall witness the pressure test. No visible leaks or loss of pressure shall be evident. After pressure testing, the main may be tapped. Only shell type cutters shall be used. The coupon from the hole that is cut shall be delivered to the Department.

11. Meters

Construction plans shall include a typical meter installation for each size meter to be installed (see Standard Details). Dual metering of a single building service (i.e., two (2) 1-inch meters instead of one 2-inch meter) shall not be permitted. The proper sizing of meters and service lines is the responsibility of the Developer's Engineer, subject to the Department's approval of the sizing. Reclaimed meters will be available in the following sizes only: 5/8-inch, 1-inch, 1 ½-inch, 2-inch, and larger sizes as necessary. Meter boxes for 2-inch and smaller meters are standard with Purple Pantone 522 colored covers and/or "RECLAIMED stamped on top of the box.

Meters 3-inches and larger shall be installed above ground. No taps or connections are allowed on above ground meter assemblies. All meters must be purchased from the Department prior to installation. Meters 2-inches and smaller will be installed by the Department.

All above ground meter assemblies shall be coated with Pantone Purple 522 paint as follows:

Sandblast and remove all paint and any loose material in accordance with NAPF 500-03. Do not paint or coat any nameplates, brass or stainless steel surfaces. Contractor shall use the paint system as specified in Section XVI Approved Product List.

Meter boxes shall be kept out of pedestrian walkways and out of driveway areas. For shopping centers, Developer's Engineer should give special consideration to meter layout so as to satisfy these requirements.

Metering for bulk users (ie, golf courses) which require telemetry, shall conform to the requirements of Subsection 17 of this section.

12. Locator for Reclaimed Water Pipe

For all open cut construction, ten (10) gauge THWN insulated, stranded copper wire shall be used. For all directional drill construction, see Section XVI Approved Product List for the wire to be used. Wire shall be laid and secured on top of pipe. Wire shall be continuous from valve box to valve box, wrapped two (2) times around each joint of the pipe and extended inside each tracer box to enable location device to be attached without digging up the valve box (see Drawing No. 18).

Service wire shall be laid in the trench with all services, connected to the main wire and wrapped around the service piping or tubing. Wire for potable water shall be purple in color.

All wire connections shall be made with Dri-Splice wire connectors, fittings filled with waterproof silicone sealant or approved equal for open cut construction. All wire

connections shall be made with the system recommended by the locate wire supplier for directional drill construction. All splices shall be inspected by the Department before burial. Locate wires shall be connected at the surface in a magnetized tracer box (see Section XVI Approved Product List) and shall have a purple cover as per APWA color code.

A location ball (see Section XVI Approved Product List) shall be installed at each fitting and every one-hundred (100) feet of separation.

13. Cleaning and Pigging

After its installation, the complete water system (including all mains, services, blow-offs, air release valves and all other appurtenances) shall be thoroughly cleaned to remove all foreign matter. The Department shall be notified at least forty-eight (48) hours in advance of any cleaning activities. Failure to provide advance notification of cleaning may result in the Contractor not being allowed to clean the mains. Water used for filling and cleaning shall be from an approved water source.

Permanent pigging facilities are to be incorporated into all designs. Minimum distances need to be set.

The cleaning of piping systems shall be accomplished by the controlled and pressurized passage through the system of a series of hydraulic or pneumatic polyurethane plugs (poly pigs). The poly pigs shall be entered into the system by the use of a pig launching assembly. The poly pigs shall be removed or discharged from the system at a point as near to the end of the system as is logistically and mechanically feasible. The contractor must demonstrate to the satisfaction of the Department that, this work will be performed by experienced and knowledgeable supervisors and personnel who have properly, safely and effectively provided for the cleaning of comparable systems in similar applications.

14. Horizontal Directional Drilling

Reclaimed water mains constructed by the Horizontal Directional Drilling (HDD) method shall comply with “SECTION III - POTABLE WATER SYSTEMS, Subsection 19.

15. Pressure Testing

All mains shall be tested for leakage. Water shall be supplied to the main and pumped to the required one-hundred fifty (150) psi pressure.

The Department shall be notified at least forty-eight (48) hours in advance of any testing procedures. After flushing is completed, line pressure shall be applied to the reclaimed water system to determine if any major defects are present. The complete reclaimed water system shall then be tested at a pressure of one-hundred fifty (150) psi. for a period of not less than two (2) hours. The Department may, at its discretion, increase the period to four (4) hours. Maximum length of line to be tested at one (1) time shall not exceed

fifteen-hundred (1500) linear feet. An oil filled pressure gauge up to two-hundred (200) psi at two (2) pound increments shall be used for all pressure tests. No visible movement of the system shall occur and leakage shall not exceed:

$$L = \frac{ND\sqrt{P}}{7400}$$

Where L = Leakage in gallons
N = Number of joints in test section
P = Test pressure in psi.
D = Diameter of pipe in inches

On all Horizontal Directional Drill (HDD) non-water crossings the project will not be considered Substantially Complete and will not be accepted by Martin County Utilities until tracer wire continuity is demonstrated to the satisfaction of the Martin County Utilities Department Inspectors.

All Horizontal Directional Drill (HDD) water crossings, the Horizontal Directional Driller will not leave the site, and the project will not be considered Substantially Complete, and will not be accepted by Martin County Utilities until tracer wire continuity is demonstrated to the satisfaction of the Martin County Utilities Department Inspectors.

16. Installation

A) Installation and testing of reclaimed water main pipe and fittings shall be in accordance with AWWA Specification C-600 Latest Revision and department's Construction Standards and Specifications.

B) Any pavement cut shall be replaced in accordance with requirements of the agency of jurisdiction.

C) All loading or unloading of pipe, fittings, valves and accessories shall be done in such a manner so as to avoid damage. The pipe shall not be skidded or rolled against pipe already unloaded. Special precautions should be taken to avoid damage to cement lined fittings and pipe. The interior of all pipe, fittings and other appurtenances shall be kept free of dirt and foreign matter at all times.

D) All valves, bends, tees, crosses, and dead ends shall be restrained with an approved mechanical restrained joint system. Where proprietary restrained joints are not used, tie rods and megalugs are the recommended system. (See Section XVI Approved Product List.)

E) Tie rods used as a method of joint restraint shall be by means of steel tie back bolts, nuts, washers and all thread rods shall be 316 stainless steel. Tie rods and nuts shall be equal in diameter to the tee bolts and nuts which were

supplied with the applicable fittings. Two (2) tie rods per joint are required for sizes 4-inch diameter through 10-inch diameter, four (4) tie rods per joint for sizes 12-inch diameter through 16-inch diameter and six (6) tie rods per joint for sizes 18-inch diameter through 24-inch diameter.

F) Air relief valves shall be at the design high points. Installation of air release valves to correct high points caused by improper installation of pipe (not at design grade) will not be permitted. (See Section XVI Approved Product List.)

G) All pipe shall be laid to line in a clean dry trench on line and grade with valves plumb. All pipe shall have a minimum cover of 30-inches and a maximum cover of 48-inches unless otherwise noted on the plans or required by permit.

H) The trench at the top of the pipe shall be kept to a maximum width of 24-inches plus the pipe diameter. The trench shall have a flat bottom, cut true and even, so that the barrel of the pipe shall bear its full length. Pipe bells will be placed in small pockets specifically excavated to receive the bell. All excavations must be in compliance with OSHA regulations.

I) No rocks larger than 2-inches in diameter or other items that may damage the pipe will be permitted over the pipe. In the event pipe is installed in rock excavation, 6-inches of granular material will be provided for bedding under the pipe. All pipe joints, thrust blocks, conflicts and service connections shall be left exposed until visually inspected and approved by a Department representative.

J) All tapping assemblies installed on existing reclaimed mains shall be pressure tested and witnessed by a Department's representative prior to the actual tap of the main. The pipe coupon shall be carefully preserved and submitted to the Authority's representative. All tapping sleeves shall be installed a minimum of 18-inches from pipe joints or fittings.

K) All field cuts on pipe shall require careful repair of the particular lining damaged in strict accordance with the manufacturer's recommendations.

L) Do not exceed 50% of the manufacturer's recommended joint deflection.

17. Metering Facility for Bulk Users

Bulk users of reclaimed water which have a contractual obligation with the Department for the use of reclaimed water, shall construct a metering facility in conformance with this section and all applicable details. The metering facility shall consist of an above grade meter, control valve, control panel, telemetry system, remote reservoir level indicating device, and electrical service with distribution load center and service isolation. The requirements for each stations instrumentation and controls may vary with its location in

the Reclaimed system. Therefore, system integration of all control devices and instrumentation shall be provided by the SCADA system designer DCR Engineering Services, Inc., Revere Systems Controls, Inc., Star Controls, CC Controls, Curry Controls or approved alternative provider.

The Engineer of Record shall provide flow calculations for sizing of the flowmeter and motor actuated valve.

All reclaimed water storage ponds should include a device to provide aeration to the pond allowing the pond to have self-purification capabilities. In addition, all Reclaimed storage ponds shall include a staff gauge that is readable by Martin County Utilities (MCU) staff from the shoreline and indicates the pond level in NGVD 1929 datum.

A) Metering Facility

The Department shall be provided with a perpetual utility easement including ingress and egress to allow operation and maintenance at the metering sites. The metering facility shall be laid out in accordance with the Department's specifications and details. Fence shall be constructed of similar materials and components to that required for lift stations and shall enclose all metering facilities with a poured concrete base extending to its perimeter. The general/electrical contractor shall provide the facility with electrical service to a support rack with meter, a distribution load center and service isolation. The support rack shall be sized to accommodate the Remote Telemetry Unit (RTU) control panel. It will also be the responsibility of the general/electrical contractor to insure that all underground/pad conduit work is completed during the construction process and prior to placement of the metering station's housekeeping slab on grade.

B) Meter

The meter shall be a one-hundred fifty (150) psi flanged Water Specialties ML-04-D with remote mount kit sized appropriately between 4-inches and 10-inches to accommodate the effective operating flow rates. Manufactured by McCrometer Corporation. The transmitter shall be powered by a twenty-four (24) VDC supply from the control panel. Meters less than 6- inches in diameter will required special review by the Department.

C) Control Valve

Depending upon the location in the reclaimed water distribution system the control valve shall be the following and sized to the same size as the meter.

Control valve with motor actuator
See Section XVI Approved Product List for control valve with motor actuator. 110 volt, single phase, open/close service with the following:

Multi voltage: 110VAC, 240VAC, 480VAC, 24VDC8 S.P.D.T. limit switches;

2 position potentiometers;
4-20 mA signal input for PID flow control;
4-20 mA signal output for indication of % of valve open position;
Electromechanical Solid State starter;
3-button, 2-lite pushbutton station;
Complete adapting package to the control valve with the actuator mounted and all switches set suitable for continuous modulating duty.

D) Control Panel & Remote Telemetry Unit (RTU)

The developer or contractor shall procure the services of DCR Engineering Services, Inc., Revere Control Systems, Inc., Start Controls, CC Controls, or Curry Controls or approved alternate provider as the provider for design, manufacture and installation of the site Remote Telemetry Unit (RTU) controller/display panel. The Department's requirements for each site will be determined by the location of the controller in the reclaimed water distribution system and will be provided at the time of the preliminary plan review.

Standards for a Reclaimed station Remote Telemetry Unit (RTU).

A Remote Telemetry Unit (RTU) does not include all of the instrumentation required for the station, as the requirements of each station's instrumentation can change and each may be unique. However the design incorporates the ability to monitor and control valves to do the following:

- Deliver the product at a user definable total amount.
- Deliver the product at a user definable flow rate. (Stations with flow control valves).
- Automatically reset based on a start time for each day. (Can be disabled.) Allow manual starting, stopping and suspending of the delivery cycle.
- Display and generate "canned reports" on all functions controlled and monitored by the Remote Telemetry Unit (RTU) using TriHedral VTScada HMI software.

Panels will be built to UL508 standards using a panel with three (3) point latch, dead front, 36"x 30"x 16" NEMA 12/3R, SS 316, welded complete with welded drip shield. Panel will be designed to receive 110VAC for power to the panel and instrumentation only.

The panel shall include main and secondary breakers, GFI receptacle, maintenance light with switch and all other items as specified and shown in the details.

Station electrical service is NOT a part of this panel and will require a separate distribution load center and service isolation to be provided by the general/electrical contractor. It is also the responsibility of the general/electrical contractor to insure that

all underground/pad conduit work is completed prior to completion of concrete slab on grade.

Equipment that is required to be installed in the Remote Telemetry Unit (RTU).

- 1 Motorola-ACE 3 slot Module panel
- 1 cellular modem
- 1 CPU Module
- 1 Modular Power Supply, 85-264 VAC, 47-63 Hz
- 2 V245 Mixed I/O modules (16 DI, 4 DO, 4 AI) with 24VDC option modules
- 1 V224 Tamper Switch
- 1 Low Profile antenna
- 1 Additional I/O as required per station
- Panel meters will be the type specified by the Department so as to conform to
- customer's current "spares" requirement.
- Digital information display.
- 1 GFI 110VAC receptacle to be mounted on the swing panel dead front.

Telemetry Automated Control and Display functions.

- Current Flow Rate. (Signal to be pulse output) Display PSI of system. (Signal to be 4-20ma) Display Pond Level. (Signal to be 4-20ma) Display Cut-Off Float/level from level sensor.
- Display Total Flow per period of Allotment Set Point.
- Display Station Auto/Manual (Local Control/ Remote "telemetry" Control).
- Control Start Delivery Cycle. Control Stop Delivery Cycle.
- Control Hour Set Point to Automatically Start Cycle. Control Valve Control.
  - Open/Close (north area).
  - % Open (south area).
- Flow Control set point in GPM .
- Total Allotment Set Point GPD (gal/day).
- AC Power loss Remote Telemetry Unit (RTU).
- Ability to utilize a laptop computer to enter control values normally entered via telemetry.

Local Control and Display Functions.

- Current Flow Rate
- Panel Light Switch (20watt Fluorescent Light)
- Display Panel Power Light to indicate Power to Remote Telemetry Unit (RTU) electronics.
- Manual override of valve.
  - 3 position momentary switch (spring loaded) Open/Close
  - 3 position maintain Local-Off-Remote

- Display of pond level (loop with meter).
- Open/Closed lights (digital valves). Local digital display for the following. ○ Total flow of current cycle.
  - ○ Current flow rate.

Additional equipment requirements.

- 24VDC 50-watt power supply fused at ½ the rated capacity to meet UL 508 standards with battery backup.

Instrumentation requirements.

- Flow meter requires an output that can be connected to the Remote Telemetry Unit (RTU), with a DC pulse signal to indicate flow. The metering device should also have a mechanical type local register to indicate flow and totalization.
- Pressure devices require an output of 4-20ma.
- Level sensing devices require an output of 4-20ma signal.

Panel construction and testing will be done by the panel manufacturer.

E) Standard Metering Facility Components

The lake level detector is listed in Section XVI Approved Product List. The general/electrical contractor shall provide an appropriate power supply from the panel, a properly designed and installed still-well and include a level indicator in the panel. The indicator, display unit, and pressure transmitter are listed in Section XVI Approved Product List.

The upstream above ground manual butterfly valve shall be a flanged one-hundred fifty (150) psi hand wheel operator manufactured by Dezurik.

The air/vacuum valve shall have a 2-inch diameter inlet rated at one-hundred fifty (150) psi as manufactured by manufacturer listed in Section XVI Approved Product List.

18. Start-Up and Testing

Developer or Engineer shall provide the following items on reclaimed water meter station start-up.

A) Deed to property, plat showing easement, or Board of County Commission approved utility easement.

B) Operation and Maintenance Manuals (three (3) sets required).

C) Meter and control equipment data and technical information concerning

operation, maintenance and repair shall be supplied at the time of completion of meter station construction. Parts lists, warranties, and all other pertinent information is also required. All equipment shall be warranted by the manufacturer for one (1) year from the date of start-up.

D) Individual schematic wiring diagrams and information concerning Control Panel operation and parts replacement.

E) Verification of operational approval by Manufacturer's Representative and Engineer in writing.

F) Contractor shall have tested the complete system prior to final start-up.

A certified factory trained representative shall be provided by the contractor for the start-up.

No start-up can begin without the Department representative on site.

19. Public Notification

Advisory signs must designate the nature of the Reclaimed and must be posted in areas where Reclaimed is practiced.

Advisory signs shall be posted at entrances to golf courses including the first and tenth tees and entrances to residential neighborhoods where reclaimed water is used for landscape irrigation. These Advisory signs must include the text: “Do Not Drink” in English and “No Beber” in Spanish together per drawing number 80.

Advisory signs shall be posted adjacent to lakes/ponds or other decorative water features used to store reclaimed water. These advisory signs must include the text: “Do Not Drink”, “Do Not Swim”, and “No Beber”, “No Nadar” in English and Spanish, respectively, together per drawing number 80.

There are no specific size requirements for advisory signs, nor are there any requirements on the number of signs to be provided at sites using reclaimed water. The use of purple as a prominent color on advisory signs and written notices is recommended. However, all signs shall be clearly legible, and enough signs shall be posted to ensure reasonable notice to the public.

Further reference to the requirements of advisory signs may be found in FDEP Rule 62-610.468, F.A.C. Also, reference the Department’s Standard Details.

Section X - PRESSURIZED RECLAIMED CONNECTION CONTROLS

1. General

It is the intent of this specification to provide Martin County a means to control and monitor the delivery of Reclaimed water to each connection point of the distribution system.

The pressurized Reclaimed system shall be constructed where the County determines that a pressurized system is needed.

The controls, which are normally located at the delivery point of each development, will consist of the following components: (see details)

A) A Reclaimed Control Panel (RCP), including a programmable Motorola ACE control system, Sierra Wireless cellular modem provide by DCR Engineering Services, Revere Controls Systems, Star Controls, CC Controls, Curry Controls, or approved alternative provider and flow indicator/interface to receive pulse signals from a flow transmitter.

B) A 117 VAC power supply (fifteen (15) amp minimum) to power Reclaimed Control Panel (RCP) and control valve.

C) A flow sensor device that transmits a signal to a pulse output transmitter.

D) A master valve with maximum flow/pressure reducing and 120 AC volt solenoids.

E) A flow transmitter that sends pulse signals to a flow indicator/interface in the Reclaimed Control Panel (RCP).

F) Surge protection with three (3) rods spaced eight (8) feet in a triangular grid as detailed.

2. Reclaimed Control Panel (RCP) and SCADA

The control panel shall combine electro-mechanical controls and a programmable microprocessor based Remote Telemetry Unit (RTU) controller to be capable of fully automatic or manual operation. The controls shall be housed in a sixteen (16) gauge seamless NEMA 3R/12 stainless steel enclosure with drip shield and padlockable three (3) point latch. Enclosure shall be mounted on the power pedestal.

The control panel shall operate on 117 VAC and be capable of actuating up to two (2) 120 VAC 7VA solenoid valves per station, plus a master valve relay. The Reclaimed Control Panel (RCP) controller output shall be protected against severe electrical surge using isolation relays and/or surge protection devices.

The Reclaimed Control Panel (RCP) shall be capable of manual operation and can be programmed to run daily or weekly programs. Programs shall allow for a measured quantity of Reclaimed water delivery during specified time intervals up to twenty-four (24) hours. A high flow rate alarm shall override the running program and stop Reclaimed water delivery until a reset command has been entered through the SCADA system. Program schedules and set points shall be entered through the SCADA system interface.

The controller shall have a twelve (12) VDC rechargeable battery and recharging circuit to compensate for power outages.

The Remote Telemetry Unit (RTU) shall have status indicator lights. These lights will indicate station operation, I/O and communications status and circuit integrity.

The controller shall be Motorola ACE. Remote communications with existing telemetry system is by cellular modems and shall be provided by DCR Engineering Services, Inc., Revere Control Systems, Star Controls, CC Controls, Curry Controls or approved alternative provider.

The Reclaimed Control Panel (RCP) shall be manufactured by a qualified control panel manufacturer with prior experience with this equipment and include all components required for a complete control system, even if not specifically called out in these standards. The panel shall bear the UL508 label.

The contractor will be responsible for providing and installing the Reclaimed Control Panel (RCP). Martin County Utilities to provide Remote Telemetry Unit (RTU) programming and HMI modifications.

A) Supervisory Control and Data Acquisition

The Reclaimed Control Panel (RCP) shall utilize the cellular communications for remote control and data acquisition. The Reclaimed Control Panel (RCP) will communicate with existing Field Interface Units (FIU) at the water plant which then processes the data and interfaces with the utilities Lift Station/IQ SCADA system software. The utility's SCADA software is VTS by Trihedral Engineering with custom graphical interface by DCR Engineering Services, Revere Control Systems, Star Controls, CC Controls, or Curry Controls or approved alternate provider. Remote control commands and site programming configurations are accomplished using the graphical user interface screens of the SCADA software.

Martin County Utilities will be responsible for required additions to the SCADA screens and databases to accommodate the new equipment.

B) Setup and Field Testing

The contractor installing the control system shall engage the equipment manufacturer's representative to calibrate and field test the Reclaimed Water Control Panel, radio

communications and SCADA modifications to insure proper communication link and control strategy between the Martin County SCADA computer terminal and the Reclaimed Control Panel (RCP) via a Verizon private network

3. Reclaimed Water Sensor

A) Sensor Selection

Unless specified by model number on the drawings, the flow sensor shall be selected by mounting location and by flow measurement range.

Sensors shall be selected/sized by the required flow measurement range. Refer to Hardware, Subsection 2 (below).

B) Mechanical Installation

1. General

The accuracy of flow measurement for all flow measuring devices is highly dependent on proper location of the sensor in the piping system. Irregular flow velocity profiles caused by valves, fittings, pipe bends, etc. can lead to inaccurate overall flow rate indications even though local flow velocity measurement may be accurate.

A) Choose a location along the pipe where five (5) pipe diameters upstream and three (3) pipe diameters downstream of the sensor provide no flow disturbance. Pipe bends, valves, other fittings, pipe enlargements and reductions should not be present in this length of pipe.

2. Hardware

Point of connection (P.O.C.) piping and control valve shall be no smaller than two-inches.

2-inch and 2½-inch P.O.C. – All piping will be **BRASS**
Flow Sensor – Model **ML-04-D** with remote flange mount kit by Water Specialties.
Ball Valve – Brass
All nuts, washers & bolts are to be Stainless Steel
3-inch and up P.O.C. – Piping will be Ductile Iron
Flow Sensor – Model **ML-04-D** by Water Specialties with remote flange mount kit
Shut Off Valve – Resilient seat gate valve (U.S. Pipe "METRO SEAL" or equal)
All nuts, washers & bolts are to be Stainless Steel
Reducing bushings shall not be allowed
Ball Valve – Brass
All nuts, washers & bolts are to be Stainless Steel

C) Electrical Wiring

1. Contractor shall utilize wiring supplied with the remote mount kit. Mount indicator (FC100) on the Reclaimed Control Panel (RCP). Wire is supplied and terminated from the meter head to the Indicator/Totalizer (TEC100). Wire is also supplied to terminate at the Remote Telemetry Unit (RTU).

2. Grounding

Grounding system meeting a minimum resistance of five (5) Ohms or less shall be installed at each transmitter location. Ground rods shall be 5/8-inch diameter X 8'0" copper clad steel. Connectors shall be solid copper clamps with connecting wire at least one (1) size larger than any other wire on the same device. The number and pattern of ground rods shall be chosen to provide the required maximum resistance.

D) Transmitter Indicator/Interface

The flow transmitter (FC100) shall be connected to a device, the Indicator/Interface, in the Reclaimed Control Panel (RCP) that interprets the digital signal and provides a signal that will interface with the control system and a visual display of the flow rate and total. Shall be Red Lion PAX2 with Modbus Card.

1. Mounting

The Indicator/Interface will be supplied, installed and wired as part of the control panel by the Reclaimed Control Panel (RCP) manufacturer and mounted on an inner dead-front door.

2. Wiring

All power supply, sensor, and interface output wiring shall be made in a work like manner conforming to the National Electric Code and local ordinances. All wiring shall be color-coded or tagged to maintain functionality and polarity. Any wire connections shall be made to screw type terminal strips using crimp on spade lug connections of the appropriate size.

E) Start-up Procedure

When the installation is complete, the equipment manufacturer's representative shall verify that all the equipment has been installed and transmitter/monitors have been correctly programmed. With the system running, the equipment manufacturer's representative verify output signals from each sensor, inputs to transmitter/monitors and correct transmitter outputs.

1. An eight (8) hour time window (seven (7) days a week) for irrigation will be set at all site Reclaimed Control Panels (RCP), beginning at 10:00 PM and finished by

6:00 AM. Martin County must approve any deviation from this schedule.

4. Automatic Control Valve

The Automatic Control Valve shall maintain a maximum (adjustable) flow rate regardless of changes in demand or inlet pressure variations. The valve will also modulate to maintain a constant (adjustable) downstream pressure. The valve shall be equipped with a solenoid intercept that will close the valve drip-tight upon actuation. Valve manufacturer for pilot set points and individual orifice bore sizes shall determine control ranges. The valve shall be equipped with an orifice bore assembly that will fit between two (2) standard pipeline flanges; no pilot tubes shall be allowed.

The valve shall be hydraulically operated, diaphragm actuated, and angle pattern. The valve shall be single chamber with a single diaphragm. The diaphragm assembly shall be the only moving part and shall form a sealed chamber between the valve body and cover, allowing for a separation of operating pressure and pipeline pressures. Internal packing glands are not permitted within the main valve. The valve body shall be stainless steel* construction with stainless steel trim. The valve shall have 125/150 lb. flanged ends (stainless valves shall have steel flanges). The valve must be fully serviceable in the pipeline, and the diaphragm may not be used as a seating surface. The main valve and controls shall be manufactured in the United States of America.

* Valves 4-inches and larger to have stainless steel body. Valves 3-inches and smaller to be cast iron epoxy coated on the inside and outside with stainless steel trim.

The main valve shall have a single removable stainless steel seat that seals against a resilient, synthetic rubber disc. This disc shall have a rectangular cross section and be surrounded on three and one-half sides of the cross section by the module formed by the disc retainer and the stainless steel contoured disc guide. No O-ring type discs shall be permitted as the seating surface interface. The main valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the stainless steel seat. The seat shall have a five (5) degree higher taper on the seat diameter, so as to insure drip tight shut off. The cover bearing shall be aligned so as to permit freedom of movement of the diaphragm assembly; center guides in a single chamber valve are not permitted.

Machined surfaces in the body and cover shall fully support the diaphragm throughout the valve stroke and over the entire three-hundred sixty (360) degrees of the diaphragm radius. The flexible, non- wicking diaphragm shall be FDA approved and consist of nylon fabric bonded with synthetic rubber compatible with chlorinated Reclaimed water. The center hole accommodating the main valve stem must be sealed by vulcanized rubber grommet. The diaphragm must withstand a Mullins Burst Test of a minimum of six-hundred (600) psi per layer of nylon fabric and shall be cycle tested 100,000 cycles to insure material longevity.

The control valve shall utilize a solenoid valve operating at one-hundred twenty (120) VAC for opening and closing of the control valve. Additional manually operated ball valve(s) shall be plumbed in parallel with the solenoid valve to allow manual means to open and close the control valve in case of failure of the electrical devices.

The control valve shall be warranted, by the manufacturer, to be free from defects in material and workmanship for a period of three (3) years from the date of shipment, provided the valve is installed and used in accordance with published instructions and application recommendations. Components supplied as part of the pilot control circuitry, but not manufactured by the valve manufacturer shall convey individual warranties; these warranties shall never be less than one (1) year from date of assembled valve shipment. The valve manufacturer shall be capable of providing a complete cavitation profile to Martin County for each subject valve installation. Installing Contractor shall provide factory-trained representative for start-up and training services to Martin County as part of start-up process. The control valve representative must be fully qualified for warranty and non-warranty service and not subcontract for these services.

Valve shall be inch angle pattern, with 125/150 lb. Flanged ends. The valve shall be AMES Co., Inc., 4-inches and larger model 951/651 A-15-43-02-38-SS-2Pg, 3-inches and smaller model 951/651 AD-15-43-02-38-2Pg as manufactured by AMES Co., Inc., Woodland CA 95776. Note: Select 951 full ported or 651 reduced port valve based on best match to flow requirements.

Developer shall submit signed and sealed flow calculations from his Engineer of Record or Registered Landscape Architect complete with manufacturer's data for review and approval by Martin County Utilities and Solid Waste.

SECTIONS XI - RESERVED FOR FUTURE USE

SECTION XII - RECORD DRAWINGS

1. General

DESCRIPTION: The work covered under this section shall include furnishing the Department all information necessary for a complete set of Record Drawings.

APPLICABLE CODES, STANDARDS AND SPECIFICATIONS: The Record Drawings information shall be in strict accordance with the following codes and standards:

A) Local County and Municipal Codes.

B) Florida Department of Environmental Protection.

C) State of Florida Department of Health and Rehabilitative Services.

RESPONSIBILITY: The Contractor and or Developer shall be required to provide Record Drawings as outlined in this section.

2. Products

RECORD DRAWINGS: The Record drawings shall correctly and accurately show all changes from the Contract Documents made during construction and shall reflect surveyed information which shall be performed by a Florida Professional Surveyor and Mapper and shall include any and all necessary dedicated utility easements (noted with O.R. Book/Plat Book and Page numbers). The drawings shall be neat and legible. Show all elevations and horizontal control of all lift stations, gravity sewers including laterals, force mains, water mains including services, reclaimed water mains and raw water mains. Locations shall be made by reference to the baseline stationing with offsets or by other means acceptable to the Department. Elevations shall be according to the North American Vertical Datum of 1988 (NAVD 1988).

Each sheet of the Record Drawings shall clearly state the horizontal & vertical datum utilized to prepare the Record Drawings. Record Drawing plan sets shall include a minimum of two (2) horizontal control points. If the control points used during design are included on a Project Network Control (PNC) sheet, then the Project Network Control (PNC) sheet shall be included in the record drawing plan set.

Record Drawings shall use State Plane Coordinates for all as-built utility features and shall be signed and sealed by the Engineer of Record or Professional Land Surveyor that complies with all applicable Florida Statutes.

The surveyor preparing the as-built drawings shall use the Engineer of Record's approved utility plan and profile sheets as a basis for the field observations. The surveyor shall strike through design information with a single line and provide as-built data immediately adjacent in a bold font. Any significant deviation of horizontal or

vertical alignment shall be depicted on the drawing and the design line work struck through.

A) Water, Force, and Reclaimed Water Mains: Record Drawings shall show the following field information:

1. Show size, type of material, used to construct mains.
2. Show location and elevation of all tees, crosses, bends, terminal ends, valves, fire hydrants, air release valves, service taps, and sampling points, etc., by distances from known reference points and provide coordinates.
3. Show location, size and type of material of all sleeves, saddles, and casing pipes.
4. Elevation and horizontal location of all storm sewers, gravity sewers including laterals, force mains, water mains, etc. which are crossed; including clearance dimension at all conflicts or crossings.
5. Top of pipe elevation and horizontal location of all water and force main stub-outs.
6. Location of all services to the property lines, including service material and locations for taps and valves.
7. Top of pipe vertical and horizontal location and size of all mains and ground elevation at one-hundred (100) foot intervals. Contractor shall construct temporary tell-tale pipes at each of the one-hundred (100) foot intervals at every fitting, and every conflict/crossing to facilitate the record drawing survey. The one-hundred (100) foot centered locate balls shall be placed directly adjacent to the tell-tales. The tell-tale pipes shall be constructed of 2-inch Polyvinyl Chloride (PVC) pipe, shall be placed on the centerline top of the pipes to be surveyed, plumb and shall be removed by the Contractor after completion of the field survey by the "As-Built" professional Surveyor.
8. Location of fire lines.
9. Dedicated easement locations, identified by Plat Book and Page or Official Book and Page.

B) Gravity Sewer: Record Drawings shall show the following surveyed information:

1. Manholes: Elevation of top rim and invert of each influent and effluent line.
2. Show distance between manholes center-to-center and horizontal location.
3. Show material size and type used to construct sewer mains.
4. Show length (center of manhole to end of stub) distances from known reference points or baseline offsets, and elevation of stub-outs.
5. Show which services have twenty (20) foot length of Ductile Iron Pipe (DIP) at water main crossings.
6. Show station and offset location of sanitary services at property line. Particular care in dimensioning needed in special situations, i.e., cul-de-sacs and locations where services are not perpendicular to wye.
7. Show invert elevation of sanitary service at property line. Show locations of

service including cleanouts.

8. Any and all necessary dedicated easement locations, identified by O.R. Plat Book and Page Number.

C) Pump/Lift Station: Record Drawings shall show elevations for top and bottom and diameter of wet well along with invert of influent line. Record Drawings shall indicate the make, model number, horsepower, impeller and condition point of pumps selected and installed, shape of wet well, location of control panel, location of pump out connection, float level settings, any deviation from the plans, and serial number of the pumps.

3. Execution

RECORDS: Daily records of changes in location of piping, fixtures and other items shall be kept and recorded on the Record Drawings. The contractor, developer or developer's engineer/surveyor shall submit monthly progress reports containing the record information including copies of the signed and sealed surveyor's field notes.

The contractor, or developer's engineer shall review the completed Record Drawings and ascertain that all data furnished is accurate and truly represents the work actually installed. No Record Drawing information will be accepted by the Department from subcontractors.

For horizontal directionally drilled segments of pipe mains, a pre-drill survey shall be performed by a Professional Surveyor and Mapper to obtain reference measurements as required to tie the Horizontal Directional Drill (HDD) tracking information from the driller to the project survey control. As a minimum this will include vertical (NAVD 1988) and horizontal location at the point of entry for the borehole. This shall include the alignment vector for the drill rig relative to the project control baseline survey.

SUBMITTAL: Upon completion of the work, but prior to submittal of request for final payment or final acceptance, the contractor or developer's engineer shall obtain and submit record information certified by a Florida Professional Surveyor and Mapper. One PDF of the plan sheets, profiles, details and lift station shall be provided for initial review. The print shall be signed and sealed by the Florida Professional Surveyor and Mapper and the Florida Professional Engineer responsible for certifying the project. All sheets must include the vertical datum and horizontal datum used in easily readable print. Upon Martin County Utilities approval of the PDF file, electronic Record Drawing CAD files shall also be provided as follows:

One (1) digital Record Drawing CAD file saved in the original format as designed, but being AutoCAD version 2010 - 2014.

One (1) digital Record Drawing saved in PDF format as an exact reproduction of the signed and sealed Record Drawing on paper, without signature or seal with a resolution of 1200 dots per inch (DPI).

All Record Drawing information shall accurately depict all surveyed information with all horizontal vector information being shown in the North American Datum of 1983 (NAD83) and in the Florida East Zone State Plane Coordinate System or the latest NGS Adopted Datum using U.S. Survey Feet as the unit of measurement.

CAD FILES: The digital Record Drawing CAD file shall follow these general standards for inclusion in the Utility's Geographic Information System (GIS):

The surveyor shall prepare a single AutoCAD file of the as-built data. Any large aerials or similar image files should be uploaded and all appropriate project x-ref files bound before saving the file. Do not use e-transmit to prepare the files as it creates multiple files.

All Record Drawing Piping information shall be placed on separate layers by piping type, diameter and material.

All Record Drawing fixture information (fire hydrants, valves, meters, reducers, tees, wyes, crosses, caps, etc.) shall be placed on separate layers by the piping type they are attached to.

All piping shall be drafted as polylines; separated only at junctions or changes in pipe diameter.

All piping polylines shall snap to one another at every junction and change in pipe diameter.

4. Close-out

Once all required documentation is received by the Department, ten (10) days must pass for processing. After the ten (10) day period, meters may be issued. (See form below)

CLOSE-OUT FORM

PROJECT NAME _____

The following Documents are required prior to final release of water and/or wastewater service and must be submitted as one complete package:

_____ 01. Two (2) sets of signed and sealed approved record drawings signed by the Engineer of Record.

_____ 02. One (1) copy of the electronic approved record drawing files on disc in AutoCAD 2004+ DWG format, ArcGIS Shapefile format, ArcGIS File Geodatabase format or Microstation v7 DGN format or any other previously approved GIS format with all vector data being shown in the North American Datum of 1988 (NAD88) Florida East Coast State Plane Coordinate System using US Survey Feet as the unit of Measurement.

_____ 03. Final release of water system from DEP.

_____ 04. Final release of wastewater system from DEP.

_____ 05. Notarized Bill of Sale from Developer with itemized cost list, certified by a Florida registered engineer, of materials used in construction of the water and wastewater systems installed by the Developer/Contractor attached as Exhibit □. Enclose recording fee made payable to Martin County Utilities ($10.00 first page, $8.50 each additional). – or current fee

_____ 06. Maintenance Bond, Letter of Credit, CD or Check with pledge assignment to be in the following amount: 100% of the first $5,000 of improvements plus 10% of the balance of the cost of improvements. – or current fee

_____ 07. Developer's No Lien Affidavit from the following:

___Developer

Release of liens from the following:

___Engineer

___Contractor(s)

___Contractor(s) principal supplier(s)

_____ 08. Board date scheduled for easement _____

_____ 09. Agreement executed (signed by all parties and fees paid) _____

_____ 10. GIS update fees as per the following: - or current fee

_____$.75 per linear foot of pipe both on and off site + _____

_____$7.00 per potable water meter _____

Total: _____

_____ 11. Bacteriological sample fee. A fee of $25 per sample will be incurred by the Owner/Developer $_____. – or current fee

_____ 12. Final inspection completed with appropriate testing and clearances to include the following:

- _____ bacteriological test results
- _____ pressure test results
- _____ video and log of all sanitary sewer lines
- _____ private lift station maintenance contract
- _____ lift station start-up log
- _____ o&m manual
- _____ backflow preventer(s) inspection signed off by Backflow Coordinator (Non-Residential)
- _____ vacuum assisted pump for each lift station inspection
- _____ final inspection checklist (to be performed by MCU)

_____ 13. Copy of FPL Bill (meter #, account name, etc) to transfer electric service to MCU for lift station.

_____ 14. Copy of FPL Bill (meter #, account name, etc) to transfer electric service to MCU for I/Q.

Please allow ten (10) working days for meter installation from meter application date.

SECTION XIII – SODDING

1. Scope

The work covered under this section shall consist of furnishing all labor, materials, and equipment necessary for the sodding of the areas indicated on the plans. The work consists of placing of grass sod, watering and maintaining the sodded areas such as to assure a healthy stand of grass.

2. Type of Sod

Unless a particular type of sod is called for, sod shall be Argentine Bahia grass. It shall be well matted with roots. Where sodding will adjoin, or be in sufficiently close proximity to private lawns, other types of sod may be used if desired by the affected property owners and approved by the Department. The sod shall be taken up in commercial-size rectangles, preferably 12-inch by 24-inch or larger, except where 6-inch strip sodding is specified.

The sod shall be sufficiently thick to secure a dense strand of live grass. The sod shall be live, fresh and uninjured, at the time of planting. It shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. It shall be reasonably free of weeds and other grasses. It shall be planted as soon as possible after being dug and shall be shaded and kept moist from the time it is dug until it is planted. The source of the sod may be inspected and approved by the Department prior to being cut for use in the work. After approval, the area from which the sod is to be harvested shall be closely mowed and raked as necessary to remove excessive top growth and debris.

Approved devices, such as sod cutters, shall be used for cutting the sod and due care shall be exercised to retain the native root soil intact.

3. Water Source

The water used in the grassing operations may be obtained from any approved spring, pond, lake, stream, or municipal water system. Water from a municipal system shall be paid for by the Developer or Contractor. The water shall be free of excess and harmful chemicals, acids, alkalis, or any substance that might be harmful to plant growth or obnoxious to traffic. Saltwater shall not be used.

4. Preparation of Ground

The areas over which the sod is to be placed shall be scarified or loosened to suitable depth. On areas where the soil is sufficiently loose, particularly on shoulders and fill slopes, the Department may authorize the elimination of the ground preparation.

5. Placing Sod

Whenever a suitable length of roadway has been graded and is ready for sodding, the contractor shall, when directed by the Department, proceed at once with the sodding of the available areas. Sodding shall be incorporated into the project at the earliest practical time in the life of the contract. No sod which has been cut for more than seventy-two (72) hours shall be used unless specifically authorized by the Department after careful inspection thereof. Any sod which is not planted within twenty-four (24) hours after cutting shall be stacked in an approved manner and maintained properly moistened.

Sodding shall not be performed when weather and soil conditions are, in the Department's opinion, unsuitable for proper results.

The sod shall be placed on the prepared surface, with edges in close contact, and shall be firmly and smoothly embedded by light tamping with appropriate tools.

Where sodding is used in drainage ditches, the setting of the pieces shall be staggered, such as to avoid a continuous seam along the line of flow. Along the edges of such staggered areas the offsets of individual strips shall not exceed 6-inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.

On areas where the sod may slide, due to height and slope, the Department may direct that the sod be pegged, with pegs driven through the sod blocks into firm earth at suitable intervals.

Any pieces of sod which, after planting, show an appearance of extreme dryness shall be removed from the work.

6. Watering

The areas on which the sod is to be placed shall contain sufficient moisture, as determined by the Department, for optimum results after being placed. The sod shall be kept in a moist condition for the duration of the contract period (and in no case less than two (2) weeks). The moist condition shall extend at least to the full depth of the rooting zone. Water shall not be applied, however, when there is danger of a freezing condition.

7. Maintenance

After installation the sod shall be adequately maintained. One (1) cutting shall be performed thirty (30) days after installation and thereafter for two (2) intervals of approximately six (6) weeks. Acceptance of sod will not be prior to 150 days after installation to insure that an acceptable cover is provided.

SECTION XIV - INSPECTIONS AND AUTHORITY OF INSPECTORS

The Department Inspectors may inspect all construction and materials and may also inspect preparation, fabrication or manufacture of components, materials and supplies. The Inspector is not authorized to revoke, alter or waive any requirements of the specifications, but is authorized and expected to call to the attention of the Developer's Engineer and/or Contractor any failure of work or materials to conform to the plans or specifications. The Inspector shall have the authority to reject materials or suspend the work until questions of issue can be referred to and decided upon by the Department Director or his designated representative.

The Inspector shall in no case act as foreman or perform other duties for the Project Engineer and/or Contractor nor interfere with the management of the work. Advice, which the Inspector may give, shall in no way be construed as binding to the County or releasing the Developer, his Engineer or Contractor from performing according to the intent of the plans and minimum County Standards.

Inspections will be scheduled for regular working hours only, except for nights when service disruptions are involved. Scheduled inspections are required for jack and bores and pipe slippage through same, setting of wet wells, pipeline pressure testing, lift station startups with manufacturer's representative present, active directional drilling, material inspection, main inspection before burial, and any time an existing County facility is to be connected (i.e., manhole tie-in and water or sewer taps). Work will not be scheduled for weekends or holidays.

The Department should be provided with at least two (2) full working days' notice for scheduled inspections. Inspectors will make routing passes on call to inspect such items as thrust restraints, materials on site and clearances between conflicting lines.

It shall be the Developer's Engineer's responsibility to schedule inspections and their qualified representative shall be present at all scheduled tests and inspections. A scheduled inspection will be canceled if the representative is not present. The Developer's Engineer shall pretest pressure tests and lampings to minimize failures. The Developer's Engineer shall prepare accurate Record Drawings which shall be submitted to the Department two (2) days before a lamping to verify adequacy of slopes. In any case, Record Drawings must be submitted prior to service being provided to any phase of a project.

SECTION XV
MANUAL OF CROSS-CONNECTION CONTROL AND BACKFLOW PREVENTION

1. Introduction

A cross-connection is defined in the rule of the Florida Department of Environmental Protection (FDEP), Chapter 62-550 Florida Administrative Code (F.A.C.) as "any physical arrangement whereby a public water supply is connected, directly or indirectly with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, sewage or other waste or liquid of unknown or unsafe quality which may be capable of imparting contamination to the public water supply as the result of backflow. By-pass arrangements, jumper connections, removable sections, swivel or changeable devices and other temporary or permanent devices through which or because of which backflow could occur are considered to be cross connections." Consequently, either cross-connections or the chance of backflow must be eliminated to prevent degrading the high quality of water that water suppliers strive to maintain.

The Rules of the FDEP, Chapter 62-555, F.A.C. require the following:

Community water systems, and all public water systems which have service areas that are also served by reclaimed water systems as defined in Chapter 62-610, Part III, F.A.C., shall establish a routine cross-connection control program to detect and prevent cross-connection that create or may create an imminent and substantial danger to public health. This program shall include a written plan that is developed using accepted practices of the American Water Works Association as set forth in "Recommended Practice for Backflow Prevention and Cross-Connection Control", Manual M14 and "Cross Connections and Backflow Prevention, 4th Edition."

Cross-connection control programs specific to reuse systems shall consider the following:

a) Enhanced public efforts toward prevention of cross-connections, and

b) Enhanced inspection programs for portions of the distribution system in areas of reuse of reclaimed water for detection and elimination of cross connections.

Upon discovery of a prohibited cross-connection, public water systems shall either eliminate the cross-connection by installation of an approved backflow prevention device acceptable to the Florida Department of Environmental Protection (FDEP) or shall discontinue service until the contaminant source is eliminated.

2. General

Purpose

It is the purpose of this manual to establish a policy and regulations concerning cross-connections and backflow prevention devices for protection of the County's water systems;

requiring installation, inspection, testing, maintenance and repair of the devices.

The purpose of this policy is to protect the public potable water supply of Martin County Utilities from the possibility of contamination. To promote the elimination or control of existing cross-connections, actual or potential, between its customers' on-site plumbing fixtures and industrial piping and the public water supply; and to provide for the maintenance of a continuing program of cross-connection control which will systematically and effectively prevent the contamination of the potable water distribution system. More specifically, the policy is intended to prevent delivered water (water that has passed beyond the public water system and is in the private distribution systems of consumers) from re-entering the public distribution system and being subsequently delivered to consumers and to allow a customers' active piping design and installation to incorporate and install appropriate backflow prevention devices correctly.

A. ACCESS TO PREMISES FOR INSPECTION AND TESTING

Martin County Utilities shall have free access to the premises of any user of its water supply for the purpose of inspecting, and/or testing the backflow devices installed or to inspect the premises to determine if there are any cross-connections. If installation is required, then appropriate backflow devices shall be installed so that they are easily accessible for inspection, testing, maintenance and repair.

B. CAUSE OF BACKFLOW

The cause of backflow cannot be eliminated completely since backflow is often initiated by accidents or unexpected circumstances. However, some cause of backflow can be partially controlled by good design and informed proper maintenance. Listed below are the many causes of backflow as outlined under the two (2) types of backflow: back-siphonage and backpressure.

1. Back-siphonage – Back-siphonage is caused by reduced or negative pressure being created in the supply piping. The principal causes of back-siphonage are:

a) A line repair or break, which is lower in elevation than a service point. This will allow negative or reduced pressures to be created by water trying to flow to a lower point in the system.

b) Undersized piping, if water is withdrawn from a pipe at a very high velocity, pressure in the pipe is reduced and the pressure differential created can cause water to flow into the pipe from a contaminated source.

c) Lowered pressure in water main due to high water withdrawal such as fire fighting, water main flushing, or water main breaks.

d) Reduced supply main pressure on suction side of a booster pump.

2. Backpressure – Backpressure may cause backflow to occur where a potable water system is connected to a non-potable system of piping, and the pressure in the non-
potable system of piping exceeds that in the potable system. The principal causes of backpressure are:

a) Booster pump system designed without backflow prevention devices.

b) Potable water connections to boilers and other pressure systems without backflow prevention devices.

c) Connections with another system which may, at times have a higher pressure.

d) Water stored in tanks or plumbing systems which by virtue of their elevation would create head sufficient to case backflow if pressure were lowered in the public system.

3. Prohibitions of Cross-Connections

All cross-connections not protected by approved backflow prevention devices are prohibited and shall be corrected within a sixty (60) day period following written notification of the existing installation. In the case of proposed installations, approved backflow devices must be installed prior to the installation of the water meter.

If the cross-connection poses a severe hazard to the public health, Martin County Utilities shall be empowered to immediately terminate the customer's water service until the situation has been corrected.

It shall be unlawful for the customer to make or allow others to create a cross-connection of potable water lines with either auxiliary water systems or piping and equipment containing toxic, harmful or objectionable substances. The customer shall be held responsible for adhering to this prohibition.

Backflow prevention assemblies shall be installed by the customer on the service connection of any premises that has been identified by Martin County Utilities as having a potential for backflow. Backflow devices shall be installed by the customer within the premise if potable water is also used for industrial, commercial, and/or fire-fighting purposes. Martin County Utilities Cross-Connection Control Manual shall serve as a guide to defining potential cross-connection and the solutions for preventing backflow into the County's water supply system. Unless otherwise stated in this chapter or in other County, State or Federal Laws and regulations, the recommendations of Manual M-14, AWWA, Recommended Practice for Backflow Prevention and Cross-Connection Control shall apply to both the customer and the County.

Backflow prevention assemblies must be tested and inspected once a year by a Certified Tester. Maintenance and repair of the backflow prevention devices must be performed by a

Certified Backflow Technician. The cost of this work shall be borne by the customer.

4. Responsibility

A. CROSS-CONNECTION PROGRAM

The responsibilities of the Martin County Utilities Department, Technical Services Division, and Cross-Connection Control Program in accordance with the rules of FDEP Chapter 62-555, F.A.C. are as follows:

1. To protect the Martin County water supply from the possibility of contamination by isolating within its consumers' private plumbing systems, contaminants or pollutants which could, under adverse conditions, backflow through uncontrolled cross-connections into the public water system.

2. To eliminate or control existing cross-connections, actual or potential, between the consumers' on-site potable water plumbing system(s) and non-potable water system(s), plumbing fixtures, and industrial piping systems.

3. To provide a continuing inspection program of cross-connection control, which will systematically and effectively control all actual or potential cross-connections which may be installed in the future.

B. CUSTOMERS

The customers' responsibility starts at the point of delivery from the public potable water system and includes all of their on-site water system. The customer (at his own expense) shall install, operate, test and maintain approved backflow prevention assemblies, as directed by Martin County Utilities. The customer shall maintain accurate records of tests and repairs made to backflow prevention assemblies and provide Martin County Utilities with copies of such records. The records shall be on forms approved or provided by Martin County Utilities. In the event of accidental pollution or contamination of the public or consumer's potable water system due to backflow on or from customer's premises, the owner shall promptly take steps to confine further spread of pollution or contamination within the customer's premises, and shall immediately notify Martin County Utilities of the hazardous condition.

C. BACKFLOW PREVENTION ASSEMBLIES INSTALLERS

The installer's responsibility is to make proper installation of backflow prevention assemblies in accordance with the manufacturer's recommended procedures for installation and any additional instructions approved by Martin County Utilities. The installer is also responsible for making sure an assembly is working properly when it is installed, and is required to furnish the following information to the Cross-Connection Control Program immediately after a backflow prevention device is installed:

1. Service address where device is located,
2. Owner,
3. Description of assembly's location and size,
4. Date of installation,
5. Type of assembly,
6. Manufacturer,
7. Model number, and
8. Serial number.

All RPZ, DDC, and PVB installations are required to be tested, after installation, by a certified backflow prevention technician. Record keeping is discussed in further detail in Item 8.

5. Inspections

A. FREQUENCY

Due to changes in models or components of equipment, methods of manufacturing and additions to plants, buildings, etc., water use requirements may change. As a result new cross-connections may be installed and existing protection may be bypassed, removed or made otherwise ineffective; therefore, an annual detailed inspection by the customer of all water usage is required. Actions for non-compliance are detailed in Section XIV.

B. PROPOSED CONSTRUCTIONS

All new construction plans and specifications for multifamily residential, industrial and commercial facilities shall be reviewed by Martin County Utilities to determine the degree of possible cross-connections hazard and applicable backflow prevention device requirements. Facilities not listed shall be reviewed on a case-by-case basis. All proposed construction classified as multifamily residential, commercial or industrial, where an application is unknown or undetermined, a reduced pressure backflow assembly (RPBA) shall be the minimum requirement.

C. NEW AND EXISTING FACILITIES

In order to determine the degree of hazard to the public potable water system, a survey will be made of the consumer's presently installed water system. This survey need not be a detailed inspection of the location or disposition of the water lines, but can be refined to establishing the water uses on the premises, the existence of cross-connections, and the availability of auxiliary or used water supplies. On-site inspections are made of new and existing facilities and should any devices or plumbing changes be required, a follow-up inspection will be made of the same facilities at a later date.

6. Definitions

1. AIR-GAP SEPARATION – The term air-gap separation shall mean a physical

separation between the free-flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An approved air-gap separation shall be a distance of at least two (2) times the diameter of the supply pipe measured vertically above the top rim of the receiving vessel with a minimum distance of one-inch.

2. APPROVED DEVISE – Accepted by the Martin County Building Division or the Martin County Utilities Department.

3. ATMOSPHERIC VACUUM BREAKER – A backflow prevention device which is operated by atmospheric pressure in combination with the force of gravity. The unit is designed to work on a vertical plane only. The one (1) moving part consists of a poppet valve which must be carefully sized to slide in a guided chamber and effectively shut off the reverse flow of water when a negative pressure exists.

4. AUXILIARY WATER SUPPLY – Any water supply on or available to the premises other than the supplier's approved public potable water supply. These auxiliary water supplies may include water from another supplier's water supply, a private non-potable water supply or any natural source(s) such as a well, spring, river, stream, harbor, etc., or "used waters" or "industrial fluids". These waters may be contaminated or they may be objectionable, and constitute an unacceptable water source over which the water supplier does not have sanitary control.

5. BACKFLOW – The flow of water or other liquids, mixtures or substances, under pressure, introduced into the distribution pipes of a potable water supply system from any source or sources other than the intended source.

6. BACKFLOW PREVENTION ASSEMBLY – A backflow prevention assembly shall mean any effective device, method or construction used to prevent backflow into a potable or reclaimed water system. The type of assembly used should be based on the degree of hazard, either existing or potential.

7. BACKFLOW PREVENTION ASSEMBLY, APPROVED – The term approved backflow prevention assembly shall mean an assembly that has met the requirements of one (1) or more of the following standards:

AWWA – C511-89 Standard for Reduced Pressure Principle Backflow Prevention Assembly.

AWWA – C510-89 Standard for Double Check Valve Backflow-Prevention Assembly

ASSE – 1020 Pressure Type Vacuum Breakers

ASSE – 1024 Dual Check Type Backflow Preventer (Residential Service Connections)

ASSE – 1013 Reduced Pressure Principle, Back Pressure Backflow Preventers that have met the laboratory and field performances specifications of the University of Southern

California Foundation for Cross-Connection Control and Hydraulic Research (USC-FCCC).

8. BACKFLOW PREVENTION ASSEMBLY CERTIFIED TECHNICIAN – The term certified backflow prevention technician shall mean a person who has proven his competency to the satisfaction of Martin County Utilities. Each person who is certified to make competent tests or to repair, overhaul and make reports on backflow prevention assemblies and shall be conversant with applicable laws, rules, and regulations and shall have attended and successfully completed FW&PCOA (FLORIDA WATER AND POLLUTION CONTROL OPERATORS ASSOCIATION) or TREEO (Training, Research, and Education for Environmental Occupations Center, University of Florida) Florida Plumbing and Backflow Association or any Training Agency endorsed by the American Water Works Association (AWWA), certification programs for backflow prevention assembly tester and repair specialist or other programs acceptable to Martin County Utilities.

9. BACKPRESSURE – Backpressure shall mean any elevation of pressure in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above the supply pressure at the point of consideration which would cause or tend to cause, a reversal of the normal flow.

10. BACK-SIPHONAGE – The flow of water or other liquids, mixtures or substances into the distribution piping of the potable water supply system from any source other than its intended source caused by the reduction of pressure in the potable water supply system.

11. CONTAMINATION – An adverse impact of the quality of the potable water supply by any solid, liquid, gaseous compounds or mixtures, to a degree, that would create a danger to the public health, or would create an unacceptable test result, odor or color in the potable water supply.

12. CROSS-CONNECTION – A cross-connection is defined in the rules of the Florida Department of Environmental Protection (F.D.E.P.), Chapter 62-550 Florida Administrative Code (F.A.C.) as " any physical arrangement whereby public water supply is connected, directly or indirectly with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixtures, or other device which contains or may contain contaminated water, sewage or other waste or liquid of unknown or unsafe quality which may be capable of imparting contamination to the public water supply as the result of backflow. By-pass arrangements, jumper connections, removable sections, swivel or changeable devices and other temporary permanent devices through which or because of which backflow could occur are considered to be cross-connections."

13. CUSTOMER – Any person, business or other entity whose name or names appear on billing for a water service connection.

14. DOUBLE CHECK VALVE ASSEMBLY – An assembly composed of two (2) single, independently acting, check valves, including tightly closing shut-off valves located at each end of the assembly and suitable connections for testing the watertightness of each check

valve. A check valve is a valve that is drip-tight in the normal direction of flow when the inlet pressure is one (1) p.s.i. And the outlet pressure is zero (0). The check valve shall permit no leakage in a reverse direction of the normal flow. The closure element (e.g., clapper) shall be internally weighted or otherwise internally loaded to promote rapid and positive closure.

15. DEGREE OF HAZARD - The term degree of hazard is a qualification of the potential risk to public health and the adverse effect upon the public water system that may result from cross-connections within a water using facility. Establishing the degree of hazard is directly related to the type and toxicity of contaminants that could feasibly enter the public water supply system as determined by Martin County Utilities.

16. HEALTH HAZARD – A cross-connection or potential cross-connection involving any substance that could, if introduced in the potable water supply, cause death, illness, spread disease, or have a high probability of causing such effects.

17. NON-HEALTH HAZARD – A cross-connection or potential cross-connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable, if introduced into the potable water supply.

18. PLUMBING HAZARD – A plumbing-type cross-connection in a consumer's potable water system that has not been properly protected by an approved air gap or an approved backflow-prevention assembly.

19. SYSTEM HAZARD – An actual or potential threat of severe damage to the physical properties of the public potable water supply system or the consumer's potable water system or of pollution or contamination that would have a protracted effect on the quality of the potable water in the system.

20. INDUSTRIAL PIPING SYSTEM – CONSUMER'S – The term consumer's industrial piping system shall mean any system used by the consumer for transmission of or to store any fluid, solid or gaseous substance other than an approved water supply. Such a system would include all pipes that convey or store substances, which are or may be polluted or contaminated.

21. PRESSURE VACUUM BREAKER – A pressure vacuum breaker is similar to an atmospheric vacuum breaker except that the checking unit "poppet valve" is activated by a spring. This type of vacuum breaker does not require a negative pressure to react and can be used on the pressure side of a valve.

22. REDUCED PRESSURE BACKFLOW PREVENTER – An assembly containing within its structure a minimum of two (2) independently acting, approved check valves, together with an automatically operating pressure differential relief valve located between the two (2) check valves. The first check valve reduces the supply pressure to a predetermined level so that during normal flow and at cessation of normal flow the pressure between the check valves shall be less than the supply pressure. In case of leakage of either check valve, the

differential relief valve, by discharging to the atmosphere, shall operate to maintain the pressure between the check valves at a pressure lower than the supply pressure. The unit shall include tightly closing shut-off valves located at each end of the device, and each device shall be fitted with properly located test cocks.

23. RECLAIMED WATER – Water that has received at least advanced secondary treatment with high level disinfection and is reused after flowing out of a wastewater treatment facility.

24. RESIDENTIAL DUAL CHECK – A compact unit manufactured with two (2) independent spring actuated check valves. A residential dual check must be of the in-line type. The residential dual check is acceptable only as added backflow prevention in areas served by reuse systems defined in Chapter 62-610, Part III, F.A.C.

25. REUSE – The deliberate application of reclaimed water in compliance with the Florida Department of Environmental Protection (FDEP) and South Florida Water Management District (SFWMD) rules, for a beneficial purpose.

26. SERVICE CONNECTION – The terminal end of a service connection from the public potable water supply system. If a meter is installed at the end of the service connection, then the service connection shall mean the downstream end of the meter. There shall be no unprotected connections from the service line ahead of any meter or backflow-prevention assembly located at the point of delivery to the customer's water system. Service connection shall also include water service connections from a fire hydrant or any and all other temporary or emergency water service connections from the public potable water system.

27. WATER SUPPLIER – The term water supplier shall mean the owner or operator of the public potable water supply system providing an approved water supply to the public. The utility shall be one that is operating under a valid permit from the Florida Department of Environmental Protection (FDEP). As used herein the term water supplier and Martin County Utilities may be used synonymously.

28. WATER SYSTEM – CUSTOMER'S – The term customer's water system shall include any water system located on the consumer's premises, whether supplied by a public potable water system or any auxiliary water supply.

29. WATER-USED – Any water supplied by a water supplier from a public potable water system to a customer's water system after it has passed through the point of delivery and is no longer under the sanitary control of the water supplier.

7. Potential Hazards and Required Protection

A. FACILITIES

1. Type of Backflow Protection Required: An approved backflow prevention device of the

type designated shall be installed on each water service connection to the following types of facilities. This list is presented as a guideline and should not be construed as being complete.

Abbreviations used are as follows:
AG – Air Gap Separations
RPBA – Reduced Pressure Backflow Prevention Assembly
DCVA – Double Check Valve Assembly
PVB – Pressure Vacuum Breaker
AVB – Atmospheric Vacuum Breaker
RDCA – Residential Dual Check Valve Assembly

2. Guide to the Assessment of Hazard and Selection of Assemblies for Internal Protection

Description of Cross Connection	Assessment of Hazard	Recommended Assembly at Fixture*
Aspirator (Medical)	Health	AVB or PVB
Bedpan washers	Health	AVB or PVB
Autoclaves	Health	RPBA
Specimen tanks	Health	AVB or PVB
Sterilizers	Health	RPBA
Cuspidors	Health	AVB or PVB
Lab bench equipment	Health	AVB or PVB
Autopsy and mortuary equipment	Health	AVB or PVB
Sewage pumps	Health	AG
Sewage ejectors	Health	AG
Fire-fighting systems (toxic liquid) foam concentrates	Health	RPBA
Connection to sewer pipe	Health	AG
Connection to planting tanks	Health	RPBA
Irrigation systems with chemical additives or agents	Health	RPBA
Connection to salt-water cooling systems	Health	RPBA
Tank vats or other vessels containing toxic substances	Health	RPBA
Connection to industrial fluid systems	Health	RPBA
Dye vats or machines	Health	RPBA
Cooling towers with chemical additives	Health	RPBA
Trap primer	Health	AG
Steam generators	Nonhealth+	RPBA
Heating equipment Commercial	Nonhealth+	RPBA

Domestic	Nonhealth+	DCVA
Irrigation systems	Nonhealth+	DCVA, AVB, PVB
Swimming pools:		
Public	Nonhealth+	RPBA, AG
Private	Nonhealth+	PVB, AG
Vending machines	Nonhealth+	RPBA, PVB
Ornamental fountains	Nonhealth+	DCVA, AVB, PVB
Degreasing equipment	Nonhealth+	DCVA
Lab bench equipment	Nonhealth+	AVB, PVB
Hose bibbs	Nonhealth+	AVB
Trap primers	Nonhealth+	AG
Flexible shower heads	Nonhealth+	AVB, PVB
Steam tables	Nonhealth+	AVB
Washing equipment	Nonhealth+	AVB
Shampoo basins	Nonhealth+	AVB
Kitchen equipment	Nonhealth+	AVB
Aspirators	Nonhealth+	AVB
Domestic space-heating boiler	Nonhealth+	RPBA

*AVBs and PVBs may be used to isolate health hazards under certain conditions, that is, back-siphonage situations. Additional area or premises isolation may be required.

+Where a greater hazard exists (due to toxicity or other potential health impacts) additional area protection with RPBAs is required.

B. MINIMUM TYPE OF PROTECTION

DESCRIPTION		TYPE
1.	Premises having an auxiliary water system.	RPBA
2.	Premises having a water storage tank, reservoir, pond, or similar appurtenance.	RPBA
3.	Premises having a steam boiler, cooling system or hot water heating system where chemical water conditioners are used.	RPBA
4.	Premises having submerged inlets to equipment.	RPBA
5.	Premises having self-draining yard hydrants, fountains, hose boxes or similar devices presenting a health or system hazard (i.e., chemical storage plants, tank farms, bulk storage yards).	RPBA

6. Premises having self-draining/yard hydrants, fountains, hose boxes or similar devices presenting a pollution hazard (i.e., parks, playing fields, cemeteries.) RPBA

7. Residential Multi-Family (three (3) or more Units served by a single service line) DCVA, RPBA

8. Residential multi-story (two (2) stories or more) DCVA, RPBA

9. Others as specified by Martin County Utilities.

8. Record Keeping

It is essential that the program administrator of a cross-connection control program keep adequate records of all transactions. In addition to keeping records of all correspondence, particular emphasis must be placed on developing a record keeping system that accommodates monitoring of the following:

1. Installation date of assemblies.

2. Location of backflow prevention assemblies.

3. Inspection and testing of backflow prevention assemblies, including the performance of those backflow prevention assemblies

4. The performance of licensed testers

9. Fire Systems

A. TYPE OF BACKFLOW PROTECTION REQUIRED/FIRE PROTECTION SERVICES

Fire systems may be divided into six (6) general classes, as described in AWWA M-14.

Due to the variety of installation designs of fire systems which may preclude the use of a meter, the point of service shall be defined as the last valve prior to the pre-OS&Y valve. An approved backflow prevention assembly of the type designated shall be installed on each fire protection service to any premises where the fire protection system contains any of the components listed unless, Martin County Utilities determines that no real or potential health, pollution, or system hazard to the public water system exists.

B. MINIMUM TYPE OF PROTECTION

DESCRIPTION TYPE

1. Class 1 – a closed automatic fire system without pumper connection, i.e., a system

having twenty (20) heads or less. DCVA

2. Class 2 – a closed automatic fire system with pumper connection. DCVA

3. Class 3 – a closed automatic fire system with pumper connection and an auxiliary water supply on or available to the premises; or an auxiliary water supply which may be located within 1700 feet of the pumper connection. RPBA

4. Class 4 – a closed automatic fire system with a closed pressure tank supply (this class may have a jockey pump inter-connected with domestic water supply and/or an air compressor connection). RPBA

5. Class 5 – a closed automatic sprinkler system inter-connected with an auxiliary water supply. RPBA

6. Class 6 – a fire system used for the combined purpose of supplying automatic sprinklers, hose lines, fire hydrants, and standpipes and/or being used for industrial purposes. RPBA

   A. Self-Draining Fire Hydrants on premises presenting a health or system hazard (i.e., Chemical Plants, Petroleum Storage Plants, Bulk Storage Yards, Stock Yards, Sewer Plants, or similar facilities where ground seepage of toxic materials may occur). DCVA

   B. Self-Draining Fire Hydrants on premises presenting a pollution hazard (i.e., Apartment House, Office Complex, Fabricating Plants, or similar facilities where ground seepage of pollution but not toxic materials may occur). DCVA

10. Other Cross-Connection Hazards

1. AIR CONDITIONING COOLING TOWERS: A potable water inlet shall have an AG separation of twice the inside diameter of the inlet or a minimum of two-inches above the flood level.

2. ASPIRATORS AND EJECTORS: Shall have an AG or PVB, depending upon the degree of hazard, on the faucet from which these devices are attached to or operated from.

3. BOOSTER PUMPS: All booster pumps shall be provided with a low pressure cut-off unless other acceptable provisions are made to prevent the creation of low or negative pressures in the piping system.

4. EXTERMINATING COMPANIES: All tanks, tank trucks, and spraying apparatus used to convey pesticides in an exterminating process are required to use only designated-protected potable water fill locations. Filling with potable water at unspecified locations or private residences is prohibited. All filling locations will consist of over-head piping

arrangements with correctly installed pressure vacuum breakers. If for any reason an overhead piping arrangement cannot be used, a reduced pressure zone backflow preventer must be installed on the fill line. All filling locations must be approved by Martin County Utilities.

5. FIXTURE INLETS OR VALVED OUTLETS: Hose attachments, which may constitute a cross-connection, shall be protected by the proper approved vacuum breaker installed at least six-inches above the highest point of usage and located on the discharge side of the last valve.

6. MISCELLANEOUS USES OF WATER FROM FIRE HYDRANTS: the operation of fire hydrants by anyone other than authorized personnel is prohibited. The Utilities Department may permit the use of water from a fire hydrant for construction or other purposes provided the applicant shall properly apply for, and adhere to the backflow requirements on the hydrant permit.

7. PORTABLE SPRAY AND CLEANING EQUIPMENT: Any portable pressure spray or cleaning units that have the capability of connecting to any potable water supply and do not contain a built-in approved air gap, should be fitted with a reduced pressure backflow device.

8. PRIVATE WELLS: Shall not be inter-connected to a public water supply unless the public supply is protected by an RPBA at the service connection, and approval is given by Martin County Utilities.

9. VACUUM BREAKERS: Vacuum relief valves designed to prevent collapse or implosion of a steam-heated pressure vessel when being cooled are not acceptable devices for protection against backflow in potable water supply lines.

Note: Any device, equipment, or situation not covered by this cross-connection policy, which may constitute a potential public health hazard, will be examined for appropriate treatment by Martin County Utilities, or its authorized agent. Single check valves will not be accepted as a means to protect the potability of drinking water and therefore may only be used to prevent backflow which would affect the functioning of a plumbing system such as to prevent recirculation of potable hot water. Where single check valves are improperly used, they will be required to be replaced by an appropriate approved backflow prevention assembly.

11. Testing of Backflow Preventers

It shall be the duty of the customer-user at any premises where reduced pressure backflow prevention assemblies (RPBA), double check valve assemblies (DCVA), and pressure vacuum breakers (PVB) and residential dual check valve assemblies (RDCA) are installed to have thorough inspections and operational tests made at least once a year or more often in those instances where inspections indicate a need. These inspections and tests shall be at the expense of the water customer/user and be performed by a certified

technician. The water supplier will notify the customer/user when tests are required and supply the necessary test forms and instructions. These forms will be completed and returned to the water supplier by the date indicated.

All backflow prevention assemblies with test cocks are required to be tested with a minimum frequency of once per year. Testing requires a water shutdown usually lasting five (5) to twenty (20) minutes. For facilities that require an uninterrupted supply of water, and when it is not possible to provide water service from two (2) separate meters, provisions shall be made for a "parallel installation" of backflow prevention assemblies.

Muti-story buildings which have a number of flushometer toilets shall be equipped with parallel assemblies. Experience has shown if the water supply is shut off to this type of building flushometers may have to be manually reset.

During testing one (1) assembly is left on while the other is being tested. Usually the two (2) assemblies are sized one (1) assembly size smaller than the service line, e.g. one (1) 2-inch device for two (2) 1-1/2 inch assemblies, one (1) 8-inch assembly for two (2) 6-inch assemblies.

Martin County Utilities will not accept any unprotected bypass around a backflow preventer when the assembly is in need of testing, repair or replacement.

12. Penalties for Non-Compliance

Termination of service: A written notification detailing all cross-connections found during the inspection will be sent to the owner or authorized agent of the owner of the building or premises, stating that corrections must be made and setting a reasonable time for compliance. Upon failure of the owner or authorized agent of the owner of the building or premises to have the defect(s) corrected within the specified time, the water supplier shall cause the water service to the building or premises to be terminated. The water supplier shall cause discontinuance of water service if a required backflow prevention assembly has been bypassed or failed to be tested and properly maintained as required by this policy statement. The water supplier shall also cause discontinuance of water service if an air-gap separation system is compromised.

13. Retrofitting Existing Facilities

All premises of the type where cross-connections are suspect, may be surveyed by Martin County Utilities to determine if a detailed inspection will be required. The customer shall be notified in writing thirty (30) days in advance to secure an appointment for inspection of the premises. The customer or his authorized representative may accompany the inspector during the tour of the premises.

An inspection form will be completed by the inspector. The customer shall be made aware of any corrective measures needed. All official letters of notification shall be sent to the customer indicating what corrective measures must be taken. Upon conformance of the

requirements in the notification letter, the customer shall immediately notify Martin County Utilities to schedule a date of reinspection.

All existing facilities, which qualify as cross-connection risks will be retrofitted with backflow prevention devices, appropriate to their classification, on the customer's side of the meter, or point of service. Proof of proper operation of the assembly must be submitted to Martin County Utilities with a statement signed by a recognized, certified tester.

In the event that the report is not received within ninety (90) days of notification, service will be immediately discontinued unless a schedule of compliance has been submitted to, and approved by Martin County Utilities.

The customer will be responsible for any and all applicable fees, charges, or other costs associated with retrofitting. The customer will be responsible for the annual, or more frequent, retesting, maintenance, repair or replacement of the assembly. The requirement for more frequent testing will be determined on a case by case basis by Martin County Utilities, primarily, upon the degree of hazard. Any work done to, or testing of, the assembly shall be reported to Martin County Utilities within seven (7) days of the incident.

14. Reclaimed Water

This is a summary of the important facts concerning the use of Reclaimed Water for irrigation within Martin County Utilities Service area. The information contained in this document is based on County Ordinances and official polices regarding the availability and use of reclaimed water. More specific and technical information can be obtained by direct reference to Ordinance # 276, and Chapter 62-610 F.A.C., Reuse of Reclaimed Water and Land Application.

What is Reclaimed Water?

It is sparkling, disinfected water that meets all requirements as described Chapter 62-610 Part III, F.A.C. for irrigation to areas that are intended to be accessible to the public. It has been reclaimed from wastewater that has received advanced tertiary treatment and high-level disinfection. Reclaimed water can be used safely for irrigation and decorative purposes in areas open to public access and for residential and commercial irrigation. Reclaimed water has been successfully used in neighboring areas for golf courses and lawn irrigation for many years.

Advantages of Reclaimed Water:

The use of Reclaimed water for irrigation is a proven technology that is safe and beneficial. It has several advantages over irrigation with well and potable water. The use of reclaimed water conserves potable water. This means less pumping of our precious underground aquifer, which supplies potable water. Reclaimed water is cheaper to use than potable water, and contains small amounts of nutrients, such as nitrogen and phosphorus, which both lawns and plants need. There are also fewer irrigation restrictions

for Reclaimed water during periods of drought.

Connection Requirements:

Once Reclaimed water service for irrigation is made available to an area, the use of potable water for irrigation will be curtailed to the maximum extent practicable, utility customers in the area may be required to connect to the Reclaimed water for irrigation of lawns and landscaping. Some wells will be permitted in areas where Reclaimed water is available to provide an augmentation supply for the overall Martin County Utilities reuse water system. Residents will be responsible for connection to the County provided service valves. Once the reuse water line is connected, the county will perform an inspection for cross connection protection.

Connection Reclaimed Water Procedure:

Individual Reclaimed water services are installed where Reclaimed water mains and capacity are available. There will be a purple box, with a connection valve, adjacent to the property line. Individual users may connect reuse water only to an irrigation sprinkler system. Only the county may use the valves located in the meter box at the customer's property line. Therefore, each user will be required to install a separate control box to regulate their irrigation cycles. All installations and operation of Reclaimed water systems shall be in accordance with Chapter 62-610 F.A.C.

Restriction on the use of Reclaimed Water:

Reclaimed water is safe for irrigation and other ornamental use, but is not safe for drinking. Certain safeguards are required in order to reduce the possibility of accidental drinking of Reclaimed water. No cross-connection or inter-connection is permitted between Reclaimed water lines and potable water lines. *Aboveground spigots and faucets may not be connected to the Reclaimed water system*. Reclaimed water will not be piped into, or used inside, a structure. The County may inspect any property to insure no cross-connection exists. In the event a cross-connection is found to exist, the user will be disconnected from the Reclaimed water system until the cross-connection violation is corrected.

15. Review and Update

Martin County Utilities will on an annual basis review, and, if necessary, update, the cross-connection control policy to meet current, local, state and federal standards.

SECTION XVI - APPROVED PRODUCT LIST

A. Water

1. FIRE HYDRANTS **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. Mueller Super Centurion 250
    2. American-Darling 5 ¼" B84B-5
    3. Clow Medallion

2. AIR RELEASE VALVES (1-inch inlet)

    1. Valmatic V.M. 38
    2. Empire 929-3
    3. Crispin #PL10
    4. ARI S050 and D040

3. RESILIENT WEDGE GATE VALVES 4"- 20" **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. Mueller #A2360 (4"-12")/A 2361 (14"-20")
    2. American Flow Control Series 2500
    3. Clow #F6100

4. GATE VALVES 20" AND LARGER **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. Mueller A2361
    2. American Flow Control Series 2500

5. TAPPING VALVES **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. American Flow Control Series 2500
    2. Mueller # T 2360/T 2361
    3. Clow F-6100 Series

6. TAPPING SLEEVE - # 304 STAINLESS STEEL WITH STAINLESS STEEL BOLTS

1. JCM #452 for HDPE / JCM#432 for all other pipe material
2. Smith/Blair #663 for all pipe material other than HDPE
3. Ford FAST for all pipe material including HDPE
4. Mueller H 304 for all pipe material other than HDPE
5. Romac SST-H for HDPE / Romac SST for all other pipe material
6. Total Piping Solutions Triple Tap for all pipe material including HDPE

7. DUAL CHECK VALVES (RESIDENTIAL) **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

1. Mueller 5/8 x 3/4 x 3/4 H14242 - 5/8" service
   H14242 - 1" service

2. Ford HHS531-323- 5/8" service
   HHS531-344- 1" service

8. MECHANICAL JOINT AND FLANGED FITTINGS (AWWA, ANSI) CEMENT LINED

1. Union Tyler McWane
2. U.S. pipe

9. MECHANICAL RESTRAINTS **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

A. Mechanical Joint
1. Ebaa Iron - Meg-A-Lug©
2. Uniflange – Ford

B. Self Restraining Gaskets for Push On Ductile Iron Pipe (DIP)
1. U.S. Pipe - AField Lock©
2. American - AFast Grip©

10. METER VALVES (curb stops) **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

1. Ford

   BA43-342WG - 5/8" service
   BA43-444WG - 1" service
   BFA43-777WG - 1-1/2" & 2" service
   UVB43-42WG - Double 5/8" service

2. Mueller

   B-24258 - 5/8" service
   B-24258 - 1" service
   B-24276 - for 1-1/2" & 2" service
   + Double Service H15363-05

3. McDonald

   4602BT – 5/8" service
   4602BT – 1" service
   4602BT – 11/2" & 2" service
   09UTBW – Double 5/8" service

11. CORPORATIONS

1. Ford 1" FB1000G
   2" FB1100G

2. Mueller 1" B-25008
   2" B-25028

3. McDonald 1" 4701BT
   2" 4704BT

12. SERVICE SADDLES (STAINLESS STEEL WIDE BAND SADDLES ONLY WITH STAINLESS STEEL BOLTS)

1. Smith-Blair #372-1 for HDPE / #372 for all other pipe material
2. Romac #305-H or 306-H for HDPE / #305 or 306 for all other pipe material
3. JCM #438 for HDPE / #502 for all other pipe material
4. Total Piping Solutions Series T3 for all pipe material including HDPE

13. METERS – DISPLACEMENT TYPE, MAGNETIC DRIVE – 5/8" – 1"

1. Badger 5/8" model # 25 w/ Itron 100W Endpoint
2. Badger 1"-model #55 w/ Itron 100W Endpoint

14. METERS – DISPLACEMENT TYPE – 1 ½" AND LARGER;

1. 1 ½" Badger model # 120 w/ Itron 100W-Endpoint
2. 2" Badger model # 170 w/ Itron 100W Endpoint

15. METER STRAINERS - 2" AND LARGER METERS

1. Badger

16. METERS 3" AND LARGER/ IRRIGATION

1. Mueller Systems / Hersey MVR
2. Neptune- HP
3. Sensus, OMNI T^2

17. METERS 3" AND LARGER/ COMPOUND

1. Badger with Itron 100W endpoint

18. FIRE SERVICE METERS

1. Neptune Protectus III
2. Badger

19. BOXES/VAULTS - Including Lids and/or Covers

1. CDR
2. Quazite-composolite

Dimensions of Boxes/Vaults shall be as follows:

Valve Box Type	Top Dimensions	Bottom Dimensions	Height
Single	11" x 18"	27" x 17"	12.5"
Double	15" x 17"	27" x 24"	12.5"
Coffin (2")	30" x 17"	39" x 26"	12"

20. DEAD END FLUSHING HYDRANT

1. Aquarius One-O-One
2. Water Plus
3. Gil Industries

21. VACUUM BREAKER (PUB)

1. Ames A 200 (¾" to 2")
2. Watts 008 PCQT (¾" to 1")
3. Wilkins 720-A (½" to 2")
4. Febco 765,767 (½" to 2")
5. Apollo PVB4A (1/2" to 2")

22. REDUCED PRESSURE BACKFLOW PREVENTERS (¾",1', 1 ½",& 2")

1. Ames 400B
2. Watts 009,909,919,& 994
3. Wilkins 975 XL
4. Febco 825Y
5. Apollo RPLF4A – Lead Free
6. A.R.I. RP-500

23. REDUCE PRESSURE BACKFLOW PREVENTERS (4", 6", 8", & 10")

1. Ames 4000 SS
2. Watts 957, 994, & 909
3. Wilkins 300AR, 375
4. Febco 825 YD
5. Apollo RPLF4A (2-1/2" to 12") - Lead Free

24. DOUBLE DETECTORS

1. Ames Series 3000SS
2. Apollo DCDALF4A (2-1/2" to 12") – Lead Free

25. LOCATION BALL

1. 3M, EMS 4" Ball Marker, Item #1403-XR : color blue
2. Omni Marker Ball, Model #161 : color blue

26. LOCATE WIRE (DIRECTIONAL DRILL CONSTRUCTION)

1. Copperhead Directional Drill Wire (#12 AWG) # 1245B-EHS

27. TRACER BOX

1. Copperhead SnakePit Magnetized Tracer Box with blue top (Specific box depends on location)

28. VALVE BOX

    1. Tyler Series 6850 w/ No. 58 and 59 extensions
    2. Or Equal

29. VALVE BOX LIDS

    1. Bingham & Taylor Round Drop-In Lid with 4” Skirt (locations in pavement)
    2. Tyler Union 5 ¼” lid (non-pavement locations)

30. WATER SERVICE TUBING

    1. Endopure by Endot Industries
    2. Or Equal

31. FIRE HYDRANT OUT OF SERVICE TAG

    1. Joseph G. Pollard
    2. Or Equal

32. PAINTING SYSTEM : ABOVE GROUND PIPING AND METERS

    1. Primer:
       TNEME-ALUMINUM MASTIC # 135 – TNEMEC
       (3.0 to 5.0 mils DFT)
    2. Intermediate Coat:
       Series 66 Epoxoline – TNEMEC
       Hi-Build Epoxy
       (4.0 to 6.0 mils DFT)
    3. Finish Coat:
       Series 73 Endura-Shield III – TENEMEC
       (2.0 to 3.0 mils DFT)

B. Reclaimed Water

1. RESILIENT SEAT GATE VALVES (4" - 20") **All components shall comply with the “American Made“ requirement as identified by A.R.R.A of 2009.**

    1. Mueller A2360 (4”-12”)/ A2361 (14”- 20”)
    2. American Flow Control Series 2500
    3. Clow F-6100

2. RESILIENT WEDGE TAPPING VALVES **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

1. American Flow Control Series 2500
2. Mueller # T2360/T2361
3. Clow F-6100 Series
4. Waterous

3. AIR RELEASE VALVES (2" inlet)

1. ARI – D025
2. Val-Matic, model # 102

4. TAPPING SLEEVE - #304 STAINLESS STEEL WITH #304 STAINLESS STEEL BOLTS

1. JCM #452 for HDPE / JCM#432 for all other pipe material
2. Smith/Blair (Rockwell) #663 for all pipe material other than HDPE
3. Ford FAST for all pipe material including HDPE
4. Mueller H304 for all pipe material other than HDPE
5. Romac SS-H for HDPE / Romac SST for all other pipe material
6. Total Piping Solutions Triple Tap for all pipe material including HDPE

5. CHECK VALVES FOR RECLAIMED WATER

1. M & H Style #159-02
2. Mueller #2600-6-01
3. American "50" Line with Weight & Lever
4. Clow F 5345

6. MECHANICAL JOINT AND FLANGED FITTINGS (AWWA, ANSI)

1. U.S. pipe
2. Union Foundry (McWane)

7. MECHANICAL RESTRAINTS **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

1. Meg-A-Lug
2. Uniflange - Manufactured in the US

8. SERVICE SADDLES (STAINLESS STEEL WIDE BAND SADDLES ONLY WITH STAINLESS STEEL BOLTS)

1. Smith-Blair #372-1 for HDPE/ #372 for all other pipe material
2. Romac # 305-H or 306-H for HDPE / # 305 or 306 for all other pipe material
3. JCM #438 for HDPE / #502 for all other pipe material
4. Total Piping Solutions Series T3 for all pipe material including HDPE

9. METERS

1. Neptune High Performance Turbine Meter
2. SENSUS Omni T2

10. LOCATION BALL

1. 3M, EMS 4” Ball Marker, Item # 1408-XR : color purple

11. LOCATE WIRE (DIRECTIONAL DRILL CONSTRUCTION)

1. Copperhead Directional Drill Wire (#12AWG) # 1245P-EHS

12. TRACER BOX

1. Copperhead SnakePit Magnetized Tracer Box with purple top (Specific box depends on location)

13. VALVE BOX

1. Tyler Series 6850 w/ No. 58 and 59 extensions
2. Or Equal

14. VALVE BOX LIDS

1. Bingham & Taylor Round Drop-In Lid with 4” Skirt (locations in pavement)
2. Tyler Union 5 ¼” lid (non-pavement locations)

15. SURFACE AERATOR

1. Kasco display aerators
2. Or Equal

16. DIFFUSED AERATOR

1. EDI flexible membranes
2. Or Equal

17. LAKE LEVEL DETECTOR

1. Blue Ribbon Industrial Components Corporations Submersible level sensor, Model BC001 with Surge Suppressor BCP3000 (including lifetime warranty). Indicator – Red Lion Model CUB4LP.

