



Village of Wellington

WATER AND WASTEWATER SYSTEMS
Construction Specifications
and Standard Details
Manual

April 9, 2018

TABLE OF CONTENTS

1	GUIDELINES -- GENERAL	
	1.1. General	1
	1.2. Easements	2
	1.3. Operation and Maintenance Manuals (O&M)	2
	1.4. Other Agencies	3
	1.5. Existing Facilities	3
	1.6. Emergency Generators	3
2	GUIDELINES -- DESIGN	
	2.1.-2.16. Submittal Criteria	4-5
3	WATER SYSTEMS -- DESIGN	
	3.1. General	
	3.2. Minimum Cover	6
	3.3. Minimum Horizontal Separation	6
	3.4. Vertical Separation	6
	3.5. Layout	7
	3.6. Watermain Material	7-8
	3.7. Watermain Size	8
	3.8. Valves, Fittings and Appurtenances	8-9
	3.9. Thrust Restraints	9-11
	3.10. Fire Hydrants & Fire Sprinkler Systems	11-12
	3.11. Water Service Lines and Taps	13
	3.12. Meter Installation	13-14
	3.13. Meter Boxes	14-15
	3.14. Backflow Prevention Devices	15-16
4	WATER SYSTEMS -- POTABLE WATER MAIN CONSTRUCTION	
	4.1. Installation	17
	4.2. Connection to Existing System	18
	4.3. Cleaning and Flushing	18
	4.4. Testing	18-20
	4.5. Disinfection	21
	4.6. Abandonment in Place of Existing Watermain	21
	4.7. Construction Using Horizontal Directional Drilling (HDD)	21-24
5	WASTEWATER SYSTEM DESIGN -- CONSTRUCTION	
	5.1. Wastewater System Design	25-26
	5.2. Gravity Sewer System	26-29
	5.3. Wastewater Force Mains	30-31
	5.4. Thrust Restraint	31-33
6	GRAVITY WASTEWATER LINE -- CONSTRUCTION	
	6.1. Installation	34
	6.2. Manholes	34
	6.3. Inspection and Testing	35
	6.4. Wastewater Lines and Force Mains in Wellfields	35-36
	6.5. Wastewater Force Main Construction	36-37
	6.6. Connection to Existing Systems	37
	6.7. Cleaning	37

Section 6 Gravity Wastewater Line Construction - Continuation

6.8.	Testing	37-38
6.9.	Abandonment in Place of Existing Force Main	38
6.10.	Construction Using Horizontal Directional Drilling	38
6.11.	Corrosion Barrier/Inflow Protection System for Concrete Structures	38

7 WASTEWATER PUMP STATION DESIGN AND CONSTRUCTION

7.1.	General	39-41
7.2.	Portable, Trailer Mounted Generator Set	41
7.3.	Fence Enclosures	41-42
7.4.	Site Selection and Layout	42-43
7.5.	Water Service	43
7.6.	Lift Station Acceptance Procedure	43-44
7.7.	Additional Requirements	44-45

8 INSPECTION REQUIREMENTS

8.1.	General	46
------	---------	----

9 RECORD INFORMATION

9.1.	Record Information	47-49
------	--------------------	-------

STANDARD DETAILS

Water

Sewer

Lift Station

INDEX - WATER DETAILS

General Construction Notes (Water)	W-1
General Construction Notes (Water)	W-2
Separation Criteria	W-3
Pressure Test Formula and Criteria	W-4
Typical Trench Detail	W-5
Typical Valve Setting	W-6
Pressure Pipe Conflict Detail	W-7
Mechanical Joint Restraint Requirements	W-8
Casing Installation Detail	W-9
Pipe Casing Spacers Detail	W-10
Canal Crossing Detail (Aerial)	W-11
Concrete Pile Detail	W-12
Concrete Pile Notes	W-13
Dual Pile Cap Support Detail	W-14
Pile Cap Support Details	W-15
Fan Guard for Single Pipe	W-16
Conflict Manhole Detail	W-17
Fan Guard for Double Pipe	W-17
Conflict Manhole Detail	W-18
Pipe Bollard Detail	W-19
Caution Sign Detail	W-20
Open Cut Pipe Installation / Non-Thoroughfare Road	W-21
Open Cut Pipe Installation / Thoroughfare Road	W-22
Shellrock Road / Driveway Replacement Detail	W-23
Typical Service Connection (Underground) for 5/8", 1" or 2" Meter	W-24
Typical Single Service and Multiple Services (Two or More)	W-25
Zero Lot Line Service	W-26
Typical Commercial Meter / Backflow Prevention Detail (3/4" to 2")	W-27
Meter and Meter Box Installation	W-28
3" Underground Meter and By-Pass Piping	W-29
3" Backflow Assembly Detail	W-30
4" Underground Meter and By-Pass Piping	W-31
4" Backflow Assembly Detail	W-32
Fire Line Backflow	W-33
Sampling Point (On Main)	W-34
Sampling Point (On Hydrant)	W-35
Typical Terminal End with 2" Blow-off	W-36
Double Valve Detail with Atmospheric Vent and Jumper with BFP and Meter	W-37
Alternate Watermain Tie-in Detail	W-38
Typical Fire Hydrant Assembly	W-39
Alternate Fire Hydrant Installation	W-40

INDEX - WATER DETAILS (continued)

Potable Watermain Underground Air Release Valve and Vault in Non-Traffic Areas and Outside of Road R/W	W-41
Potable Watermain Underground Air Release Valve in Manhole in Paved Areas and Road R/W	W-42
Potable Watermain Off-Set Underground Air Release Valve	W-43
Cannon Flushing Detail	W-44
Pipe Support Detail	W-45
Automatic Flushing Assembly (Type A)	W-46
Automatic Flushing Assembly (Type B)	W-47
Permanent Sampling Point	W-48

INDEX - SEWER DETAILS

General Construction Notes (Wastewater)	S-1
General Construction Notes (Wastewater)	S-2
Typical Trench Detail	S-3
Typical Sewer Service Connection	S-4
Typical Zero Lot Line Sewer Service Connection	S-5
Sanitary Sewer Cleanout	S-6
Standard Manhole (Concentric Cone)	S-7
Standard Manhole (Eccentric Cone)	S-8
Inside Drop Connection for Standard Manhole	S-9
Inside Drop Bowl	S-10
Outside Drop Connection for Standard Manhole	S-11
Inside Force Main Drop Connection	S-12
Flow Patterns for Manhole Inverts	S-13
Standard Manhole Frame and Cover	S-14
Manhole Rain Guard	S-15
Water Connection Detail at Lift Station	S-16
Force Main Air Release Valve and Vault Outside of R/W and Non-Traffic Areas Outside of R/W	S-17
Force Main Air Release Valve and Manhole in Paved Areas and Road R/W	S-18
Force Main Off-Set Underground Air Release Valve	S-19
Grease Interceptor	GT-1

INDEX - LIFT STATION DETAILS

Typical Lift Station Layout (Within Easement)	LS-1
Typical Lift Station (Plan)	LS-2
Typical Lift Station (Section)	LS-3
Pressure Gauge in Vault Detail	LS-4
Emergency Pump Out Connection	LS-5
Water Service at Lift Station Detail	LS-6
Fencing Detail	LS-7
Prestressed Concrete Communications Pole Detail	LS-8
Typical Control Panel Installation	LS-9
Typical Control Panel Notes	LS-10
Main Disconnect Switch	LS-11
Control Panel Legend	LS-12
Control Panel Bill of Material	LS-13
Control Panel Specifications	LS-14
Control Panel Specifications	LS-15
Control Panel Specifications	LS-16
Control Panel Specifications	LS-17
Control Panel Electrical Schematic Diagram (480V)	LS-18
Control Cabinet (2 Pumps)	LS-19
Control Cabinet (2 Pumps)	LS-20
Duplex Station Selection Chart (2 Pumps)	LS-21
Control Panel Electrical Schematic Diagram (2 Pumps)	LS-22
Control Panel Electrical Schematic Diagram (2 Pumps)	LS-23
Control Panel Electrical Schematic Diagram (2 Pumps)	LS-24
Control Panel Electrical Schematic Diagram (2 Pumps)	LS-25
Control Panel Electrical Schematic Diagram (2 Pumps)	LS-26
Control Panel Electrical Schematic Diagram (2 Pumps)	LS-27
Control Cabinet (3 Pumps)	LS-28
Control Cabinet (3 Pumps)	LS-29
Triplex Station Selection Chart (3 Pumps)	LS-30
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-31
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-32
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-33
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-34
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-35
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-36
Control Panel Electrical Schematic Diagram (3 Pumps)	LS-37

APPROVED PRODUCT LIST (APL)

CROSS-CONNECTION CONTROL

SECTION 1

GUIDELINES – GENERAL

1.1. General:

The Minimum Standards set forth in this document are intended to provide a basis for design and construction for those Utilities that come under the jurisdiction of the Village of Wellington (VOW). Applicable Federal, State and local environmental laws and regulations should be considered concurrently with this document. Any variations from these standards are to be approved in advance by the Utility Director or the designated representative. Variations, in general, will not be approved unless requested in writing and are acceptable to the VOW. It is intended the requirements of these standards shall be applicable in all cases where the facilities being constructed or to be constructed shall be owned and/or operated and maintained by the VOW. These requirements shall also be applicable to those portions of the facilities, which will lie within public rights-of-way of the VOW. In addition, the VOW will require that any private utilities beyond the VOW point of service or responsibility meet certain minimum standards.

The VOW assumes no responsibility for the design of improvements or for any material specified. Approval of the Plans and Specifications or use of the Minimum Standards does not relieve the Engineer of Record (EOR) and/or Owner/Developer from his responsibility for providing a complete working system that does not adversely impact the operation of the existing system.

All referenced standards, American Water Works Association (AWWA), American Standards Testing Methods (ASTM), American National Standard Institute (ANSI), National Sanitary Foundation (NSF), Florida Department of Transportation (FDOT) and others are the latest revisions thereof. The VOW assumes no responsibility for standards developed by outside agencies. Note the VOW standards may not satisfy other agency requirements. Conflicts shall be deferred to the Utility Director in writing for resolution.

The VOW's responsibility for ownership, operation and maintenance of watermains or water service lines shall end at the meter or backflow prevention device. Hydrant mains and hydrants shall be owned by the VOW, unless stated otherwise. Fire sprinkler mains shall be owned by the VOW up to the top 90 degree bend on the supply side of RPDA. A gate valve is required at the R/W Line or Property Line and identified as the VOW "Point of Service". Proper easements and testing are required for all VOW owned facilities as described within.

The VOW will not be responsible for maintaining sewer services within private property. The VOW will not operate, maintain or acquire ownership of any on-site wastewater facility that is not constructed to the VOW standards. Responsibility for these facilities will reside with the owner/developer. Ownership and maintenance of all facilities shall be at the discretion of the VOW.

It shall be the responsibility of the EOR to secure proper existing utility information, size facilities and prepare plans all in accordance with these minimum standards. The Utility

Director may, at his/her option, apply standards that are more stringent where site-specific conditions warrant. Copies of all design criteria and calculations shall be provided to the VOW.

All construction plans shall be reviewed and approved by the VOW. No changes shall be made on approved plans without specific VOW concurrence. The VOW will enforce the approved construction plans and specifications to a level equal to that of the minimum standards. No construction shall start prior to a pre-construction conference with a VOW representative in attendance. While the VOW will make every effort to ascertain the plans are in conformance with these standards, the right is reserved to enforce the minimum VOW standards regardless. Should revisions to the standard details or APL take place during the review and approval process of a project, the most current shall always apply. The contractor and the EOR shall review and/or approve shop drawings prior to the department. All applicable shop drawings are required to be reviewed and approved by the department.

1.2. Easements:

Easements shall be of sufficient width to guarantee that structures are not placed closer than 10' to a facility or main. In addition, the easement will allow un-hindered access to all such facilities and mains and are exclusive, to water/sewer only.

For easements adjacent and parallel to road right-of-ways, a minimum 10' wide easement shall be provided. A minimum 12' wide easement shall be provided for single mains in open areas. A 15' wide easement will be necessary for a main that runs down the side property line of a single-family type dwelling, or through areas not typically accessible. A 30' wide easement will be necessary when multiple utilities (such as water and sewer) are placed parallel to each other. Wider easements may be required by the Utility Director when design conditions warrant. Easements shall be kept on file until such time in the construction process that they will be recorded by VOW. Easements for lift stations shall be reviewed by the VOW and sized on a case-by-case basis.

All work performed under the auspices of the VOW Minimum Standards shall fully comply with any Wellfield Protection Rule, Conservation Ordinances and Comprehensive Plan Requirements adopted by the VOW.

Projects requiring easements not shown on the plat must submit separate sketch and legal descriptions with construction plans. Plan approval will not move forward until easements are reviewed and approved. This includes receipt of executed VOW Grant of Easement form (see blank forms).

1.3. Operations & Maintenance Manuals (O&M):

The EOR shall supply to the VOW two complete sets of operation and maintenance manuals for all electrical and mechanical components including pumps, motors, control circuits, radios, sensors, meters, wiring diagrams, etc. An O&M manual must be

provided for all lift station equipment and installed in the control panel (not part of the 2 sets to be supplied to the VOW).

1.4. Other Agencies:

The EOR is warned the approval of plans and specifications by the VOW is for water and wastewater systems only. Separate approvals are required for the following: storm-water systems, road repair and replacement, maintenance of traffic (MOT), electrical work, etc.

1.5. Existing Facilities:

All taps, tie-ins, etc., to existing facilities shall only be completed within the presence of a VOW representative. All connections shall be made in accordance with approved plans and specifications as issued by the VOW.

1.6. Emergency Generators:

The Developer/Contractor shall provide portable emergency generators with all appurtenances (trailer, chord, plug, etc.) consistent with standards established by VOW. One appropriately sized generator shall be furnished for every lift station. The Developer/Contractor shall provide a permanently installed emergency generator for all lift stations with a design ultimate pumping capacity of 500 gallons per minute or higher.

The Design Engineer/Developer shall consult with VOW, Electrical Engineer and lift station pump manufacturer to determine the model of Wacker Neuson, Generac or VOW approved equal, generator package sufficient to provide emergency power. The emergency generator and all costs associated with delivery and consultation with VOW shall be included as a separate proposal pay item.

SECTION 2 GUIDELINES – DESIGN

2.1. Submittal Criteria:

The EOR can obtain a copy of the most current submittal requirements from the Engineering and Environmental Services Department. Guidelines and submittal criteria for construction plans are as follows:

Submit two (2) sets of water and sewer plans and specifications to VOW, 3 if lift station is appropriate. Prepare plans on 24" x 36" sheets and specifications on 8½" x 11" sheets. Specification sheets should be bound. Use an appropriate scale no smaller than 1 inch = 20 feet, unless a smaller scale is warranted and approved by the VOW in advance of plan submittal. The scales used should be the same as on a standard engineer's scale. Vertical Profile shall be in a scale of the Plan Horizontal Scale divided by 10.

- 2.2.** Clearly show phase lines and match lines as appropriate. Include an overall site plan or key sheet as part of the plan set, and include a key map on each sheet with that portion of the project identified for clarity.
- 2.3.** Use VOW standard details as required. Details are available in PDF format on the Village's website. Limit sheets to maximum eight (8) details per page.
- 2.4.** Avoid placing watermains under storm drains, drainage ditches or sewers.
- 2.5.** Call out all utility crossings with existing and/or proposed mains. Label bottom of top pipe and top of bottom pipe elevations and show the difference. If more than two pipes are crossing, show all data as required.
- 2.6.** Profiles are required for all pressure pipe mains and gravity sewer mains (show all crossings). Provide a space as required to label "as-built" information at 100' intervals or more frequently as may be required. Profiles are also required for off-site watermain, gravity mains and sewer force mains.
- 2.7.** Place gravity sewer data, including rim elevations and pipe inverts, and distance between manholes on both profile and plan sheets. If the profile resides on the same plan sheet (plan and profile), then the information can be shown one time in the plan or profile view. Keep the information consistent on all sheets.
- 2.8.** Avoid placing piping outside of road right-of-way areas. Easements are required for all facilities, which fall outside of road right-of-ways.
- 2.9.** Avoid placing manholes and sewer mains out of pavement areas. Where unavoidable, sewers shall be C-900 PVC per the APL. In those cases, manholes shall have a concrete collar.
- 2.10.** No manhole inside drops greater than two (2) feet are allowed. Drops over two (2) feet require an inside drop, minimum five (5) feet diameter manhole. If a drop is proposed on an existing manhole, an outside drop may be required, or the manhole may need to be

replaced. All drop manholes, existing or proposed are required to be coated with a product as listed on the APL.

- 2.11.** Provide meter and service line requirements, including supporting calculations and historical data, if applicable. The VOW will use the AWWA Publication, M22 "Sizing Water Service Lines and Meters" as a guideline for establishing meter and service line sizes.
- 2.12.** Specify details for all connections to existing facilities. In many cases, it may be necessary to show well beyond the project area to identify existing valving as required to operate the system.
- 2.13.** All drawings submitted shall be neat and legible and shall conform to acceptable standards of drafting. Cloud all revisions on the plans, and note all revisions in the revision block.
- 2.14.** A currently registered Florida Professional Engineer, in the appropriate discipline, shall sign and seal each set of plans submitted along with supporting calculations and applicable permit applications.
- 2.15.** All material specified to be installed should be new and unused.
- 2.16.** Watermains shall be extended across the full width of the property frontage. Exceptions to full frontage extension shall be considered if all of the following are applicable:
 - 2.16.1.** Fire protection is not requested or required by the applicable Fire Marshall.
 - 2.16.2.** If a fire hydrant is not more than 500' as the hose lies from the proposed structure.
 - 2.16.3.** There are no existing watermains within 100' of each end of the property (along the property frontage).

SECTION 3 WATER SYSTEMS – POTABLE WATER DESIGN

3.1. General:

There shall be no physical connection between an active Potable Water supply and an unapproved water supply, or any reclaimed water, wastewater or storm water system, which would allow unsafe water to enter, or backflow into the active Potable Water system by direct pressure, vacuum, gravity or any other means. All Potable Water services shall be in compliance with all applicable cross connection control regulations. All brass in contact with Potable Water shall be "Lead Free".

Design standards for Potable Water mains (WM) are as follows (Raw water mains shall be designed and constructed to Potable Water main standards):

3.2. Minimum Cover:

Design finished grade over WM shall be 36" minimum (30" is acceptable with DIP except for pipes under proposed/existing pavement in public rights-of-way) and 60" maximum. All Potable Water transmission mains within major thoroughfare rights of way shall have full plan and profiles shown. Pipes shall be designed to be as level as possible to avoid high points. Reduced minimum cover requires prior approval.

3.3. Minimum Horizontal Separation (Wall to Wall):

- 10' to buildings, exfiltration trenches, roof overhangs, canopies, walls, fountains, and other structures.
- 10' to Wastewater lines (Min. 6' may be approved in special cases)
- 10' to drainage pipes (Min. 3' may be approved in special cases).
- 8' to power poles, light poles and other public utility lines
- 3' to drainage structures and reclaimed water lines

3.4. Vertical Separation:

- 12" separation between all pipes should be maintained. A minimum of 6" vertical separation is acceptable, however, if it is not possible to maintain 12" and if the water main crosses over a storm or wastewater gravity main. When there is no alternative to the water main passing under a storm or Wastewater main, and when the water main crosses over or under a reclaimed water main, or force main, a minimum of 12" vertical clearance shall be maintained.
- WM shall cross over other pipes unless not feasible.

3.5. Layout:

- The Potable Water mains shall be looped unless otherwise not feasible. Multiple feed lines may be required at discretion of the Department. Permanent “Dead Ends” are not acceptable unless unavoidable. Dead Ends shall be equipped with a blow-off for flushing or automatic flushing devices to maintain water quality.
- WM should be placed in ROWs or dedicated common tracts whenever possible. Placement of WM 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 shall not be placed in ditches, landscape buffers, wetlands, or storm water management areas unless specifically approved by the Department.
- Details of connections to existing facilities must be shown. A reverse tap due to pre-existing conditions are acceptable only if approved by the Department (detail drawing required).
- In order to facilitate Potable Water service for all properties within the service area, Potable Water mains shall be extended along the full length of all fronting boundaries of a property by the Developer/Owner requesting Potable Water service and may be required to be extended through the property if another is to be served in the future.
- Loop Potable Water main to existing Potable Water mains or leave provisions for looping or extension whenever possible. The mains in such instances shall end with a valve and plug. Water mains 16” and larger shall end with a teed off fire hydrant, inline valve and plug. The valve shall be mechanically restrained. Approved permanent “Dead Ends” shall be terminate with automatic flushing devices.
- Sample points as required by the Health Department must be shown on plans.

3.6. Water Main Material:

Special Thickness Class Rated Cement Lined Ductile Iron Pipe (DIP) is required for all watermain construction. 3”-12” shall be special thickness class 51, and 14”-30” shall be special thickness class 52. All fire line related piping shall be special thickness call 53. The cement mortar lining and sealant for DIP shall be factory applied in accordance with the manufacturer’s specifications and shall be warranted by the pipe manufacturers. Unless specific approval is granted, no water main shall be encased in concrete. Potable Water mains shall be marked with one continuous strip of 6” wide magnetic blue coded tape imprinted with two (2) inch high lettering reading "Caution - Potable Water Line Buried Below", and located approximately twelve (12) inches above the crown of the pipe. The wording shall occur every three (3) feet. Buried DIP smaller than 24” shall be painted with a 4” wide continuous blue line parallel to the axis of the pipe and that is located on top of pipe. Buried DIP 24” and larger shall have a 4” wide continuous blue line applied along each side of pipe as well as along the top of pipe. The coating shall be minimum eight (8) mils WFT, and minimum three (3) mils DFT.

Watermain criteria shall be as follows:

- Within 10' of Wastewater/ storm/reclaimed water pipes for parallel installation.
- Within 15' of structures, (near side of concrete footing), and top of bank of canals or lakes.
- Crossings over Wastewater, reclaimed water and storm pipes with less than 12" separation with no joint within 10' of each other; crossings under any Wastewater, reclaimed water or storm pipe.
- Jack and bores (mechanical joints with "Megalugs" or equal).
- Potable Water mains for fire sprinkler system connections up to point of service.
- Fire hydrant branches.
- The right is reserved to mandate DIP in any instances of off-site or on-site construction where future damage to the line is possible due to location or circumstances, or in private property away from dedicated ROWs.
- Flanged ductile iron pipe is required for exposed (not buried) installation.
- Ductile iron pipe shall be polywrapped if buried closer than 10' to other underground iron/steel pipes if no other protection is provided.
- Water main with less than 36" cover over pipe.
- Where required for locations with substandard separations to other piping systems.

3.7. Water Main Size:

The WM shall be sized by the developer's engineer as required. The Department's Master Planning may require a greater diameter.

The minimum size of WM shall be 6". Four-inch (4") mains may be proposed for non-fire hydrant lines serving cul-de-sacs where additional development will not occur. The engineer may be required to demonstrate the adequacy of such sizing. In cases where the completion of gaps in the Potable Water systems to meet flow requirements of the development is necessary, the developer shall construct the required improvements. Delivered flows shall meet peak domestic requirements as mandated by State DEP plus fire flow as mandated by the Fire Marshall. The residual pressure under these conditions shall not be less than 20 psi. Potable Water Main sizes shall conform to the latest Department Potable Water Master Plan.

3.8. Valves Fittings and Appurtenances:

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 less than the number of pipes forming the intersection.