18. CONTROL VALVE WITH MOTOR ACTUATOR

1. KTM Single V Control Ball Valve by Tyco Flow Control. Actuator: Auma Type SA muti-turn or Type SG quarter-turn approved for wastewater applications

19. PRESSURE TRANSMITTER

1. Blue Ribbon BR4111 Pressure Transmitter with BCP3000 surge suppressor (including lifetime warranty)
2. Rosemount 3051 Gauge Pressure Transmitter

20. RATE/TOTAL DISPLAY

1. Red Lion PAX2 with Modbus Card

21. PAINTING SYSTEM: ABOVE GROUND PIPING AND METERS

1. Primer:
   TNEME-ALUMINUM MASTIC # 135 – TNEMEC
   (3.0 to 5.0 mils DFT)
2. Intermediate Coat:
   Series 66 Epoxoline – TNEMEC
   Hi-Build Epoxy
   (4.0 to 6.0 mils DFT)
3. Finish Coat:
   Series 73 Endura-Shield III – TENEMEC
   (2.0 to 3.0 mils DFT)

22. WETWELL & VAULT COATING

1. Bitumastic - 2 coats inside and outside as heavy bitumastic. 1st coat to be red and 2nd coat to be black.

C. Wastewater

1. RESILIENT WEDGE GATE VALVES (4" - 20") **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. Mueller A2360 (4"-12")/ A2361 (4"-20")
    2. American Flow Control Series 2500
    3. Clow F-6100

2. RESILIENT WEDGE TAPPING VALVES) **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. Ames Valve
    2. Mueller T 2360/T2361
    3. American Flow Control, Series 2500

3. AIR RELEASE VALVES (2" inlet)

    1. ARI – D025

4. TAPPING SLEEVE - #304 STAINLESS STEEL WITH #304 STAINLESS STEEL BOLTS

    1. JCM #452 for HDPE / JCM#432 for all other pipe material
    2. Smith/Blair (Rockwell) #663 for all pipe material other than HDPE
    3. Ford FAST for all pipe material including HDPE
    4. Mueller H 304 for all pipe material other than HDPE
    5. Romac SST-H for HDPE / Romac SST for all other pipe material
    6. Total Piping Solutions Triple Tap for all pipe material including HDPE

5. CHECK VALVES FOR WASTEWATER

    1. M & H Style #159-02
    2. Mueller #2600-6-01
    3. American "50" Line with Weight & Lever Series 600
    4. Clow F 5345
    5. Ferguseon # PFX31

6. MECHANICAL JOINT AND FLANGED FITTINGS (AWWA, ANSI)

    1. U.S. pipe
    2. Union Foundry (McWane)

7. MECHANICAL RESTRAINTS) **All components shall comply with the "American Made" requirement as identified by A.R.R.A of 2009.**

    1. Meg-A-Lug
    2. Uniflange - Manufactured in the US

8. SERVICE SADDLES (STAINLESS STEEL WIDE BAND SADDLES ONLY WITH STAINLESS STEEL BOLTS)

    1. Smith-Blair #372- for HDPE / #372 for all other pipe material
    2. Romac # 305-H or 306-H for HDPE / #305 or 306 for all other material
    3. JCM #438 for HDPE / #502 for all other pipe material
    4. Total Piping Solutions Series T3 for all pipe material including HDPE

9. LOCATION BALL

    1. 3M, EMS 4" Ball Marker, Item # 1404-EX: color green
    2. Omni Marker Ball, Model #162: color green

10. LOCATE WIRE (DIRECTIONAL DRILL CONSTRUCTION)

    1. Copperhead Directional Drill Wire (#12AWG) #1245G-EHS

11. TRACER BOX

    1. Copperhead SnakePit Magnetized Tracer Box with green top (Specific box depends on location)

12. VALVE BOX

    1. Tyler Series 6850 w/ No. 58 and 59 extensions
    2. Or Equal

13. VALVE BOX LIDS

    1. Bingham & Taylor Round Drop-In Lid with 4" Skirt (locations is pavement)
    2. Tyler Union 5 ¼" Lids (non-pavement locations)

14. MANHOLE COVER (H-20 traffic load bearing)

    1. U.S. Foundry Model # 420-C
    2. Vulcan Foundry Model # V-101

15. MANHOLE COATINGS

1. Standard manhole (interior and exterior)– 2 coats water base epoxy [PRO TECH EW-1 or equal] (20 mils red, 20 mils black) minimum of 40 mils total.
2. Force main entering manhole, Drop manhole & Terminal manhole (Interior Coatings, exterior same as # 1 above)
    1. Rezclad E-125S AR (minimum 120 mils)
    2. SewperCoat (minimum ½-inch)
    3. IET Systems Coating, primary coat shall be 5 mil, minimum, intermediate coat shall be 50 mil coat minimum, and finish coat shall be 5 mil minimum.
    4. REFRATTA HAC 100 (minimum ½")

16. PAINTING SYSTEM: ABOVE GROUND PIPING

1. Primer:
   TNEME-ALUMINUM MASTIC # 135 – TNEMEC
   (3.0 to 5.0 mils DFT)
2. Intermediate Coat:
   Series 66 Epoxoline – TNEMEC
   Hi-Build Epoxy
   (4.0 to 6.0 mils DFT)
3. Finish Coat:
   Series 73 Endura-Shield III – TENEMEC
   (2.0 to 3.0 mils DFT)

D. Pump Stations

1. SUBMERSIBLE SEWAGE PUMPS "TYPE A"

1. Flygt Pumps
2. ABS Pumps
3. Barnes Pumps

2. SANITARY SEWER PUMP STATION "TYPE B"

1. Milwaukee Pumps
2. Myers Pumps
3. Flygt Pumps
4. Barnes Pumps

3. HATCH SAFETY GRATE

1. Standard Hatch Safety Grate, U.S.F. Fabrication, Inc.
2. Or Equal

4. FLOAT SWITCHES

1. Anchor Scientific S30NO Roto Floats
2. Or Equal

5. VFDS

1. Yaskawa

6. WIRE MARKERS

1. Panduit
2. Brandy
3. Or Equal

7. CABLE TIES

1. Panduit
2. Thomas & Betts
3. Heyco
4. Tyco
5. Or Equal

8. ADHESIVE BACK MOUNTS

1. Panduit – ABM25
2. Or Equal

9. STANDBY POWER PLUG AND RECEPTACLE

1. 100 amp service, JRSB 1044, FR Receptacle
2. 200 amp service, JRSB 2044, FR Receptacle

10. LIFT STATON COATING (INTERIOR)

1. Rezclad E-125S AR (minimum 120 mils)
2. Sewper Coat (minimum ½")
3. IET Systems Coating (primary coat shall be 5 mils minimum, intermediate coat shall be 50 mils minimum, and finish coat shall be 5 mils minimum)
4. REFRATTA HAC 100 (minimum ½")

11. PAINTING SYSTEM: ABOVE GROUND PIPING

1. Primer:
   TNEME-ALUMINUM MASTIC # 135 – TNEMEC
   (3.0 to 5.0 mils DFT)
2. Intermediate Coat:
   Series 66 Epoxoline – TNEMEC
   Hi-Build Epoxy
   (4.0 to 6.0 mils DFT)
3. Finish Coat:
   Series 73 Endura-Shield III – TENEMEC
   (2.0 to 3.0 mils DFT)

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GENERAL NOTES:

FOR THE PURPOSE OF THE GENERAL NOTES BELOW, THE TERM DEPARTMENT SHALL MEAN "MARTIN COUNTY UTILITIES & SOLID WASTE DEPARTMENT".

1. ALL CONNECTIONS TO EXISTING MAINS SHALL BE OBSERVED BY THE DEPARTMENT. VALVES ON EXISTING MAINS SHALL BE OPERATED BY DEPARTMENT PERSONNEL OR UNDER THEIR DIRECT SUPERVISION. TAPPING SLEEVE AND VALVE SHALL BE PRESSURE TESTED PRIOR TO TAPPING. IF SERVICE MUST BE CUT OFF TO EXISTING CUSTOMERS, THE DEPARTMENT MUST HAVE THREE DAYS NOTICE TO MAKE NECESSARY NOTIFICATIONS. THE CONTRACTOR MAY BE REQUIRED TO ASSIST IN NOTIFICATIONS. IN THIS EVENT, CONTRACTOR SHALL BE READY TO PROCEED WITH AS MUCH MATERIAL PREASSEMBLED AS POSSIBLE AT THE SITE TO MINIMIZE THE LENGTH OF SERVICE INTERRUPTION. THE DEPARTMENT WILL POSTPONE A SERVICE CUT OFF IF THE CONTRACTOR IS NOT READY TO PROCEED ON SCHEDULE. SUCH CONNECTIONS SHALL BE MADE AT NIGHT TO MINIMIZE EFFECTS UNLESS OTHERWISE AUTHORIZED BY THE DEPARTMENT. NO CUSTOMER SHOULD BE WITHOUT SERVICE FOR MORE THAN FOUR HOURS.

LOCAL CHLORINATION WILL BE REQUIRED FOR ALL PIPE AND FITTINGS USED TO COMPLETE CONNECTIONS WITH POTABLE WATER.

2. THE CONTRACTOR SHALL HAVE AVAILABLE AT THE JOB SITE AT ALL TIMES ONE COPY OF MARTIN COUNTY UTILITIES MINIMUM DESIGN AND CONSTRUCTION STANDARDS, ONE COPY OF THE CONTRACT DOCUMENTS, INCLUDING PLANS, SPECIFICATIONS AND SPECIAL PROVISIONS, AND COPIES OF ANY REQUIRED CONSTRUCTION PERMITS.

3. THE CONTRACTOR SHALL CONTACT ALL CONCERNED UTILITIES AT LEAST 48 HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS.

4. THE LOCATION AND SIZE OF ALL EXISTING UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE AND ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITIES BY ELECTRONIC METHOD AND BY HAND EXCAVATION IN COORDINATION WITH ALL UTILITY COMPANIES PRIOR TO BEGINNING ANY CONSTRUCTION OPERATIONS. ANY AND ALL CONFLICTS OF EXISTING UTILITIES WITH PROPOSED IMPROVEMENTS SHALL BE RESOLVED BY THE ENGINEER AND DEPARTMENT PRIOR TO BEGINNING ANY CONSTRUCTION OPERATIONS. THIS WORK BY THE CONTRACTOR SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND NO ADDITIONAL COMPENSATION SHALL BE ALLOWED.

5. LOCATION OF PROPOSED FACILITIES WILL BE STAKED BY CONTRACTOR. CONTRACTOR MUST GIVE 48 HOURS NOTICE TO THE DEPARTMENT IN ADVANCE OF LAYOUT.

6. PROJECT SUPERINTENDENT: THE CONTRACTOR SHALL PROVIDE A QUALIFIED SUPERINTENDENT TO REMAIN ON THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED. THE SUPERINTENDENT SHALL BE PRESENT AT THE PRE-CONSTRUCTION MEETINGS. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT BY LETTER PRIOR TO THE PRE-CONSTRUCTION MEETING APPOINTING THE SUPERINTENDENT FOR THIS PROJECT INCLUDING A FORMAL RESUME SHOWING QUALIFICATIONS. IN THE EVENT THE SUPERINTENDENT WILL NOT BE PRESENT FOR ANY PERIOD OF TIME DURING CONTRACT WORK THE CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE IN WRITING TO THE DEPARTMENT, INCLUDING THE APPOINTMENT OF A QUALIFIED REPLACEMENT SUPERINTENDENT WHO WILL BE PRESENT DURING THE CONSTRUCTION. WORK SHALL NOT BE ALLOWED TO PROCEED UNLESS THE ASSIGNED SUPERINTENDENT IS PRESENT.

7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE HIS COMPLETE FAMILIARITY WITH THE PROJECT SITE AND COMPONENTS TO INCLUDE SUBSURFACE CONDITIONS OF SOIL AND GROUNDWATER TABLE.

WARNING: EXACT LOCATION OF UNDERGROUND UTILITIES IS NOT KNOWN NOR IS THIS DRAWING TO BE CONSTRUED AS DEPICTING THE LOCATION OF ALL UNDERGROUND UTILITIES OR STRUCTURES. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINATION OF LOCATION PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR IS RESPONSIBLE, THEREFORE, FOR ALL DAMAGE AND REPAIR COSTS.

GENERAL NOTES (Cont.):

8. DENSITY TESTS OF TRENCH BACKFILL MATERIAL SHALL BE REQUIRED AT INTERVALS OF NOT MORE THAN 500 FEET. DENSITY TESTS OF PAVEMENT OPEN-CUT AREAS INCLUDING ROADS, TURNLANES, AND DRIVES SHALL BE REQUIRED AT EACH OPEN-CUT AT INTERVALS OF NOT MORE THAN 50 FEET. ALL TESTS SHALL COMMENCE AT THE TOP OF CONDUIT AND EVERY 12 INCHES TO THE FINISH GRADE. COMPACTION SHALL BE IN ACCORDANCE WITH MARTIN COUNTY UTILITIES CONSTRUCTION STANDARDS "TYPICAL TRENCH DETAIL" AND "FLEXIBLE PAVEMENT REPLACEMENT DETAIL". FLORIDA BEARING TESTS FOR THE STABILITY OF EXISTING SUBSOIL SHALL BE TAKEN AT INTERVALS OF NOT MORE THAN 500 FEET, AND CLOSER AS MIGHT BE NECESSARY IN THE EVENT OF VARIATIONS IN THE STRATA. A CERTIFIED COPY OF THE TESTS SHALL BE PROVIDED TO THE DEPARTMENT AND THE FLORIDA DEPARTMENT OF TRANSPORTATION OR MARTIN COUNTY ENGINEERING DEPARTMENT DEPENDING ON JURISDICTION. CONTRACTORS BID PRICE SHALL INCLUDE PAYMENT FOR ALL TESTS CONDUCTED BY AN INDEPENDENT TESTING LAB.

9. ANY LANDSCAPING DISTURBED, UNLESS OTHERWISE SHOWN ON THE PLANS, SHALL BE REPLACED BY THE CONTRACTOR TO THE SATISFACTION OF THE DEPARTMENT AT THE CONTRACTORS EXPENSE.

10. ANY SIDEWALK, CURB AND GUTTER OR PAVEMENT DISTURBED, UNLESS OTHERWISE SHOWN ON PLANS, SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 psi AT 28 DAYS AND ALL CONCRETE WORK SHALL COMPLY WITH THE CURRENT EDITION OF THE AMERICAN CONCRETE INSTITUTE (ACI) BUILDING CODE AND THE APPLICABLE BUILDING CODES HAVING JURISDICTION IN THE AREA. ALL CONSTRUCTION SHALL MEET ADA REQUIREMENTS. THIS INCLUDES, BUT IS NOT LIMITED TO, DETECTABLE WARNING SURFACES.

11. ALL SOD IS TO BE PLACED FOR THE FULL WIDTH DISTURBED AT THE PER LINEAR FOOT UNIT PRICE FOR SOD. SOD SHALL BE REPLACED TO MATCH EXISTING KIND UNLESS OTHERWISE SHOWN ON PLANS.

12. CONTRACTOR SHALL PROVIDE PROPER BENDS TO MAINTAIN REQUIRED DEPTH AND ALIGNMENT OF PIPE. COST OF BENDS NOT DESIGNATED ON PLANS SHALL BE INCLUDED WITH THE UNIT PRICE FOR PIPE.

13. ANY TREES AND/OR SCRUB OR OTHER VEGETATION NOT TO BE REPLACED SHALL BE REMOVED FROM THE PROJECT AT THE CONTRACTOR'S EXPENSE.

14. ALL RUBBLE AND UNSUITABLE MATERIAL MUST BE REMOVED FROM THE PROJECT AND DISPOSED OF PROPERLY BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

15. MAILBOXES MUST BE CAPABLE OF RECEIVING MAIL AT ALL TIMES.

16. DEFLECT PIPE AS NECESSARY TO OBTAIN THE REQUIRED ALIGNMENT. USE APPROPRIATE FITTINGS WHEN DEFLECTION EXCEEDS 75% OF MANUFACTURER'S RECOMMENDED MAXIMUM DEFLECTION.

17. ALL FITTINGS SHALL BE MECHANICALLY RESTRAINED. REFER TO MARTIN COUNTY UTILITIES DEPARTMENT MINIMUM DESIGN & CONSTRUCTION STANDARDS (LATEST EDITION).

18. ALL CONSTRUCTION DEWATERING (WELL POINTS, SUMPS, ETC.) WILL REQUIRE A DEWATERING PERMIT FROM SOUTH FLORIDA WATER MANAGEMENT DISTRICT. THIS SHALL BE OBTAINED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE PRIOR TO BEGINNING OF CONSTRUCTION.

19. THE "TRENCH SAFETY ACT" SHALL BE INCORPORATED INTO THIS CONTRACT AS ENACTED BY THE LEGISLATURE OF THE STATE OF FLORIDA TO BE IN EFFECT AS OF OCTOBER 1, 1990.

20. A U-2 PERMIT IS REQUIRED FOR ALL WORK WITHIN COUNTY RIGHT-OF-WAY. THIS PERMIT MUST BE OBTAINED BY THE CONTRACTOR FROM THE MARTIN COUNTY ENGINEERING DEPARTMENT. ALL COSTS PAYABLE BY THE CONTRACTOR. A COPY OF THIS PERMIT MUST BE MAINTAINED ON THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION.

21. ALL CONCRETE AND ASPHALT DRIVES MUST BE REPLACED FROM SAW CUT TO EDGE OF PAVEMENT.

GENERAL NOTES (Cont.):

22. LOCATIONS OF FIRE HYDRANTS AND AIR RELEASE VALVES ARE APPROXIMATE ONLY. FINAL LOCATIONS WILL BE DETERMINED BY DEPARTMENT PERSONNEL IN FIELD.

23. MAXIMUM LENGTH OF WATER MAIN AND FORCE MAIN PRESSURE TEST SHALL BE 1500 FEET. WATER SOURCE FOR FLUSHING, FILLING AND PRESSURE TESTING THE WATER MAIN SHALL BE FROM A TREATED SOURCE APPROVED BY THE DEPARTMENT.

24. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION AND RESTORATION (IF DAMAGED) OF ALL EXISTING STRUCTURES WITHIN THE CONSTRUCTION LIMITS OF THE PROJECT, INCLUDING BUT NOT LIMITED TO WALLS, FENCES, POWER POLES, MAIL BOXES, DRAINAGE PIPES AND STRUCTURES, ETC.

25. THE CONTRACTOR SHALL VERIFY THE LOCATION OF EXISTING WATER SERVICES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL PROTECT THE EXISTING WATER SERVICES FROM DAMAGE AND REPAIR ANY BREAKS IMMEDIATELY.

26. "RECORD DRAWINGS" SHALL INCLUDE FURNISHING MARTIN COUNTY UTILITIES DEPARTMENT WITH ALL INFORMATION NECESSARY FOR A COMPLETE SET OF RECORD DRAWINGS AS STIPULATED IN THE MARTIN COUNTY UTILITIES DEPARTMENT MINIMUM DESIGN AND CONSTRUCTION STANDARDS (LATEST EDITION).

27. MECHANICALLY RESTRAIN LENGTHS, AS INDICATED ON DRAWING No. 20, ON EACH SIDE OF ALL BENDS AND AS INSTRUCTED IN MARTIN COUNTY UTILITIES DEPARTMENT SPECIFICATIONS. MECHANICAL RESTRAINTS SHALL BE EITHER MEG-A-LUG, TYLER OR UNIFLANGE. THE CONTRACTORS BID PRICE FOR PIPE, GATE VALVES AND FITTINGS SHALL INCLUDE MECHANICAL RESTRAINT.

28. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL SUPPORT UTILITIES AND SHORE TRENCH AS REQUIRED TO PROTECT AND MAINTAIN EXISTING UTILITIES. THE CONTRACTOR SHALL NOTIFY EACH UTILITY PRIOR TO ATTEMPTING TO SUPPORT THEIR FACILITIES. IF THE UTILITY REQUIRES THAT ONLY THEIR CREWS SHALL BE ALLOWED TO SUPPORT THEIR FACILITIES, THEN IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO COORDINATE WORK AND PAY THE UTILITY FOR THEIR EXPENSES IF REQUIRED. ALL COSTS FOR THIS WORK SHALL BE AT THE CONTRACTORS EXPENSE AND INCLUDED IN THE CONTRACTORS BID PRICE.

29. ALL PRESSURE TESTS SHALL BE IN ACCORDANCE WITH AWWA STANDARDS.

30. AIR RELEASE VALVE VAULT COVERS SHALL BE CONSTRUCTED PER DETAIL AS SHOWN IN THE DEPARTMENTS MINIMUM DESIGN AND CONSTRUCTION STANDARDS.

31. ALL WATER SERVICES SHALL BE DIRECTIONALLY DRILLED UNDER EXISTING PAVEMENT.

32. VALVE STEM RISER SHALL BE REQUIRED WHERE OPERATING NUT DEPTH EXCEEDS 4 FEET. THE RISER SHALL BE BOLTED TO THE VALVE NUT. METHOD AND MATERIALS SHALL BE APPROVED BY THE DEPARTMENT. COST FOR THIS WORK SHALL BE INCLUDED IN THE CONTRACTORS BID UNIT PRICE FOR GATE VALVES.

33. THE CONTRACTOR SHALL CLEAN MAINS USING APPROVED POLYURETHANE PIG(S). TEMPORARY CLEANING STATIONS SHALL BE CONSTRUCTED BY THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE A CLEANING PLAN SHOWING METHOD OF FILLING AND CLEANING MAINS PRIOR TO START OF CONSTRUCTION. THE CLEANING PLAN SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION. ALL COSTS FOR FILLING AND CLEANING SHALL BE AT THE CONTRACTORS EXPENSE.

34. A FLORIDA DEPARTMENT OF TRANSPORTATION PERMIT IS REQUIRED FOR ALL WORK, EXCEPT PERPENDICULAR CONNECTIONS, WITHIN THE STATE RIGHT-OF-WAY. A COPY OF THIS PERMIT MUST BE MAINTAINED ON THE PROJECT SITE AT ALL TIMES DURING CONSTRUCTION.

35. THE CONTRACTOR SHALL INSTALL TESTING POINTS FOR PRESSURE & BACTERIOLOGICAL TESTING OF WATER MAINS. THE CONTRACTOR SHALL INSTALL AND REMOVE AND PLUG CORP. STOPS PER MARTIN COUNTY UTILITIES STANDARDS "SAMPLE POINT DETAIL". THE LOCATION OF TEST POINTS SHALL BE APPROVED BY THE DEPARTMENT.

GENERAL NOTES (Cont.):

36. WATER MAIN DISINFECTION SHALL BE IN ACCORDANCE WITH CURRENT AWWA, BULLETIN C-651.

37. WATER MAINS AND APPURTENANCES SHALL BE IN ACCORDANCE WITH CURRENT AWWA, FDEP AND NSF STANDARDS.

38. MINIMUM COVER TO FINISHED GRADE OVER WATER MAINS SHALL BE 30 INCHES UP TO 8" DIAMETER; 10" OR LARGER SHALL HAVE 36" COVER OR GREATER TO PROVIDE A MINIMUM 18" COVER OVER OPERATING NUT OF GATE VALVES.

39. ALL MAINS SHALL BE TESTED FOR LEAKAGE. WATER SHALL BE SUPPLIED TO THE MAIN AND PUMPED TO THE REQUIRED 150 PSI PRESSURE. THE MAIN TESTED SHALL EITHER BE ISOLATED FROM PRESENTLY POTABLE LINES OR PROTECTED FROM LEAKAGE BY A DOUBLE VALVE ARRANGEMENT.

40. NEWLY CONSTRUCTED FIRE HYDRANTS THROUGHOUT THE PROJECT SHALL HAVE A RED "OUT OF SERVICE" DISK (JOSEPH G. POLLARD CO. OR EQUAL) ATTACHED TO 4" PUMPER NOZZLE CAP. DISK TO BE REMOVED AFTER WATER SYSTEM HAS BEEN APPROVED FOR SERVICE BY THE DEPARTMENT.

THE DEPARTMENT SHALL BE NOTIFIED AT LEAST 48 HOURS IN ADVANCE OF ANY TESTING PROCEDURES. AFTER FLUSHING IS COMPLETED, LINE PRESSURE SHALL BE APPLIED TO THE WATER SYSTEM TO DETERMINE IF ANY MAJOR DEFECTS ARE PRESENT. THE COMPLETE WATER SYSTEM SHALL THEN BE TESTED AT A PRESSURE OF 150 PSI FOR A PERIOD OF NOT LESS THAN TWO HOURS. THE DEPARTMENT MAY, AT ITS DISCRETION, INCREASE THE PERIOD TO FOUR HOURS. MAXIMUM LENGTH OF LINE TO BE TESTED AT ONE TIME SHALL NOT EXCEED 1500 LINEAR FEET. AN OIL FILLED PRESSURE GAUGE UP TO 200 PSI AT 2 POUND INCREMENTS SHALL BE USED FOR ALL PRESSURE TESTS. NO VISIBLE MOVEMENT OF THE SYSTEM SHALL OCCUR AND LEAKAGE SHALL NOT EXCEED:

$$L=\frac{ND\sqrt{P}}{7400} \text{ PER HOUR}$$

WHERE:
- L= LEAKAGE IN GALLONS
- N= NUMBER OF JOINTS IN TEST SECTION
- P= TEST PRESSURE IN PSI.
- D= DIAMETER OF PIPE IN INCHES

NOTE: MARTIN COUNTY UTILITIES DEPARTMENT'S MINIMUM DESIGN AND CONSTRUCTION STANDARDS (LATEST EDITION), ARE TO BE ADHERED TO AND WILL BE ENFORCED TO AT LEAST THESE MINIMUM STANDARDS.

48 HOURS BEFORE DIGGING
CALL TOLL-FREE
1-800-432-4770
SUNSHINE STATE ONE CALL
OF FLORIDA, INC
UNDERGROUND UTILITIES NOTIFICATION CENTER

STANDARD WATER/SEWER SEPARATION STATEMENT

62–555.314 Location of Public Water System Mains.
For the purpose of this section, the phrase water mains shall mean mains, including treatment plant process piping, conveying either raw, partially treated, or finished drinking water; fire hydrant leads; and service lines that are under the control of a public water system and that have an inside diameter of three inches or greater.

(1) Horizontal Separation Between Underground Water Mains and Sanitary or Storm Sewers, Wastewater or Stormwater Force Mains, Reclaimed Water Pipelines, and On–Site Sewage Treatment and Disposal Systems.

(a) New or relocated, underground water mains shall be laid to provide a horizontal distance of at least three feet between the outside of the water main and the outside of any existing or proposed storm sewer, Stormwater force main, or pipeline conveying reclaimed water regulated under Part III of Chapter 62–610, F.A.C.

(b) New or relocated, underground water mains shall be laid to provide a horizontal distance of at least three feet, and preferably ten feet, between the outside of the water main and the outside of any existing or proposed vacuum–type sanitary sewer.

(c) New or relocated, underground water mains shall be laid to provide a horizontal distance of at least six feet, and preferably ten feet, between the outside of the water main and the outside of any existing or proposed gravity– or pressure–type sanitary sewer, wastewater force main, or pipeline conveying reclaimed water not regulated under Part III of Chapter 62–610, F.A.C. The minimum horizontal separation distance between water mains and gravity–type sanitary sewers shall be reduced to three feet where the bottom of the water main is laid at least six inches above the top of the sewer.

(d) New or relocated, underground water mains shall be laid to provide a horizontal distance of at least ten feet between the outside of the water main and all parts of any existing or proposed on–site sewage treatment and disposal system as defined in Section 381.0065(2), F.S., and Rule 64E–6.002, F.A.C.

(2) Vertical Separation Between Underground Water Mains and Sanitary or Storm Sewers, Wastewater or Stormwater Force Mains, and Reclaimed Water Pipelines.

(a) New or relocated, underground water mains crossing any existing or proposed gravity– or vacuum–type sanitary sewer or storm sewer shall be laid so the outside of the water main is at least six inches, and preferably 12 inches, above or at least 12 inches below the outside of the other pipeline. However, it is preferable to lay the water main above the other pipeline.

(b) New or relocated, underground water mains crossing any existing or proposed pressure–type sanitary sewer, wastewater or stormwater force main, or pipeline conveying reclaimed water shall be laid so the outside of the water main is at least 12 inches above or below the outside of the other pipeline. However, it is preferable to lay the water main above the other pipeline.

(c) At the utility crossings described in paragraphs (a) and (b) above, one full length of water main pipe shall be centered above or below the other pipeline so the water main joints will be as far as possible from the other pipeline. Alternatively, at such crossings, the pipes shall be arranged so that all water main joints are at least three feet from all joints in vacuum–type sanitary sewers, storm sewers, stormwater force mains, or pipelines conveying reclaimed water regulated under Part III of Chapter 62–610, F.A.C., and at least six feet from all joints in gravity– or pressure–type sanitary sewers, wastewater force mains, or pipelines conveying reclaimed water not regulated under Part III of Chapter 62–610, F.A.C.

(3) Separation Between Water Mains and Sanitary or Storm Sewer Manholes.

(a) No water main shall pass through, or come into contact with, any part of a sanitary sewer manhole.

(b) Effective August 28, 2003, water mains shall not be constructed or altered to pass through, or come into contact with, any part of a storm sewer manhole or inlet structure. Where it is not technically feasible or economically sensible to comply with this requirement (i.e., where there is a conflict in the routing of a water main and a storm sewer and where alternative routing of the water main or the storm sewer is not technically feasible or is not economically sensible), the Department shall allow exceptions to this requirement (i.e., the Department shall allow construction of conflict manholes), but suppliers of water or persons proposing to construct conflict manholes must first obtain a specific permit from the Department in accordance with Part V of this chapter and must provide in the preliminary design report or drawings, specifications, and design data accompanying their permit application the following information:

1. Technical or economic justification for each conflict manhole.
2. A statement identifying the party responsible for maintaining each conflict manhole.
3. Assurance of compliance with the design and construction requirements in sub–subparagraphs a. through d. below.

a. Each water main passing through a conflict manhole shall have a flexible, watertight joint on each side of the manhole to accommodate differential settling between the main and the manhole.

b. Within each conflict manhole, the water main passing through the manhole shall be installed in a watertight casing pipe having high impact strength (i.e., having an impact strength at least equal to that of 0.25–inch–thick ductile iron pipe).

c. Each conflict manhole shall have an access opening, and shall be sized, to allow for easy cleaning of the manhole.

d. Gratings shall be installed at all storm sewer inlets upstream of each conflict manhole to prevent large objects from entering the manhole.

(4) Separation Between Fire Hydrant Drains and Sanitary or Storm Sewers, Wastewater or Stormwater Force Mains, Reclaimed Water Pipelines, and On–Site Sewage Treatment and Disposal Systems. New or relocated fire hydrants with underground drains shall be located so that the drains are at least three feet from any existing or proposed storm sewer, stormwater force main, or pipeline conveying reclaimed water regulated under Part III of Chapter 62–610, F.A.C.; at least three feet, and preferably ten feet, from any existing or proposed vacuum–type sanitary sewer; at least six feet, and preferably ten feet, from any existing or proposed gravity– or pressure–type sanitary sewer, wastewater force main, or pipeline conveying reclaimed water not regulated under Part III of Chapter 62–610, F.A.C.; and at least ten feet from any existing or proposed on–site sewage treatment and disposal system as defined in Section 381.0065(2), F.S., and Rule 64E–6.002, F.A.C.

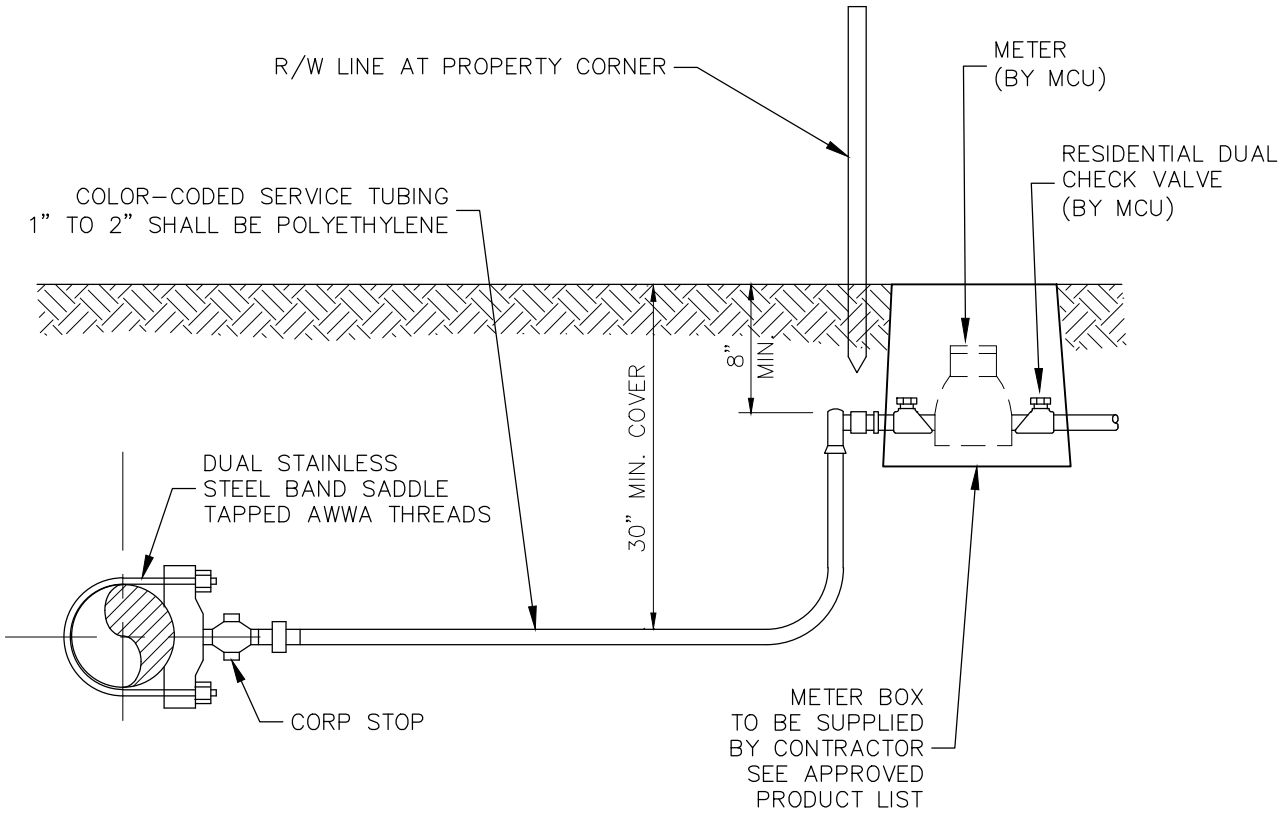
(5) Exceptions. Where it is not technically feasible or economically sensible to comply with the requirements in subsection (1) or (2) above, the Department shall allow exceptions to these requirements if suppliers of water or construction permit applicants provide technical or economic justification for each exception and provide alternative construction features that afford a similar level of reliability and public health protection. Acceptable alternative construction features include the following:

(a) Where an underground water main is being laid less than the required minimum horizontal distance from another pipeline and where an underground water main is crossing another pipeline and joints in the water main are being located less than the required minimum distance from joints in the other pipeline:

1. Use of pressure–rated pipe conforming to the American Water Works Association standards incorporated into Rule 62–555.330, F.A.C., for the other pipeline if it is a gravity– or vacuum–type pipeline;
2. Use of welded, fused, or otherwise restrained joints for either the water main or the other pipeline; or
3. Use of watertight casing pipe or concrete encasement at least four inches thick for either the water main or the other pipeline.

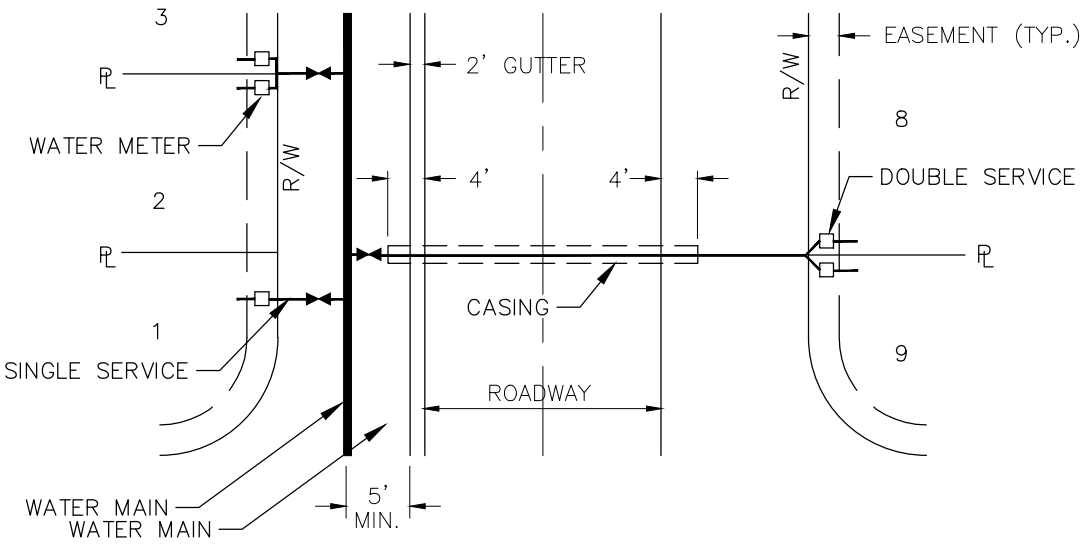
(b) Where an underground water main is being laid less than three feet horizontally from another pipeline and where an underground water main is crossing another pipeline and is being laid less than the required minimum vertical distance from the other pipeline:

1. Use of pipe, or casing pipe, having high impact strength (i.e., having an impact strength at least equal to that of 0.25–inch–thick ductile iron pipe) or concrete encasement at least four inches thick for the water main; and
2. Use of pipe, or casing pipe, having high impact strength (i.e., having an impact strength at least equal to that of 0.25–inch–thick ductile iron pipe) or concrete encasement at least four inches thick for the other pipeline if it is new and is conveying wastewater or reclaimed water.

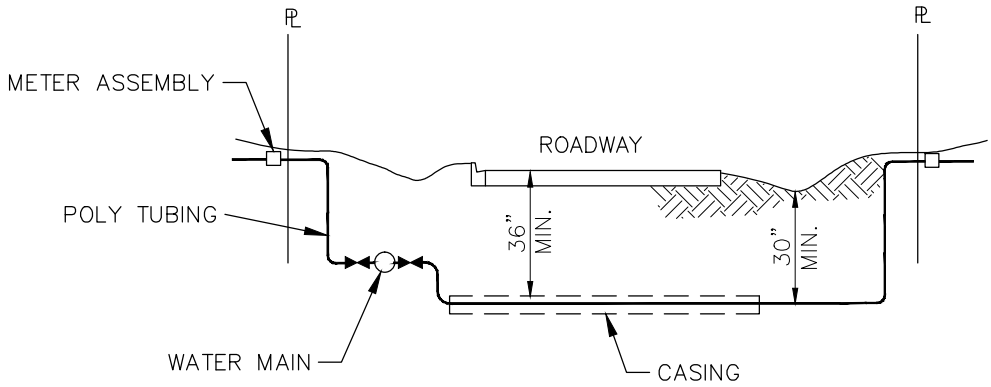


NOTES:

1. MIN. SERVICE LINES SHALL BE AS FOLLOWS: 1" FOR SINGLE AND DOUBLE SERVICES WHERE METER SIZE IS 5/8"; 2" FOR SINGLE AND DOUBLE SERVICES WHERE METER SIZE IS 1".
2. COMPRESSION FITTINGS SHALL BE SUITABLE FOR TUBING USED AND REQUIRE METAL (S.S.) INSERTS.
3. DOUBLE SERVICES REQUIRE "U" BRANCH WITH ANGLE CURB STOPS.
4. POLYETHYLENE SHALL BE AS DEFINED BY A.S.T.M. D2737 SDR9 COPPER TUBE SIZE (CTS) AND A.W.W.A. 901, LATEST EDITION, AND BE PRESSURE RATED FOR 200 PSI AND SHALL BE "ENDOPURE" BY ENDOT INDUSTRIES, INC., ROCKAWAY, N.J., OR APPROVED EQUAL.
5. TUBING SHALL BE MARKED WITH SIZE, MANUFACTURERS NAME, WORKING PRESSURE, NATIONAL SANITATION FOUNDATION APPROVAL, A.S.T.M. SPECIFICATION AND PRODUCTION CODE. TUBING SHALL HAVE AN OUTSIDE DIAMETER EQUIVALENT TO THE OUTER DIAMETER OF COPPER TUBING.
6. SERVICE LOCATOR WIRE SHALL BE LAID IN THE TRENCH WITH ALL SERVICES, CONNECTED TO THE MAIN WIRE AND WRAPPED AROUND THE SERVICE PIPING OR TUBING. WIRE FOR POTABLE WATER SHALL BE BLUE IN COLOR.



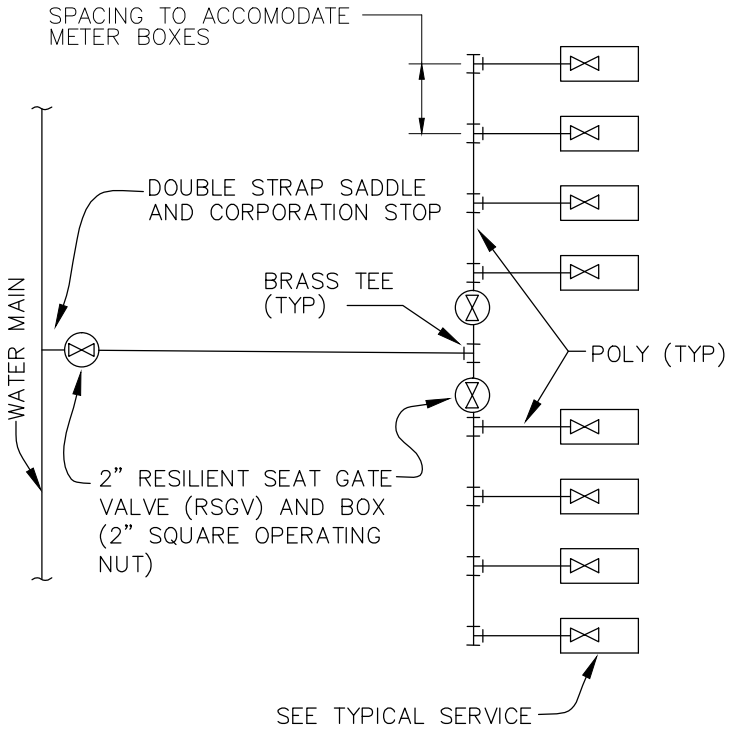
PLAN



PROFILE

NOTES:

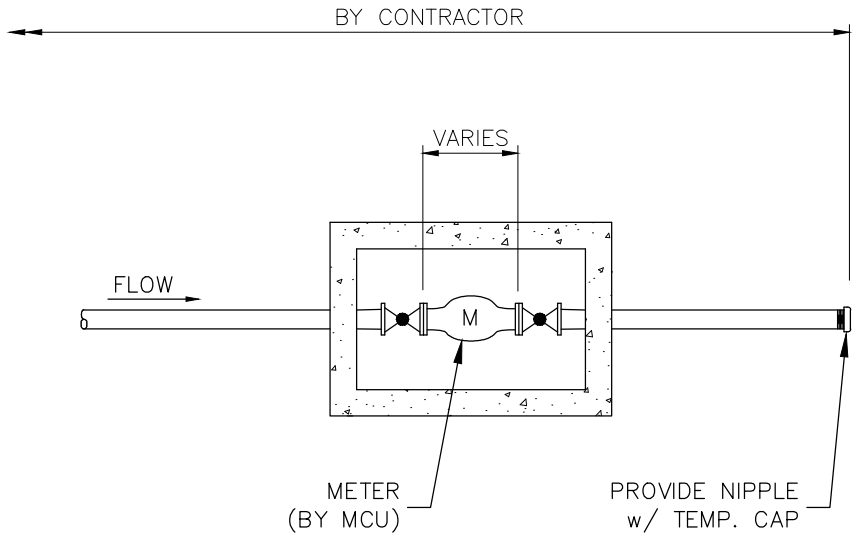
1. HOUSE SERVICE LATERAL UNDER PAVEMENT SHALL BE INSTALLED THROUGH A 2" MINIMUM PVC SCH. 80 CASING OR HDPE CASING (EXISTING ROADWAYS).
2. TAPPING SADDLE AND CORPORATION STOP MUST BE PLACED IN ACCESSIBLE AREAS, OUT FROM UNDER ANY PAVED AREAS.
3. SERVICE LOCATOR WIRE SHALL BE LAID IN THE TRENCH WITH ALL SERVICES, CONNECTED TO THE MAIN WIRE AND WRAPPED AROUND THE SERVICE PIPING OR TUBING. WIRE FOR POTABLE WATER SHALL BE BLUE IN COLOR.



TYPICAL MULTIPLE SERVICE SIZES	
No. OF UNITS	LINE SIZES
3 –12	2" OR 4"

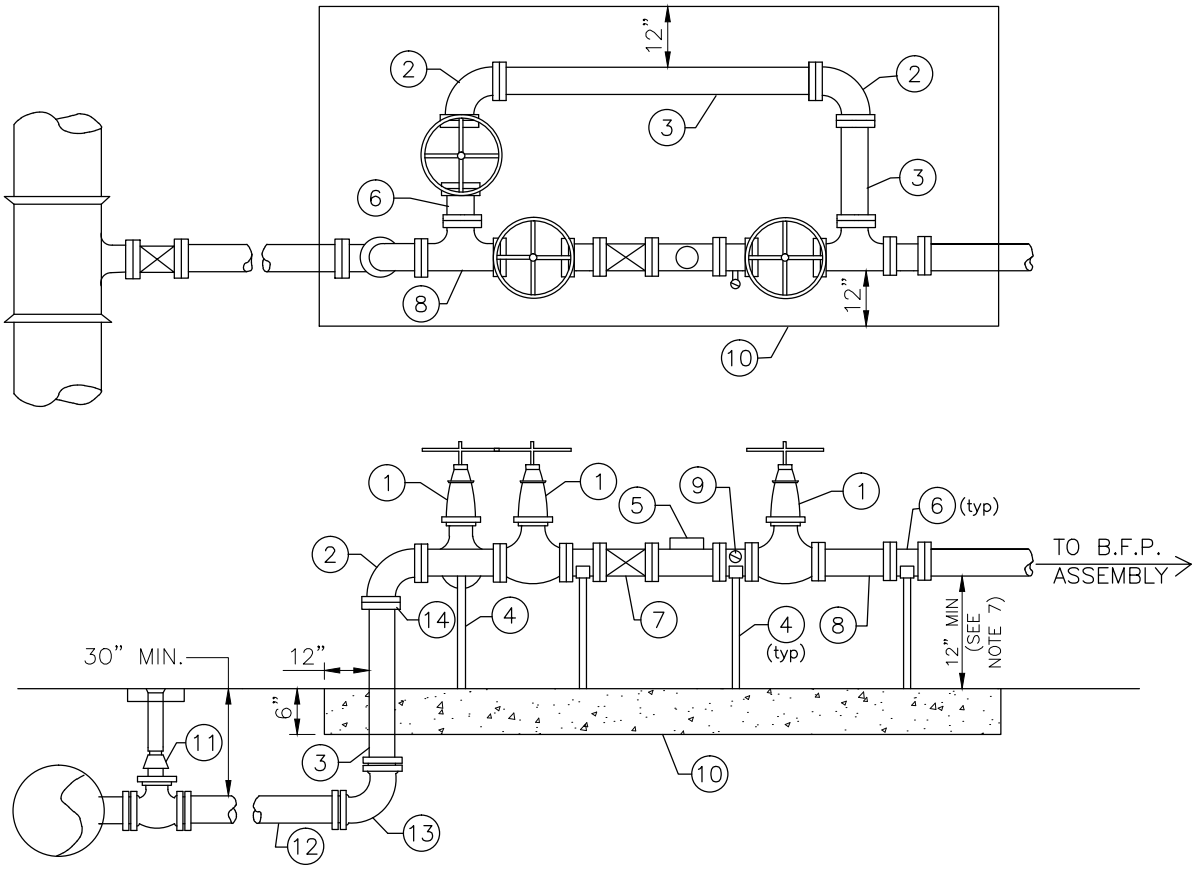
NOTES:

1. CONTRACTOR TO BUILD ALL METER MANIFOLDS.



NOTES:

1. ALL VALVES TO BE STRAIGHT 1–1/2" BALL VALVES FOR 1–1/2" METER AND 2" BALL VALVES FOR 2" METER WITH LOCK–WING. (FLANGE AT METER) FORD OR APPROVED EQUAL.
2. SEE TYPICAL SERVICE DETAIL FOR MAIN CONNECTION.
3. METER BOX SHALL BE POLYMER CONCRETE AND FIBER REINFORCED POLYESTER.
4. PIPING SHALL BE 1–1/2" HDPE FOR 1–1/2" METER AND 2" HDPE FOR 2" METER, DR 9 WITH BRONZE COMPRESSION FITTINGS.

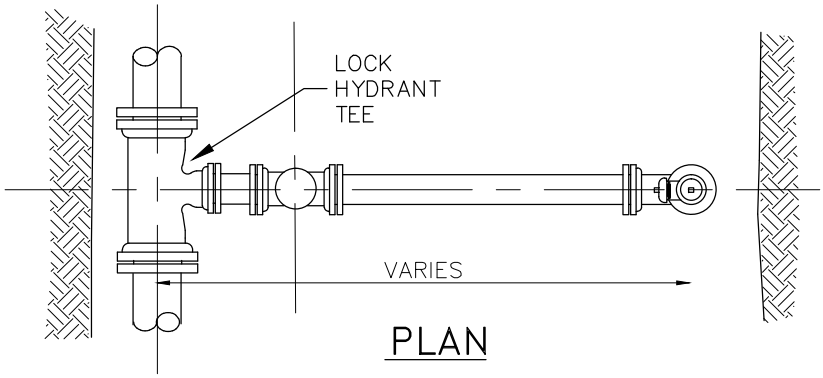


MATERIAL

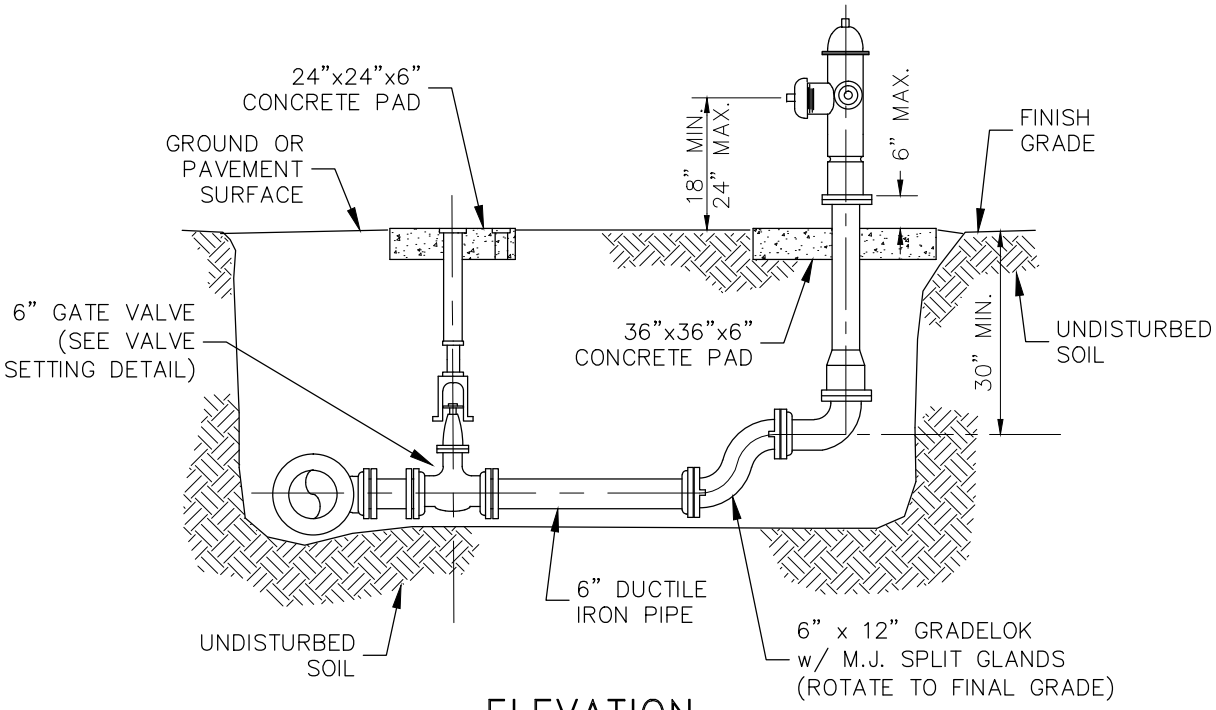
ITEM	QUANT.	DESCRIPTION
1	3	4",6",8" VALVE, GATE, C.I., (FLANGE – FLANGE) OS&Y
2	3	4",6",8" BEND – 90 , (FLANGE – FLANGE)
3	VARIES	4",6",8" PIPE, DUCTILE IRON, (FLANGE – FLANGE)
4	4	ADJUSTABLE PIPE SUPPORTS (316 SS)
5	1	3",4",6",8" METER, (FLANGE – FLANGE)
6	4	4",6",8" D.I. SPOOL PIECE, 12" MIN. LENGTH, F – F
7	1	3",4",6",8" WATER METER STRAINER, (FLANGE – FLANGE)
8	2	D.I. BYPASS TEE, (FLANGE – FLANGE), (SIZE VARIES)
9	1	2" TAP WITH LOCKING BALL VALVE
10	*	CONC. SLAB, 2500# PSI
11	1	4",6",8" VALVE, GATE, MJ
12	VARIES	4",6",8" PIPE
13	1	4",6",8" BEND–90°, (MJ–MJ) W/ RETAINER GLANDS
14	1	4",6",8" ADAPTER, FLANGE, DIP

NOTES:

1. ALL ABOVE GRADE PIPING SHALL BE DUCTILE IRON WITH FLANGED ENDS
2. FOR 3" METER AND STRAINER, USE 4" D.I. PIPE WITH 4"x3" REDUCER WITH FLANGED ENDS ON BOTH SIDES OF THE METER/STRAINER ASSEMBLY.
3. FIELD ADJUST AND CUT D.I. PIPE TO THE PROPER LENGTH AS REQUIRED.
4. METER BYPASS SHALL BE A MIN. OF 4" DIA. AND SIZED TO MEET REQUIRED FLOWS
5. ALL EXPOSED DUCTILE IRON PIPING AND FITTINGS SHALL BE PAINTED "BLUE". PAINT SPECIFICATIONS MUST BE SUBMITTED TO MARTIN COUNTY UTILITIES PRIOR TO APPLICATION.
6. METER SHALL BE BADGER COMPOUND METER, BRONZE BODY, POLYMER BOTTOM PLATE WITH INTEGRAL MOUNT ITRON 100W FN ENDPOINT.
7. HEIGHT SHALL ALLOW A MINIMUM OF 12" FROM TOP OF SLAB TO THE BOTTOM OF THE BLOWDOWN OF THE B.F.P.



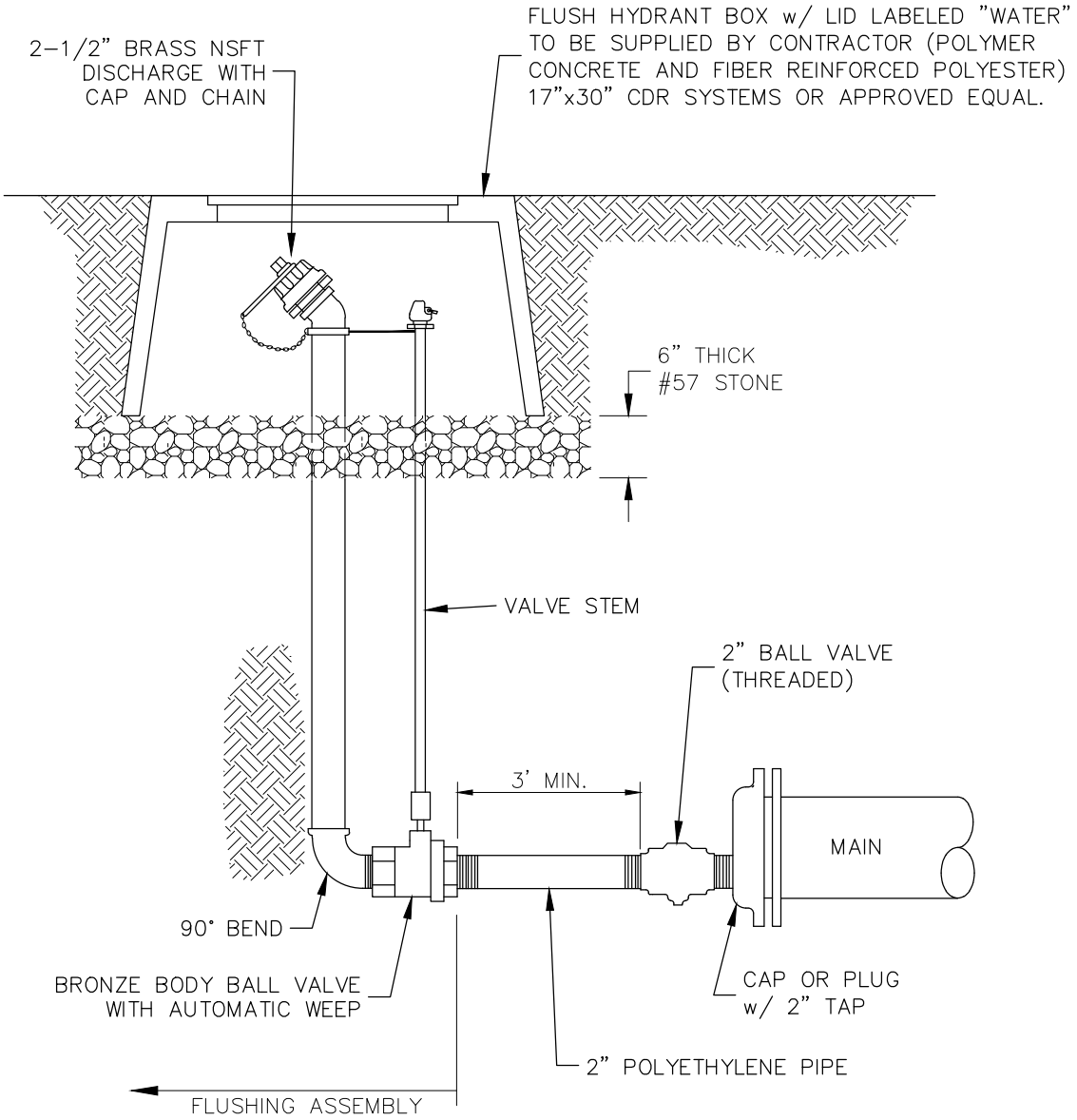
PLAN



ELEVATION

NOTES:

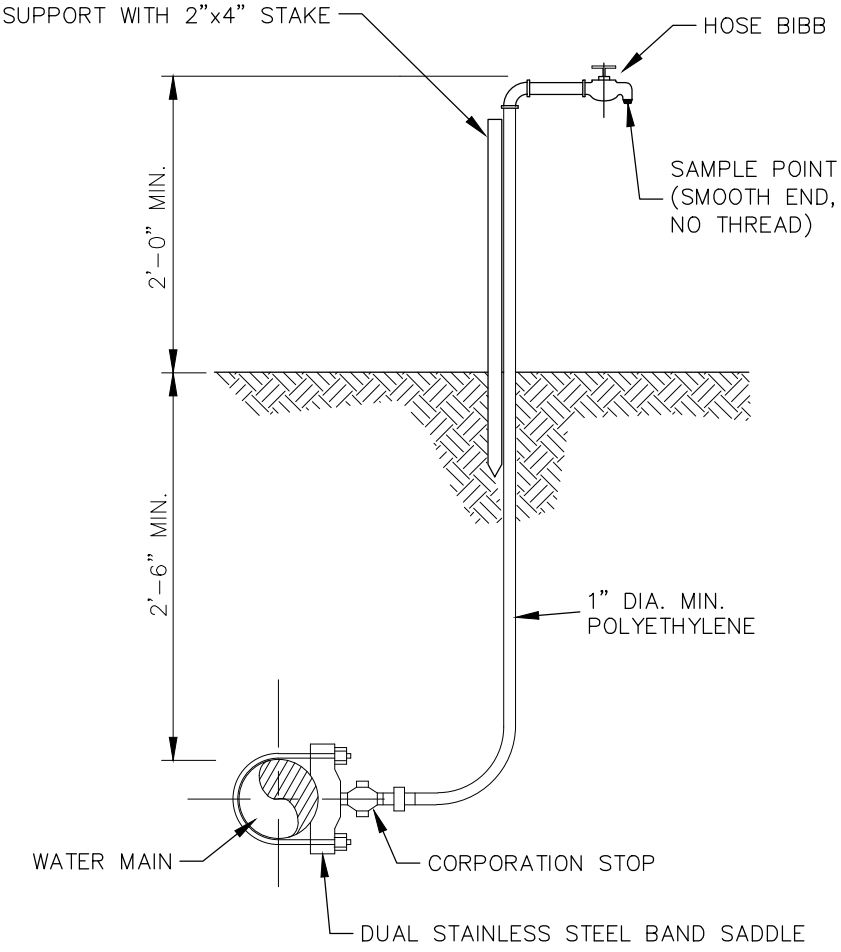
1. HYDRANTS SHALL BE INSTALLED PLUMB AND TRUE.
2. VALVES SHALL BE PLACED ADJACENT TO MAIN, AND TIED TO TEE.
3. ANCHOR TEES ARE REQUIRED.
4. ALL HYDRANTS SHALL BE TEE'D OFF OF MAIN.
5. HYDRANTS SHALL NOT BE PLACED IN SIDEWALK, ROADWAYS OR BIKEPATHS.
6. PIPE FROM VALVE TO HYDRANT SHALL BE RESTRAINED.
7. HYDRANT BARREL AND BONNET COLOR TO BE OSHA YELLOW.
8. THE CONNECTOR PIPE SHALL BE CEMENT LINED DUCTILE IRON, CLASS 350 AND POSITIONED BETWEEN THE FIRE HYDRANT AND GATE VALVE.
9. THE CONNECTOR PIPE SHALL HAVE AN ANCHORING FEATURE AT BOTH ENDS SO THAT WHEN USED WITH M.J. SPLIT GLANDS A RESTRAINED JOINT IS PROVIDED.
10. HYDRANT EXTENSIONS SHALL NOT BE ALLOWED.
11. NEWLY CONSTRUCTED FIRE HYDRANTS THROUGHOUT THE PROJECT SHALL HAVE A RED "OUT OF SERVICE" DISK (JOSEPH G. POLLARD CO. OR EQUAL) ATTACHED TO 4" PUMPER NOZZLE CAP. DISK TO BE REMOVED AFTER WATER SYSTEM HAS BEEN APPROVED FOR SERVICE BY THE DEPARTMENT.
12. A MAXIMUM OF 20 FEET OF HORIZONTAL PIPE SHALL TYPICALLY BE INSTALLED BETWEEN THE 6" GATE VALVE AT THE WATER MAIN AND THE HYDRANT. IF IT IS NECESSARY TO INSTALL MORE THAN 20 FEET OF HORIZONTAL PIPE, AN ADDITIONAL 6" GATE VALVE WILL BE REQUIRED AT THE HYDRANT LOCATION.



NOTES:

1. FLUSHING HYDRANT ASSEMBLY SHALL BE GIL INDUSTRIES, AQUARIUS ONE–O–ONE OR WATER PLUS VB2000 2" POST FLUSHING HIDDEN HYDRANT.

2. MAIN TO BE RESTRAINED FOR THREE FULL LENGTHS.

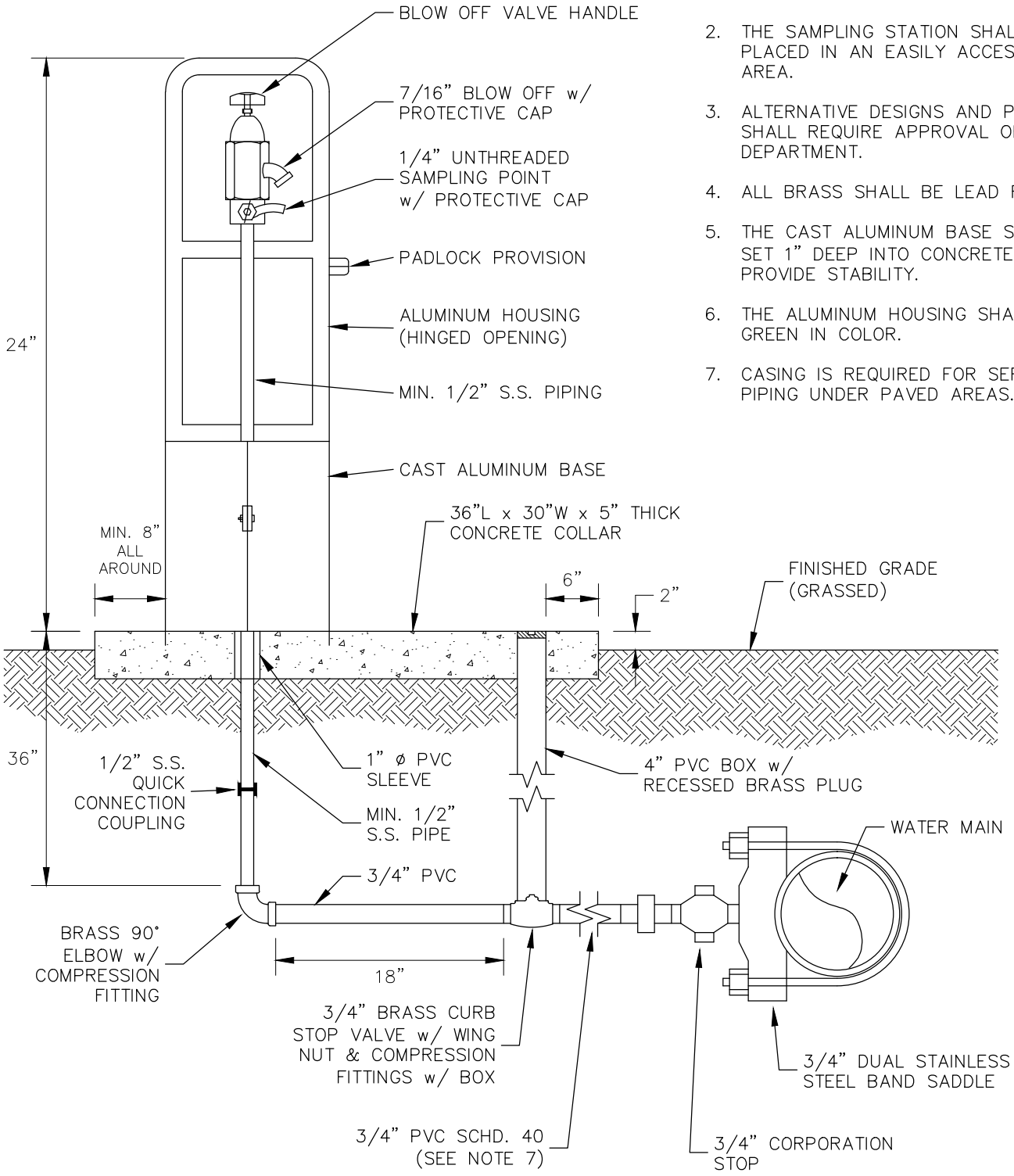


NOTES:

1. SAMPLE POINT SHOULD BE A SERVICE LINE OR FIRE HYDRANT IF POSSIBLE.
2. AFTER SAMPLING IS COMPLETED AND APPROVED, SHUT OFF CORP. STOP, REMOVE TUBING, PLUG WITH BRASS PLUG AND LOCATE FOR RECORD DRAWINGS.
3. MOUNT METAL OR PLASTIC TAG INDICATING "SAMPLE POINT – DO NOT TURN OFF"

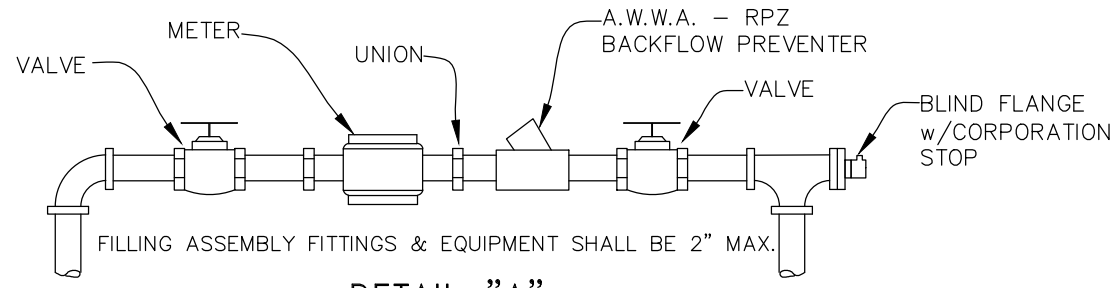
NOTES:

1. THE SITE LOCATION(S) OF THE PERMANENT SAMPLING STATION SHALL BE DETERMINED BY THE DEPARTMENT.
2. THE SAMPLING STATION SHALL BE PLACED IN AN EASILY ACCESSIBLE AREA.
3. ALTERNATIVE DESIGNS AND PLACEMENT SHALL REQUIRE APPROVAL OF THE DEPARTMENT.
4. ALL BRASS SHALL BE LEAD FREE.
5. THE CAST ALUMINUM BASE SHALL BE SET 1" DEEP INTO CONCRETE PAD TO PROVIDE STABILITY.
6. THE ALUMINUM HOUSING SHALL BE GREEN IN COLOR.
7. CASING IS REQUIRED FOR SERVICE PIPING UNDER PAVED AREAS.

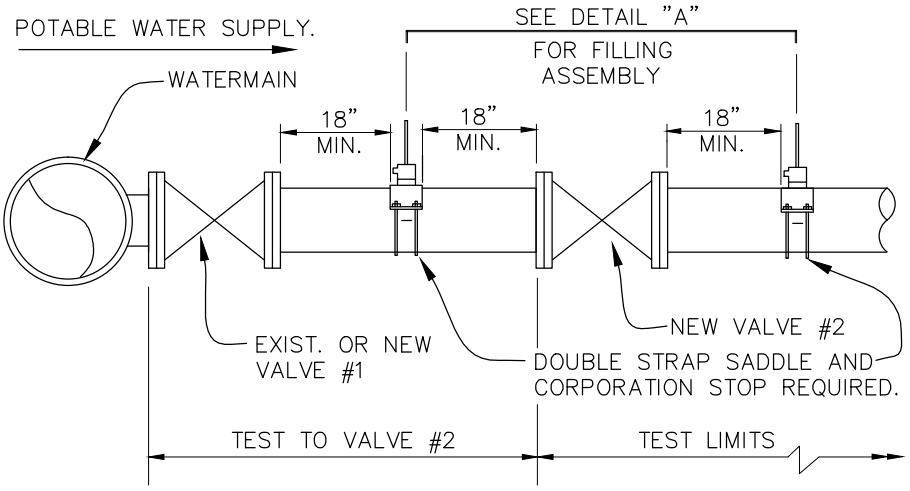


MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	PERMANENT SAMPLING POINT DETAIL	DWG No.
AUGUST 2016		10

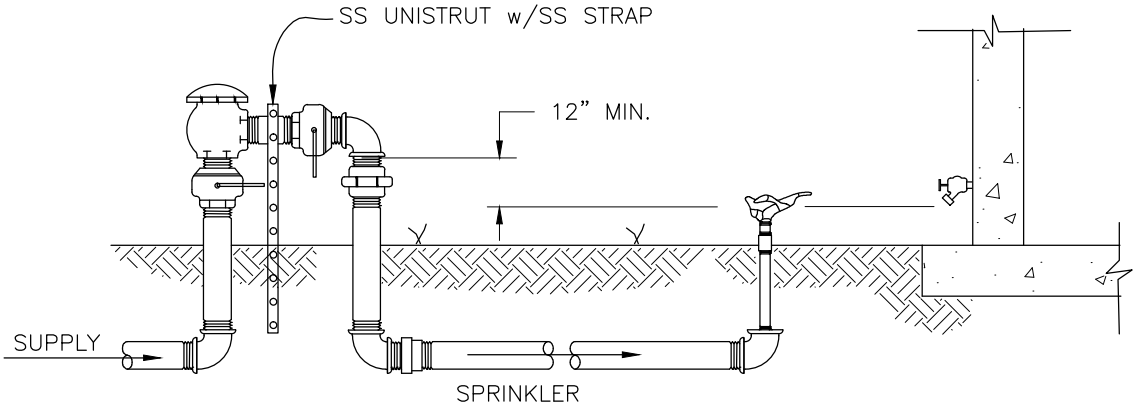


DETAIL "A"



NOTES:

1. BOTH VALVES SHALL BE KEPT CLOSED EXCEPT FOR FILLING, FLUSHING AND BACTERIOLOGICAL TESTING PURPOSES.
2. DEPARTMENT SHALL BE NOTIFIED BEFORE FILLING AND FLUSHING.
3. PRESSURE TEST PUMP CONNECTS TO SERVICE LINE OR BLOWOFF. NO EXTRA TAPS ARE PERMITTED UNLESS PRECEEDING ARE NOT PRESENT IN TEST SECTION.
4. PRESSURE GAUGE TO BE LOCATED IN VICINITY OF TEST PUMP CONNECTION.
5. GAUGE AND RISER TO BE REMOVED AFTER PRESSURE TEST.
6. REMOVE TEMPORARY CONNECTION AT CORPORATION STOPS AFTER FILLING AND FLUSHING HAS BEEN COMPLETED.
7. INJECT CHLORINE ON PROJECT SIDE OF BACKFLOW PREVENTER.
8. CONTRACTOR TO PROVIDE AN RPZ CERTIFICATION (LESS THAN 1 YEAR) PRIOR TO INSTALLATION.



NOTES:

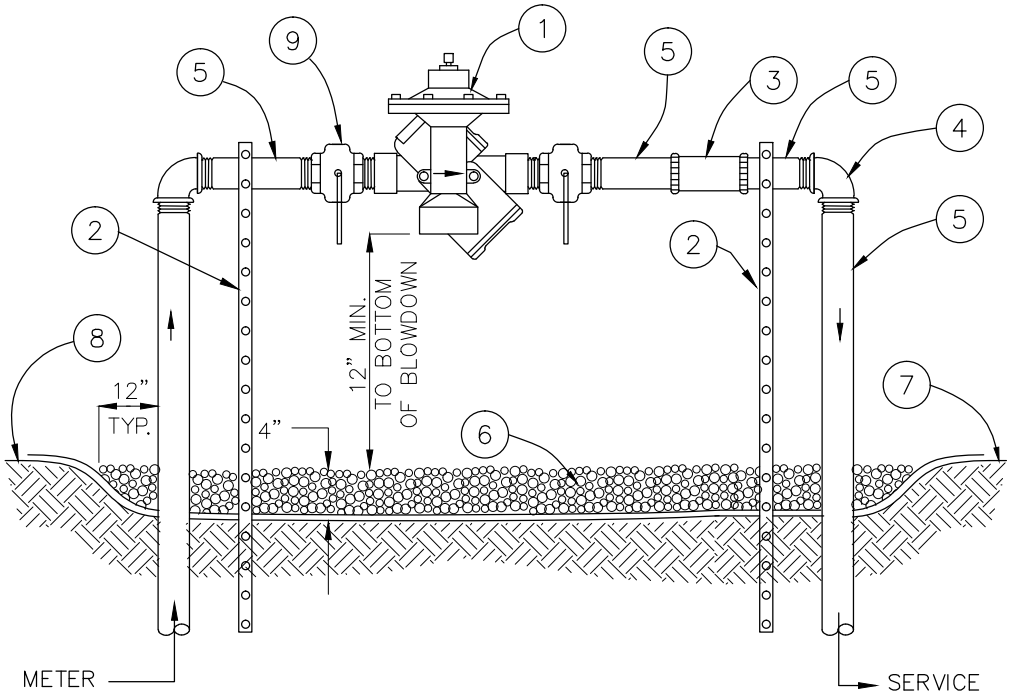
1. THE PRESSURE VACUUM BREAKER (P.V.B.) CANNOT BE INSTALLED WHERE IT WILL BE SUBJECTED TO BACK PRESSURE. IT PROVIDES PROTECTION AGAINST BACK-SIPHONAGE OF BOTH POLLUTANTS AND CONTAMINANTS.

2. EACH P.V.B. SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION TO FACILITATE INSPECTION AND SERVICING.

3. EACH P.V.B. SHALL BE INSTALLED ON THE MAIN LINE TO THE IRRIGATION SYSTEM AND AT LEAST 12 INCHES ABOVE THE HIGHEST SPRINKLER HEAD OR OUTLET. (VALVES MAY BE LOCATED DOWNSTREAM FROM THE DEVICE).