All valves shall have mechanical joint or flanged ends and be of resilient seat design with right hand closed operation; all valves shall be gate valves unless another type of valve is approved in writing by the Department. Valves shall be certified for buried service if applicable. Valves 24" and smaller shall be rated min. 150 psi. Larger valves shall be rated min. 200 psi. Inline valves shall be installed for mains 16" and smaller near each side of a canal crossing and/or major road crossing.

In-line valves shall generally be installed at intervals no greater than 1,000 feet on transmission mains, at intervals of no greater than 700 LF on main distribution loops and feeders, and on all primary branches connected to these lines. 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 location. Valves placed in curbs will not be accepted. When located in traffic areas, valves shall be placed in center of traffic lanes. All valves require lids and must be marked "water". All valves shall be numerically identified on construction drawings.

Clearance of 36" shall be maintained between all fittings (bells, valves, saddles, flanges, etc.). 18" clearance is allowed from bells, valves, etc. to double strap tapping saddles for water services.

Air Release Valves - Air release valves shall be installed at all canal crossings and at high points. Air release valves shall be sized per manufacturer's recommendations.

All fittings, bends, crosses and caps shall have mechanical joint or flanged ends unless an approved flexible joint restraint system is used. Approved electronic markers are required at all fittings and services.

3.9. Thrust Restraints:

- All bends, tees, crosses, reducers, valves and dead ends shall be restrained through an approved means of mechanical or approved flexible joint restraint. Thrust blocks consisting of poured-in-place concrete having a minimum compressive strength of 2,500 psi after 28 days cure may be utilized only with prior approval for connections to existing un-restrained piping. Any line terminated as a construction phase that is a known future extension, shall have a plugged valve placed at the end, and restrained with approved mechanical or flexible joint restraint.
- An adequate number of pipe lengths shall be restrained using approved mechanical joint restraints (MJ pipe), flexible joint restraints (DIP push-on joint pipe) or pressure pipe bell restraints (PVC [existing] or DIP push-on joint pipe) to handle 150 psi working pressure and 250 psi surge pressure. Pipes larger than 24" shall be restrained and pressure tested to 200 psi. If the restraint pipe length on a design deviates from the standard length listed herein in the restrained pipe lengths shall be designed by a Registered Engineer based upon the soil conditions and shall be shown on the design drawings and record drawings.
- If flexible joint restraints are utilized, the following requirements must be met:
 1. The installation of flexible joint restraints must be witnessed by a VOW representative.
 2. A copy of the material invoice must be available on the job site for review to confirm the shipment of restraining gaskets, etc.
 3. PVC/DI pipe transitioning from HDPE pipe shall be restrained as a minimum to "in-line valve" condition.

MIN. LENGTH OF PIPE (FEET) 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								200psi			
		4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"
90° HORIZ. BEND		14	20	25	30	35	45	54	62	98	112	124	135
45° HORIZ. BEND		6	8	11	13	15	19	22	26	41	46	51	56
22.5° HORIZ. BEND		3	4	5	6	7	9	11	12	19	22	25	27
11.25° HORIZ. BEND		1	2	3	3	4	4	5	6	10	11	12	13
90° VERT. OFFSET	UPPER BEND	29	41	53	64	74	95	115	134	214	246	276	304
	LOWER BEND	7	10	13	16	19	25	30	35	57	66	74	83
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56	89	102	114	126
	LOWER BEND	3	4	6	7	8	10	12	15	23	27	31	34
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27	43	49	55	60
	LOWER BEND	1	2	4	4	4	5	6	7	11	13	15	16
11.25° VERT. OFFSET	UPPER BEND	3	4	6	7	8	9	11	13	21	24	27	30
	LOWER BEND	1	1	1	2	2	2	3	3	6	6	7	8
PLUG (DEAD END)		32	45	59	70	83	107	129	151	214	246	276	304
IN-LINE VALVE		32	45	45	45	45	55	65	80	110	125	140	155
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	208	-	-	-
	36"X ø	1	1	22	39	54	80	103	124	206	240	-	-
	42"X ø	1	1	15	33	49	77	100	122	205	239	270	-
48"X ø	1	1	7	27	44	73	97	120	203	238	269	298	
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	-	-	-	-	-
200psi	30"X ø	209	204	197	188	177	153	116	75	-	-	-	-
	36"X ø	243	236	233	226	217	196	168	135	74	-	-	-
	42"X ø	273	270	265	259	252	234	211	183	133	72	-	-
	48"X ø	301	298	294	289	283	268	249	226	183	131	71	-

NOTES:

- THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:
 SOIL TYPE-SAND TEST PRESSURE-150 PSI/200 PSI DEPTH OF BURY-3'
 TRENCH TYPE-3 SAFETY FACTOR- 1.5 VERTICAL OFFSET-3'
 MINIMUM PIPE LENGTH ALONG TEE RUN-5'
- THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
- ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
- RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.
- MULTIPLY PIPE LENGTH BY 1.4 FOR POLYETHYLENE ENCASED PIPE.
- RESTRAINED PIPE LENGTHS EQUAL TO AN "INLINE VALVE" CONDITION ARE REQUIRED AT EACH END OF A TRANSITION FROM HDPE PIPE TO OTHER PIPE MATERIALS.
- DESIGN ENGINEER IS RESPONSIBLE TO PROPERLY SIZE THE RESTRAINT PIPE LENGTHS FOR THE PROJECTS.

Notes:

The data in the above table are based upon the following installation conditions:

- Soil Type – Sand
 - Test Pressure – 150 psi up to 24", 200 psi for pipes larger than 24".
 - Depth of Bury – 3'
 - Trench Type – 3
 - Safety Factor – 1.5
 - Vertical Off-Set – 3'
 - Minimum pipe length along tee run – 5'
1. The restrained pipe lengths apply to PVC pipe and DIP without polyethylene encasement.
 2. All joints between upper and lower bends shall be restrained.
 3. Restrained pipe lengths apply to pipe on both sides of valves and fittings.

The above table shall serve as a general design and construction guide only. It is the Engineer's responsibility to justify and document any deviations from the pipe lengths specified in the above table.

3.10. Fire Hydrants and Fire Sprinkler Systems:

The appropriate Fire Marshall has final jurisdiction on fire flow requirements, on hydrant locations and fire sprinkler system requirements. A Fire Marshall approved plan is required with each first plan submission and with any revision that relocates a hydrant or a fire line connection. An approved above ground Reduced Pressure Principle Detector Assembly (RPDA) shall be installed prior to Service Activation on all dedicated fire lines. Ames Cotl 500 is required for a VOW owned devices. Refer to the APL for a complete list of approved products.

Fire Hydrants:

Fire hydrants shall be provided in all Potable Water distribution systems and shall have a 5-1/4" main valve. Each hydrant shall be equipped with approved locking caps (with chains). The caps must be installed prior to water system certification. Fire hydrants shall be spaced such that the radius of protection will not be more than 300', or as approved by the Fire Marshall. For new developments, water distribution system shall be capable of delivering a minimum fire flow of 1,000 gallons per minute for residential areas, and 1500 gpm for non-residential areas (or a higher flow as required by the Fire Marshall), with a residual pressure of not less than 20 psi. Multiple fire hydrants with looped mains and/or larger main sizes may be required to provide adequate level of fire protection for projects with higher flow demand. Flow tests shall be performed to verify the specified fire flow demand prior to final DEP certification.

Fire hydrant branches (from main to hydrant) shall not be less than 6" ID and be as short as possible to minimize any potential for a Potable Water main with no flow. Each branch shall be restrained and provided with a gate valve. Hydrants shall be located minimum five feet from edge of road pavement with raised curbing and no less than three (3') feet from driveways with the pumper discharge nozzle facing the roadway. Hydrants shall be located so as to minimize their vulnerability to traffic. Bollards shall be shown on the design plans and installed where required. Bollards are not allowed within "Clear Zones" in thoroughfare plan roads. On transmission mains, fire hydrants shall be spaced as required by the Fire Marshall and to serve as sample points for bacteriological testing.

Fire hydrants shall be placed in an accessible, unobstructed location with 7.5' clearance in all directions. Fire hydrants shall be numerically identified on construction drawings. All new fire hydrants to be owned and maintained by the Department must be in the Right-of-Way or a dedicated easement as required. New private fire hydrants and fire mains require PBC Fire Marshall approval. Private hydrants and mains must be maintained by the owner. The system is required to have an annual service agreement a licensed fire sprinkler professional and be certified in good operational condition. The results shall be submitted to the utility department. All privately owned dedicated fire hydrant lines shall be separated from Department owned water mains by a privately owned RPDA.

Fire Sprinkler System Connections:

Residential fire sprinkler systems (NFPA type 13d). There shall be no separate service connection to the potable water system. The sprinkler system shall be connected to the domestic water service line on the customer side of the water meter. A minimum 1" water service line and a minimum 1" meter are required to assure adequate flow rate. As a minimum, an RPDA is required at the Point of Connection of the fire line into the domestic service line to prevent backflow. It is the property owner's responsibility to obtain any necessary permits and certifications for the fire sprinkler system.

NFPA type 13r fire sprinkler systems. Fire sprinkler system branches shall be minimum 4" ductile iron pipe up to Point of Service. Closed dedicated fire sprinkler connections shall require as minimum backflow prevention device an RPDA. Sprinkler systems with pressure/storage tanks, booster pumps, chemical additive injection systems, and/or auxiliary water supply connections also require an RPDA. Pressure testing and inspection of the Department's water distribution system shall be performed as a minimum up to the valve designated as the Point of Service (see Standard Detail). The VOW point of service is the suction side of the RPDA. The Property Owner is responsible to perform the initial testing and certification of the backflow prevention assembly prior to Service Activation. A VOW representative must present to witness the initial testing. All subsequent tests and annual certifications are also the responsibility of the Property Owner. There shall be no pipe joints or any service connections between the point of fire service valve and first 90 degrees bend leading up to the backflow prevention assembly. The design shall minimize any potential for Potable Water main with no flow.

The design and construction of privately owned fire lines shall conform to the applicable Fire Marshall standards pertaining to dedicated fire sprinkler systems (i.e., the installation of tamper switches and post indicator valves may be required).

3.11. Water Service Lines and Taps:

Potable Water service taps on the main shall be spaced at a minimum distance of 18" apart or greater, as shown on details. All services shall be ENDOT ENDOPOLY (black) per the APL. Services shall be installed in accordance with the construction details of this manual and shall have corporation stops. Refer to the standard details for the appropriate tap size for the meter size required. The threaded area of a corporation stop shall be spiral wrapped with two wraps of Teflon tape. The corporation stop shall not be bottomed out (1-3 threads remain showing).

Services shall not exceed 100' to the meter. Services crossing under parking tracts shall have their meters placed prior to the crossing so that the Department is not responsible for these lines.

In developments where the property line is not clearly defined (condominiums and commercial), the meter shall be placed in a readily accessible location. Service lines under driveways and roadways shall be sleeved in Schedule 80 PVC or HDPE Pipe. See the standard details for appropriate sleeve sizing. Service taps under driveways and roadways shall be avoided whenever possible.

For water meter installations within nonexclusive utility easement paralleling a road right-of-way, the control valve shall be located a maximum of 18" from the right-of-way line and the meter box shall not extend into the easement by more than 48" from the right-of-way line.

Private services shall not cross Potable Water mains unless specifically identified on plans and approved by the Department. The Developer shall coordinate the installation of private service lines with location of meters to deliver Potable Water to the correct multi-family dwelling unit or bay and shall identify each to the Department. The water meter location shall match the site plan layout to eliminate service line crossings.

Wet Taps equal or larger than one-half the pipe's diameter require a tapping sleeve. VOW service area includes multiple material types of existing watermains. Different sleeves are required depending on the type of pipe material being tapped. Refer to the APL for the appropriate tapping sleeve. No size on size taps are allowed.

3.12. Meter Installation:

General requirement - Construction plans shall include a typical meter installation detail for each size meter to be installed. Service line and meter sizes must be shown on the plans. Dual metering of a single building service (i.e., two 1" meters instead of one 2" meter) shall not be permitted. The proper sizing of meters and service lines is the responsibility of the developer's engineer. Meters will be available in the following sizes only: 5/8" X 3/4", 1", 1-1/2", 2", 3", 4" and larger sizes as necessary. Meter boxes for 2"

and smaller meters are standard. A bypass will be required for meters 3" and larger (see details).

All applicable Service Initiation Fees must be paid to the Department prior to meter installation, and all meters will be installed by the Department. All service piping, valves, lids, boxes and required backflow prevention assemblies/devices must be built in accordance to these standards prior to meter installation. Generally, the Department will not install services for meters 3" and larger.

The meter location and layout shall be determined prior to plan approval. Commercial establishments with Grease Traps, Oil/Grease Interceptors and/or Sand/Oil Interceptors shall be individually metered through the Department.

Consideration shall be given to the plumbing system in master metered projects, so water service can be provided individually in the future, if so desired or required.

3.13. Meter Boxes:

- All meter boxes and lids shall display the manufacturer's name.
- All meter boxes shall display the date of manufacture.
- Traffic rated boxes and lids are required for all boxes in hardscaped area.
- Meter box lids to be "RF" compatible.

Location requirement - Meters shall generally be set in grass area generally at or near a common property line unless shown otherwise on approved plans.

Meter boxes for "zero lot line" properties shall be set in grass area as close as possible to a common property line. An installation detail shall be added to each plan sheet.

When no alternative is available, a meter will be allowed in paved area and:

- Top of box shall be flush with surface located outside of drainage flow lines (i.e., dry surface area).
- Meter box shall be placed out of a common traffic area. Bollards may be required under certain conditions.
- Meter box and lid shall meet the requirements of Tier 15 minimum load rating (ANSI) for incidental traffic.
- A 12" thick compacted rock base (3/4" washed rock) shall be required under the meter box to prevent settlement. The base shall extend minimum 12" beyond the perimeter of the meter box.

Locations for meter boxes and control valves shall be selected to be accessible and provide the "minimum unobstructed space" shown on applicable details. Meter boxes shall be installed in grass areas whenever possible and shall not be installed in pedestrian walkways, driveways or inaccessible areas:

- Minimum 12" horizontal separation is required between front edge of electrical transformer pad or its projection and back edge of water meter box.

- The Developer and/or his representative shall be responsible for coordination of locations of services.
- Meter/service will not be installed/activated until:
 - (1) Driveway, sidewalk and/or form boards for same are in place.
 - (2) A Wastewater lateral connection inspection was conducted.
 - (3) "Minimum unobstructed space" is provided as shown on applicable details.
 - (4) The required backflow prevention assembly/device is installed and has passed the initial testing (if applicable).
 - (5) A signoff from the applicable Building Department has been obtained for a residential fire line (NFPA Type 13d).
- Minimum 5' horizontal separation is required between Potable Water service line and Wastewater lateral.
- **Please note:** that minimum 1" meters are required for services with NFPA Type 13d residential fire lines.

Meters shall not be placed in areas that can be fenced, such as backyards, under any circumstances. Double boxes shall be used whenever possible for 5/8" X 3/4" meters with 3/4" fittings on or as close as possible to a common property line.

In cases where Potable Water, Reclaimed Water and Wastewater lines have been constructed and a developer replotted the development or relocated structures, the Department shall require that services, which cannot be reasonably adjusted, be removed and plugged at the main.

If the number of services removed is excessive, the entire line may be required to be replaced. A reasonable adjustment is considered to be less than three (3) feet laterally. Any adjustments/reconstruction shall be regarded as having to meet all new construction requirements.

3.14. Backflow Prevention Assemblies/Devices for Potable Water Services:

Backflow Prevention Assemblies/Devices shall be provided on all projects for prevention and control of cross-connections. All nonresidential services, services for buildings with more than three stories, and residential services with 1 1/2" meters or larger shall have a Reduced Pressure Principle Backflow Prevention Assembly. There shall be no service connection between the Backflow Prevention Assembly/Device and meter assembly.

All applicable Backflow Prevention Assemblies/Devices must be installed by the Developer/Customer prior to Potable Water meter installation. The installation of the assembly/device must follow the manufacturer's guidelines. The assembly/device must be easily accessible and have a minimum of 3' clear space around it. The assembly/device shall be located as close as possible to the Point of Service. Except for water services for Department facilities, the testable Reduced Pressure Principle

Backflow Prevention Assembly will remain the property of the Customer, who shall also be responsible for installation, operation, maintenance, and testing of the assembly following Service Activation. Multiple parallel installed backflow prevention devices shall be designed for potable water connections where service continuity is of utmost importance (for example, schools, treatment plants, etc.). In cases where a Reduced Pressure Principle is required, the Property Owner shall perform the initial testing of the assembly and certify the installation for compliance. A VOW representative shall be present for all such testing.

SECTION 4

WATER SYSTEMS – POTABLE WATER MAIN CONSTRUCTION

4.1. Installation:

Installation of Potable Water pipe and associated fittings shall be in accordance with current AWWA and NSF standards and manufacturers' requirements for their particular products. All mains shall have a minimum of 36" clear cover to finished grade unless specifically approved otherwise, subject to pipe material limitation, with the pipe installed as level as possible.

Approved pipe joint restraint shall be required at each fitting involving a change of direction and as specified in plan details. Approved electronic markers are required at all fittings and services. The contractor shall be responsible to ensure that all safety requirements are met with respect to construction.

Changes in pipe alignment may be accomplished using appropriate fittings or through pipe deflection. Pipe deflection at the joint is allowed with ductile iron pipe. The deflection shall not exceed 75% of the Manufacturer's recommended maximum joint deflection. All pipes shall be laid in trenches having a dry and stable bottom. Backfill shall be free of boulders and debris. 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.

Fire hydrants shall be installed with the center of the pumper nozzle approximately 18" above finished grade. Hydrants shall not be placed in sidewalks or traffic areas. It will be the responsibility of the developer to move hydrants placed in an unacceptable location and provide protection from traffic damage if necessary, upon the Department's request. Fire hydrants must be ordered red in color. Fire hydrants must be clean and have a glossy red finish when accepted by the utility. If painting is required, all oil, grease, dirt, salts and other contaminants must be removed. Two coats of approved paint to be applied by brush per manufacturer's specification for a DFT of at least four (4) mils per coat.

All valves shall be placed according to plans unless relocation is approved by the Department. Valves shall not be placed in curbs or gutters or in designated parking spaces and shall be accessible at all times. As-built drawings shall reflect the actual location of all mains, hydrants, services, mechanically restrained pipe and valves. All service taps and testing taps must be at least 18" from a fitting or bell. Potable Water mains shall not be laid in fuel contaminated areas.

All road crossings, pavement cuttings and restoration shall be in accordance with the requirements of the particular authority governing the area.

4.2. Connection to Existing System:

All connections to existing Potable Water mains shall be made under the direct supervision of the Department. Valves on existing Potable Water mains shall be operated by the Department personnel or under direct supervision of the Department. The contractor shall confirm the compliance of the existing facilities with the Standards and, modify the facilities, if required, at no cost to the Department, prior to connection. The added restraint must be designed by the Project Engineer subject to approval by the Department. Tapping sleeve and valve shall be pressure tested prior to tapping. Insertion valves or temporary line stops may be required in order to eliminate service interruptions.

If service must be cut off to existing Customers, the Department must have minimum ten (10) days notice to make necessary notifications. The contractor or developer 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 may have to be made at night to minimize effects. No Customer should be without service for more than two (2) hours. Local chlorination will be required for all pipe and fittings used to complete connections with existing potable water main.

4.3. Cleaning and Flushing:

Foreign material shall be kept out of pipe or cleaned from pipe prior to installation. The ends of pipe installed during one day shall be capped at the end of each day with pipe plugs to prevent contamination. Upon completion of installation and initial disinfection, the mains shall be flushed with potable water and the water disposed of without creating a nuisance. Bypass piping is required for filling and initial disinfection. The existing potable water main valve shall remain closed during the filling and initial disinfection. Bypass piping shall include a minimum of two (2) single check valves and a water meter as required to account for all water used. The contractor is responsible to obtain a construction meter through the customer service department. A tee with pressure gauge shall allow for chlorine injection during filling and disinfection. A metering injection pump shall be used to ensure a minimum of 50-ppm chlorine level. After the pipe is disinfected, the existing valve and the tie-in valve in the potable water main shall be cracked open to allow for flushing. A Department Inspector shall witness the filling and flushing through the main pipe.

4.4. Testing:

Bacteriological Testing:

New water mains shall be bacteriologically tested prior to pressure testing unless "alternate" testing sequence is approved by the Department. The "alternate" testing procedure allows for pressure testing ahead of bacteriological testing, and requires double valving with a pressure gauge installed between the valves.

All new Potable Water mains shall be tested for bacteriological acceptability by a certified laboratory and pressure tested using Potable Water. Sample points are required. Fire hydrants shall be used as sample points whenever possible. Bacteriological testing is generally required for any work involving a connection to the potable water system. Bacteriological testing is required in order to certify the newly installed Potable Water main to the Health Unit. The test results must be certified by the Department and FDEP as required within 60 days of sampling. EOR submitting documents shall factor in review time for approval and signatures as required to maintain project schedule without expiration of samples. Only "construction meters" (hydrant meters) may be installed with "construction only release" from the Health Unit. The water through construction meters shall be considered non-potable and shall not be used for drinking or consumption purposes. "Construction water" may be used for non-potable applications such as temporary irrigation, testing of internal plumbing systems, flushing toilets in model homes, construction trailers and/or sales trailers. The Developer shall post "Non-Potable Water – Do Not Drink" signs at all water outlets served with construction water.

Pressure Testing:

New water mains may be required to be pressure tested before and/or after the "construction water release" is received, record drawings, and fire flow tests are approved by the Department. The road rock/base and "tack coat" shall be installed prior to pressure testing of water mains within road rights-of-way. Potable water shall be supplied to the main and pumped to 150 psi or 200 psi for pipes larger than 24".

The maximum length of line to be tested as one section will be 2,000 feet. HDPE pipe segments shall be pressure tested separately from other pipe material. The test shall be performed as determined in the current AWWA specification subject to specifications as listed below. The standard test duration is two (2) hours. The maximum quantity of make-up water that must be supplied into the tested pipe to maintain pressure within 5 psi of the specified test pressure shall not exceed 50% of the applicable AWWA C-600 Standard. The make-up water for pressure testing shall consist of ½ ounce of 5% sodium hypo chloride per one gallon of Potable Water. If the pressure test fails, or if the water main pressure drops below 20 psi after the initial bacteriological tests were conducted, the bacteriological tests must be repeated before a request for "full release" certification is issued to the Health Unit.

Fire Hydrant Flow Testing:

A flow test to verify the fire flow rates shall be provided by the Developer on all new fire hydrants prior to the project's final HRS Certification and after "construction water only" clearance is obtained from the Health Department. The fire flow test shall generally be performed by the Fire Marshal. The Fire Marshall may accept test results for residential projects performed by a contractor when witnessed by a utility inspector. Only accurate, calibrated pressure gauges (0-100 psi) shall be used for testing. The gauges must "zero

out” at the end of the test. The flow tests shall be witnessed by the Department following the procedure as outlined below:

- (a) Make provisions for minimizing interruptions to traffic and for adequate drainage of water.
- (b) Locate the residual hydrant and do the following:
 - Flush the residual hydrant to eliminate sediment that may damage the gauge. (Always open and close hydrants SLOWLY to minimize water hammer).
 - Install the outlet-nozzle cap equipped with the pressure gauge on a hydrant nozzle. A “Defuser” shall be used to minimize damage to landscaping, etc.
 - Open the main valve slowly until the air is vented, close the vent and open the main valve fully.
 - Read the gauge. This is the static pressure reading.
- (c) Conduct the flow test as follows:
 - Station one person at the residual hydrant and one person at each test hydrant.
 - Open each test hydrant SLOWLY until it is fully open. Open one hydrant at a time to avoid a pressure surge.
 - When the pressure at the residual hydrant is stabilized, the person at the residual hydrant signals the person stationed at the test hydrant to take the reading. The readings for residual pressure and flow rate readings of each flow hydrant must be taken simultaneously. The air should be exhausted from the flowing hydrant before the reading is taken.
 - Record the residual reading and the flow reading at each test hydrant. Then SLOWLY close the test hydrants one at a time.