4. ALL ABOVE GROUND PIPING WILL BE TYPE "K" OR "L" COPPER TUBING WITH SWEAT FITTINGS.

5. IF CHEM FEED IS USED IN IRRIGATION LINE, THEN USE RPZ. RPZ MAY BE USED IN LIEU OF PRESSURE VACUUM BREAKER.

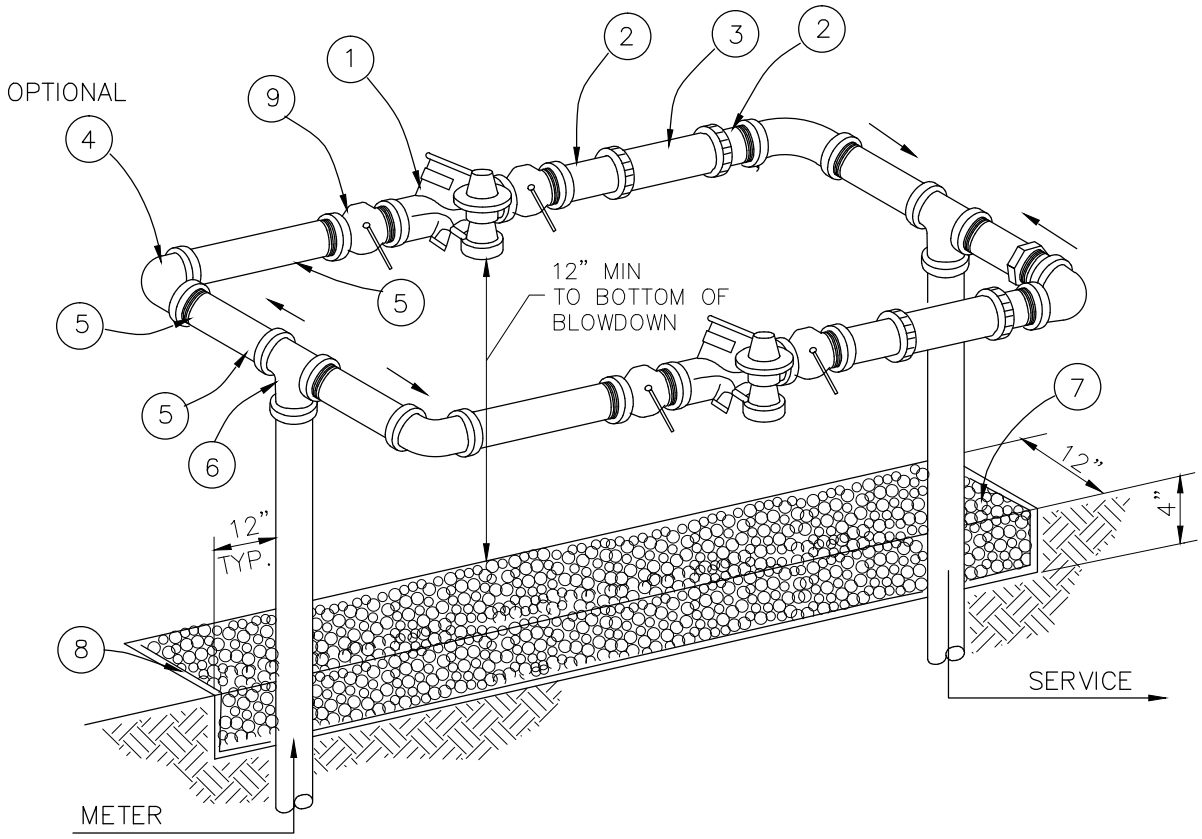


MATERIALS		
ITEM	QUANT.	DESCRIPTION
1	1	2" BACKFLOW PREVENTER
2	2	1" S.S. UNISTRUT W/ S.S. STRAPS
3	1	2" COUPLING – COMPRESSION
4	2	2" X 90° ELBOW
5	4	2" X 6" NIPPLES
6		PEA GRAVEL
7		FILTER FABRIC
8		FINISHED GRADE
9	2	BALL VALVE

NOTES:

1. INSTALLATION SHOWN ABOVE IS FOR A 2" SERVICE. CHANGE PIPING MATERIALS ACCORDINGLY FOR SERVICE SIZE.

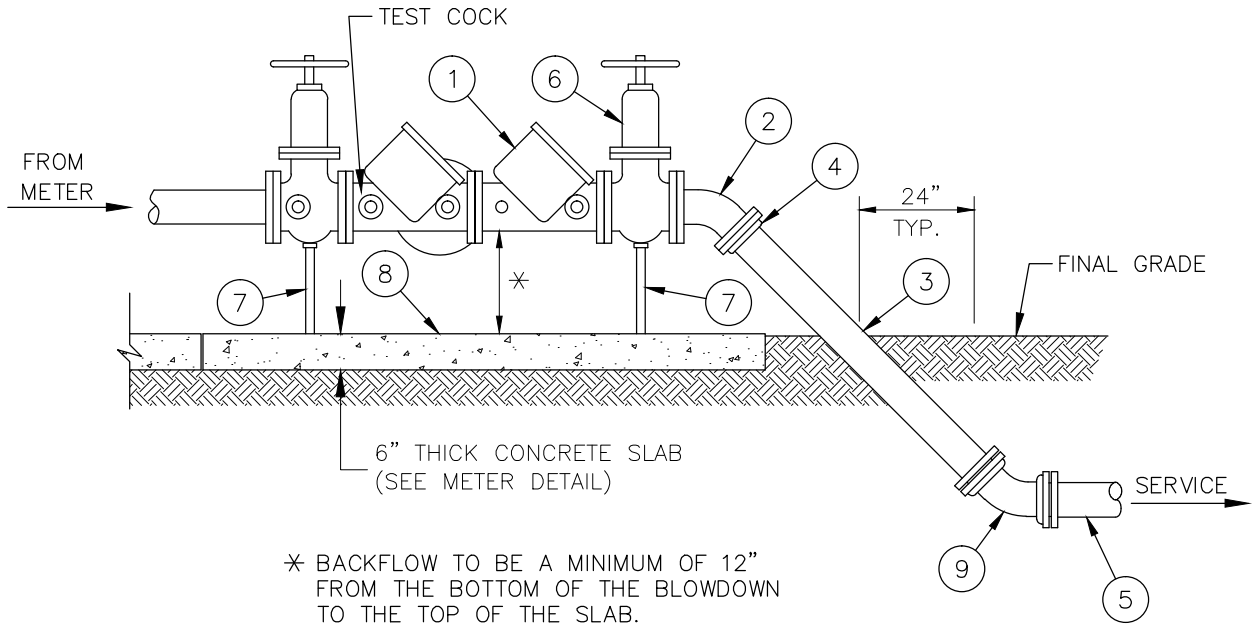
2. USE COPPER, BRASS OR STAINLESS STEEL FOR FITTINGS AND PIPE MATERIAL.



MATERIALS			
ITEM	QUANT.	DESCRIPTION	
1	2	2"	BACKFLOW PREVENTER
2	4	2" X 6"	NIPPLES
3	2	2"	COUPLING – COMPRESSION
4	4	2" X 90°	ELBOW
5	14	2" X 4"	NIPPLES
6	2	2"	TEE
7	*		PEA GRAVEL
8	*		FILTER FABRIC
9	4		BALL VALVES

NOTES:

1. INSTALLATION SHOWN ABOVE IS FOR A 2" SERVICE. CHANGE PIPING MATERIALS ACCORDINGLY FOR SERVICE SIZE.
2. USE COPPER, BRASS OR STAINLESS STEEL FOR FITTINGS AND PIPE MATERIAL.

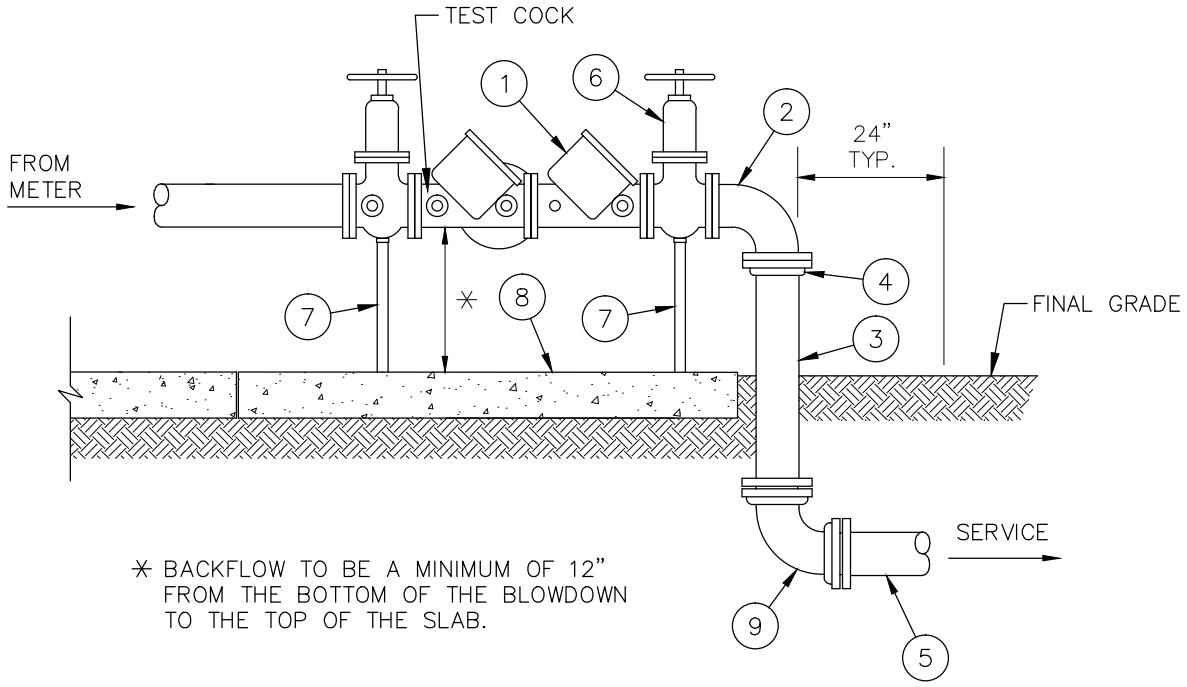


MATERIAL

ITEM	QUANT.	DESCRIPTION	
1	1	3", 4", 6", 8"	VALVE, O.C. BACKFLOW PREVENTER
2	2	4", 6", 8"	BEND _ 45° (FLANGE–FLANGE)
3	*	4", 6", 8"	PIPE, DUCTILE IRON (CLASS 350)
4	2	4", 6", 8"	ADAPTER, FLANGE, D.I.P.
5	2	4", 6", 8"	PIPE, P.V.C. (DR–18)
6	2	3", 4", 6", 8"	GATE VALVE, C.I., (FLANGE–FLANGE)
7	2		ADJUSTABLE PIPE SUPPORTS (316 SS)
8	1	6"	CONCRETE SLAB
9	2		BEND – 45° (MJ–MJ)

NOTES:

1. FIELD ADJUST AND CUT ITEM 3 TO PROPER LENGTH. THIS TYPE OF CONSTRUCTION IS DESIGNED FOR LIMITED WORKING AREA.
2. ALL EXPOSED DUCTILE IRON PIPES AND FITTINGS SHALL BE PAINTED "BLUE". PAINT SPECIFICATIONS MUST BE SUBMITTED TO MARTIN COUNTY UTILITIES PRIOR TO APPLICATION.
3. FOR 3" BACKFLOW ASSEMBLY, USE 4" D.I. PIPE WITH 4"x3" REDUCER WITH FLANGED ENDS ON BOTH SIDES OF THE BACKFLOW ASSEMBLY.



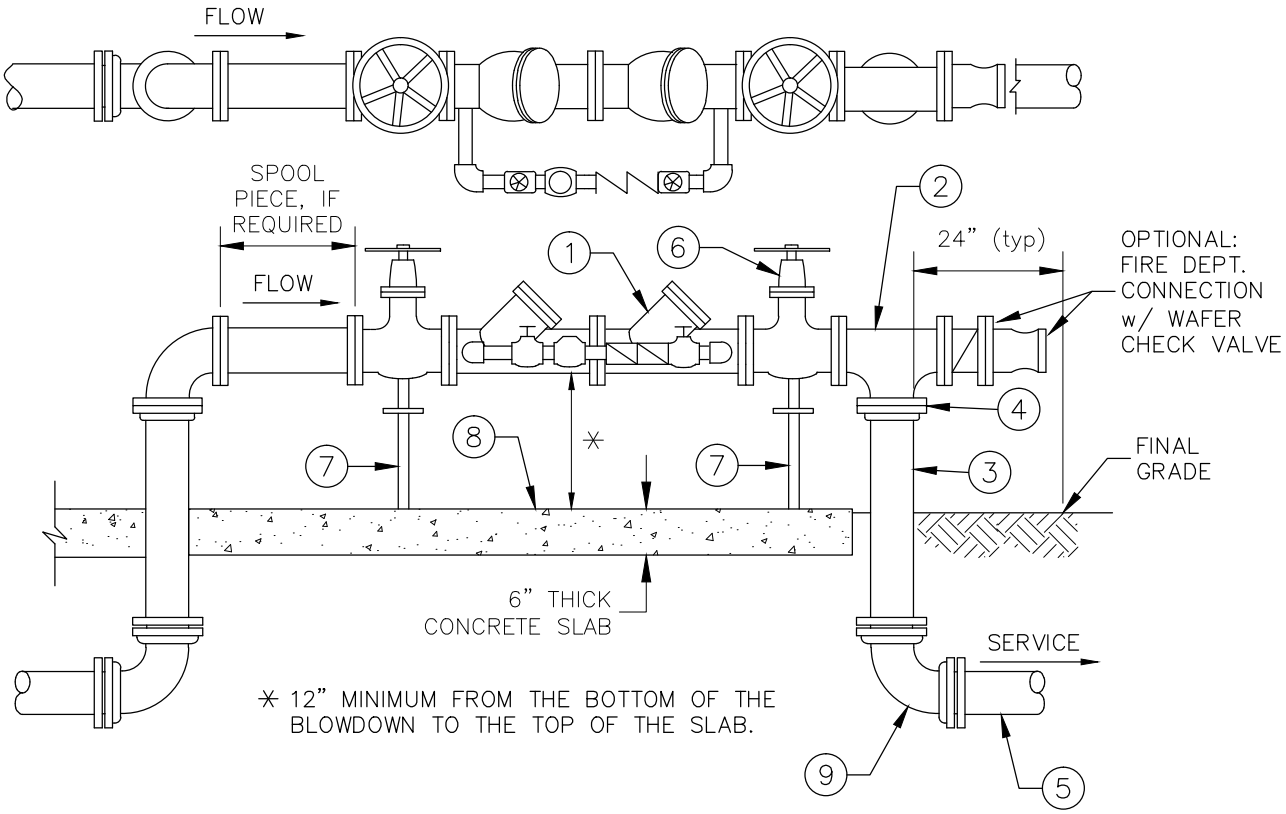
✳ BACKFLOW TO BE A MINIMUM OF 12" FROM THE BOTTOM OF THE BLOWDOWN TO THE TOP OF THE SLAB.

MATERIAL

ITEM	QUANT.	DESCRIPTION	
1	1	3", 4", 6", 8"	VALVE, O.C. BACKFLOW PREVENTER
2	2	4", 6", 8"	BEND _ 90° (FLANGE–FLANGE)
3	*	4", 6", 8"	PIPE, DUCTILE IRON (CLASS 350)
4	2	4", 6", 8"	ADAPTER, FLANGE, D.I.P.
5	2	4", 6", 8"	PIPE, P.V.C. (DR–18)
6	2	3", 4", 6", 8"	GATE VALVE, C.I., (FLANGE–FLANGE)
7	2		ADJUSTABLE PIPE SUPPORTS (316 SS)
8	1	6"	CONCRETE SLAB
9	2		BEND – 90° (MJ–MJ)

NOTES:

1. FIELD ADJUST AND CUT ITEM 3 TO PROPER LENGTH. THIS TYPE OF CONSTRUCTION IS DESIGNED FOR LIMITED WORKING AREA.
2. ALL EXPOSED DUCTILE IRON PIPES AND FITTINGS SHALL BE PAINTED "BLUE". PAINT SPECIFICATIONS MUST BE SUBMITTED TO MARTIN COUNTY UTILITIES PRIOR TO APPLICATION.
3. FOR 3" BACKFLOW ASSEMBLY, USE 4" D.I. PIPE WITH 4"x3" REDUCER WITH FLANGED ENDS ON BOTH SIDES OF THE BACKFLOW ASSEMBLY.

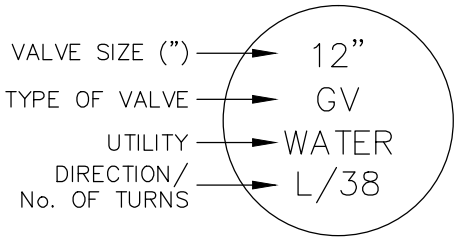


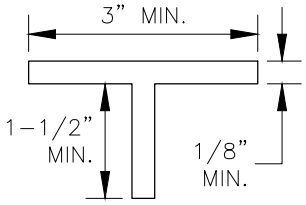
MATERIAL

ITEM	QUANT.	DESCRIPTION	
1	1	2", 4", 6", 8"	DOUBLE CHECK DETECTOR BACKFLOW PREVENTER
2	2	2", 4", 6", 8"	TEE (FLANGE–FLANGE)
3	*	2", 4", 6", 8"	PIPE, DUCTILE IRON (CLASS 350)
4	2	2", 4", 6", 8"	ADAPTER, FLANGE, D.I.P.
5	2	2", 4", 6", 8"	PIPE
6	2	2", 4", 6", 8"	GATE VALVE, C.I., (FLANGE–FLANGE) OS&Y
7	2		ADJUSTABLE PIPE SUPPORTS (316 SS)
8	1	6"	CONCRETE SLAB
9	3		BEND – 90° (MJ–MJ)

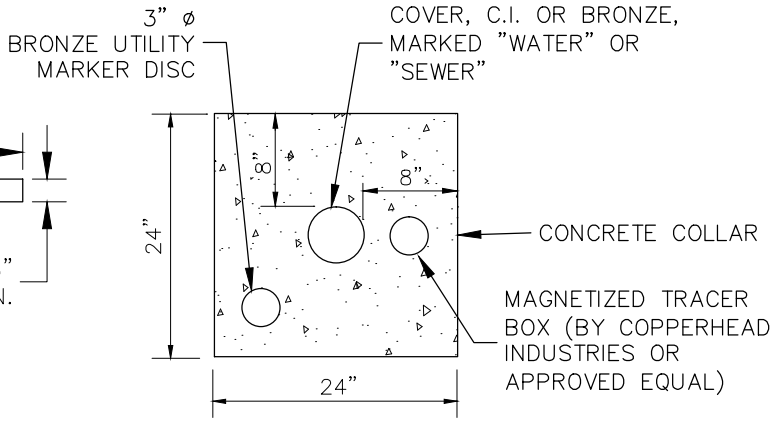
NOTES:

1. FIELD ADJUST AND CUT ITEM 3 TO PROPER LENGTH. THIS TYPE OF CONSTRUCTION IS DESIGNED FOR LIMITED WORKING AREA.
2. ALL EXPOSED DUCTILE IRON PIPES AND FITTINGS SHALL BE PAINTED "RED". PAINT SPECIFICATIONS MUST BE SUBMITTED TO MARTIN COUNTY UTILITIES PRIOR TO APPLICATION.
3. DETECTOR METER SHALL READ IN GALLONS AND SHALL BE 5/8" NEPTUNE MAGNETIC DRIVE, MODEL T–10.

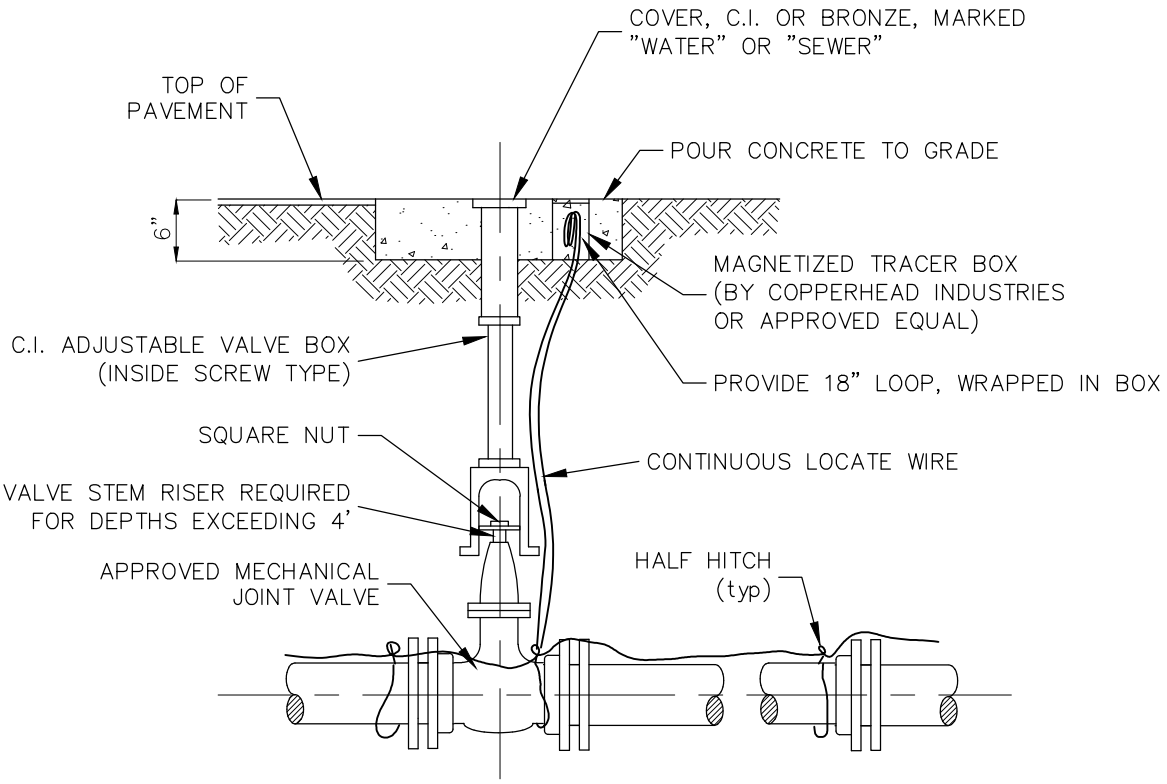




UTILITY MARKER DISC



PLAN

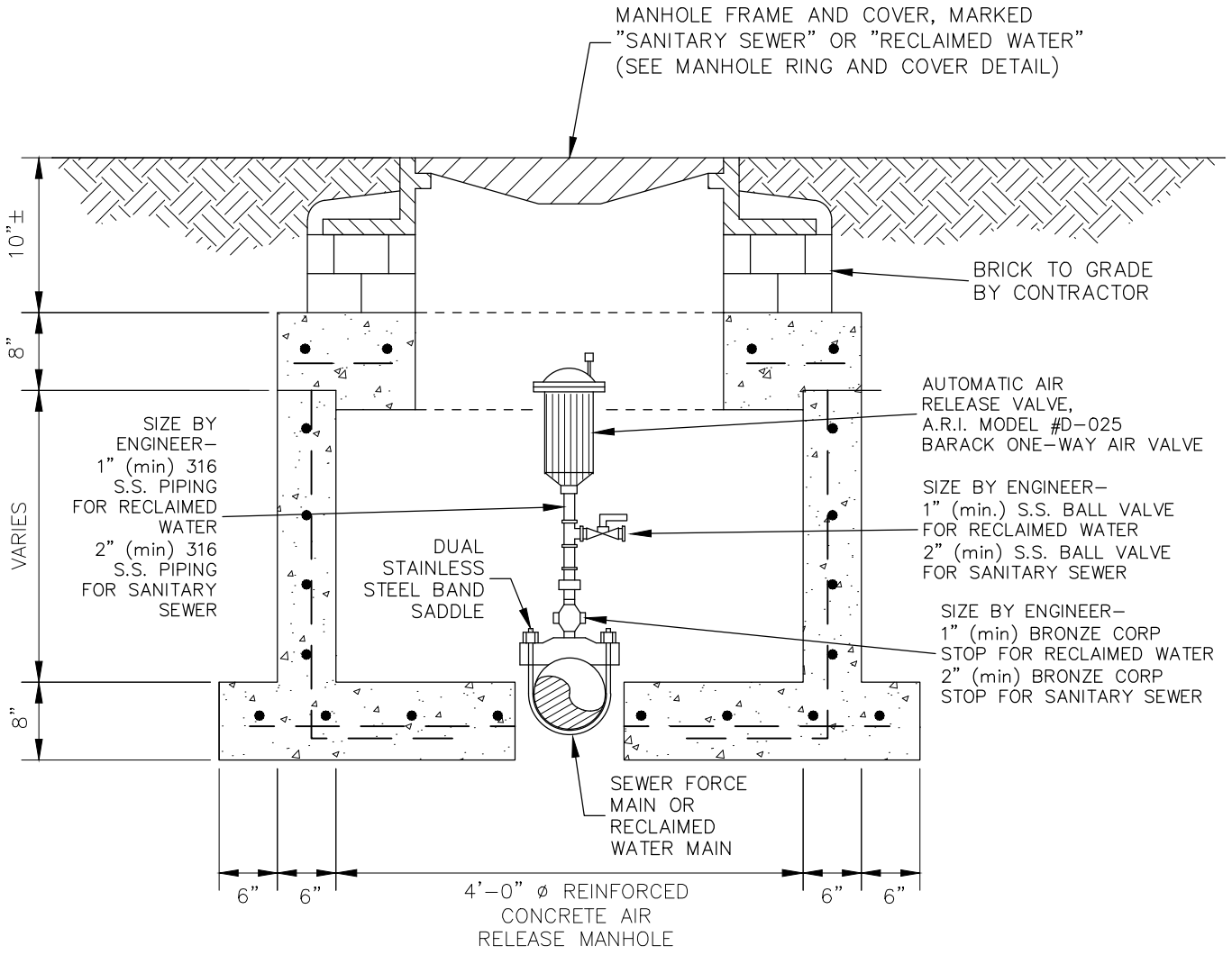


ELEVATION

NOTES:

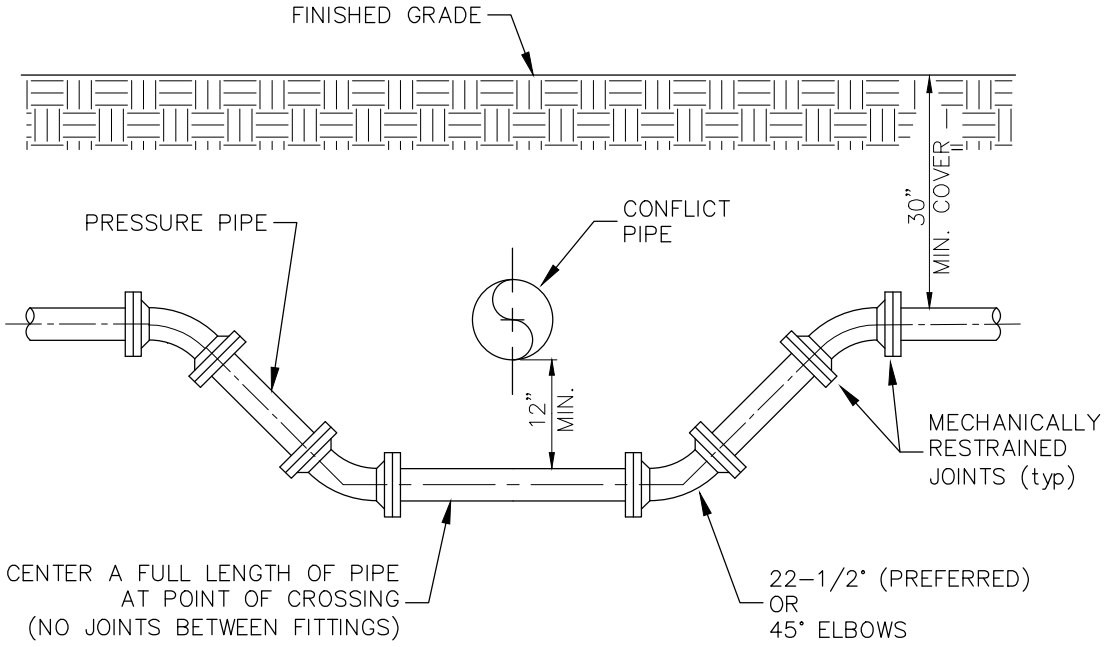
1. A LOCATION BALL (3M EMS BALL MARKERS; WATER/BLUE, MODEL No. 1403-XR; SEWER/GREEN, MODEL No. 1404-XR OR EQUAL) SHALL BE INSTALLED AT EACH FITTING AND/OR EVERY 100 FEET OF SEPARATION.

2. FOR DEEP VALVE INSTALLATIONS, A 6" C-900 PVC EXTENSION MAY BE USED TO BRING VALVE BOX TO GRADE.

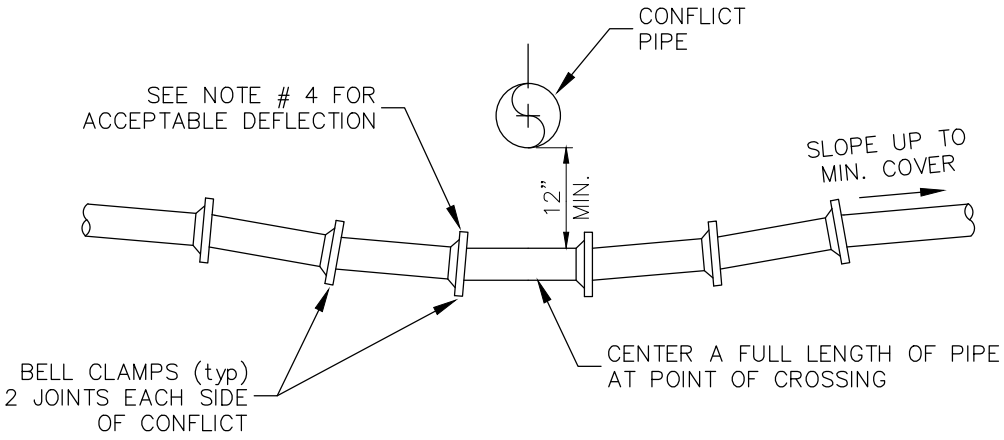


NOTES:

1. AIR RELEASE VALVE SHALL BE A.R.I. MODEL #D-025 WITH BARACK ONE-WAY AIR VALVE, SIZED APPROPRIATELY FOR SERVICE INTENDED.
2. ALL PIPING TO BE 316 STAINLESS STEEL.
3. TYPE II CEMENT; CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
4. CONCRETE STRUCTURE REINFORCEMENT SHALL MEET ASTM C478 SPECS.
5. CONCRETE STRUCTURE AND D.I. COVER SHALL MEET H-20 LOADING REQUIREMENTS.
6. FOR MINIMUM PIPING AND AIR RELEASE VALVE SIZES, REFER TO M.C.U. APPROVED PRODUCT LIST. ENGINEER OF RECORD SHALL BE RESPONSIBLE FOR SIZING.



FITTING TYPE



DEFLECTION TYPE

NOTES:

1. THESE METHODS ARE TO BE USED WHEN INSUFFICIENT COVER EXISTS TO ALLOW PRESSURE PIPE TO CROSS ABOVE CONFLICT PIPE WITH 6" VERTICAL SEPARATION AND MAINTAIN REQUIRED COVER TO FINISHED GRADE.
2. FITTINGS SHALL BE RESTRAINED WITH RETAINER GLANDS.
3. THE DEFLECTION TYPE CROSSING IS PREFERRED.
4. DO NOT EXCEED 50% OF MANUFACTURER'S RECOMMENDED MAXIMUM JOINT DEFLECTION.

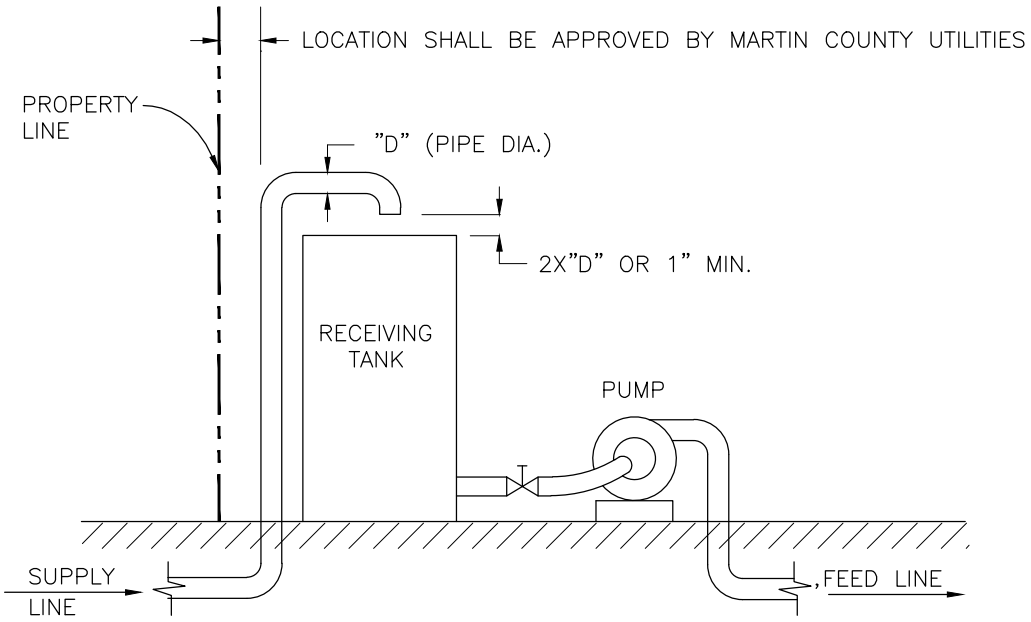
MIN. LENGTH (IN FEET) OF PIPE TO BE RESTRAINED

(SOURCES: EBAA IRON RESTRAINT LENGTH CALCULATION PROGRAM FOR PVC PIPE, RELEASE 3.1, AND DIPRA THRUST RESTRAINT FOR DUCTILE IRON PIPE, RELEASE 3.2)

FITTING TYPE		PIPE SIZE							
		4"	6"	8"	10"	12"	16"	20"	24"
90° HORIZ. BEND		14	20	25	30	35	45	54	62
45° HORIZ. BEND		6	8	11	13	15	19	22	26
22.5° HORIZ. BEND		3	4	5	6	7	9	11	12
11.25° HORIZ. BEND		1	2	3	3	4	4	5	6
90° VERT. OFFSET	UPPER BEND	29	41	53	64	74	95	115	134
	LOWER BEND	7	10	13	16	19	25	30	35
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56
	LOWER BEND	3	4	6	7	8	10	12	15
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27
	LOWER BEND	1	2	4	4	4	5	6	7
11.25° VERT. OFFSET	UPPER BEND	3	4	6	7	8	9	11	13
	LOWER BEND	1	1	1	2	2	2	3	3
PLUG (DEAD END)		32	45	59	70	83	107	129	151
IN-LINE VALVE		32	45	45	45	45	55	65	80
TEE (BRANCH RESTRAINT)	4" x ø	23	–	–	–	–	–	–	–
	6" x ø	21	35	–	–	–	–	–	–
	8" x ø	18	34	47	–	–	–	–	–
	10" x ø	16	32	46	58	–	–	–	–
	12" x ø	13	30	44	57	69	–	–	–
	16" x ø	7	26	41	55	67	90	–	–
	20" x ø	1	21	38	52	65	88	109	–
	24" x ø	1	16	34	49	62	86	108	129
	30" x ø	1	8	28	44	58	83	106	127
	36" x ø	1	1	22	39	54	80	103	124
	42" x ø	1	1	15	33	49	77	100	122
	48" x ø	1	1	7	27	44	73	97	120
REDUCER (LARGER PIPE RESTRAINT)	6" x ø	23	–	–	–	–	–	–	–
	8" x ø	38	25	–	–	–	–	–	–
	10" x ø	57	43	24	–	–	–	–	–
	12" x ø	72	60	44	41	–	–	–	–
	16" x ø	99	90	78	75	45	–	–	–
	20" x ø	123	116	107	105	81	45	–	–
	24" x ø	146	140	132	131	111	82	45	–

NOTES:

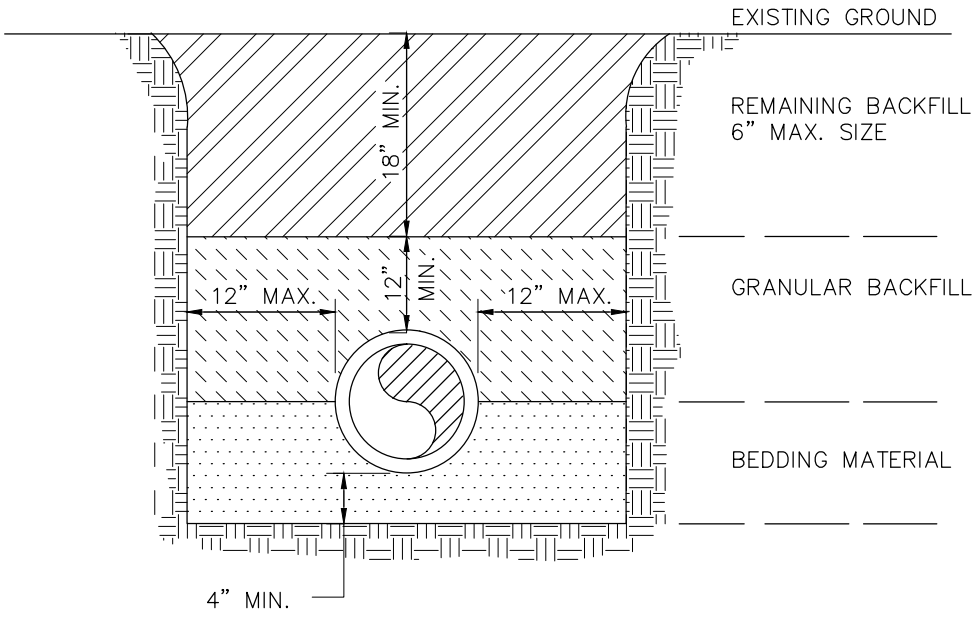
1. THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:
   SOIL TYPE–SAND TEST PRESSURE–150 PSI DEPTH OF BURY–3'
   TRENCH TYPE–3 SAFETY FACTOR– 1.5 VERTICAL OFFSET–3'
   MINIMUM PIPE LENGTH ALONG TEE RUN–5'
2. THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
3. ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
4. RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.
5. DESIGN ENGINEER SHALL BE RESPONSIBLE FOR PROPERLY SIZING THE LENGTH OF PIPE TO BE RESTRAINED.



NOTES:

1. AN AIR GAP SEPARATION MEANS THE UNOBSTRUCTED VERTICAL DISTANCE THROUGH THE FREE ATMOSPHERE BETWEEN THE LOWEST OPENING FROM ANY PIPE OR FAUCET SUPPLYING WATER TO A TANK, PLUMBING FIXTURE OR OTHER DEVICE AND THE FLOOD LEVEL OR OVERFLOW RIM OF THE RECEPTACLE.

2. THE "APPROVED AIR GAP SEPARATION" SHALL BE AT LEAST DOUBLE THE DIAMETER OF THE SUPPLY PIPE MEASURED VERTICALLY ABOVE THE OVERFLOW RIM OF THE VESSEL AND IN NO CASE SHALL THE GAP BE LESS THAN ONE (1) INCH IN DIAMETER.



NOTES:

1. BEDDING MATERIAL SHALL BE HAND PLACED IN 6" LIFTS AND SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK 3/8"-7/8" SIZING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCK SHALL BE REMOVED.

2. THE PIPE SHALL BE FULLY SUPPORTED FOR ITS ENTIRE LENGTH WITH APPROPRIATE COMPACTION UNDER THE PIPE HAUNCHES.

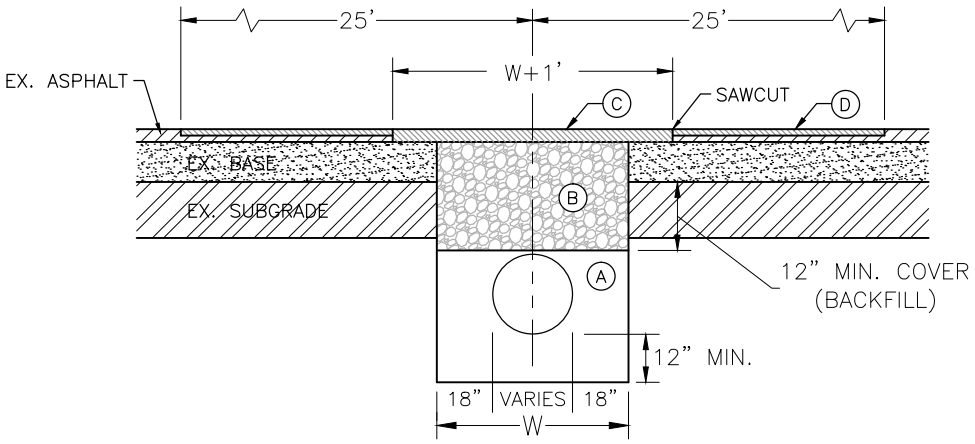
3. THE PIPE SHALL BE PLACED IN A DRY TRENCH.

4. BACKFILL SHALL BE DONE WITH APPROVED MATERIAL, CLEAN AND FREE OF ROCKS, MUCK AND OTHER DELETERIOUS MATTER AND COMPACTED BENEATH THE HAUNCHES OF THE PIPE USING MECHANICAL TAMPERS TO 100% MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99.

5. BACKFILL TO BE COMPACTED ALONG THE SIDES OF THE PIPE AND TO A POINT ONE FOOT ABOVE THE TOP OF THE PIPE TO 100% MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99.

6. A. WHERE PAVEMENT IS TO BE CONSTRUCTED OVER THE PIPE THE REMAINING BACKFILL SHALL BE COMPACTED IN 6 INCH LAYERS AND COMPACTED TO 95% MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180.
   B. WHERE "NO" PAVEMENT IS TO BE CONSTRUCTED OVER THE PIPE THE REMAINING FILL SHALL BE COMPACTED IN 6 INCH LAYERS TO A DENSITY 90% MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180.

7. CONTRACTOR SHALL COMPLY WITH ALL STATE AND LOCAL TRENCH SAFETY REGULATIONS



TRENCH DETAIL
N.T.S.

BACKFILL AND BASE

A. PROVIDE CLEAN BACKFILL. BACKFILL SHALL BE REPLACED IN 6" LAYERS. EACH LAYER SHALL BE MECHANICALLY COMPACTED TO A MINIMUM 100% DENSITY AS DETERMINED BY AASHTO T-99, METHOD "C" (MINIMUM LBR OF 40).

B. BASE ROCK MATERIAL SHALL BE A MINIMUM OF 2' THICK AND BE PLACED IN 6" LAYERS OR AS OTHERWISE APPROVED AND EACH LAYER THOROUGHLY MECHANICALLY COMPACTED TO (98%) DENSITY AS DETERMINED BY AASHTO T-180. ALL BASE MATERIAL MUST MEET FDOT SPECIFICATIONS FROM A CERTIFIED MINING OPERATION. DEPTH OF BASE MATERIAL VARIES ON ROADWAY TYPE AS PER MARTIN COUNTY ENGINEERING STANDARD DETAIL R-10.

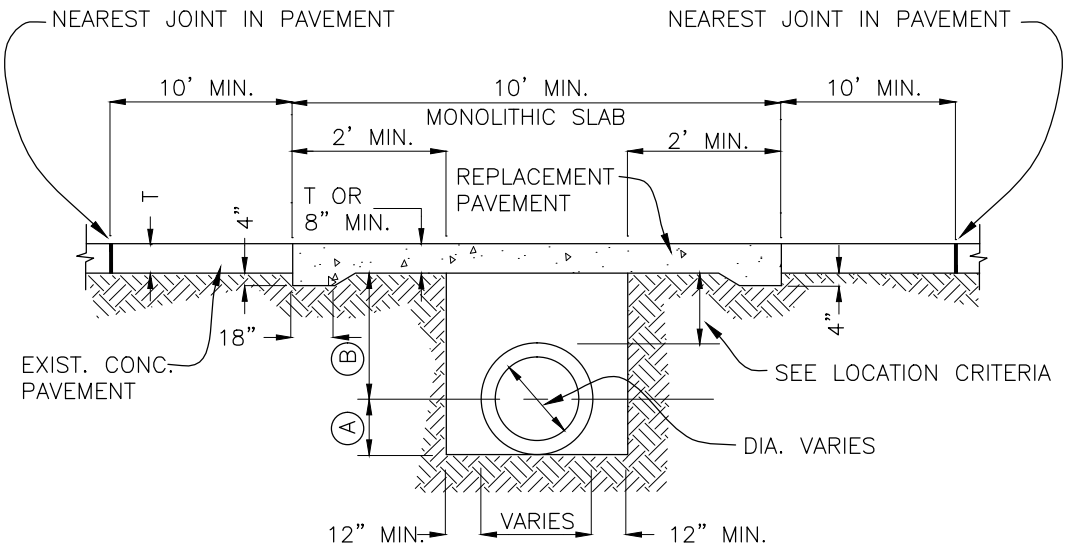
PAVING

C. A TEMPORARY PATCH SHALL BE NO LESS THAN 2" THICK OR MATCHING EXISTING PAVEMENT THICKNESS, WHICHEVER IS GREATER. ASPHALT PATCHES MUST BE OF A HOT MIX TYPE FRICTION COURSES. MARTIN COUNTY DOES NOT ALLOW COLD PATCH IN COUNTY MAINTAINED ROADWAYS. THE PATCH IS TO REMAIN 30 DAYS AT MINIMUM TO ASSURE ANY SETTLING OF THE ROADWAY TRENCH HAS TAKEN PLACE.

D. MILL 1 INCH OF ASPHALT A MINIMUM OF 25' FROM CENTER OF TRENCH ON BOTH SIDES, SEE NOTE #1. PAVE AND COMPACT 1" OF SP-9.5 OR MATCH EXISTING TYPE OF FRICTION COURSE.

NOTES:

1. ALL OPEN CUT OF PAVEMENT MUST BE REVIEWED BY MARTIN COUNTY ENGINEERING PRIOR TO ANY WORK BEING DONE IN COUNTY MAINTAINED RIGHT-OF-WAY. DEPENDING ON THE LOCATION OF THE OPEN CUT ADDITIONAL MILLING AND PAVING MAY BE REQUIRED; ALL PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
2. ALL MATERIAL USED WITHIN THE ROADWAY MUST MEET FDOT SPECIFICATIONS AND BE SUPPLIED FROM A FDOT CERTIFIED MINING OPERATION AND ASPHALT PLANT.
3. A MINIMUM OF TWO DENSITY TESTS SHALL BE TAKEN FOR EACH SIX (6) INCH LIFT OF SUB GRADE AND EACH OPEN CUT CROSSING. WHEN THE SPECIFIED COMPACTED BASE IS GREATER THAN SIX AND ONE-HALF (6 ½") INCHES THE BASE SHALL BE CONSTRUCTED IN TWO OR MORE COURSES. PROCTORS FOR MATERIALS USED IN BACK-FILLING SHALL BE OBTAINED BY A CERTIFIED LABORATORY. DENSITY TESTS SHALL BE CONDUCTED BY A CERTIFIED LABORATORY OR THE PERMITTEE'S CONSULTANTS. THE PERCENTAGE OF MAXIMUM DENSITY REQUIRED SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS. A COPY OF ALL COMPLETED AND ACCEPTED DENSITY TESTS SHALL BE FURNISHED TO THE COUNTY ENGINEER'S OFFICE PRIOR TO FINAL INSPECTION.
4. MARTIN COUNTY DOES NOT ALLOW CRUSHED CONCRETE WITHIN COUNTY MAINTAINED ROADWAY.



REPLACEMENT OF CONCRETE PAVEMENT FOR PERMITTED PAVEMENT CUT

DENSITY PROCEDURES:

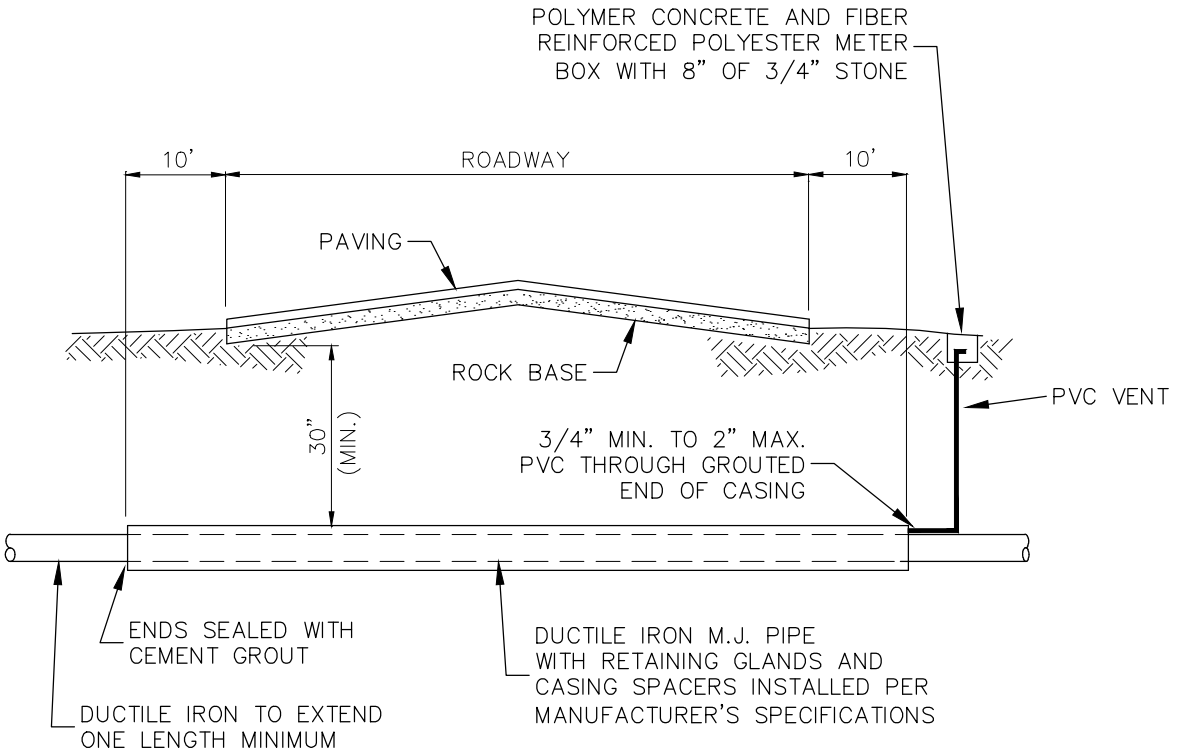
THE BACKFILL FOR Ⓐ AND Ⓑ SHALL BE PLACED IN 6" LAYERS (COMPACTED THICKNESS) AND SHALL BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99 METHOD "C".

Ⓐ THE PERMITTEE SHALL PROVIDE ADEQUATE COMPACTED FILL BENEATH THE HAUNCHES OF THE PIPE, USING MECHANICAL TAMPS SUITABLE FOR THIS PURPOSE. THIS COMPACTION APPLIES TO THE MATERIAL PLACED BENEATH THE HAUNCHES OF THE PIPE AND ABOVE ANY BEDDING REQUIRED.

Ⓑ THE PERMITTEE SHALL OBTAIN A WELL COMPACTED BED AND FILL ALONG THE SIDES OF THE PIPE AND TO A POINT INDICATING THE BOTTOM OF REPLACEMENT PAVEMENT.

GENERAL NOTES:

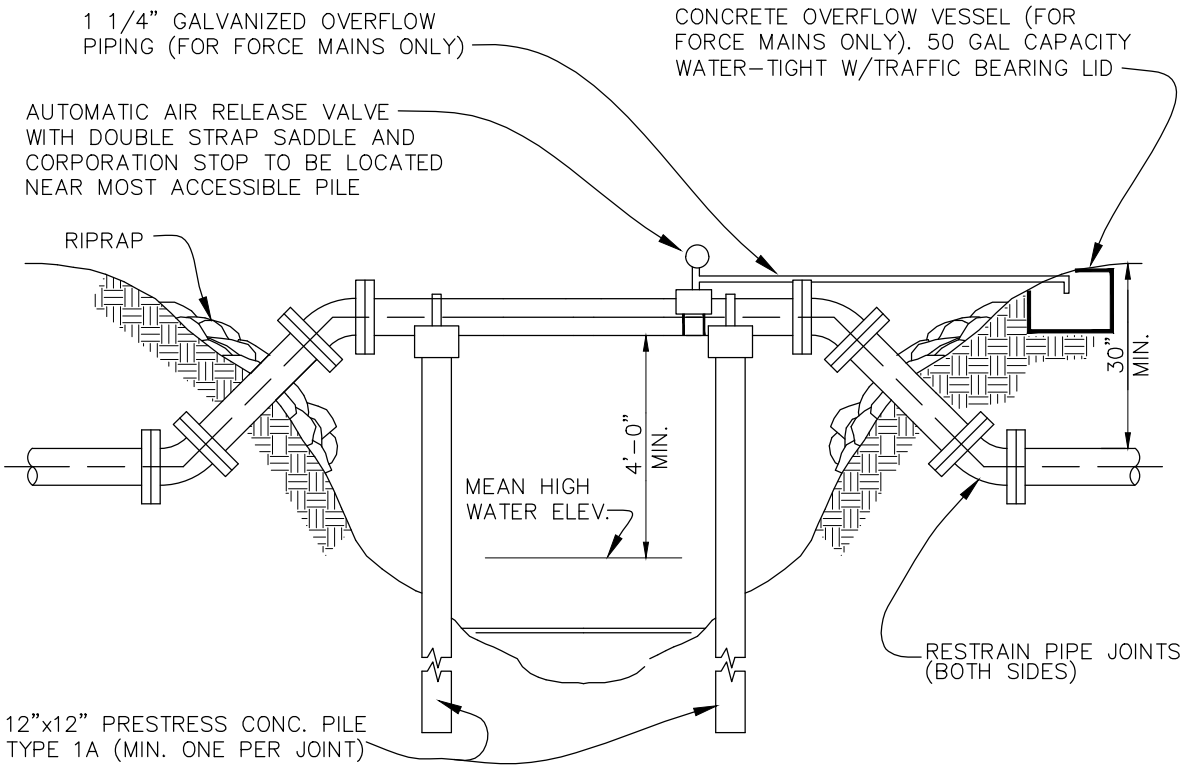
1. 3000 P.S.I. CONCRETE, BY USE OF HIGH EARLY STRENGTH CEMENT, TO BE USED FOR REPLACEMENT, OR OTHER APPROVED HIGH STRENGTH, FAST SET MATERIALS.
2. CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED TO CONFORM WITH ADJOINING SLABS.
3. BACKFILL MATERIAL SHALL BE EITHER OF THE SAME TYPE AND COMPOSITION AS THE MATERIAL REMOVED, OR OF EQUAL OR GREATER STRUCTURAL ADEQUACY. MATERIALS CONTAMINATED WITH DELETERIOUS SUBSTANCES DURING EXCAVATION SHALL NOT BE USED.



CARRIER PIPE SIZE	MINIMUM STEEL CASING	MINIMUM WALL THICKNESS
4"	12"	.250
6"	16"	.250
8"	18"	.312
10"	20"	.375
12"	24"	.375
16"	30"	.500
18"	30"	.500
20"	36"	.562
24"	36"	.562

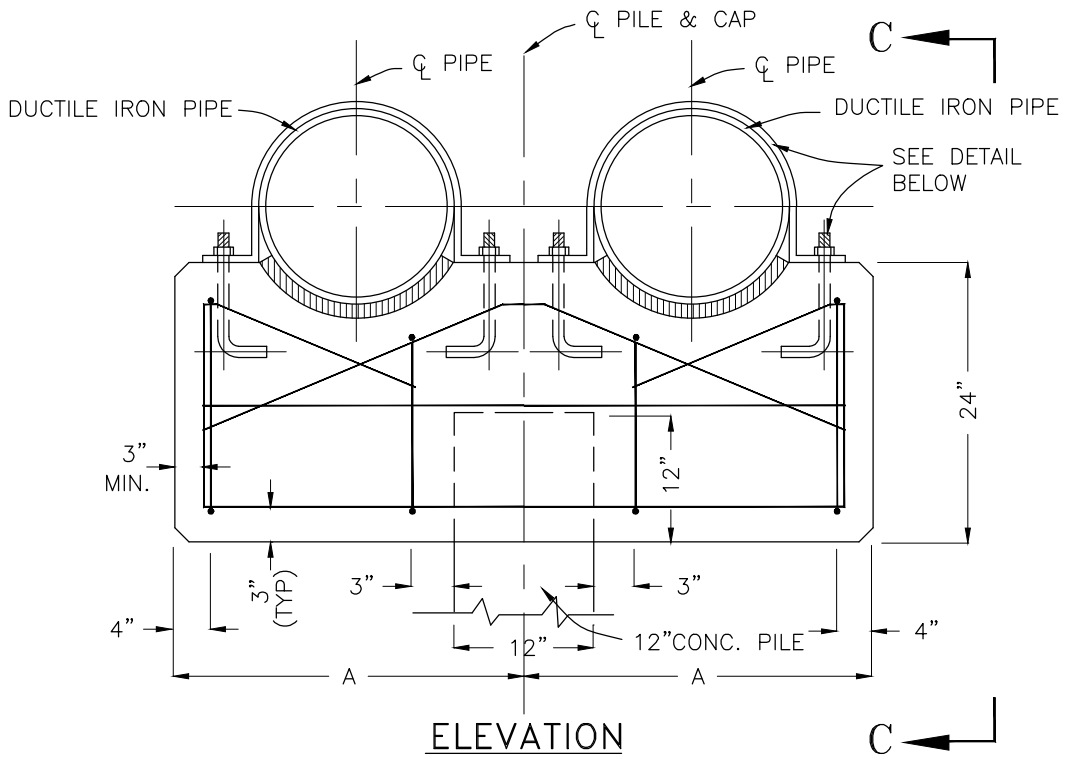
NOTE:

1. LOCATOR WIRE SHALL BE MIN. #10 GAUGE MULTI-STRAND WIRE FOR ALL BORE & JACKING



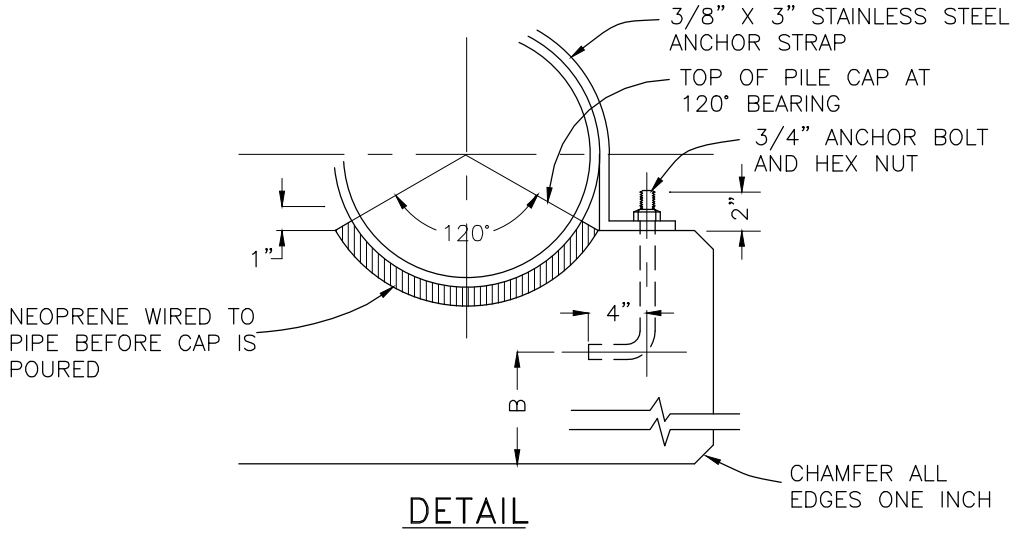
NOTES

1. ALL EXPOSED PIPES SHALL BE DUCTILE IRON WITH FLANGED FITTINGS. RETAINER GLANDS. UNIFLANGE TYPE FITTINGS ARE NOT TO BE SUBSTITUTED FOR FLANGED FITTINGS.
2. SPAN HEIGHT AS REQUIRED BY PERMITTING AGENCY.
3. MAXIMUM SUPPORT SPACING SHALL BE IN ACCORDANCE TO MANUFACTURERS RECOMMENDATION.
4. FAN GUARDS ARE REQUIRED, SEE STANDARD DETAIL.
5. ALL EXPOSED PIPING, GUARDS AND FITTINGS SHALL BE PAINTED.
6. PIPE SHALL BE CRADLED ON NEOPRENE.
7. TIE-DOWN STRAPS MUST PROPERLY FIT AND SECURE PIPE IN CRADLE.
8. FOR CONCRETE PILES SEE DETAILS
9. ALL PAINT SPECIFICATIONS MUST BE SUBMITTED AND APPROVED BY MARTIN COUNTY UTILITIES PRIOR TO APPLICATION.
10. CONCRETE IN C.I.P. CAP SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF 3,400 p.s.i.
11. ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.
12. THE PILES SHALL BE DRIVEN TO A MINIMUM PENETRATION OF 20'-0" UNLESS THE PRESENCE OF POOR SOILS (N<3) NECESSITATE A DEEPER PENETRATION.
13. PROVIDE TWO FULL LENGTHS OF RESTRAINED D.I.P. BOTH SIDES OF CROSSING.
14. CONTINUE LOCATOR WIRE ACROSS CANAL CROSSING.

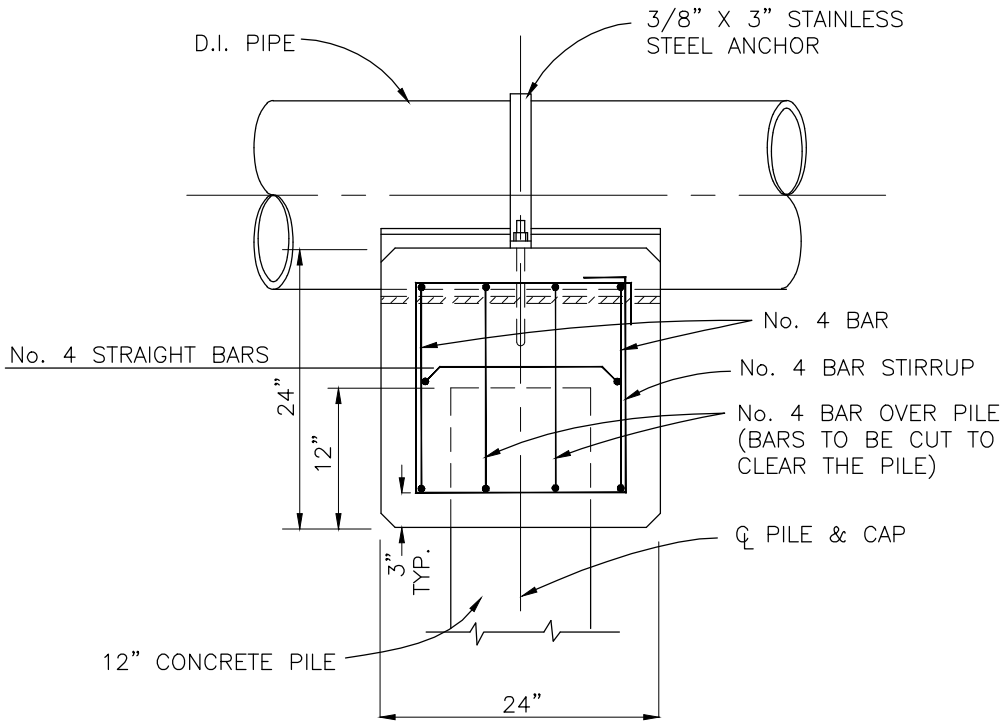


ELEVATION

NOTE:
1. ALL REINF. STEEL SHALL BE No. 4 BARS.
2. ALL HARDWARE SHALL BE STAINLESS STEEL.
3. SEE SHEET 28A FOR ADDITIONAL DIMENSIONS.



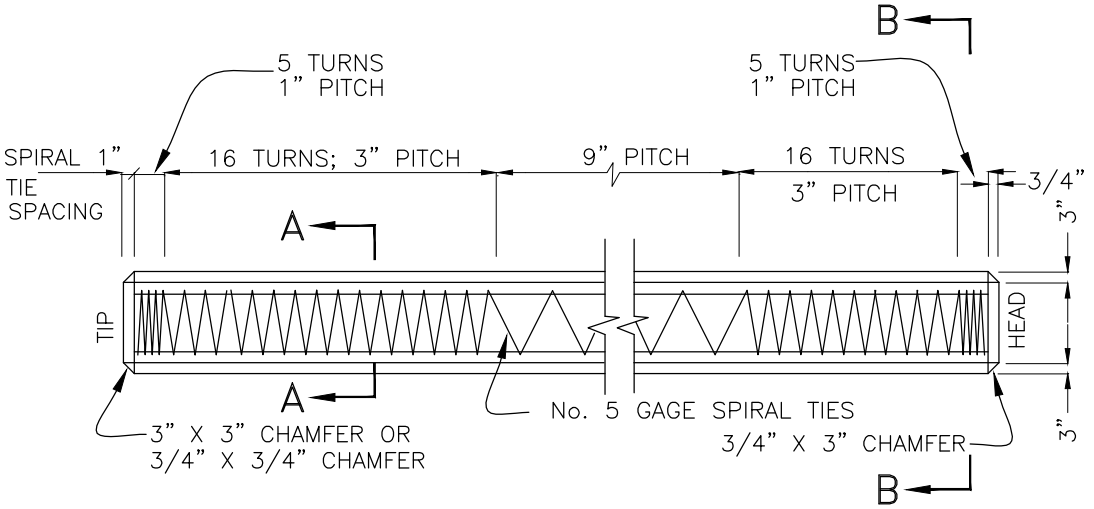
DETAIL



VIEW C–C

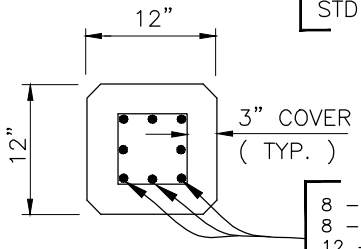
NOTE: ALL HARDWARE SHALL BE STAINLESS STEEL.

PIPE DIA.	PILE SIZE	DIMENSIONS	
		A	B
4"	12"x12"	16"	16"
8"	12"x12"	20"	16"
12"	12"x12"	26"	16"
16"	12"x12"	30"	16"



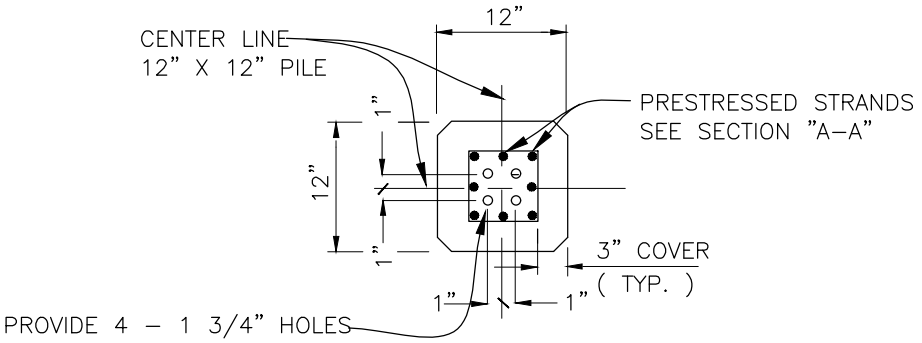
ELEVATION OF 12" X 12" PILE

MAXIMUM LENGTH – 50' SINGLE POINT PICK–UP
MAXIMUM LENGTH – 70' DOUBLE POINT PICK–UP
OVER 70' TRIPLE POINT PICK–UP SEE F.D.O.T
STD. DRAWINGS INDEX No. 600



8 – 7/16"Ø L.R.S. – AS – 0.115 in². – 270K @ 21.700# EA. SPACED 2 9/16" CTRS.
8 – 1/2"Ø S.R. – AS – 0.144 in². – 250K @ 24.100# EA. SPACED 2 1/2" CTRS.
12 – 3/8"Ø L.R.S. – AS – 0.085 in². – 270K @ 14.800# EA. SPACED 1 11/16" CTRS.
12 – 3/8"Ø S.R. – AS – 0.085 in². – 270K @ 15.600# EA. SPACED 1 11/16" CTRS.

SECTION "A–A"



SECTION "B–B"

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	CONCRETE PILE DETAIL	DWG No.
AUGUST 2016		28B

NOTES:

1. PILE BUILD–UP, WHEN REQUIRED, SHALL BE ACCOMPLISHED WITH 4 #10 DOWEL 3" LONG SET IN 1 3/4" DIA. DRILLED HOLES WITH EPOXY MORTAR. PROVIDE 4 #5 LONGITUDINAL BARS AS LONGITUDINAL REINFORCING. SPIRAL TIES SHALL BE #5 CONTINUOUS. SPIRALS SHALL BE TIED TO AT LEAST TWO LONGITUDINAL BARS FOR EACH WRAP.

2. PILING AS PER F.D.O.T. STANDARD SPECIFICATION SECTION 455.

3. SPIRAL TIES: EACH WRAP OF SPIRALS SHALL BE TIED TO AT LEAST TWO CORNER STRANDS. ONE TURN REQUIRED FOR SPIRAL SPLICES. SPIRALS MAY BE MANUFACTURED FROM STOCK MEETING REQUIREMENTS OF ANY GRADE OF REINFORCING STEEL OR HARD DRAWN STEEL.

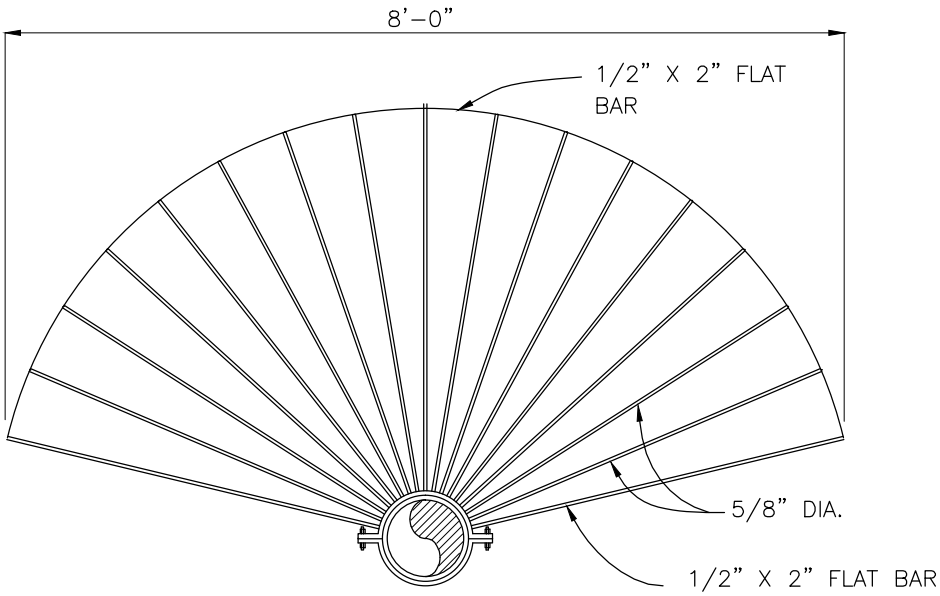
4. CONCRETE CLASS: CONCRETE FOR ALL PILES SHALL BE CLASS V (SPECIAL). CLASS V (SPECIAL) CONCRETE SHALL CONFORM TO THE REQUIREMENTS FOR CLASS V CONCRETE EXCEPT FOR THE 28 DAY STRENGTH AS NOTED BELOW.

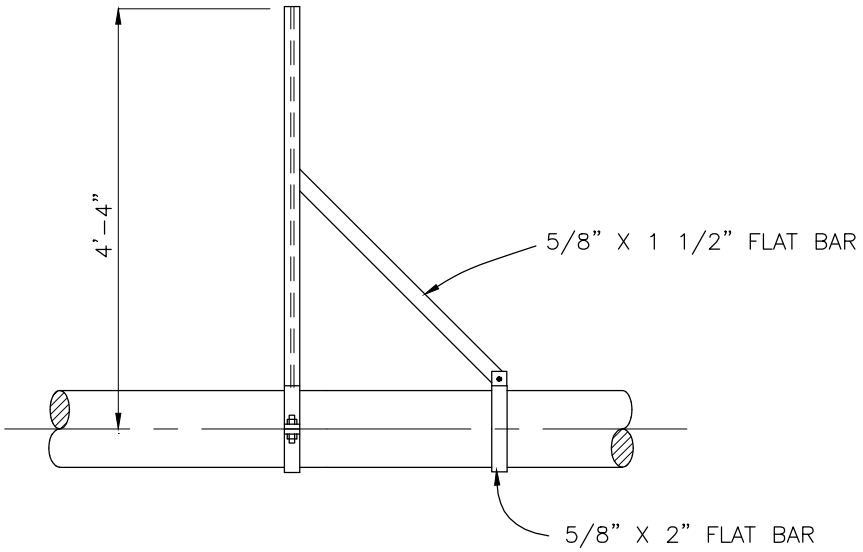
5. CONCRETE STRENGTH: THE CYLINDER STRENGTH SHALL BE 6,000 p.s.i. MINIMUM AT 28 DAYS AND 4,000 p.s.i. MINIMUM AT TRANSFER OF THE PRESTRESSING FORCE.

6. PILES SHALL BE MARKED AT PICK–UP POINTS TO INDICATE PROPER POINTS FOR ATTACHING HANDLING LINE.

7. REINFORCING STEEL: ALL REINFORCING STEEL SHALL BE EITHER GRADE 40 OR 60. UNLESS OTHERWISE NOTED. SEE ENVIRONMENTAL REQUIREMENTS NOTE FOR SPLICE REINFORCING ONLY (SPIRAL TIES AND PRESTRESSING STRAND ARE UNCOATED FOR ALL ENVIRONMENTAL CLASSES).

8. STRAND NOMENCLATURE: S.R. = STRESS RELIEVED STRAND L.R.S = LOW–RELAXATION STRAND



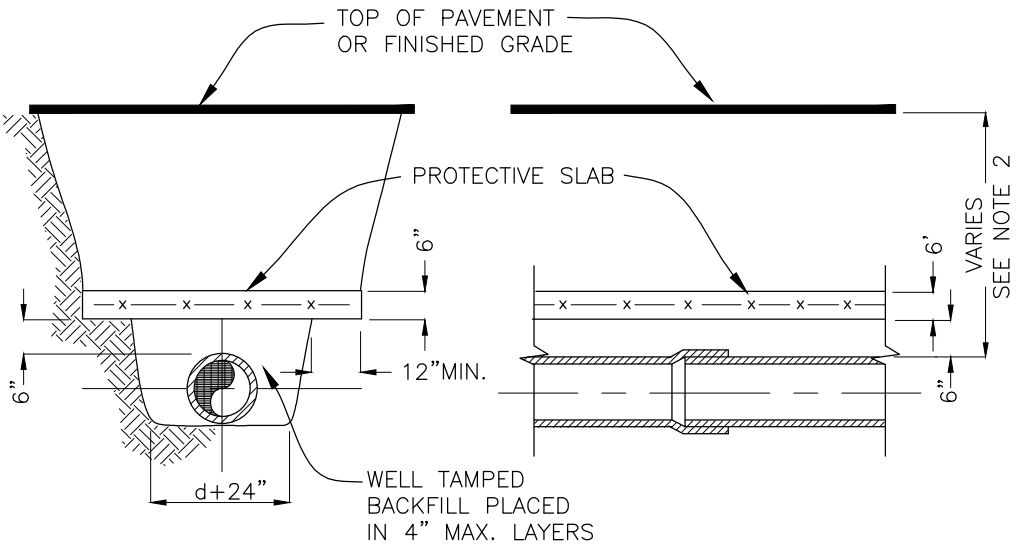


NOTES:

1. FAN GUARDS SHALL BE PLACED AT EACH END OF CANAL CROSSING.

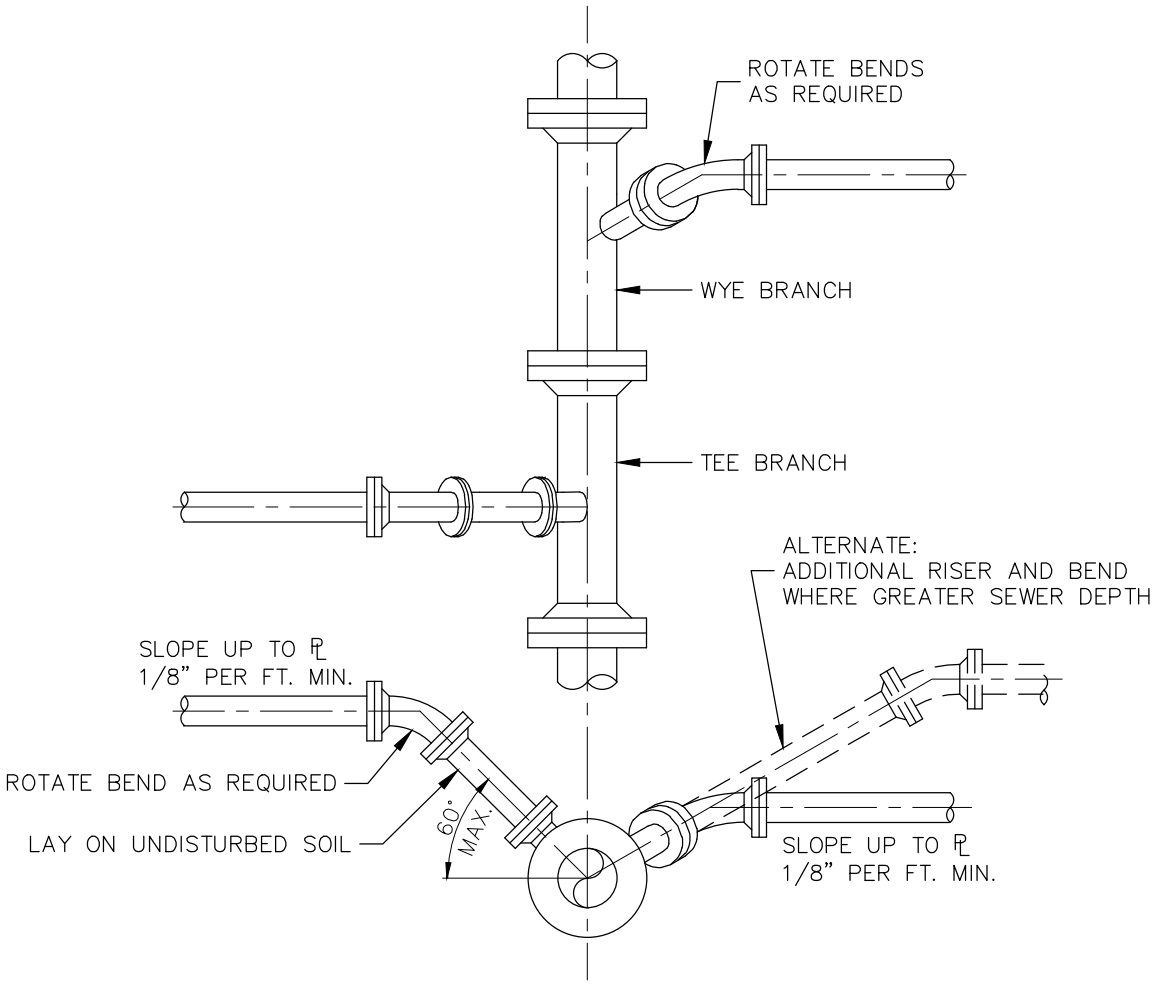
2. FAN GUARD AND ALL MOUNTING BRACKETS TO BE HOT DIP GALVANIZED AND MOUNTING HARDWARE TO BE STAINLESS STEEL.

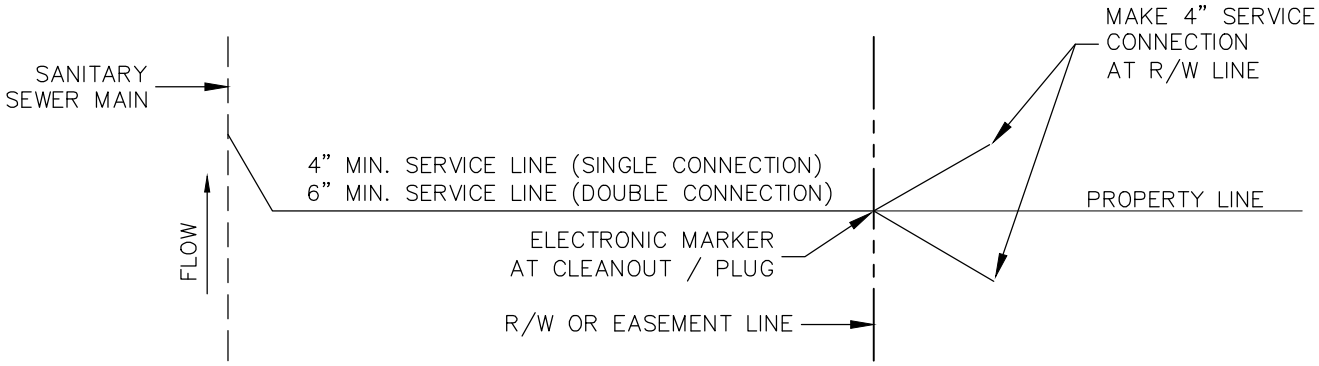
3. 1/2" THICK NEOPRENE PAD TO INSULATE PIPE FROM CONTACT WITH ALL MOUNTING HARDWARE, FAN GUARD HARDWARE, AND CONCRETE SURFACES.



NOTES:

1. CONCRETE PROTECTIVE SLAB SHALL BE 2500 P.S.I. WITH 6"X6"–10/10 W.W. MESH AND 12" MIN. BEARING EACH SIDE OF TRENCH.
2. PROTECTIVE SLAB REQUIRED WHERE COVER FOR MAINS IS LESS THAN 30" AND LATERALS WHEN LESS THAN 24".