For accurate test results, the pressure drop between the static and the residual pressures should be at least 10 psi. If the pressure drop is less than 10 psi, an additional test hydrant should be added to the test.

Plot the flow results in the field utilizing appropriate graph so that if the results appear in error, the test can be repeated immediately. Any inconsistencies in flows shall be verified and corrected (if necessary) prior to final water system certification.

The cumulative fire flow rate at 20 psi shall equal or exceed the minimum fire flow rate required by the Fire Marshall.

Backflow Prevention Assembly Testing: The Property Owner shall perform the initial testing of the assemblies and certify the installation and operation for compliance prior to Service Activation. A VOW representative shall be present for all testing.

4.5. Disinfection:

All Potable Water mains shall be disinfected in accordance with AWWA standards and Palm Beach County Public Health Unit regulations. Samples will be taken from all sections of main and a clearance is required from the Health Department before the main can be put in service.

4.6. Abandonment in place of existing watermain:

All efforts shall be made to remove existing watermains upon completion of new mains. Grouting and/or abandonment in place of existing watermains requires approval by the utility director. Any pipe to be abandoned in place shall be filled with grout. Pipe is to be shown on the as-built drawings. The grout mix shall be:

<u>Type</u>	<u>Pounds</u>	<u>Cubic Feet</u>
Cement	340	1.73
Sand	2840	17.91
Stone	0	0
Water	374	6.00
Admix/Type B	13 oz.	
Air 170 + 5.0%	1.35	

The slump shall be 6" + 1 inch, Admix 1 shall meet ASTM C-494 type BD. Alternative mixes will be considered.

4.7. Construction using horizontal directional drilling (HDD):

General:

Potable Water design and construction standards (Section 1, 2, 4) shall apply unless noted otherwise. The Department reserves the right to disapprove a horizontal directional drilling installation if the conventional open trench or jack and bore type installation is preferred by the Department, because:

- Excessive number of high/low points
- Excessive depth of pipe is of concern
- A casing is required by the Department to protect the utility pipe
- Future service and main connections to the utility pipe will be negatively impacted by a horizontal directional drilling

Pipe sizes, pipe material:

The horizontal directional drilled utility main shall be manufactured approved restraint joint DIP, PVC AWWA C-900 DR14, 200 psi, NSF 61 (4"-12") or HDPE pipe (SDR 11).

If the directional-drilled pipe is to be used as a casing for a small diameter service line (up to 2" diameter), PVC DR18 or HDPE DR 17 pipes are acceptable. Pipe and system components shall be free from voids, cracks, inclusions, and other defects and shall be uniform in color throughout the installation.

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 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"=10' vertical scale preferred). The plan must show:

- Finished grade and surface improvements
- Locations of drill set-up (bore pit and receiving pit)
- Length of bore
- Deflection and radiuses of the pilot bore
- Field verified locations of existing utilities and underground structures
- Minimum horizontal and vertical clearances from underground structures, conduits, piping systems (the proposed clearances must exceed the Department's standards plus the guidance system accuracy tolerance)
- Pipe size and specifications (including restraining provisions against "pipe shrinkage")
- Proposed pilot bore pipe deflection limits shall not exceed 75% of the maximum deflection allowed by the pipe manufacturer
- The drill radius of the final HDD pipe shall be minimum 30 pipe diameters, not exceeding 80% of the max. bending radius as recommended by 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
- Minimum pipe joint restraints at each end of pipe material transition from HDPE pipe
- Tracer wires
- Isolation valves and/or transition fittings/adapters

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 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. The Licensed HDD Contractor shall provide references certifying minimum five (5) years HDD experience.

Pilot Bore:

The Engineer shall schedule the beginning of work with the Department a minimum of 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).

A high accuracy MGS (Magnetic Guidance System) shall be capable to provide vertical pipe data with a max. + 2% deviation and horizontal pipe location data with max. + 2 foot deviation. The data shall be collected at max. 25' intervals. Deviation of more than + 2 feet vertically or horizontally from the approved pilot bore plan shall be reported immediately to the project engineer for evaluation. The Engineer shall evaluate the as-built data and confirm the compliance with the design parameters. Deviation beyond approved parameters (depths, deflection radius, and 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 if the "as-built" location differs substantially from the design plan.

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 maximum 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 butt fused/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 excessive deformed pipe or couplings shall be rejected. Two approved APWA color-coded HDD tracer wires shall be pulled along the sides of the product pipe, and extended to nearest valve boxes (coil min. 3' wire near the surface inside valve box).

The installation of the tracer wires is an essential part of the Horizontal Directional Drill process and the contractor shall use all reasonable means and methods to insure that

the tracer wires are pulled without breakage. However, accidental tracer wire breakage shall not be a reason to require a repeat directional drill unless specifically required in the project specifications.

The pipe shall be elevated to the approximate angle of entry and supported by roller arms or equivalent. Any field welding/fusion of HDPE pipe and fittings may be performed only by personnel certified through a pipe/fitting manufacturer approved training program.

Testing:

Pipe installed using the HDD method shall be flushed and pressure tested using Potable Water. The pressure within the HDPE Pipe test section shall be raised to approx. 160 psi and then allowed to idle for approximately 3 hours in order to allow to stabilize. Additional make-up water/pressure shall be applied during the 3-hour stabilization period only to maintain a minimum 140-psi pressure.

The final phase of the pressure test shall involve applying make-up water/pressure to achieve a test pressure of 150 psi or higher (as required). The test section is then allowed to idle (no make-up water /pressure is added) for a period of 2 hours. After this 2-hour period, make-up water/pressure is applied and measured to reestablish the test pressure. If the measured and added quantity of water is greater than the allowable amount, the pressure test fails. No leakage is acceptable.

Installed services, tees and stub-outs shall be pressure tested together with the main. Pressure test is not required if the installed pipe is intended to be used as a casing.

If the pipe successfully passed the pressure test, a connection to the existing pipe system may be performed. Bacteriological testing is required.

As-Builts:

Certified as-built drawings , CD or DVD with cadd files and PDF's, and all other DCA required documents must be submitted to the Department for review and approval prior to any final certification. The record drawings must be prepared in State Plane Coordinate System. "As-builts" must be prepared and signed and sealed by a licensed professional land surveyor or professional engineer.

SECTION 5

WASTEWATER SYSTEM DESIGN AND CONSTRUCTION

5.1. Wastewater System Design

Department and privately owned gravity Wastewater collection systems, pump stations, and force mains shall be designed to deliver peak flows under the following conditions:

Wastewater systems shall be designed on the basis of an average per capita daily flow of not less than 100 gallons and an average domestic flow of no less than 200 gpd per Equivalent Residential Connection. On that basis, lateral Wastewater piping shall be designed with capacities when running full of not less than four times the average flow. Trunk lines shall have capacities under the same conditions of not less than 2.5 times the average flow. Special flow assumptions shall be made in each case for Wastewater from commercial and industrial sites. For proposed projects connecting to existing gravity sewer system, the Department may require the Property Owner to design and construct, at no cost to Department, upgrades to existing lift station(s) serving the gravity system. The upgrades may include new pumps, control panel, valves, PLC, an emergency generator, corrosion barrier system, driveway and fence replacement, etc.

No person shall connect or cause to connect any roof downspout, exterior foundation drain, areaway drain, or other source of surface runoff or groundwater to a building wastewater service line or building drain which in turn is connected directly or indirectly to the VOW waste water collection system without prior approval by the Department. Floor Drains in rooms with Generators or other equipment with a possibility of a fuel spill shall not be connected directly into the sanitary sewer system. Unmetered condensation water from air conditioning units shall generally not be connected to sanitary sewer system. Dumpster pad areas are not allowed to drain into the sanitary collection system. The dumpster area must be graded such that positive drainage can be maintained to the storm water inlets. Can wash pads with floor drains connecting to the Department's wastewater collection system shall be designed to minimize surface runoff and to minimize solids to enter into the drain. The pad shall consist of a small-elevated area with the surrounding area to drain away from the pad. The drain shall be equipped with a removable cap or plug. The drain shall be connected to a Department approved Grease Trap for pretreatment prior to discharge into the Department's Wastewater collection system. Commercial and/or residential pools are not allowed to discharge into the Department's Wastewater collection system. An area on site must be graded as required to accept backwash or main drain discharge and percolate into the soil.

Industrial Wastewater from service station wash-racks, lubrication racks, car wash, repair shops or other commercial facility and shop floor drains shall not be connected into the wastewater collection system without pre-treatment through an adequately-sized Sand/Oil Interceptor (SOI) specifically approved by the Department. The residual wastewater shall be disposed of separately by the owner. No toxic, hazardous or discharge deleterious to the wastewater system shall be allowed to be discharged without a VOW approved pre-treatment program. Generally, no cooling tower water shall be discharged into the sanitary sewer system. This will also include any diluting of discharge other than that which meets pre-treatment standards. Wastewater dumping stations are not allowed to be

connected (directly or indirectly) to the Department's Wastewater Collection System. Each commercial facility where foods are prepared, processed or served and which generate grease laden waste such as restaurants, hotel kitchens, hospitals, school kitchens, bars, factory cafeterias, clubs, clubhouses, food take out places, bakeries, stores with food departments, etc., must include the correct size and number of grease traps as required by the department. The minimum grease trap size is 750 gallons. See standard details for specific information.

The Model number, capacity and the manufacturer's name of the Grease Trap or Interceptors shall be shown on the utility record drawings. The Grease Trap Interceptor shall be located outside of buildings, preferably in grass areas, minimum 10' from any Department owned facility, but not in traffic areas, parking spaces, walkways or storm retention areas. The rim elevation of the access point shall be designed to prevent any storm water inflow.

The Owner shall operate and maintain the pretreatment devices as required to insure optimum performance and to comply with the Department's discharge parameters.

5.2. Gravity Sewer System

Size and Layout:

The minimum allowable size for any Wastewater gravity main other than house service connection shall be 8" in diameter. See detail sheets for service laterals. Upsizing of Wastewater lines to reduce slopes will not be permitted unless justified by calculated flow. In order to facilitate Wastewater service for all properties within the service area, Wastewater gravity mains and force mains shall generally be extended along the full length of all fronting boundaries of a property by the Developer/Owner requesting Wastewater service, and may be required to be extended through the property if another is to be served in the future. Wastewater gravity mains shall not be placed in ditches, wetlands or stormwater management areas unless specifically approved.

Slopes:

All gravity Wastewater lines shall be designed with hydraulic slopes sufficient to give mean velocities, when flowing full or half full, of not less than 2 feet per second or more than 5 feet per second, based on an acceptable equation. Slopes shall be calculated using the distance from centerline of manhole to centerline of manhole.

The following minimum grades will be used for design:

- 8" gravity mains 0.42%
- 10" gravity mains 0.28%
- 12" gravity mains 0.22%

A 0.1 foot drop inside the manholes may be used to reduce the minimum slope for an 8" gravity Wastewater from 0.42% to 0.40%. Note: Maximum 2% slope is allowed for 8" pipe.

Increasing Size:

When Wastewater collection lines are increased in size, or when a smaller line joins a larger one, the invert of the larger pipe should be lowered sufficiently to maintain the same energy gradient.

Alignment:

Wastewater collection lines of all sizes shall be designed with uniform slope and alignment between manholes. A 15' distance shall be maintained from top of bank of canals, lakes and structures, unless unavoidable, in which case 10' shall be maintained with C900 PVC pipe. A minimum 10 feet horizontal separation is required to the edge of drainage fabric in exfiltration trenches.

Pipe Material:

Polyvinyl Chloride (PVC) 4"-15" ASTM 3034 SDR 26 with PVC SDR 35 fittings, 18" and up AWWA C905 DR25 with PVC C-900 PVC fittings, and epoxy lined Ductile Iron Pipe (DIP) shall be acceptable pipe material for gravity Wastewater lines. Unless specific approval is granted, no gravity Wastewater line shall be encased in concrete. PVC gravity lines within Wellfield Zones 1 and 2 shall be C900, DR-18 min. The lining for DIP shall be factory applied in accordance with the manufacturer's recommendations and shall be warranted by the pipe manufacturer. Ductile iron pipe shall be polywrapped if buried closer than 10' to other underground iron/steel pipes and if no other protection is provided. DIP pipe shall be used only if unavoidable.

DIP gravity sewer main with additional lining shall be specified in the following circumstances:

- Terminal manhole upstream from the lift station to the lift station wetwell.

PVC C900 DR18 Pipe shall be specified:

- When there is less than 4 feet from finish surface to the invert of the pipe. Four and one half (4 1/2) feet to invert shall be the standard minimum design depth. Less depth will not be accepted unless it is unavoidable and has prior Department approval.
- Any time the Wastewater line is separated horizontally (wall to wall) from a Potable Water Main by less than 10 feet (min. 6 feet is required) or other pipes by less than 5 feet (minimum 3 feet clearance is required).
- When the Wastewater line is placed out of a right-of-way, between buildings, under large diameter pipes, culverts, etc., along property lines or in areas subject to heavy landscaping.

- Minimum 5 feet (5') length of C900 PVC from each cored invert (i.e., not precast by manhole manufacturer).
- Any time a wastewater gravity main passes under or over pipes other than potable water mains with less than 12" clearance.

Wastewater Lines in Wellfields:

New or replacement installation of gravity Wastewater lines in protected zones of a public drinking water wellfield shall be constructed to force main standards.

Manholes:

Location: Manholes shall be installed at the end of each Wastewater system, at every change in grade, size or alignment, at all gravity Wastewater main intersections, and at distances not greater than 400' apart unless prior approval is obtained from the Department for a distance greater than 400'. Gravity Wastewater mains shall have no less than a 90 degree angle to direction of flow between runs. Manholes shall be placed in accessible locations, preferably in pavement, always flush to the surface. Manholes in roadway pavement shall not be located in wheel paths (i.e. structures shall be located centered in the travel lane, crown of road, paved shoulder or off the pavement). Manholes in designated parking spaces or other inaccessible locations will not be approved. A concrete collar shall be placed around manholes in grassed areas. The design depth of the manhole from rim elevation to invert elevation shall be no less than 4.5' and no more than 16', unless specifically approved by the Department prior to initial plan submittal. The Developer/Property Owner shall videotape all gravity mains and all corresponding laterals deeper than 10' prior to Wastewater system certification. All Wastewater mains (including stub-outs) shall end with a manhole. In "phased" projects pavement must be in place over stub-out runs minimum 5' past the end manhole. A rain guard is required on all manholes.

Inside Drop Manholes:

All inside drop manholes shall have a minimum diameter of 5'. An inside drop pipe shall be provided for a wastewater run designed to enter a manhole at an invert elevation of 2.0' or more above the outgoing manhole channel invert. There is no limit on the length of an interior drop pipe. No drop invert shall be in the cone section of the manhole. In cases where the elevation difference between the inverts is less than 2.0', a drop pipe is not required, but an interior drop channel shall be constructed to guide the flow into the outgoing channel. Manholes with a change in direction of flow of over 45 degrees and manholes with more than two (2) inverts shall have no greater than a 0.5' inside drop. No design should be submitted showing an incoming invert greater than 2.0' above the outgoing invert.

Flow Channel:

The manhole floor shall have a flow channel made to conform in shape and carrying capacity to that of the Wastewater pipes. The flow channel shall be field constructed

concrete formed to match inverts and flow direction of the influent and effluent pipes as required.

- Approved inflow protectors are required for all wastewater manholes.
- Suppliers shall certify that calcareous aggregate is used in the manhole concrete mix minimum CaCO₃ content: 65% in large aggregate, 50% in concrete screenings). Certification on the submitted shop drawings is acceptable.
- All new manholes, existing “tie-in” manholes and modified existing manholes shall be lined with an approved corrosion barrier system and inside manhole chimney sealant. New “Inside Drop Manholes,” manholes, last manhole prior to a lift station and manholes with a force main connection shall be lined with an approved as listed on APL.
- External Manhole Joint Seals must be applied between all precast manhole sections.

Service Connections:

Unmetered sewer gravity services: A collector service connection may not be directed into a manhole, unless approved on the construction plans. This is permissible only if it is treated as a Wastewater main, i.e. provide elevation, precast hole and flow channel, and no reasonable alternative is available. No service connection shall be made within 5' of any manhole. Wastewater laterals shall be located a minimum of 5' from water services, hydrants, blow-offs, light poles, power poles, catch basins, walls, fountains or other structures. The allowable length of Department owned service laterals shall be kept to a minimum (generally, less than 75'). All service connections must be leak-free using same methods and materials as for main lines. Cleanouts shall be shown on plans at the property/right-of-way line or other required locations to limit the Department's maintenance and ownership responsibility. Cleanouts ending the Department's maintenance responsibility shall be installed a minimum of 3' from back of curb, edge of driveway/pavement. For cleanout installations within a non-exclusive utility easement paralleling a road right-of-way, the cleanout shall be located a maximum of 18" from the right-of-way line. Unless otherwise specified, one cleanout at the property line is required for each wastewater service main connection. An inspection of connection into the Department's wastewater lateral is required prior to Service Activation. At the time of gravity Wastewater main construction and inspection, the cleanout connection shall be marked with a wooden stake. The required cleanout shall be constructed per the Department's Typical Cleanout Installation Detail prior to water meter installation. Service connections shall be typically one size smaller than the wastewater main.

Metered sewer flow service force main connections: Design shall include vault, piping, valves, magnetic flow meter rated for submersible service, control panel, power source and easements. By-pass piping may be required. To allow for meter service and calibration without service interruption.

5.3. Wastewater Force Mains

Force mains (FM) shall generally not be less than 4" ID and with an ultimate design flow velocity of no less than 2.0 FPS nor greater than 4.0 FPS. Force mains less than 4" in diameter will be approved on a case-by-case basis, with proper justification. Design standards for FMs will be generally the same as for Potable Water mains. FMs shall never enter a manhole from a direction contrary to the direction of flow out of the manhole. All private FMs entering a road right-of-way shall be built to the Department's standards past that point (usually at property line) and a valve shall be placed there to delineate the change in responsibilities and to control the flow.

Design standards for force mains are as follows:

Minimum Cover:

Design minimum cover to finished grade over FM shall be 36". Mains installed at depths of more than 60" without justification will not be accepted. Pipe is to be designed and installed as level as possible to minimize high points. Reduced cover requires advance approval.

Minimum Horizontal Separation (Wall to Wall):

- 10' to buildings, roof overhangs, canopies, walls, fountains, and other structures.
- 10' to Potable Water lines.(Min. 6' in special cases).
- 5' to other public utility lines.
- 8' to power poles, light poles and drainage pipes.
- 3' to drainage structures and reclaimed water lines.

Vertical Separation:

Minimum 12" separation between all pipes shall be maintained, with FM crossing under Potable Water mains and reclaimed water mains whenever possible.

Layout:

FM should be placed in ROW'S whenever possible. Placement of FM on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable. The Department may require the developer to extend the force main across the property for future connections. Use a friction coefficient $c=120$ for flow calculations and a maximum flow velocity of 3.0 fps to determine proper pipe sizing. Force mains shall not be placed in ditches, wetlands or storm water management areas unless specifically approved by the Department.

Valves and Appurtenances (FM):

Valving of all systems shall be designed to facilitate the isolation of each section of pipeline. All valves 3" or larger shall be gate valves of resilient seat design with right hand closed operation. For valves 16" and larger "Full Bore," eccentric plug valves may be used if approved in advance by the Department. Valves smaller than 24" shall be

rated a minimum of 150 psi. Larger valves shall be rated a min. of 200 psi. Air release valves are to be located at the high points of the force main (minimum size – 2”). In-Line valves shall be installed at intervals of no greater than 2,000 LF on transmission mains. In-line valves shall be installed for mains 16” and smaller near each side of a canal crossing and/or major road crossing. In all instances, effectiveness of placement shall be the primary criteria in determining valve location. Valves placed in curbs will not be accepted. Clearance of 36” shall be maintained between all fittings (bells, valves, flanges, etc.).

All valves shall have:

- a standard screw type valve box
- operator nuts centered in the valve box and plumb
- mechanical joint or flanged ends

Valve operator nuts located 36" or more below final grade shall be equipped with an approved mechanically connected valve extension. All fittings, bends, crosses, etc., shall have mechanical joint or flanged ends unless previously approved flexible joint restraint system is used. The use of 90 degrees bends shall be avoided whenever possible (use two 45 degrees bends or wye).

5.4. Thrust Restraint:

All bends, tees, crosses, reducers, valves and dead ends shall be restrained through an approved means of mechanical or approved flexible joint restraint. Thrust blocks consisting of poured-in-place concrete having a minimum compressive strength of 2,500 psi after 28 days cure may be utilized with prior approval only if necessary for connections to existing piping system using a tapping sleeve or a cut-in-tee. The size and placement specification for the trust block must be designed by the Engineer of Record and approved by the Department prior to installation. Any line terminated as a construction phase that is a known future extension, shall have a plugged valve placed at the end, and restrained with approved mechanical or flexible joint restraint.

An adequate number of pipe lengths shall be restrained using approved mechanical joint restraints (MJ pipe), flexible joint restraints (DIP push-on joint pipe) or pressure pipe bell restraints (PVC or DIP push-on joint pipe) to handle 150 psi working pressure and 250 psi surge pressure. The restrained pipe lengths shall be designed by a Registered Engineer based upon the soil conditions and shall be shown on the design drawings and record drawings.

If flexible joint restraints are utilized, the following requirements must be met:

- The installation of flexible joint restraints must be witnessed by the Department Construction Coordinator and the Engineer of Record.
- A copy of the material invoice must be available on the job site for review to confirm the shipment of restraining gaskets, etc.
- PVC/DI pipe transitioning from HDPE pipe shall be restrained as a minimum to "in-line valve" condition.

MIN. LENGTH OF PIPE (FEET) 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								200psi			
		4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"
90° HORIZ. BEND		14	20	25	30	35	45	54	62	98	112	124	135
45° HORIZ. BEND		6	8	11	13	15	19	22	26	41	46	51	56
22.5° HORIZ. BEND		3	4	5	6	7	9	11	12	19	22	25	27
11.25° HORIZ. BEND		1	2	3	3	4	4	5	6	10	11	12	13
90° VERT. OFFSET	UPPER BEND	29	41	53	64	74	95	115	134	214	246	276	304
	LOWER BEND	7	10	13	16	19	25	30	35	57	66	74	83
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56	89	102	114	126
	LOWER BEND	3	4	6	7	8	10	12	15	23	27	31	34
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27	43	49	55	60
	LOWER BEND	1	2	4	4	4	5	6	7	11	13	15	16
11.25° VERT. OFFSET	UPPER BEND	3	4	6	7	8	9	11	13	21	24	27	30
	LOWER BEND	1	1	1	2	2	2	3	3	6	6	7	8
PLUG (DEAD END)		32	45	59	70	83	107	129	151	214	246	276	304
IN-LINE VALVE		32	45	45	45	45	55	65	80	110	125	140	155
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	208	-	-	-
	36"X ø	1	1	22	39	54	80	103	124	206	240	-	-
	42"X ø	1	1	15	33	49	77	100	122	205	239	270	-
48"X ø	1	1	7	27	44	73	97	120	203	238	269	298	
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	-	-	-	-	-	-
200psi	24"X ø	146	140	132	131	111	82	45	-	-	-	-	-
	30"X ø	209	204	197	188	177	153	116	75	-	-	-	-
	36"X ø	243	236	233	226	217	196	168	135	74	-	-	-
	42"X ø	273	270	265	259	252	234	211	183	133	72	-	-
48"X ø	301	298	294	289	283	268	249	226	183	131	71	-	

NOTES:

- THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:
 SOIL TYPE-SAND TEST PRESSURE-150 PSI/200 PSI DEPTH OF BURY-3'
 TRENCH TYPE-3 SAFETY FACTOR- 1.5 VERTICAL OFFSET-3'
 MINIMUM PIPE LENGTH ALONG TEE RUN-5'
- THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
- ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
- RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.
- MULTIPLY PIPE LENGTH BY 1.4 FOR POLYETHYLENE ENCASED PIPE.
- RESTRAINED PIPE LENGTHS EQUAL TO AN "INLINE VALVE" CONDITION ARE REQUIRED AT EACH END OF A TRANSITION FROM HDPE PIPE TO OTHER PIPE MATERIALS.
- THE DESIGN ENGINEER IS RESPONSIBLE FOR PROPER SIZING OF RESTRAINT PIPE LENGTHS FOR THE PROJECT.