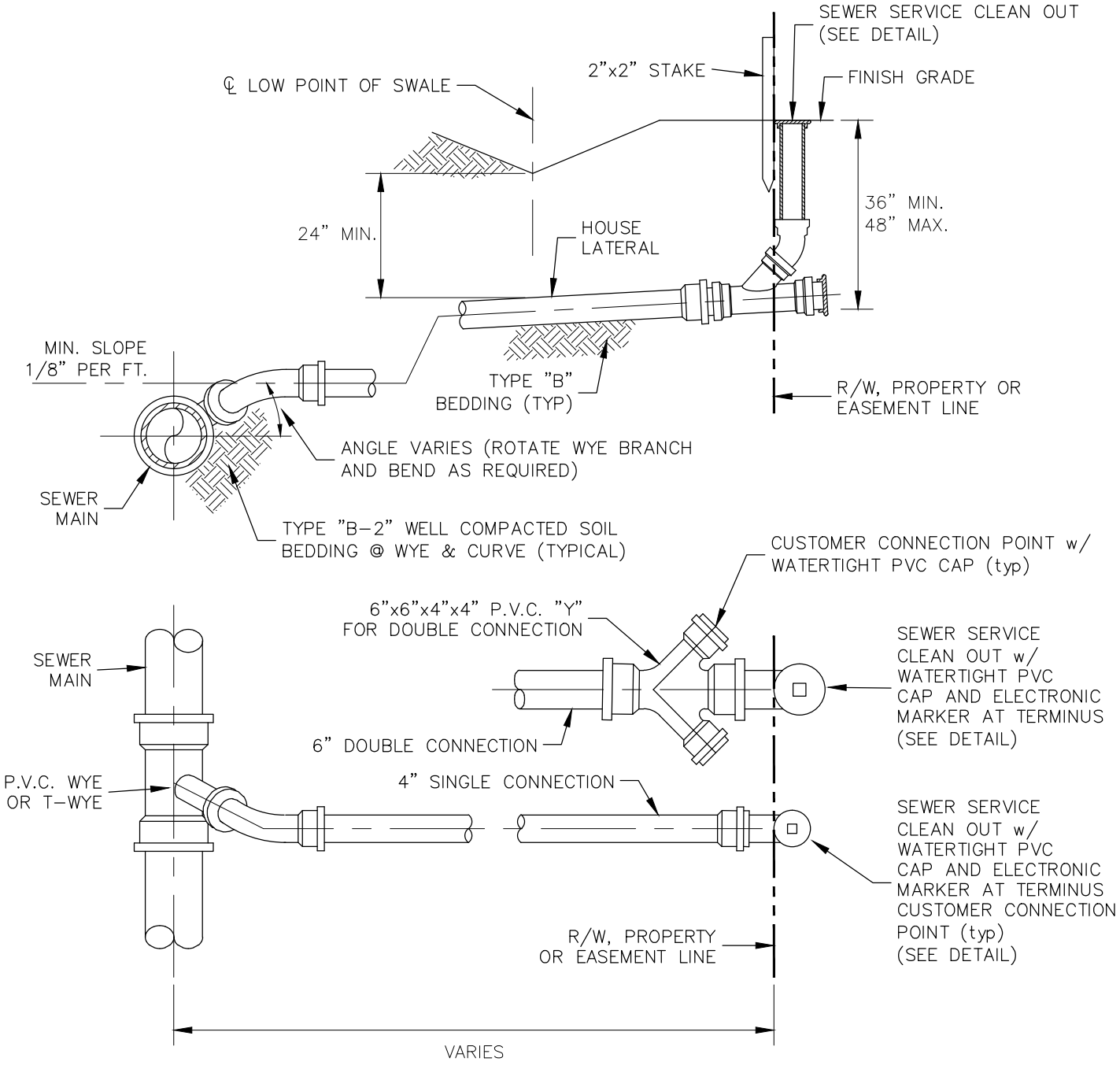


NOTES:

1. SERVICE LATERALS SHALL TERMINATE WITH A CLEANOUT AT ℄.
2. LATERAL DEPTH AT ℄ SHALL BE (3) FEET MIN., PLUGGED WATERTIGHT AND MARKED WITH 2" x 2" TREATED STAKE AND ELECTRONIC MARKER.

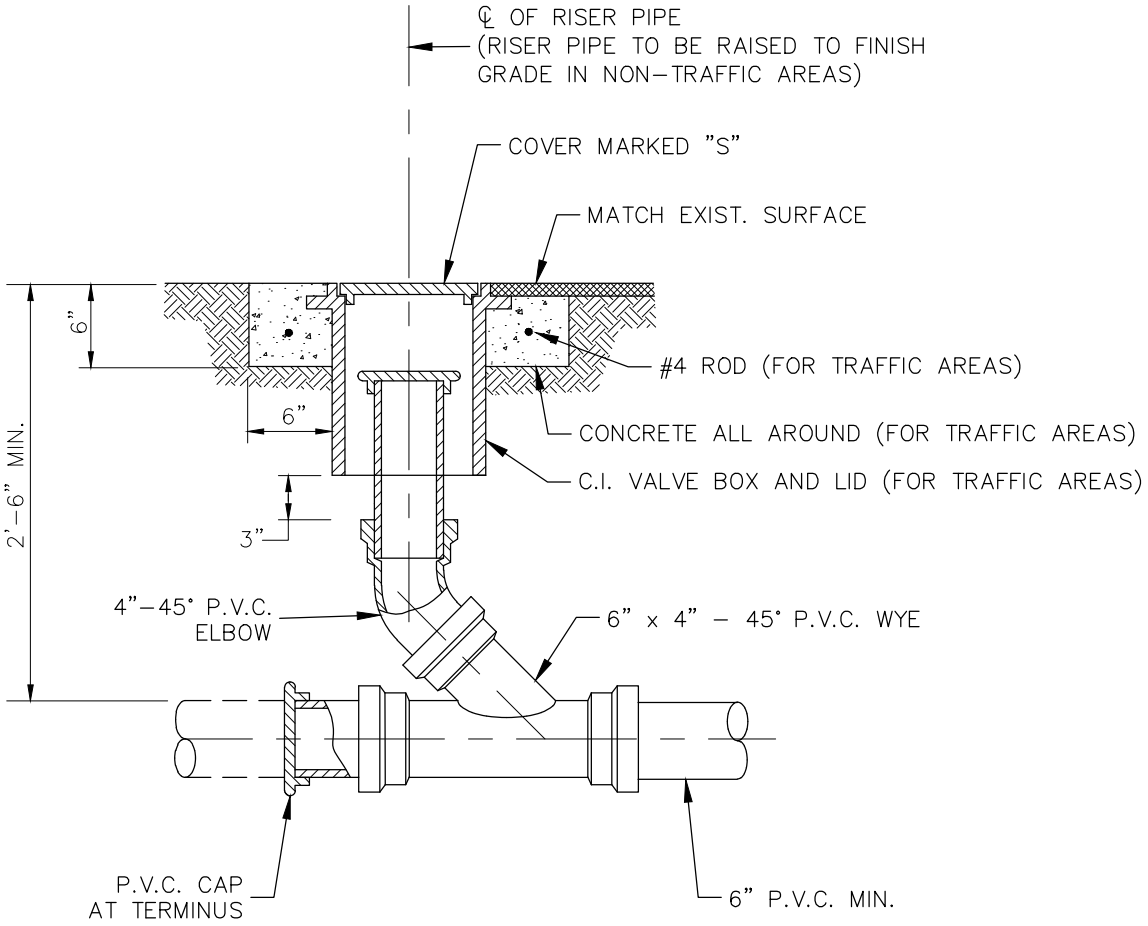
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPICAL SEWER SERVICE CONNECTION	DWG No.
AUGUST 2016		31



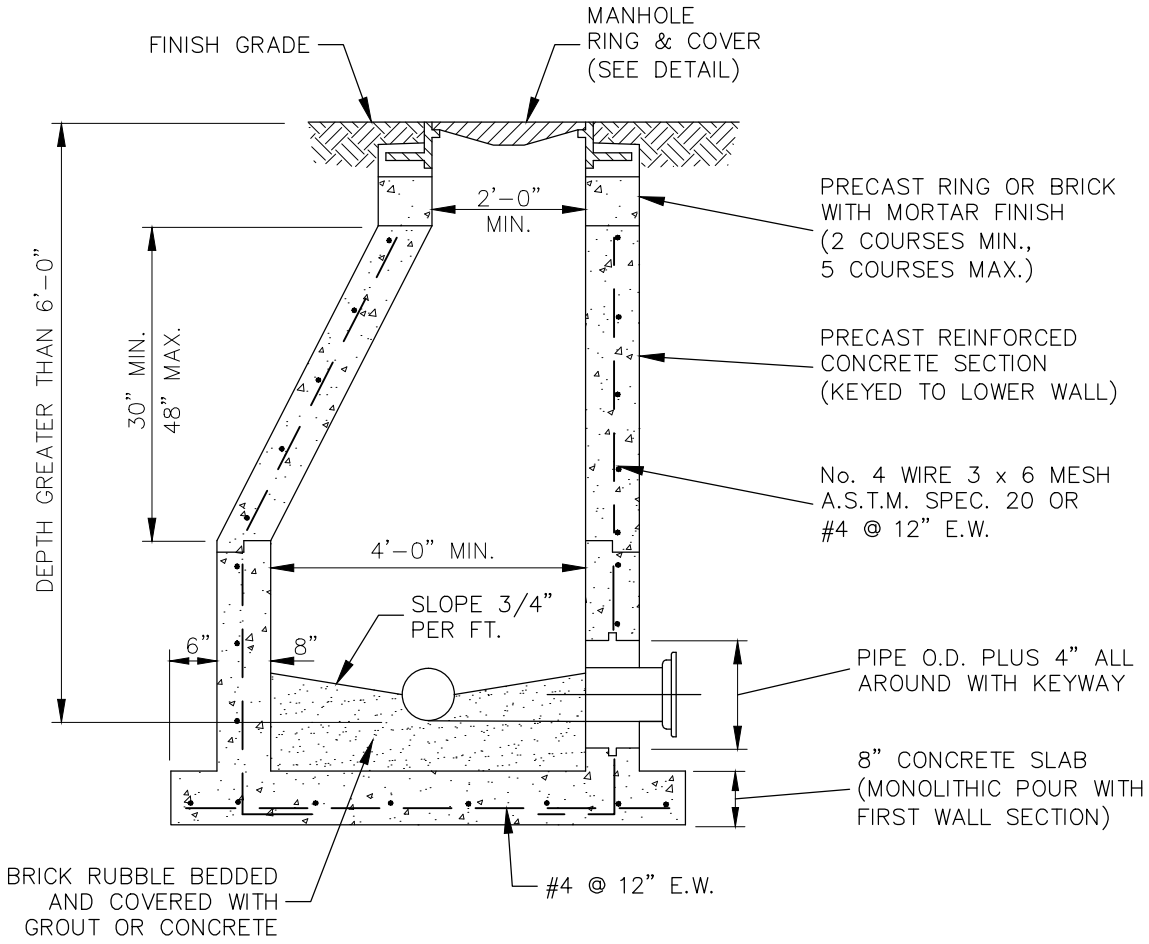
NOTES:

1. INVERT OF LATERAL TO BE 36" FROM FINISHED GRADE EXCEPT ON " WATER LINE SIDE " OF STREET R/W WHERE IT SHALL DROP TO 48" AS SOON AS DEPTH OF SEWER MAIN PERMITS.
2. THIS DETAIL TO BE USED WHEN TOP OF SEWER MAIN IS LESS THAN 7'-0" DEEP.
3. INSTALL MAGNETIC MARKERS AT THE END OF EACH SERVICE LINE OR OPPOSITE WYES AND RECORD LOCATION.
4. SERVICE LATERALS SHALL TERMINATE WITH A CLEANOUT AT ℄.



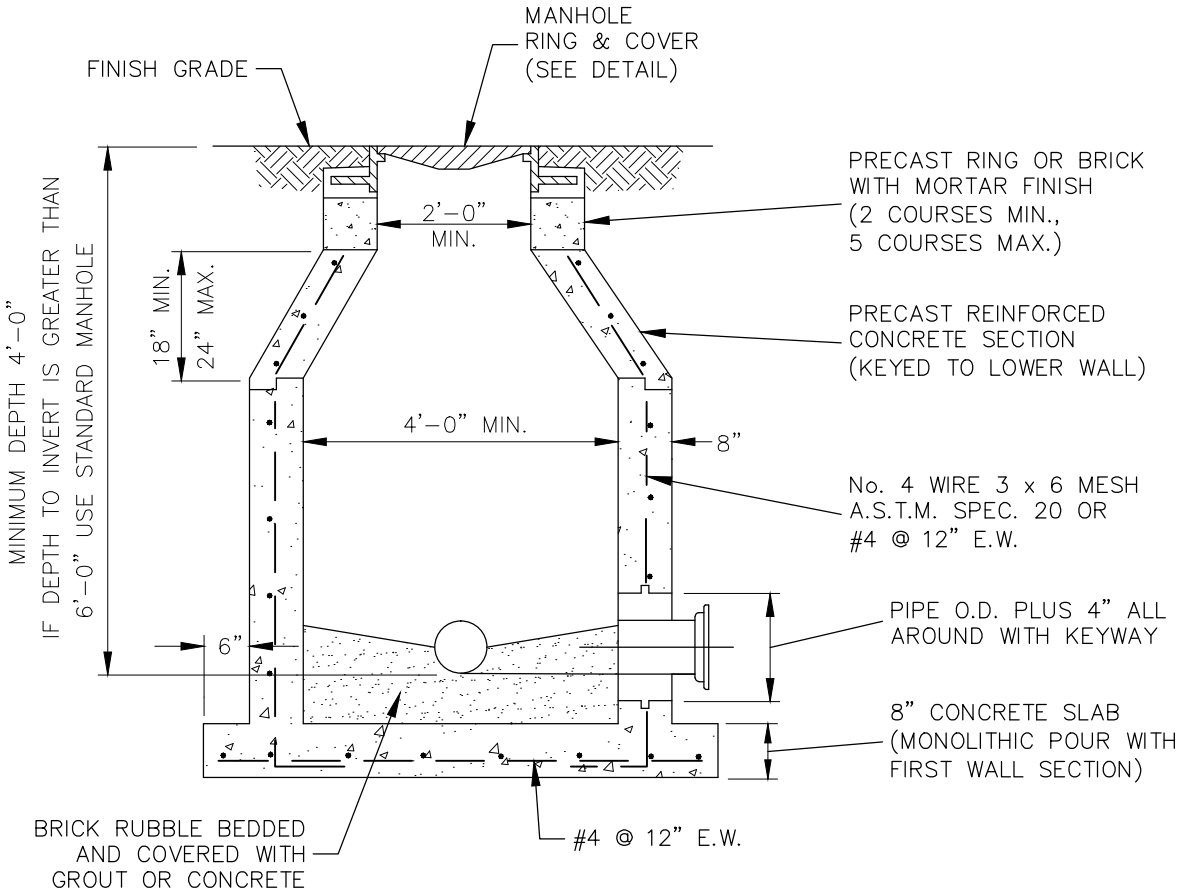
NOTES:

1. CONCRETE PAD w/ REBAR AND CAST IRON VALVE BOX TO BE INSTALLED IN TRAFFIC AREAS ONLY.



NOTES:

1. PROVIDE 0.1' DROP THROUGH MANHOLE.
2. PRECAST CONCRETE TYPE II, 4000 P.S.I.
3. "RAMNEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH WIDTH AT LEAST 1/2 THE WALL THICKNESS) WITH GROUT ON INSIDE AND OUTSIDE.
4. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
5. FLOW CHANNELS SHALL BE CONSTRUCTED TO DIRECT INFLUENT INTO FLOW STREAM. (SEE DETAIL)
6. LIFT HOLES ARE PERMITTED.
7. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
8. SAND COLLAR OR APPROVED RUBBER BOOT MUST BE USED WITH P.V.C. PIPE.
9. MANHOLE TO RECEIVE 2 COATS WATER BASED EPOXY (PRO TECH EW-1 OR APPROVED EQUAL) ON THE INTERIOR AND EXTERIOR. TERMINAL MANHOLES, i.e. THE LAST MANHOLE PRIOR TO DISCHARGE TO A LIFT STATION, SHALL RECEIVE 2 COATS OF WATER BASED EPOXY ON THE EXTERIOR (PRO TECH EW-1 OR APPROVED EQUAL). THE INTERIOR SHALL RECEIVE COATING OF 120 MILS OF REZCLAD E-125S AR OR MIN. 1/2" SEWPER COAT OR IET SYSTEMS COATING (10 MILS PRIMARY COAT, 30 MILS INTERMEDIATE COAT, 5-10 MILS FINISH COAT) OR MIN. 1/2" REFRATTA HAC 100.



NOTES:

1. PROVIDE 0.1' DROP THROUGH MANHOLE.
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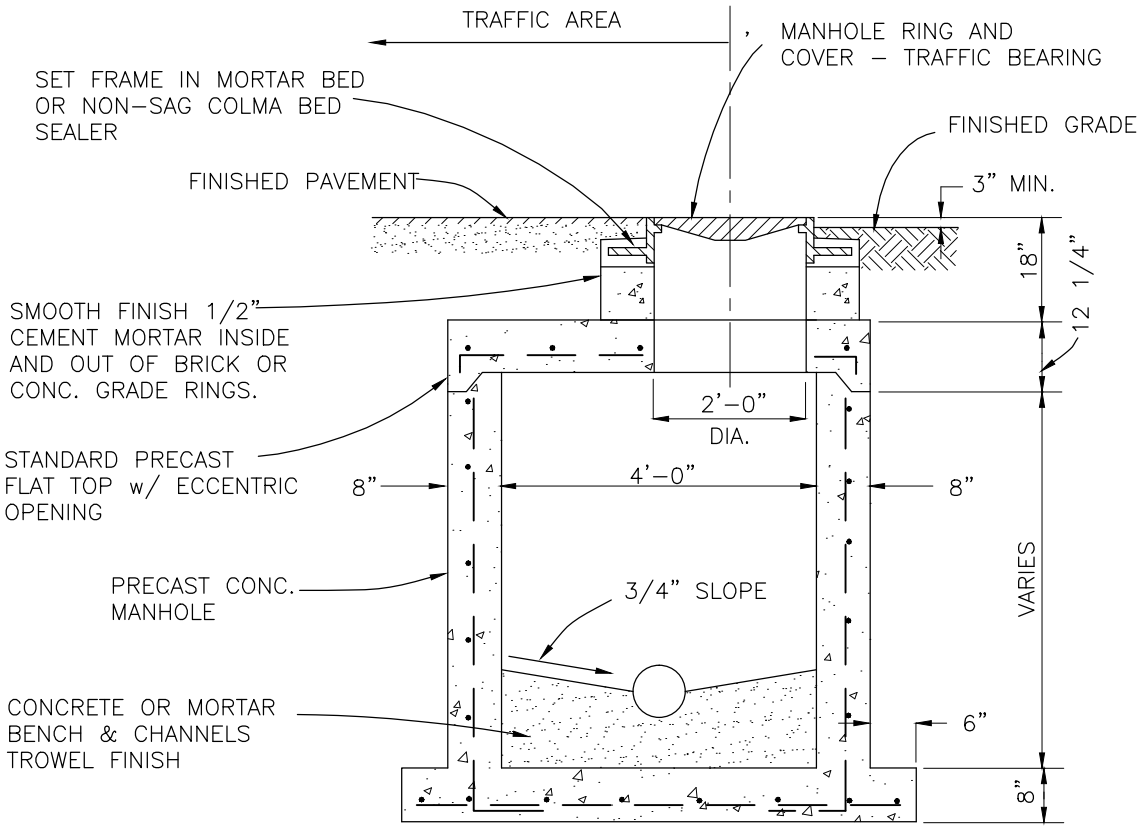
3. "RAMNEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH WIDTH AT LEAST 1/2 THE WALL THICKNESS) WITH GROUT ON INSIDE AND OUTSIDE.
4. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
5. FLOW CHANNELS SHALL BE CONSTRUCTED TO DIRECT INFLUENT INTO FLOW STREAM. (SEE DETAIL)
6. LIFT HOLES ARE PERMITTED.
7. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
8. SAND COLLAR OR APPROVED RUBBER BOOT MUST BE USED WITH P.V.C. PIPE.
9. MANHOLE TO RECEIVE 2 COATS WATER BASED EPOXY (PRO TECH EW-1 OR APPROVED EQUAL) ON THE INTERIOR AND EXTERIOR. TERMINAL MANHOLES, i.e. THE LAST MANHOLE PRIOR TO DISCHARGE TO A LIFT STATION, SHALL RECEIVE 2 COATS OF WATER BASED EPOXY ON THE EXTERIOR (PRO TECH EW-1 OR APPROVED EQUAL). THE INTERIOR SHALL RECEIVE COATING OF 120 MILS OF REZCLAD E-125S AR OR MIN. 1/2" SEWPER COAT OR IET SYSTEMS COATING (10 MILS PRIMARY COAT, 30 MILS INTERMEDIATE COAT, 5-10 MILS FINISH COAT) OR MIN. 1/2" REFRATTA HAC 100.



NOTES:

1. PROVIDE 0.1' DROP THROUGH MANHOLE.
2. PRECAST CONCTETE MANHOLES SHALL CONFORM TO ASTM C478, SHALL BE TYPE II ACID RESISTANT CEMENT AND SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI IN 28 DAYS.
3. USE ONLY WHERE APPROVED AND SPECIFIED ON PLANS.
4. "RAMNEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH WIDTH AT LEAST 1/2 THE WALL THICKNESS) WITH GROUT ON INSIDE AND OUTSIDE.
5. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON–SHRINKING GROUT.
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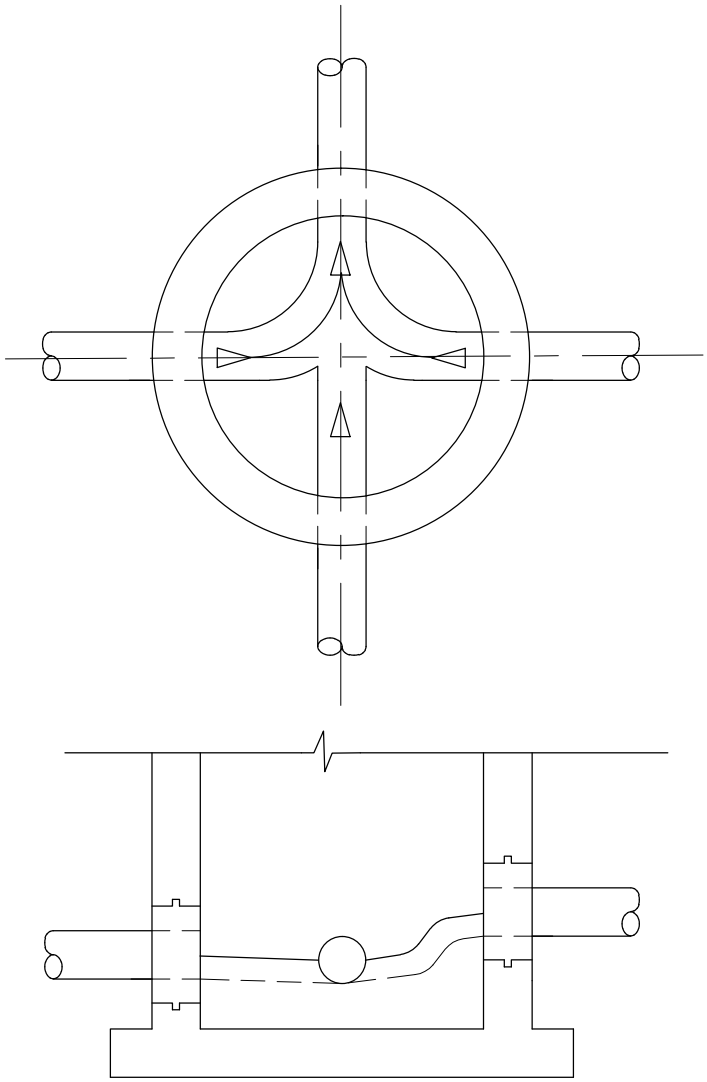


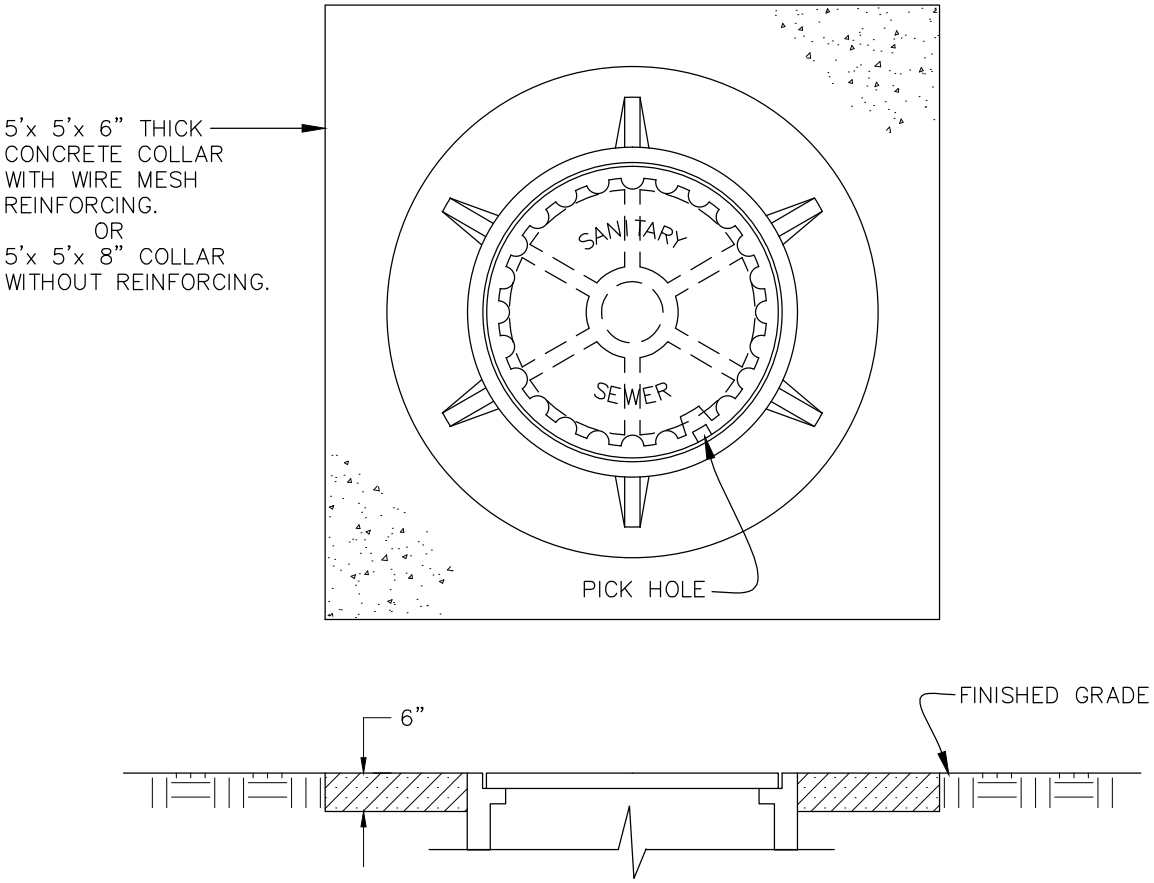
NOTES:

1. ALL INVERT CHANNELS ARE TO BE CONSTRUCTED FOR SMOOTH FLOW WITHOUT OBSTRUCTION.

2. PROPERLY SHAPED SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS TO PROVIDE FOR SMOOTH FLOWS.

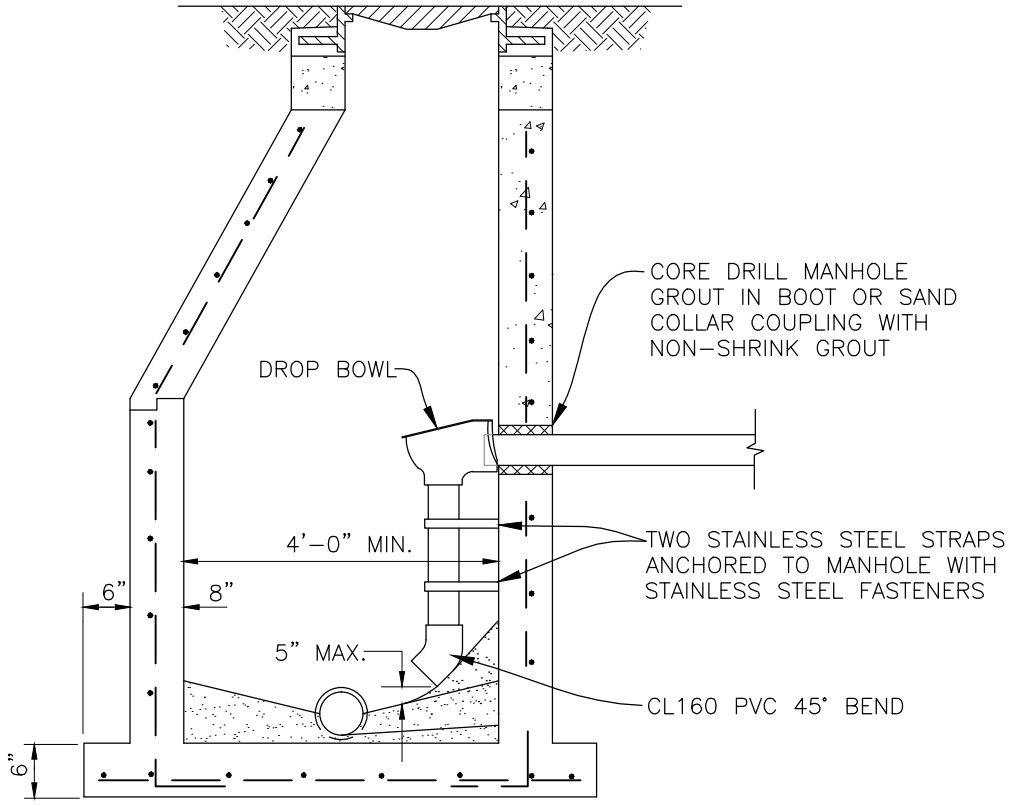
3. BRICK AND CONCRETE RUBBLE PERMITTED AS FLOW CHANNEL BUILDUP.

4. SIDEWALLS OF FLOW CHANNEL SHALL BE AT LEAST HALF OF PIPE HEIGHT AT ALL POINTS.



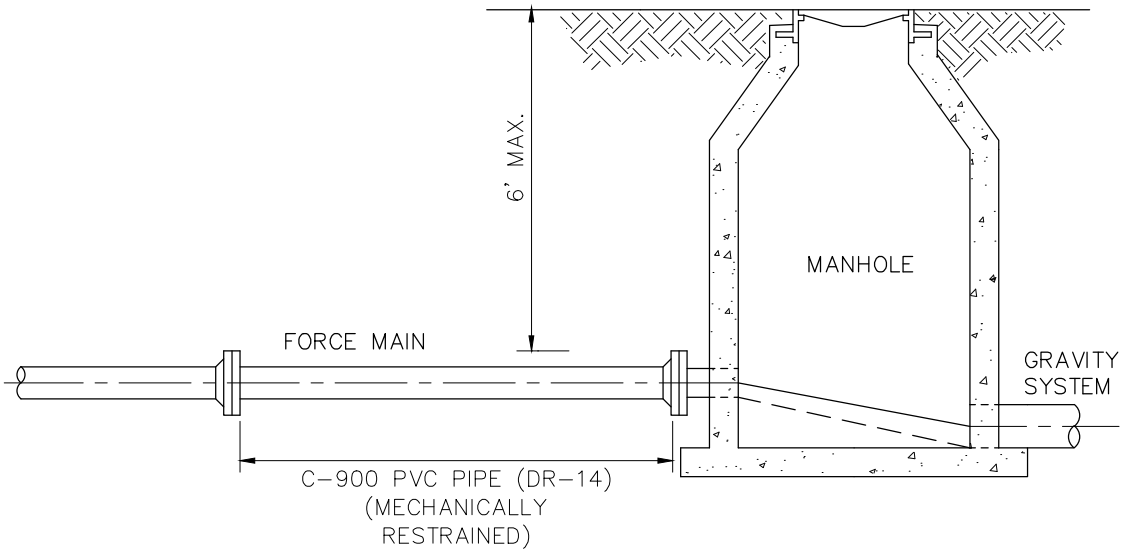
NOTES:

1. COLLAR IS REQUIRED ONLY WHEN MANHOLE IS OUT OF PAVEMENT.
2. MINIMUM WEIGHTS: COVER – 160 LBS., FRAME – 240 LBS.
3. RING AND COVER SHALL BE U.S. FOUNDRY 420–C, VULCAN FOUNDRY V–101 OR APPROVED EQUAL.
4. MANHOLE COVER SHALL HAVE THE WORDS "SANITARY SEWER" CAST IN METAL.
5. MANHOLE COVER SHALL MEET H–20 TRAFFIC LOADING.



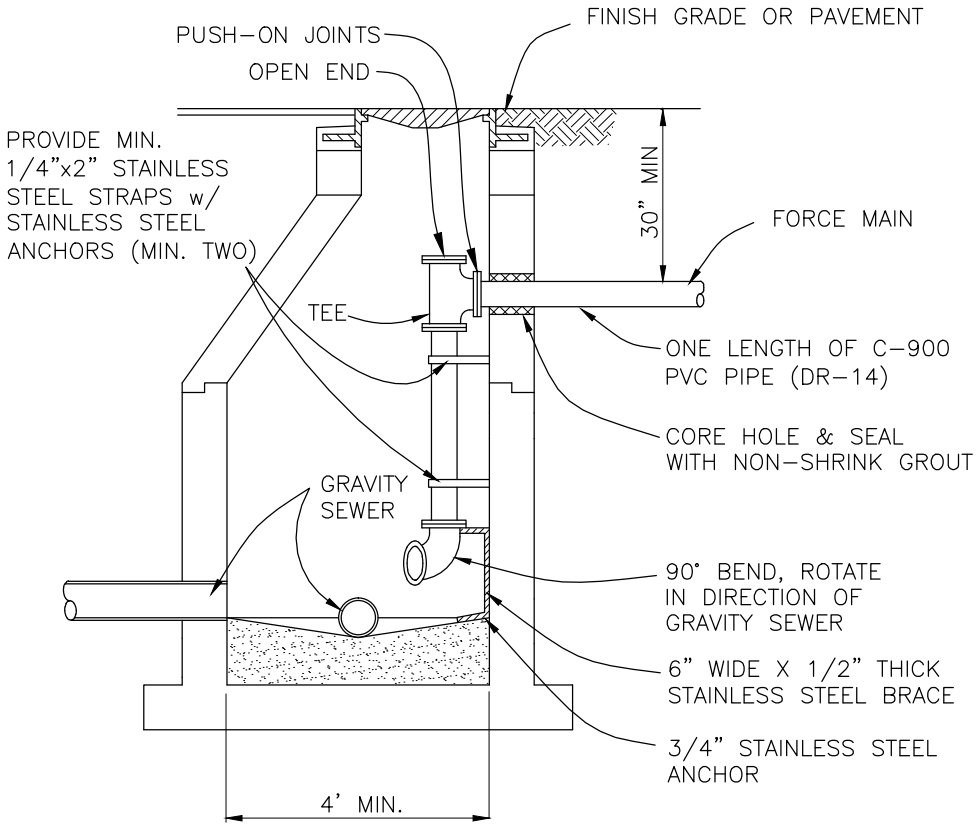
NOTES:

1. ALL DETAILS AND SPECIFICATIONS FOR STANDARD MANHOLES ARE APPLICABLE EXCEPT FOR REFERENCES TO DROP ASSEMBLY AND COATINGS.
2. THE PRECAST BASE SHALL EXTEND FULLY UNDER THE DROP ASSEMBLY.
3. MASONRY CONSTRUCTION ABOVE THE EXTENDED PRECAST BASE IS PERMISSIBLE IF FILLED WITH CONCRETE.
4. BRICK AND CONCRETE RUBBLE ARE PERMITTED AS FILLER IN DROP ENCASEMENT.
5. DROP CONNECTIONS SHALL BE REQUIRED WHENEVER AN INFLUENT INVERT IS LOCATED 2.0 FEET OR MORE ABOVE THE MAIN INVERT CHANNEL. DROP CONNECTIONS SHOULD NOT BE DESIGNED FOR LESS THAN A 24–INCH DROP.
6. SOLVENT TYPE JOINT P.V.C. FITTINGS MAY BE UTILIZED IN THE DROP ASSEMBLY ONLY.
7. THE EXTERIOR SHALL RECEIVE 2 COATS OF WATER BASED EPOXY (PRO TECH EW–1 OR APPROVED EQUAL). THE INTERIOR SHALL RECEIVE COATING OF 120 MILS OF REZCLAD E–125S AR OR MIN. 1/2" SEWPER COAT OR IET SYSTEMS COATING (10 MILS PRIMARY COAT, 30 MILS INTERMEDIATE COAT, 5–10 MILS FINISH COAT) OR MIN. 1/2" REFRATTA HAC 100.



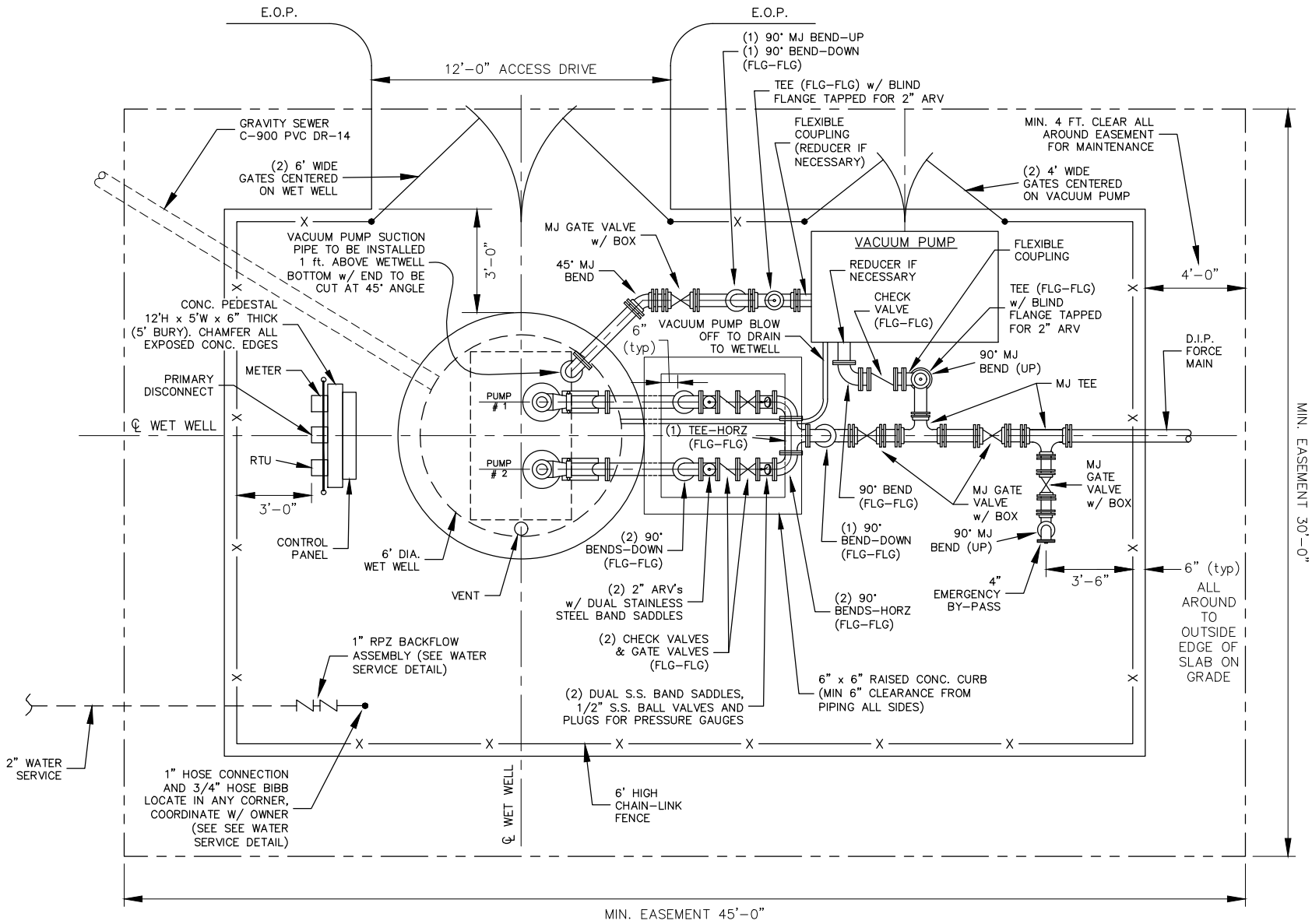
NOTES:

1. FORCE MAIN TO ENTER MANHOLE AS CLOSE AS POSSIBLE TO 180° TO GRAVITY OUTLET.
2. THE INVERT LEVEL OF FORCE MAIN AT POINT OF ENTRY SHALL BE 6" ABOVE INVERT OF MANHOLE.
3. CORE ENTRY ONLY INTO EXISTING MANHOLES. SAND COLLAR OR APPROVED RUBBER BOOT MUST BE USED WITH PVC PIPE.
4. FLOW CHANNEL REQUIRED.
5. THE EXTERIOR SHALL RECEIVE 2 COATS OF WATER BASED EPOXY (PRO TECH EW-1 OR APPROVED EQUAL). THE INTERIOR SHALL RECEIVE COATING OF 120 MILS OF REZCLAD E-125S AR OR MIN. 1/2" SEWPER COAT OR IET SYSTEMS COATING (10 MILS PRIMARY COAT, 30 MILS INTERMEDIATE COAT, 5-10 MILS FINISH COAT) OR MIN. 1/2" REFRATTA HAC 100.



NOTES:

1. DROP PIPE AND FITTINGS MUST BE PVC.
2. PRECAST CONCRETE TYPE II, 4000 P.S.I.
3. "RAMNEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH WIDTH AT LEAST 1/2 THE WALL THICKNESS) WITH GROUT ON INSIDE AND OUTSIDE.
4. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON–SHRINKING GROUT.
5. FLOW CHANNELS SHALL BE CONSTRUCTED TO DIRECT INFLUENT INTO FLOW STREAM. (SEE DETAIL)
6. LIFT HOLES ARE PERMITTED.
7. ALL PIPE HOLES SHALL BE PRECAST OR CORE–DRILLED.
8. SAND COLLAR OR APPROVED RUBBER BOOT MUST BE USED WITH PVC PIPE.
9. THE EXTERIOR SHALL RECEIVE 2 COATS OF WATER BASED EPOXY (PRO TECH EW–1 OR APPROVED EQUAL). THE INTERIOR SHALL RECEIVE COATING OF 120 MILS OF REZCLAD E–125S AR OR MIN. 1/2" SEWPER COAT OR IET SYSTEMS COATING (10 MILS PRIMARY COAT, 30 MILS INTERMEDIATE COAT, 5–10 MILS FINISH COAT) OR MIN. 1/2" REFRATTA HAC 100.



NOTES:

1. ACCESS ROAD SHALL CONSIST OF:
   - 12" THICK STABILIZED SUBBASE, STABILIZED TO NOT LESS THAN 50 FBV AND COMPACTED TO NOT LESS THAN 98% MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180
   - 8" THICK ROCK BASE, COMPACTED TO NOT LESS THAN 98% MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180
   - 8" THICK CONCRETE w/FIBERGLASS MESH REINFORCEMENT.
2. FURNISH AND INSTALL, TWO (2) EACH; 4", 0-60 psig (MAX PRESSURE TO BE CONFIRMED WITH PUMP STATION DESIGN) OIL FILLED PRESSURE GAUGES.
3. ENGINEER OF RECORD RESPONSIBLE FOR FINAL PIPING AND LIFT STATION LAYOUT.

REVISION
AUGUST 2016

TYPE "A" LIFT STATION
TYPICAL SITE PLAN LAYOUT

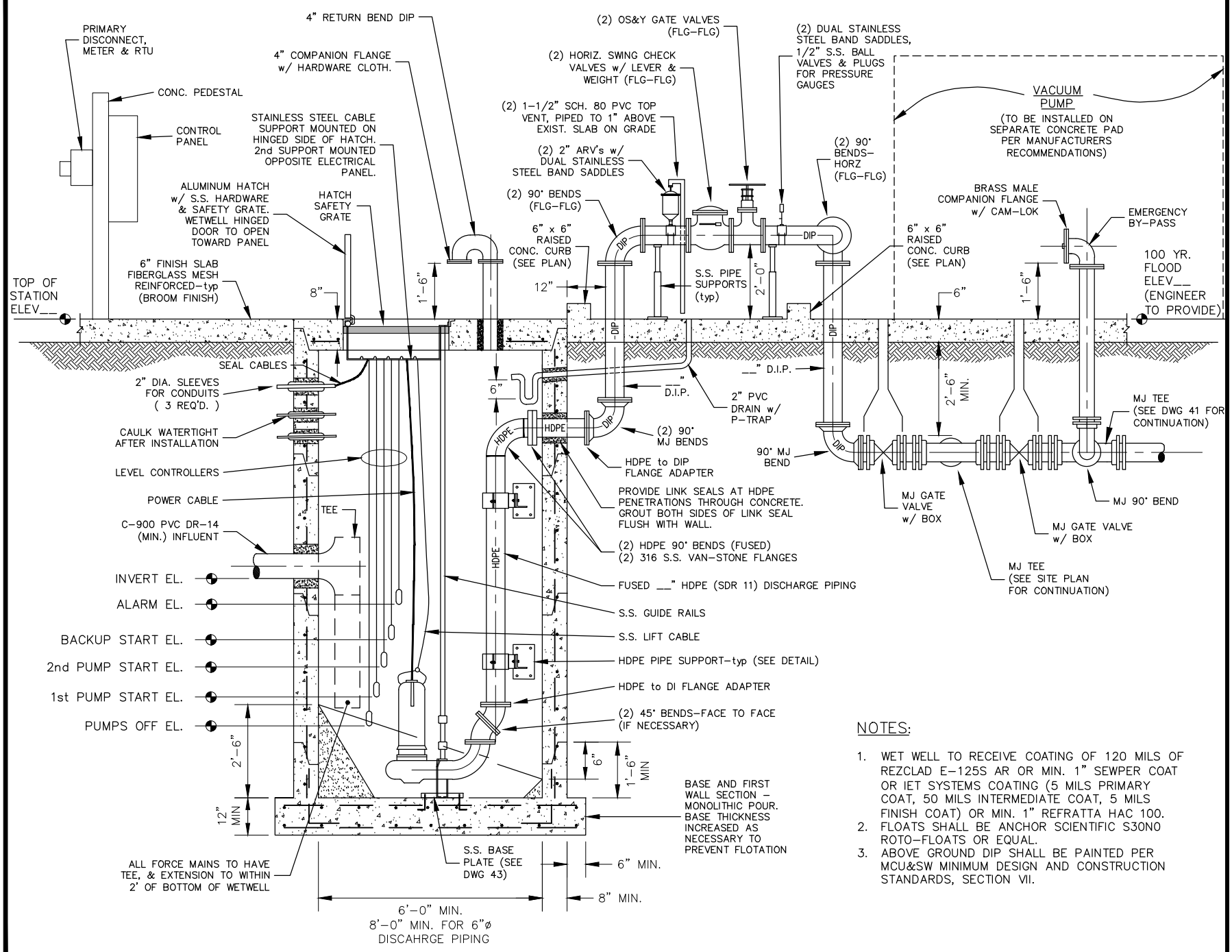
DWG No.
42

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION
AUGUST 2016

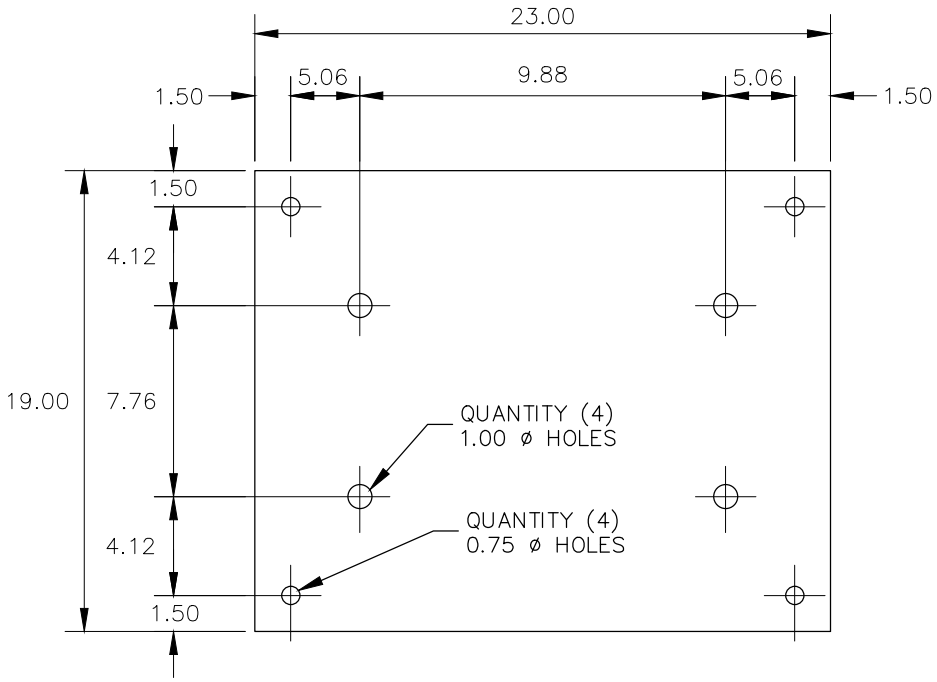
TYPE "A" LIFT STATION
TYPICAL SECTION

DWG No.
43

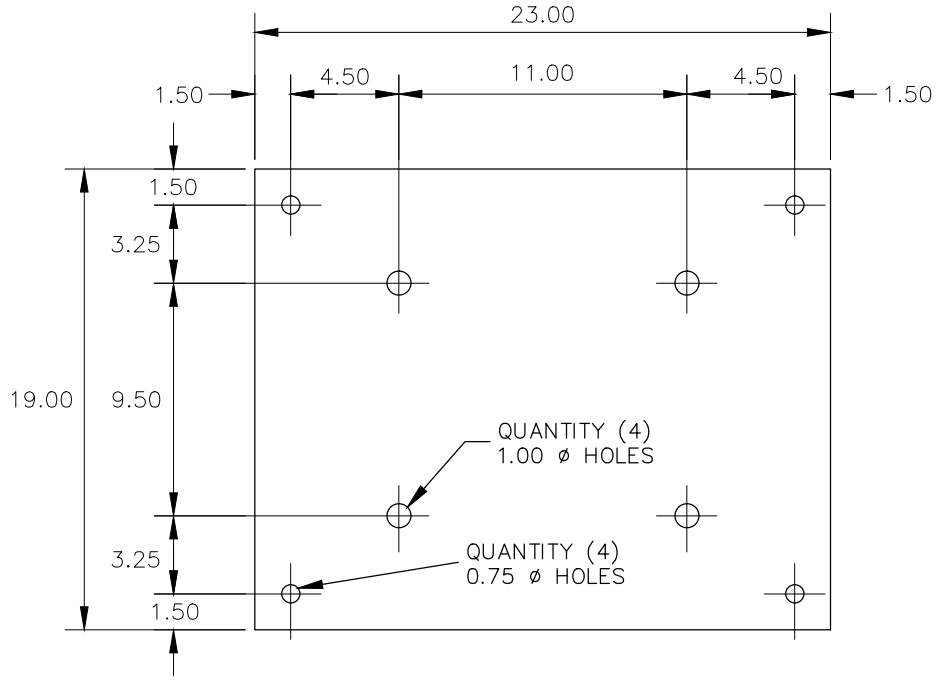


NOTES:

1. WET WELL TO RECEIVE COATING OF 120 MILS OF REZCLAD E–125S AR OR MIN. 1" SEWPER COAT OR IET SYSTEMS COATING (5 MILS PRIMARY COAT, 50 MILS INTERMEDIATE COAT, 5 MILS FINISH COAT) OR MIN. 1" REFRATTA HAC 100.
2. FLOATS SHALL BE ANCHOR SCIENTIFIC S30N0 ROTO–FLOATS OR EQUAL.
3. ABOVE GROUND DIP SHALL BE PAINTED PER MCU&SW MINIMUM DESIGN AND CONSTRUCTION STANDARDS, SECTION VII.



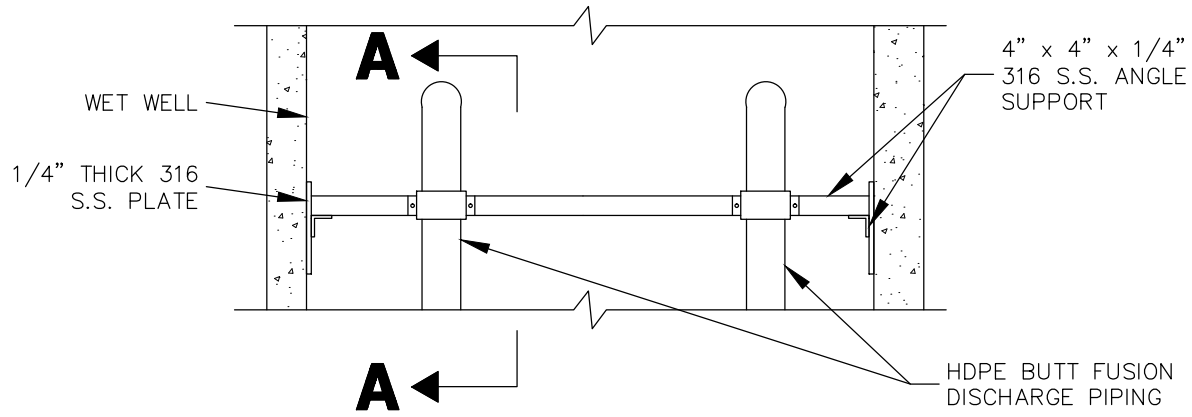
4"x4" ELBOWS

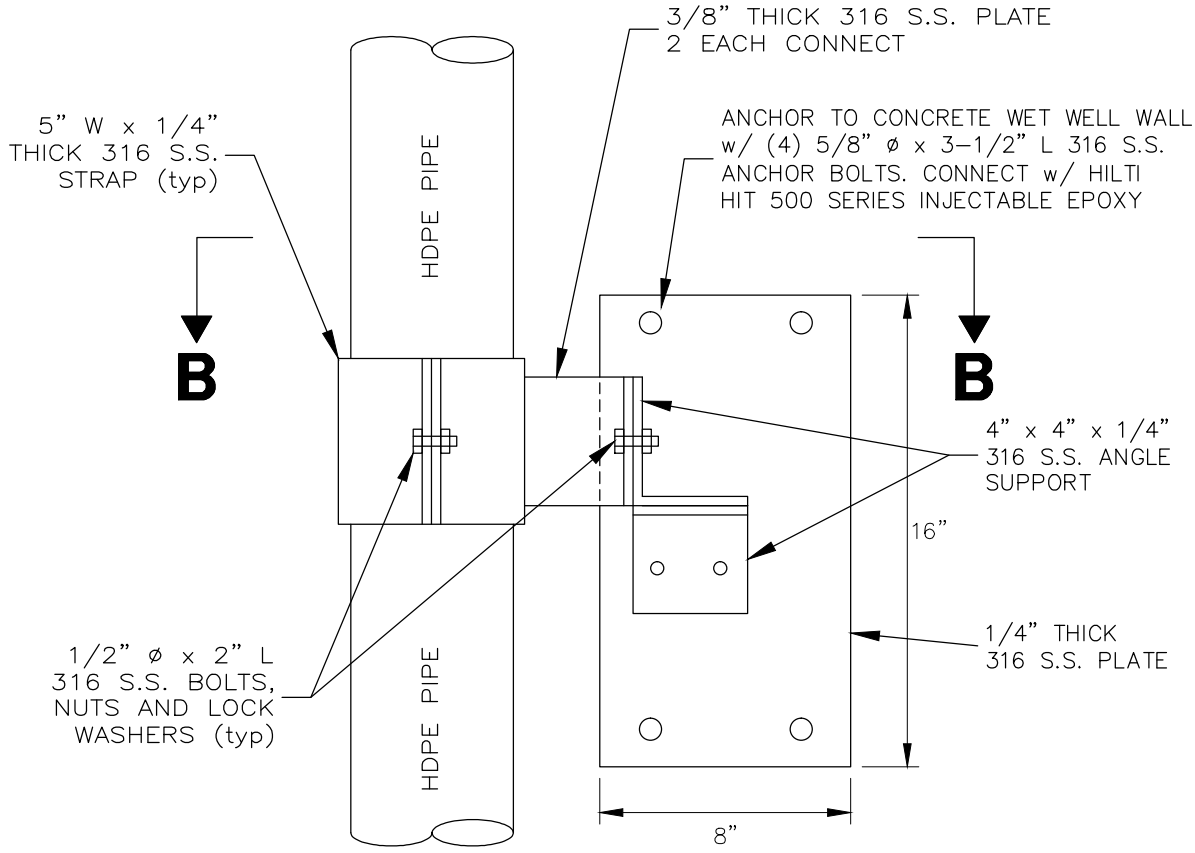


6"x6", 6"x8" & 8"x8" ELBOWS

NOTES:

1. EACH BASE ELBOW SHALL BE SECURED TO THE BOTTOM OF THE WET WELL WITH FOUR (4) 3/4" STEEL WEDGE ANCHOR BOLTS AND STAINLESS STEEL PLATE. THE PLATE SHALL BE SECURED WITH FOUR (4) 1/2" STAINLESS STEEL ANCHOR BOLTS. THE BOLTS SHALL BE EMBEDDED A MINIMUM OF 4" INTO THE CONCRETE AND TORQUED TO 150 FT. LBS.
2. THE STAINLESS STEEL PLATES AND BOLTS SHALL BE FURNISHED BY THE PUMP MANUFACTURER.

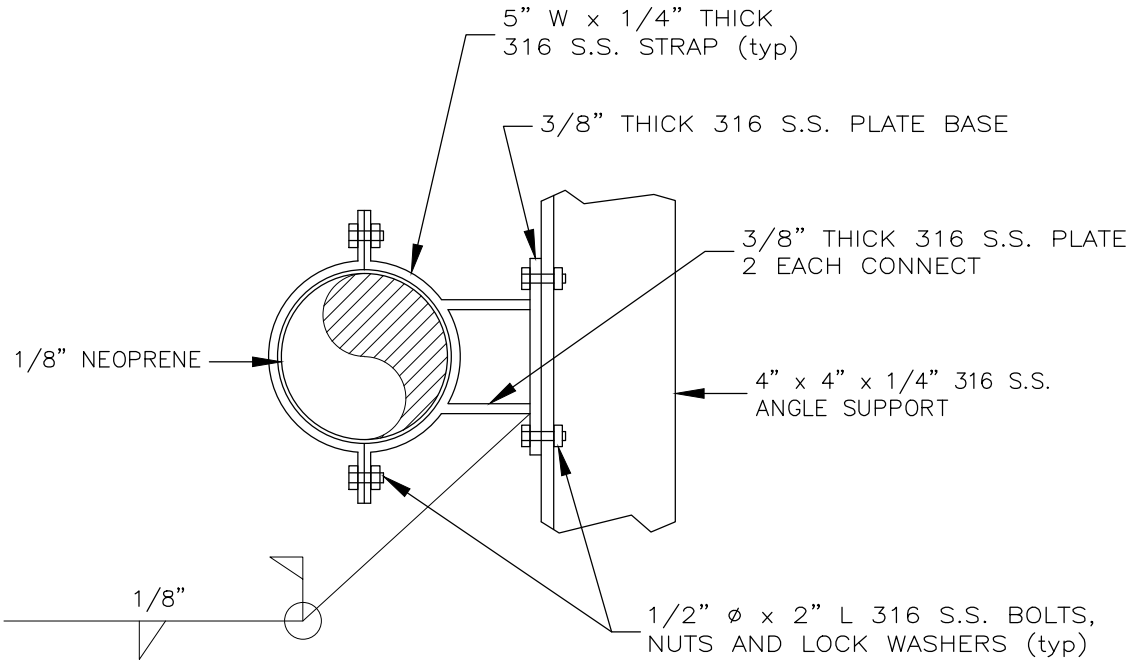




SECTION A–A

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

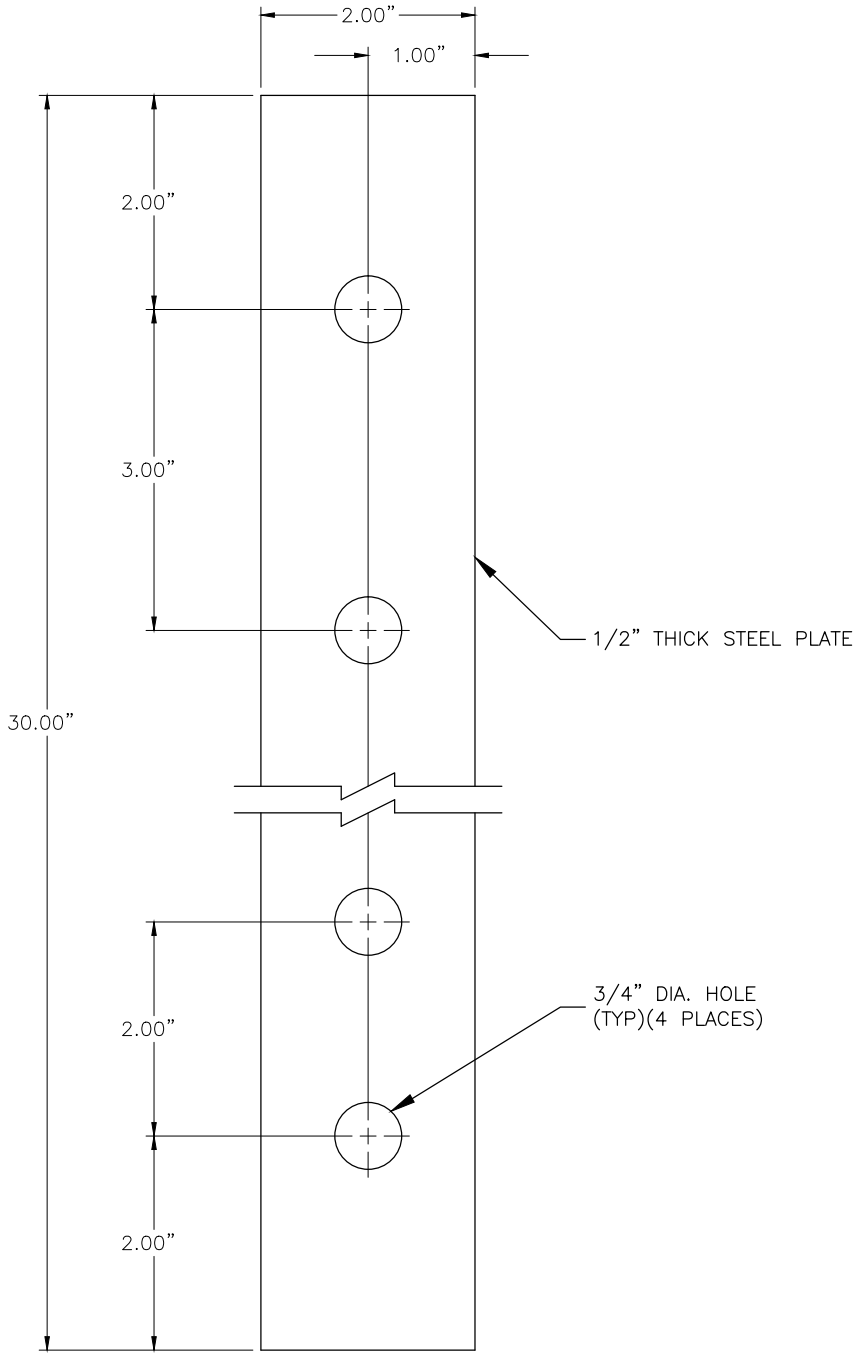
REVISION	TYPE "A" LIFT STATION HDPE ANGLE PIPE SUPPORT	DWG No.
AUGUST 2016		45



SECTION B–B

NOTE:

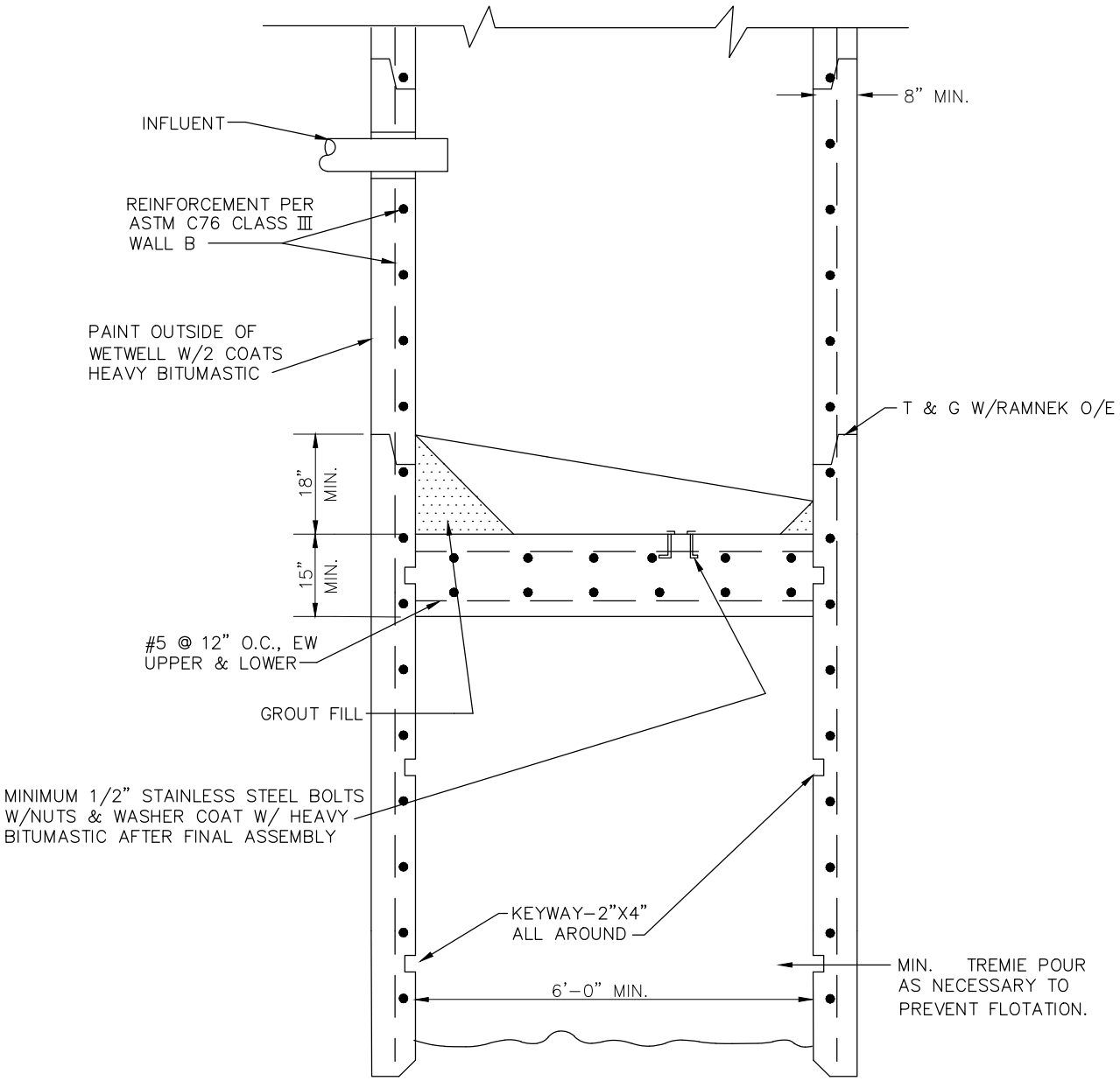
1. CONSTRUCT ALL WELDS IN ACCORDANCE WITH AWS D–1.6 STRUCTURAL WELDING CODE.
2. ALL FASTENERS, SUPPORTS AND ANCHOR BOLTS SHALL BE 316 S.S.
3. SUPPORTS SHALL HAVE A MAXIMUM SPACING OF 5'–0"
4. AT A MINIMUM, ONE SUPPORT SHALL BE LOCATED 4' ABOVE THE BASE ELBOW AND ONE SUPPORT SHALL BE LOCATED 4' BELOW THE BOTTOM OF TOP SLAB.



NOTE: 6 RETAINER STRAPS PER JOINT.

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION WET WELL SECTION RETAINER STRAP	DWG No.
AUGUST 2016		46



SECTION

NOTES:

1. CONCRETE WETWELL SECTIONS SHALL BE CONNECTED BY STEEL STRAPS, SIX PER JOINT. CONTRACTOR SHALL SUBMIT METHOD TO UTILITIES FOR APPROVAL ALONG WITH SHOP DRAWING.
2. SEE TYPICAL LIFT STATION DETAILS FOR ADDITIONAL DESIGN AND CONSTRUCTION STANDARDS.
3. TREMIE SEAL MINIMUM 5'-0" THICK.
4. DESIGN CALCULATIONS TO BE SUBMITTED FOR APPROVAL.
5. WET WELL TO RECEIVE COATING OF MIN. 120 MILS OF REZCLAD E-125S AR OR MIN. 1" SEWPER COAT OR IET SYSTEMS COATING (MIN. 5 MILS PRIMARY COAT, MIN. 50 MILS INTERMEDIATE COAT, MIN. 5 MILS FINISH COAT) OR MIN. 1" REFRATTA HAC 100.

PUMP DATA: MANUFACTURER, _____

_____ MOD. No., _____ IMP. No., _____ MOTOR,

_____ HP, _____ RPM, _____ VOLTS, _____ PHASE, 60 HERTZ

OPERATING CONDITIONS: _____ GPM AT _____ TDH.

AS-BUILT:
- PUMP NO. 1 _____ GPM AT _____ TDH.
- PUMP NO. 2 _____ GPM AT _____ TDH.

WET WELL: SIZED FOR MINIMUM PUMP CYCLE TIME OF 10 MINUTES AND A MAXIMUM OF 6 PUMP STARTS PER HOUR. WORKING DEPTH _____ FT. WORKING VOLUME _____ GALS.

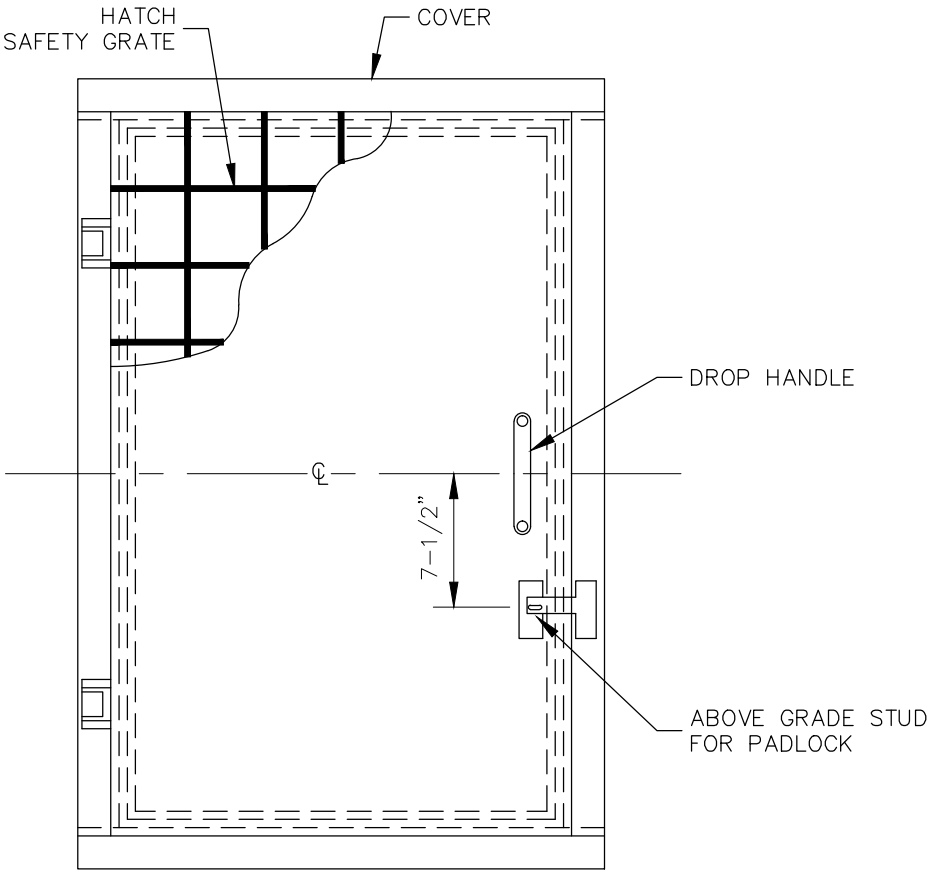
ELECTRICAL: FEEDERS AND CONDUIT _____ MAIN SWITCH _____ POLES _____ AMPS

NOTE:

THE FOLLOWING VOLTAGE STANDARDS FOR LIFT STATION PUMPS ARE REQUIRED PER FPL AND MCU:

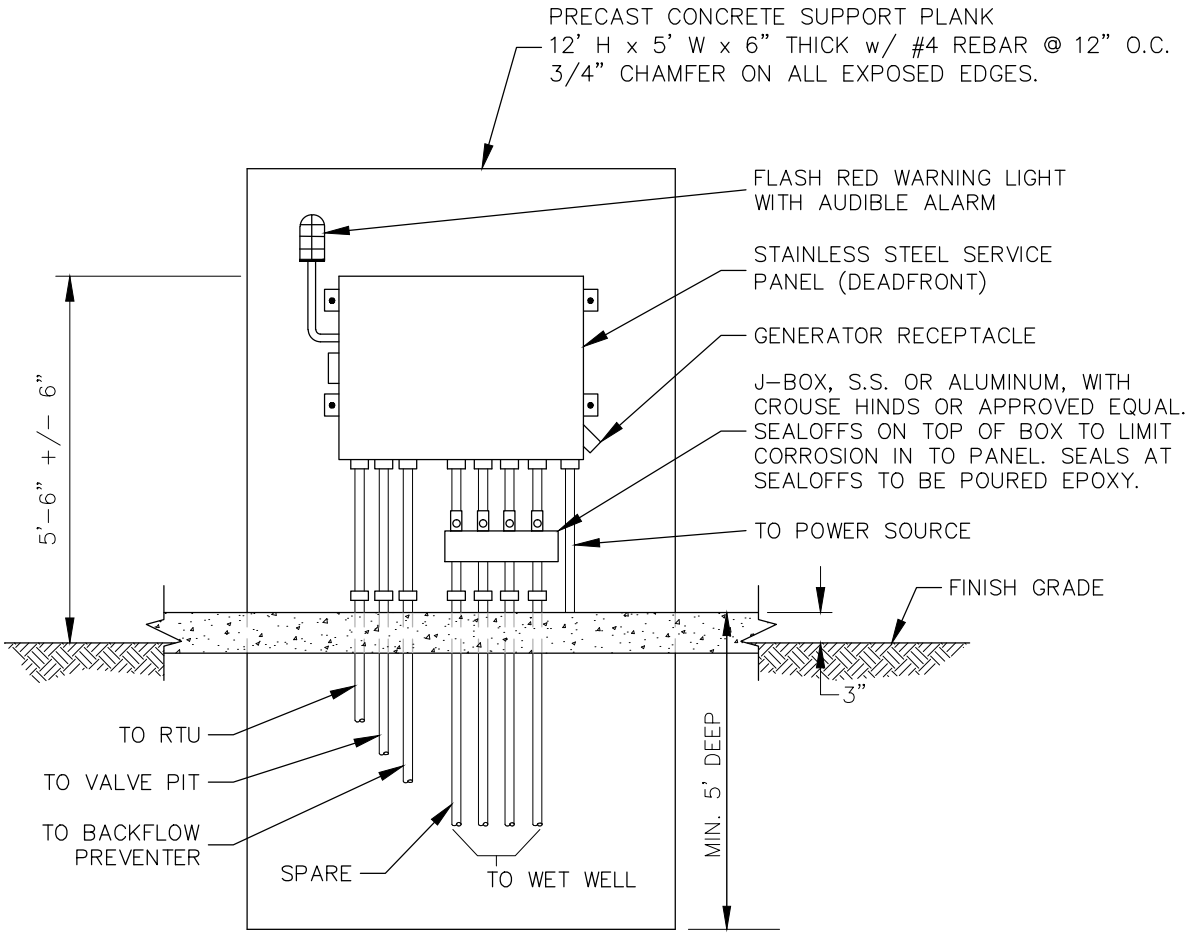
WHERE 3-PHASE POWER IS AVAILABLE

- LESS THAN OR EQUAL TO 10 HP: 120/230 3-PHASE, 4 WIRE, OPEN DELTA
- MORE THAN 10 HP: 277/480 3-PHASE, 4 WIRE, OPEN DELTA (WHEN POSSIBLE)
- COORDINATE WITH FPL FOR SUPPLY



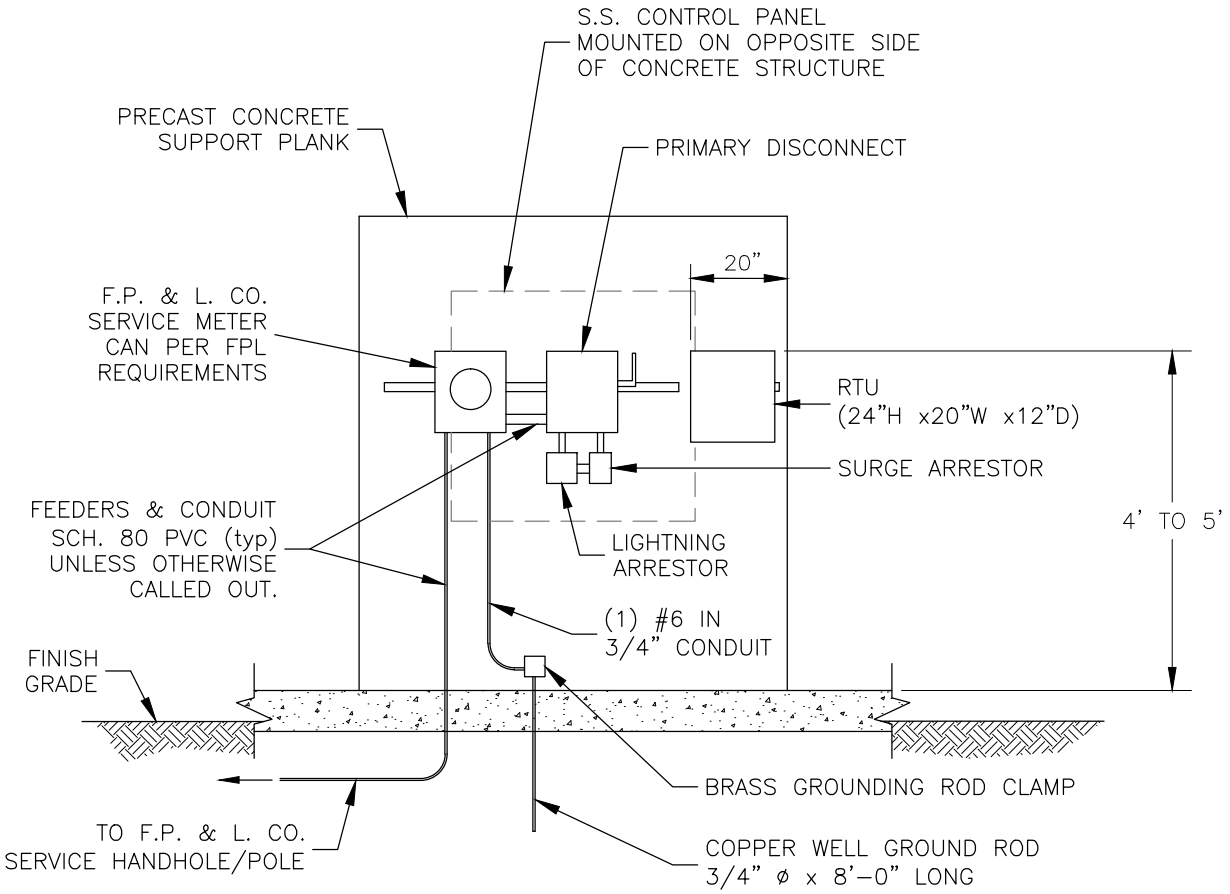
NOTES:

1. COVER TO BE ALUMINUM DIAMOND PLATE, HINGED, TRAFFIC BEARING WITH POSITIVE LOCKING ARM AND PADLOCK STUD.
2. MINIMUM COVER DIMENSIONS – – – 36"x 60"
3. COVER SHALL BE CAST IN PLACE (BILCO TYPICAL).
4. SPLIT COVER IS ACCEPTABLE FOR LARGER SIZES.
5. RECESSED LOCKING HASP IS REQUIRED IN WALKWAYS AND TRAFFIC AREAS.
6. LID TO BE DESIGNED TO HANDLE A MINIMUM OF 300 LBS. PER S.F. LOADING.
7. HANDLE TO BE SECURED BY STAINLESS STEEL NUTS.
8. HATCH SAFETY GRATE SHALL BE MANUFACTURED BY U.S.F. FABRICATION, INC.