Notes:

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 Off-Set – 3'
- Minimum pipe lengths along tee run – 5'
- The restrained pipe lengths apply to PVC pipe and DIP without polyethylene encasement.
- All joints between upper and lower bends shall be restrained.
- Restrained pipe lengths apply to pipe on both sides of valves and fittings.

The above table shall serve as a general design guide only. It is the Engineer's responsibility to justify and document any deviations from the pipe lengths specified in the above table.

Force Main Materials:

Force mains 4"-12" shall be DIP special thickness class 51 epoxy lined, 14"-36" shall be DIP special thickness class 52 epoxy lined with epoxy lined ductile iron fittings. Force mains shall be marked with one continuous strip of six (6) inch wide, green coded magnetic tape imprinted with two (2) inch high lettering reading: "**CAUTION - FORCE MAIN BURIED BELOW**", and located approximately twelve (12) inches above the crown of pipe. The wording shall occur every three (3) feet. The lining shall be factory applied in accordance with the manufacturer's recommendations and shall be warranted by the pipe/fitting manufacturer. Unless specific approval is granted, no force main shall be encased in concrete. Flanged ductile iron pipe and fittings is required for exposed installation.

Should the proposed force main alignment fall within the vicinity of a wellfield, the plans shall reflect all dimensions from wells to the pipeline as required to ensure the proper clearances and/or material types are being instituted. Special material conditions may apply.

SECTION 6

GRAVITY WASTEWATER LINE CONSTRUCTION

6.1. Installation:

Gravity Wastewater lines shall be laid accurately to both line and grade. The Department will generally not accept any line laid with a slope varying by more than 10% of its design slope especially for lines laid at minimum gradients. For specific instance the minimum acceptable slope of an 8" line shall be .38% if the design called for .42%. The Department reserves the right to independently verify questionable survey results at the Developers/Property Owners expense. Visible leakage, deflections, horizontal misalignment, significant bowing, non-constant slopes between manholes and sagging joints shall each be grounds for rejection of lines. Certified verification by televising of all mains and laterals deeper than 10' at the Developers/Property Owners expense is required. A wastewater lateral connection inspection is required prior to Service Activation. The minimum design depth of a PVC gravity Wastewater line shall be 4.5 feet to invert. C-900 PVC pipe shall be placed for all lengths with less than 4.0 feet to invert in cases where this cannot be met and prior approval is obtained. Trenches and excavations shall be kept dry and stable while work is in progress.

The contractor shall be responsible to ensure that all safety requirements are met. Unsuitable excavated material such as boulders and logs shall 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 unsuitable material.

6.2. Manholes:

Manholes shall be designed and set according to construction plans and standard details, and shall be precast in accordance with approved shop drawings and specification detail drawings accompanying this text. The mix used for the precast shall include calcareous aggregate (minimum CaCO₃ content: 65% in large aggregate, 50% in concrete screenings). When not using the optional precast concrete or cast-in PP or FRP flow channel, the manhole inverts and flow channel shall be carefully formed in the field to conform to the sewer flow direction. Flow channels within the manholes involving changes of direction or slide slopes 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 water-tight job. Manholes shall be core-drilled to provide pipe opening when precast hole is not available. The standard manhole frame height shall be 7". A 4" frame may be used only with prior approval. Approved joint sealant shall be used at all riser joints. The manhole shop drawings shall call out the size of the joint sealant and include a blow-up detail showing the exact location of the sealant rings within the tongue and groove area. Structures with any leakage will not be accepted. All new manholes and existing tie-in manholes shall be lined with a Department approved standard corrosion barrier system as listed in the APL. The coating shall be in place prior to Wastewater system lapping and system certification to the Health Department. The exterior manhole joint seal must be installed prior to backfilling. (See details). Manhole top covers must fit flush into the rings with the inflow protectors installed.

6.3. Inspection and Testing:

Lamping of the completed gravity Wastewater system will be performed after complete backfilling, the laying and compaction of the roadway base, and accurate record drawings are received. The lamping will determine that the lines have been laid to accurate line and grade. At time of lamping, the line shall be clean and dry. A final inspection will be held after the roadway is completed to verify that the system has not been damaged. All lines and appurtenances not meeting specifications or reasonable standards shall be repaired or replaced. The Department requires videotaping of gravity mains and laterals as previously indicated at the Developers/Property Owners expense. If substandard installation is suspected or if ground water infiltration/leakage is present, further, more stringent testing will be required to determine if the main and/or laterals are repairable/acceptable. The Developer/Property Owner shall videotape all gravity mains deeper than 16' and the corresponding laterals prior to Wastewater system certification. The corrosion barrier system components shall be inspected and tested as required herein.

6.4. Gravity Wastewater Lines and Force Mains in Wellfields:

All new or replacement installations of gravity Wastewater mains in Zone One (1) or Zone Two (2) of a public drinking water wellfield shall be constructed to force main standards. The following are the required minimum design and construction standards for Wastewater system pipe, fittings, coatings and pressure testing criteria within Zones 1 or 2 of a wellfield.

Ductile Iron Pipes and Fittings for Force Main Application:

Ductile iron pipe shall conform to the requirements of ANSI/AWWA C151/A21, 51-86 unless otherwise noted on the plans. Glands for mechanical joints shall be of ductile iron. Fittings shall have mechanical joints or flanged ends unless an approved flexible joint restraint system is used. The fittings shall conform to the requirements of AWWA C-110 or AWWA C-153. Flanged ductile iron pipe shall be "special thickness class 53". Flanged ductile iron pipe and fittings shall have threaded flanges, unless otherwise noted on the drawings, and shall conform to ANSI/AWWA C115/A21, 15-83. All flanges shall be Class 1560, ANSI B16.5. All above grade flanges shall be flat faced unless they are mating up to existing, or otherwise specified, raised flanges. All gaskets shall be full-faced 1/8" red rubber. Joints shall conform to the requirements of ANSI/AWWA C111/A21, 11-85.

PVC Pipe (gasketed joint) and Fittings for Gravity Wastewater Application:

Pipe 4" or larger in diameter shall conform to the requirements as set forth in AWWA C-900/C-905 with dimension ratio DR 18. Provisions must be made for contraction and expansion at each joint, or with rubber ring and an integral bell as part of each joint, or by a rubber ring sealed coupling. Clean, reworked material generated from the manufacturer's own pipe production may be used. Fittings shall be cast or ductile iron. Pipe shall have cast iron pipe equivalent outside dimensions. Pipe smaller than 4" in diameter shall conform to Commercial Standard CS 256 and ASTM D-22141. Provisions shall be made for contraction and expansion at each joint, with a rubber ring and an integral bell as part of each joint, or by a rubber ring sealed coupling. Pipe shall be made

from SDR 21, 200 psi clean, virgin NSF approved Type I, Grade 1 PVC conforming to ASTM D-1784. Clean reworked material generated from the manufacturer's own pipe production may be used. Fittings for pipe smaller than 4" in diameter shall be PVC.

Coatings:

All ductile iron pipe and fittings shall have an epoxy lining and a bituminous coating on the exterior, per AWWA specification C-210. The coating and lining shall be applied in accordance with the manufacturer's recommendations.

Pressure Tests:

The test shall be of two (2) hour duration. During the test, the pipe being tested shall be maintained at pressure of not less than 150 psi. All pipes shall be pressure tested in accordance with the current AWWA C-600 Standard with a no leakage tolerance. No more than 500' of gravity Wastewater main or 1000' of force main shall be tested at one time. Pressure tested gravity Wastewater mains and laterals located in wellfield zones 1 and 2 shall be PVC C900 SDR18. The tested portion of the laterals shall end at the "upper" bend using a temporary mechanical joint restrained cap.

Manholes:

Manholes shall be precast and coated with an approved corrosion barrier system. Exterior manhole joint seal application is required (**see details**). Manhole inlets and outlets shall be tightly sealed around the sewer pipe and coated to eliminate leakage.

Pipes and manholes with any leakage will not be accepted.

6.5. Wastewater Force main Construction:

Installation:

Installation of force main pipe and associated fittings shall be in accordance with current AWWA specifications, and manufacturer's requirements for their particular products. All non-DIP mains shall have a minimum of 36" clear cover to finished grade, unless specifically approved otherwise, subject to pipe material limitations. Approved pipe joint restraint shall be required at each fitting involving a change of direction and as specified in plan details.

All pipes shall be laid in trenches having a dry and stable bottom. Backfill shall be free of boulders and debris. 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. The contractor shall be responsible to ensure that all safety requirements are met.

Changes in pipe alignment may be accomplished using appropriate fittings or through pipe deflection. Pipe deflection at the joint is allowed with ductile iron pipe. The deflection shall not exceed 75% of the Manufacturer's recommended maximum joint deflection.

All valves shall be placed according to plans unless relocation is approved by the Department. As-built drawings shall reflect the actual location of all mains and valves. All taps must be at least 36" from a fitting or bell. Force mains shall not be laid in fuel contaminated areas.

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

6.6. Connection to Existing Systems:

All connections to existing mains shall be made under the inspection of the Department. Valves on existing mains shall be operated by Department personnel or under direct supervision by the Department.

The Contractor shall confirm the compliance of the existing facilities with the Standards and modify the facilities prior to connection, if required, at no cost to the Department. Using a cut-in tee or a tapping sleeve is an acceptable method of connecting to an existing force main (minimum branch size shall be 4"). Tapping sleeve and valve shall be pressure tested prior to tapping. A reverse tap due to preexisting conditions is acceptable only if previously approved by the Department (construction detail required).

Temporary in line insertion valves (line stop valves) may be required in order to avoid spillage and limit service interruptions. If service must be cut off to existing Customers, the Department must have ten (10) days notice to make necessary notifications. The contractor or developer 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 may be required to be made at night to minimize effects. No Customer should be without service for more than two (2) hours.

6.7. Cleaning:

Foreign material shall be kept out of pipe or cleaned from pipe prior to installation. Upon completion of installation, the mains shall be pigged and flushed and the water disposed of without creating a nuisance. The ends of pipe installed during one day shall be capped at the end of each day with a pipe plug to prevent contamination.

6.8. Testing:

All force mains shall be pressure tested in accordance with the current AWWA C-600 Standard. Water shall be supplied to the main and pumped to the required pressure, 150

psi. The maximum length of line to be tested as one section will be 2,500 feet. The standard test duration is two (2) hours. The maximum quantity of water that must be supplied into the tested pipe to maintain pressure within 5 psi of the specified test pressure shall not exceed 50% of the applicable AWWA C-600 Standard. There is a “zero” tolerance for pressure tests for force mains and gravity sewers within well for protection zones 1 and 2. Force mains within road rights-of-way and under traffic areas shall be pressure tested after the road base/rock and “tack-coat” is installed, and before the asphalt is installed.

6.9. Abandonment in place of existing force main:

All efforts shall be made to remove existing force mains upon completion of new mains. Grouting and/or abandonment in place of existing force mains requires approval by the utility director. Any pipe to be abandoned in place shall be filled with grout. Pipe is to be shown on the as-built drawings. The grout mix shall be:

<u>Type</u>	<u>Pounds</u>	<u>Cubic Feet</u>
Cement	340	1.73
Sand	2840	17.91
Stone	0	0
Water	374	6.00
Admix/Type B	13 oz.	
Air 170 + 5.0%	1.35	

The slump shall be 6" + 1 inch, Admix 1 shall meet ASTM C-494 type BD. Alternative mixes will be considered.

6.10. Construction Using Horizontal Directional Drilling:

- Refer to sections 3a-3h

6.11. Corrosion Barrier/Inflow Protection System For Concrete Structures:

Refer to the APL and standard details for acceptable corrosion protection materials and methods for all pre-cast and cast-in-place structures. A certified and licensed applicator is required for all materials.

It is the contractor’s responsibility to comply with all applicable safety standards and regulations. A safety/maintenance of traffic plan is required (if applicable).

SECTION 7

WASTE WATER PUMP STATION DESIGN AND CONSTRUCTION

7.1 General:

Lift stations serving residential or commercial developments shall be owned and operated by the Department. Privately owned wastewater force mains and pump/lift stations are discouraged. However, a non-standard, private grinder station may be approved by the Utility Director in certain cases. In such cases, the owner of the privately owned force main or pump/lift station is responsible for all maintenance and operation. The VOW assumes no responsibility for changes in pumping capacity due to decreasing or increasing pressures within the VOW force main network at the point of connection. Grinder pumps are not acceptable for VOW owned and operated lift stations.

The Department shall have the right to require the over sizing of the Department owned lift station to allow other properties to connect to a gravity Wastewater system. Signed and sealed lift station calculations are required for VOW dedicated and "private" lift stations. Buoyancy calculations and cycling time calculations are required. For buoyancy calculations, the assumed ground water level shall be the top slab elevation of the wet well. Top slab shall be set at a 100 year storm elevation, or higher. Top slab, secondary concrete pour, soil friction and mechanical equipment shall not be included in "down weight". Minimum (1.1) buoyancy safety factor is required. Operating System Pressure calculations (TDH) for low and high pressure conditions, as applicable, shall be based on field confirmed pressure data provided by VOW, and shall consider friction losses, static pressure and minor losses. The low and high pressure system curves shall be plotted together with the selected pump curves, and indicate the projected pump operating and efficiency ranges. A current force main pressure "tie-in" letter from VOW shall be included with the lift station calculations. The pressure range provided by VOW shall be used for the initial pump selection/design.

- **Type:**

The standard Department owned Wastewater lift station shall be a below-ground, submersible pump type. All stations shall be designed for 230/460 volt, 3-phase, 60-cycle electric service. Each pump will have a minimum horsepower rating of 5-horsepower, and will have a speed rating of between 1700 and 1800 RPM. No deviation from these standards will be permitted without the prior approval of VOW Utilities Department. All electrical components and assemblies shall be UL listed. Two or more pumps are required. When peak flow exceeds 400 gallons per minute, three (3) pumps are required. When only two (2) units are provided, each shall be capable of handling the anticipated maximum flow with the same capacity. The pumps shall seat into self-seating bases. The pump and impeller shall pass a minimum of 3" solids, and all fixtures and fasteners, including guide rails and brackets shall be of 316 stainless steel.

Projects constructed in phases will be allowed only at the discretion of the Utility Director. In projects constructed in phases, 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 percent of the permanent pumps, unless approved by the Utility Director.

- **Controls and Telemetry System:**

Pump control panels, telemetry systems, and associated electrical service equipment shall be provided and installed in accordance with VOW Construction Standards and Details.

- **Valves and Piping:**

A plug valve is required on the discharge line of each pump with a pressure gauge on the discharge side of the gate valve, see standard details. A check valve is required between the pump and gate valve. Only plug valves shall be used in force mains. Plug valves shall be right hand close operation, check valves shall have an external weight arm; no springs will be permitted.

A 4" or 6" tee and valve with 4" or 6" companion flange and plug shall be installed on the pump-station discharge (FM) as an emergency by-pass. The emergency by-pass connection with an aluminum male cam-lock with cover shall be the same size as the pump discharge, and shall be accessible above ground level. An above ground gate valve located between the valve vault and emergency by-pass connection is required. Refer to standard details.

- **Wet Wells/Valve Vaults:**

The minimum diameter wet well is 72 inches. For pumps 25 hp and larger, a minimum 96 inches diameter wet well is required. The maximum depth shall be 22' unless approved in advance by the Department. For lift stations serving less than 200 residential units, the Department may require the installation of an odor control system if a long cycling time, or close proximity of the lift station to occupied structures may create an odor control problem. The effective capacity of the wet well, or utilized capacity, shall provide a holding period not to exceed a 10 minute pump cycle (maximum six pump starts per hour). The bottom section and slab of the wet well and valve vault shall be a monolithically cast section. The sidewalls and top slab shall be pre-cast in accordance with ASTM C-478. Alternative methods for constructing wet well bases will be considered only if the size and depth of the wet well is excessive. The wet well floor shall have a minimum slope of 1 to 1 to the intake. Where operation continuity is important, consideration should be given to dividing the wet well into two sections, suitably interconnected, to facilitate repairs and cleaning. Valve vaults shall be sized to accommodate the force main pipe size and associated valves. The bottom floor shall have grout placed at a 1 percent slope (minimum) to a 2" PVC drain with trap connected to the wet well. The exterior of both wet well and valve vault structures shall be coated

in accordance with the APL. The interior protective coating is to include the valve vault and underside of tops. Protective coating requirements, as well as the specific manufacturers, are defined in the latest copy of our Approved Products List. Wet Wells shall be fitted with a permanently installed fall-through prevention grate system that is easily retractable for access to the opening below. The wall openings shall be precast whenever possible. Aluminum access covers are required for wet wells and valve vaults. Pump numbers (1, 2) shall be painted on the underside of the excess covers (red color, 12" size, stencil required). A grate type (not netting) fall protection device is required for the wet well top opening. The device must be installed by the manufacturer or by a Contractor licensed by the manufacturer. External manhole joint seals must be applied between all wet well barrel joints. The wet well shall be certified by the supplier that calcareous aggregate is used in the concrete mix (minimum CaCO₃ content: 65% in large aggregate, 50% in concrete screenings). Certification on the submitted shop drawings is acceptable. Wet wells with any leakage will not be accepted.

7.2. Portable, Trailer Mounted Generator Set (38-96kw)

For projects that require a VOW owned wastewater pump station(s), the developer/property owner shall provide at no cost to the Village, one portable, trailer mounted diesel powered generator for each lift station(s). The unit shall be transferred to the VOW by a Bill of Sale prior to a lift station start-up, or sewer system certification for the project, whichever comes first.

The generator shall be a Wacker Neuson or Generac. Generac model shall be a fiberglass body. An aluminum diamond plate storage box mounted in the front is required for cable storage. The box shall be weather proof and lockable. For generators 38 kW – 58kW a 2 gage 4 conductor type SOOW cord is required. Cord to be 30' long. Connector to panel shall be a Russellstoll. For 96kW generators, cord shall be 3/0 gauge.

The Generator shall comply with the latest addition of the National Electric Code, all applicable local, state and federal codes, and be listed by Underwriters Laboratories (UL). The complete set shall be warranted to be free from defect in materials and workmanship under normal use and service for a period of minimum one year from the date of equipment acceptance by the VOW. In addition to the equipment and features listed herein, the products shall be equipped with and warranted for all standard equipment and accessories as supplied by the manufacturer for the selected models. The products shall be completely assembled, tested at the factory and ready for operation (with engine oil and coolant) prior to delivery to the VOW. One set of spare filters (fuel and oil), a shop manual (service, parts), electrical wiring schematics and operating manual are required (hard copy and electronic copy)

7.3. Fenced Enclosures:

All lift stations shall be enclosed by a 6' high chain link fence with a 12' wide double gate centered on the wet well. Black vinyl coating is required for fence fabric, all posts, braces, rails and accessories. Decorative fencing or landscaping may be used in addition to the chain link fence. This is at the developer's/successor's discretion and maintenance

responsibility and must be approved by the Department prior to installation. Approved hedges shall be installed a minimum of 5' from the fence.

Wire mesh fencing shall be constructed of 9-gauge wire with a maximum 2" mesh of chain linked steel hot dip galvanized after weaving. Top and bottom selvages are to be barbed. Line posts shall be 2 1/2" Schedule 40 galvanized steel pipe. Corner and gate posts shall be 3" Schedule 40 galvanized steel pipe. A truss rod with turnbuckle is required from top of each gate post to the bottom of the next adjacent post.

Post spacing shall be equidistant with maximum 8'-0" spacing. Fencing shall be 6'-0" high, fitted with top rail, mid-height horizontal brace and a bottom rail. The top rail couplings are to be positioned over posts.

Fabric shall be continuous from corner post to corner post or corner post to gate post and shall be supported on stretcher bars at each corner of gate post. Fabric ties shall be located at maximum 8" spacing.

Top and bottom rails and rail braces shall be fabricated of 1-5/8" Schedule 40 galvanized steel pipe. Gate frames (2" Schedule 40 galvanized pipe) shall be full height of fencing, have horizontal bracing and gate fabric shall be sized to fit within the frame. Fabric shall be installed with stretcher bars.

Gates shall be double, providing for minimum 12'-0" clear opening between gate posts and shall be fitted with a lockable latch. Concrete line post footings shall be a minimum of 36" deep by 12" diameter. Corner and gate posts footings shall be minimum 40" deep by 12" diameter.

7.4. Site Selection and Layout:

Direct vehicle access shall be provided for maintenance purposes. An easement or right-of-way of sufficient size is necessary for access (typically 20' wide). A platted lift station easement or exclusive VOW water and sewer easement will be required for the lift station property.

The exterior top of the wet well shall be designed at or above the one hundred (100) year flood elevations and not be more than 1' above the road grade adjacent to the station and in no case shall be at a lower elevation than the adjacent road. The driveway shall be no less than 30' in length from the edge of the ultimate right-of-way road pavement to the gate with a maximum grade of 3%.

The layout of the station should be such as to provide easy access without interference between control panel and truck access. Six-inch (6") thick concrete pad (broom finish required) shall be poured over 6" compacted rock base. The concrete pad shall be tied to the wet well top and valve vault top using #6 rebar. The concrete pad shall extend up to the fenced area. (See detailed drawings).

The site for a lift station shall be selected:

- To be easily accessible (preferably not from a major collector or arterial road).
- To allow for unobstructed data transmission from the telemetry system to the nearest

- base station.
- To provide minimum 30' separation from the lift station fence line to any residential buildings.
- Not to be located under overhead power lines, cables, etc.
- Not to cause a "Line of Sight" problem near intersections.
- To be outside of "Clear Zones" for traffic safety.
- The door of the Control Panel shall not face west or south unless unavoidable (north (preferred) and east are acceptable).

7.5. Water Service:

A 1½" metered Potable Water service shall be installed to each Department owned lift station site. The service line shall terminate with a Reduced Pressure Principle Backflow Prevention Assembly. The Developer shall be responsible for the initial testing and certification of the assembly prior to the lift station start-up. The meter and Backflow Prevention Assembly shall be located as shown on standard lift station site layout detail.

7.6. Lift Station Acceptance Procedure:

The lift station components shall be pre-tested by the contractor prior to the start-up meeting with VOW. A representative of the Department's Field Services Division shall be present at final inspections/start-up of a lift station. The following will be the basis of a Department-owned lift station acceptance:

- The pumps are reasonably pumping on the design-pumping curve. Revised pumps, electrical systems, and/or impellers may be required if the force main system conditions changed since the initial approval of the pump design.
- The design amperage is not being exceeded.
- The telemetry unit is functioning properly.
- The station is functioning as designed.
- The station was built in accordance with these standards.
- Completed lift station checklist (diskette and hard copy) must be submitted to the Construction Coordinator prior to the lift station start-up.
- Legal documents are submitted.
- A copy of blackflow prevention assembly testing and certification is submitted.
- Wet well and valve vault are coated with approved corrosion barrier system an the coating tested and certified.
- Contractor shall demonstrate that pumps can be easily removed from wet wells.