NOTES:

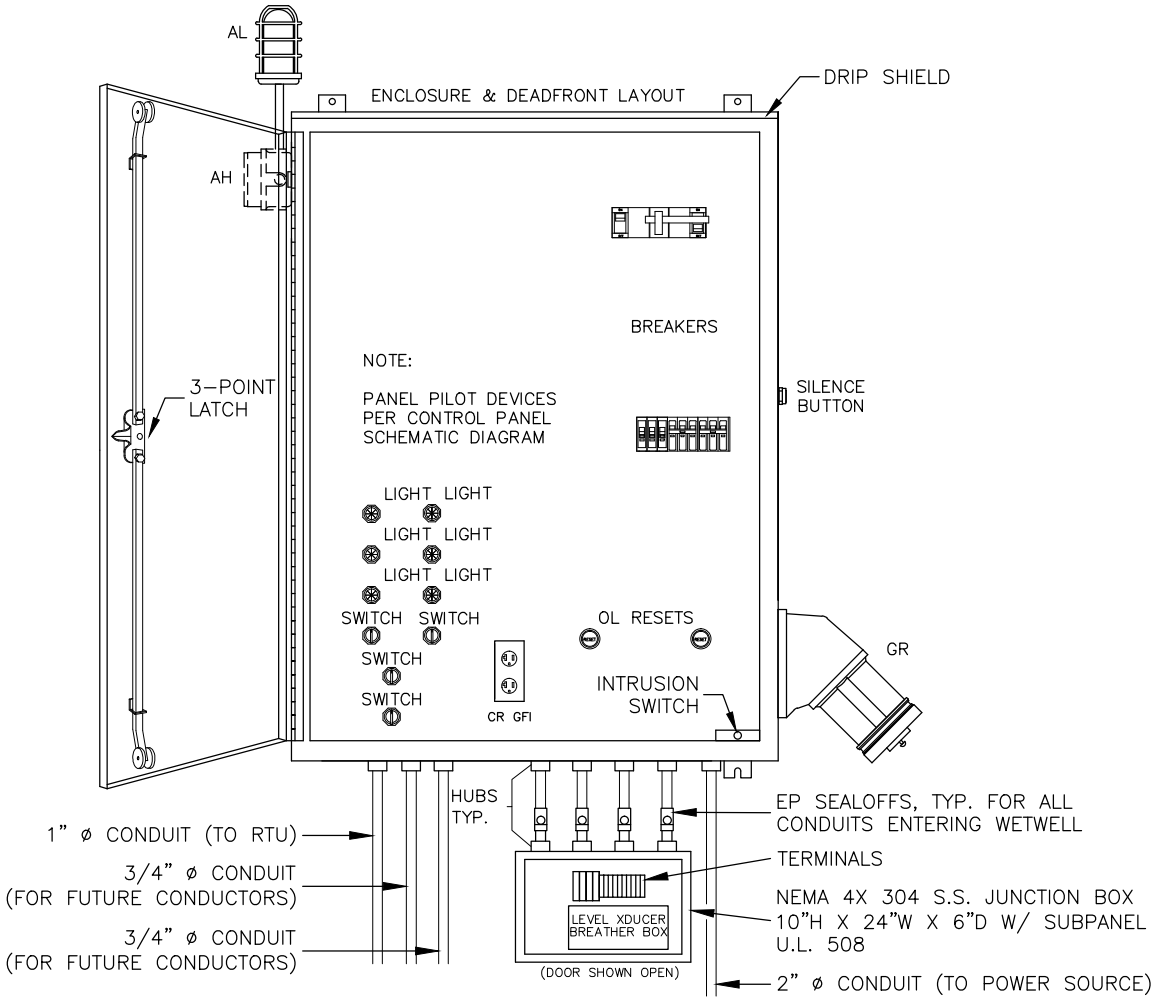
1. ELECTRIC METER AND PRIMARY DISCONNECT MOUNTED ON BACK SIDE OF PANEL.
2. EMERGENCY GENERATOR RECEPTACLES: RUSSELL & STOLL, JRSB 1044FR (FOR 100 amp SERVICE), 2044FR (FOR 200 amp SERVICE).
3. ALL POWER AND CONTROLS LINES SHALL BE CONTINUOUS (NO SPLICES).
4. POWER SUPPLY MECHANICALLY INTERLOCKED.
5. PHASE MONITOR ON ALL THREE PHASES (480 & 230 3ø); VOLTAGE MONITOR REQUIRED ON 1ø.
6. GROUND FAULT INTERRUPTER ON CONVENIENCE RECEPTACLE.
7. 1.5 K.V.A. TRANSFORMER IN ALL CONTROL PANELS.
8. PANEL MOUNTED TO S/S UNI-STRUT BY WELDED TABS.
9. CONTROL PANEL SHALL BE UL LISTED AS A UNIT.
10. TELEMETRY CONDUIT SHALL BE INSTALLED BY THE CONTRACTOR WITH SWEEP 90 DEGREE BEND.
11. ALL HARDWARE, NUTS & BOLTS, AND APPURTENANCES ABOVE GROUND SHALL BE 316 STAINLESS STEEL.
12. ALL CONDUIT NOT ENTERING WETWELL SHALL BE SCHEDULE 80 P.V.C.
13. PANEL MOUNTING SHALL ALLOW FOR UNRESTRICTED VIEW OF ALARM LIGHT.
14. MOUNT RTU PANEL TO ALLOW FOR UNRESTRICTED LINE-OF-SIGHT TO ANTENNA FROM ALL DIRECTIONS.
15. INSTALL PANFLEX STRAIN RELIEF ON PUMP POWER LEADS IN J-BOX JUST ABOVE SLAB ON GRADE (THOMAS AND BETTS OR APPROVED EQUAL)
16. INSTALLATION IS NOT CLASSIFIED. SEALOFFS ARE USED SOLELY FOR THE PURPOSE OF LIMITING CORROSIVE CHEMICALS INTO THE ELECTRICAL EQUIPMENT.



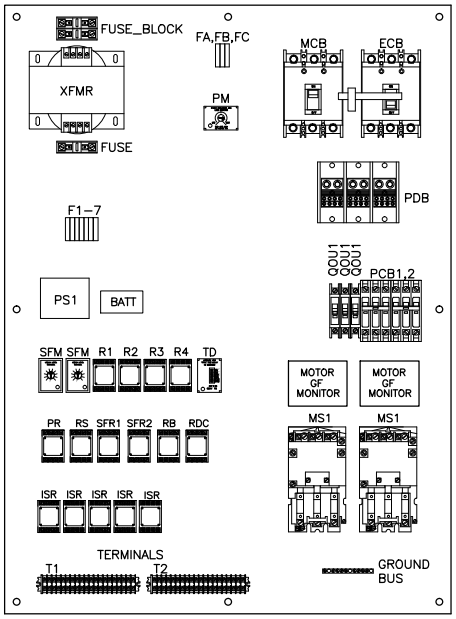
NOTES:

1. NO PENETRATION THROUGH PANEL TOPS.
2. TWENTY INCHES ON RIGHT SIDE OF SUPPORT PLANK (MEASURED FROM INSIDE EDGE OF RIGHT BEVEL) IS RESERVED FOR RTU AND ACCESSORIES.

BACK VIEW OF L.S. CONTROL PANEL



ENCLOSURE & DEADFRONT LAYOUT



BACKPLATE LAYOUT

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION	DWG No.
AUGUST 2016	CONTROL PANEL – DEADFRONT & BACKPLATE LAYOUT	52

LIFT STATION CONTROL PANEL NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES. THE PANEL MAKER SHALL BE A U.L. LISTED SHOP.

2. THE CONTROL PANEL SHALL BE FURNISHED COMPLETELY ASSEMBLED AND WIRED WITH THE FOLLOWING MINIMUM FEATURES:

   A. ENCLOSURE SHALL BE STAINLESS STEEL, MODIFIED NEMA 3R, 14 GAUGE, TYPE 304 SS, WITH WELDED SEAMS AND DRIP SHIELD. ALL HARDWARE SHALL BE STAINLESS STEEL. PROVIDE BLANK OUTSIDE DOOR WITH PIANO HINGE, NEOPRENE GASKET, 3 POINT CAPTIVE LATCH WITH NYLON ROLLERS OPERATED FROM A SINGLE PADLOCKABLE HANDLE, WITH DRAWING POCKET. PROVIDE ALUMINUM DEAD FRONT HINGED INNER DOOR FOR MOUNTING CONTROL COMPONENTS; EXTEND CIRCUIT BREAKER HANDLES, RESET BUTTONS, ETC. THROUGH THE DEAD FRONT INNER DOOR. PROVIDE SUB PLATE OF ENAMELED STEEL OR ALUMINUM.

   B. MAIN BREAKER, MECHANICALLY INTERLOCKED WITH EMERGENCY BREAKER.

   C. GROUND BUS.

   D. SEPARATE CIRCUIT BREAKERS FOR THE CONTROL CIRCUITS ETC.

   E. 15A DUPLEX RECEPTACLE, GFI, WITH SEPARATE BREAKER.

   F. SURGE ARRESTER ON THE INCOMING POWER FEEDER

   G. POWER MONITOR WHICH DISCONNECT THE CONTROL POWER FOR ABNORMAL POWER CONDITIONS INCLUDING VOLTAGE DEGRADATION OR PHASE LOSS AND WILL AUTOMATICALLY, WHEN POWER RETURNS, RETURN TO NORMAL. EQUAL TO DIVERSIFIED SLA SERIES.

   H. PROVIDE SQD NEMA SIZED STARTER CONTROLLER WITH OVERCURRENT PROTECTION, SHORT CIRCUIT PROTECTION AND DISCONNECT FOR EACH MOTOR.

   I. HOA, MAINT.LIGHT SW. AND PILOT LIGHTS

   J. ALL SELECTOR SWITCHES, PUSH BUTTONS, AND PILOT LIGHTS SHALL BE THE HEAVY DUTY, OIL TIGHT, EQUAL TO SQ.D. TYPE K. ALL PILOT LIGHTS SHALL NOT BE TRANSFORMER TYPE AND NOT BE PRESS TO TEST.

   K. 120V/12V POWER SUPPLY FOR THE FLOAT TYPE LEVEL SWITCH RELAYS AND ANALOG SIGNAL.

   L. SURGE CAPACITOR ON THE LOAD SIDE OF THE MAIN BREAKER EQUAL TO GE 9118BAB301.

   M. NUMBERED WIRES AND CORRESPONDING TERMINALS. COLOR CODED WIRING TO DISTINGUISH PANEL WIRING OF DIFFERING VOLTAGES AND INCOMING FOREIGN CIRCUITS.

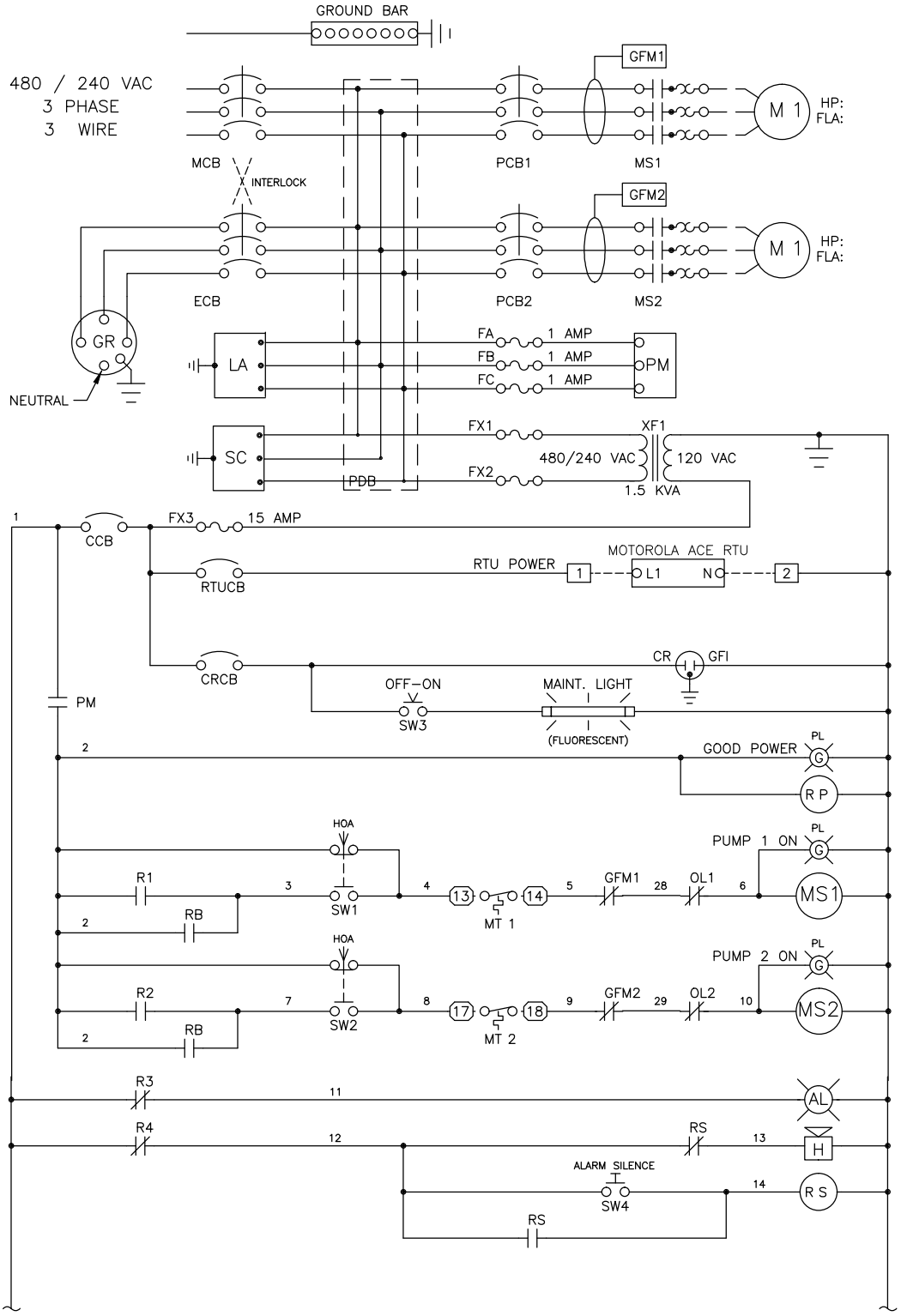
   N. CONTROL PANEL AND RTU SHALL BE PROVIDED AND CONFIGURED TO SEND & RECEIVE SIGNALS TO THE WWTP COMPUTER SYSTEM USING THE OWNER'S AND I/O SYSTEM. ALL CONFIGURATION AT THE CONTROL COMPUTER SHALL BE PROVIDED SEPARATELY BY THE OWNER. CONFIGURATION, STARTUP, TESTING AND CHECK–OUT SHALL BE PROVIDED BY THE RTU MANUFACTURER. CONTRACTOR SHALL PROVIDE AND INSTALL RADIO/MODEM AND I/O SYSTEM IN AGREEMENT WITH THE OWNER'S STANDARD

3. ALL CONDUITS ENTERING THE WETWELL SHALL PVC COATED RGS, SIZED PER PLANS, PERMACOAT, ROBROY OR AN APPROVED EQUAL.

4. ALL CONTROL CIRCUITS ENTERING WETWELL SHALL BE INSTALLED THROUGH INTRINSICALLY SAFE RELAYS, PHOENIX CONTACT OR TURCK, OR AN APPROVED EQUAL.

5. THE PUMP MOTOR CIRCUITS SHALL BE INSTALLED WITH GROUND FAULT MONITORS, AS MANUFACTURED BY BENDER OR AN APPROVED EQUAL.

6. ARC FLASH LABEL TO BE INSTALLED ON THE FRONT OF THE PANEL.



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NOTE:
COORDINATE PANEL WIRING, GR RECEPTACLE WIRING, AND ENGINE–GENERATOR WIRING SUCH THAT THE CENTER WIRE ON THE BREAKER AND AT ALL POINTS IS THE HIGH LINE.

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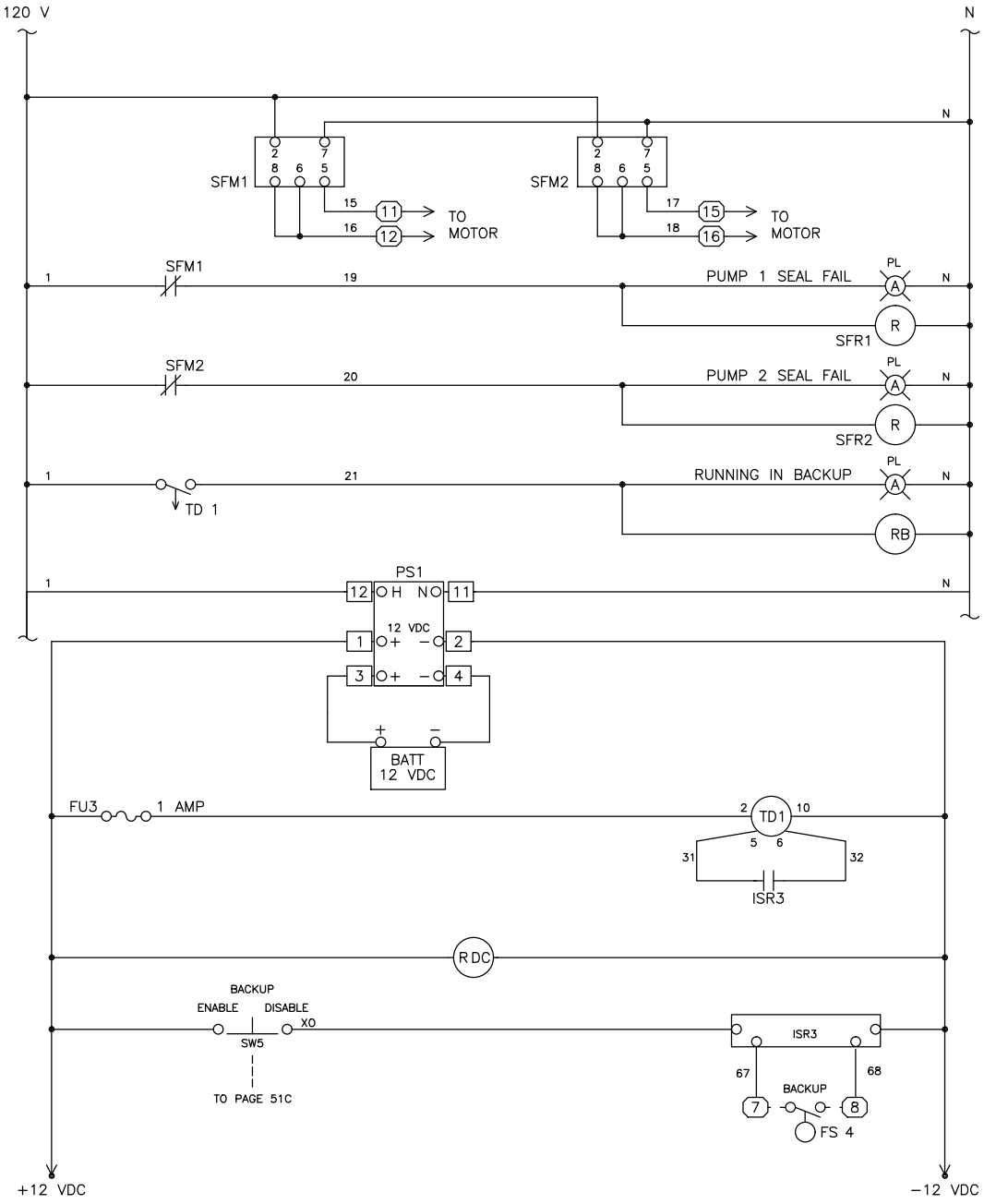

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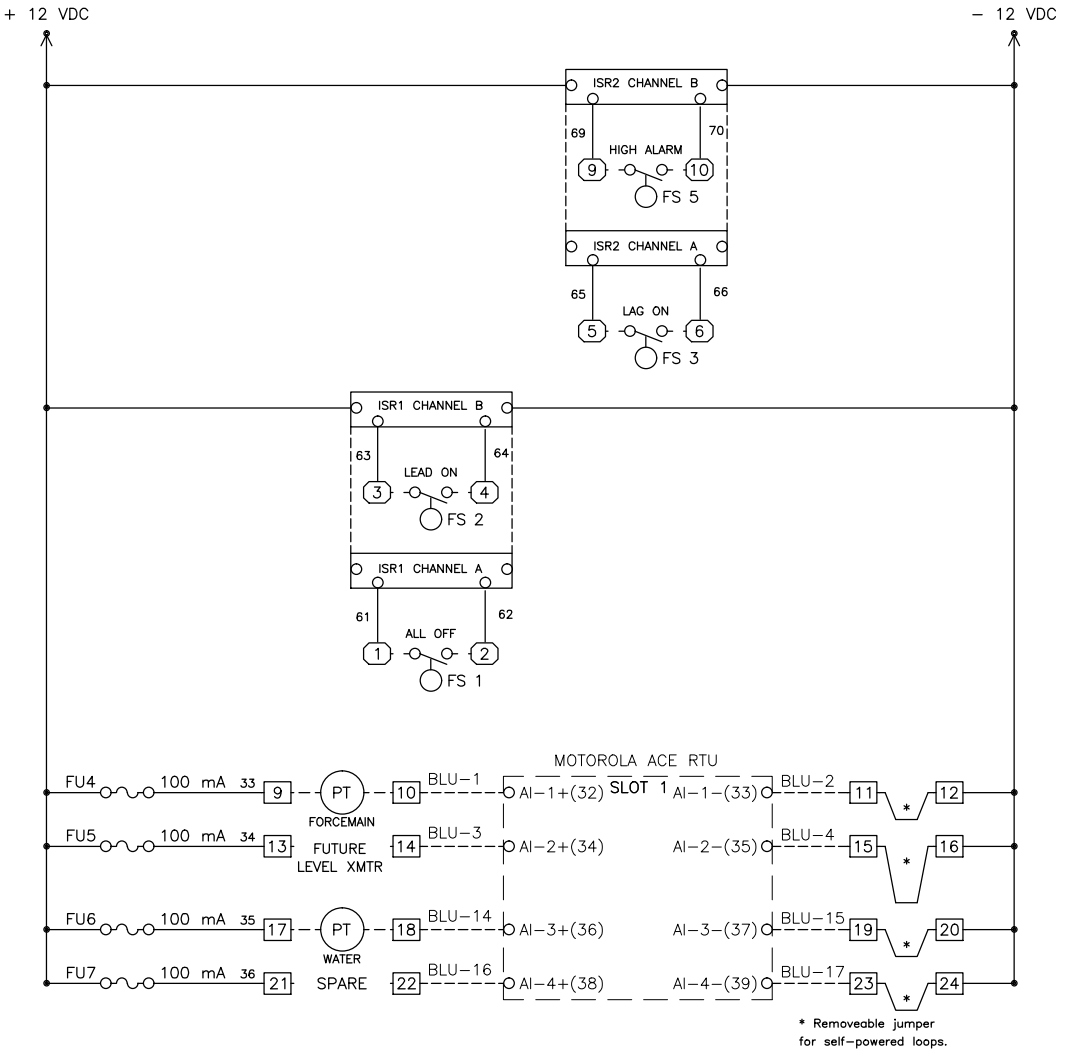
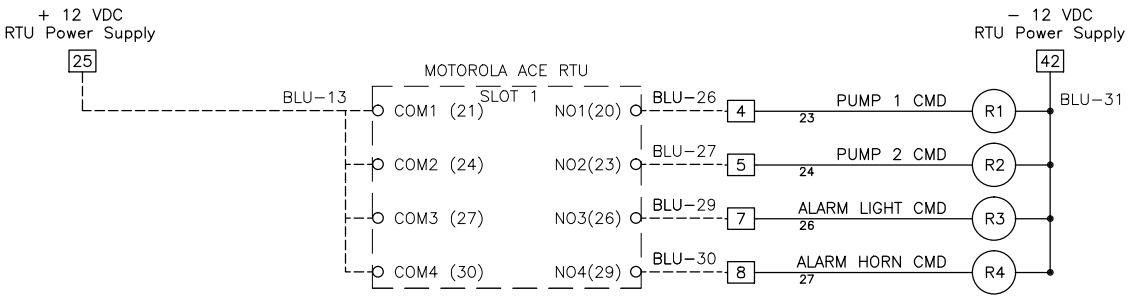
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (480/240 VOLT, 3 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		53A

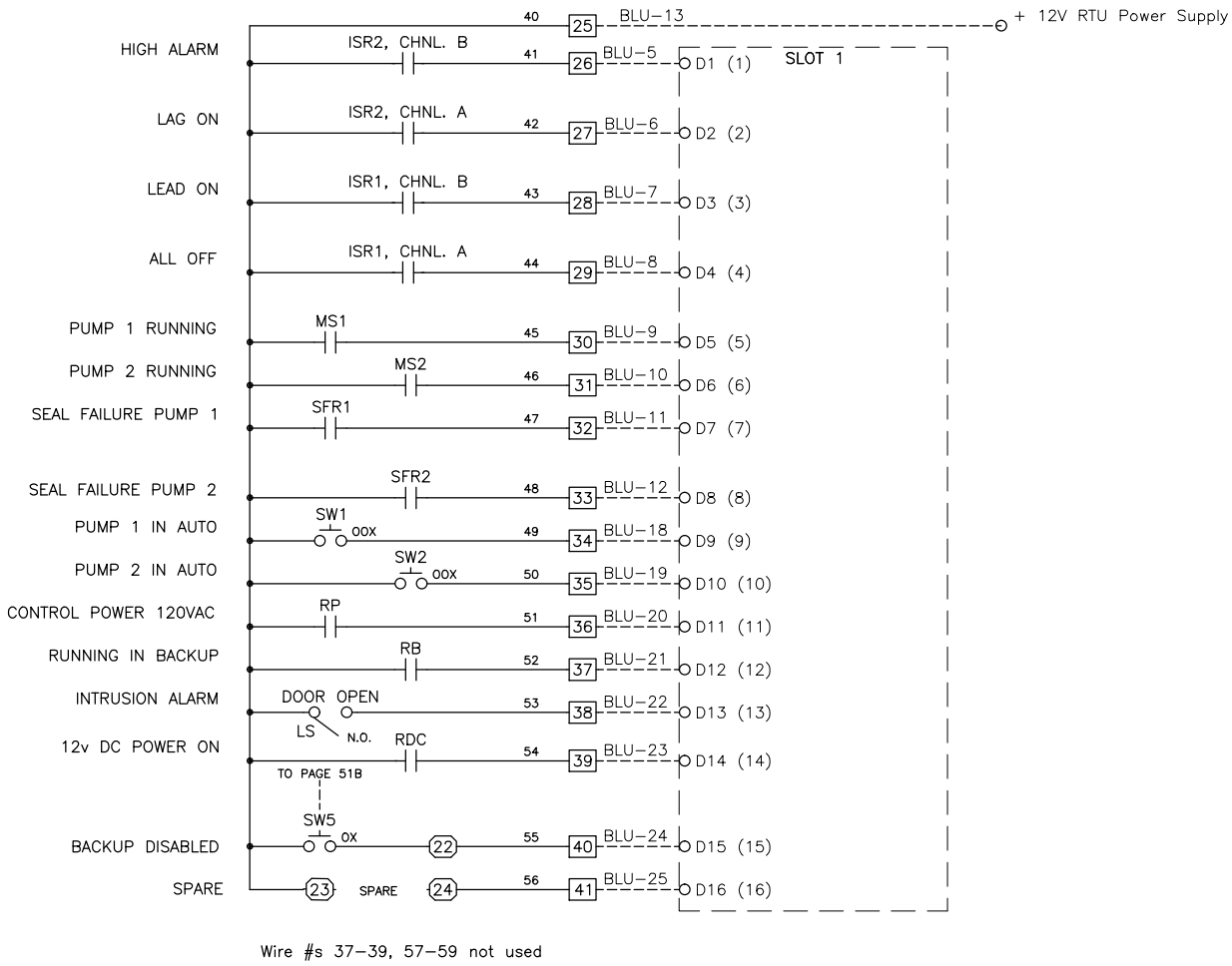
CONTINUED ON 53A





MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (480/240 VOLT, 3 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		53B



Wire #s 37–39, 57–59 not used

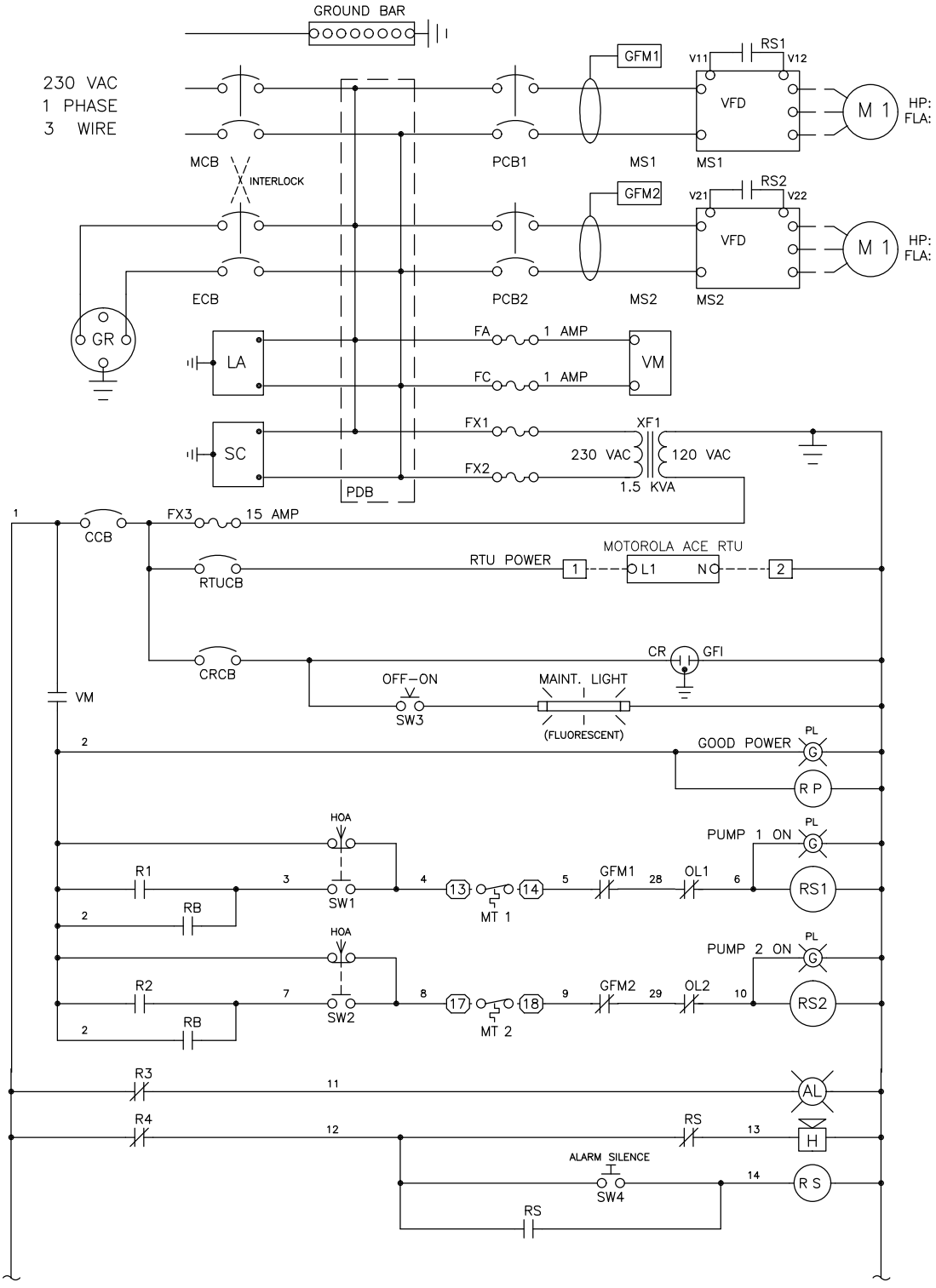
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (480/240 VOLT, 3 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		53C

CONTROL PANEL PARTS LIST

Abbrv.	Description	Manufacturer	Part Number
ENC	Enclosure	Hoffman or equal	Custom, Nema 3R, 304SS w/ rainshield and 3 Pt. latch
AL	Alarm Light (Red Bulb)	RAB	RAB-VP100DG
BATT	Battery, 12V DC	Power Sonic	PS-1270
CCB	Control Circuit Breaker	Square D	QOU110
CR	Convenience Recept, GFI Type	Pass and Seymour	1595-I and Weatherproof Box
CRCB	Convenience Recept, CB	Square D	QOU115
ECB	Emergency Circuit Breaker	Square D	Size as required
FA-FC	Fuse, Phase Monitor Power	Ferraz	ATQR-1
FX1, FX2	Fuse, Transformer Primary	Ferraz	ATQR-X (460 V) or ATQR-15 (230 V)
FX3	Fuse, Transformer Secondary	Ferraz	FNM15
FU1-FU3	Fuse	Buss	GDB-1A
FU4-FU7	Fuse	Buss	GDB-100Ma
GFM1,2	Motor Ground Fault Monitor	Bender	RCM460/465 Series
GR	Generator Receptacle	Russell-Stoll	JRS1044FR or JRS2044FR (as required)
H	Horn	Federal	350-WB-120
ISR1-3	Intrinsically Safe Relays	Ingram Products	ISR2-12V-100K
LA	Lightning Arrestor	Ditek	DTK-240-3CM or DTK-480-3CM (as required)
MCB	Main Circuit Breaker	Square D	Size as required
MS1, MS2	Motor Starters	Square D	Class 8536 NEMA series, Size as required
PCB1,2	Pump Circuit Breaker	Square D	Size as required
PDB	Power Distribution Block	Marathon	1333555
PL	Pilot Light, color as noted	Square D	Class 9001 Type SK
PS1	Power Supply, 12 DC	Astrodyne	AD55-A
PM	Phase Monitor	Diversified	SLA-230-ASA or SUA-460-ASA (as required)
R1-R4	Control Relay	Omron	MY2N-DC12V
RB, RP, RS	Control Relay	Omron	MK2PS-AC120
RDC	Control Relay	Omron	MY2N-DC12V
RTUCB	RTU Circuit Breaker	Square D	QOU110
SFM1, SFM2	Seal Fail Monitor	SSAC	LC54BA
SFR1, SFR2	Control Relay, Seal Fail Relay	Square D	Class 8501 Type KP
SW1 - 3, SW5	Switch	Square D	Class 9001 Type SK
SW4	Alarm Silence Pushbutton	Square D	Class 9001 Type SK
TB	Terminal Blocks	Wago	280 Series
TD1	Time Delay Relay	SSAC	TRDU12D3
XF1	Transformer	Square D	Class 9070 T1500-D1
SC	Surge Capacitor	Square D	6671-SDSA3650

NO EXCEPTIONS will be allowed as to manufacturer of Generator Receptacle, Breakers or Motor Starters. Upon submittal and approval, substitution of other parts on an "As Equal" basis may be allowed if they are directly interchangeable with parts specified. APPROVAL OF A SUBMITTED ITEM AS AN "EQUAL" SHALL BE AT THE SOLE DISCRETION OF THE DEPARTMENT.



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MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (230 VOLT, 1 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		54

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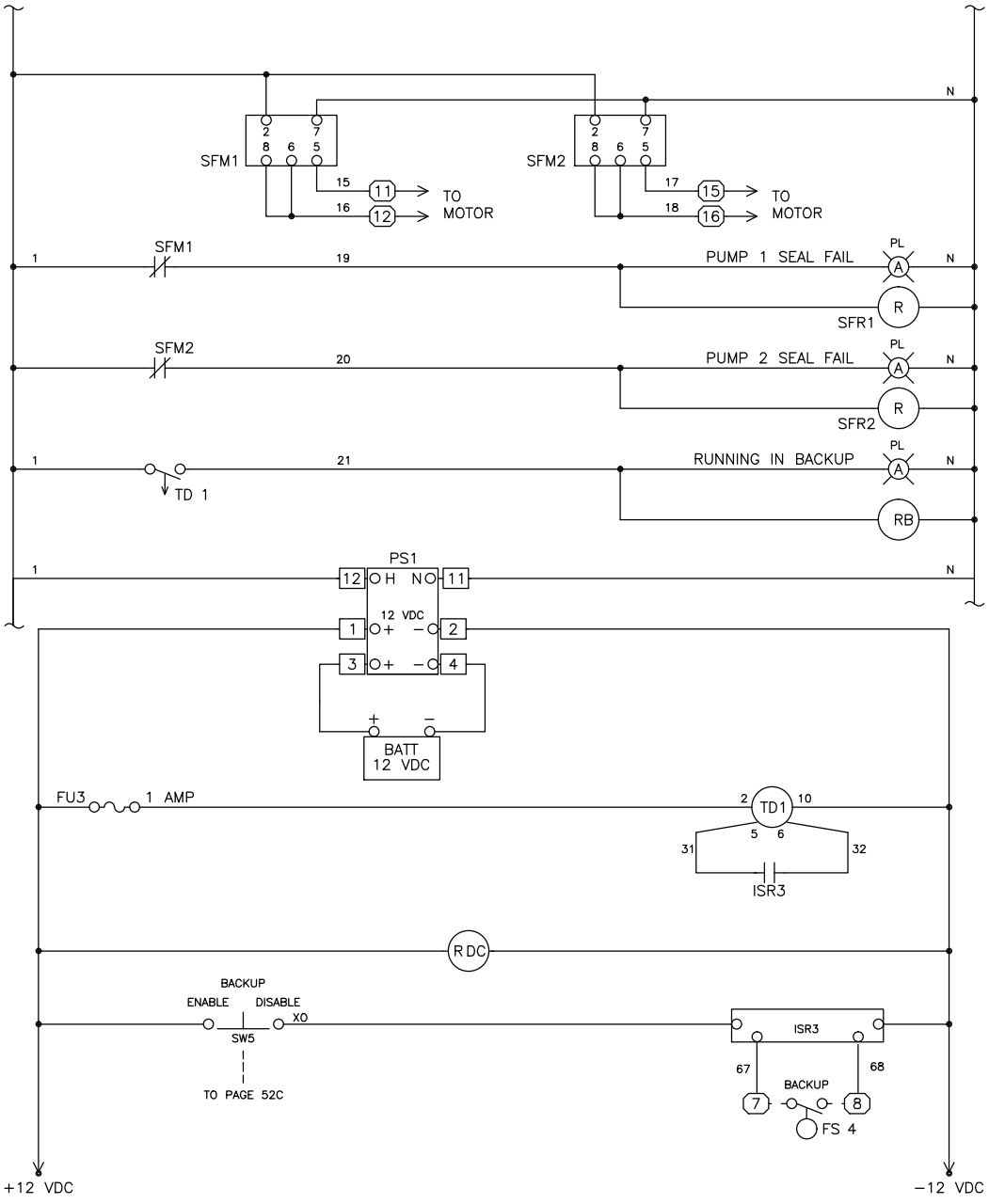

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MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (230 VOLT, 1 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		54A

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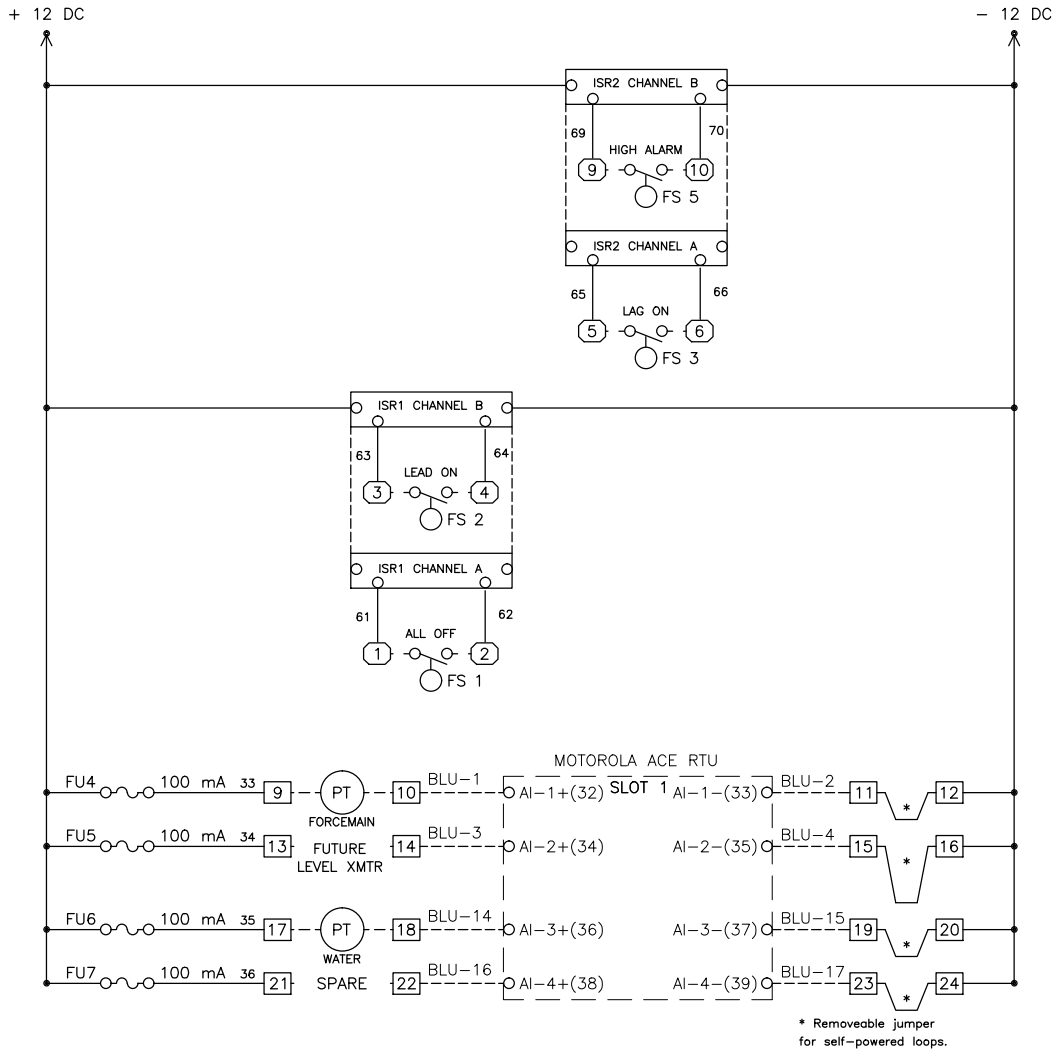
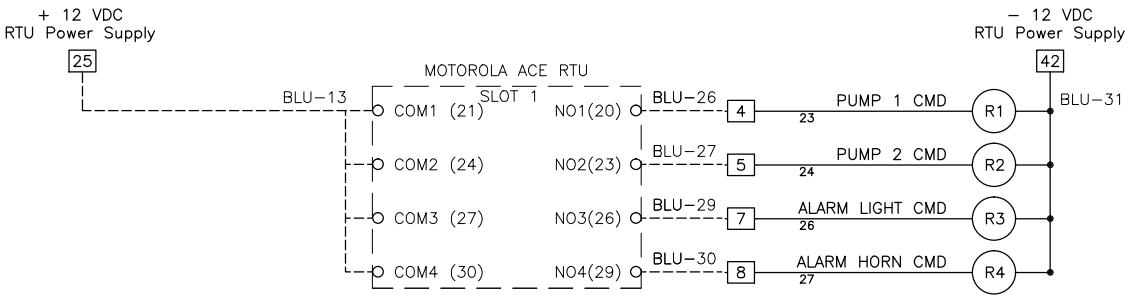
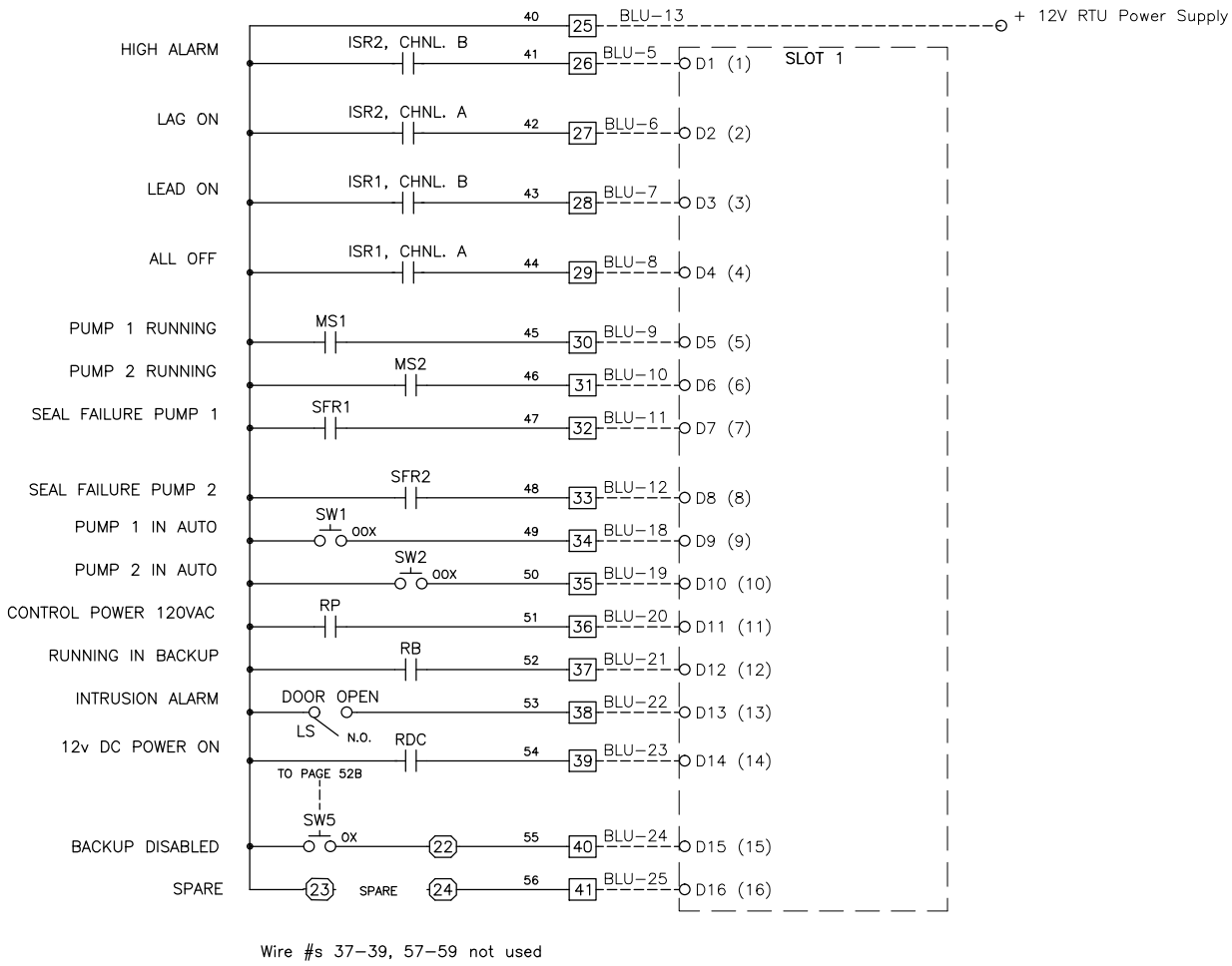




MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (230 VOLT, 1 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		54B



Wire #s 37–39, 57–59 not used

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (230 VOLT, 1 PHASE, 3 WIRE)	DWG No.
AUGUST 2016		54C

CONTROL PANEL PARTS LIST

Abbrv.	Description	Manufacturer	Part Number
ENC	Enclosure	Hoffman or equal	Custom, Nema 3R, 304SS w/ rainshield and 3 Pt. latch
AL	Alarm Light (Red Bulb)	RAB	RAB-VP100DG
BATT	Battery, 12V DC	Power Sonic	PS-1270
CCB	Control Circuit Breaker	Square D	QOU110
CR	Convenience Recept, GFI Type	Pass and Seymour	1595-I and Weatherproof Box
CRCB	Convenience Recept, CB	Square D	QOU115
ECB	Emergency Circuit Breaker	Square D	Size as required
FA-FC	Fuse, Phase Monitor Power	Ferraz	ATQR-1
FX1, FX2	Fuse, Transformer Primary	Ferraz	ATQR-15 (230 V)
FX3	Fuse, Transformer Secondary	Ferraz	FNM15
FU1-FU3	Fuse	Buss	GDB-1A
FU4-FU7	Fuse	Buss	GDB-100Ma
GFM1,2	Motor Ground Fault Monitor	Bender	RCM460/465 Series
GR	Generator Receptacle	Russell-Stoll	JRS1044FR or JRS2044FR (as required)
H	Horn	Federal	350-WB-120
ISR1-3	Intrinsically Safe Relays	Ingram Products	ISR2-12V-100K
LA	Lightning Arrestor	Ditek	DTK-240-3CM (as required)
MCB	Main Circuit Breaker	Square D	Size as required
MS1, MS2	Motor Starters	Yaskawa-iQ Pump Controller Series	Size as required
PCB1,2	Pump Circuit Breaker	Square D	Size as required
PDB	Power Distribution Block	Marathon	1333555
PL	Pilot Light, color as noted	Square D	Class 9001 Type SK
PS1	Power Supply, 12 DC	Astrodyne	AD55-A
VM	Voltage Monitor	Diversified	VBA-120-ALA (as required)
R1-R4	Control Relay	Omron	MY2N-DC12V
RB, RP, RS	Control Relay	Omron	MK2PS-AC120
RDC	Control Relay	Omron	MY2N-DC12V
RTUCB	RTU Circuit Breaker	Square D	QOU110
SFM1, SFM2	Seal Fail Monitor	SSAC	LC54BA
SFR1, SFR2	Control Relay, Seal Fail Relay	Square D	Class 8501 Type KP
SW1 - 3, SW5	Switch	Square D	Class 9001 Type SK
SW4	Alarm Silence Pushbutton	Square D	Class 9001 Type SK
TB	Terminal Blocks	Wago	280 Series
TD1	Time Delay Relay	SSAC	TRDU12D3
XF1	Transformer	Square D	Class 9070 T1500-D1
SC	Surge Capacitor	Square D	6671-SDSA3650

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XYLEM / GODWIN CD-103M FOUR INCH SOUND ATTENUATED FIXED- MOUNTED EMERGENCY BACKUP PUMP

PART ONE - GENERAL DESCRIPTION

1.1.1 Furnish and Install one (1) fixed–mounted Xylem/Godwin CD103M automatic starting lift station dry–priming back–up pump at each Type "A" Lift Station.

1.2 SYSTEM DESCRIPTION

1.2.1 The emergency backup trash pump specified in this section will be used to automatically pump raw sewage in the event that the Type "A" pumps fail to pump.

1.2.2 Pump shall be fitted with a fully automatic priming system capable of repeated priming from a completely dry pump casing.

1.2.3 The pump and accessories shall be supplied by the pump manufacturer.

1.2.4 The pump offered shall be the manufacturer's standard production model. It shall have been in continuous use by municipal and industrial owners for a minimum of five years.

1.2.5 The diesel engine driven pump unit shall be fixed–mounted at the new lift station by the installing contractor complete with spring type isolation dampeners affixed to a suitably sized concrete base. Concrete base shall be designed by the lift station Engineer of Record using information from Xylem/Godwin to provide a stable installation with no unacceptable vibration transmitted to the surrounding housekeeping slab.

1.2.6 The engine and pump shall be completely enclosed with marine grade 5052 aluminum sheet metal panels backed with one inch and two–inch layers of polydamp acoustical sound–deadening material. The acoustical enclosure shall reduce pump and engine noise to sixty–nine dBA or less at a distance of thirty feet. The enclosure shall be removable for easy access to the engine / pump for maintenance and repair. The enclosure doors shall all be equipped with latches that are keyed alike. For maintenance and service needs, the enclosure sides shall have hinged doors for quick access to the engine oil fill, fuel fill port, oil dipstick, and filters.

1.3 DESIGN REQUIREMENTS

1.3.1

OPERATING SPEED (MAXIMUM)	2200 RPM
MAXIMUM SOLIDS HANDLING SIZE	3 INCHES
IMPELLER DIAMETER	256 mm
SUCTION SIZE	4 INCHES
DISCHARGE SIZE	4 INCHES
MAXIMUM SUCTION LIFT	28 FEET
MAXIMUM DUTY POINT	700 GPM AT 140' TDH (INCLUDING A 15' SUCTION LIFT)
SECOND DUTY POINT	500 GPM AT 90' TDH (INCLUDING A 25' SUCTION LIFT)
MINIMUM SHUTOFF HEAD	170 FEET

1.4 REFERENCES

1.4.1 ANSI B16.1 – Standard for Cast Iron Pipe Flanges and Flanged Fittings.

PART TWO - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

2.1.1 The pump shall be a Model CD103M, size 4" x 4" as manufactured by GODWIN PUMPS, Bridgeport, New Jersey.

2.2.1 CASING, SUCTION COVER, SEPARATION TANK: Pump castings shall be cast iron. Pump design shall incorporate a direct suction flow path that is in axial alignment with the impeller eye. There shall be no turns, chambers, or valves between the suction flange and the impeller eye.

2.2.2 IMPELLERS: The pump impeller shall be an open, two–bladed, non–clog type with pump–out vanes on the back shroud and fabricated from hardened cast–chromium steel construction (minimum Brinell Hardness 341 HB).

2.2 EQUIPMENT

2.2.3 WEARPLATES: Shall be fully adjustable and replaceable, fabricated of cast iron. Wear plate clearances shall have no relationship to the ability of the pump to achieve a prime.

2.2.4 BEARINGS AND SHAFTS: Pump shall be fitted with a bearing bracket to contain the shaft and bearings. Bearings shall be tapered roller bearings of adequate size to withstand imposed loads for sustained pumping at maximum duty points. Minimum ISO L10 bearing life to be 100,000 hours. Impeller shafts shall be fabricated of 1.5% chromium alloy.

2.2.5 SEALS: Seals shall be high pressure, mechanical self–adjusting type with silicon carbide faces capable of withstanding suction pressures to 100 psi. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for periods up to twenty–four hours. All metal parts shall be of stainless steel. Elastomers shall be Viton.

2.2.6 PUMP SUCTION AND DISCHARGE FLANGES: Shall be cast iron ANSI (B16.1) Class 150, raised faced.

2.2.7 PUMP GASKETS: Shall be compressed fiber and/or Teflon.

2.2.8 PUMP O–RINGS: Shall be Viton.

2.2.9 PRIMING SYSTEM: Automatic priming system incorporates a twin–cylinder compressor and air ejector assembly, no vacuum pump. The compressor shall be mounted on the pump bearing frame, driven by the pump shaft, lubricated by the engine. The priming system shall require no fail–safe protection float gear or any adjusting at high or low suction lifts. Pumps with self–priming chambers modified with vacuum priming systems shall not be accepted as equal. The pump must be capable of running totally dry for periods up to 24 hours, then re–priming and returning to normal pumping volumes. Pump and priming system is capable of priming the pump from a completely dry pump casing. The pump shall be capable of static suction lifts to 28 vertical feet, at sea level. It shall also be capable of operation using extended suction lines.

2.2.10 CHECK VALVE: Pump shall be supplied with an integral swing check valve mounted on the discharge of the pump, allowing unrestricted flow from the impeller. The check valve shall prevent in–line return of flow when the pump is shut off. Non–return valve elastomers shall be Nitrile rubber and shall be field replaceable.

2.2.11 DRIVE UNIT: The drive unit shall be a diesel, water–cooled engine. The engine shall drive the pump by use of direct–connected intermediate drive plate. Starter shall be 12 volt electric. Safety shutdown switches for low oil pressure and high temperature shall be provided. Battery shall have 180 amp hour rating. Unit shall include a tachometer and an hour meter. Drive unit shall be an Isuzu 4LE2T Final Tier 4 or equal, rated at 48 HP (continuous) at 2000 R.P.M. A certified, continuous–duty engine curve shall be supplied to the owner/engineer.

2.2.12 GOVERNOR: Governor shall be a mechanical type. Engine speed shall be adjustable to operate the pump between maximum and minimum design operation speeds.

2.2.13 EXHAUST: Exhaust system shall include a hospital grade muffler housed in a separate chamber within the enclosure. All exhaust piping and manifolds shall be encased in fitted acoustic blankets. They shall be constructed of high–density fiberglass material with waterproof jacketing.

2.2.14 UL LISTED SKID BASE/FUEL TANK

2.2.14.1 Integral 316L stainless steel skid type 80–gallon fuel tank shall have sufficient capacity to provide at least 24 hours of operating time at full load. The engine shall be capable of operating satisfactorily on a commercial grade of distilled No. 2 fuel oil.

2.2.14.2 The pump base tank shall be a UL–142 approved double wall design constructed in accordance with Flammable and Combustible Liquids Code, NFPA 30; The Standard for Installation and use of Stationary Combustible Engine and Gas Turbines, NFPA 37; and The Standard for Emergency and Standby Power Systems, NFPA 110.

2.2.14.3 The tank design shall be a Closed Top Dike Pump Base Tank. It shall be of double wall construction having a primary tank to contain the diesel fuel, held within another tank or dike, which is intended to collect and contain any accidental leakage from the primary fuel tank. The completed base tank assembly is to incorporate pump mounting locations and must be able to support four times the rated load.

2.2.14.4 The primary tank shall be designed to withstand normal and emergency internal pressures and external loads. It shall be capable of withstanding internal air pressures of 3 to 5 psig without showing signs of excessive or permanent distortion and 25 psig hydrostatic pressure without evidence of rupture or leakage.

2.2.14.5 The primary and secondary tanks or dike shall have venting provisions to prevent the development of vacuum or pressure capable of distorting them as a result of the atmospheric temperature changes or while emptying or filling. The vent shall also permit the relief of internal pressures caused by exposure to fires. The vent size shall be determined by using the calculated wetted surface area in square feet (the top is excluded) in conjunction with venting capacity table 10.1of UL–142. The tank's vent shall also be equipped with a coupling device and shall be located to facilitate connection to a vent piping system. The dike's vent may be an opening for venting directly to the atmosphere and protection from the entrance of natural elements or debris shall be provided.

2.2.14.6 The primary tank is to be constructed of 7 gauge 316 stainless steel hot rolled plate material. Internal baffles or reinforcement plates shall be located on a maximum of 24 inch centers in tanks up to 60 inch width and on a maximum of 19.5 inch centers in tanks over 60 inch width. At least one baffle shall separate the fuel suction pipe from the fuel return line.

2.2.14.7 The outer tank is to be constructed of 316L stainless steel hot rolled plate material in a manner to be able to support four times the wet load of the pump and housing. All of the load is to be carried by the outer tank so no load or vibration stress is placed on the primary tank. If the pump base tank is wider than the pump set to be supported, structural rails are to be incorporated to span the width of the base tank so that the load is transferred to the side rails of the tank. Vertical reinforcements shall be welded to the outer sides of the secondary tank or dike at a maximum of 45 inch centers on tanks up to 30 inches high and on 24 inch centers on tanks greater than 30 inches high. At least one vertical reinforcement shall be positioned adjacent to each mounting hole location.

2.2.14.8 Both primary and secondary tanks shall be fitted with the proper welded pipe fittings to accommodate the requirements for the fill port and normal and emergency venting.

2.2.14.9 The completed assembly is to be cleaned with a heated pressure wash followed by a chromium free post treatment to ensure proper paint adhesion. The tank assembly is to be painted with an epoxy ester primer and high quality polyurethane enamel with total paint thickness of 3.5 mils. The painted tank assembly is to be baked at 180 degrees for 30 minutes to provide a hard durable finish.

2.2.14.10 Manufacturing and testing of this system shall be performed within the scope of Underwriters Laboratories, Inc. "Standard for Safety UL 142." A UL label shall be permanently attached to the tank system showing the following information:

- The registered UL mark and the name: Underwriters Laboratories, Inc.
- A control number and the word "listed"
- The product's name as identified by Underwriters Laboratories Inc.
- The serial number assigned by Underwriters Laboratories, Inc.
- Other manufacturer's information may also be included.

2.2.15 FACTORY PAINTING: Pump, engine, other related components and enclosure shall be shop primed with PPG HSP–528 Urethane Primer 1.0–1.8 DFT and finish painted with PPG HSP–528 Urethane Primer 1.0–1.8 DFT at the place of manufacture.

2.3 AUTOMATIC STARTING CONTROL SYSTEM

2.3.1 The engine shall be equipped with a factory installed PrimeGuard microprocessor–based controller as supplied by Godwin Pumps of America, Inc. and designed to start/stop the engine at a signal supplied by high and low level floats or a 4–20 mA transducer.

2.3.2 Engine / Pump Control Specifications

The engine shall be started, stopped, and controlled by a PrimeGuard high performance state of the art digital controller as supplied by Godwin Pumps of America, Inc. The controller shall be weather proof enclosed, and contain an external weatherproof 12–position keypad accessible without the need to remove or open any protective cover or enclosure. It shall be designed to start/stop the engine at a signal supplied by high and low level floats or a 4–20 mA transducer. The PrimeGuard controller shall provide the following functions without modification, factory recalibration, or change of chips or boards, by simply accessing the keypad.

2.3.2.1 The keypad shall be a capacitive touch sensing system. No mechanical switches will be acceptable. The keypad shall operate in extreme temperatures, with gloves, through ice, snow, mud, grease, etc. and maintain complete weather–tight sealing of the PrimeGuard controller.

2.3.2.2 In automatic mode, the unit shall conserve energy and go to "sleep".

2.3.2.3 The PrimeGuard controller shall function interchangeably from float switches, pressure switch, or transducer, as well as manual start/stop by selection at the keypad. No other equipment or hardware changes are required.

2.3.2.4 The PrimeGuard controller with integrated AutoThrottle shall be capable of varying the engine speed to maintain a constant level in a process without a change to the controller other than via the keypad.

2.3.2.5 The start function can be programmed to provide three separate functions each day for seven days (i.e. a start, warm up, exercise cycle on two separate days at different times and for a varying length of time all via the keypad).

2.3.2.6 Manual–Automatic Button:

2.3.2.6.1 In Manual Mode, manual "Start" button starts engine and runs until "Stop" button is depressed or an emergency shutdown occurs.

2.3.2.6.2 In Automatic Mode, start/stop sequencing is initiated by two normally–open narrow–angle float switches.

2.3.2.7 The controller shall integrate the engine safety shut–off for low and high oil temperature, and provide over–speed protection.

2.3.2.8 The controller shall include standard, field–adjustable parameters for engine cycle crank timer, shutdown time delay, warm–up time delay, and cool–down time delay.

2.3.2.9 The PrimeGuard controller shall have only one circuit board with eight built–in relays. Three (3) of the relays shall be programmable to output desired parameter on display and to be used as dry–contacts for communication with Martin County Utility Department's SCADA system, all via the keypad without changing relays, chips, printed circuits, or any hardware or software.

2.3.2.10 Standard components shall consist of (24) digital inputs, (7) analog inputs, (1) magnetic pick–up input, (8) 20–amp form "C" relays, (1) RS232 port, (1) RS485 port, (1) RS232/RS485 port, (1) J1939 port, and (1) 64X128 pixel full graphic LCD display with backlight.

2.3.2.11 The industrially–hardened PrimeGuard Controller shall withstand Vibration of 3 g, 3 axis, frequency swept 10–1000 Hz, in an operating temperature Range of 4 to 176F (–20 to 80C) and an operating humidity range of 0–95% Non–Condensing.

2.4 REQUIRED ADDITIONAL ITEMS

2.4.1 ELECTRICAL JUNCTION BOX: The unit shall include a duplex GFCI outlet (junction box) for a single point 115VAC, 30–amp electrical connection circuit to power the automatic trickle charger.

2.4.2 FULLY AUTOMATIC TRICKLE CHARGER: The unit shall include a fully automatic trickle charger powered by 2–amps, 115VAC (6A 12VDC).

2.4.3 FLOATS: The unit shall include two (2) normally open PrimeGuard floats which shall be connected to the unit by the installing contractor to automatically control start and stop of the unit.

2.4.4 LIGHT: The unit shall include a single switch operated 12VDC interior dome light mounted within the enclosure.

2.4.5 EXTERIOR HINGES AND HARDWARE: All hinges and hardware attached to the sound enclosure shall be fabricated from 316L stainless steel.

PART THREE - EXECUTION

3.1 MANUFACTURERS SERVICES

3.1.1 The manufacturer shall furnish the services of a competent factory representative to do the following:

3.1.1.1 Inspect the system prior to delivery, supervise the start up and testing of the system, and certify the system has been properly furnished and is ready for operation.

3.1.1.2 Instruct the owner's operating personnel in the proper operation and maintenance of the system for a period of not less than one–half day.

3.2 TOOLS AND SPARE PARTS

3.2.1 The manufacturer shall furnish the following on delivery of the pumping system;

3.2.1.1 One Spare Parts Kit Consisting of:

INCLUDES	PART NUMBER	DESCRIPTION
1	GPV4150F	GPV4-150# Valve Flapper
1	GPV4150300G	GPV4-150/300# Valve Cover Gasket
1	2305682016	Ejector Jet
1	2305712016	Ejector Nozzle
1	2305869923	CD80-HL80 Separation Tank Filter/Screen
10	4307639912	M12 Dowty Washer
2	3810041112A	Viton Wearplate O-Ring
2	3810134112A	O-Ring
2	3810144112A	Ejector Nozzle O-Ring
1	3906414113A	Ejector Ball
1	4316129913	Compressor Pipe
2	4400369912A	Relief Valve
1	390H150	Compressor Belt
3	4905230300A	Valve Plate Gasket
3	4905230400A	Valve Plate Gasket
3	4905230900A	Head Gasket

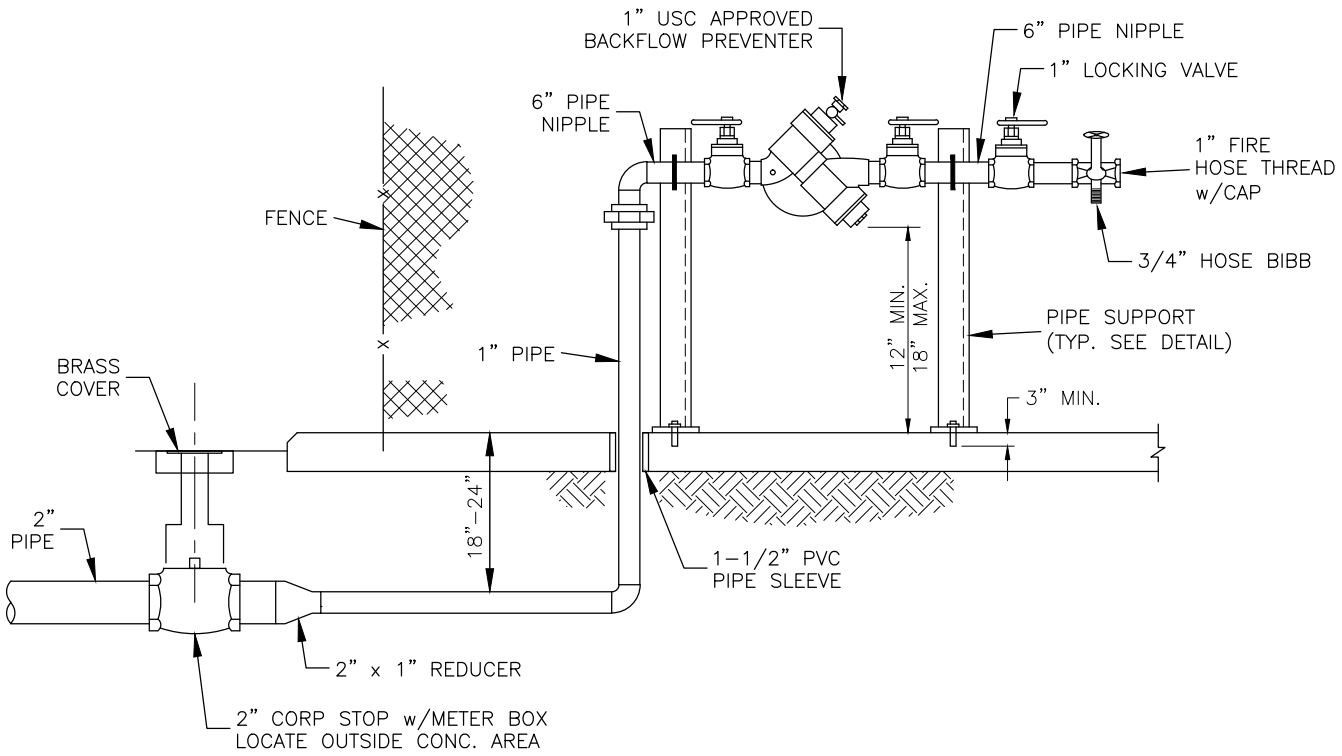
3.2.1.2 An Operations and Maintenance manual for the pump and engine.

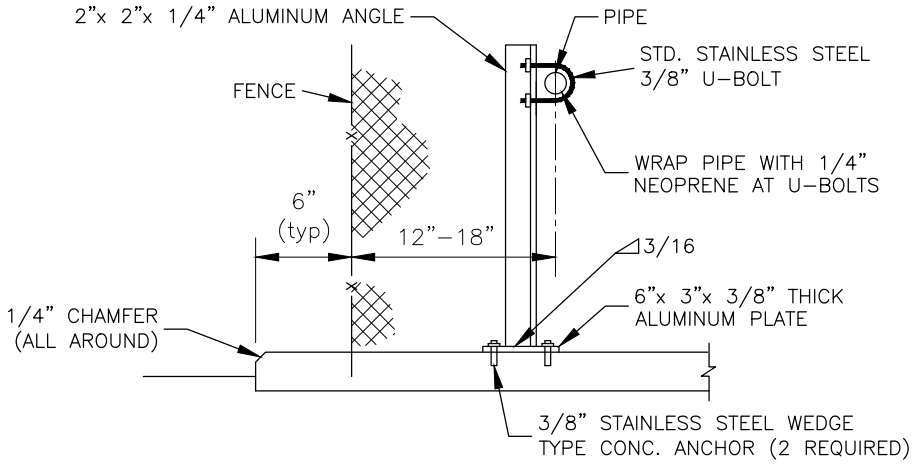
3.3 WARRANTY

3.3.1 The manufacturer shall furnish the following to the owner:

3.3.1.1 A copy of the engine manufacturer's parts and labor warranty.

3.3.1.2 A one-year Parts and Labor Warranty issued by the manufacturer on the Trash Pump System. This warranty must cover all pump parts, including the mechanical seal.

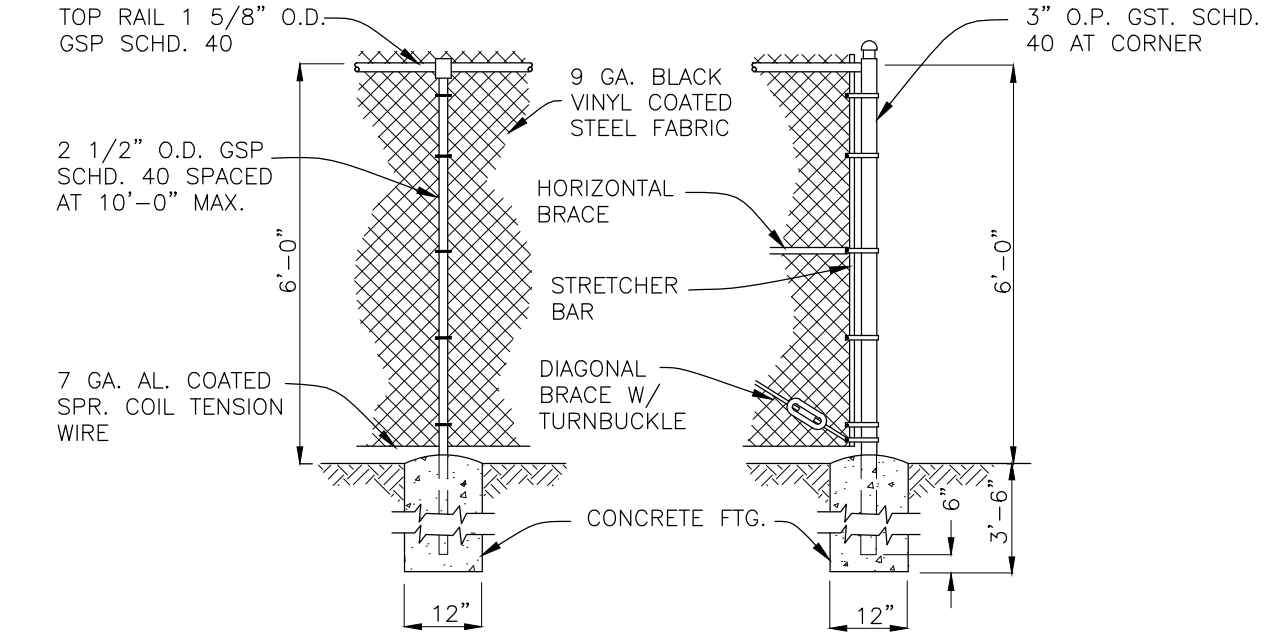




PIPE SUPPORT DETAIL

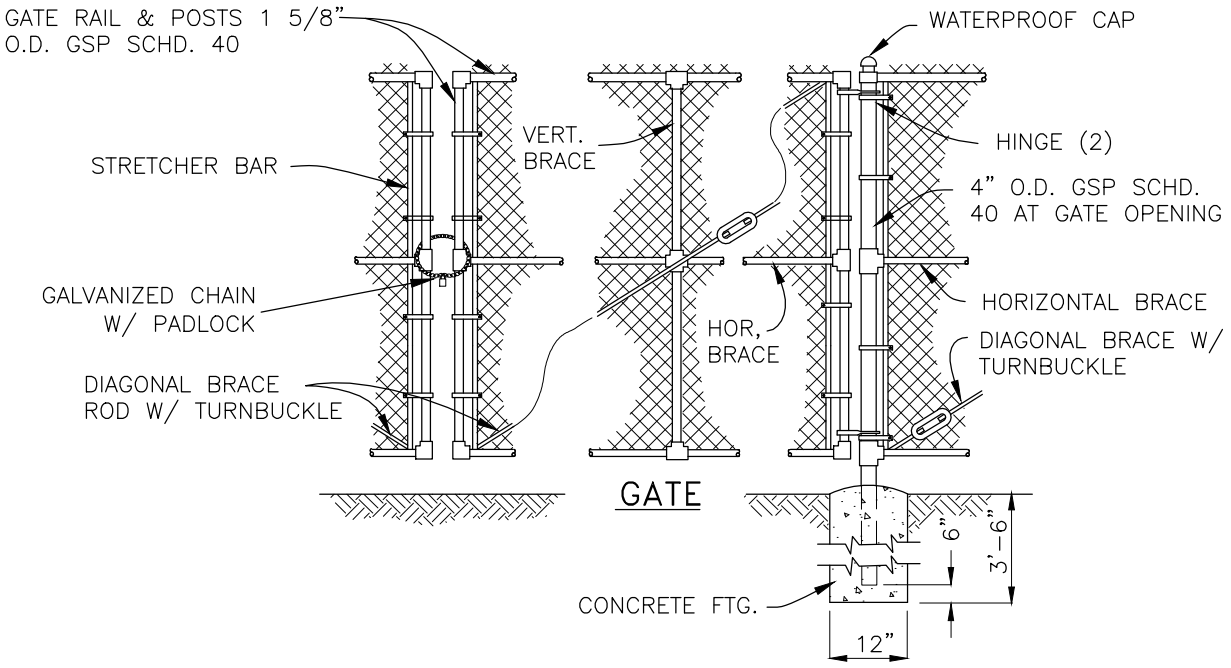
NOTES:

1. ALL ABOVE GRADE PIPING SHALL BE BRASS. FITTINGS SHALL BE BRONZE.
2. ALL JOINTS SHALL BE THREADED.
3. FOR LIFT STATION TO BE OWNED BY M.C.E.S. USE RPZ BACKFLOW PREVENTER BY FEBCO MODEL 825Y, AMES SERIES 4000 SS (SILVER BULLET), OR APPROVED EQUAL.
4. MIN. 24" CLEARANCE BETWEEN RPZ BACKFLOW PREVENTER AND CONTROL PANEL REQUIRED.
5. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.



LINE POST

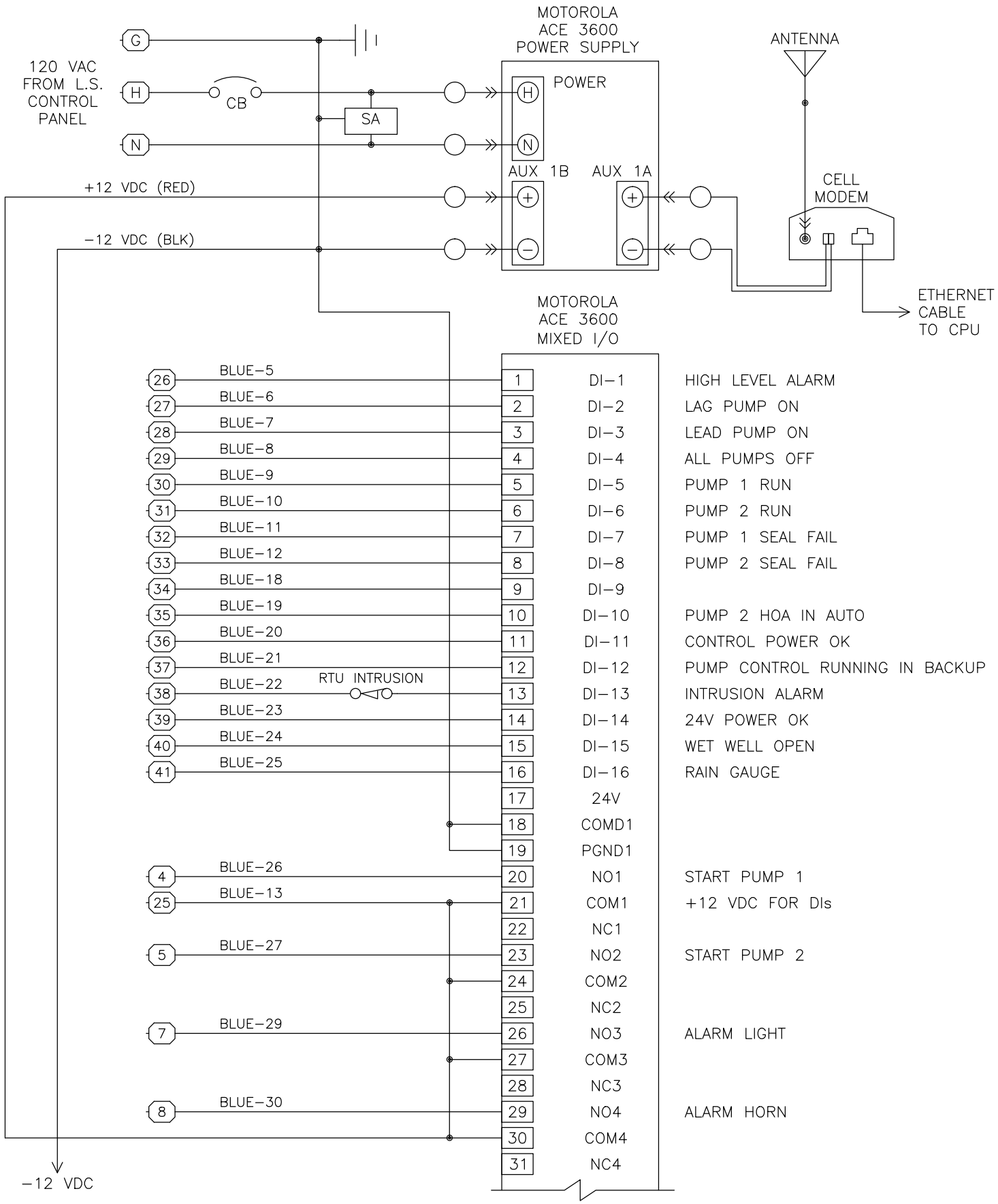
CORNER POST



GATE POST

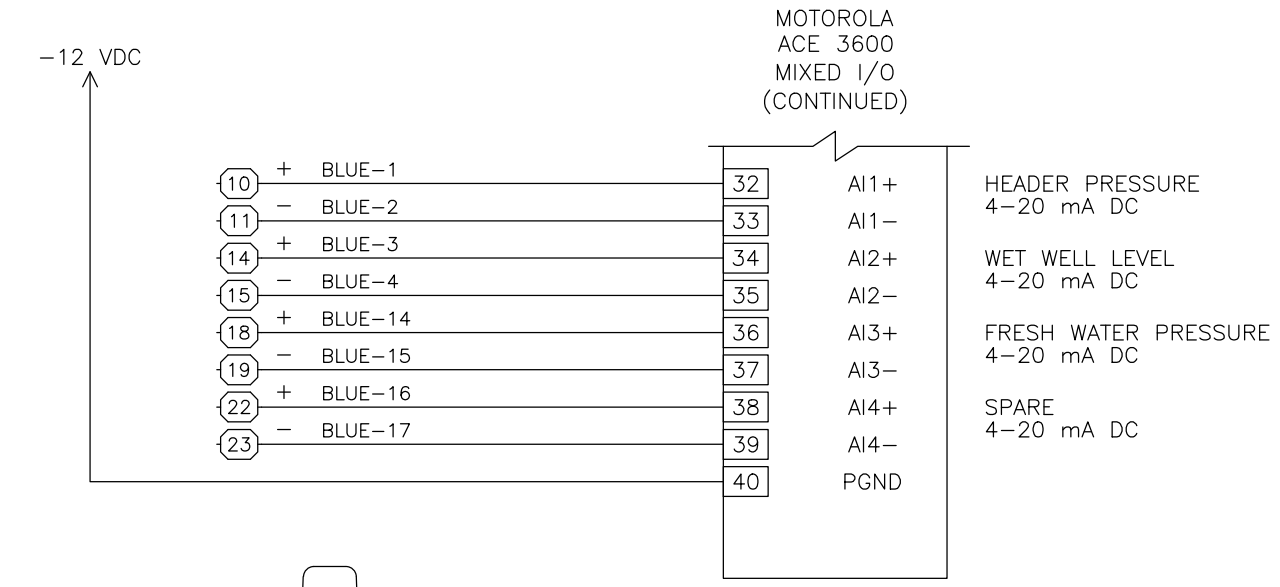
NOTES:

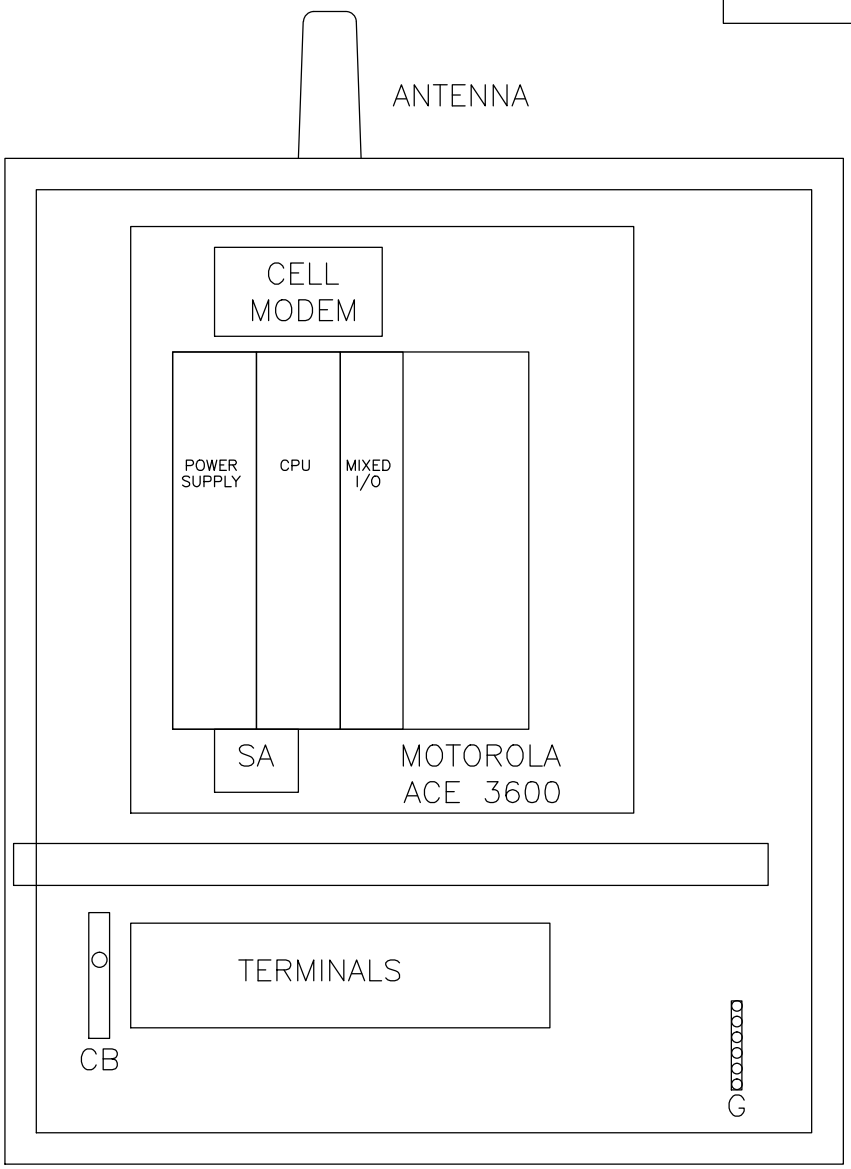
1. GATE TO BE 12'-0" CLEAR OPENING.
2. BLACK VINYL COATED STEEL WOVEN WIRE FABRIC TO BE STRETCHED TAUT W/ STRETCHER BARS AND STRAPS AND FASTENED TOP & BOTTOM AND AT LINE POSTS WITH GALV. PIG RING TIES.
3. GATE TO BE SECURED OPEN WITH GATE STOP SET IN CONCRETE.
4. ALL RAILS, POSTS AND HARDWARE TO BE VINYL COATED. ALL VINYL COATING SHALL BE BLACK.