- Title and minimum (1) year parts and labor warranty to the portable pump station back-up unit set shall be provided. **Note:** The unit shall be delivered to a location as specified by the Department.
- Manufacturer's "Start-Up Report" (Disk and a Paper Copy) is submitted.
- Completed "Notice of Acceptance" is submitted.
- Complete Operation, Maintenance, Repair and Service Manuals for Lift Station equipment, by-pass pumps and generators (if applicable). One (1) hard copy and one (1) electronic copy (CD) are required.
- Two (2) copies of pump and panel shop drawings are submitted.
- "Full Load" Test Certification is provided for the generator.
- Bill of Sale for the back-up pumping unit.
- The control panel is properly UL labeled.
- The provided pump station back-up pumping unit is delivered to a location as specified by the Department.

7.7. Additional Requirements:

Upon final inspection of a lift station by the Department's Construction Coordination Section and Operations & Maintenance (O&M) Division personnel, and upon the satisfactory correction of any deficiencies detected at said inspection, the Chief Construction Coordinator shall notify the Development Improvements Section and confirm that the Bill of Sale has been submitted and accepted.

Upon the receipt of the Bill of Sale or lift station acceptance, whichever is later, and the receipt of a copy of the latest electric utility bill from the developer, Development Improvements Section shall notify the electric utility to transfer the account to the Department. Copies of the notification letter shall be sent to O&M, Finance/Accounting and to the developer. The unconditional labor and material warranty period for the lift station (five years for the corrosion barrier system, five years for lift station pump and motor assemblies, and one year for all other components) shall commence at the time of first permanent Service Activation discharging Wastewater into the lift station.

The warranty for the Department initiated lift station rehabilitation projects shall begin at the time of final payment to the Contractor by the Department and shall cover all materials and labor associated with the rehabilitation project, including but not limited to, site restoration, flow by-passing, and temporary power.

During said warranty period, Developer also agrees to reimburse the Department for any repairs/replacements (on warranty items) performed by the Department under any emergency basis. Emergency is defined as any event occurring, which would potentially endanger the safety or welfare of the public. Department Inspector and O&M personnel shall be present at the private lift station start-up.

A "private" lift station start-up report shall be submitted to the Department prior to request of Sewer System Certification. The start-up report shall include as a minimum date of start up, pump manufacturer, pump model, impeller, horsepower, start-up pressure, and pumping rate.

SECTION 8 INSPECTION REQUIREMENTS

8.1. General:

No work shall be covered until observed by a representative of the VOW Utilities Department.

The VOW 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 observed failure of work or materials to conform to the plans or specifications. Failure of the inspector to call to the attention of the Contractor any item not in conformance to the plans and specs shall not constitute acceptance of the item. The inspector shall have the authority to reject materials or suspend the work pending review. The inspector shall in no case act as foreman or perform other duties for the engineer and/or contractor nor interfere with the management of the work. Advice that the inspector may give shall in no way be construed as binding on the VOW or releasing the developer, his engineer or contractor from performing according to the intent of the plans and minimum VOV Standards.

Inspections will be scheduled for regular working hours only, except for nights when service disruptions are involved. Work will not be scheduled for weekends or holidays. The VOW shall be provided with at least two (2) full working days' notice for scheduled inspections. Inspectors will make routine passes to the project to inspect such items as restraints, valve locations, materials on site, clearances between conflicting lines, etc. Scheduled inspections are also required for, but not limited to, Jack and Bore, setting of wet wells, lift station startups with manufacturer's representative present, and any time an existing VOW facility is to be modified (i.e., manhole tie-in and water taps).

It shall be the 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 engineer shall have the Contractor pre-test water and force mains and gravity sewers to minimize failures and the need for additional inspections. The engineer shall prepare accurate record drawings and submit to the VOW two (2) days before a lamping to verify adequacy of gravity sewer slopes. In any case, record drawings must be submitted prior to service being provided to any phase of a project.

The Contractor shall be allowed one scheduled test and one scheduled re-test at no cost. For additional tests, the VOW shall bill the developer for the time of the VOW Inspector at the amount defined within the VOW rate structure.

The Contractor shall be solely responsible for safety.

SECTION 9 RECORD INFORMATION

9.1. Record Information:

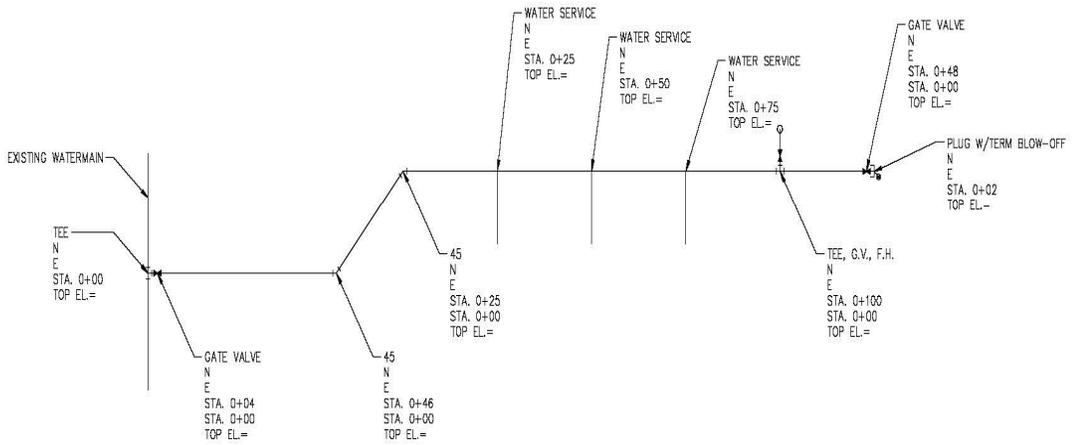
The following requirements must be submitted before any project will be fully released into operation. If a project requires phasing, additional submittals will be required as necessary. It is recommended to submit a 24"x36" preliminary copy of the "as-builts" for review and comment prior to preparing the final "as-builts" package submittal. When submitting the final package, include the preliminary comments to ensure that previously addressed items have been completed. "As-built" prints must be signed and sealed by the Engineer of Record or a Professional Land Surveyor. A "Third Party Disclaimer" will not be accepted, i.e. the data shall be collected by the same party who is preparing the "as-builts". "As-builts" signed and sealed by a Land Surveyor must comply with applicable Florida Statutes. The approved design plan sheets must be used for the "as-built" presentation.

The final package of hard copy and electronic data shall be as follows:

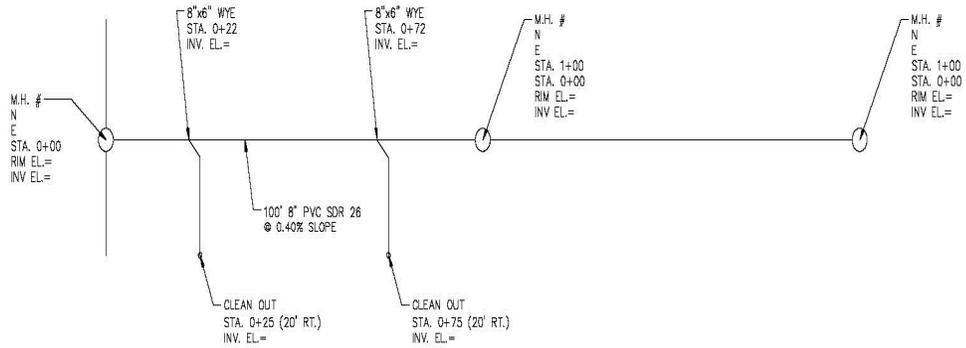
1. 2 sets of 24"x36" paper copy – signed and sealed
2. 2 sets of 11"x17" paper copy – signed and sealed
3. 2 sets of 8 ½" x 11" paper copy – signed and sealed and marked as Exhibit "A"
4. 4 sets of 11"x17" laminated (0.003 mil) – does not need to be signed and sealed
5. CD/DVD containing the following:
 - AutoCAD files shall be in 2013 format or later, in NAD 1983 state plane coordinates, Florida East Zone, US Feet. Vertical datum shall be NAVD 1988. Provide one (1) cad file named "Final Utilities".dwg, all entities to be bilayer, accurately layer named and showing all utility related improvements, (watermains, valves, fire hydrants, fittings, service tap locations and meter locations, sample points, air release valves, all double strap tapping saddles used for jumpers or vents as required for filling/flushing/testing, gravity mains, force mains, manholes, laterals, cleanouts, force mains, lift stations, grease traps or sand/oil separators, limits of all joint restraints, or thrust blocks/dead men if used, etc.). The "Final Utilities".dwg shall also include Right of way and property lines.
 - Provide all plan/profile sheets and any special utility details and/or cross sections. Standard V.O.W. utility detail sheets are not required. Provide the overall utility map or key sheet. Each sheet shall be a separate file named that sheet number. All external reference files shall be bound into each sheet as required. All items identified as "as-built" shall have a northing and easting. If a baseline station was used for project control, do not add record stationing for the utility "as-builts" from that original stationing. Stationing required for the "as-builts" shall be completely independent from the original baseline. At the watermain, force main or gravity sewer beginning, identify

that point as Sta. 0+00. At the next fitting or manhole along the watermain, force main or gravity alignment, identify the stationing at that point and then start again at sta. 0+00 from there and proceed throughout the project in that format. See attached for example. Top of pipe elevations shall be shown at all fittings and valves and along the pipe at 100' intervals max, or at critical locations along the main as required. Provide crossing data at ALL pipe crossings. Show the clearance difference. Do not show top of nut elevation on gate valves.

- For an on-site distribution plan, the design alignment is to be deleted, leaving only the as-built alignment on the plan. For any transmission main located within a right-of-way, the original design alignment may remain, appearing together with the bolder "as-built" alignment.
- If any aerials or photos were required on the plan or detail sheets, provide them in folders on the disk and label accordingly. Provide a complete set of 24"x36" PDF's on the disk. Provide all field reports and site photos in folders labeled accordingly. Provide fire flow tests, and all testing reports (bacteriological reports, pressure tests, lamping report, mandrel report, densities, etc.) in folders labeled accordingly. Provide the lift station start up report and three (3) lift station operation and maintenance manuals if applicable.
- Clearly label and dimension any root barrier installed.
- Provide a copy of the final plat with all utility easements clearly dimensioned and labeled. Provide separate sketch and legals if required. Applicable utility easements shall be identified on record drawings with ORB/Plat Book/Page.
- For projects with utility related right-of-way permits (FDOT, PBC Roadway, etc.) an acknowledgement of completion from the permitting Agency shall be submitted to the Department prior to the first service initiation.



EXAMPLE - PRESSURE PIPE LABELING



EXAMPLE - GRAVITY MAIN LABELING

STANDARD DETAILS

1. THE CONTRACTOR SHALL HAVE AVAILABLE AT THE JOB SITE AT ALL TIMES ONE (1) COPY OF THE CONTRACT DOCUMENTS, INCLUDING PLANS, SPECIFICATIONS AND COPIES OF ALL REQUIRED CONSTRUCTION PERMITS.
2. THE CONTRACTOR SHALL CONTACT ALL CONCERNED UTILITIES AT LEAST 48 HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS.
3. 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 THE VILLAGE 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.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE HIS COMPLETE FAMILIARITY WITH THE PROJECT SITE AND IT'S COMPONENTS TO INCLUDE SUBSURFACE CONDITIONS OF SOIL AND GROUNDWATER TABLE. BY SUBMITTAL OF A BID FOR THIS PROJECT, THE CONTRACTOR ACKNOWLEDGES HIS COMPLETE UNDERSTANDING AND RESPONSIBILITIES WITH RESPECT TO THE CONSTRUCTION ACTIVITIES REQUIRED UNDER THE SCOPE OF THIS PROJECT.
5. 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 STRUCTURES, LANDSCAPING, ETC.
6. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE FOLLOWING 48 HOURS BEFORE DIGGING:
 1. VILLAGE OF WELLINGTON
 2. FLORIDA POWER & LIGHT
 3. SOUTHERN BELL TELEPHONE
 4. ADELPHIA CABLE TV
 5. SUNSHINE STATE ONE CALL OF FLORIDA INC.
7. VILLAGE OF WELLINGTON (VOW) WRITTEN SPECIFICATIONS AND STANDARD DETAILS (LATEST EDITION) ARE TO BE CONSIDERED PART OF THIS PROJECT AND CONSTRUCTION SHALL BE ENFORCED TO AT LEAST THESE MINIMUM STANDARDS.
8. ALL MATERIAL MUST CONFORM TO APPROVED SHOP DRAWINGS. ANY CHANGES MUST BE APPROVED BY THE ENGINEER AND VOW PRIOR TO INSTALLATION. FAILURE OF THE INSPECTOR TO CALL TO THE ATTENTION OF THE CONTRACTOR ANY ITEM NOT IN CONFORMANCE WITH PLANS AND SPECS SHALL NOT CONSTITUTE ACCEPTANCE OF THE ITEM.
9. VOW REPRESENTATIVES SHALL BE PRESENT DURING ALL OPERATIONS INVOLVING EXISTING UTILITIES.
10. NO CONCRETE THRUST BLOCKS WILL BE ALLOWED. ALL JOINTS SHALL BE MECHANICALLY RESTRAINED AS REQUIRED BY THE VOW.
11. SERVICE INTERRUPTIONS REQUIRE MINIMUM OF TWO (2) WEEKS PRIOR NOTIFICATION.

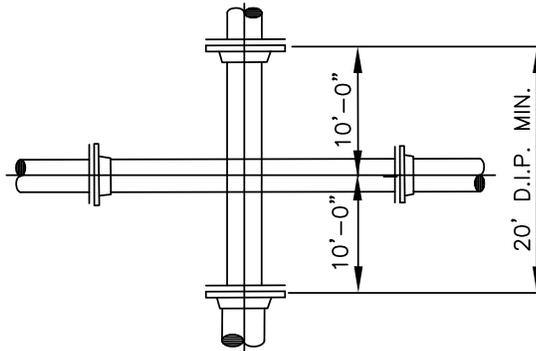
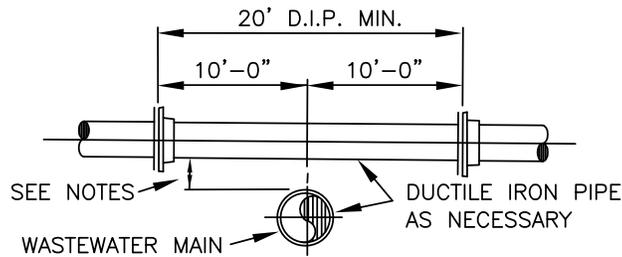
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	GENERAL CONSTRUCTION NOTES (WATER)	PAGE No. W-1
OCT. 2017		

12. ALL PIPING MUST BE INSTALLED DRY.
13. MINIMUM COVER SHALL BE 36 INCHES FROM FINISH GRADE.
MINIMUM COVER UNDER DITCH SHALL BE 2' AND CANAL BOTTOMS SHALL BE 5' BELOW THE TYPICAL DESIGN SECTION.
MAXIMUM COVER SHALL BE 42 INCHES FROM FINISHED GRADE.
14. DIP SHALL BE REQUIRED IN THE FOLLOWING CIRCUMSTANCES (WATER MAIN):
 - A. WITHIN 10 FEET OF SANITARY AND STORM PIPES.
 - B. WITHIN 10 FEET OF STRUCTURES, CANALS OR LAKES.
 - C. CROSSINGS OVER AND UNDER SEWERS, CANAL CROSSINGS, GAS AND STORM PIPES WITH LESS THAN 12 INCHES SEPARATION.
 - D. BENEATH ALL PAVED AREAS.
 - E. WITHIN EASEMENTS.
15. TAPPING SLEEVES & VALVES SHALL BE A MINIMUM OF 3 FEET FROM A PIPE JOINT AND SERVICE TAPS SHALL BE A MINIMUM OF 18 INCHES APART AND 18 INCHES FROM A BELL OR FITTING.
16. AN APPROPRIATELY SIZED SCHEDULE 80 PVC (OPEN CUT) OR HDPE (DIRECTIONAL DRILLED) CASING IS REQUIRED FOR ALL SERVICES THAT CROSS UNDER PAVEMENT. ENDS SHALL BE PLUGGED WITH SPRAY FOAM SEALANT OR APPROVED EQUAL AND SHALL BE LEFT EXPOSED FOR INSPECTION.
17. APPROPRIATELY MARKED 6 INCH METALLIC BACKED INDICATOR TAPE IS REQUIRED OVER ALL PVC MAINS INSTALLED ONE (1) FOOT ABOVE PIPE.
18. ALL FIRE HYDRANTS SHALL MAINTAIN PROPER CLEAR ZONE PER PBC FIRE MARSHAL STANDARDS.
19. PAVEMENT REPLACEMENT, INCLUDING CURB, GUTTERS AND STRIPING SHALL OCCUR WITHIN SEVEN (7) WORKING DAYS FOLLOWING COMPLETION OF OPEN CUT WORK.
20. ALL EXPOSED (ABOVE GRADE) DUCTILE IRON WATER MAIN SHALL BE COLOR CODED TNEMEC SAFETY BLUE.
FOR EXPOSED FIRE LINE DUCTILE IRON PIPING COLOR SHALL BE TNEMEC SAFETY RED.
21. ALL BACKFLOW ASSEMBLIES MUST BE REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTERS (RPZ).
22. FIRE LINE PIPING MUST BE D.I.P. SPECIAL CLASS 53, INSTALLED FROM MAIN TO SUPPLY SIDE OF BACKFLOW ASSEMBLY. DISCHARGE SIDE OF RPZ IS GOVERNED BY PBCFR AND PBCWUD STANDARDS.
23. USE OF REPAIR SLEEVES AND / OR REPAIR COUPLINGS IS PROHIBITED WITHOUT PRIOR APPROVAL FROM THE UTILITY DIRECTOR.
24. ALL MATERIALS FOR CONNECTION TO EXISTING MAINS, I.E. TAPPING SLEEVES, VENT TO ATMOSPHERE, ETC. MUST BE PRESENT AT SCHEDULED CONNECTION TIME. IF NOT, CONNECTION WILL BE CANCELLED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	GENERAL CONSTRUCTION NOTES (WATER)	PAGE No.
OCT. 2017		W-2



NOTES:

1. STORM SEWER, GRAVITY WASTEWATER AND RECLAIMED WATER MAIN CROSSING UNDER POTABLE WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF TWELVE (12) INCHES BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE STORM/WASTEWATER/RECLAIMED WATER PIPE JOINTS AND POTABLE WATER MAIN JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN TEN (10) FEET BETWEEN ANY TWO JOINTS, BOTH PIPES SHALL BE D.I.P., AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6 INCHES. WHERE THERE IS NO ALTERNATIVE TO STORM/WASTEWATER/RECLAIMED WATER PIPES CROSSING OVER A POTABLE WATER MAIN, THE CRITERIA FOR MINIMUM 12" VERTICAL SEPARATION BETWEEN LINES AND JOINT ARRANGEMENT, AS STATED ABOVE, SHALL BE REQUIRED, AND BOTH PIPES SHALL BE D.I.P. IRRESPECTIVE OF SEPARATION. D.I.P. IS NOT REQUIRED FOR STORM SEWERS.
2. WHENEVER POSSIBLE MAINTAIN MIN. TEN (10) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN POTABLE WATER MAIN AND STORM SEWER, WASTEWATER MAIN, OR FORCE MAIN (A MIN. 6' SEPARATION MAY BE APPROVED ON A CASE BY CASE BASIS). MAINTAIN MIN. THREE (3) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN RECLAIMED WATER MAIN AND POTABLE WATER MAIN, STORM SEWER, WASTEWATER GRAVITY MAIN OR FORCE MAIN.
3. FORCE MAIN CROSSING POTABLE WATER MAIN OR RECLAIMED WATER MAIN SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF TWELVE (12) INCHES BETWEEN THE OUTSIDE OF THE FORCE MAIN AND OUTSIDE OF THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN WITH THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN CROSSING OVER THE FORCE MAIN.
4. WASTEWATER LATERALS SHALL CROSS UNDER POTABLE WATER MAINS WITH A MIN. 12" VERTICAL SEPARATION WHENEVER POSSIBLE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, A 20' SECTION OF DUCTILE IRON PIPE POTABLE WATER MAIN CENTERED ON THE CROSSING IS REQUIRED AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6". WHERE THERE IS NO ALTERNATIVE TO A WASTEWATER LATERAL PIPE CROSSING OVER A POTABLE WATER MAIN, A MINIMUM 12" VERTICAL SEPARATION IS REQUIRED, THE LATERAL SHALL BE P.V.C. C-900 SDR18 OR BETTER, THE POTABLE WATER MAIN SHALL BE D.I.P. AND THE PIPE JOINTS SHALL BE EQUIDISTANT FROM THE POINT OF CROSSING.
5. POTABLE WATER SERVICE LINES SHALL CROSS OVER WASTEWATER MAINS WITH MIN. 12" VERTICAL SEPARATION. WHERE THIS MIN. SEPARATION CAN NOT BE MAINTAINED, THE WATER SERVICE SHALL BE ENCASED IN A MIN. 10' LONG CASING CENTERED OVER THE CROSSING WITH MIN. 6" VERTICAL SEPARATION.
6. WASTEWATER MAINS, WATER MAINS, STORM PIPES AND OTHER UTILITY PIPES SHALL CROSS PERPENDICULAR WHENEVER POSSIBLE.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>POTABLE WATERMAIN, WASTEWATER MAIN AND STORM SEWER CROSSING CRITERIA</p>	<p>PAGE No.</p> <p>W-3</p>
----------------------------------	---	----------------------------

**MAXIMUM QUANTITY OF WATER (GALLONS PER HOUR) THAT MAY BE SUPPLIED
TO MAINTAIN PRESSURE WITHIN 5 P.S.I. OF THE SPECIFIED TEST PRESSURE**

(MECHANICAL OR PUSH-ON JOINT, 18 FT. NOMINAL LENGTHS, PER 1000 FT. OF PIPE)

AVG. TEST PRESSURE	PIPE DIAMETER (INCHES)																
	PSI	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
150	0.10	0.14	0.18	0.27	0.37	0.46	0.55	0.64	0.73	0.83	0.92	1.10	1.38	1.65	1.93	2.20	
200	0.10	0.15	0.21	0.31	0.42	0.53	0.63	0.74	0.84	0.95	1.06	1.27	1.59	1.91	2.22	2.54	

FORMULA BASIS: $L = \frac{(S) \times (D) \times (P)^{1/2}}{148,000} \times 1/2$

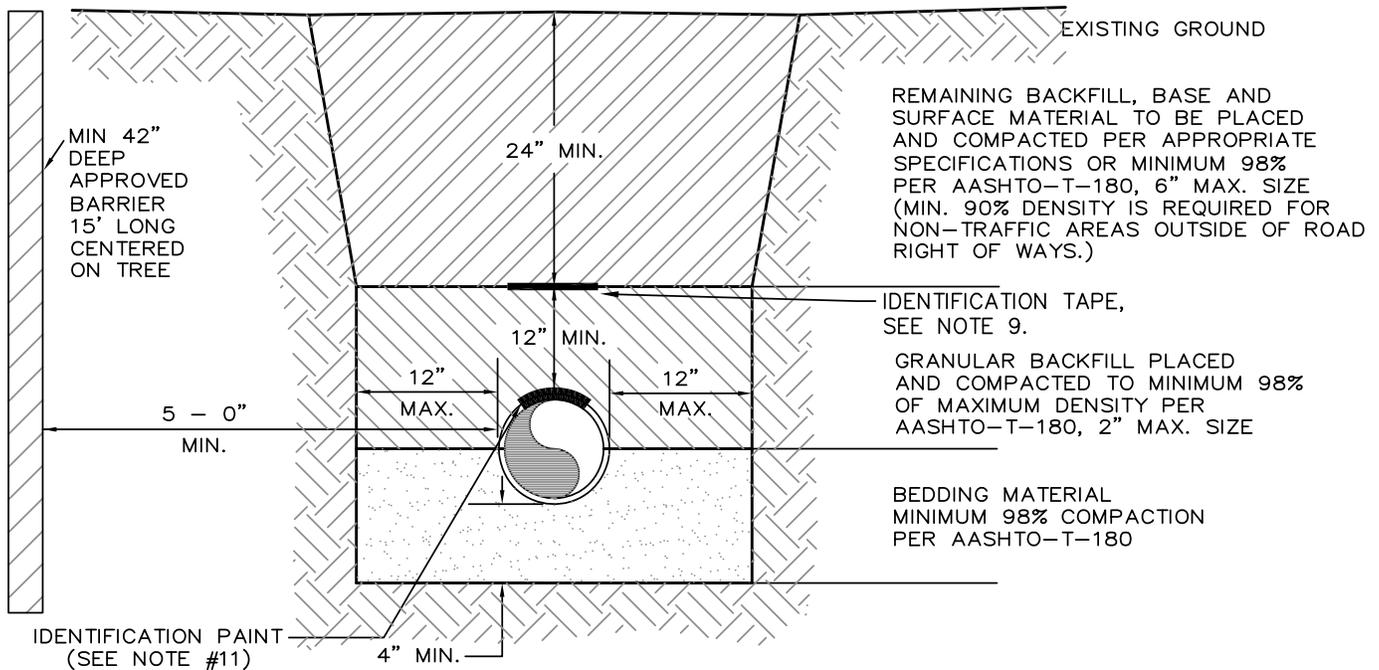
L = MAXIMUM QUANTITY OF WATER TO BE ADDED (GALLONS PER HOUR)
 S = LENGTH OF PIPE TESTED (FEET)
 D = DIAMETER OF PIPE (INCHES)
 P = TEST PRESSURE (P.S.I.)