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" & "B" LIFT STATIONS RTU – MOTOROLA ACE 3600 – WIRING DIAGRAM	DWG No.
AUGUST 2016		58





ENCLOSURE

NEMA 4X Stainless Steel
Single Door, Continuos Hinge (left side)
Padlockable 3 Pt. Latch
White Powdercoat Epoxy Finish
24"H x 20" W x 10" D

OUTER DOOR NOT SHOWN FOR CLARITY

Components to be mounted on removeable back panel, white painted steel or heavy guage aluminum.

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "A" & "B" LIFT STATIONS RTU-MOTOROLA ACE 3600-WIRING DIAGRAM & ENCLOSURE	DWG No.
AUGUST 2016		59

LIFT STATION RTU PARTS LIST

ITEM	QUANTITY	MANUFACTURER	MODEL	PART NUMBER	
ENCLOSURE	1		24"H x 20"W x 12"D Stainless Steel, Painted White, 3 point locking hatch, drip shield, document holder, door brace		
MODEM	1	Sierra Wireless	GX450	1102326	
ANTENNA	1	Laird	Phantom	TRA6927M3NWN-001	
ANTENNA MOUNT & CABLE	1	PCTEL	MAXRAD	MLF-12-204-S1-A	
RTU SYSTEM	1	Motorola	ACE3600	F7509	ACE3600 Basic Model no Radio
Required Options	1	Motorola		V103	3 I/O Slots Frame
	1	Motorola		V214	Medium metal chassis
	1	Motorola		V245	Mixed I/O Module
	1	Motorola		V260	24V Plug in power supply for IO modules
	1	Motorola		V261	AC Power Supply
	1	Motorola		V114	6.5 Ah backup battery
	1	Motorola		V448	CPU3680
	2	Motorola		V20	Slot Filler
RADIO BRACKET	1	Motorola		FHN6895	XTL Radio Bracket

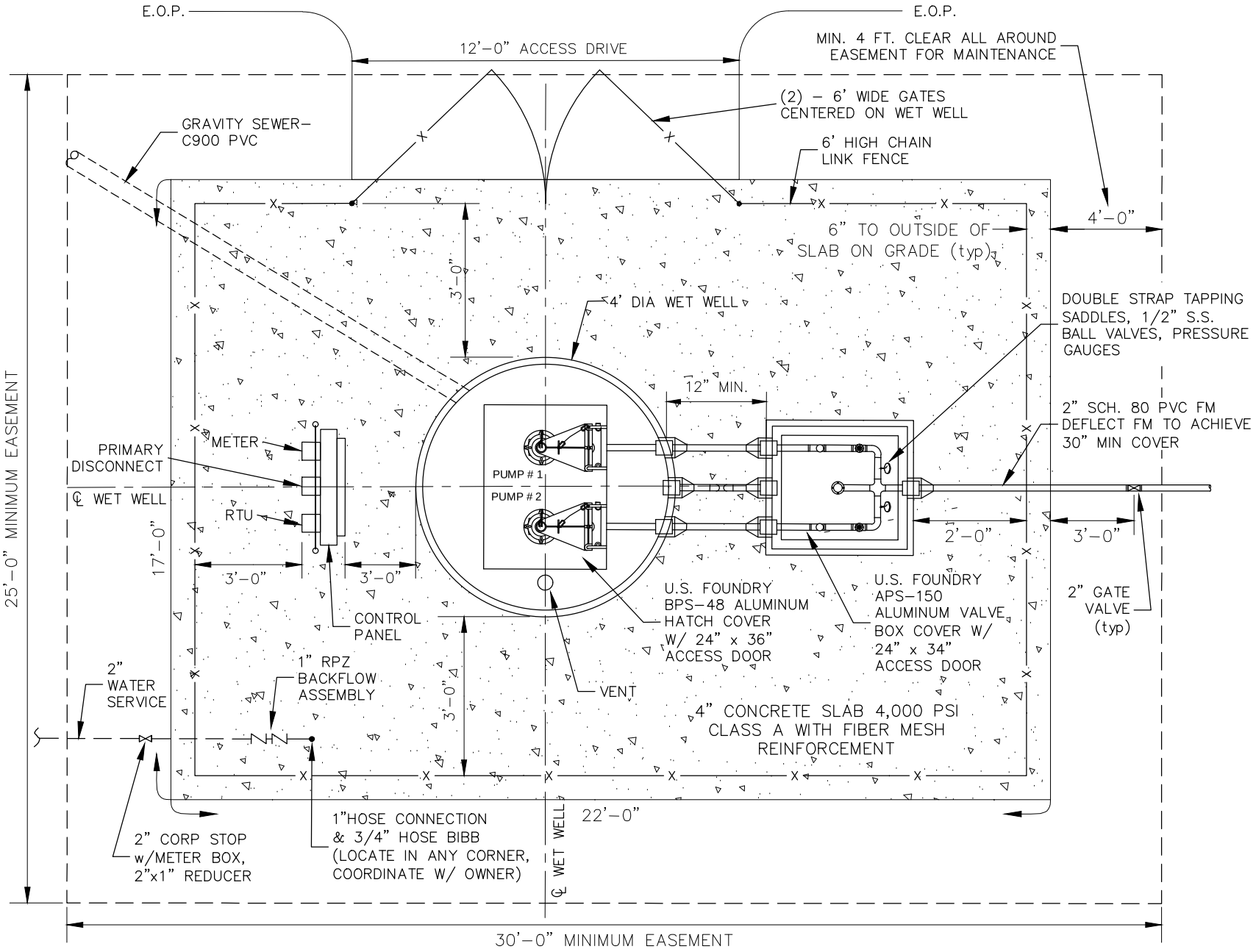
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION
AUGUST 2016

TYPE "B" LIFT STATION
TYPICAL SITE PLAN LAYOUT

DWG No.
61

NOTES:
1. Access Road shall consist of:
   - 12" thick Stabilized Subbase, stabilized to not less than 50 FBV and compacted to not less than 98% maximum density as determined by AASHTO T-180
   - 8" Thick Rock Base, compacted to not less than 98% maximum density as determined by AASHTO T-180
   - 8" Thick Concrete w/ fiberglass mesh reinforcement.
2. Furnish and Install two (2) 4", 0-60 psig, oil filled pressure gauges (max pressure to be coordinated with pump station design).

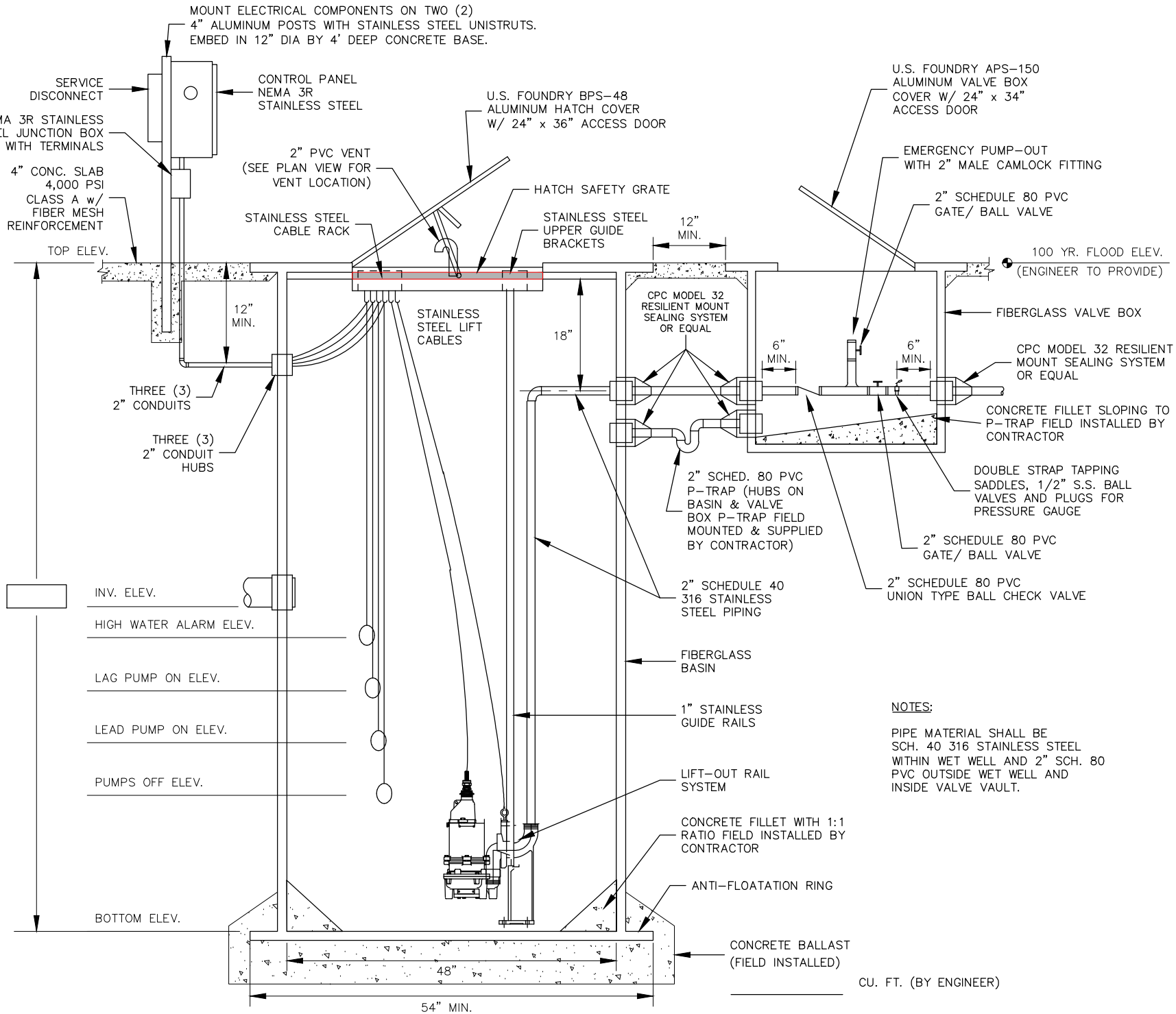


MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

TYPE "B" LIFT STATION
TYPICAL SECTION

REVISION
AUGUST 2016

DWG No.
62



PUMP DATA: MANUFACTURER,_____

MOD. No._____ IMP. No._____ MOTOR,_____ HP,_____

RPM,_____ VOLTS,_____ PHASE, 60 HERTZ

OPERATING CONDITIONS:_____ GPM AT _____ TDH. _____% EFFICIENCY

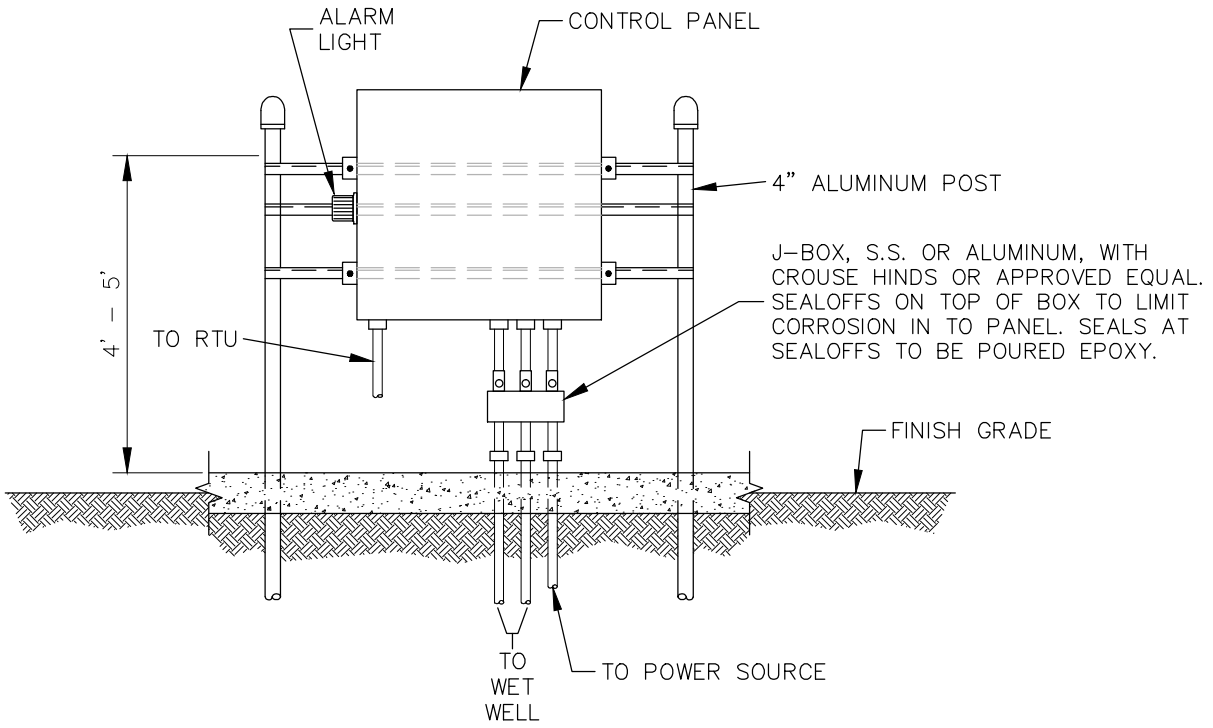
AS-BUILT:

PUMP NO. 1: _____ GPM AT _____ TDH.

PUMP NO. 2: _____ GPM AT _____ TDH.

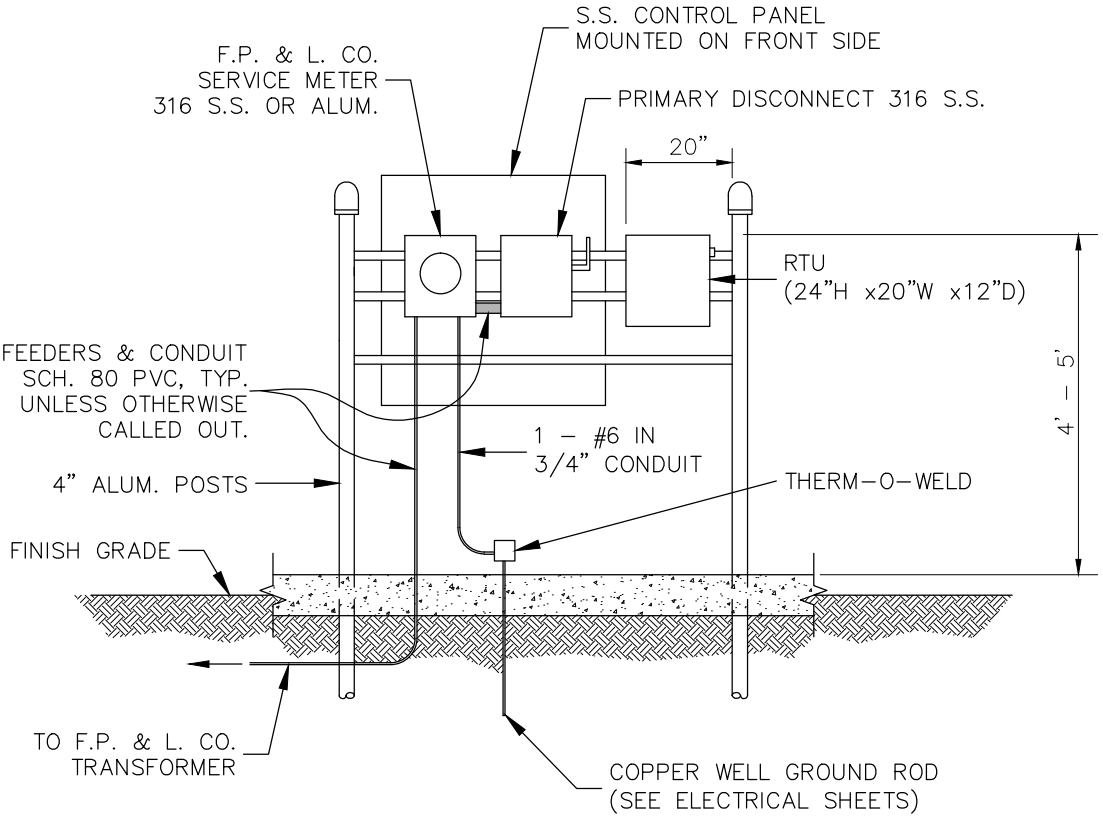
WET WELL: SIZED FOR MINIMUM PUMP CYCLE TIME OF 10 MINUTES AND A MAXIMUM OF 6 PUMP STARTS PER HOUR. WORKING DEPTH _____ FT. WORKING VOLUME _____ GALS.

ELECTRICAL: FEEDERS AND CONDUIT _____ MAIN SWITCH _____ POLES_____ AMPS



NOTES:

1. ELECTRIC METER AND PRIMARY DISCONNECT MOUNTED TO UNI-STRUT ON BACK SIDE OF PANEL.
2. ALL POWER AND CONTROLS LINES SHALL BE CONTINUOUS (NO SPLICES).
3. GROUND FAULT INTERRUPTER ON CONVENIENCE RECEPTACLE.
4. PANEL MOUNTED TO S/S UNI-STRUT BY WELDED TABS.
5. ALUMINUM POSTS IN CONCRETE SHALL BE COATED WITH BITUMASTIC.
6. CONTROL PANEL SHALL BE UL LISTED AS A UNIT.
7. ALL HARDWARE, NUTS & BOLTS, AND APPURTENANCES ABOVE GROUND SHALL BE 316 STAINLESS STEEL.
8. TELEMETRY CONDUIT SHALL BE INSTALLED BY THE CONTRACTOR WITH SWEEP 90 DEGREE BEND.
9. ALL CONDUIT NOT ENTERING WETWELL SHALL BE SCHEDULE 80 P.V.C.
10. PANEL MOUNTING SHALL ALLOW FOR UNRESTRICTED VIEW OF ALARM LIGHT.
11. MOUNT RTU PANEL TO ALLOW FOR UNRESTRICTED LINE-OF-SIGHT TO ANTENNA FROM ALL DIRECTIONS.
12. INSTALLATION IS NOT CLASSIFIED. SEALOFFS ARE USED SOLELY FOR THE PURPOSE OF LIMITING CORROSIVE CHEMICALS INTO THE ELECTRICAL EQUIPMENT.



NOTES:
1. TWENTY INCHES ON RIGHT SIDE OF SUPPORT POST IS RESERVED FOR RTU AND ACCESSORIES.

BACK VIEW OF CONTROL PANEL

SPECIFICATIONS FOR DUPLEX (FDEP TYPE) CONTROL PANEL

EACH PANEL SHALL CONTROL 2, 3, 5 OR 7.5 HP, 230 VOLT, THREE PHASE (PREFERRED), 60 Hz PUMPS.
230 VOLT, SINGLE PHASE w/VFD DRIVES WILL BE ACCEPTED ONLY WHERE THREE PHASE IS NOT AVAILABLE.

A NEUTRAL SHALL BE SUPPLIED TO THE PANEL FOR 120 VOLT CONTROL POWER.

PANEL ENCLOSURE

ENCLOSURE SHALL BE NEMA 3R, FABRICATED FROM 304 STAINLESS STEEL

ENCLOSURE SHALL BE WELDED CONSTRUCTION, INCLUDING INTEGRAL WELDED RAIN GUARD. OUTER DOOR SHALL HAVE HINGES AND MEANS FOR PAD LOCKING, INNER DEADFRONT DOOR SHALL BE 5052–H32 ALLOY ALUMINUM. ALL MOUNTING HOLES SHALL BE DRILLED AND TAPPED, SELF TAPPING SCREW NOT ACCEPTABLE. ALL BOLTS, NUTS, LOCK WASHERS, AND MACHINE SCREWS SHALL BE STAINLESS STEEL.

THE FOLLOWING MAJOR COMPONENTS ARE REQUIRED:

1) MAIN BREAKER
2) EMERGENCY BREAKER AND GENERATOR RECEPTACLE–RUSSELL STOLL JRS1044FR (FOR 100 AMP SERVICE)
3) PUMP BREAKERS
4) CONTROL CIRCUIT BREAKER
5) ALTERNATOR
6) HIGH LEVEL FLASHING ALARM LIGHT
7) HIGH LEVEL HORN ALARM WITH SILENCE – WHEN SILENCE LIGHT STAYS ON
8) LIGHTNING ARRESTOR
9) SURGE SUPPRESOR
10) PHASE/UNDER VOLTAGE MONITORING RELAY IF 3 PHASE, UNDER VOLTAGE MONITORING RELAY IF SINGLE PHASE
11) NEMA RATED MOTOR STARTERS WITH OVERLOAD PROTECTION FOR ALL POWER LEGS
12) ELAPSE TIME METERS
13) YASKAWA VFD ON SINGLE PHASE SYSTEM.

TYPICAL SEQUENCE OF OPERATION:

ON RISE LEVEL:

LOWEST FLOAT WILL CLOSE CIRCUIT TO RELAY.
LEAD PUMP ON FLOAT CLOSES TO BRING LEAD PUMP ON.
IF LEAD DOES NOT RECEDE AND CONTINUES TO RISE, THE LAG FLOAT WILL CLOSE AND BRING ON THE LAG PUMP. FURTHER RISING OF LEVEL IN WETWELL WILL CLOSE 4TH FLOAT (HIGH LEVEL) AND ACTIVATE THE HIGH LEVEL ALARM LIGHT AND HORNS.

ON FALLING LEVEL:

ALL PUMPS WILL DE–ENERGIZE AT THE OPENING OF THE LOWEST (OFF) FLOAT

CONTROL CIRCUITRY WILL BE SUCH THAT NO FLOAT WILL DEPEND ON ANOTHER FLOAT FOR ITS CONTROL POWER.

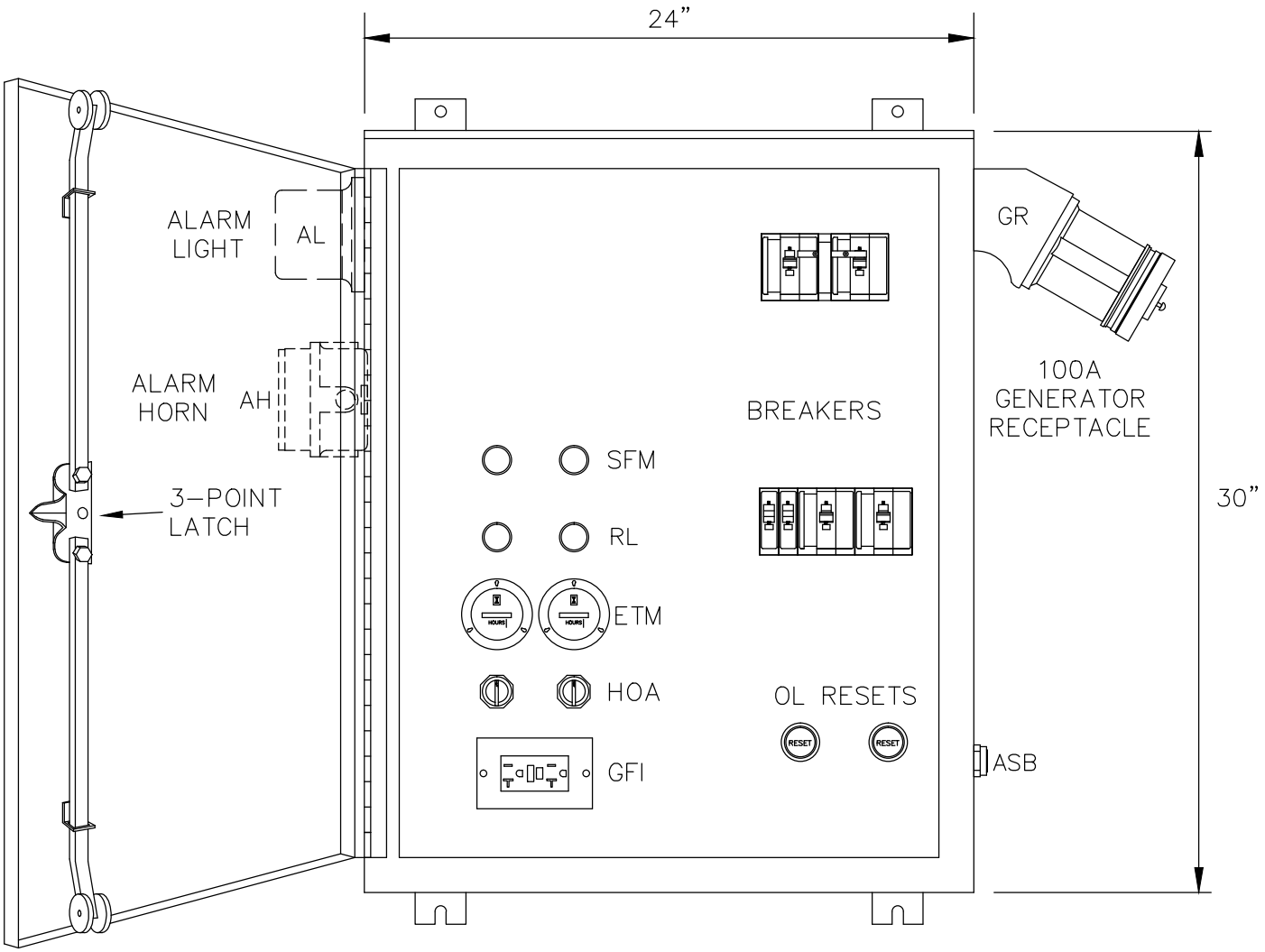
CONTROL PANEL SCHEMATICS, IN PLASTIC LAMINATE, IS TO BE AFFIXED TO THE INSIDE OF THE OUTER DOOR.

ALL WIRING SHALL BE NUMBERED.

IN THE EVENT THE PUMPS BEING FURNISHED REQUIRE SEAL FAILURE COMPONENTS AND INDICATION TO VALIDATE WARRANTY, THESE COMPONENTS SHALL BE FURNISHED AS REQUIRED.

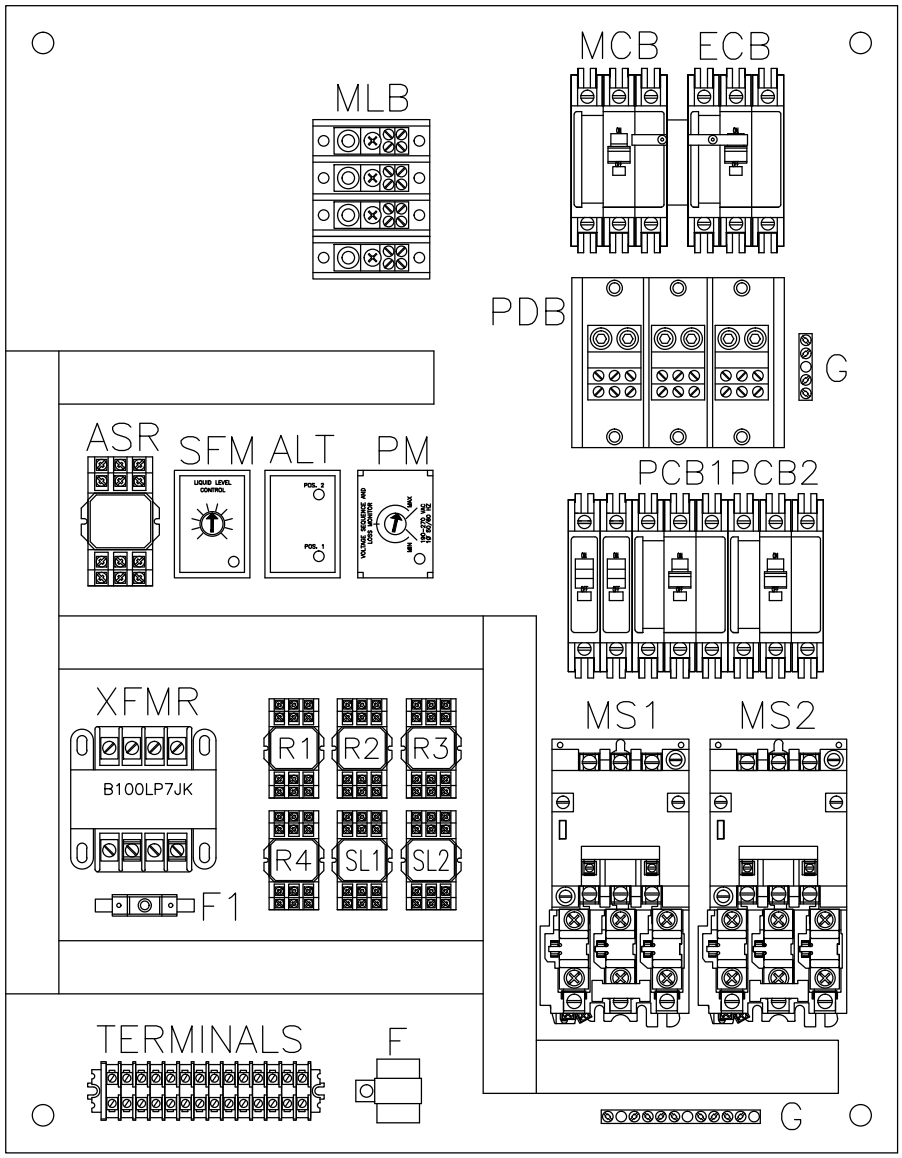
ALL COMPONENT LABELS SHALL BE OF THE LASER PRINTED MYLAR PLASTIC LABELS.

A 24 HOUR EMERGENCY TELEPHONE CONTACT SHALL BE ATTACHED TO CONTROL PANEL COVER "FOR EMERGENCIES CONTACT MARTIN COUNTY UTILITIES AT TEL : 772–221–1442"



MAIN ENCLOSURE : NEMA 3R RATED, FABRICATED FROM 304 STAINLESS STEEL, WELDED CONSTRUCTION, INCLUDING INTEGRAL WELDED RAIN GUARD (3 PT. LATCH ON OUTER DOOR).
BACKPANEL : 12 GAUGE STEEL WITH WHITE ENAMEL.
HINGED INNER DOOR : FABRICATED FROM .080 ALUMINUM.

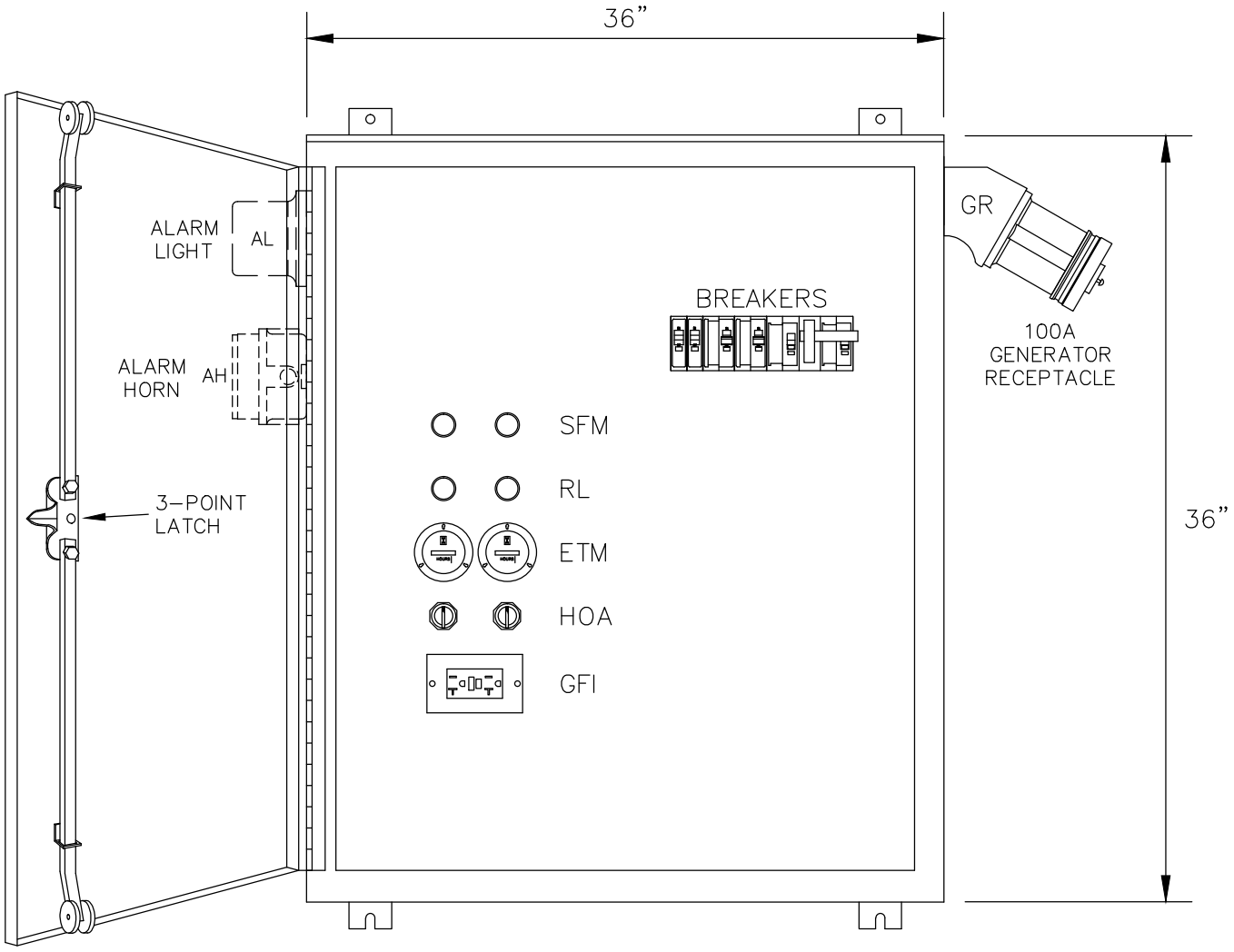
ENCLOSURE AND DEADFRONT LAYOUT THREE PHASE



BACKPANEL LAYOUT – THREE PHASE

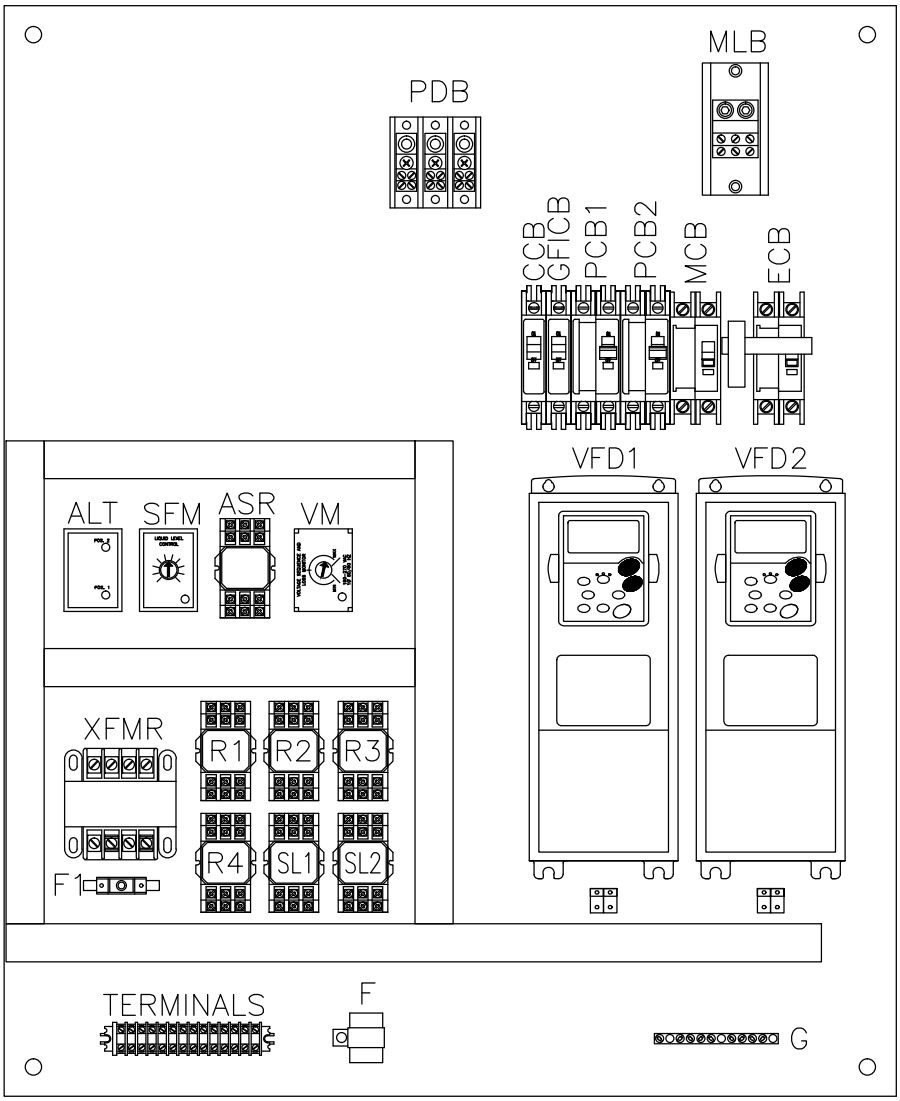
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "B" LIFT STATION – CONTROL PANEL BACKPANEL LAYOUT (THREE PHASE)	DWG No.
AUGUST 2016		67A



MAIN ENCLOSURE : NEMA 3R RATED, FABRICATED FROM 304 STAINLESS STEEL, WELDED CONSTRUCTION, INCLUDING INTEGRAL WELDED RAIN GUARD (3 PT. LATCH ON OUTER DOOR).
BACKPANEL : 12 GAUGE STEEL WITH WHITE ENAMEL.
HINGED INNER DOOR : FABRICATED FROM .080 ALUMINUM.

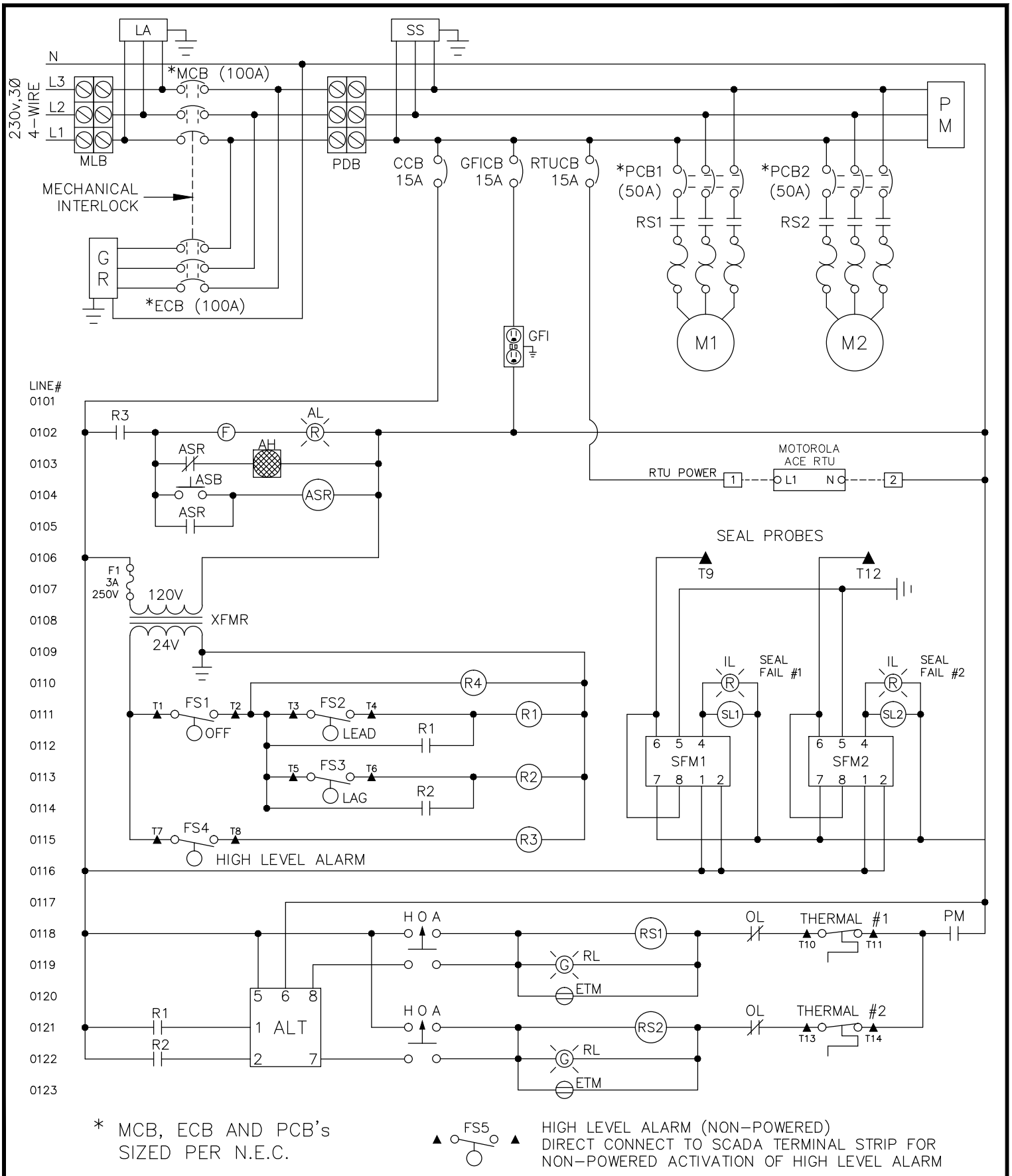
ENCLOSURE AND DEADFRONT LAYOUT SINGLE PHASE



BACKPANEL LAYOUT – SINGLE PHASE

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "B" LIFT STATION – CONTROL PANEL BACKPANEL LAYOUT (SINGLE PHASE)	DWG No.
AUGUST 2016		68A



* MCB, ECB AND PCB's SIZED PER N.E.C.

FS5 — HIGH LEVEL ALARM (NON-POWERED) DIRECT CONNECT TO SCADA TERMINAL STRIP FOR NON-POWERED ACTIVATION OF HIGH LEVEL ALARM

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "B" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (THREE PHASE)	DWG No.
AUGUST 2016		69

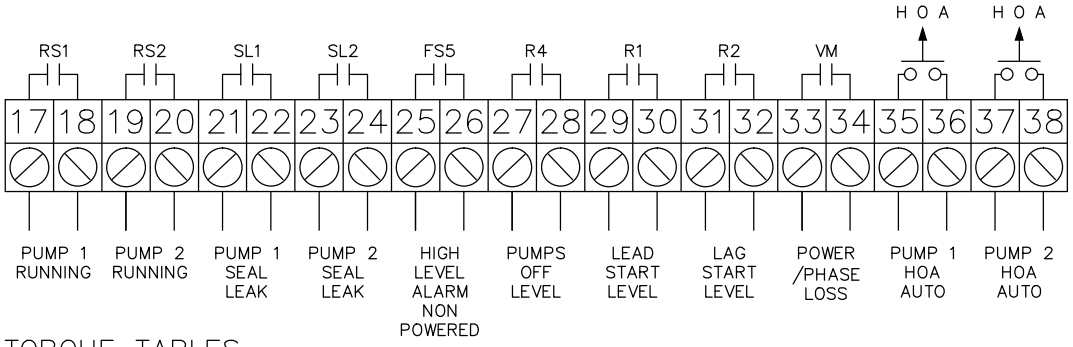
NOTES:

1. CONTROL TERMINAL IN MAIN PANEL
2. ⊡ NEUTRAL TERMINAL AND GROUND LUGS IN MAIN PANEL
3. ○ TERMINAL IN JUNCTION BOX
4. — — — FIELD WIRING (EXTERNAL TO CONTROL PANEL)
5. ——— PANEL WIRING
6. SEAL ALL CONDUITS ENTERING CONTROL PANEL
7. CONTROL PANEL IS UL508A LABELED
8. INSTALL IN ACCORDANCE WITH ARTICLE 504 OF THE N.E.C.
9. MINIMUM #16 AWG WIRE AT 600V

CONTROL WIRE COLOR CODE

120VAC HOT	RED	24VDC POSITIVE (+)	ORANGE
120VAC NEUTRAL	WHITE	24VDC NEGATIVE (−)	BROWN
24VAC HOT	BLUE	12VDC POSITIVE (+)	RED
POWER FROM OUTSIDE PANEL SOURCE & RTU CONNECTIONS	YELLOW	12VDC NEGATIVE (−)	BLACK

TERMINAL STRIP IN CONTROL PANEL FOR SCADA



TORQUE TABLES

CONTROL TERMINALS
RECOMMENDED TIGHTENING TORQUE

TERMINAL	TORQUE
SIZE 2.5	4.4 in/lb.
SIZE 4.0	4.4 in/lb.
SIZE 6.0	7.0 in/lb.
SIZE 16.0	10.6 in/lb.
SIZE 35.0	26.5 in/lb.

GROUND LUG
RECOMMENDED TIGHTENING TORQUE

WIRE SIZE	TORQUE
AWG 14 - 10	35.0 in/lb.
AWG 8	40.0 in/lb.
AWG 6 - 4	45.0 in/lb.
AWG 3 - 2	50.0 in/lb.

BLUE – TYPICAL OF ALL

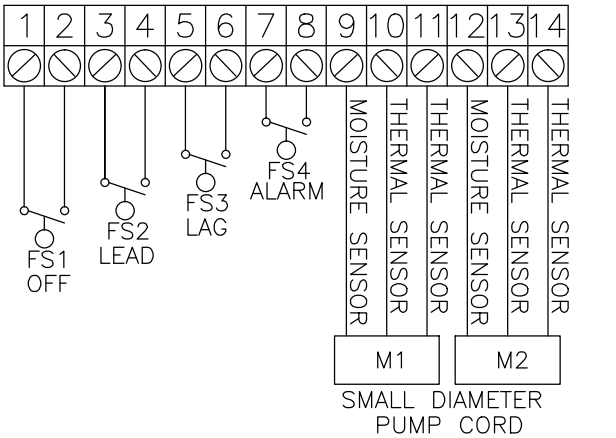
BILL OF MATERIALS			
QTY.	ABBR.	DESCRIPTION	MANUFACTURER, PART#
1	ENC	ENCLOSURE, 304SS, NEMA 3R/12	HOFFMAN, 30Hx24Wx12D-3R
1	MCB	MAIN CIRCUIT BREAKER	SQ.D, QOU360 *
1	ECB	EMERGENCY CIRCUIT BREAKER	SQ.D, QOU360 *
2	PCB1,2	PUMP CIRCUIT BREAKER	SQ.D, QOU330 *
1	RTUCB	RTU CIRCUIT BREAKER	SQ.D, QOU115
1	CCB	CONTROL CIRCUIT BREAKER	SQ.D, QOU115
1	GFICB	GFI CIRCUIT BREAKER	SQ.D, QOU115
1	PM	PHASE MONITOR	DIVERSIFIED, SLA-230-ASA
1	XFMR	TRANSFORMER 120V/24V	EATON, C0100E1B OR SQ. D, 9070T SERIES **
1	SS	SURGE SUPPRESSOR	SQ.D, 6671-SDSA3650
2	MS1,2	MOTOR STARTER	SQ.D, 8536-SCO3-V02S
6	OL	OVERLOAD HEATER	SQ.D, B-28
1	GR	GENERATOR RECEPTACLE	RUSSELL STOLL, JRSB1044FR
1	GFI	GFI RECEPTACLE	HUBBEL GF151L
2	IL	INDICATING LIGHT	EATON, C22-L-XR-120 & M22-XLH-R
2	RL	RUN LIGHT	SQ.D, 9001-SKP38-G9
4	R1-4	CONTROL RELAY 24V	SQ.D, 8501-KU13-V14
2	HOA	HAND OFF AUTO SWITCH	SQ.D, 9001-SKS43BH13
1	AL	ALARM LIGHT	RAB VAPORPROOF VP100DG
1	AH	ALARM HORN	FEDERAL VIBRATONE, 350-100V, SERIES B1
1	ASB	ALARM SILENCE BUTTON	SQ.D, 9001-SKR1BH5
1	ASR	ALARM SILENCE RELAY 120V	SQ.D, 8501-KU13-V20
2	SL1,2	SEAL FAIL RELAY 120V	SQ.D, 8501-KU13-V20
2	SFM1,2	SEAL FAIL MODULE	SSAC, LLC54BA
1	J-BOX	JUNCTION BOX, 304SS, NEMA 4X	CUSTOM EQUIPMENT, 10X24X6
2	P-TER	PUMP TERMINALS	MARATHON, 1333555
2	ETM	ELAPSED TIME METER	EATON, 6-T-3H-508RPM-406
1	ALT	ALTERNATOR	DIVERSIFIED, ARB-120-AEA
1	F	FLASHER	INGRAM, SSF-150W
1	F1	FUSE 3A 250V	BUSS, GDB 3A
1	LA	LIGHTNING ARRESTOR	SQ.D, 6671-SDSA3650
1	SC	SURGE CAPACITOR	
22		CONTROL TERMINALS	WAGO 280 SERIES

NOTES:

* PUMP MANUFACTURER SHALL SIZE THESE BREAKERS. SUBMIT SIZING CONFIRMATION WITH PANEL SHOP DRAWINGS.

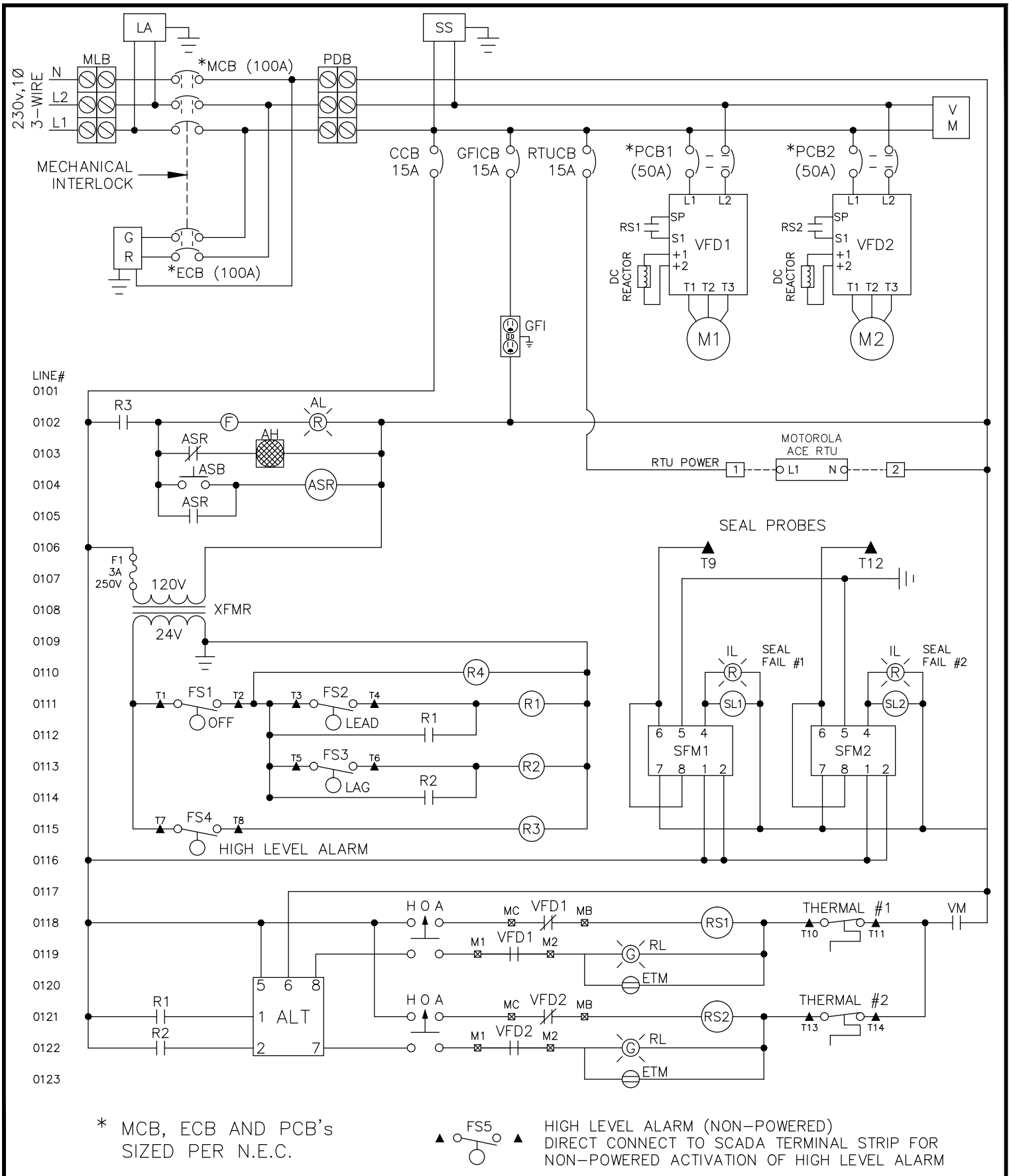
** CONTROL POWER TRANSFORMER TO BE SIZED FOR ALL LOADS OPERATING SIMULTANEOUSLY PLUS ONE SIZE LARGER.

TERMINAL STRIP IN JUNCTION BOX & CONTROL PANEL



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "B" LIFT STATION – CONTROL PANEL BILL OF MATERIALS (THREE PHASE)	DWG No.
AUGUST 2016		69B



* MCB, ECB AND PCB's SIZED PER N.E.C.

▲ FS5 ▲ HIGH LEVEL ALARM (NON-POWERED) DIRECT CONNECT TO SCADA TERMINAL STRIP FOR NON-POWERED ACTIVATION OF HIGH LEVEL ALARM

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "B" LIFT STATION – CONTROL PANEL WIRING DIAGRAM (SINGLE PHASE)	DWG No.
AUGUST 2016		70

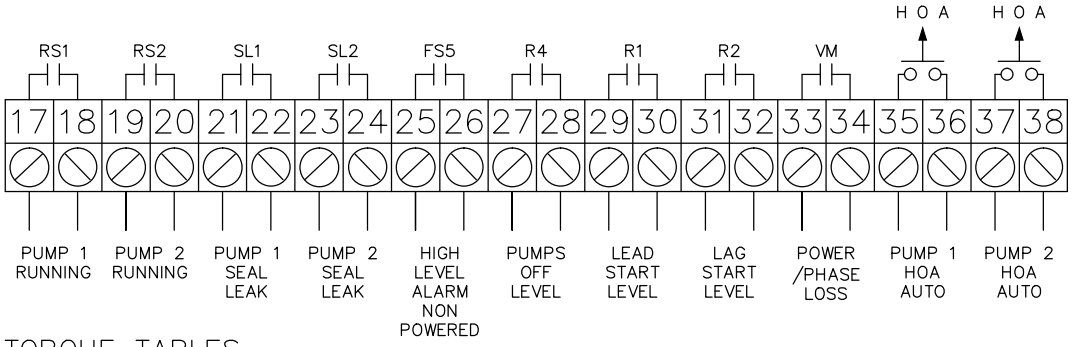
NOTES:

1. CONTROL TERMINAL IN MAIN PANEL
2. ⊡ NEUTRAL TERMINAL AND GROUND LUGS IN MAIN PANEL
3. ○ TERMINAL IN JUNCTION BOX
4. — — — FIELD WIRING (EXTERNAL TO CONTROL PANEL)
5. ——— PANEL WIRING
6. SEAL ALL CONDUITS ENTERING CONTROL PANEL
7. CONTROL PANEL IS UL508A LABELED
8. INSTALL IN ACCORDANCE WITH ARTICLE 504 OF THE N.E.C.
9. MINIMUM #16 AWG WIRE AT 600V

CONTROL WIRE COLOR CODE

120VAC HOT	RED	24VDC POSITIVE (+)	ORANGE
120VAC NEUTRAL	WHITE	24VDC NEGATIVE (−)	BROWN
24VAC HOT	BLUE	12VDC POSITIVE (+)	RED
POWER FROM OUTSIDE PANEL SOURCE & RTU CONNECTIONS	YELLOW	12VDC NEGATIVE (−)	BLACK

TERMINAL STRIP IN CONTROL PANEL FOR SCADA



TORQUE TABLES

CONTROL TERMINALS
RECOMMENDED TIGHTENING TORQUE

TERMINAL	TORQUE
SIZE 2.5	4.4 in/lb.
SIZE 4.0	4.4 in/lb.
SIZE 6.0	7.0 in/lb.
SIZE 16.0	10.6 in/lb.
SIZE 35.0	26.5 in/lb.

GROUND LUG
RECOMMENDED TIGHTENING TORQUE

WIRE SIZE	TORQUE
AWG 14 - 10	35.0 in/lb.
AWG 8	40.0 in/lb.
AWG 6 - 4	45.0 in/lb.
AWG 3 - 2	50.0 in/lb.

BLUE — TYPICAL OF ALL

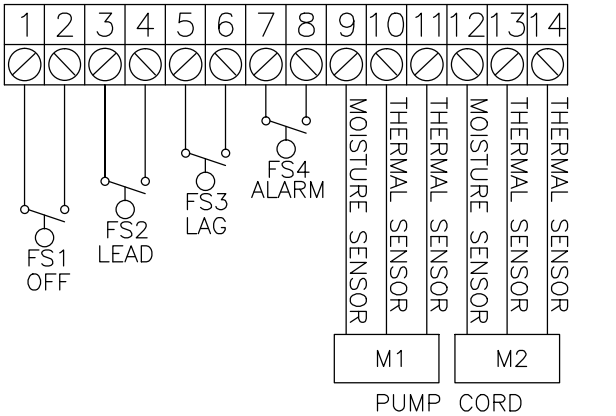
BILL OF MATERIALS			
QTY.	ABBR.	DESCRIPTION	MANUFACTURER, PART#
1	ENC	ENCLOSURE, 304 SS, NEMA3R/12	HOFFMAN, 36x36x12-3R
1	MCB	MAIN CIRCUIT BREAKER	SQ.D, QOU250 *
1	ECB	EMERGENCY CIRCUIT BREAKER	SQ.D, QOU250 *
2	PCB1,2	PUMP CIRCUIT BREAKER	SQ.D, QOU225 *
1	RTUCB	RTU CIRCUIT BREAKER	SQ.D, QOU115
1	CCB	CONTROL CIRCUIT BREAKER	SQ.D, QOU115
1	GFICB	GFI CIRCUIT BREAKER	SQ.D, QOU115
1	VM	VOLTAGE MONITOR	DIVERSIFIED, UOA-240-ALA Check this
1	XFMR	TRANSFORMER 120V/24V	EATON, C0100E1B or SQ.D. 9070T Series **
1	SS	SURGE SUPPRESSOR	SQ.D, 6671-SDSA1175
2	VFD1,2	VARIABLE FREQUENCY DRIVES	YASKAWA CIMR-PW2A0056FAA
2		DC BUS REACTOR (OPEN TYPE)	YASKAWA URX000059
1	GR	GENERATOR RECEPTACLE	RUSSELL STOLL, JRSB1044FR
1	GFI	GFI RECEPTACLE	HUBBELL GF15IL
2	IL	INDICATING LIGHT	EATON, C22-L-XR-120 & M22-XLH-R
2	RL	RUN LIGHT, GREEN	SQ.D, 9001-SKP38-G9
4	R1-4	CONTROL RELAYS 24V	A.B. 700-HC14A24
2	HOA	HAND OFF AUTO SWITCH	SQ.D, 9001-SKS43BH13
1	AL	ALARM LIGHT	RAB VAPORPROOF VP100DG
1	AH	ALARM HORN	FEDERAL VIBRATONE, 350-100V, SERIES B1
1	ASB	ALARM SILENCE BUTTON	SQ.D, 9001-SKR1BH5
1	ASR	ALARM SILENCE RELAY 120V	SQ.D, 8501-KU13-V20
2	SL1,2	SEAL FAIL RELAY 120V	SQ.D, 8501-KU13-V20
2	SFM1,2	SEAL FAIL MODULE	SSAC, LLC54BA
2	SR	START RELAY	MARS, 19007
1	J-BOX	JUNCTION BOX, 304SS, NEMA 4X	CUSTOM EQUIPMENT, 10X24X6
2	P-TER	PUMP TERMINALS	MARATHON, 1333555
2	ETM	ELAPSED TIME METER	EATON, 6-T-3H-508RPM-406
1	ALT	ALTERNATOR	DIVERSIFIED, ARB-120-AEA
1	F	FLASHER	INGRAM, SSF-150W
1	F1	FUSE 3A 250V	BUSS, GDB 3A
1	LA	LIGHTNING ARRESTOR	SQ.D, 6671-SDSA1175
1	SC	SURGE CAPACITOR	REFER TO ELECTRICAL DWGS.
22		CONTROL TERMINALS	WAGO 280 SERIES

NOTES:

* PUMP MANUFACTURER SHALL SIZE THESE BREAKERS. SUBMIT SIZING CONFIRMATION WITH PANEL SHOP DRAWINGS.

** CONTROL POWER TRANSFORMER TO BE SIZED FOR ALL LOADS OPERATING SIMULTANEOUSLY PLUS ONE SIZE LARGER.

TERMINAL STRIP IN JUNCTION BOX & CONTROL PANEL



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPE "B" LIFT STATION – CONTROL PANEL BILL OF MATERIALS (SINGLE PHASE)	DWG No.
AUGUST 2016		70B

TYPE "B" PACKAGED FIBERGLASS PUMP LIFT STATIONS, PACKAGED FIBERGLASS VALVE BOXES, AND STANDARD CONTROL PANELS

FURNISH AND INSTALL A COMPLETE PACKAGED TYPE "B" GRINDER PUMP STATION AS DESCRIBED BELOW:

SPECIFICATIONS

DESIGN CONDITIONS

MODEL _____ H.P. _____

VOLT _____ PHASE _____

DISCHARGE _____ IMPELLER _____

GPM _____ TDH _____

PUMP: MILWAUKEE, MYERS, FLYGT, BARNES – GRINDER PUMP 2.0 – 7.5 H.P.

THE PUMP SHALL HAVE AN INTEGRALLY BUILT IN GRINDER UNIT AND SUBMERSIBLE TYPE MOTOR. THE PUMP SHALL BE SUSPENDED IN THE BASIN BY TWO (2) 1" GUIDE RAILS AND QUICK DISCONNECT LIFT OUT MOUNTING ASSEMBLY. SOLIDS SHALL BE FED IN AN UPFLOW DIRECTION TO THE GRINDER MECHANISM WITH NO OBSTRUCTIONS BELOW THE GRINDER INLET.

THE GRINDER UNIT SHALL BE CAPABLE OF CUTTING SOLID MATERIAL FOUND IN NORMAL DOMESTIC SEWAGE, INCLUDING REASONABLE AMOUNTS OF FOREIGN OBJECTS, SUCH AS WOOD PLASTIC, GLASS, RUBBER, SANITARY NAPKINS, DISPOSABLE DIAPERS AND PANTY HOSE INTO A FINE SLURRY THAT WILL PASS FREELY THROUGH THE PUMP, SERVICE LINE AND FORCE MAIN.

MOTOR

THE PUMP MOTOR SHALL BE OF THE SUBMERSIBLE TYPE RATED FOR 2 – 7.5 HORSEPOWER AT 3450 RPM. MOTOR SHALL BE THREE PHASE, 230 VOLT, 60 HERTZ.

THE STATOR WINDING SHALL BE THE OPEN TYPE WITH CLASS F INSULATION RATED FOR 105° C MAXIMUM OPERATING TEMPERATURE. THE WINDING HOUSING WILL BE FILLED WITH CLEAN DIELECTRIC OIL THAT WILL LUBRICATE BEARINGS, SEALS AND TRANSFER HEAT FROM THE WINDINGS TO THE OUTER SHELL. THE MOTOR STATOR IS TO BE PRESSED INTO THE MOTOR HOUSING FOR OPTIMUM CONCENTRICITY AND ALIGNMENT, AND MAXIMUM HEAT TRANSFER. THE MOTOR SHALL BE CAPABLE OF OPERATING OVER FULL RANGE OF PERFORMANCE CURVE WITHOUT OVERLOADING MOTOR AND CAUSING ANY OBJECTIONAL NOISE OR VIBRATION.

THE MOTOR SHALL HAVE TWO BEARINGS TO SUPPORT THE ROTOR; AN UPPER BALL BEARING TO ACCOMMODATE THRUST LOADS AND A LOWER BALL BEARING TO TAKE RADIAL LOADS. BALL BEARINGS SHALL BE DESIGNED FOR A LB–10 LIFE (50,000 HOURS).

A HEAT SENSOR THERMOSTAT AND OVERLOAD SHALL BE ATTACHED TO THE TOP END OF THE MOTOR WINDINGS AND SHALL STOP THE MOTOR IF THE MOTOR WINDING TEMPERATURE REACHES 200° F. THE HIGH TEMPERATURE SHUTOFF WILL CAUSE THE PUMP TO CEASE OPERATION, SHOULD A CONTROL FAILURE CAUSE THE PUMP TO RUN IN A DRY WET WELL. THE THERMOSTAT SHALL RESET AUTOMATICALLY WHEN THE MOTOR COOLS TO A SAFE OPERATING TEMPERATURE.

SEAL CHAMBER

THE MOTOR SHALL BE PROTECTED BY TWO (2) ROTARY SHAFT SEALS MOUNTED IN TANDEM WITH AN OIL FILLED CHAMBER SEPARATING THE SEALS. THE SEALS SHALL HAVE CARBON / CERAMIC / SILICON SEAL FACES DIAMOND LAPPED TO A TOLERANCE OF ONE LIGHT BAND. METAL PARTS AND SPRINGS FOR SEALS SHALL BE STAINLESS STEEL. AN ELECTRICAL SENSING PROBE SHALL BE MOUNTED IN THE SEAL CHAMBER TO DETECT ANY WATER LEAKAGE PAST THE LOWER SEAL.

CONTINUED ON 66A

GRINDER ASSEMBLY & CONSTRUCTION

THE GRINDER ASSEMBLY SHALL CONSIST OF A ROTATING RADIAL CUTTER AND A STATIONARY SHREDDING RING, AND SHALL BE MOUNTED DIRECTLY BELOW THE VOLUTE PASSAGE. THE ROTATING CUTTER SHALL BE THREADED ONTO THE STAINLESS STEEL SHAFT AND SHALL BE LOCKED WITH A SCREW AND WASHER. THE STATIONARY SHREDDING RING SHALL BE PRESSED ONTO AN IRON HOLDING FLANGE FOR EASY REMOVAL. THE FLANGE SHALL BE PROVIDED WITH TAPPED BACK-OFF HOLES SO THAT SCREWS CAN BE USED TO PUSH THE SHREDDING RING FROM THE HOUSING. BOTH THE RADIAL CUTTER AND SHREDDING RING SHALL BE REMOVABLE FROM THE OUTSIDE WITHOUT DISMANTLING PUMP. GRINDER ASSEMBLY SHALL BE OF SUCH CONSTRUCTION THAT NO CLEARANCE ADJUSTMENTS ARE REQUIRED WHEN ASSEMBLING. ALL GRINDING OF SOLIDS SHALL BE FROM THE ACTION OF THE RADIAL CUTTER AGAINST THE SHREDDING RING. THE RADIAL CUTTER AND SHREDDING RING SHALL BE OF #440 STAINLESS STEEL HARDENED TO 58-60 ROCKWELL C.

PUMP IMPELLER

THE PUMP IMPELLER SHALL BE OF THE RECESSED TYPE TO PROVIDE AN OPEN UNOBSTRUCTED PASSAGE THROUGH THE VOLUTE FOR THE GROUND SOLIDS. THE IMPELLER SHALL BE CONSTRUCTED OF CAST IRON AND SHALL HAVE PUMP OUT VANES ON THE BACK SIDE OF THE IMPELLER TO KEEP SOLIDS FROM LOWER SEAL AND REDUCE PRESSURE AT THE SEAL FACES. IMPELLER SHALL BE THREADED ONTO THE STAINLESS STEEL SHAFT.

PUMP & MOTOR CASTINGS

ALL IRON CASTING SHALL BE OF HIGH TENSILE CAST IRON AND SHALL BE PROPERLY CLEANED, PRE-TREATED WITH CHROMIC RINSE, AND PAINTED WITH A HIGH QUALITY ENAMEL PAINT. ALL PUMP COMPONENTS THAT ARE NOT CAST IRON OR STAINLESS STEEL SHALL BE GALVANIZED OR PAINTED WITH BAKED-ON EPOXY. ALL FASTENERS SHALL BE #302 STAINLESS STEEL.

WET WELL

SHALL BE A FILAMENT WOUND FIBERGLASS BASIN USING A COMMERCIAL GRADE OF GLASS FIBER HAVING A COUPLING AGENT WHICH WILL PROVIDE A SUITABLE BOND BETWEEN THE GLASS REINFORCEMENT AND THE RESIN. THE LAMINATE SHALL CONSIST OF AN INNER SURFACE, AN INTERIOR LAYER, AND AN EXTERIOR LAYER OF LAMINATE BODY. THE INNER SURFACE SHALL BE FREE OF CRACKS AND CRAZING WITH A SMOOTH FINISH. SOME WAVINESS IS PERMISSIBLE AS LONG AS THE SURFACE IS SMOOTH AND FREE OF PITS. BETWEEN 0.010 AND 0.020 INCHES OF RESIN-RICH SURFACE SHALL BE PROVIDED. THE BASIN SHALL BE PROVIDED WITH AN ANTI-FLOATATION RING TO PREVENT RISING.

VALVE BOX

SHALL BE CPC MODEL VB3242 FIBERGLASS VALVE BOX WITH U.S. FOUNDRY APS-150 ALUMINUM VALVE BOX COVER. VALVE BOX SHALL BE PRE-PLUMBED USING ALL SCHEDULE 80 PVC PIPING AND FITTINGS, AND SHALL INCLUDE TWO (2), 2" SCHEDULE 80 PVC BALL CHECK VALVES, AND THREE (3), 2" SCHEDULE 80 PVC GATE VALVES. (ONE (1) 2" GATE VALVE IS SUPPLIED AS AN EMERGENCY PUMP-OUT). PVC PIPING IN VALVE BOX, AND WET WELL SHALL BE CONNECTED AND HELD IN PLACE BY CPC MODEL 32 RESILIENT MOUNT SEALING SYSTEM TO COMPENSATE FOR POSSIBLE UNEVEN SETTLING OF BASIN OR VALVE BOX. SYSTEM SHALL BE PRESSURE TESTED AT 150 P.S.I. PRIOR TO SHIPMENT.

ALUMINUM HATCH COVERS

SHALL BE FABRICATED FROM 1/4" ALUMINUM DIAMOND PLATE AND BUILT TO WITHSTAND A LOAD OF 300 P.S.F. AND SHALL BE MANUFACTURED BY U.S. FOUNDRY, HALLIDAY, OR EQUAL. STAINLESS STEEL BOLTS, NUTS AND HINGES - LOCKING STAPLE.

FLOATS

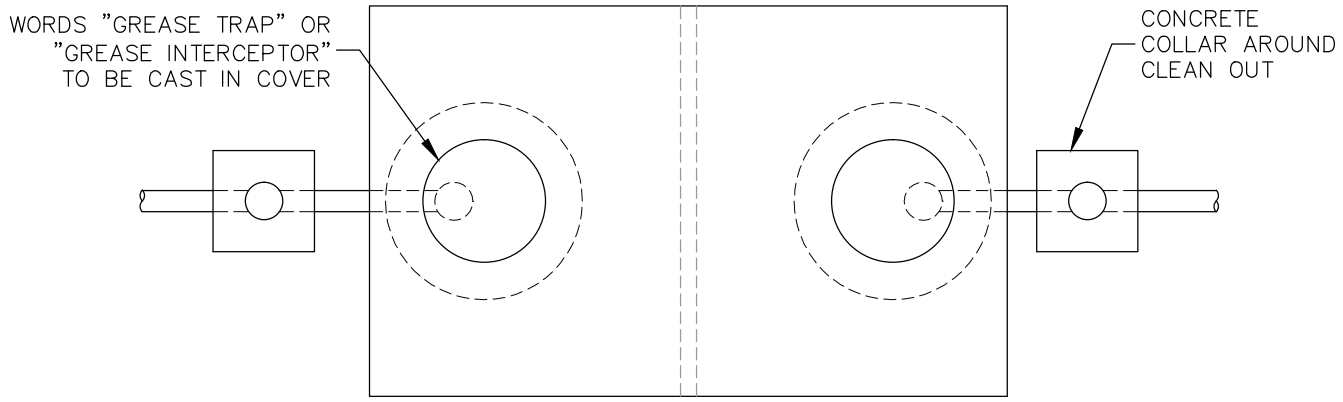
SHALL BE ANCHOR SCIENTIFIC S30N0 ROTO-FLOATS OR EQUAL.

ACCESSORIES

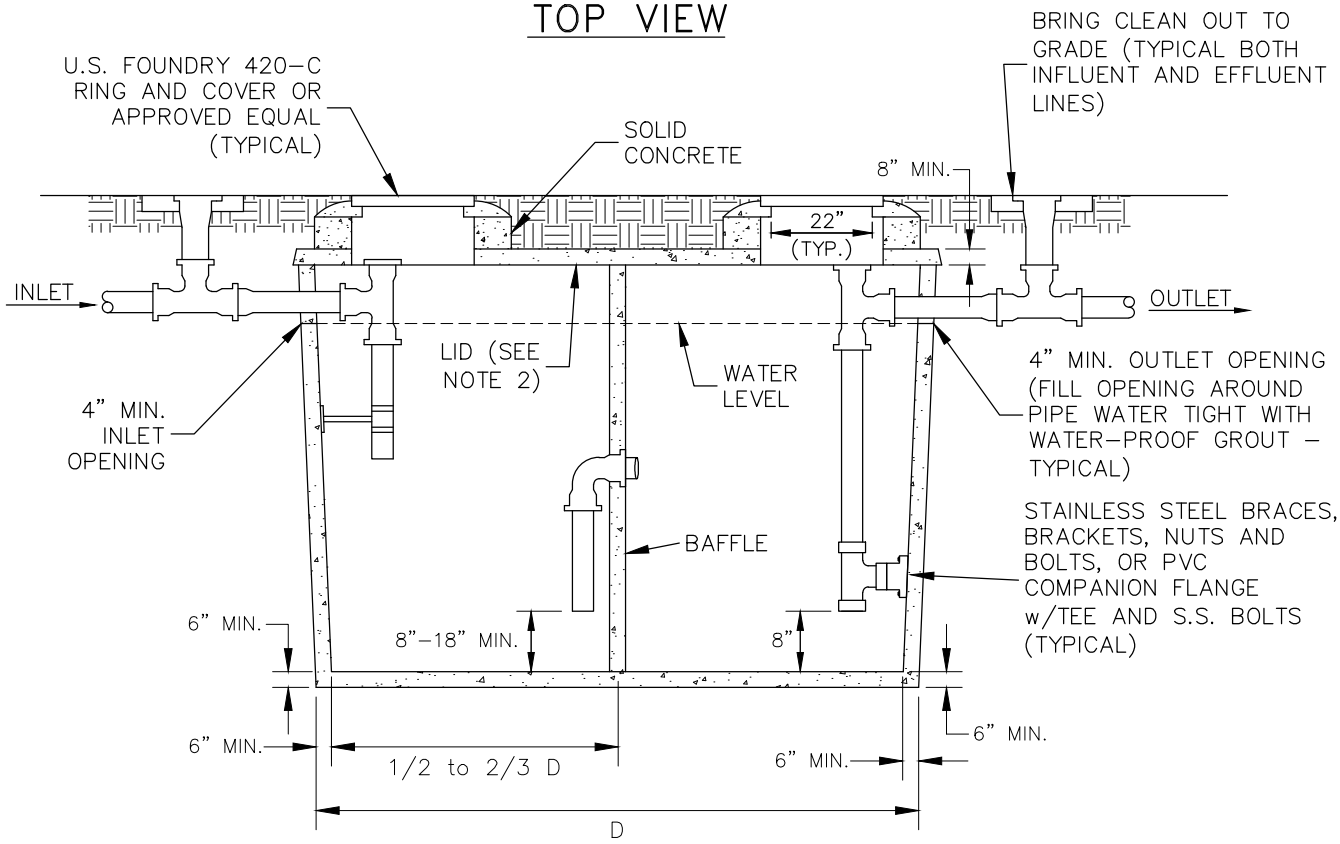
-- STAINLESS STEEL UPPER GUIDE BRACKETS
-- STAINLESS STEEL GUIDE RAILS
-- STAINLESS STEEL CABLE RACK
-- STAINLESS STEEL LIFT CABLES

ANTI-FLOATATION

CONCRETE IS REQUIRED TO PREVENT FLOATATION OF THE FIBERGLASS BASIN. THE ENGINEER OF RECORD SHALL PROVIDE SIGNED AND SEALED BUOYANCY CALCULATIONS TO UTILITY DEPARTMENT.



TOP VIEW

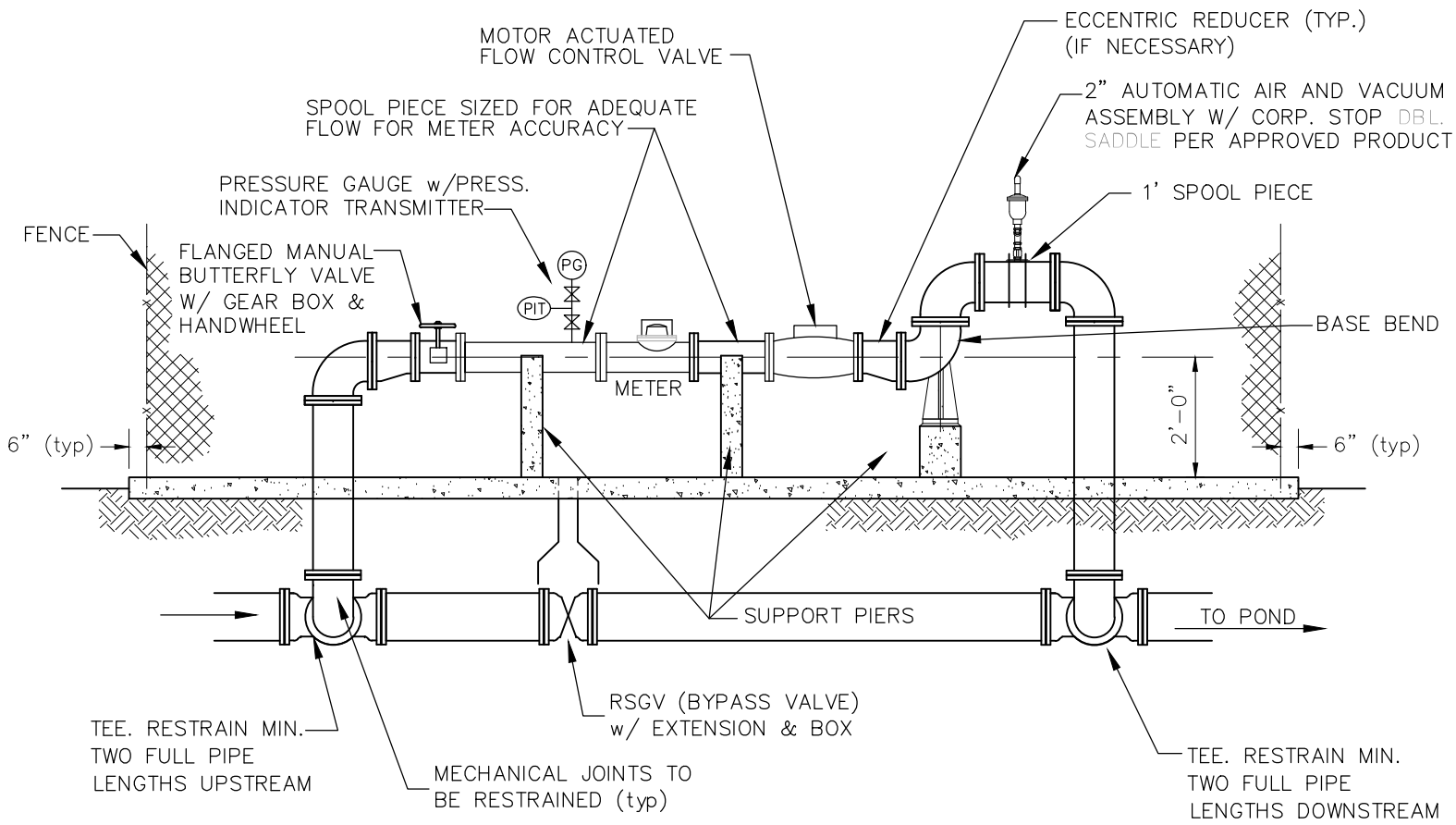


SECTION

NOTES:

1. GREASE TRAPS (SEPTIC TANKS) SHALL BE MANUFACTURED BY FLORIDA SEPTIC INC., SEBRING SEPTIC, AVERETT SEPTIC, OR APPROVED EQUAL. STATEMENT: "THIS CONCRETE STRUCTURE MEETS OR EXCEEDS ALL THE REQUIREMENTS FOR GREASE INTERCEPTORS/SEPTIC TANKS AS REQUIRED BY THE FLORIDA ADMINISTRATIVE CODE (F.A.C.), CHAPTERS 64E-6.013". TANK SIZES SHALL BE 750 GALLONS MINIMUM AND 1,250 GALLONS MAXIMUM AS REQUIRED BY THE F.A.C.. SIZING CALCULATIONS, (3 COPIES MINIMUM), SHALL THEN BE SIGNED AND SEALED BY THE ENGINEER-OF-RECORD AND FORWARDED TO THE DEPARTMENT FOR APPROVAL. NOTE THAT GENERATION RATES FOR ORDINARY RESTAURANTS SHALL BE 16 GPD PER SEAT PER MARTIN COUNTY UTILITY DEPARTMENTAL POLICY.
2. LID TYPES:
   A) 4" REGULAR LID
   B) 8" TRAFFIC BEARING LID
3. ALL INTERNAL COMPONENTS WILL BE CONSTRUCTED BY GREASE TRAP INSTALLER.
4. TANK INSPECTIONS WILL OCCUR WITH TANK ABOVE GROUND.
5. BAFFLE SHALL BE INSTALLED 1/2 (ONE HALF) TO 2/3 (TWO THIRDS) 'D'.
6. MEETS H-20 LOAD REQUIREMENTS.