NOTES:

1. TO OBTAIN THE MAXIMUM QUANTITY OF WATER FOR PIPE WITH 20 FT. NOMINAL LENGTHS, MULTIPLY THE QUANTITY CALCULATED FROM THE TABLE BY 0.9
2. THE MAXIMUM QUANTITY OF ADDED WATER FOR A PIPELINE IS CALCULATED BY MULTIPLYING THE QUANTITY PER HOUR AS OBTAINED FROM THE ABOVE TABLE, BY THE DURATION OF THE TEST IN HOURS, AND BY THE TOTAL LENGTH OF THE LINE BEING TESTED DIVIDED BY 1,000. IF THE LINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE MAXIMUM QUANTITY ADDED WILL BE THE SUM OF THE COMPUTED QUANTITIES FOR EACH SIZE.
3. MAXIMUM TEST LENGTH = 2,500 FEET PER SECTION.
4. THIS STANDARD SHALL REFLECT ANY REVISION OF A.W.W.A. C-600. HOWEVER, THE MAXIMUM QUANTITY OF WATER ADDED SHALL NOT EXCEED 50% OF THE RECOMMENDED LIMIT PER APPLICABLE AWWA C-600 STANDARD.
5. STANDARD TEST PRESSURE = 150 P.S.I.; 200 P.S.I. FOR MAINS LARGER THAN 24"
6. PRESSURE TEST DURATION TO BE MIN. 2 HOURS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	PRESSURE TEST FORMULA AND CRITERIA	PAGE No.
OCT. 2017		W-4

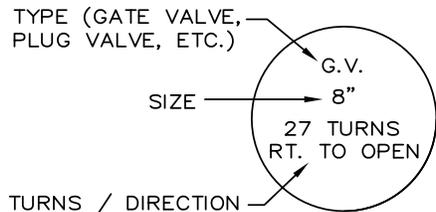


NOTES:

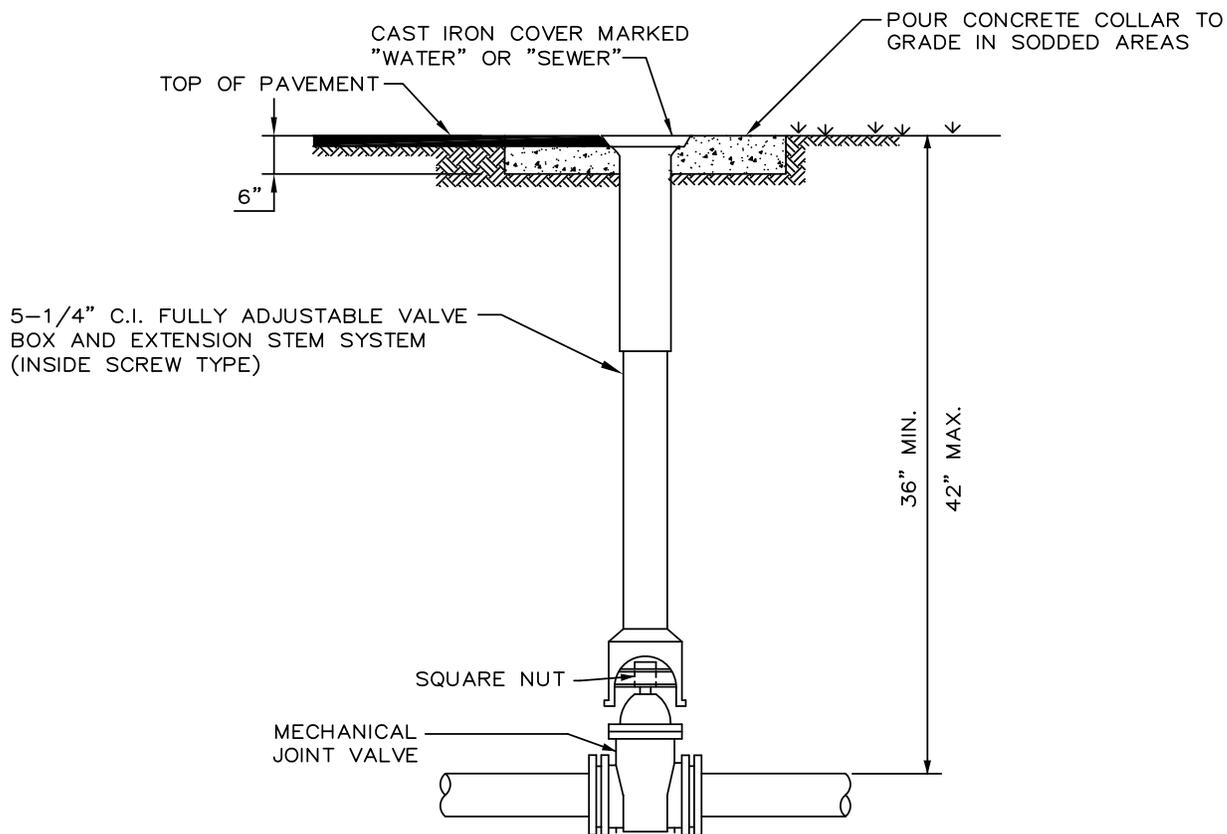
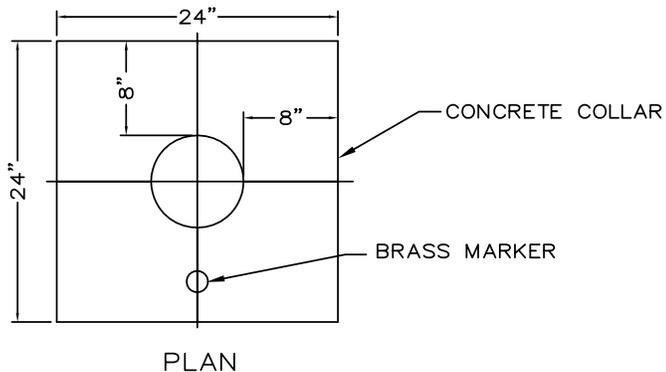
1. BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK $\frac{3}{8}$ " TO $\frac{7}{8}$ " SIZING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK DEBRIS AND LARGER ROCKS SHALL BE REMOVED.
2. THE PIPE SHALL BE FULLY SUPPORTED FOR ITS ENTIRE LENGTH WITH APPROPRIATE COMPACTION UNDER THE PIPE HAUNCHES.
3. THE PIPE SHALL BE PLACED IN A DRY TRENCH.
4. BACKFILL SHALL BE FREE OF UNSUITABLE MATERIAL SUCH AS LARGE ROCK, MUCK, ROOTS AND DEBRIS.
5. DENSITY TESTS ARE REQUIRED IN 1 FOOT LIFTS ABOVE THE PIPE AT INTERVALS OF 400' MAXIMUM. MINIMUM 1 SET SET OF TESTS FOR EACH GRAVITY MAIN RUN BETWEEN, MANHOLES OR AS DIRECTED BY THE INSPECTOR.
6. THE DEVELOPER/CONTRACTOR SHALL BE RESPONSIBLE TO COMPLY WITH ALL TRENCH SAFETY LAWS AND REGULATIONS.
7. SEE SEPERATE DETAIL FOR "PIPE INSTALLATION UNDER EXISTING PAVEMENT – OPEN CUT."
8. THE AFFECTED AREA SHALL BE RESTORED TO EQUAL OR BETTER CONDITION OR AS SPECIFIED IN PERMIT/CONTRACT DOCUMENTS.
9. APPROVED MAGNETIC TAPE IS REQUIRED FOR: ALL PVC MAINS. THE TAPE SHALL BE INSTALLED 12" ABOVE PIPE.
10. ROOT BARRIER IS REQUIRED FOR APPROVED TREE INSTALLATION CLOSER THAN 10 FEET FROM UTILITY FACILITIES.
11. CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP WATER MAINS (BLUE) AND DIP RECLAIMED WATER MAINS (PURPLE).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>TYPICAL TRENCH DETAIL</p>	<p>PAGE No.</p> <p>W-5</p>
----------------------------------	------------------------------	----------------------------



BRASS MARKER
 WITH INFORMATION AS
 REQUIRED ABOVE
 * SEE NOTE #3

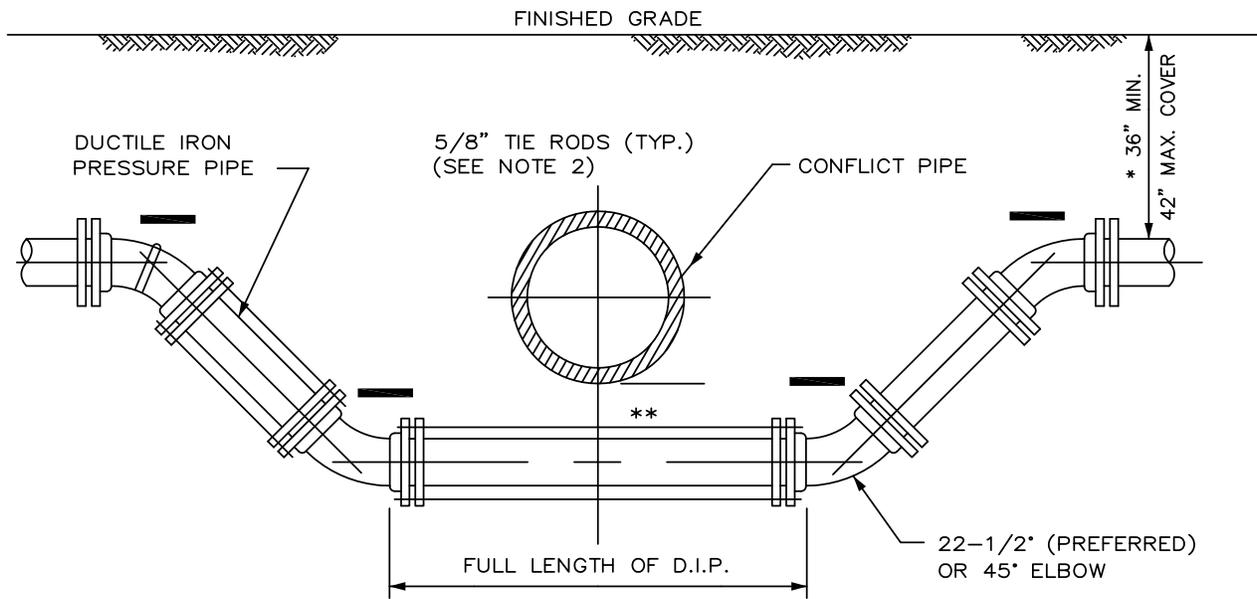


NOTES:

1. AS NOTED, ALL VALVE BOXES AND STEMS SHALL BE FULLY ADJUSTABLE. THE VALVE BOX SHALL BE AS MANUFACTURED BY AN APPROVED PRODUCT PER THE APL.
2. NO VALVES SHALL BE DESIGNED OR CONSTRUCTED WITHIN CURBS, SIDEWALKS OR DRIVEWAYS.
3. BRASS MARKERS ARE NOT REQUIRED IN PAVEMENT.
4. VALVE NUT EXTENSION STEM REQUIRED WHEN TOP OF UNIT ELEVATION EXCEEDS 3.5 FROM FINISH GRADE. EXTENSION STEM TO COME WITHIN 12"–18" OF FINISH GRADE.

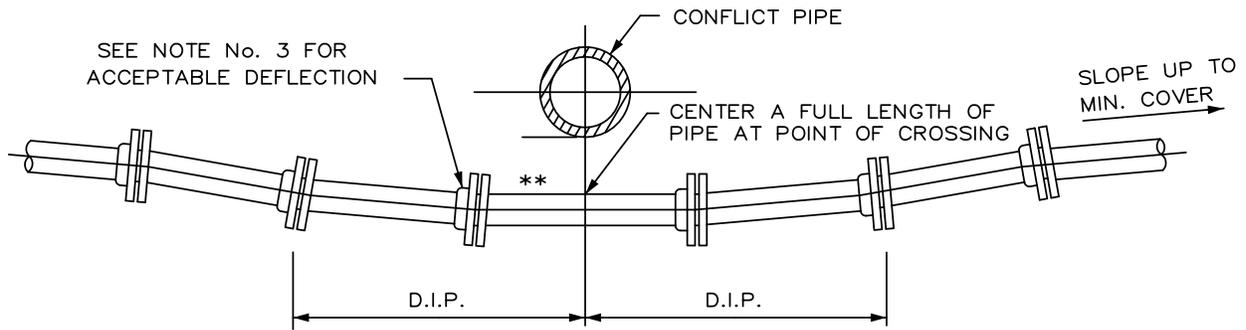
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	TYPICAL VALVE SETTING	PAGE No. W-6
---------------------------	-----------------------	---------------------



FITTING TYPE

ELECTRONIC MARKERS (TYP) 



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 30" COVER TO FINISHED GRADE AND MEET CURRENT FDEP SEPARATION STANDARDS.
2. THE DEFLECTION TYPE CROSSING IS PREFERRED.
3. DO NOT EXCEED 75% OF MANUFACTURERS RECOMMENDED MAXIMUM JOINT DEFLECTION.
4. MECHANICALLY RESTRAIN ALL FITTINGS, AS PER MANUFACTURERS RECOMMENDATION AND APPROVED CONSTRUCTION PLANS.
5. LOCATOR DISCS MUST BE PLACED ON ALL FITTING TYPE DEFLECTIONS.

* 36" MIN IN STATE ROAD R/W AND UNDER ASPHALT

** SEPARATION TO CONFORM WITH LATEST FDEP SEPARATION REQUIREMENTS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>PRESSURE PIPE CONFLICT DETAIL</p>	<p>PAGE No.</p> <p>W-7</p>
----------------------------------	--------------------------------------	----------------------------

MIN. LENGTH OF PIPE (FEET) 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)

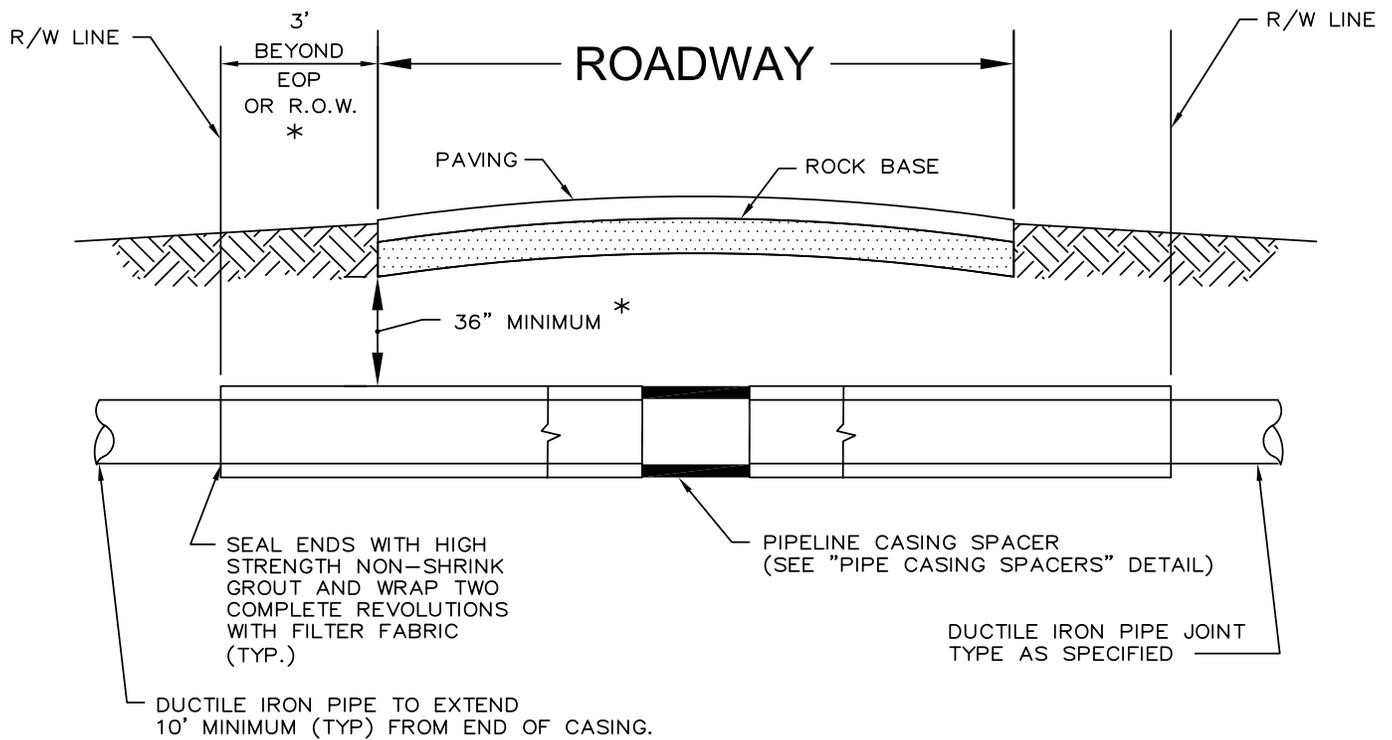
FITTING TYPE	PIPE SIZE								200psi				
	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"	
90° HORIZ. BEND	14	20	25	30	35	45	54	62	98	112	124	135	
45° HORIZ. BEND	6	8	11	13	15	19	22	26	41	46	51	56	
22.5° HORIZ. BEND	3	4	5	6	7	9	11	12	19	22	25	27	
11.25° HORIZ. BEND	1	2	3	3	4	4	5	6	10	11	12	13	
90° VERT. OFFSET	UPPER BEND	29	41	53	64	74	95	115	134	214	246	276	304
	LOWER BEND	7	10	13	16	19	25	30	35	57	66	74	83
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56	89	102	114	126
	LOWER BEND	3	4	6	7	8	10	12	15	23	27	31	34
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27	43	49	55	60
	LOWER BEND	1	2	4	4	4	5	6	7	11	13	15	16
11.25° VERT. OFFSET	UPPER BEND	3	4	6	7	8	9	11	13	21	24	27	30
	LOWER BEND	1	1	1	2	2	2	3	3	6	6	7	8
PLUG (DEAD END)	32	45	59	70	83	107	129	151	214	246	276	304	
IN-LINE VALVE	32	45	45	45	45	55	65	80	110	125	140	155	
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	208	-	-	
	36"X ø	1	1	22	39	54	80	103	124	206	240	-	
	42"X ø	1	1	15	33	49	77	100	122	205	239	270	
48"X ø	1	1	7	27	44	73	97	120	203	238	269	298	
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	-	-	-	-		
200psi	30"X ø	209	204	197	188	177	153	116	75	-	-	-	
	36"X ø	243	236	233	226	217	196	168	135	74	-	-	
	42"X ø	273	270	265	259	252	234	211	183	133	72	-	
	48"X ø	301	298	294	289	283	268	249	226	183	131	71	

NOTES:

- THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:
 SOIL TYPE-SAND TEST PRESSURE-150 PSI/200 PSI DEPTH OF BURY-3'
 TRENCH TYPE-3 SAFETY FACTOR- 1.5 VERTICAL OFFSET-3'
 MINIMUM PIPE LENGTH ALONG TEE RUN-5'
- THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
- ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
- RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.
- MULTIPLY PIPE LENGTH BY 1.4 FOR POLYETHYLENE ENCASED PIPE.
- RESTRAINED PIPE LENGTHS EQUAL TO AN "INLINE VALVE" CONDITION ARE REQUIRED AT EACH END OF A TRANSITION FROM HDPE PIPE TO OTHER PIPE MATERIALS.
- DESIGN ENGINEER IS RESPONSIBLE TO PROPERLY SIZE THE RESTRAINT PIPE LENGTHS FOR THE PROJECT

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	MECHANICAL JOINT RESTRAINT REQUIREMENTS	PAGE No. W-8
OCT. 2017		



	NOMINAL PIPE SIZE	* STEEL CASING	* THICKNESS SCHEDULE
FIELD LOK GASKET	4"	12"	.375
	6"	16"	.375
	8"	18"	.375
	10"	20"	.375
	12"	24"	.375
RESTRAINED JOINT	14"	24"	.375
	16"	30"	.375
	18"	30"	.375
	20"	36"	.375
	24"	42"	.500
	30"	48"	.500
	36"	54"	.500
	42"	60"	.500
48"	72"	.500	

* INDICATES A MINIMUM. DISTANCE MAY BE INCREASED TO SUIT D.O.T., RAILROAD OR VOW. PERMIT REQUIREMENTS OR TYPE OF RESTRAINED JOINT TO BE USED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

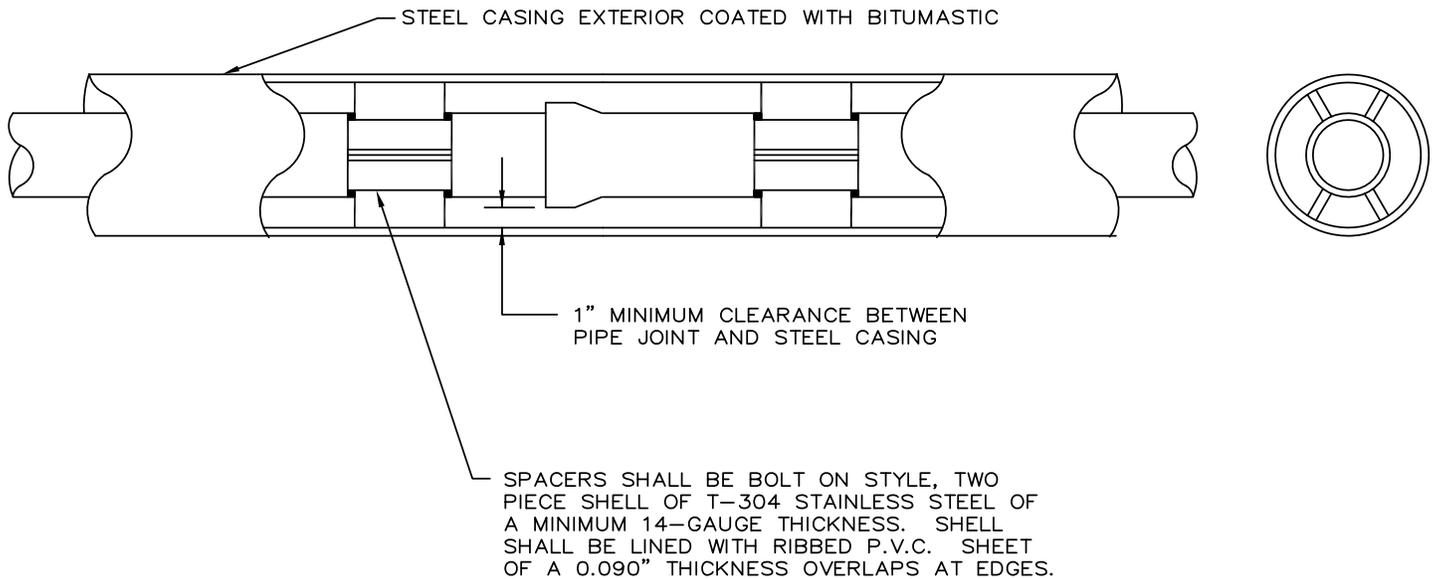
REVISION

CASING INSTALLATION DETAIL

PAGE No.