BULK USER RECLAIMED WATER SYSTEM



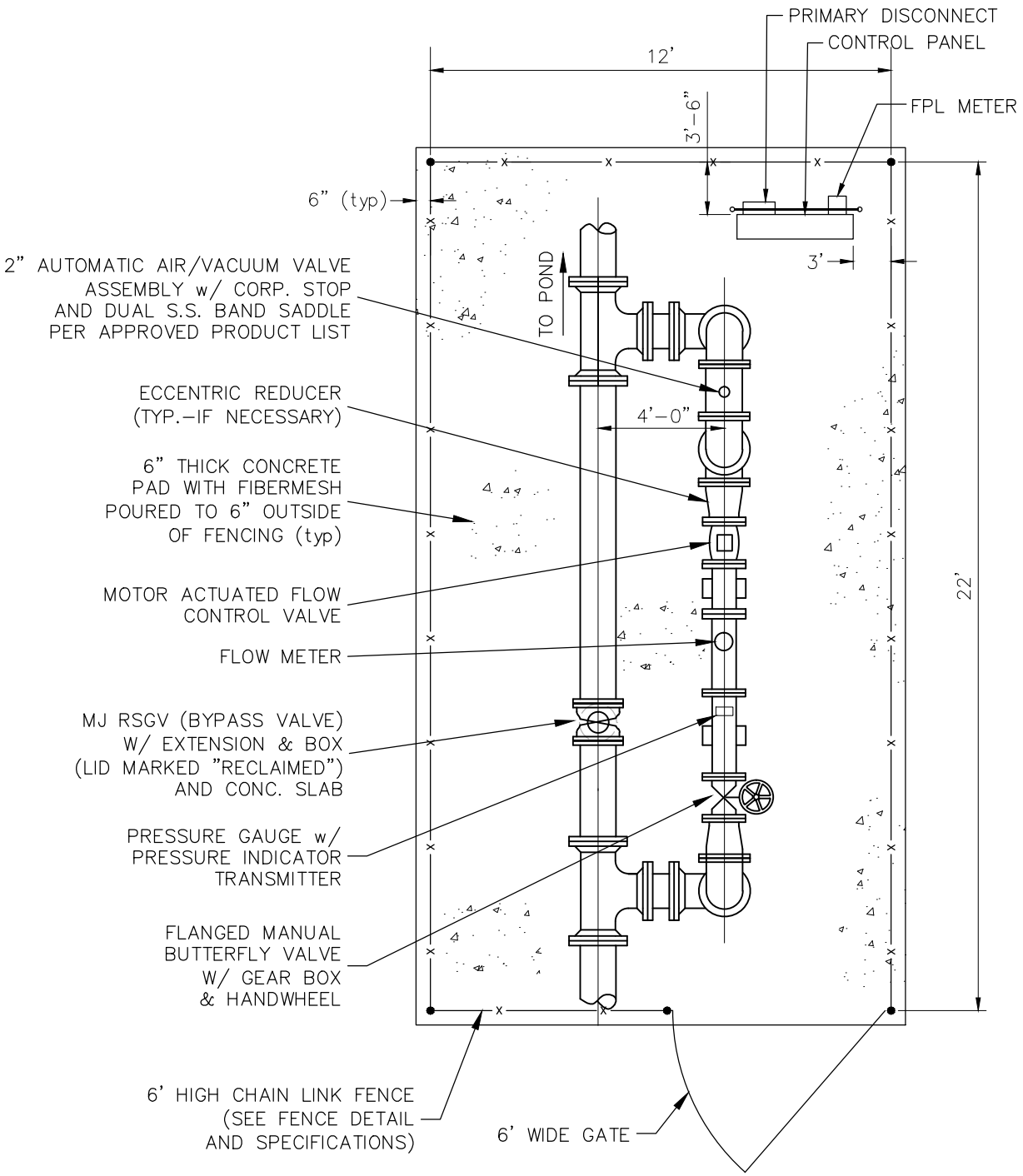
NOTES:

1. ALL FLANGED PIPE AND FITTINGS SHALL BE DUCTILE IRON, CEMENT LINED.
2. MECHANICAL JOINT FITTINGS REQUIRED BELOW GRADE AND FLANGED FITTINGS FOR ABOVE GRADE USE.
3. ALL ABOVE GRADE MATERIAL SHALL BE COATED WITH PANTONE PURPLE 522 PAINT PER THE FOLLOWING SPECIFICATION:

   TNEMEC
   Primer: TNEME-ALUMINUM MASTIC #135 (3.0 to 5.0 mils DFT)
   Intermediate Coat: Series 66 Epoxoline Hi-Build Epoxy (4.0 to 6.0 mils DFT)
   Finish Coat: Series 73 Endura-Shield III Urethane or equal (2.0 to 3.0 mils DFT)

4. CONCRETE SUPPORTS SHALL BE INSTALLED AS SHOWN. ALL CONCRETE SHALL BE 3000 PSI.
5. ALL ABOVE GROUND BOLTING SHALL BE STAINLESS STEEL.
6. PIPE SHALL BE SIZED BY ENGINEER.
7. CONCRETE MONOLITHIC SLAB POURED TO 6" OUTSIDE OF FENCING.

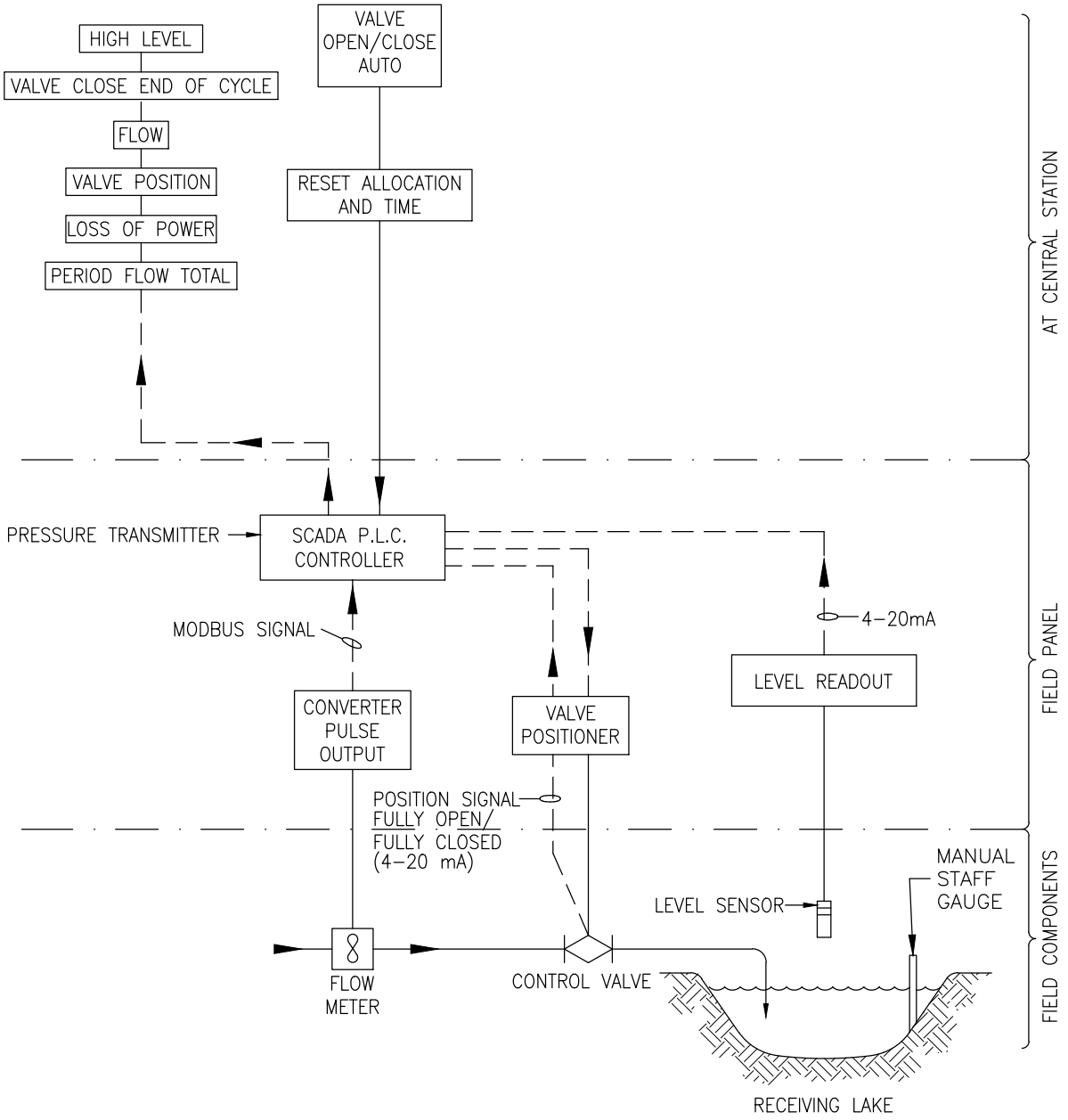
BULK USER RECLAIMED WATER SYSTEM



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	RECLAIMED WATER METERING FACILITY PLAN (BULK USER)	DWG No.
AUGUST 2016		74

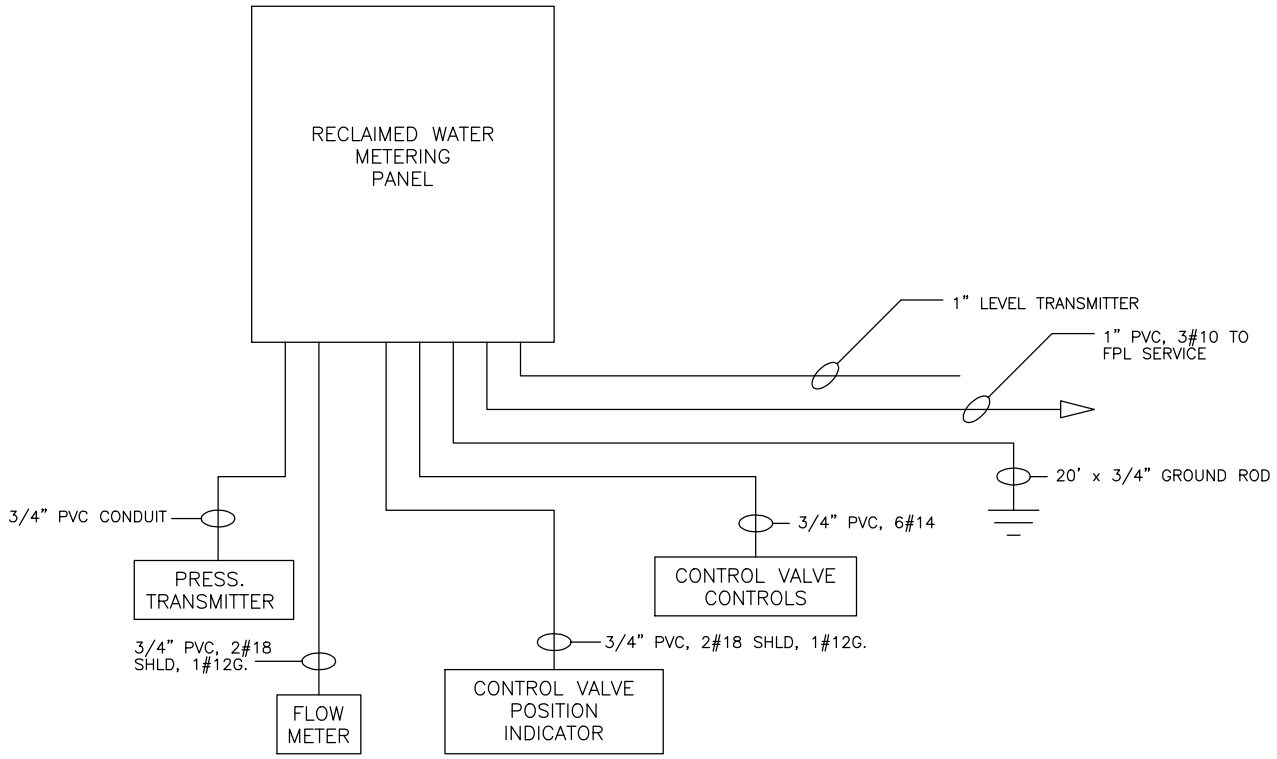
BULK USER RECLAIMED WATER SYSTEM



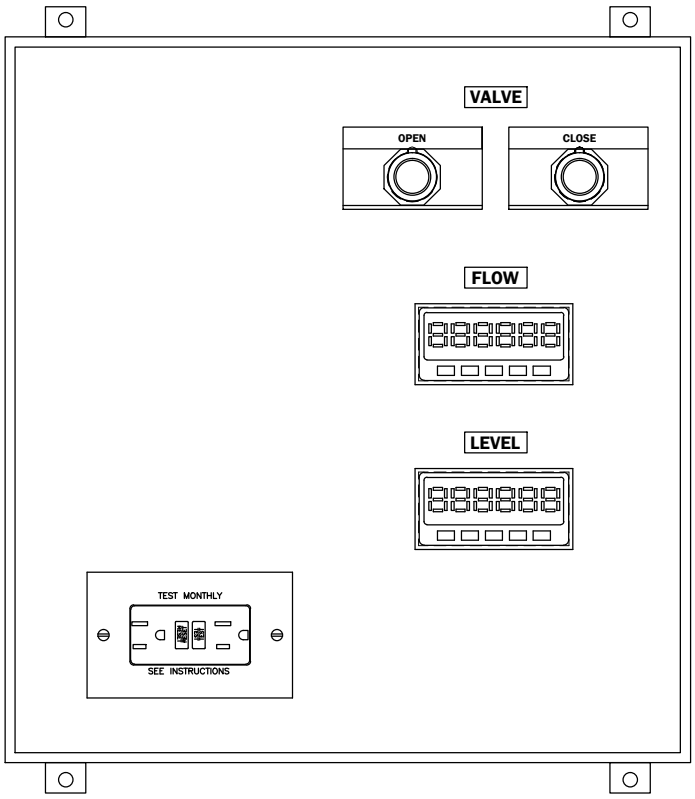
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	RECLAIMED WATER METERING FACILITY CONTROL SCHEMATIC (BULK USER)	DWG No.
AUGUST 2016		75

BULK USER RECLAIMED WATER SYSTEM

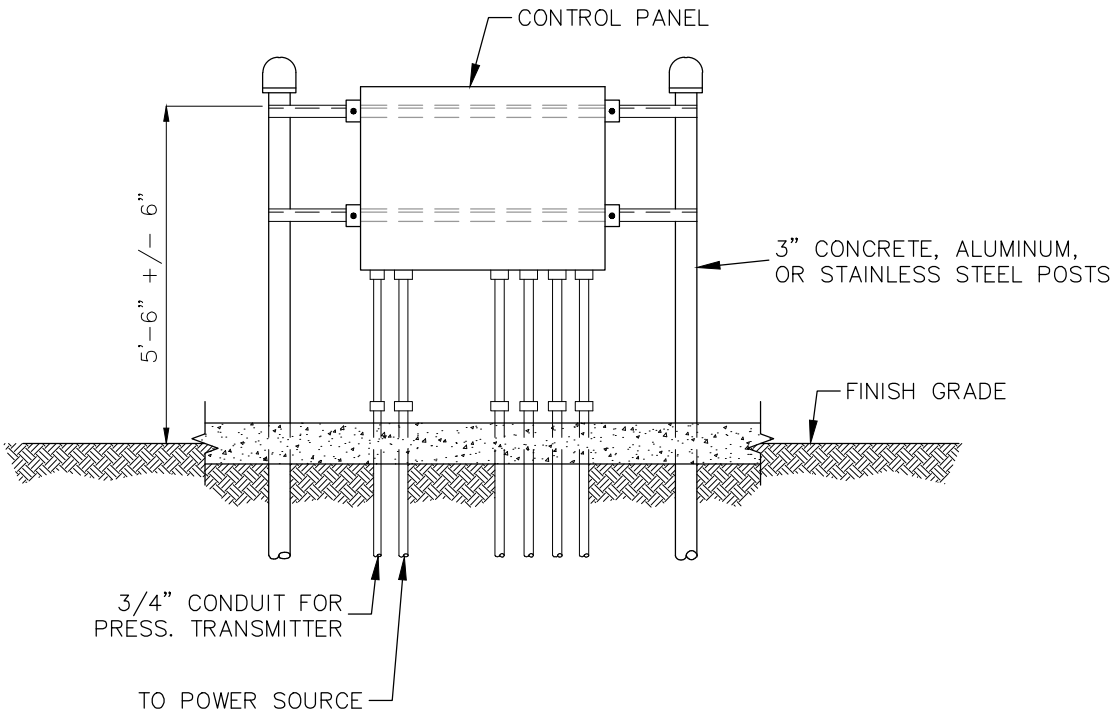


CONDUIT SCHEMATIC



CONTROL PANEL DEADFRONT LAYOUT (BULK USER)

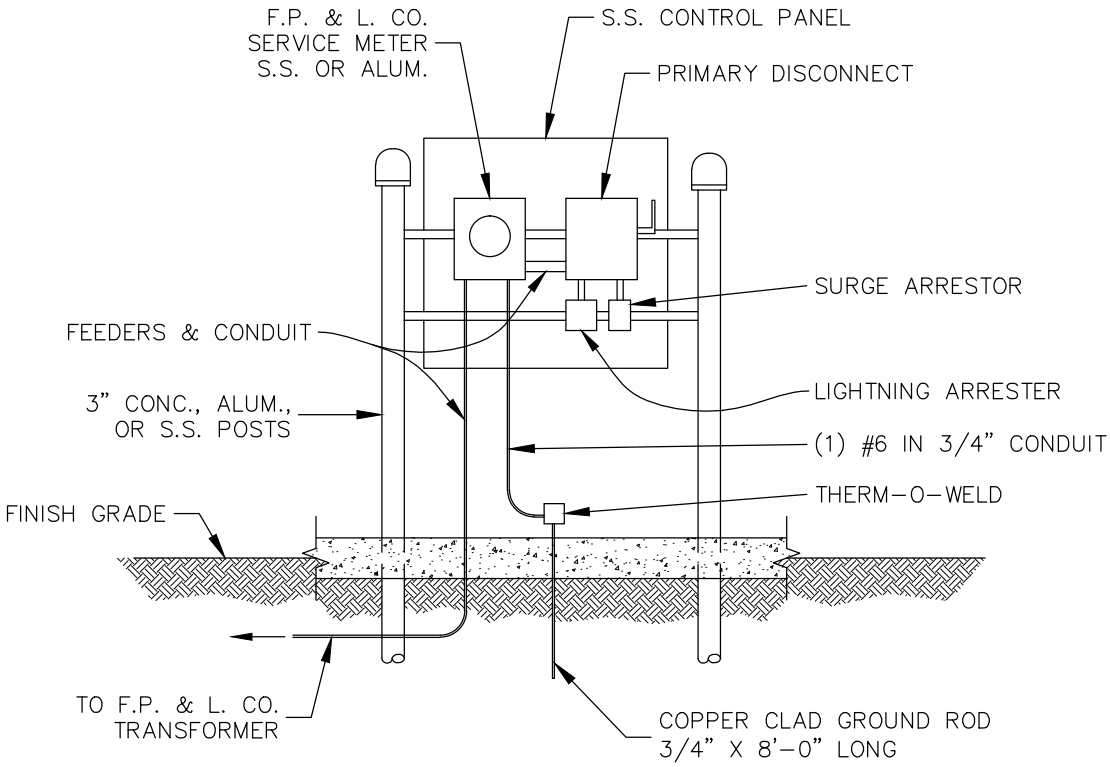
BULK USER RECLAIMED WATER SYSTEM



NOTES:

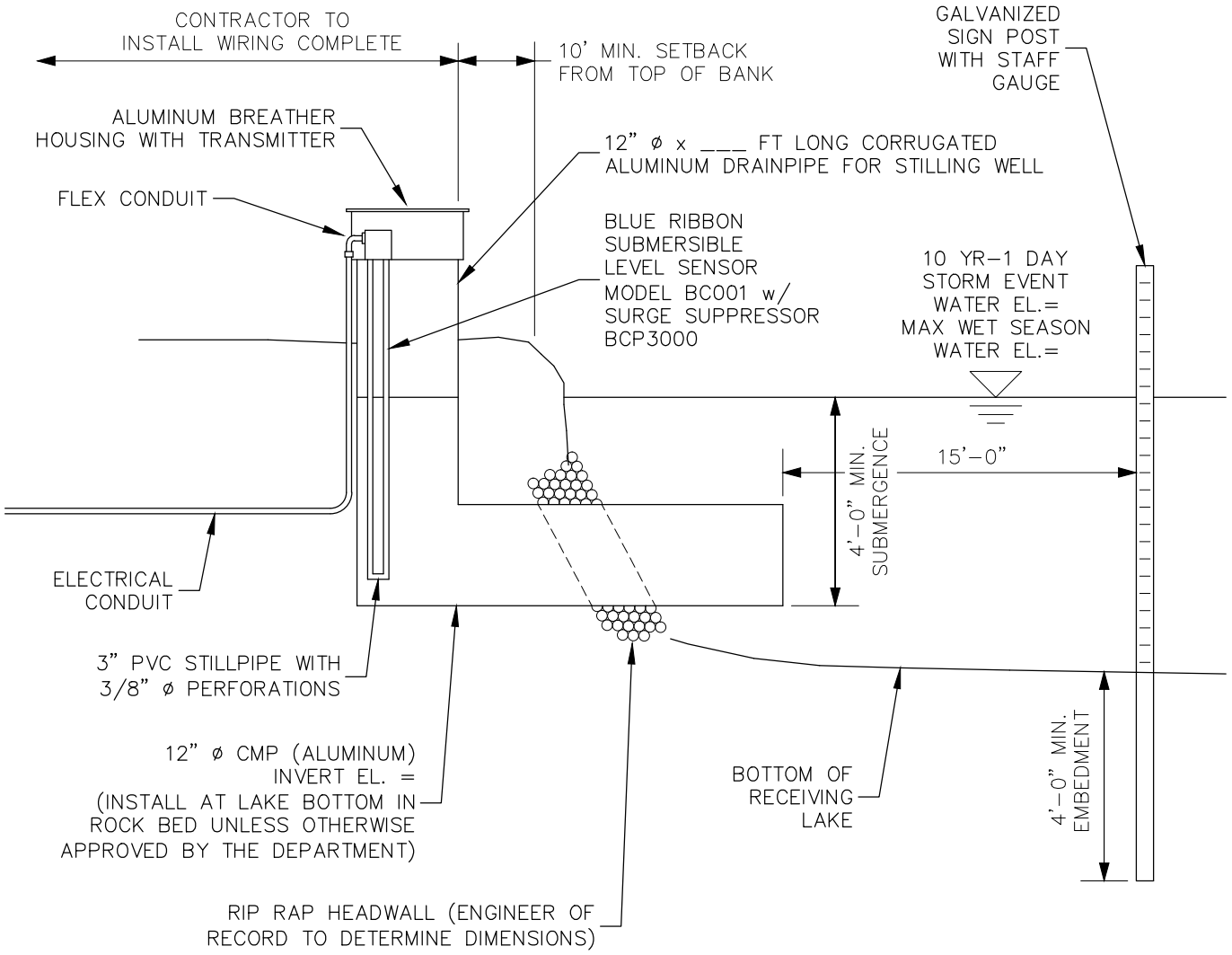
1. ELECTRIC METER AND PRIMARY DISCONNECT MOUNTED TO UNI-STRUT ON BACK SIDE OF PANEL.
2. ALL POWER AND CONTROLS LINES SHALL BE CONTINUOUS (NO SPLICES).
3. GROUND FAULT INTERRUPTER ON CONVENIENCE RECEPTACLE.
4. PANEL MOUNTED TO S/S UNI-STRUT BY WELDED TABS.
5. ALUMINUM POSTS IN CONCRETE SHALL BE COATED WITH BITUMASTIC.
6. CONTROL PANEL SHALL BE UL LISTED AS A UNIT.
7. ALL HARDWARE, NUTS & BOLTS, AND APPURTENANCES ABOVE GROUND SHALL BE 316 STAINLESS STEEL.

BULK USER RECLAIMED WATER SYSTEM



BACK VIEW OF CONTROL PANEL

BULK USER RECLAIMED WATER SYSTEM



NOTES:

1. SIGN POST SHALL BE 12' LONG, STEEL, U-CHANNEL SIGN POST FOR LAKE LEVEL STAFF GAUGE ATTACHMENT, USA BLUEBOOK ITEM # 53759 OR APPROVED EQUAL. TRIM AS NECESSARY.

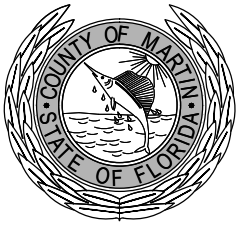
2. LAKE LEVEL GAUGE SHALL BE 4" WIDE FIBERGLASS STREAM GAUGE MARKED IN INCREMENTS OF FEET, TENTHS AND HUNDREDTHS, BEN MEADOWS ITEM # 8JH-12511* (*=WATER LEVEL) OR APPROVED EQUAL.

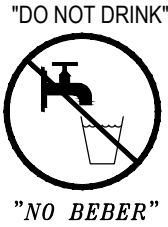
   A. A LICENSED SURVEYOR MUST SET THE GAUGE TO ACCURATELY DISPLAY ELEVATION IN NGVD 1929.
   B. GAUGE MUST BE VISIBLE 1 FOOT ABOVE THE TOP OF BANK AND THE BOTTOM OF THE GAUGE MUST TOUCH THE BOTTOM OF THE LAKE. THE GAUGE SHALL BE PLACED IN A DEEP PART OF THE POND TO ENSURE VISIBILITY AS THE WATER RECEDES DURING THE DRY SEASON.

BULK USER RECLAIMED WATER SYSTEM

RECLAIMED WATER

Used for Irrigation





A Water Conscious Community

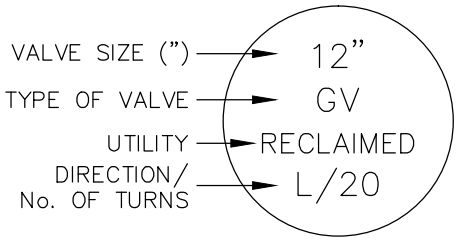
NOTE: FOR POSTING IN AREAS THAT IRRIGATE WITH RECLAIMED WATER

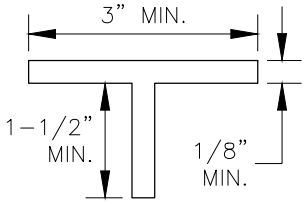
LAKE CONTAINS RECLAIMED WATER

A Water Conscious Community

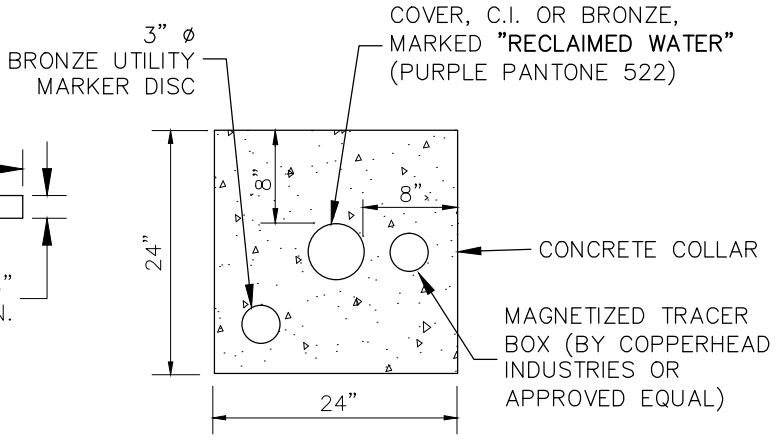
NOTE: FOR POSTING AROUND STORAGE LAKES/PONDS THAT USE RECLAIMED WATER.

RECLAIMED WATER SYSTEM
(BULK AND PRESSURIZED)

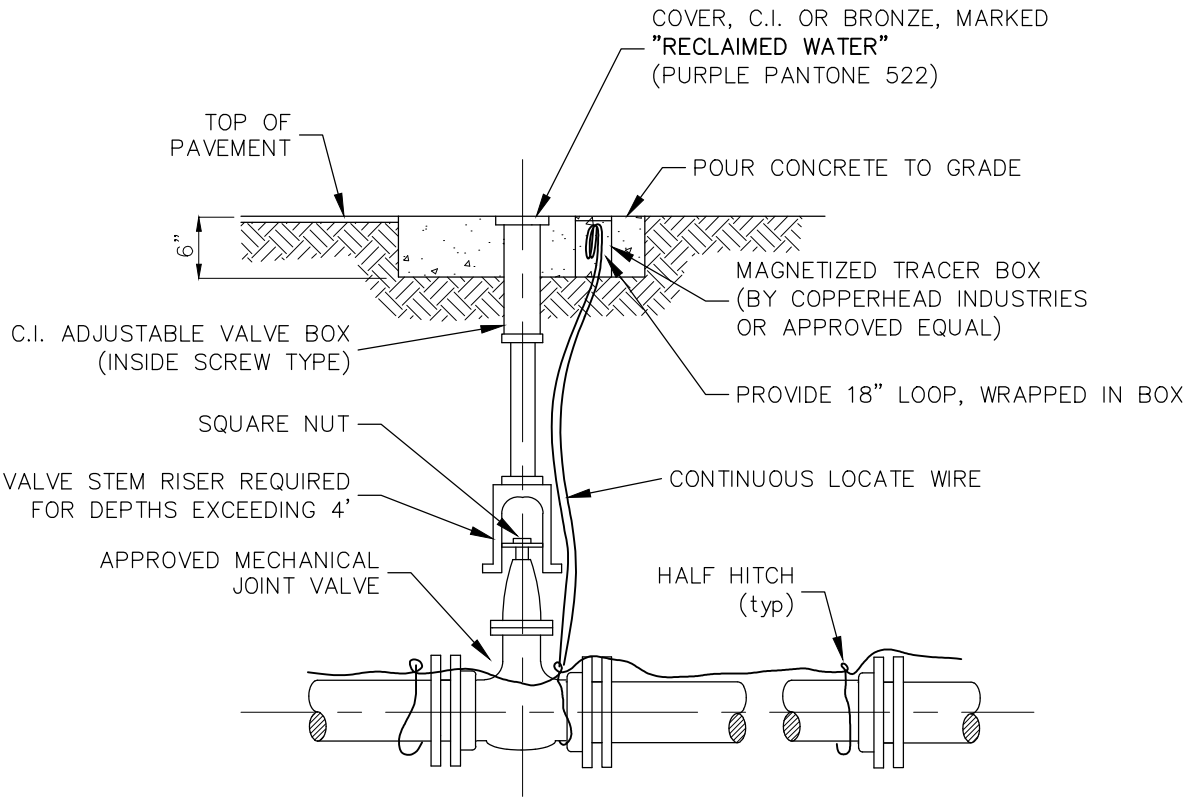




UTILITY MARKER DISC



PLAN



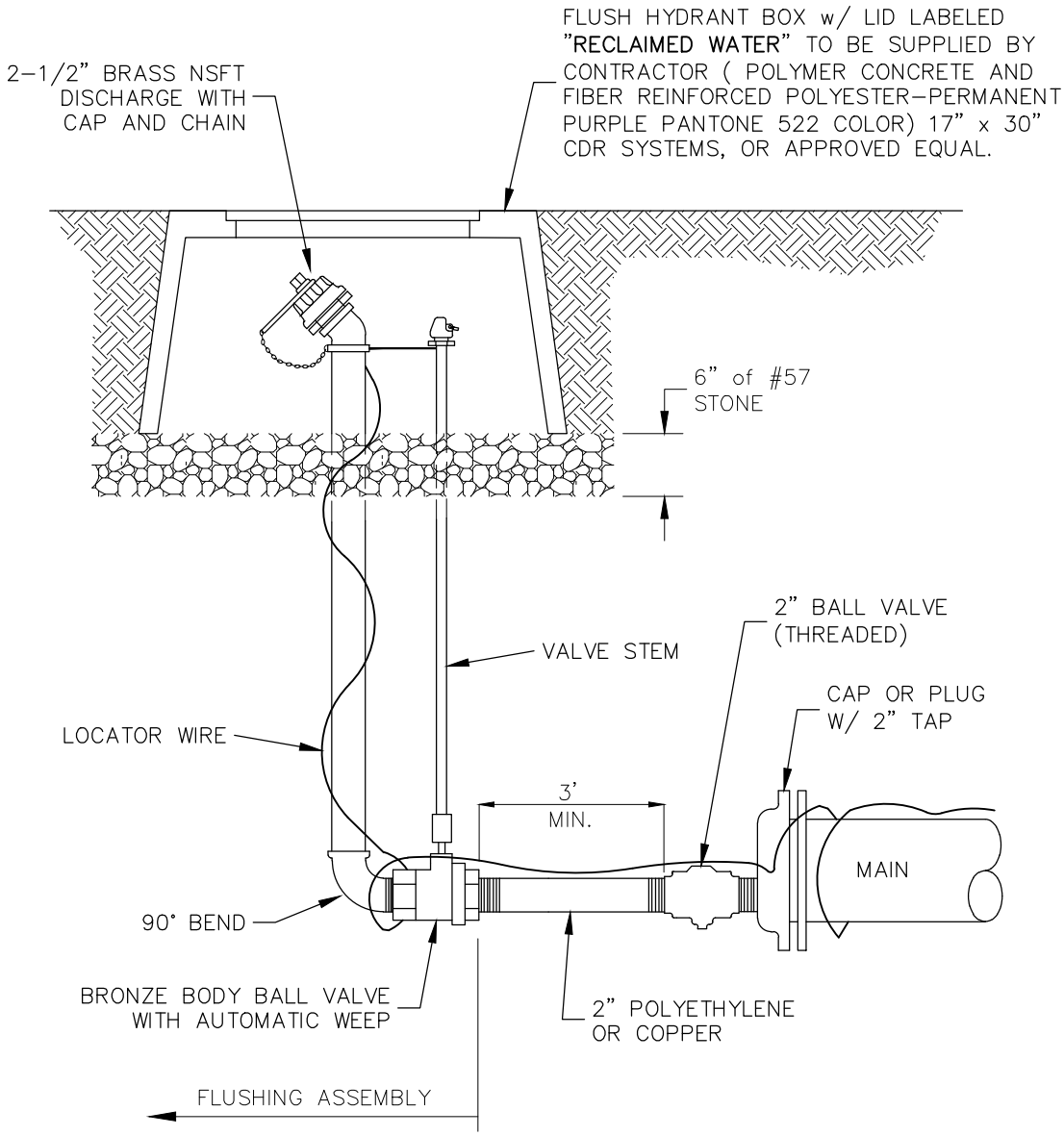
ELEVATION

NOTES:

1. A LOCATION BALL (3M EMS BALL MARKERS; RECLAIMED WATER/PURPLE, MODEL No. 1408-XR) SHALL BE INSTALLED AT EACH FITTING AND/OR EVERY 100 FEET OF SEPARATION.

2. FOR DEEP VALVE INSTALLATIONS, A 6" C-900 PVC EXTENSION MAY BE USED TO BRING VALVE BOX TO GRADE.

RECLAIMED WATER SYSTEM
(BULK AND PRESSURIZED)



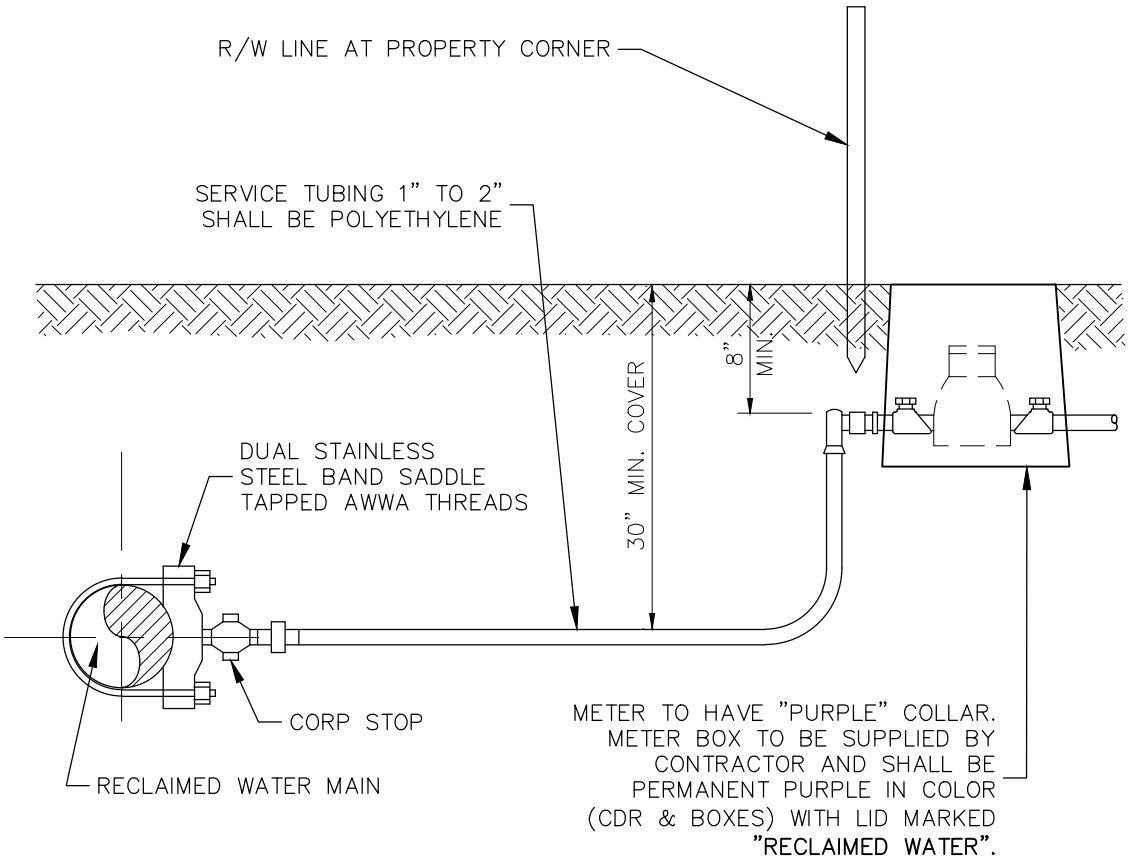
NOTES:

1. FLUSHING HYDRANT ASSEMBLY SHALL BE GIL INDUSTRIES, AQUARIUS ONE-O-ONE 2" POST FLUSHING HIDDEN HYDRANT.

2. MAIN TO BE RESTRAINED FOR TWO FULL LENGTHS.

3. LID SHALL BE LOCKABLE AND MARKED "RECLAIMED WATER".

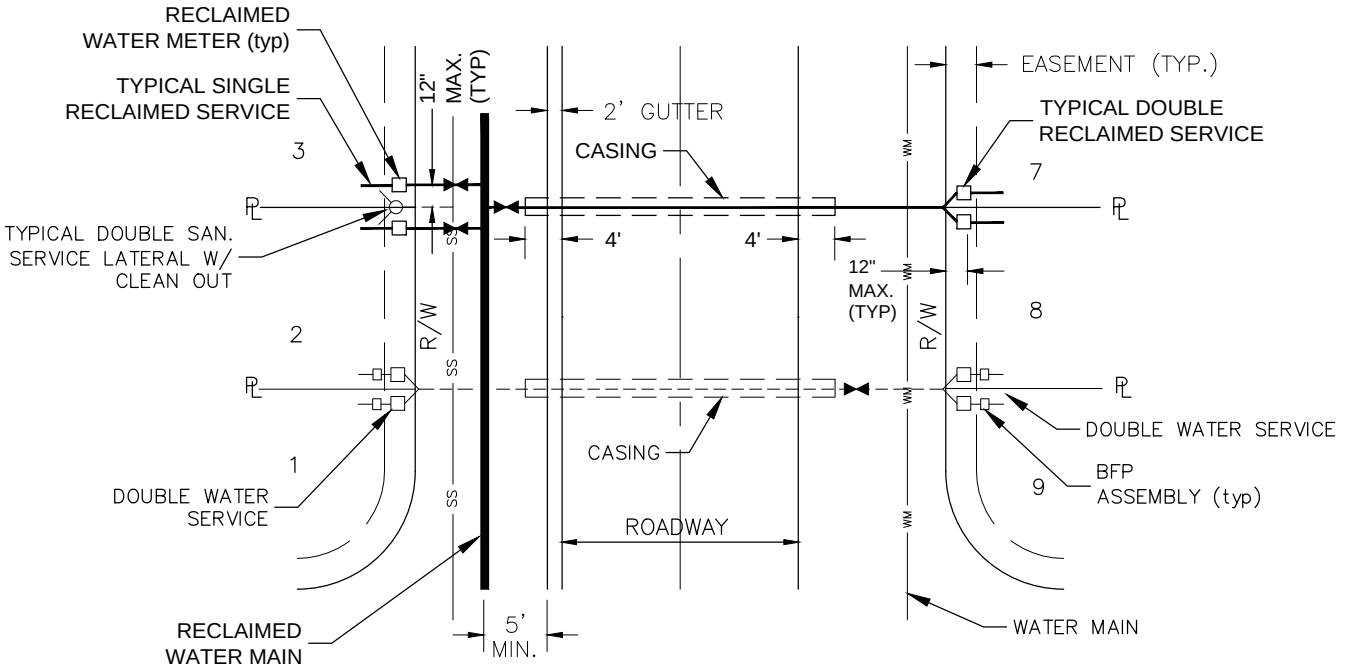
PRESSURIZED RECLAIMED WATER SYSTEM



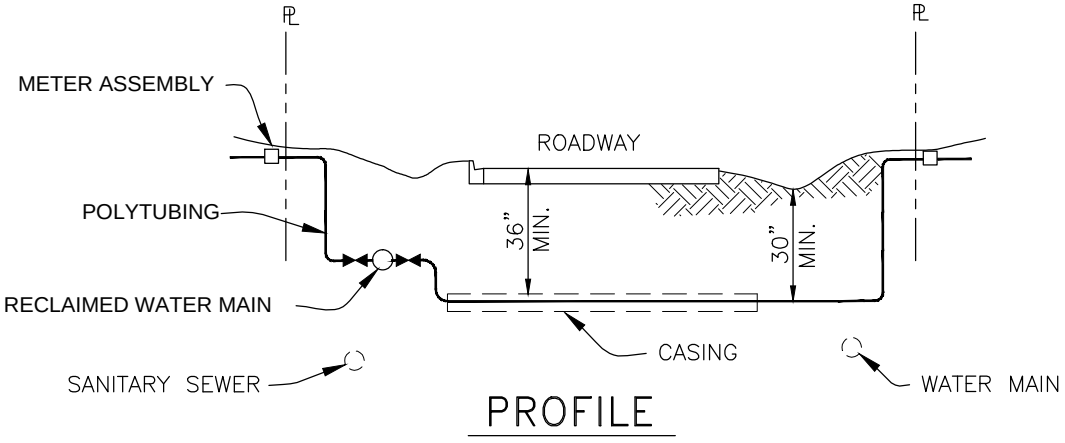
NOTES:

1. MIN. SERVICE LINES SHALL BE AS FOLLOWS: 1" FOR SINGLE AND DOUBLE SERVICES WHERE METER SIZE IS 5/8"; 2" FOR SINGLE AND DOUBLE SERVICES WHERE METER SIZE IS 1".
2. COMPRESSION FITTINGS SHALL BE SUITABLE FOR TUBING USED AND REQUIRE METAL (S.S.) INSERTS.
3. DOUBLE SERVICES REQUIRE "U" BRANCH WITH ANGLE CURB STOPS.
4. POLYETHYLENE SHALL BE AS DEFINED BY A.S.T.M. D2737 SDR9 AND A.W.W.A. 901, LATEST EDITION, AND BE PRESSURE RATED FOR 200 PSI. (COLORED PURPLE PANTONE 522).
5. TUBING SHALL BE MARKED WITH SIZE, MANUFACTURERS NAME, WORKING PRESSURE, NATIONAL SANITATION FOUNDATION APPROVAL, A.S.T.M. SPECIFICATION AND PRODUCTION CODE. TUBING SHALL HAVE AN OUTSIDE DIAMETER EQUIVALENT TO THE OUTER DIAMETER OF COPPER TUBING.
6. SERVICE LOCATOR WIRE SHALL BE LAID IN THE TRENCH WITH ALL SERVICES, CONNECTED TO THE MAIN WIRE AND WRAPPED AROUND THE SERVICE PIPING OR TUBING. WIRE FOR RECLAIMED WATER SHALL BE PURPLE IN COLOR.

PRESSURIZED RECLAIMED WATER SYSTEM



PLAN

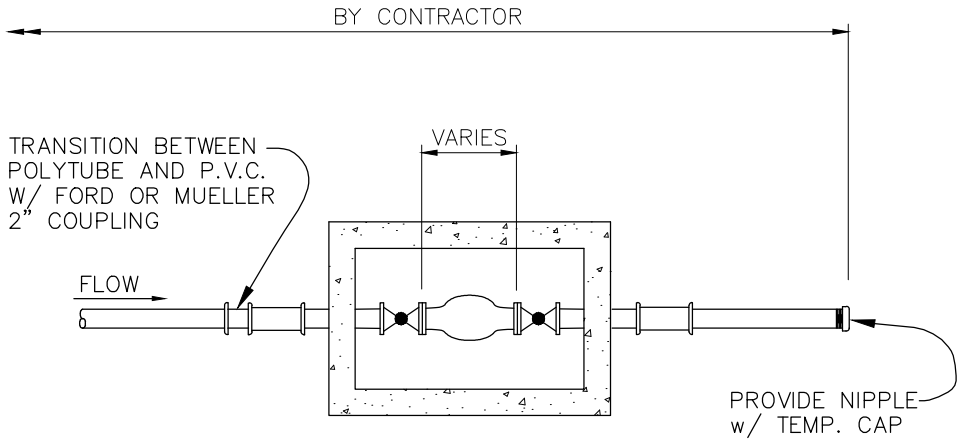


PROFILE

NOTES:

1. HOUSE SERVICE LATERAL UNDER PAVEMENT SHALL BE INSTALLED THROUGH A 2" BLACK IRON PIPE OR PVC SCH. 80 CASING.
2. TAPPING SADDLE AND CORPORATION STOP MUST BE PLACED IN ACCESSABLE AREAS, OUT FROM UNDER ANY PAVED AREAS.
3. RECLAIMED WATER SERVICE TO BE LOCATED ADJACENT TO SANITARY SERVICE LOCATIONS.

PRESSURIZED RECLAIMED WATER SYSTEM



NOTES:

1. ALL VALVES TO BE STRAIGHT 2" BALL VALVES WITH LOCK– WING. (FLANGE AT METER) FORD OR APPROVED EQUAL.
2. SEE TYPICAL SERVICE DETAIL FOR MAIN CONNECTION.
3. METER BOX SHALL BE POLYMER CONCRETE FIBER REINFORCED POLYESTER, AND **"PURPLE"** IN COLOR. (PANTONE 522)
4. PIPING SHALL BE 2" SCHEDULE 80 PVC WITH SCHEDULE 80 FITTINGS.
5. LID SHALL BE PURPLE AND MARKED **"RECLAIMED WATER"**.

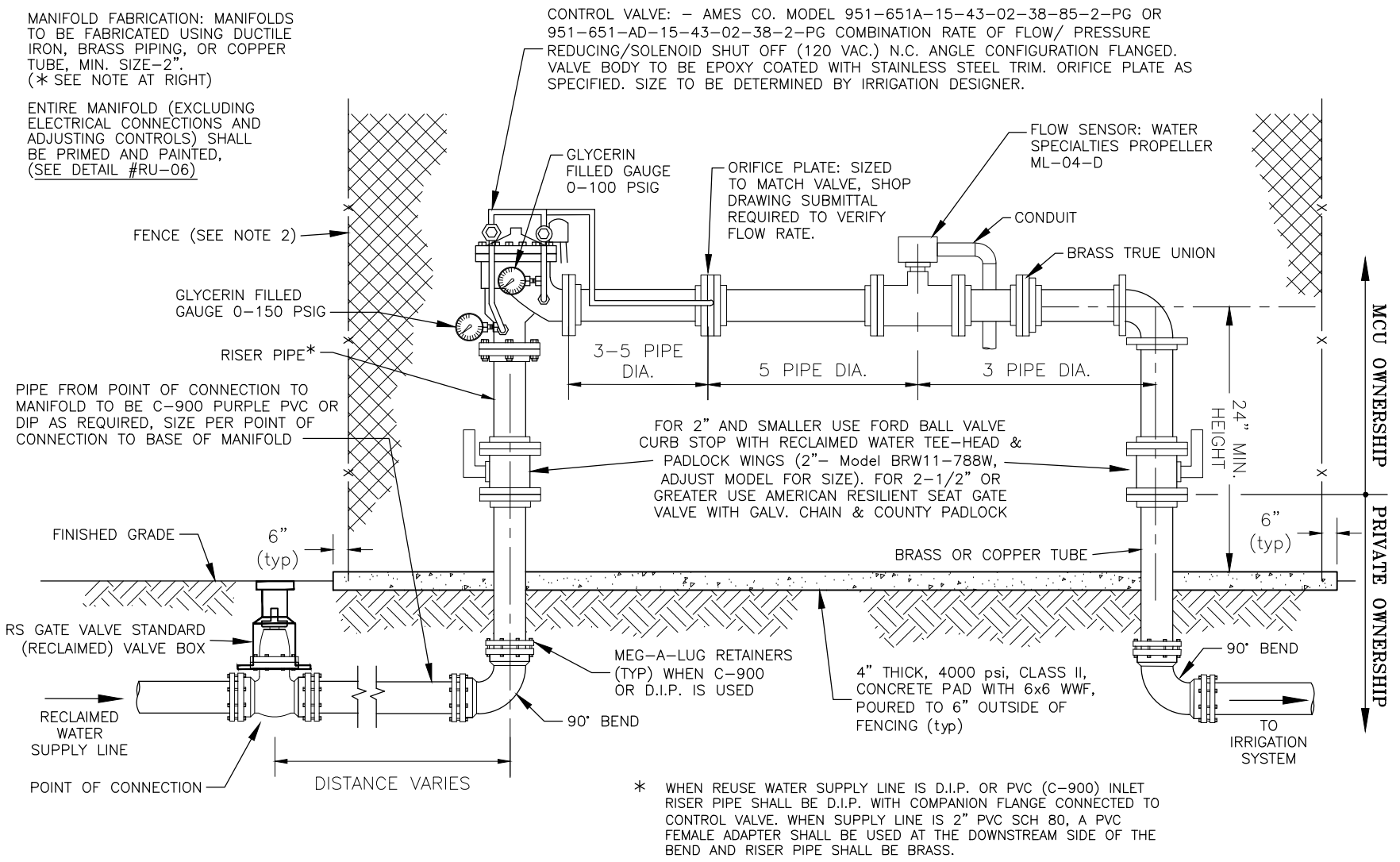
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION
AUGUST 2016

PRESSURIZED RECLAIMED WATER SYSTEM
POINT OF CONNECTION DETAIL–CONNECTION CONTROLS

DWG No.
86

PRESSURIZED RECLAIMED WATER SYSTEM

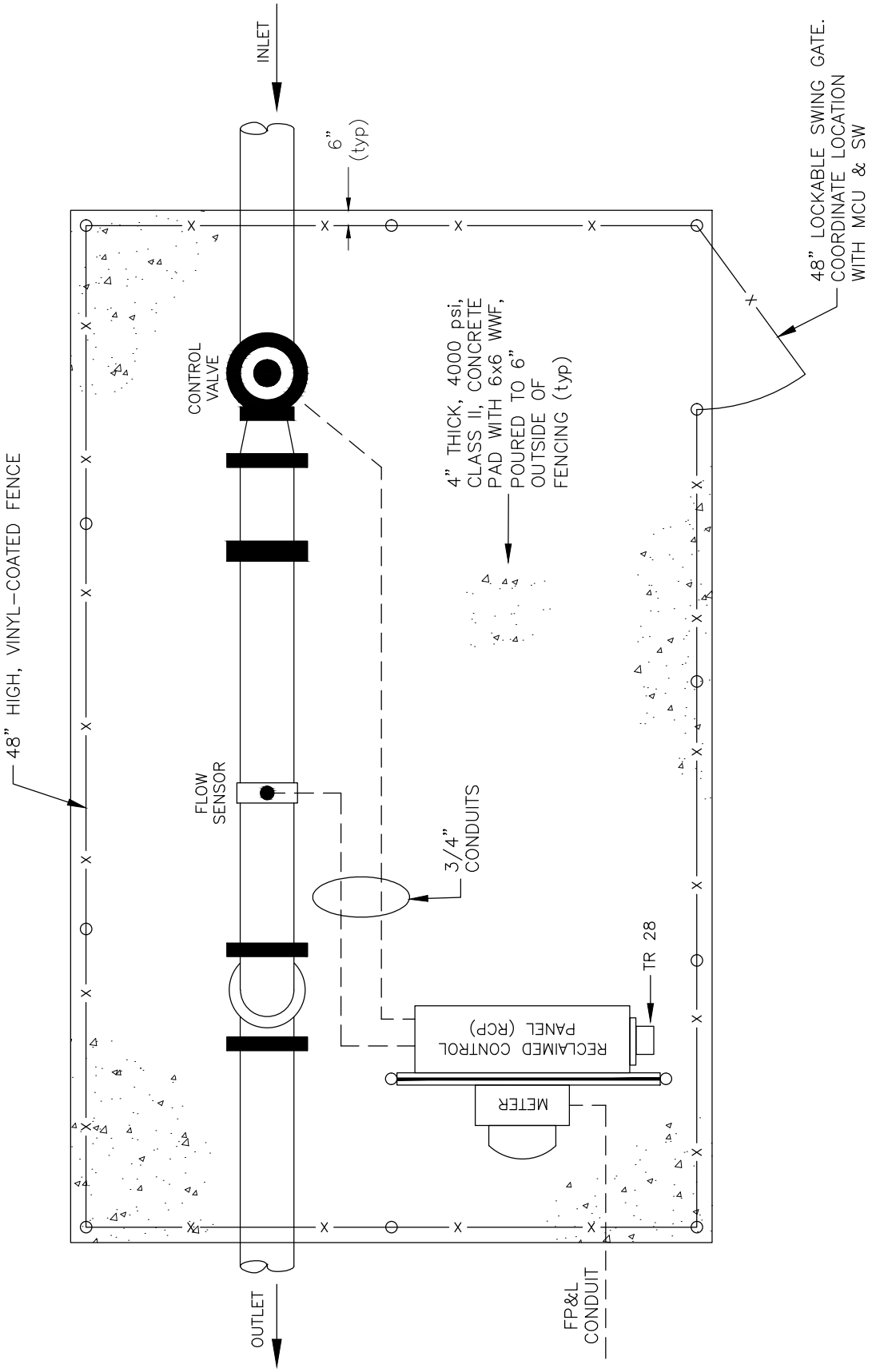


* WHEN REUSE WATER SUPPLY LINE IS D.I.P. OR PVC (C–900) INLET RISER PIPE SHALL BE D.I.P. WITH COMPANION FLANGE CONNECTED TO CONTROL VALVE. WHEN SUPPLY LINE IS 2" PVC SCH 80, A PVC FEMALE ADAPTER SHALL BE USED AT THE DOWNSTREAM SIDE OF THE BEND AND RISER PIPE SHALL BE BRASS.

NOTES:

1. TWO (2) GLYCERIN FILLED/SS BODY PRESSURE GAUGES SHALL BE INSTALLED ON HIGH AND LOW SIDE PORTS OF CONTROL VALVE.
2. FENCE: 48" HIGH, VINYL–COATED, w/ 48" WIDE LOCKABLE GATE.
3. ALL PRESSURIZED RECLAIMED FACILITIES TO BE PAINTED PER SPECIFICATIONS FOR RECLAIMED WATER SYSTEMS.

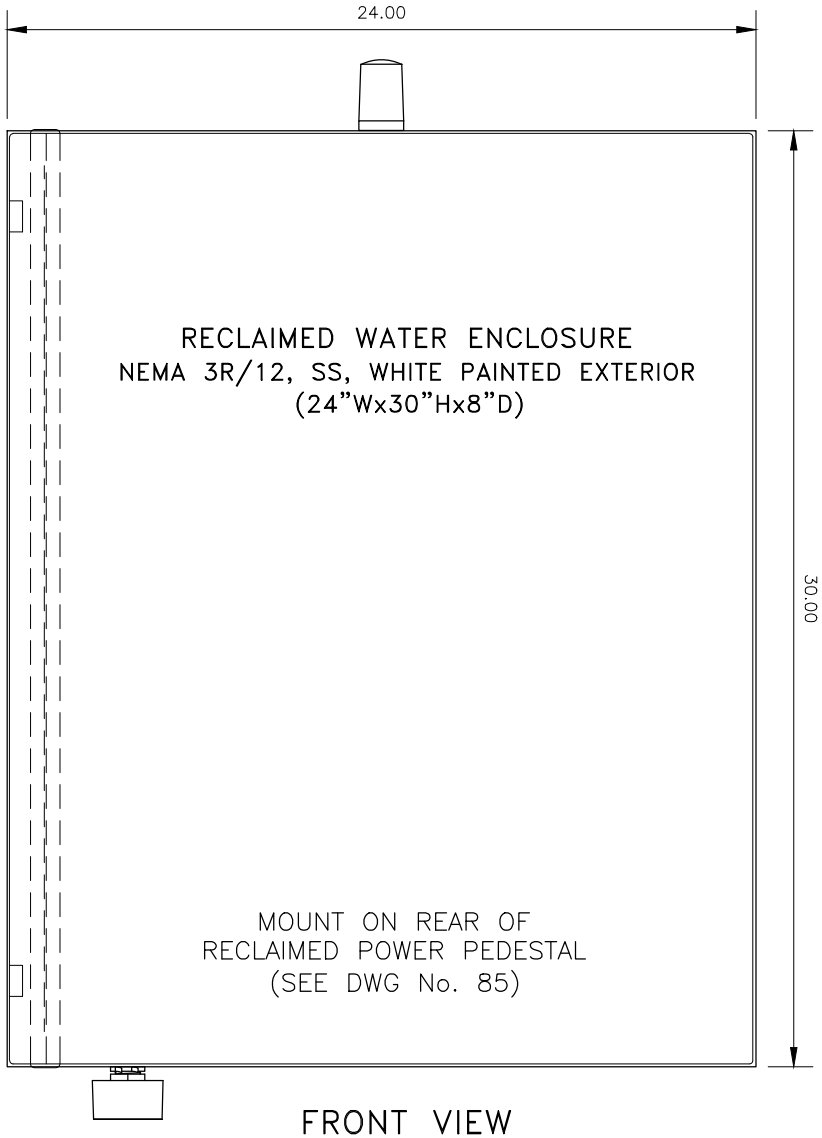
PRESSURIZED RECLAIMED WATER SYSTEM



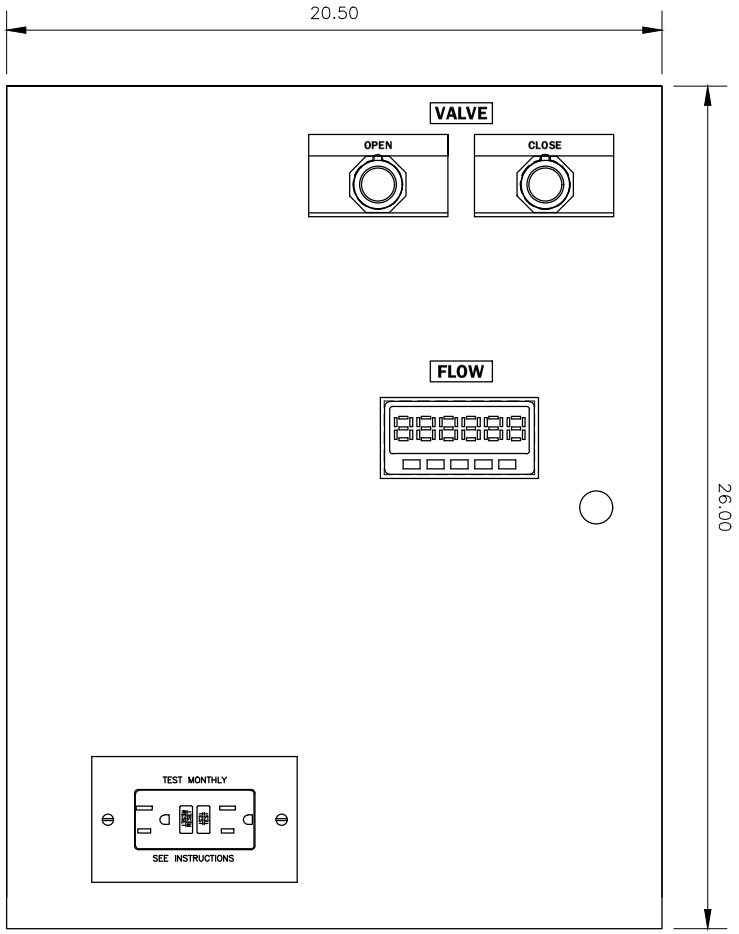
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION		DWG No.
AUGUST 2016	PRESSURIZED RECLAIMED WATER SYSTEM POINT OF CONNECTION PLAN–CONNECTION CONTROLS	87

PRESSURIZED RECLAIMED WATER SYSTEM



FRONT VIEW
(N.T.S.)



RECLAIMED WATER ENCLOSURE
DEAD FRONT DOOR LAYOUT
(N.T.S.)

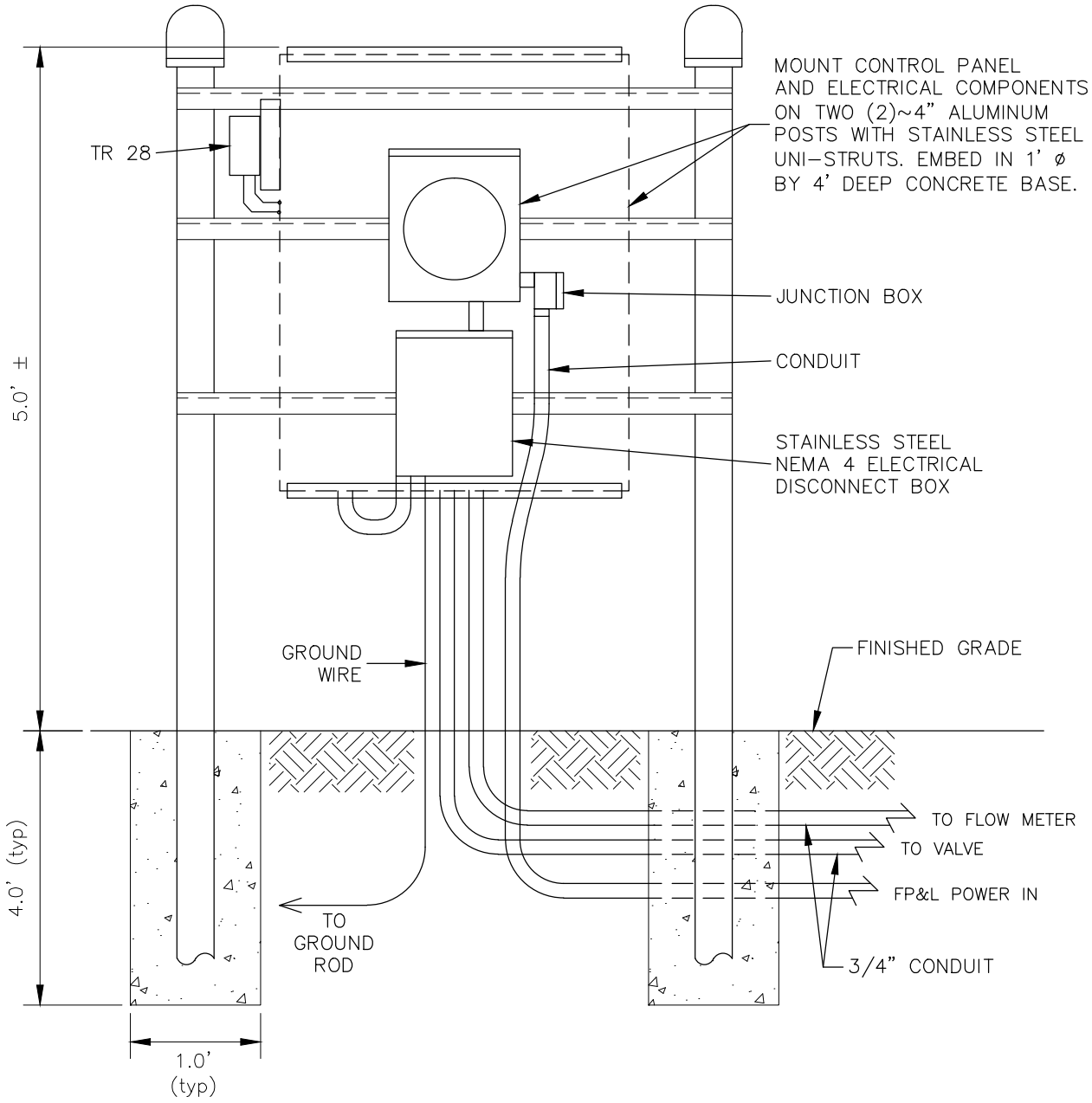
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

PRESSURIZED RECLAIMED WATER SYSTEM
CONTROL PANEL (FRONT) – CONNECTION CONTROLS

REVISION
AUGUST 2016

DWG No.
88

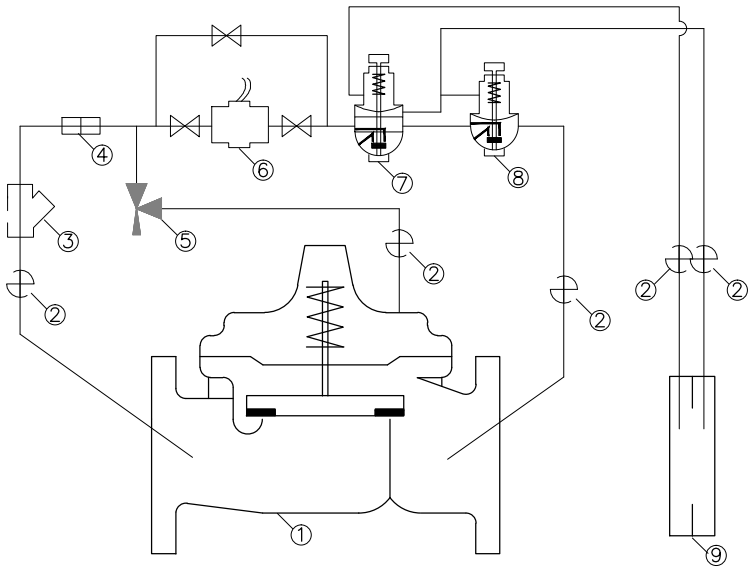
PRESSURIZED RECLAIMED WATER SYSTEM



NOTES:

1. CONTRACTOR SHALL FURNISH AND INSTALL ALUMINUM POSTS W/ UNI-STRUTS AND STAINLESS STEEL NEMA 4 DISCONNECT SWITCH AND ENCLOSURE.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUIT AND WIRES BETWEEN FIXTURES AND CONTROL PANEL.
3. ELECTRIC METER AND PRIMARY DISCONNECT MOUNTED TO UNI-STRUT ON BACK SIDE OF PANEL.
4. ALL POWER AND CONTROLS LINES SHALL BE CONTINUOUS (NO SPLICES).
5. PANEL MOUNTED TO S/S UNI-STRUT BY WELDED TABS.
6. ALUMINUM POSTS IN CONCRETE SHALL BE COATED WITH BITUMASTIC, BOTH EXTERIOR AND INTERIOR.
7. ALL HARDWARE, NUTS & BOLTS, AND APPURTENANCES ABOVE GROUND SHALL BE 316 STAINLESS STEEL.

PRESSURIZED RECLAIMED WATER SYSTEM

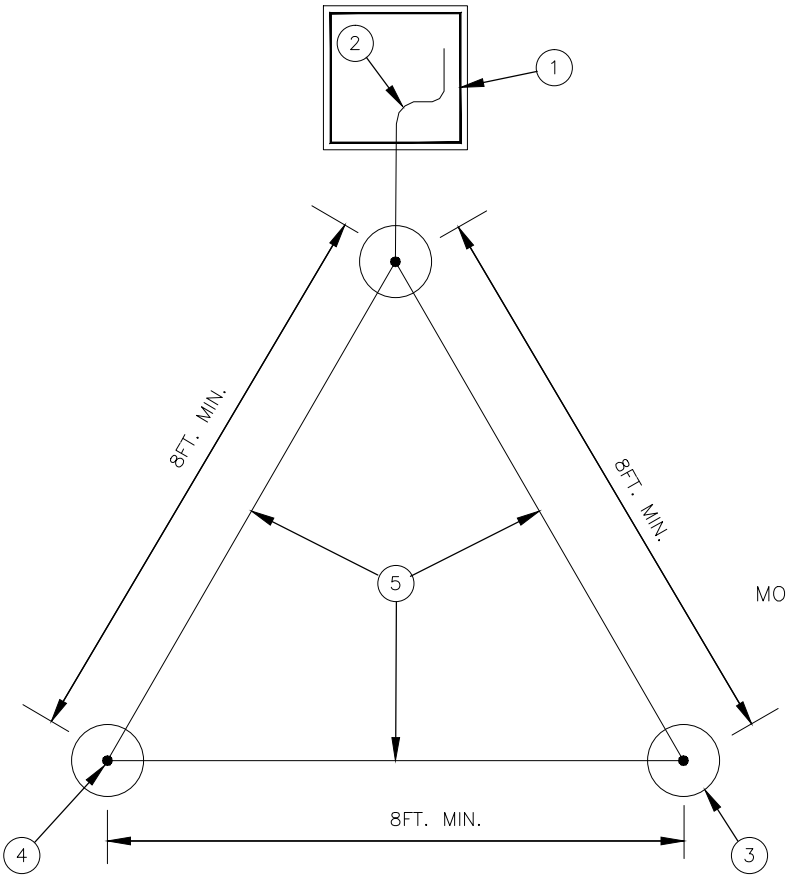


1. CONTROL VALVE
2. ISOLATION COCKS
3. LARGE CONTROL FILTER
4. RESTRICTION FITTING
5. OPENING SPEED CONTROL
6. TWO–WAY SOLENOID (120VAC)
7. PRESSURE REDUCING PILOT
8. RATE OF FLOW PILOT
9. ORIFICE PLATE ASSEMBLY

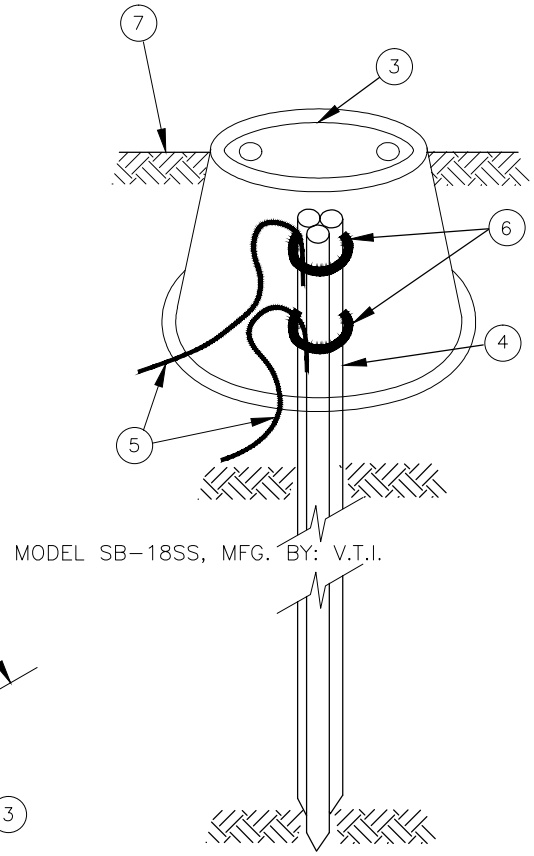
NOTE:
ORIFICE PLATE ASSEMBLY SHOULD BE INSTALLED 3 TO 5 PIPE DIAMETERS DOWNSTREAM OF MAIN VALVE OUTLET.

RATE OF FLOW, PRESSURE REDUCING & SOLENOID SHUTOFF VALVE
EQUIPPED WITH LARGE CONTROL FILTER AND SPEED CONTROL

PRESSURIZED RECLAIMED WATER SYSTEM



GROUND ROD LAYOUT



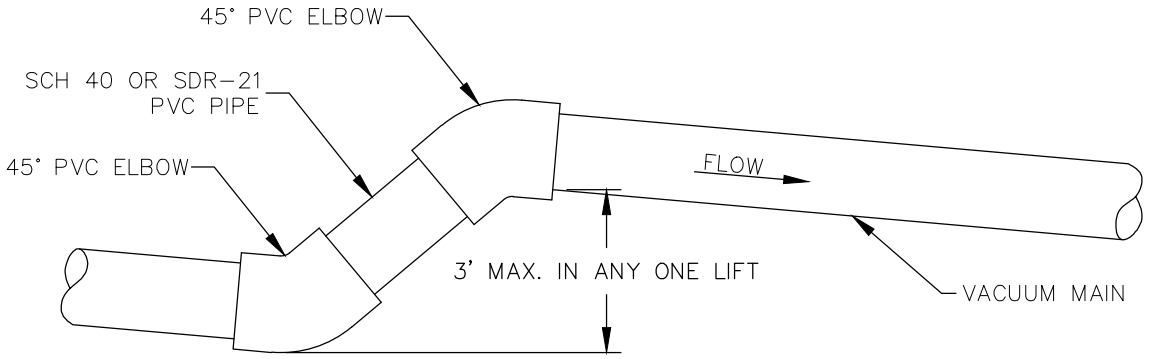
GROUND ROD ASSEMBLY

LEGEND:

1. RCP PANEL.
2. #10 AWG SOLID BARE COPPER WIRE FROM GROUNDING ROD TO RCP. MAKE WIRE AS SHORT AND STRAIGHT AS POSSIBLE.
3. COVER GROUNDING ROD WITH 10" ROUND VALVE BOX.
4. 5/8" X 8' COPPER CLAD GROUNDING ROD. INSTALL RODS IN SOIL IN A TRIANGULAR PATTERN SPACED A MINIMUM OF 8' APART FROM EACH OTHER. GROUNDING GRID TO HAVE A RESISTANCE OF 5 OHMS OR LESS.
5. #10 AWG BARE COPPER BETWEEN GROUNDING RODS.
6. BRASS WIRE CLAMP. USE SEPARATE CLAMP FOR EACH WIRE.
7. FINISH GRADE.

3-ROD GROUNDING GRID INSTALLATION

THE 3 RODS SHALL BE DRIVEN INTO THE GROUND WITH THE TOP OF THE ROD AT LEAST 6" BELOW THE FINISH GRADE. THE RODS SHALL BE TIED TOGETHER BELOW GRADE WITH #10 GAUGE OR LARGER BARE COPPER WIRE. THE WIRE SHALL BE ATTACHED TO THE ROD USING A BRASS CLAMP. A SEPARATE BRASS CLAMP SHALL BE USED FOR EACH ATTACHMENT. NOTE! NO MORE THAN ONE WIRE SHALL BE USED IN ANY INDIVIDUAL CLAMP – MULTIPLE WIRES SHALL NOT BE ALLOWED. ANY ROD THAT HAS A GROUND WIRE CONNECTED TO IT, COMING FROM THE SURGE ARRESTOR AT THE EQUIPMENT OR GROUNDING THE EQUIPMENT, SHALL HAVE A 6" AMETEK OR CARSON VALVE BOX, PURPLE COLOR INSTALLED AROUND THE TOP OF THE ROD. THIS SHALL PROVIDE FUTURE ACCESS FOR MAINTENANCE.

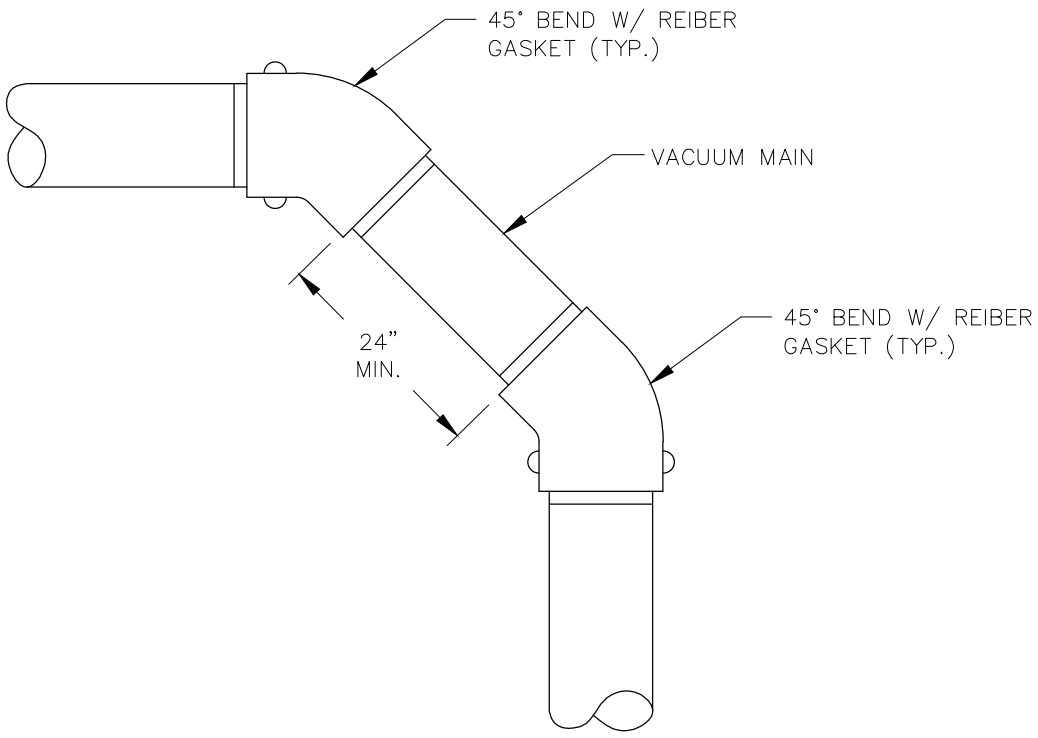


SLOPE SCHEDULE			
PIPE DIA.	MINIMUM FALL BETWEEN LIFTS * USE GREATER VALUE OF (A) OR (B)		DISTANCE AT WHICH (B) GOVERNS
	(A)	(B)	
3"	0.20 FT	0.2% x DISTANCE	> 100 FT
4"	0.25 FT	0.2% x DISTANCE	> 125 FT
6"	0.25 FT	0.2% x DISTANCE	> 125 FT
8"	0.25 FT	0.2% x DISTANCE	> 125 FT
10"	0.25 FT	0.2% x DISTANCE	> 125 FT

* WHEN NOT BETWEEN LIFTS, USE 0.2% SLOPE

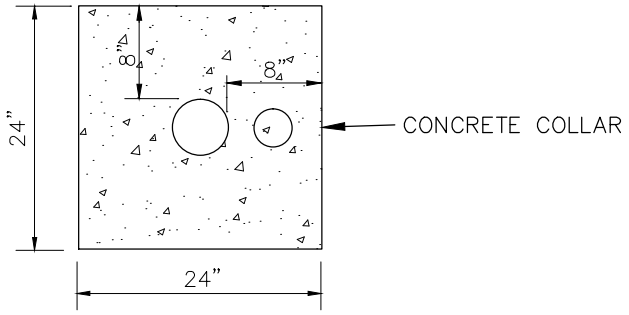
NOTE:

1. MAGNETIC MARKERS SHALL BE PLACED AT EVERY FITTING, LIFT, AND EVERY 100 ft. ALONG THE VACUUM MAIN INSTALLATION. (3M EMS BALL MARKERS; SEWER/GREEN, MODEL No. 1404-XR OR EQUAL)



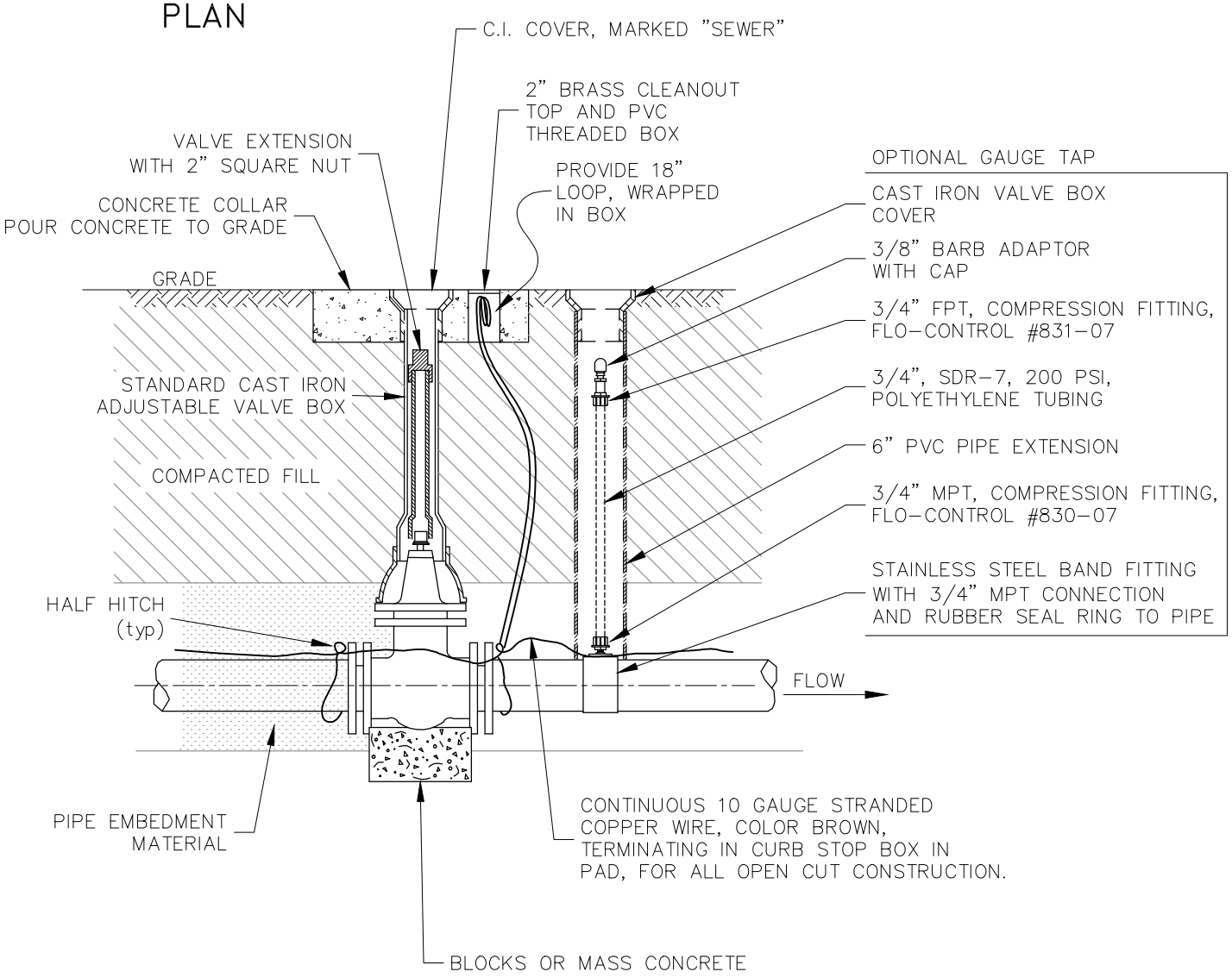
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION		DWG No.
AUGUST 2016	VACUUM SEWER VACUUM MAIN – CHANGE OF DIRECTION	93



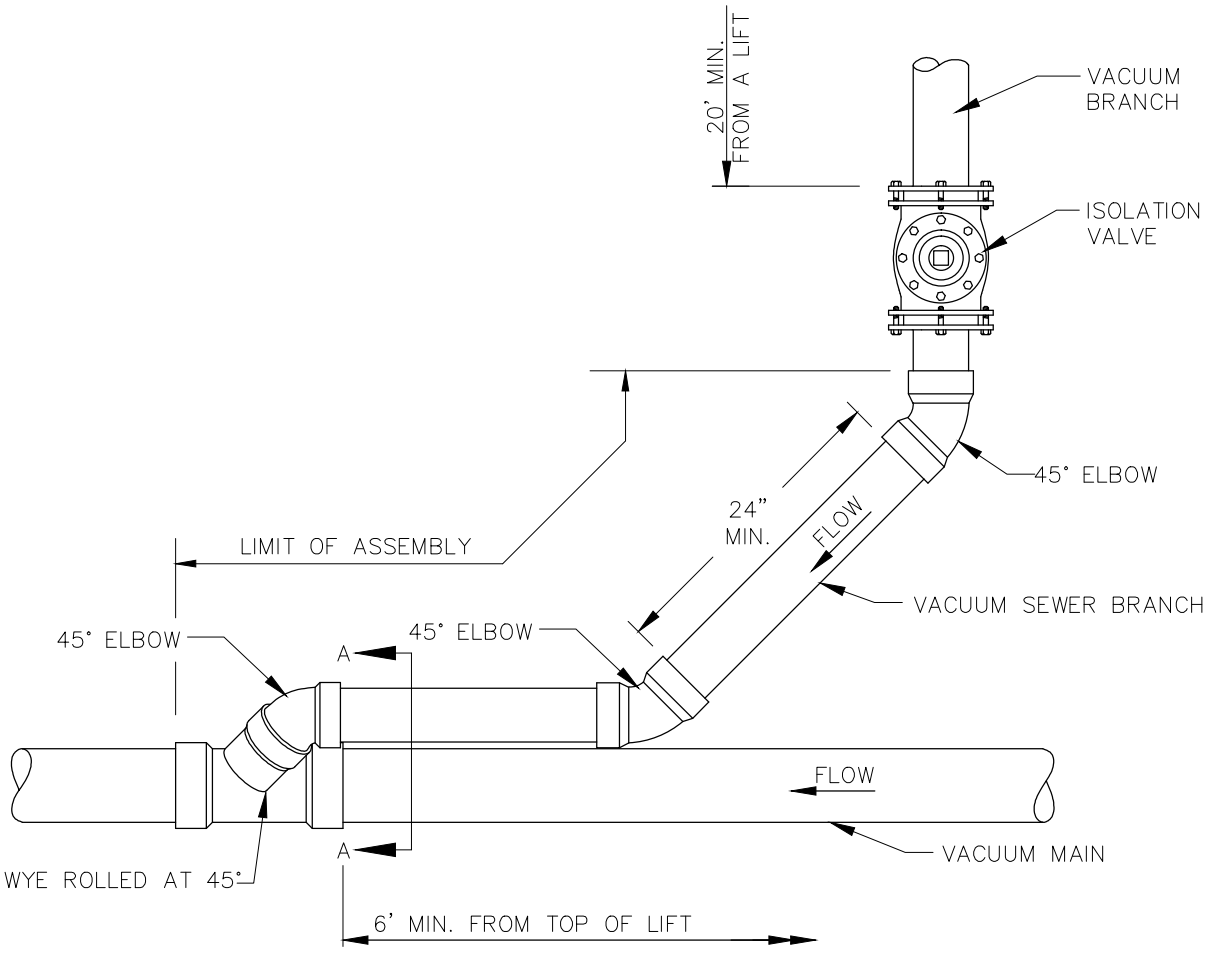
PLAN

DIVISION VALVE SUPPORT INFORMATION	
VALVE SIZE	SUPPORT SIZE
4"	1" THICK X 1.75' SQUARE
6"	1" THICK X 2.25' SQUARE
8"	1" THICK X 3.00' SQUARE
10"	1" THICK X 3.50' SQUARE

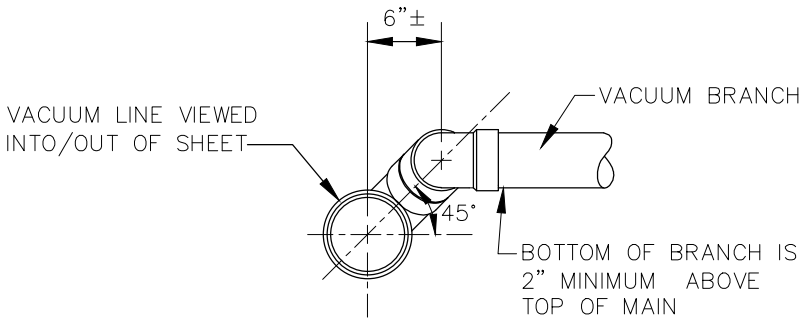


MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	VACUUM SEWER	DWG No.
AUGUST 2016	ISOLATION VALVE & BOX W/ OPTIONAL GAUGE TAP	94



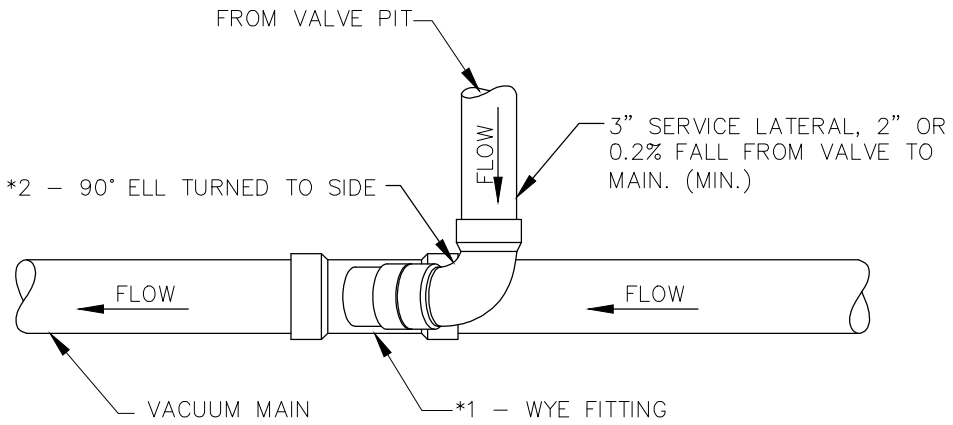
PLAN VIEW



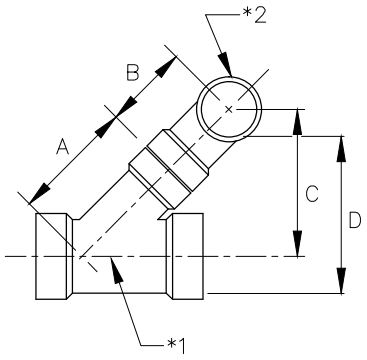
SECTION A–A

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION		DWG No.
AUGUST 2016	VACUUM SEWER BRANCH TO MAIN CONNECTION ASSEMBLY	95



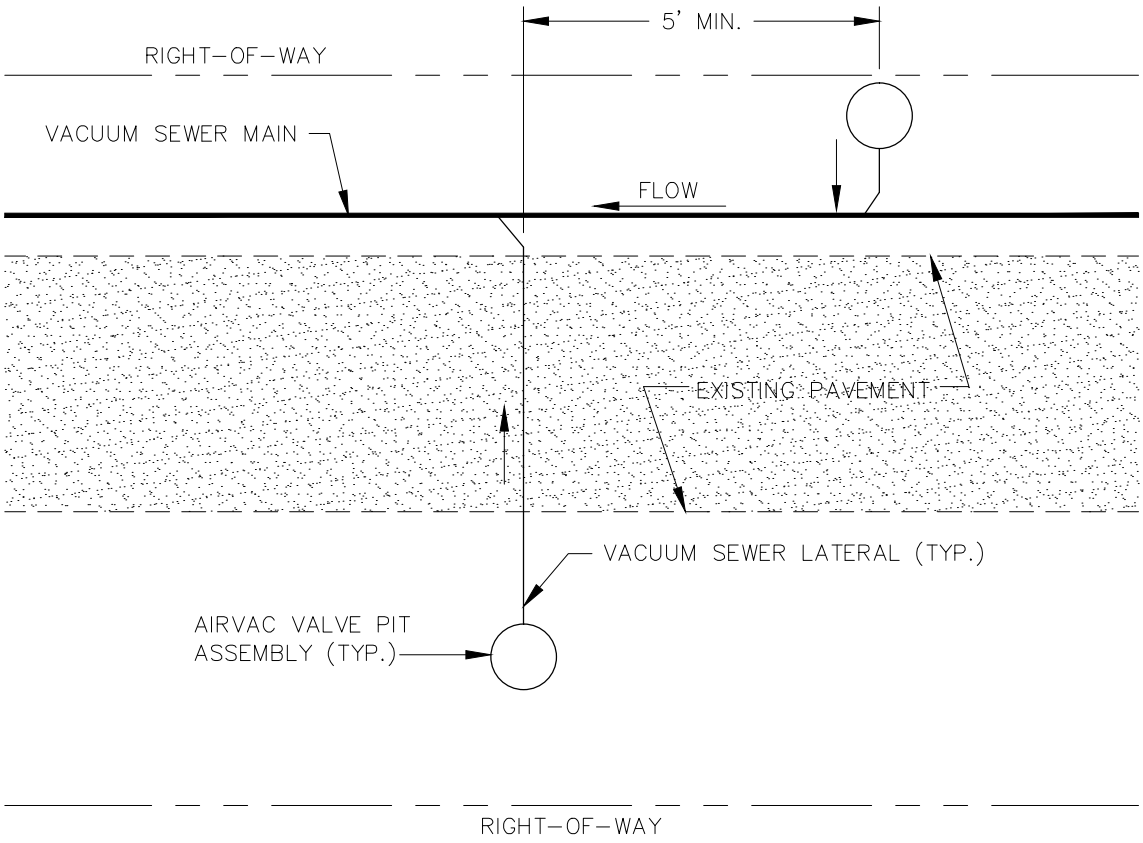
PLAN VIEW



ELEVATION

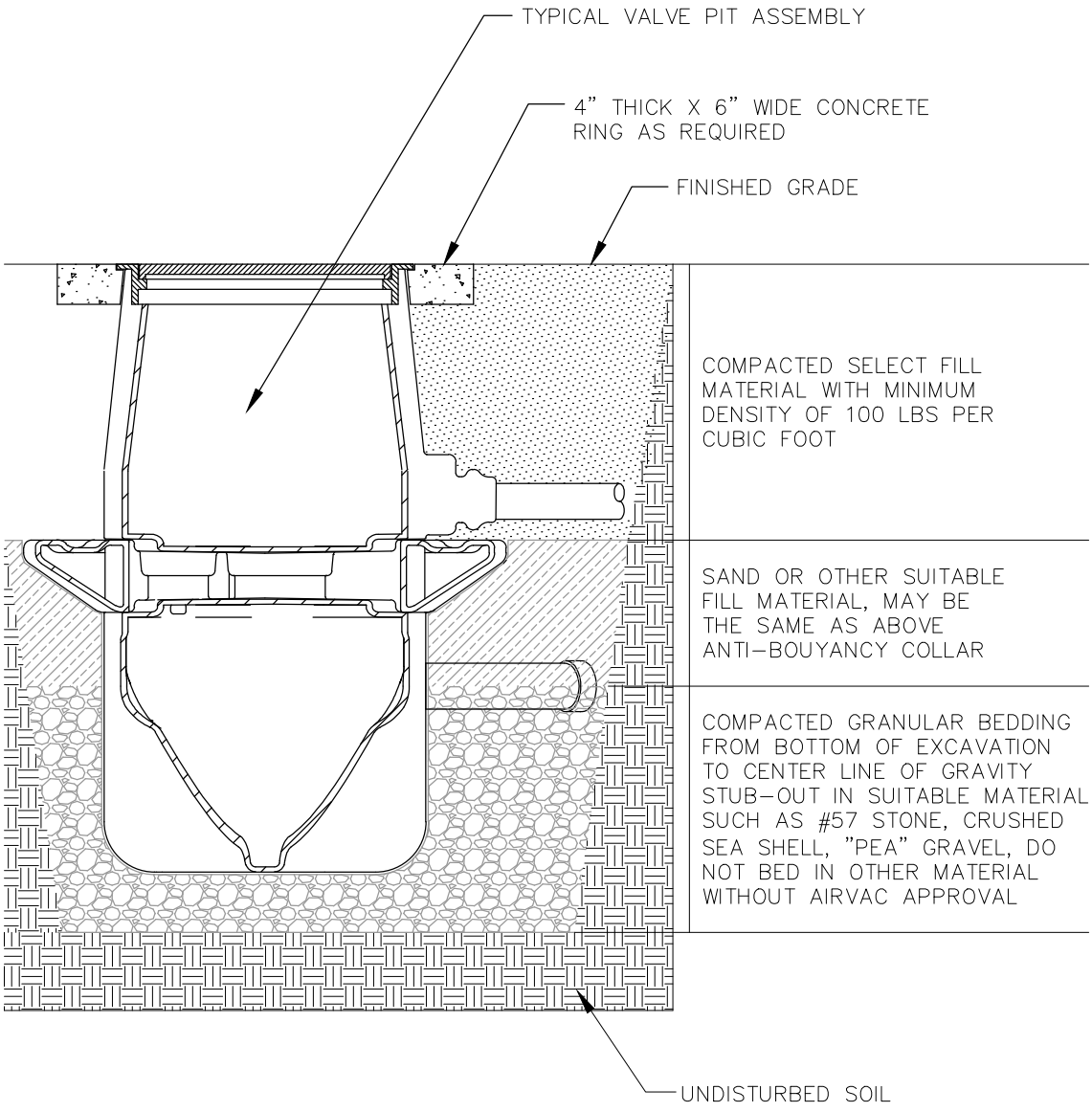
* DIMENSIONS BASED ON SPEARS MANUFACTURING
1. 45 DEG WYE, SOCKET x SOCKET x SOCKET
2. 90 DEG ELL, SOCKET x SOCKET

WYE SIZE	A	B	C	D– INVERT
4 x 4 x 3	9 1/4"	3 25/32"	9.32"	0.78'
6 x 6 x 3	10 1/2"	3 25/32"	10.21"	0.85'
8 x 8 x 3	13"	3 25/32"	11.86"	1.00'
10 x 10 x 3	14 3/8"	3 25/32"	12.84"	1.10'



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

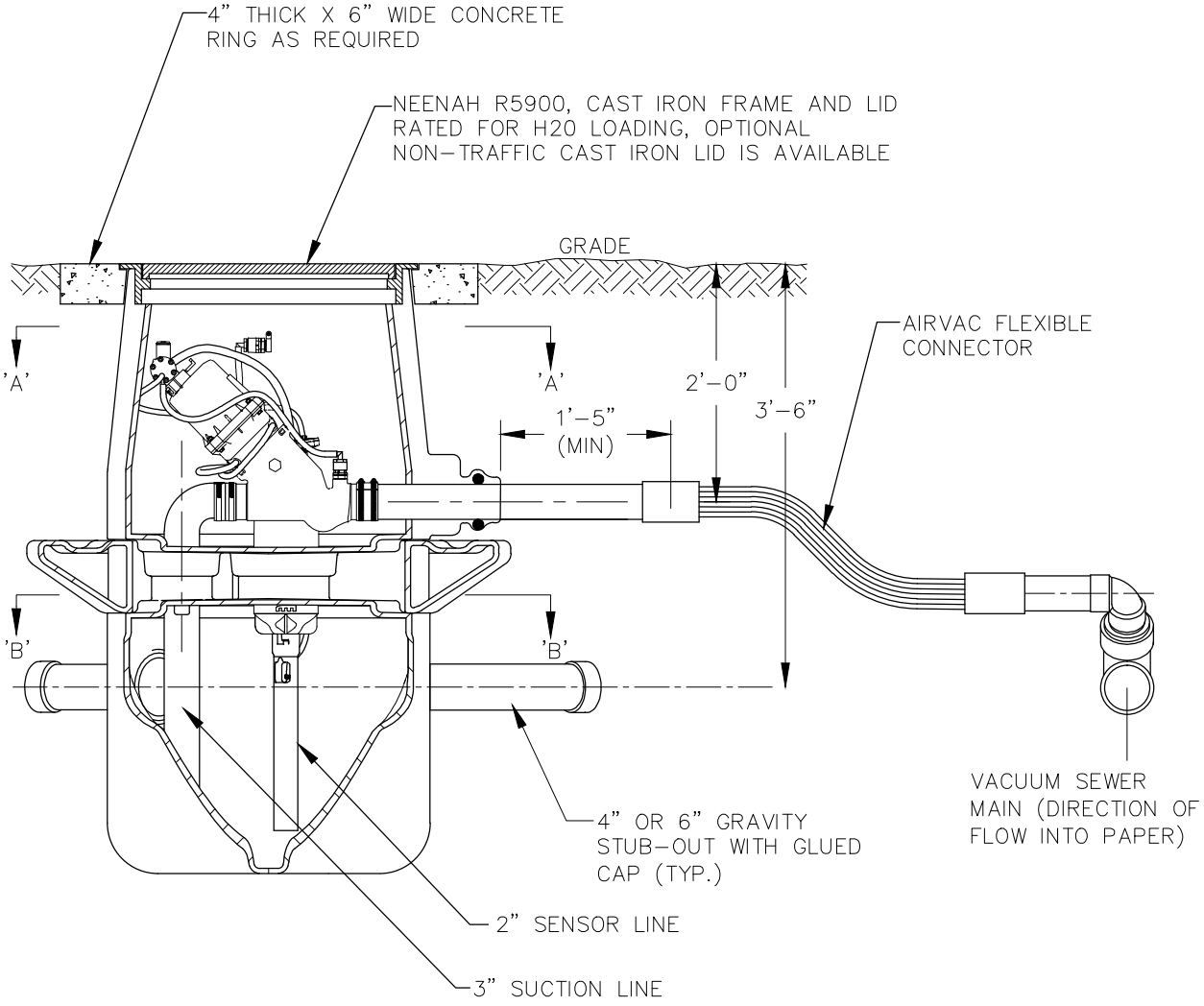
REVISION	VACUUM SEWER MINIMUM SPACING BETWEEN CONNECTIONS	DWG No.
AUGUST 2016		97



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

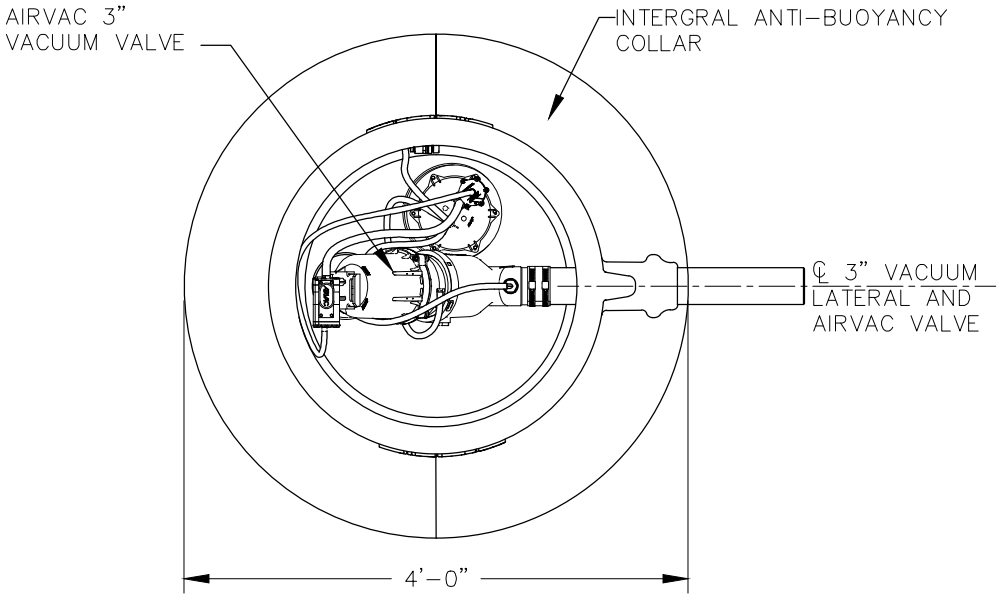
REVISION	VACUUM SEWER	DWG No.
AUGUST 2016	VALVE PIT BEDDING AND BACKFILL	98

MODEL VP3030WT

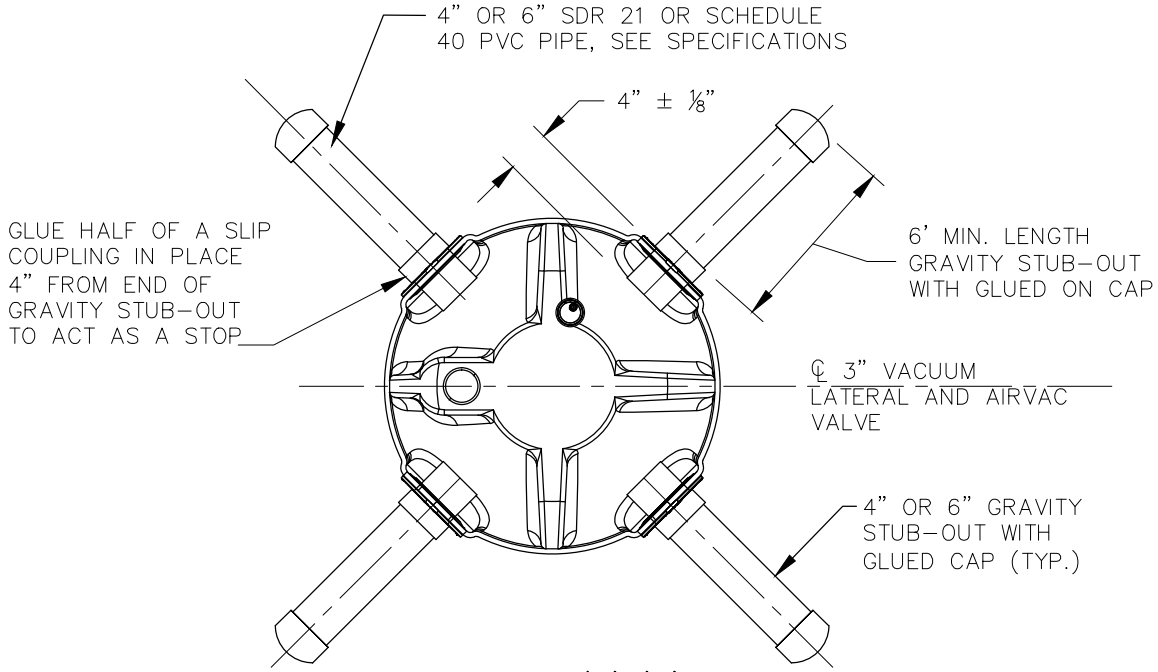


MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	VACUUM SEWER STANDARD 1-PIECE VALVE PIT	DWG No.
AUGUST 2016		99



SECTION 'A'-A'

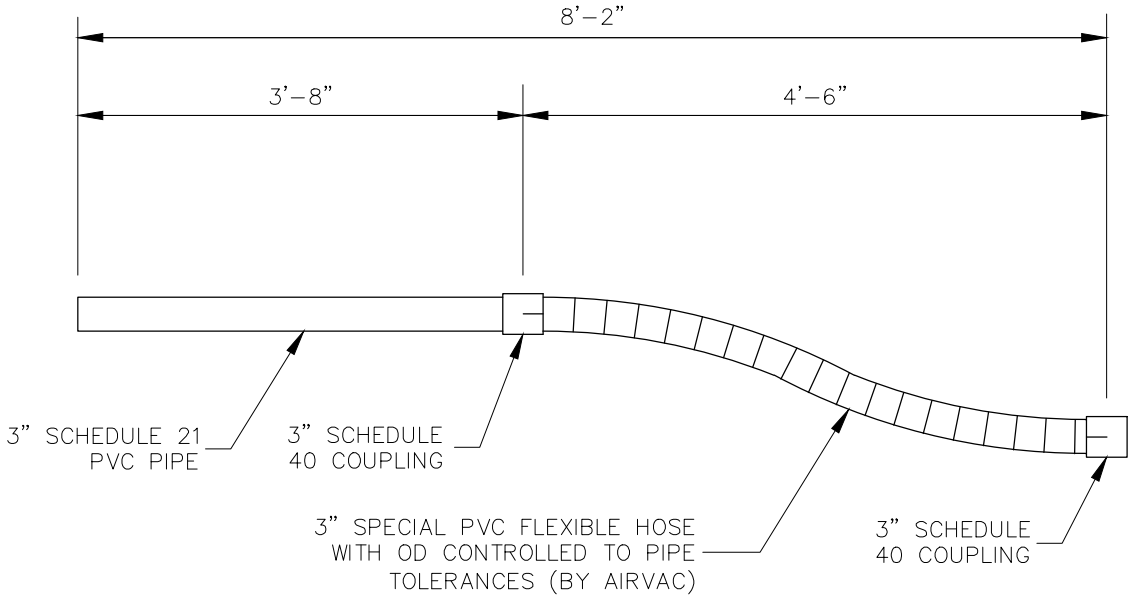


SECTION 'B'-'B'

SHOWING UP TO 4 GRAVITY
CONNECTIONS TO SUMP

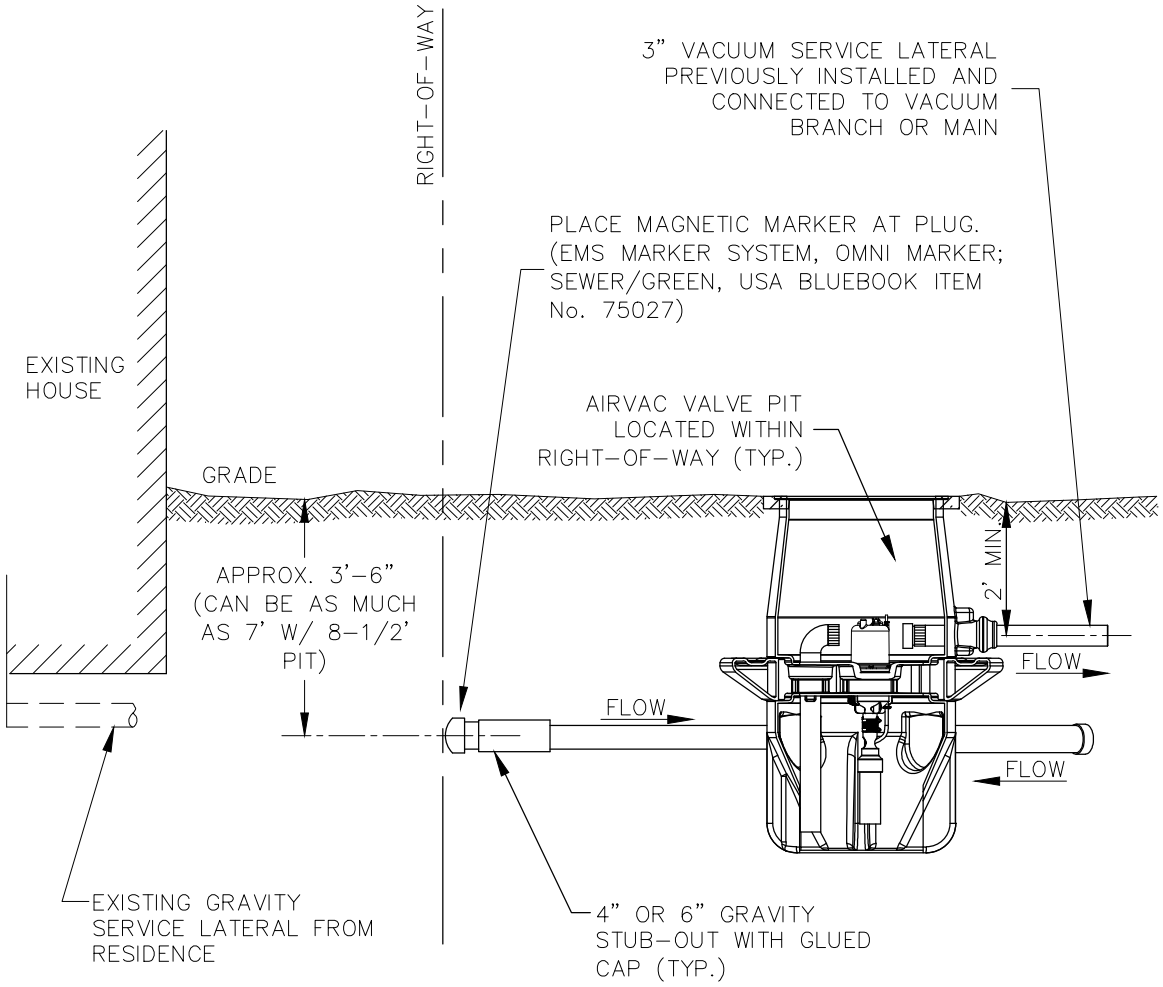
NOTE:

1. EVIDENCE THAT COUPONS FROM GRAVITY SEWER LATERAL CONNECTIONS TO THE VALVE PIT SUMP MUST BE PRESENTED TO THE MCU INSPECTOR PRIOR ACCEPTANCE AND PLACEMENT OF VALVE PIT INTO OPERATION



NOTE:

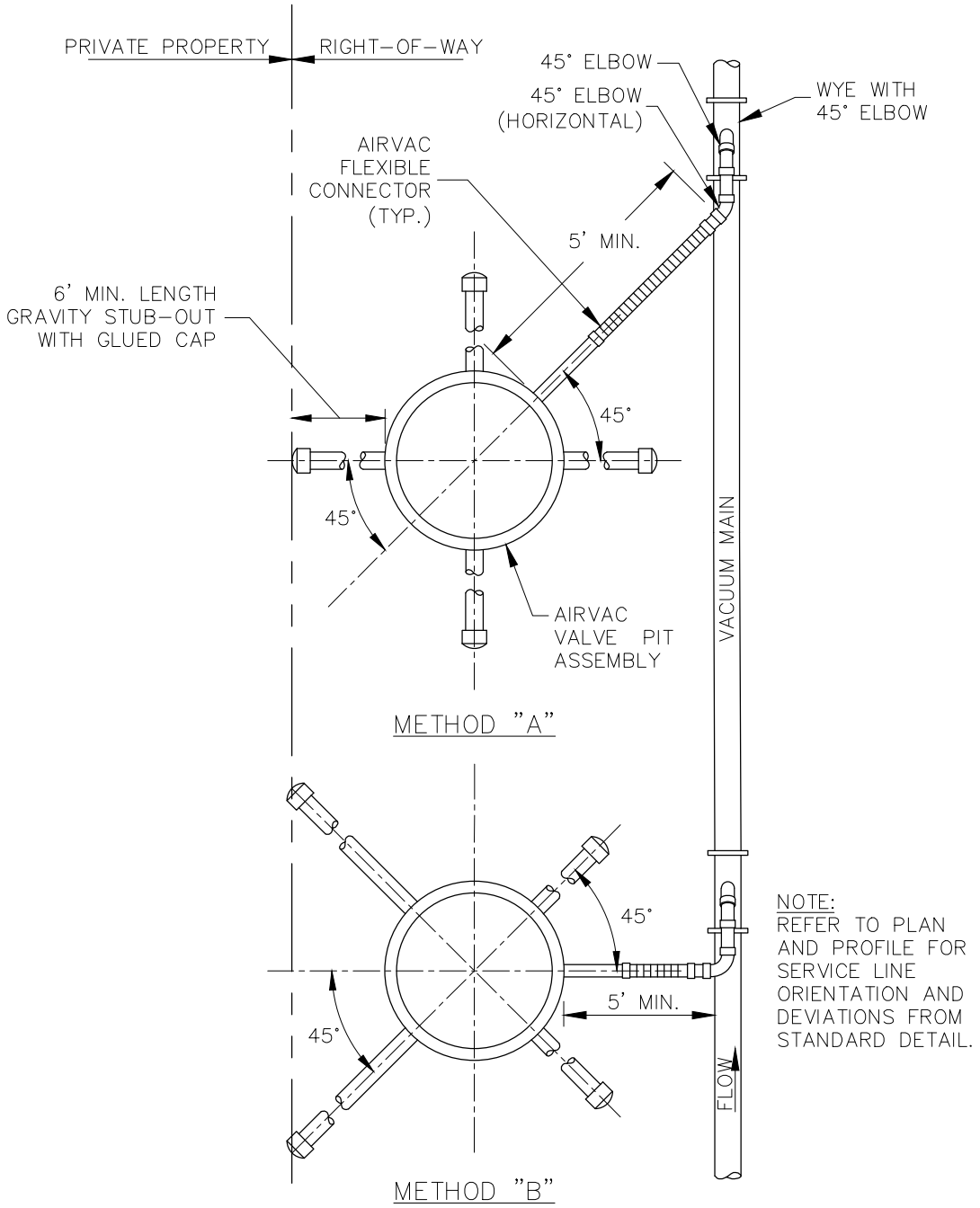
1. FLEXIBLE CONNECTOR USED TO CONNECT VALVE PIT TO 3" VACUUM SERVICE LATERAL
2. FLEXIBLE CONNECTOR LENGTH MAY NOT BE ALTERED, DO NOT CUT PVC PIPE OF FLEXIBLE HOSE



NOTE:
DO NOT INSTALL AIRVAC VALVE UNTIL 6" AIR-INTAKE ASSEMBLY IS IN PLACE

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

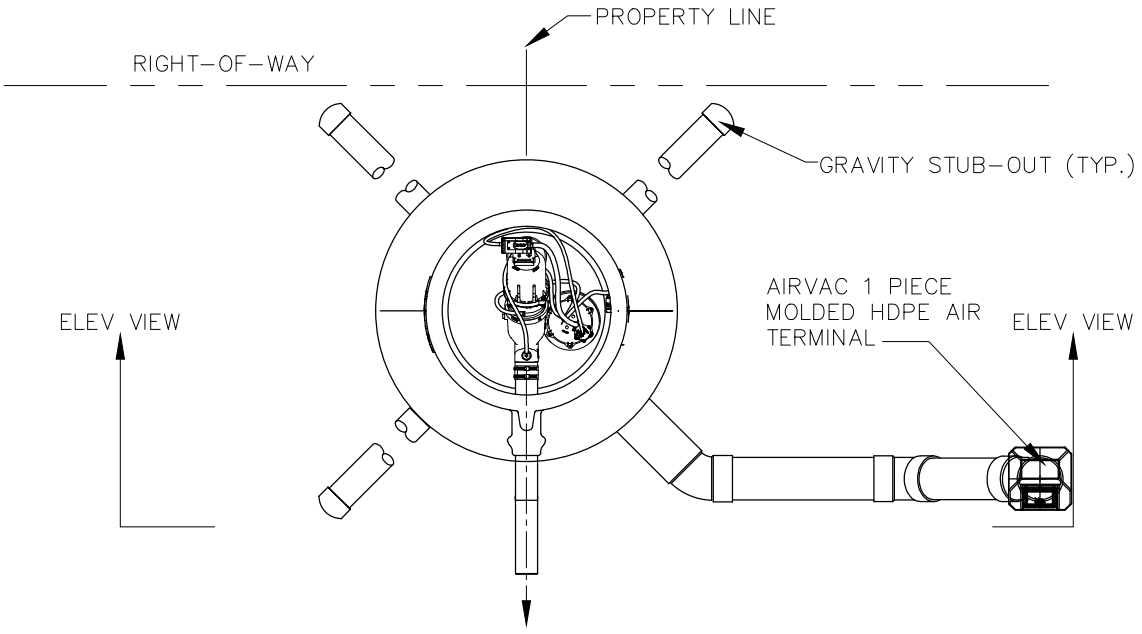
REVISION		DWG No.
AUGUST 2016	VACUUM SEWER VALVE PIT – PRIOR TO HOUSE CONNECTION	102

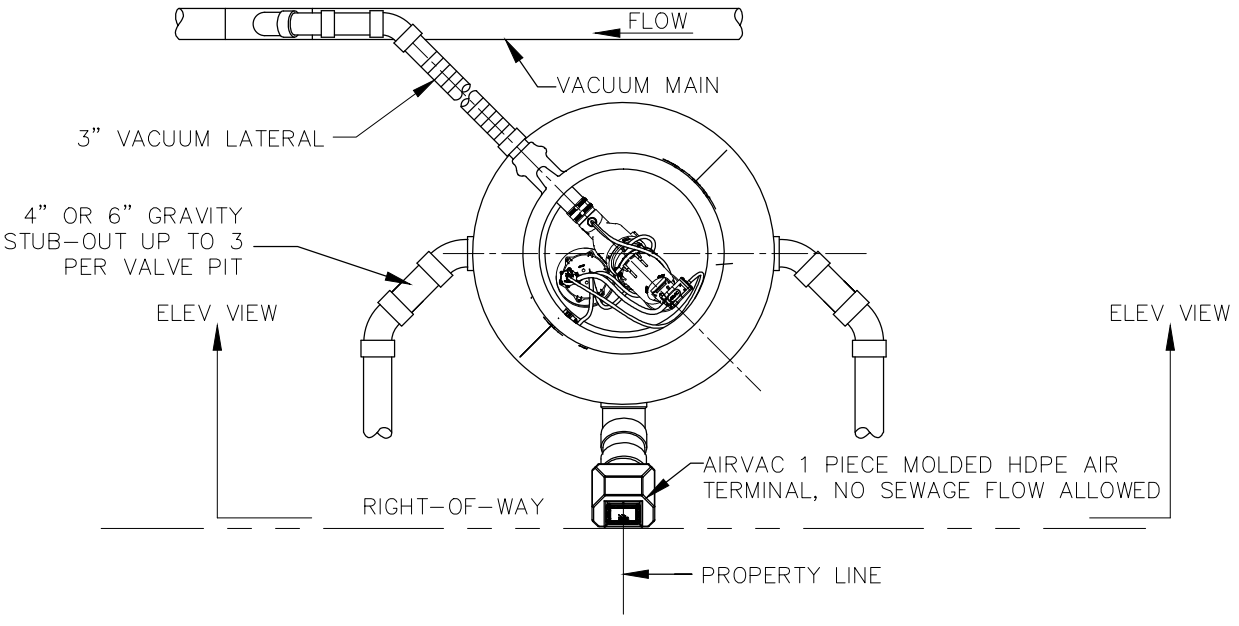


NOTE:
REFER TO PLAN AND PROFILE FOR SERVICE LINE ORIENTATION AND DEVIATIONS FROM STANDARD DETAIL.

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION		DWG No.
AUGUST 2016	VACUUM SEWER STANDARD VALVE PIT ORIENTATION	103



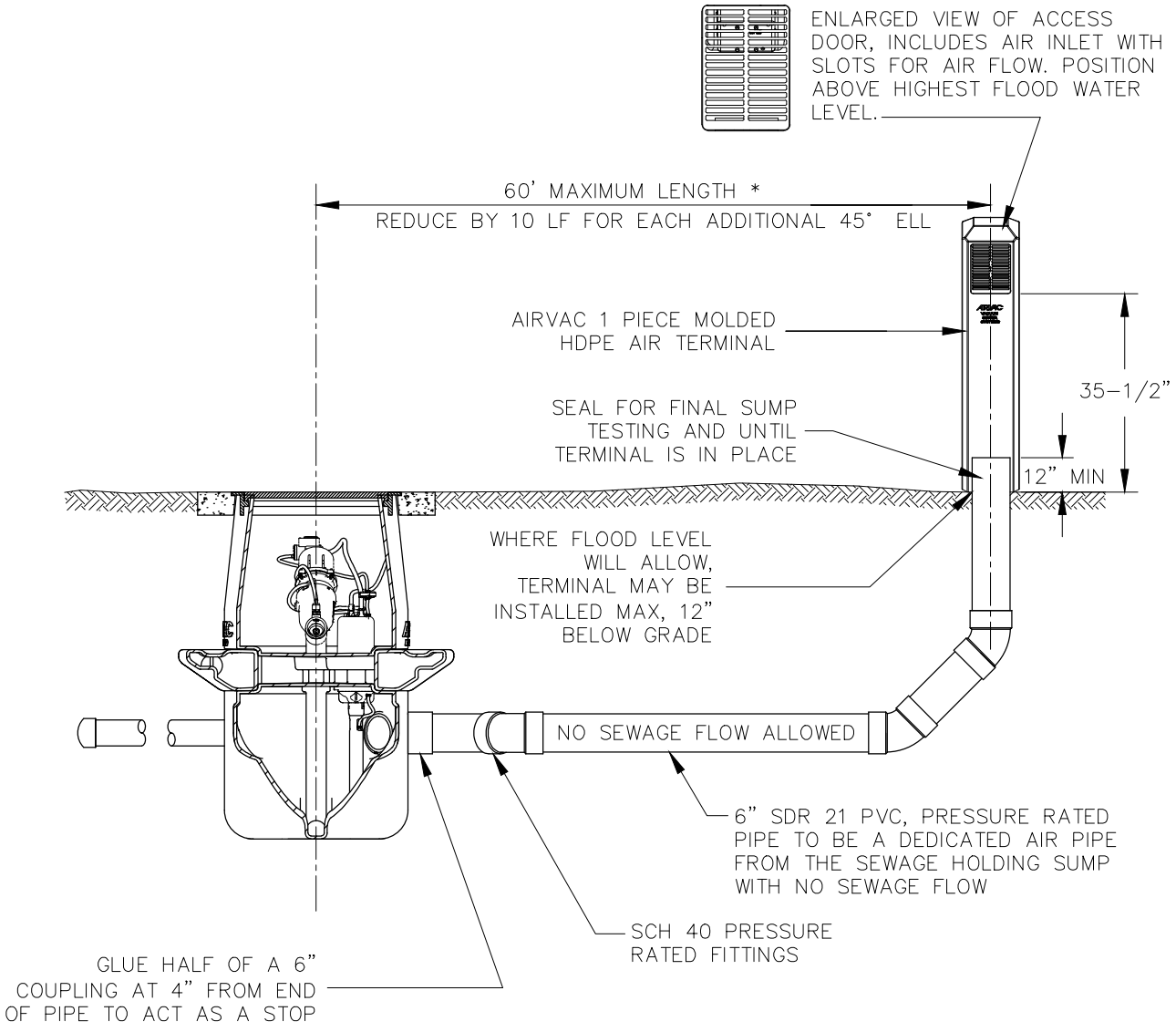


ALTERNATE ARRANGEMENT

PLAN

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

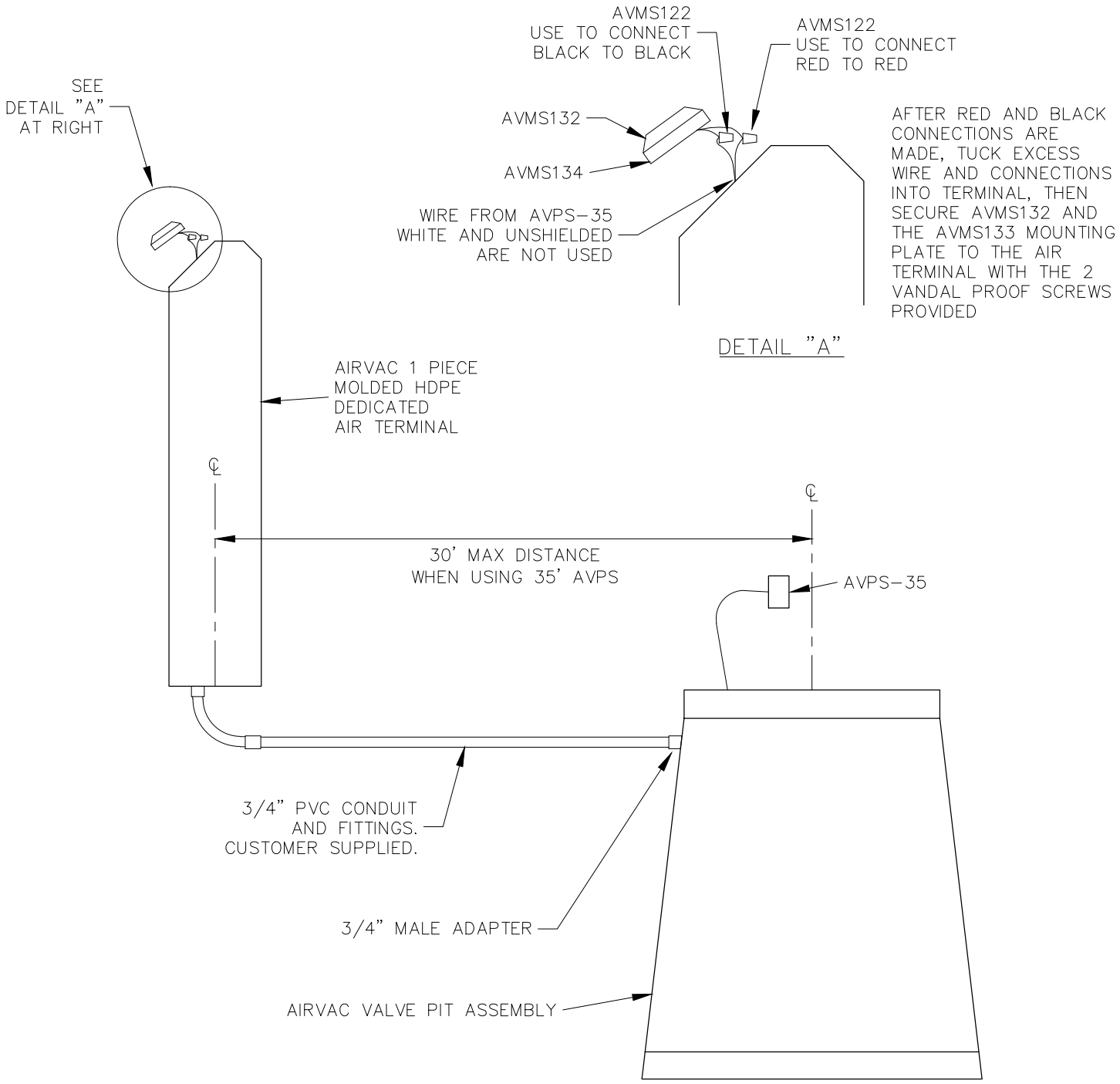
REVISION		DWG No.
AUGUST 2016	VACUUM SEWER 6" DEDICATED AIR TERMINAL (PLAN)	104



ELEVATION

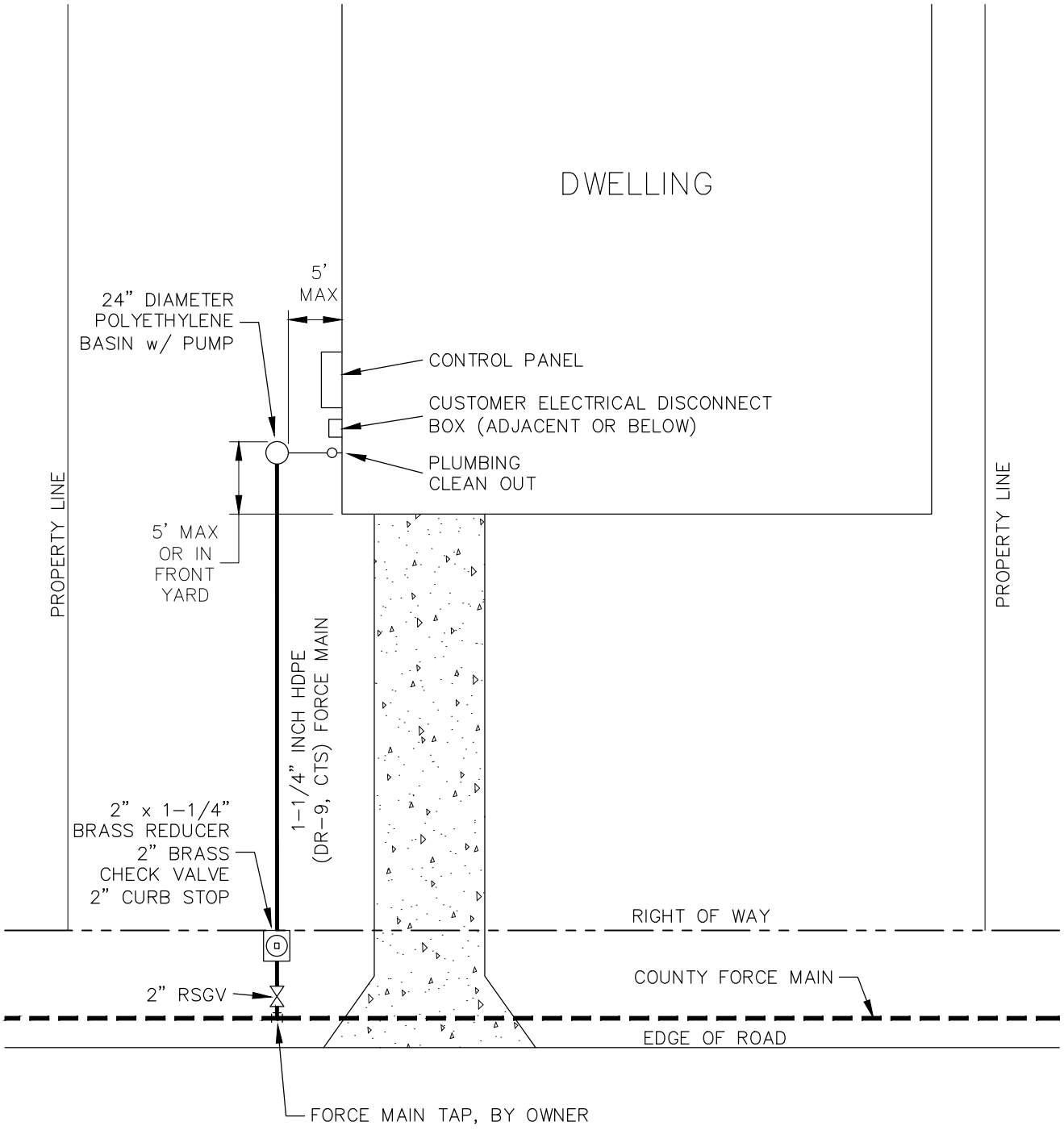
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION		DWG No.
AUGUST 2016	VACUUM SEWER 6" DEDICATED AIR TERMINAL (ELEVATION)	105



NOTE:

1. IF AVPS CABLE IS TOO SHORT, LONGER CABLES ARE AVAILABLE THROUGH AIRVAC. EXTENDING WIRE LEADS IS NOT RECOMMENDED.
2. FOR FIBERGLASS PIT: USE 1-1/6" HOLE SAW TO DRILL HOLE FOR ADP. SECURE ADP TO PIT WITH CONDUIT NUT PROVIDED
3. FOR PE PIT: USE 59/64" DRILL. TAP HOLE 3/4" NPT. USE THREAD TAPE AND SCREW INTO SIDEWALL.
4. SLIDE AVPS-35 INTO 3" VALVE UPPER HOUSING SLOT AND SECURE WITH TREE CLIP.

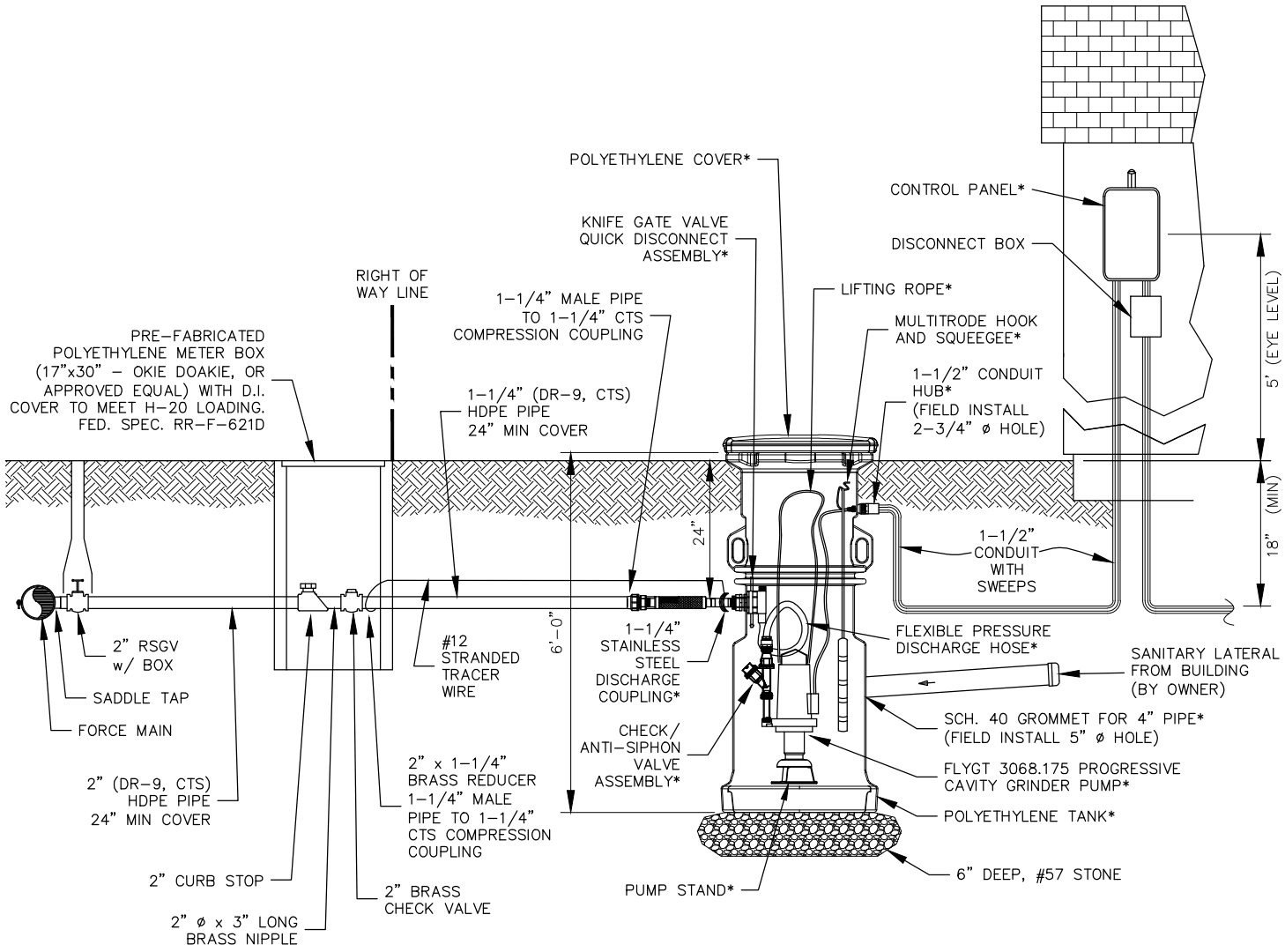


NOTE:

1. REPLACE EXISTING CLEANOUT IF NOT 2-WAY.
2. BASIN TO BE INSTALLED WITH PUMP DISCHARGE FACING RIGHT OF WAY.

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPICAL RESIDENTIAL GRINDER SYSTEM LAYOUT (PLAN VIEW)	DWG No.
AUGUST 2016		107

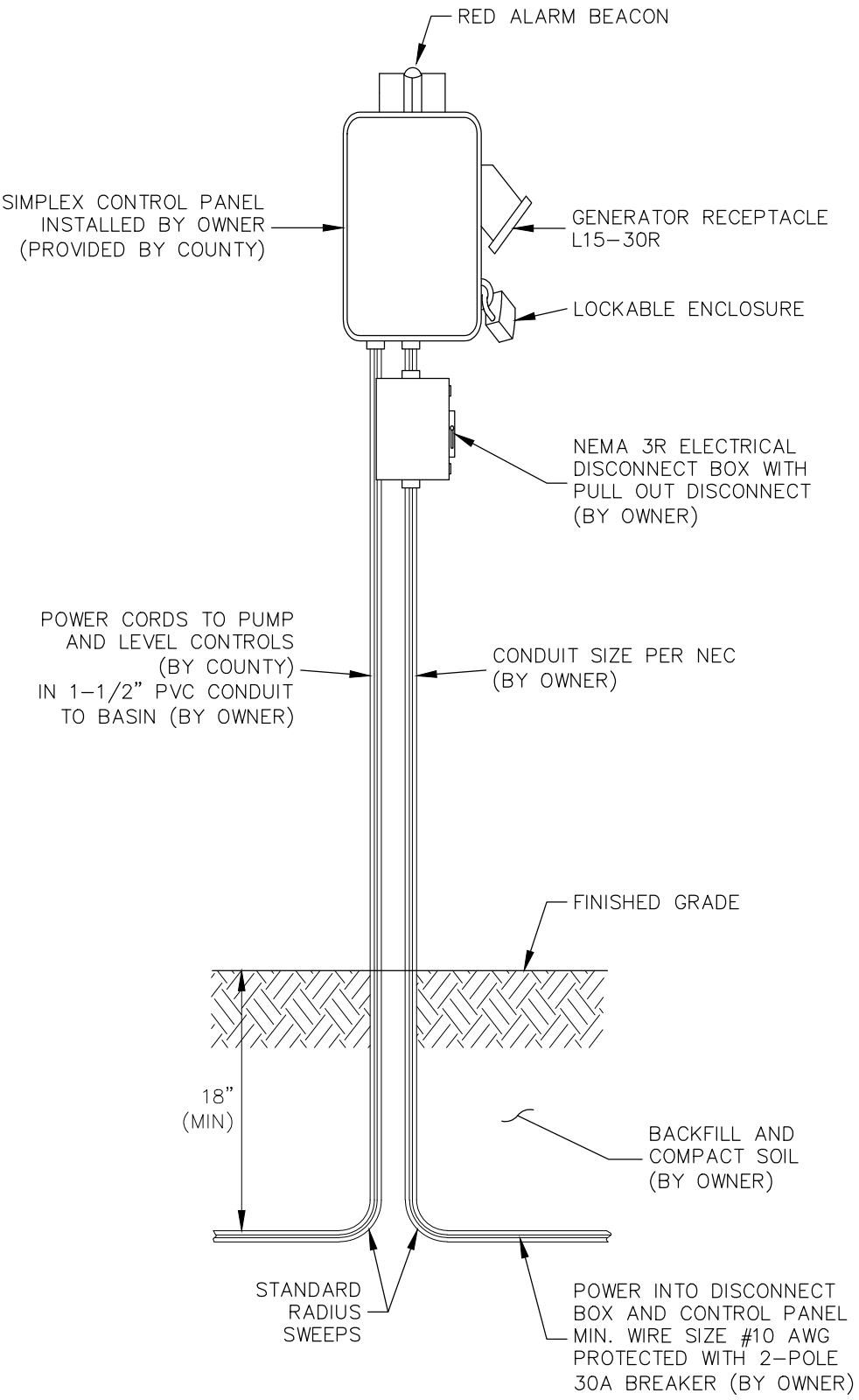


NOTE:

* COMPONENTS PROVIDED WITH GRINDER ASSEMBLY

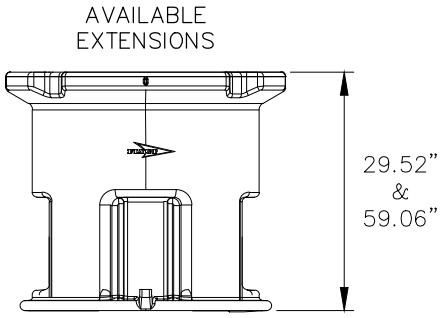
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

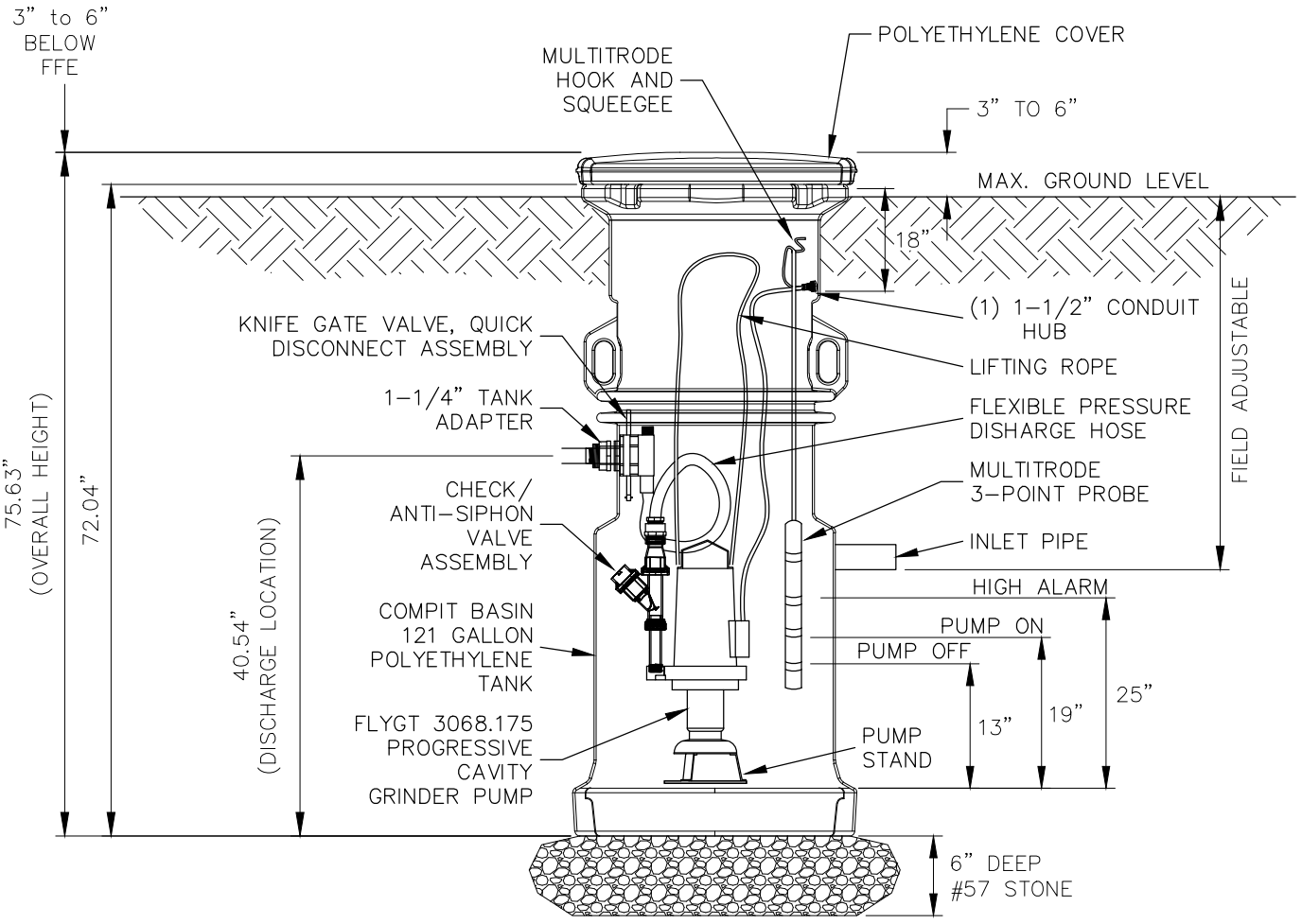
REVISION	TYPICAL RESIDENTIAL GRINDER SYSTEM LAYOUT (SECTION VIEW)	DWG No.
AUGUST 2016		108



MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

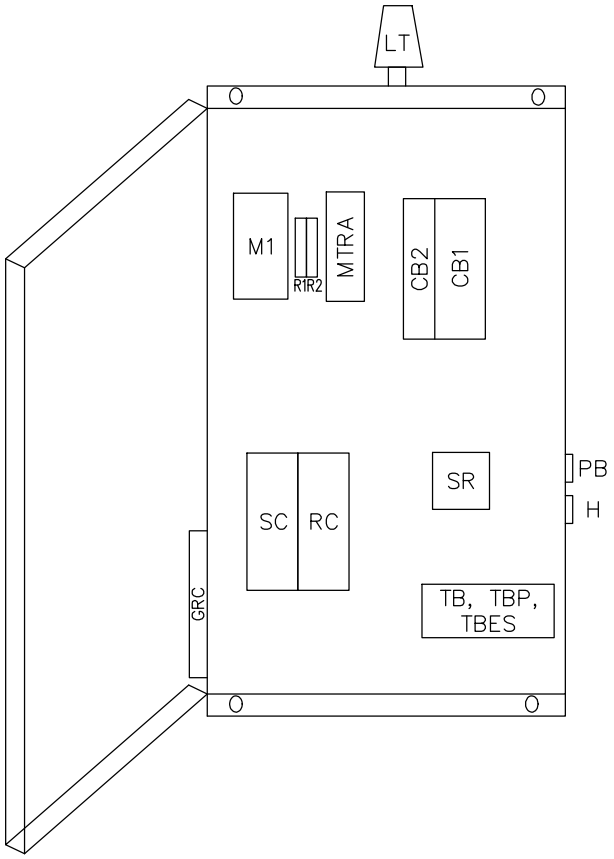
REVISION	TYPICAL RESIDENTIAL GRINDER SYSTEM WALL MOUNTED CONTROL PANEL	DWG No.
AUGUST 2016		109



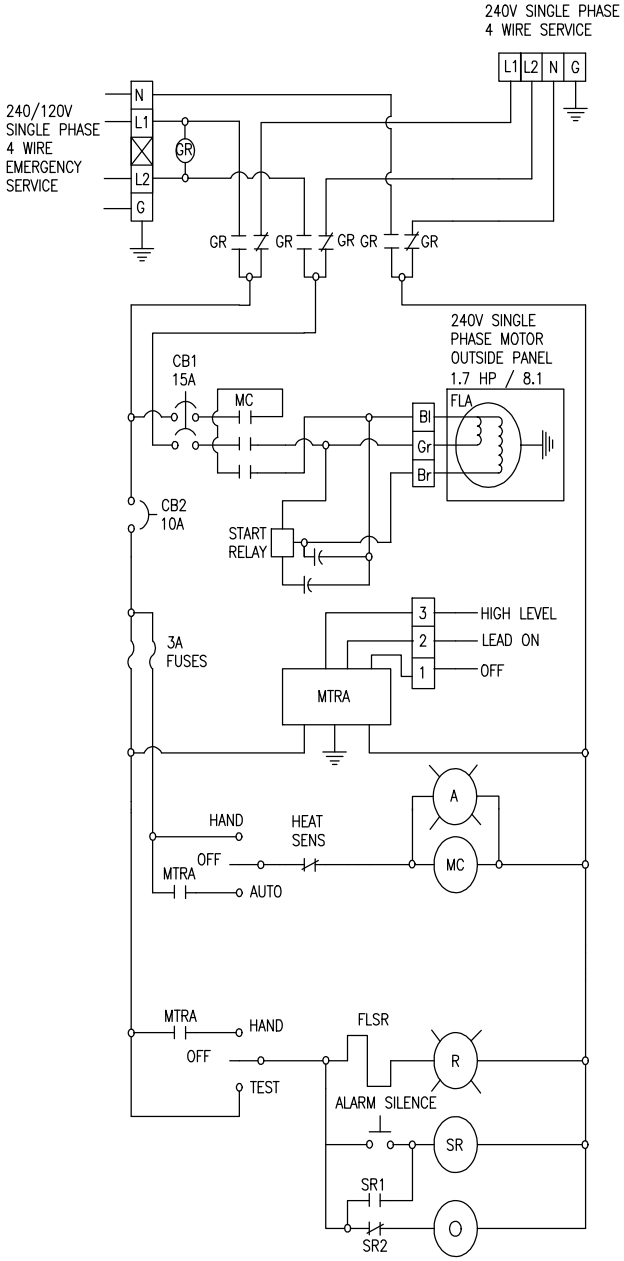


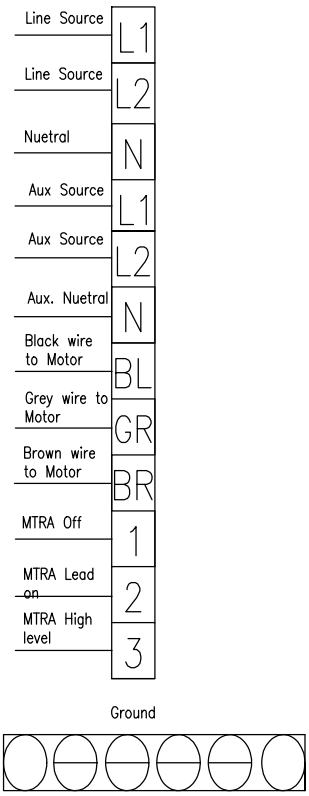
MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPICAL RESIDENTIAL GRINDER SYSTEM TYPICAL WET WELL	DWG No.
AUGUST 2016		110



DESCRIPTION	ABV
14" x 12" x 6" POLY ENCLOSURE	ENC
14" x 12" BACK PANEL – ALUMINUM	BP
14" x 12" HINGED FRONT PANEL	FP
CIRCUIT BREAKER 2 POLE, 15A UL 489	CB1
CIRCUIT BREAKER 1 POLE, 10A UL 489	CB2
CONTACTOR – 3 HP @ 230V, 1 PH	M1
N/O BLACK PLASTIC PUSH BUTTON 22mm	PB
PILOT LIGHT 22mm	PL
3 POSITION MAINTAINED SELECTOR SWITCH, 2 NO	3P
2 POSITION MAINTAINED SELECTOR SWITCH, 1 NO	2P
MIN. INDUSTRIAL RELAY, DPDT 8A 120V COIL	R1,R2
RELAY BASE	R1,R2
STROBE / FLASH ALARM LIGHT 120VAC	LT
WARBLE ALARM, 30 MM	H
START CAP 230V 150MFD	SC
START RELAY / POTENTIAL RELAY	SR
RUN CAP 370V 50MFD	RC
2, 5mm 2 SPRING TERMINAL BLOCK	TB
END PLATE FOR TERMINAL BLOCK	TBP
GENERATOR RECEPTACLE AND COVER 30A	GRC
END STOP	TBES



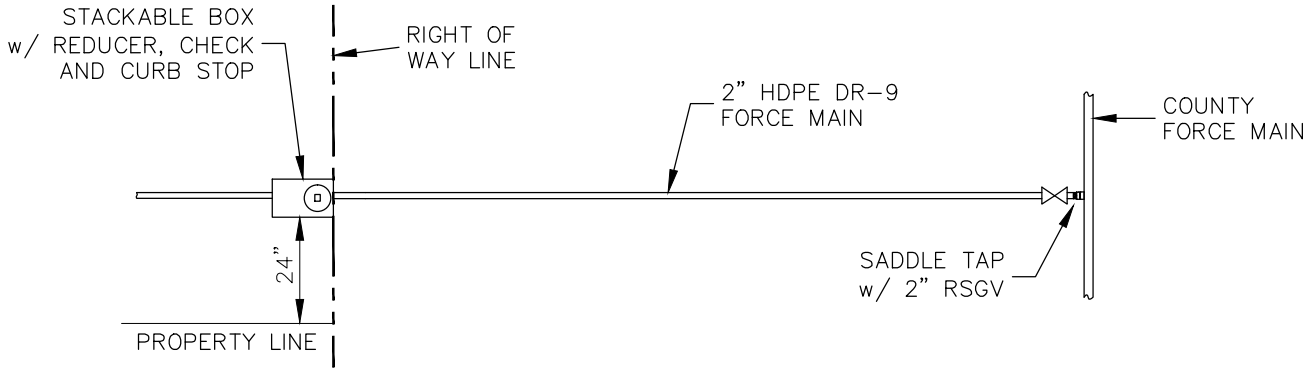


Notes:
> All wire to be 12-16AWG.
> Torque all wiring terminals to 4-8 in/lbs.
> Use 60 C Copper wire only minimum for less that 100 amps.
> All penetrations must meet the enclusure type rating indicated on the "UL" information label.
> L2 to act as Neutral in all control wiring.

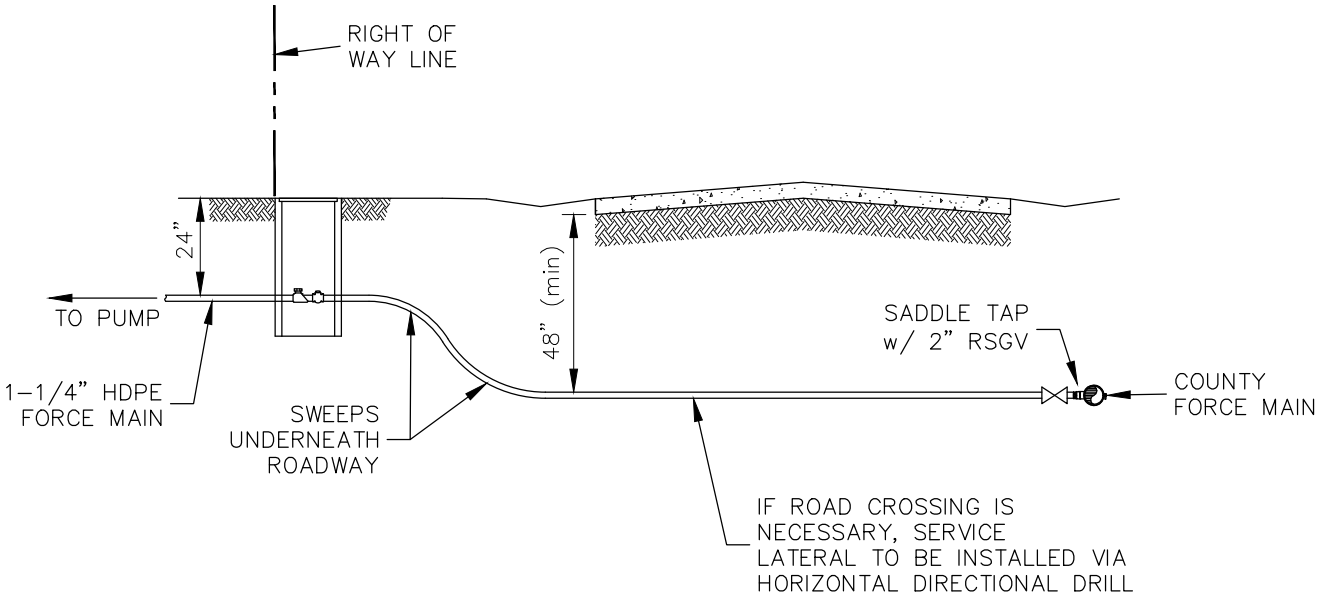
Voltage: 240VAC	Phase: 1	Hertz: 60	HP/FLA: 1.7/8.1
Enclosure Type: 4X			
Short curcuit current: 5KA			

MARTIN COUNTY CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPICAL RESIDENTIAL GRINDER SYSTEM CONTROL PANEL WIRING DIAGRAM	DWG No.
AUGUST 2016		112



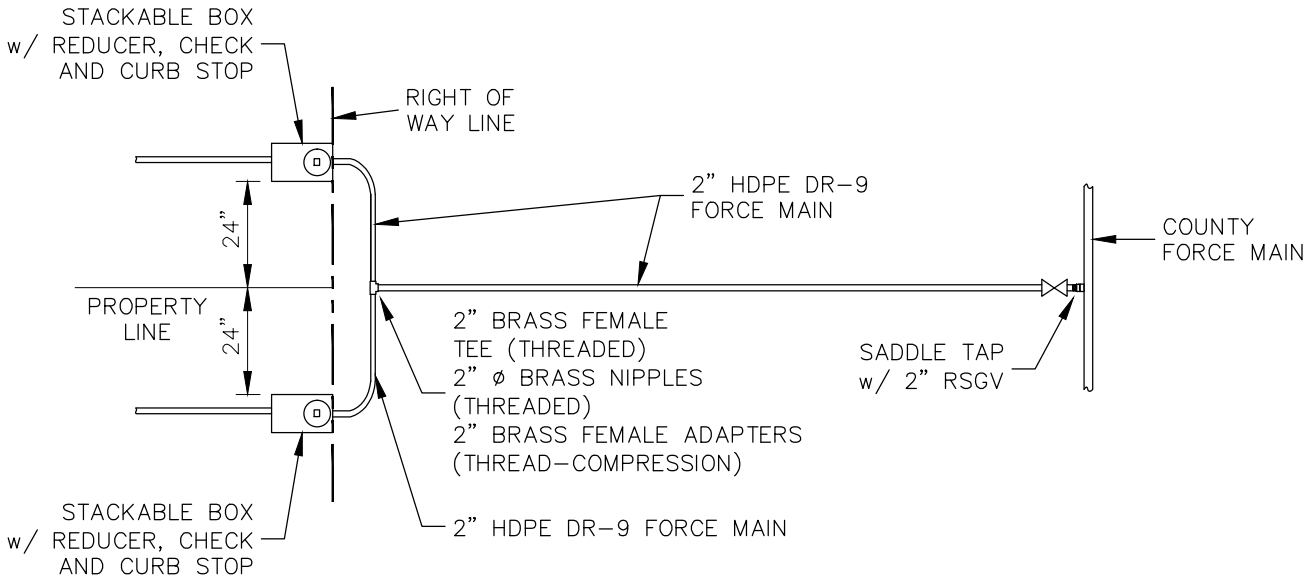
TYPICAL ROAD CROSSING PLAN VIEW



TYPICAL ROAD CROSSING SECTION VIEW

NOTES:

1. ACTUAL LOCATIONS OF SERVICES SHALL BE DETERMINED IN FIELD BY MARTIN COUNTY UTILITIES DEPENDING UPON EXISTING CONDITIONS & LOCATION OF EXISTING SEPTIC TANK.
2. SEE PLAN SHEET FOR LOCATION OF SERVICES



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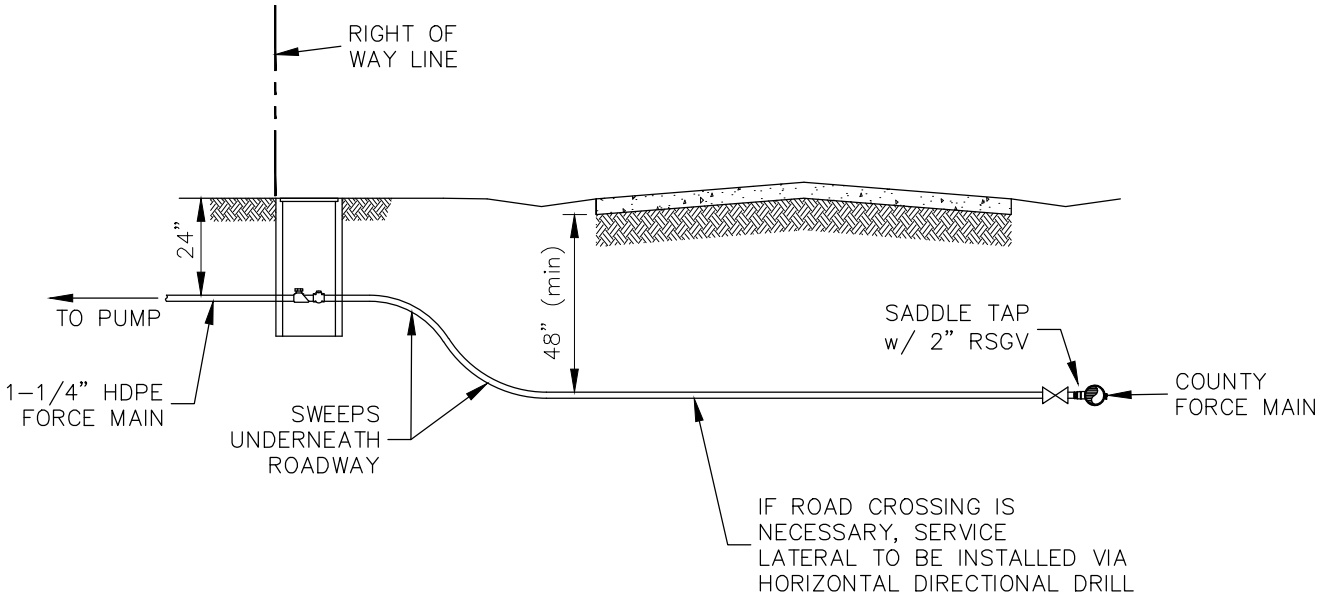

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