W-9

OCT. 2017



NOTES:

1. U.S. PIPE FIELD LOK GASKET SYSTEM SHALL BE USED FOR 4" THRU 12" DIAMETER PIPE.
2. RESTRAINED MECHANICAL JOINTS SHALL BE USED FOR PIPE 14" DIAMETER AND ABOVE AND SHALL HAVE FACTORY WELDED RETAINING RINGS. AMERICAN RESTRAINED JOINT PIPE OR APPROVED EQUAL MAY BE USED.
3. FOR PIPE 4" THRU 48" DIAMETER, CASING SPACERS ARE REQUIRED 24" FROM EACH END AND TWO (2) SPACES PER PIPE-JOINT EVENLY SPACED ALONG PIPE JOINT. (CASCADE MFG. CO. OR APPROVED EQUAL REQUIRED).
4. PROVIDE ADDITIONAL CASING SPACER @ 24" FROM EACH END.
5. THE CARRIER PIPE SHALL BE CENTERED WITHIN THE CASING AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

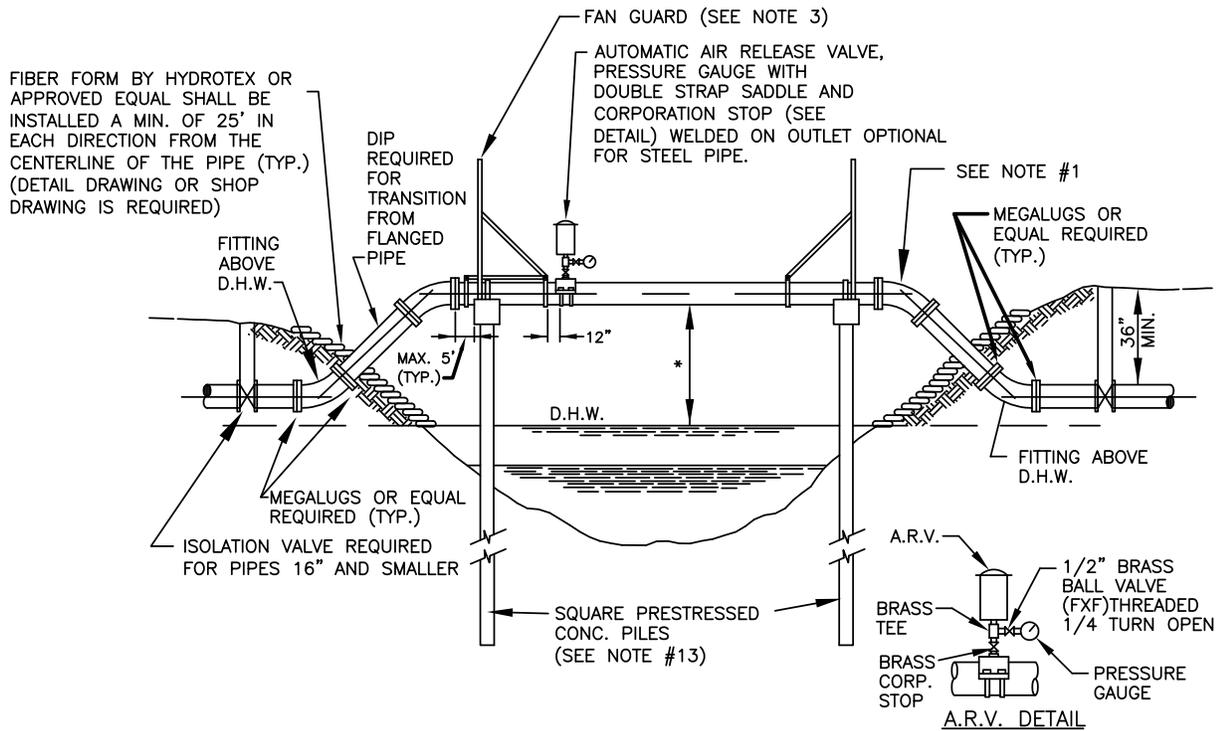
REVISION

PIPE CASING SPACERS DETAIL

PAGE No.

W-10

OCT. 2017



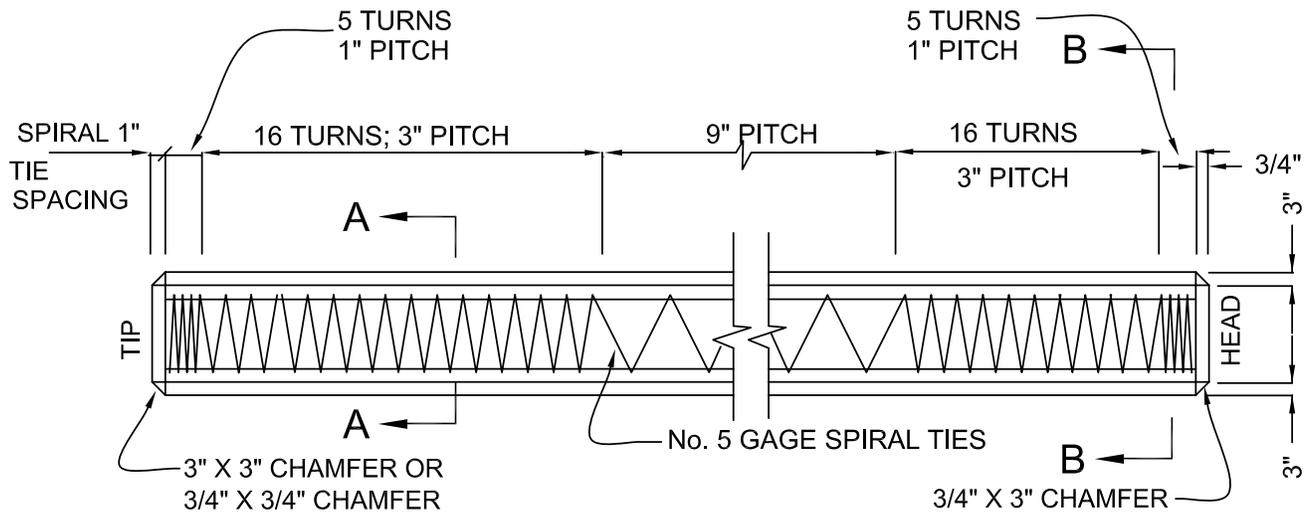
NOTES:

1. ALL EXPOSED PIPE SHALL BE DUCTILE IRON WITH FLANGED FITTINGS. RETAINER GLANDS AND UNIFLANGE TYPE FITTINGS ARE NOT ALLOWED. O-RING GASKETS ARE REQUIRED FOR FLANGED FITTINGS AND JOINTS.
2. SPAN LENGTHS AS REQUIRED BY PERMITTING AGENCY AND IN ACCORDANCE WITH PIPE MANUFACTURERS RECOMMENDATION. LENGTH OF SPAN WILL DETERMINE NUMBER OF PILES REQUIRED.
3. FAN GUARDS ARE REQUIRED. LOCATION OF FAN GUARD ON PIPE REQUIRES V.O.W. APPROVAL PRIOR TO PLACEMENT. SEE FAN GUARD/PILE CAP DESIGN DETAILS FOR ADDITIONAL REQUIREMENTS. ACCESS PLATFORM AND GATE REQUIRED ON ARV SIDE ONLY. SUBMIT SHOP DRAWINGS FOR APPROVAL.
- 4A. ALL EXPOSED PIPING SHALL BE PAINTED AS SPECIFIED IN THE APPROVED MATERIAL LIST.
- 4B. ALL HARDWARE SHALL BE PAINTED WITH COAL-TAR EPOXY.
5. PIPE SHALL BE CRADLED ON 1/2" THICK NEOPRENE.(DUROMETER GRADE 50,) CURRENT FDOT STANDARDS APPLY. NEOPRENE IS REQUIRED AT ALL STRAPS INSTALLED OVER STEEL PIPE. NEOPRENE SHALL EXTEND MIN. 1" BEYOND THE EDGES OF CRADLE AND STRAPS.
6. TIE-DOWN STRAPS SHALL FIT PROPERLY AND SECURE PIPE IN CRADLE. PIPE SHALL BE CRADLED ON NEOPRENE, MIN. 1/2" THICK.
7. PIPE CRADLE IN CAP SHALL CONTACT 2/3 CIRCUMFERENCE OF PIPE. (SEE FAN GUARD DETAIL)
8. SHOW EXISTING CANAL CROSS SECTION, ULTIMATE CANAL SECTION AND RELEVANT ELEVATIONS AND DISTANCES ON A TO SCALE DETAIL DRAWING.
9. PILE LIFT CABLE SHALL BE REMOVED BELOW SURFACE; HOLE SHALL BE FILLED WITH EPOXY CEMENT.
10. THREADED AREAS OF BRASS FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
11. THE PRESSURE GAUGE SHALL FACE THE CLOSEST FAN GUARD.
12. THE PRESSURE GAUGE SHALL BE "ASHCROFT NO. 45-1009A" OR APPROVED EQUAL.
13. THE PILES AND CAP DESIGN SHALL BE SHOWN ON TO SCALE SIGNED AND SEALED DETAIL DRAWINGS. (MIN. 12"x12" TYPE 1A FLORIDA DOT INDEX PILES ARE REQUIRED.) PILE PENETRATION BELOW CANAL BOTTOM SHALL BE 15' MINIMUM. MINIMUM LOAD CAPACITY OF 20 TONS PER PILE IS REQUIRED (FDOT STANDARDS APPLY). SIGNED AND SEALED SHOP DRAWINGS ARE REQUIRED. SHOP DRAWINGS MUST BE APPROVED PRIOR TO SCHEDULING A PRE-CONSTRUCTION MEETING.
14. 306 STAINLESS STEEL REQUIRED FOR ALL STRAPS, SADDLES, FLANGE BOLTS, NUTS AND OTHER HARDWARE FOR INSTALLATIONS OVER ALL WATER BODIES (ANTI-GALL COMPOUND TO BE USED WHEN ASSEMBLING STAINLESS STEEL NUTS AND BOLTS)

* PER REGULATORY AGENCY REQUIREMENTS

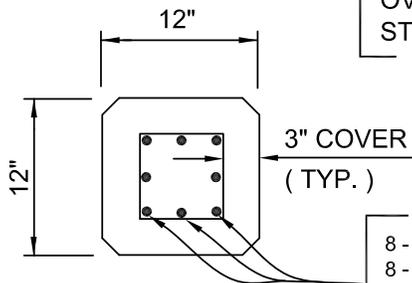
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	CANAL CROSSING DETAIL (AERIAL)	PAGE No.
OCT. 2017		W-11



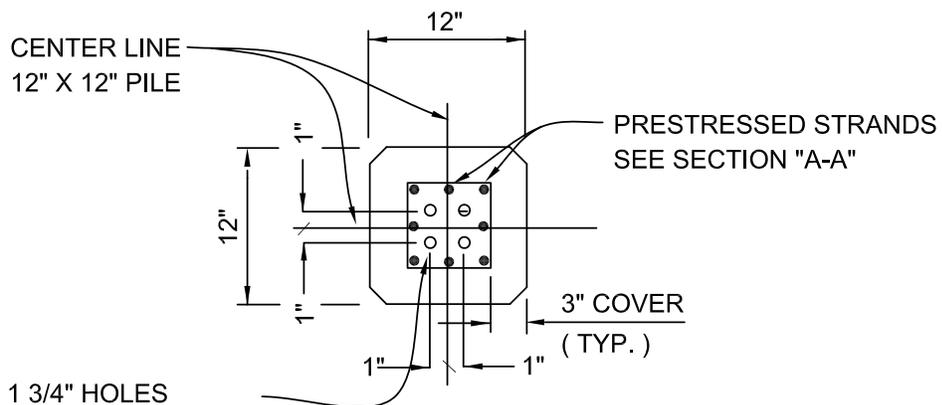
ELEVATION OF 12" X 12" PILE

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



SECTION "A-A"

8 - 7/16" O L.R./S. - AS - 0.115 in. - 270K @ 21.700# EA. SPACED 2 9/16" CTRS.
 8 - 1/2" O S.R./S. - AS - 0.144 in. - 250K @ 24.400# EA. SPACED 2 1/2" CTRS.
 12 - 3/8" O L.R./S. - AS - 0.085 in. - 270K @ 14.800# EA. SPACED 1 11/16" CTRS.
 12 - 3/8" O S.R./S. - AS - 0.085 in. - 270K @ 15.800# EA. SPACED 1 11/16" CTRS.



PROVIDE 4 - 1 3/4" HOLES
 FOR 4 - No. 10 DOWELS
 4 - 10" LG. GR. 60

SECTION "B-B"

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONCRETE PILE DETAIL

PAGE No.

W-12

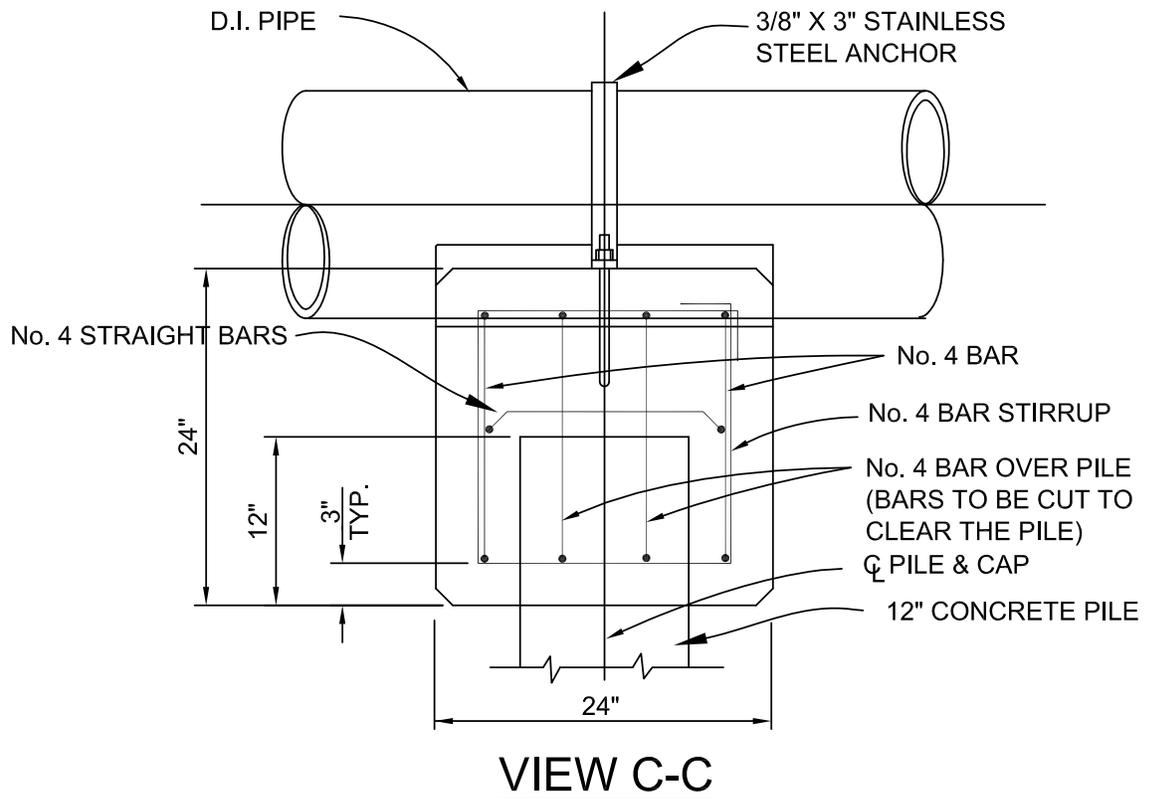
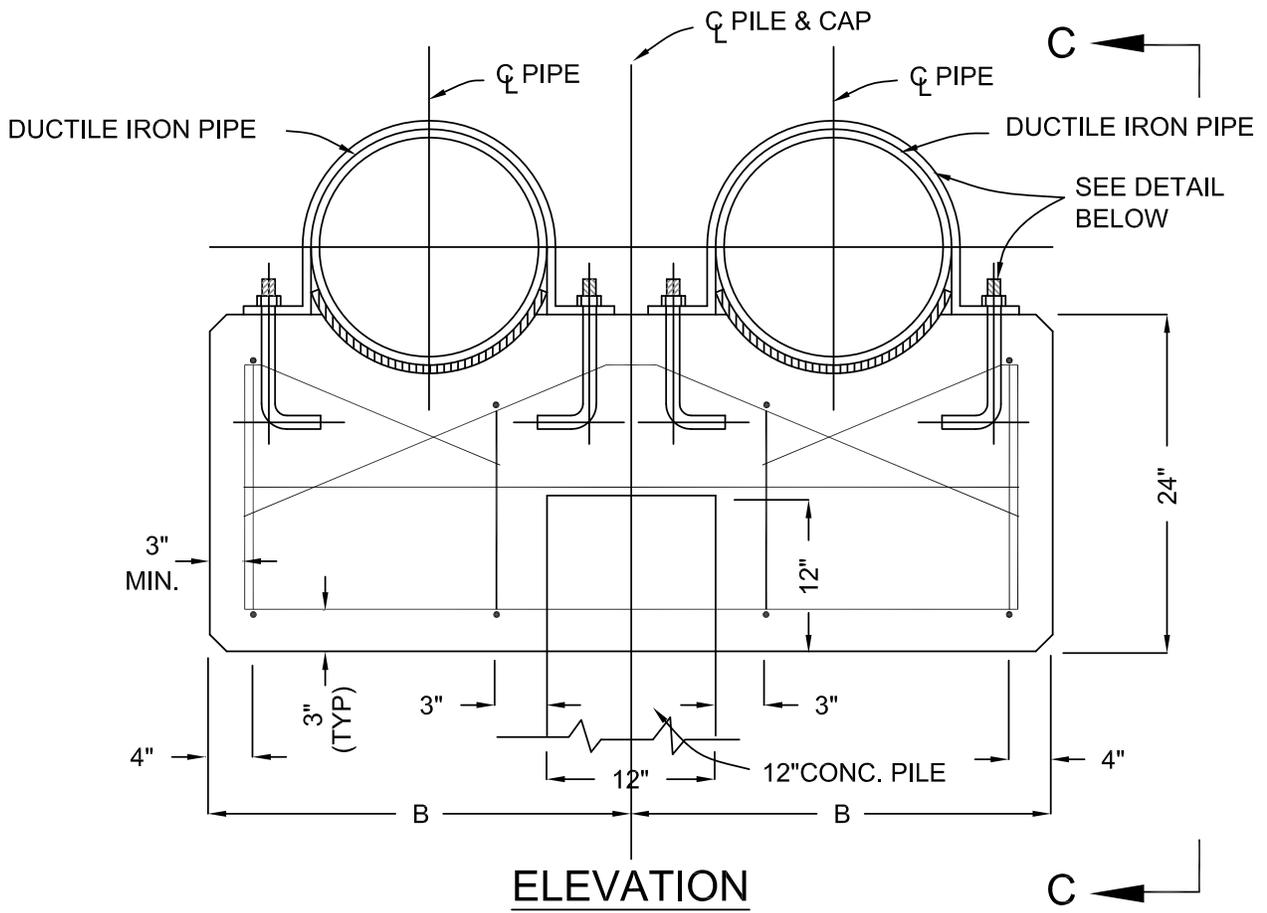
OCT. 2017

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

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	CONCRETE PILE NOTES	PAGE No. W-13
---------------------------	---------------------	----------------------

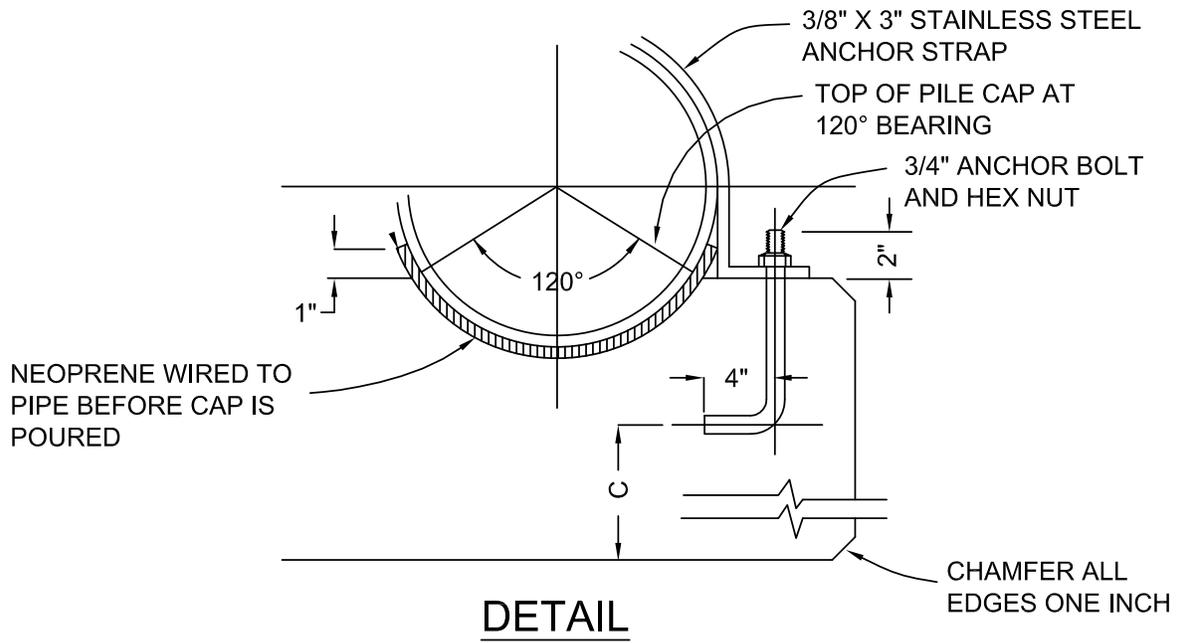


V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION
OCT. 2017

DUAL PILE CAP SUPPORT DETAIL

PAGE No.
W-14



PIPE DIA.	PILE SIZE	DIMENSIONS		
		A	B	C
4"	12"x12"	24"	16"	16"
8"	12"x12"	24"	20"	16"
12"	12"x12"	26"	26"	14"
16"	12"x12"	30"	30"	16"

NOTE:
ALL REINF. STEEL SHALL BE No. 4 BARS

V.O.W. CONSTRUCTION STANDARDS & DETAILS

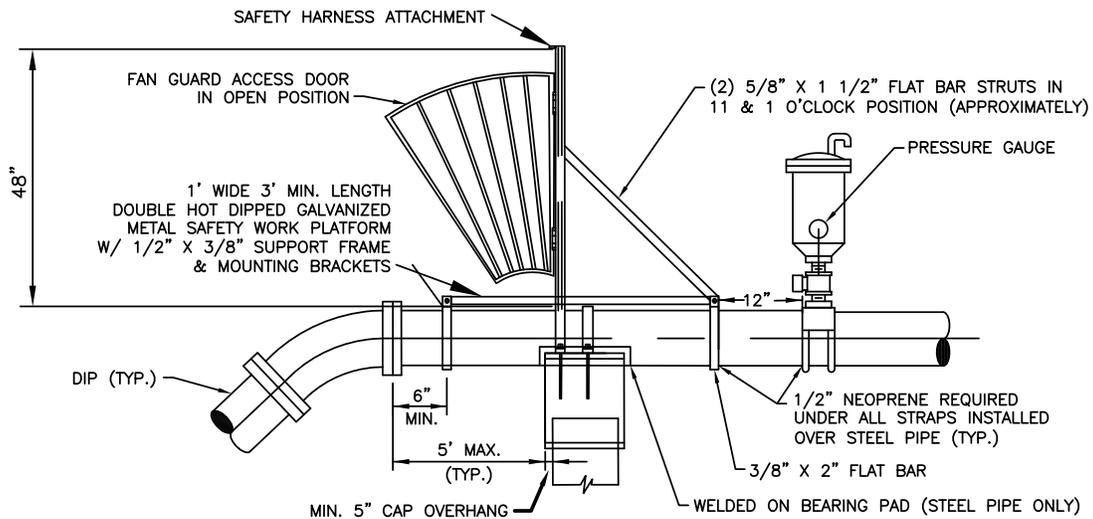
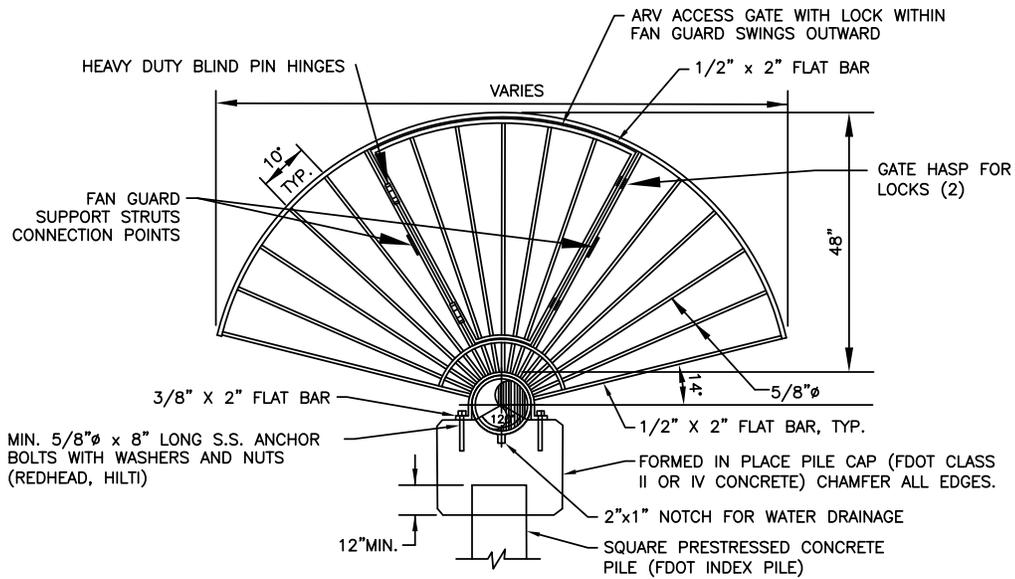
REVISION

PILE CAP SUPPORT DETAILS

PAGE No.

W-15

OCT. 2017



NOTES:

1. FAN GUARDS SHALL BE PLACED AT EACH END OF CANAL CROSSING.
2. HARDWARE SHALL BE PAINTED WITH COAL TAR EPOXY.
3. FANGUARD WITH HARDWARE SHALL BE FABRICATED FROM DOUBLE HOT DIPPED GALVANIZED STEEL.
4. SHOP DRAWINGS FOR FANGUARDS, CAPS, AND PILES MUST BE SUBMITTED TO V.O.W. UTILITY DEPARTMENT FOR REVIEW AND APPROVAL PRIOR TO SCHEDULING A PRE-CONSTRUCTION MEETING.
5. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60. MIN. 2" CONCRETE COVER OVER ALL STEEL.
6. SEE "CANAL CROSSING DETAIL (AERIAL)" FOR ADDITIONAL REQUIREMENTS.
7. NO WELDING OF REBAR TO REBAR OR REBAR TO PILE STRANDS SHALL BE ALLOWED.
8. DESIGN DRAWINGS ARE REQUIRED.
9. IF A PILE/CAP STEEL CONNECTION IS REQUIRED BY DESIGNING ENGINEER, MIN. (4) #8 REINFORCEMENT BARS SHALL BE DRILLED AND DOWELED (EPOXIED) MIN. 16" DEEP INTO THE PILE AND TIED WITH THE CAP STEEL.
10. ACCESS PLATFORM AND GATE REQUIRED ON ARV SIDE ONLY.
11. WHEN DOUBLE PIPELINES ARE BEING CONSTRUCTED, SUBMIT SIMILAR PLANS AS REQUIRED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

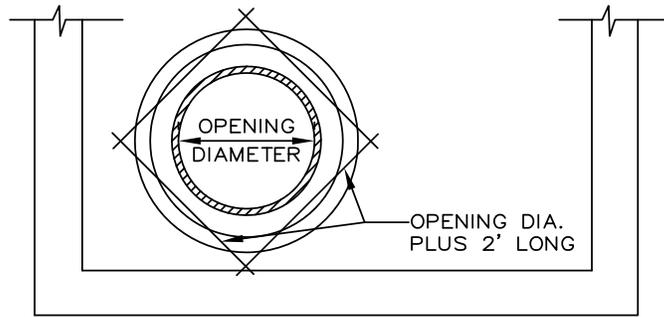
REVISION

FAN GUARD FOR SINGLE PIPE

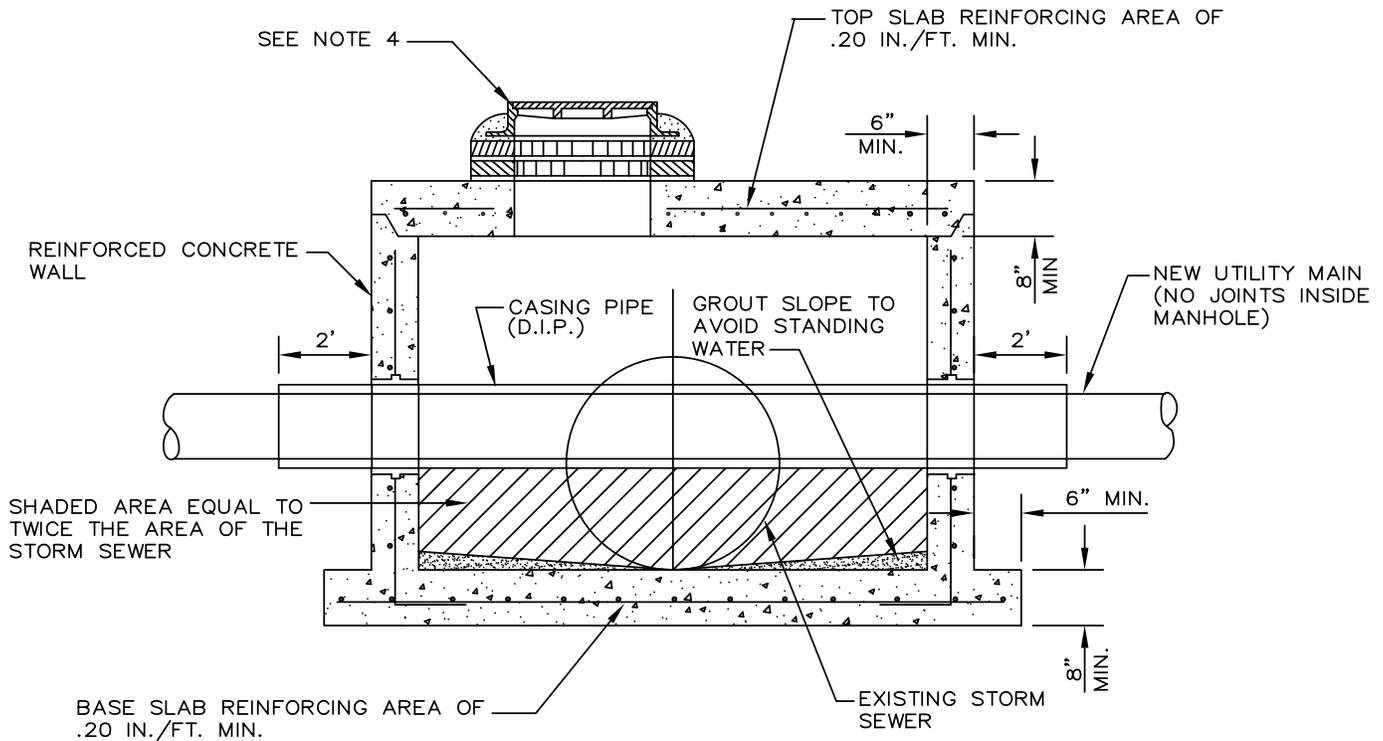
PAGE No.

W-16

OCT. 2017



PARTIAL PLAN

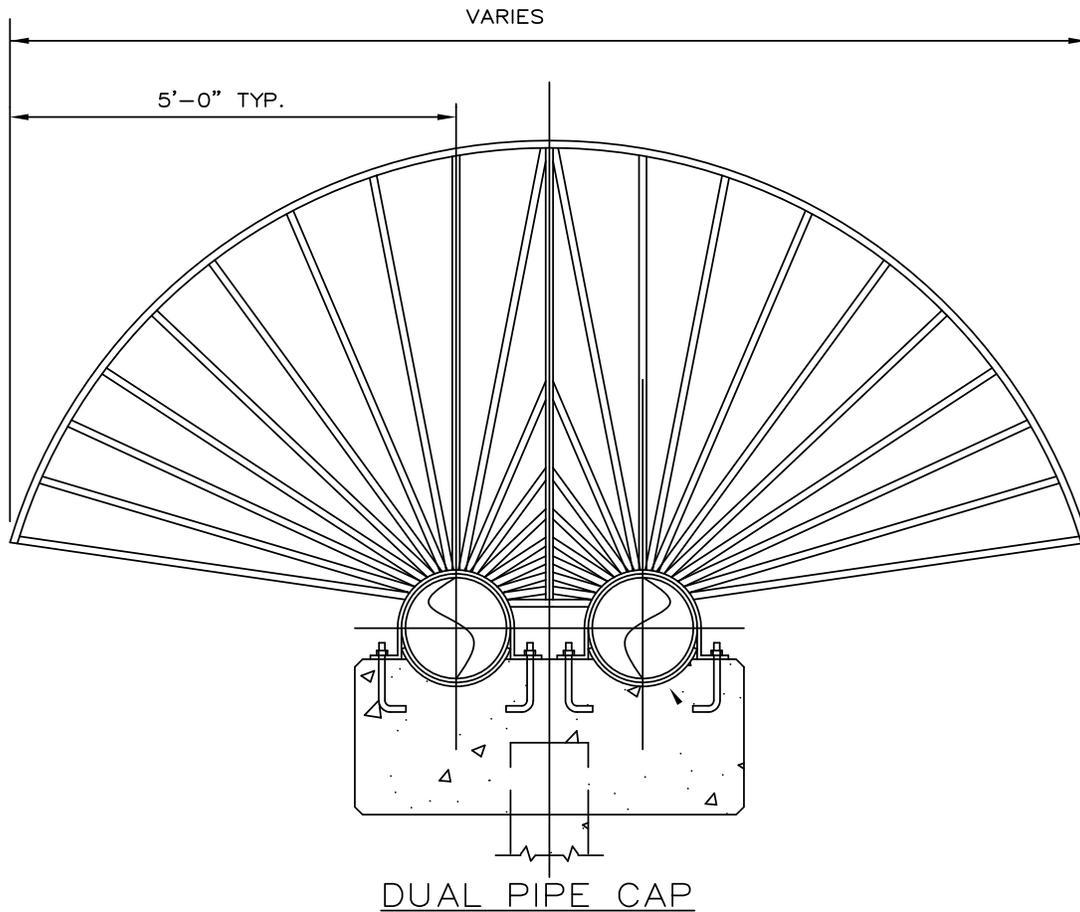


NOTES:

1. WHERE CONDITIONS PERMIT THE LOWEST POINT OF CONFLICT MAIN AT OR ABOVE CENTER LINE OF STORM SEWER.
2. CONFLICT MANHOLES WILL BE ALLOWED WHERE DESIGN PROBLEMS AND ECONOMICS PROVE THEM TO BE THE ONLY VIABLE SOLUTION AS APPROVED BY V.O.W.
3. CONFLICT MANHOLES WILL NOT BE ALLOWED FOR WATER MAINS CROSSING GRAVITY WASTEWATER SYSTEMS.
4. USF RING WITH SELF SEALING COVER MODEL USF 663-AB-M.
FOR WATER MAIN APPLICATIONS, "WATER" TO BE CAST IN COVER
FOR WASTEWATER APPLICATIONS, "SEWER" TO BE CAST IN COVER
5. ALL OPENINGS AND PIPING ENTERING / EXITING STRUCTURE SHALL BE SEALED WITH WATERPROOF NON SHRINKING GROUT OR APPROVED EQUAL.
6. FOR CASING PIPE AND SPACER REQUIREMENTS, SEE APPLICABLE DETAILS WITHIN.
7. CASING DIAMETER TO BE SIZED 1.5 TIMES CARRIER PIPE. (I.E. 8" CARRIER / 12" CASING).
8. FOR EXISTING WM/FM APPLICATIONS - CASING TO BE SPLIT IN HALF WITH 2" ANGLE IRON WELDED TO EACH HALF WITH HOLES DRILLED 12" O.C. FOR 1/2" STAINLESS STEEL BOLTS.(316SS).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>CONFLICT MANHOLE DETAIL</p>	<p>PAGE No.</p> <p>W-18</p>
----------------------------------	--------------------------------	-----------------------------

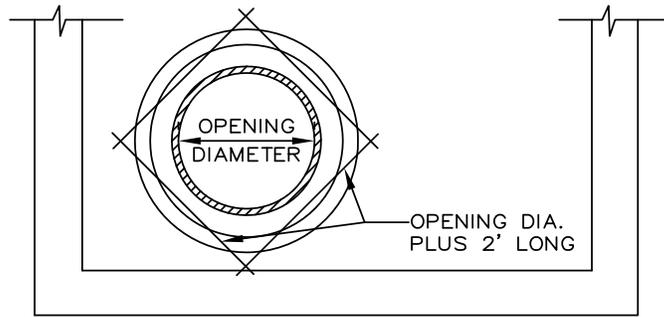


NOTES:

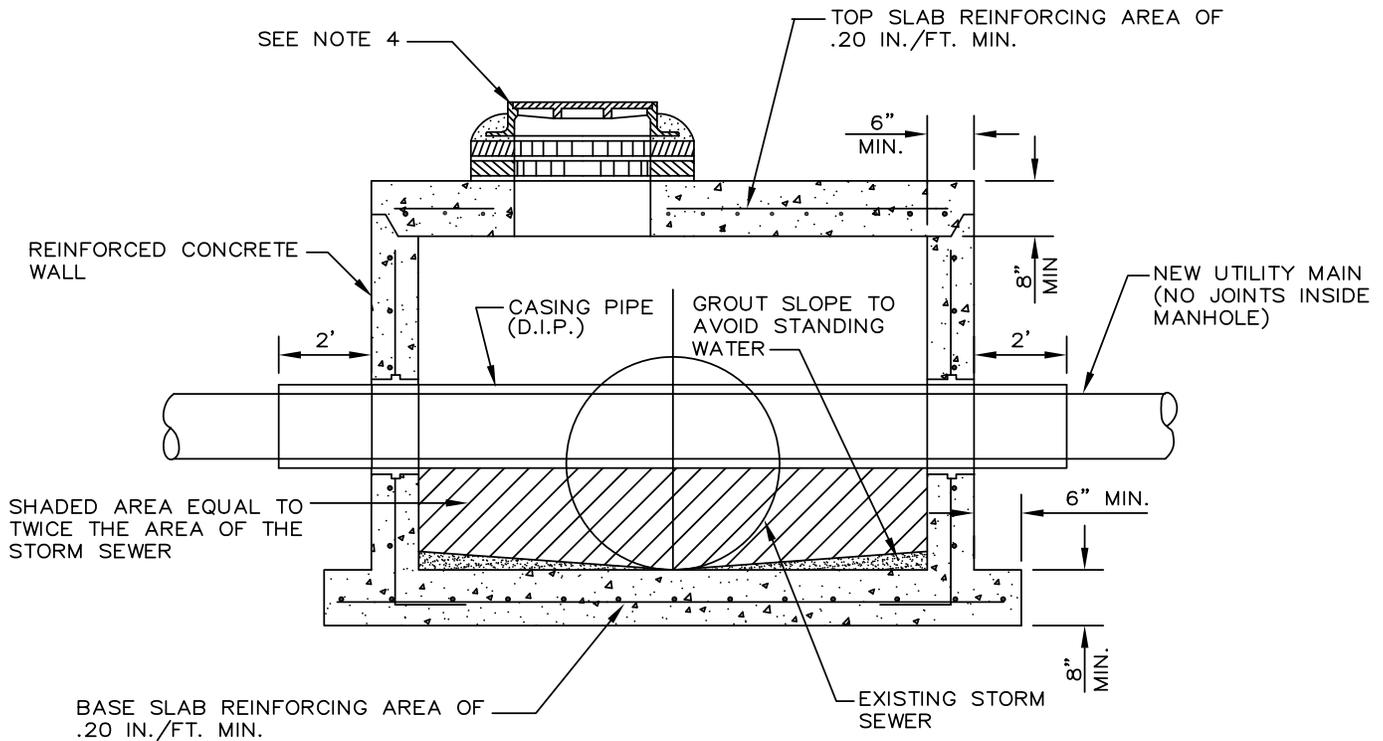
1. FAN GUARDS SHALL BE PLACED AT EACH END OF CANAL CROSSING.
2. HARDWARE SHALL BE PAINTED WITH COAL TAR EPOXY.
3. FANGUARD WITH HARDWARE SHALL BE FABRICATED FROM DOUBLE HOT DIPPED GALVANIZED STEEL.
4. SHOP DRAWINGS FOR FANGUARDS, CAPS, AND PILES MUST BE SUBMITTED TO V.O.W. UTILITY DEPARTMENT FOR REVIEW AND APPROVAL PRIOR TO SCHEDULING A PRE-CONSTRUCTION MEETING.
5. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60. MIN. 2" CONCRETE COVER OVER ALL STEEL.
6. SEE "CANAL CROSSING DETAIL (AERIAL)" FOR ADDITIONAL REQUIREMENTS.
7. NO WELDING OF REBAR TO REBAR OR REBAR TO PILE STRANDS SHALL BE ALLOWED.
8. DESIGN DRAWINGS ARE REQUIRED.
9. IF A PILE/CAP STEEL CONNECTION IS REQUIRED BY DESIGNING ENGINEER, MIN. (4) #8 REINFORCEMENT BARS SHALL BE DRILLED AND DOWELED (EPOXIED) MIN. 16" DEEP INTO THE PILE AND TIED WITH THE CAP STEEL.
10. ACCESS PLATFORM AND GATE REQUIRED ON ARV SIDE ONLY.
11. WHEN DOUBLE PIPELINES ARE BEING CONSTRUCTED, SUBMIT SIMILAR PLANS AS REQUIRED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	FAN GUARD FOR DOUBLE PIPE	PAGE No. W-17
OCT. 2017		



PARTIAL PLAN



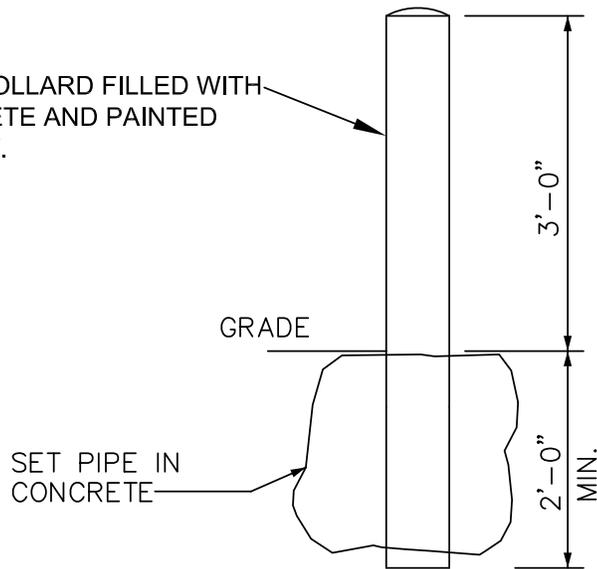
NOTES:

1. WHERE CONDITIONS PERMIT THE LOWEST POINT OF CONFLICT MAIN AT OR ABOVE CENTER LINE OF STORM SEWER.
2. CONFLICT MANHOLES WILL BE ALLOWED WHERE DESIGN PROBLEMS AND ECONOMICS PROVE THEM TO BE THE ONLY VIABLE SOLUTION AS APPROVED BY V.O.W.
3. CONFLICT MANHOLES WILL NOT BE ALLOWED FOR WATER MAINS CROSSING GRAVITY WASTEWATER SYSTEMS.
4. USF RING WITH SELF SEALING COVER MODEL USF 663-AB-M.
FOR WATER MAIN APPLICATIONS, "WATER" TO BE CAST IN COVER
FOR WASTEWATER APPLICATIONS, "SEWER" TO BE CAST IN COVER
5. ALL OPENINGS AND PIPING ENTERING / EXITING STRUCTURE SHALL BE SEALED WITH WATERPROOF NON SHRINKING GROUT OR APPROVED EQUAL.
6. FOR CASING PIPE AND SPACER REQUIREMENTS, SEE APPLICABLE DETAILS WITHIN.
7. CASING DIAMETER TO BE SIZED 1.5 TIMES CARRIER PIPE. (I.E. 8" CARRIER / 12" CASING).
8. FOR EXISTING WM/FM APPLICATIONS - CASING TO BE SPLIT IN HALF WITH 2" ANGLE IRON WELDED TO EACH HALF WITH HOLES DRILLED 12" O.C. FOR 1/2" STAINLESS STEEL BOLTS.(316SS).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>CONFLICT MANHOLE DETAIL</p>	<p>PAGE No.</p> <p>W-18</p>
----------------------------------	--------------------------------	-----------------------------

4" DIP BOLLARD FILLED WITH
CONCRETE AND PAINTED
YELLOW.



V.O.W. CONSTRUCTION STANDARDS & DETAILS

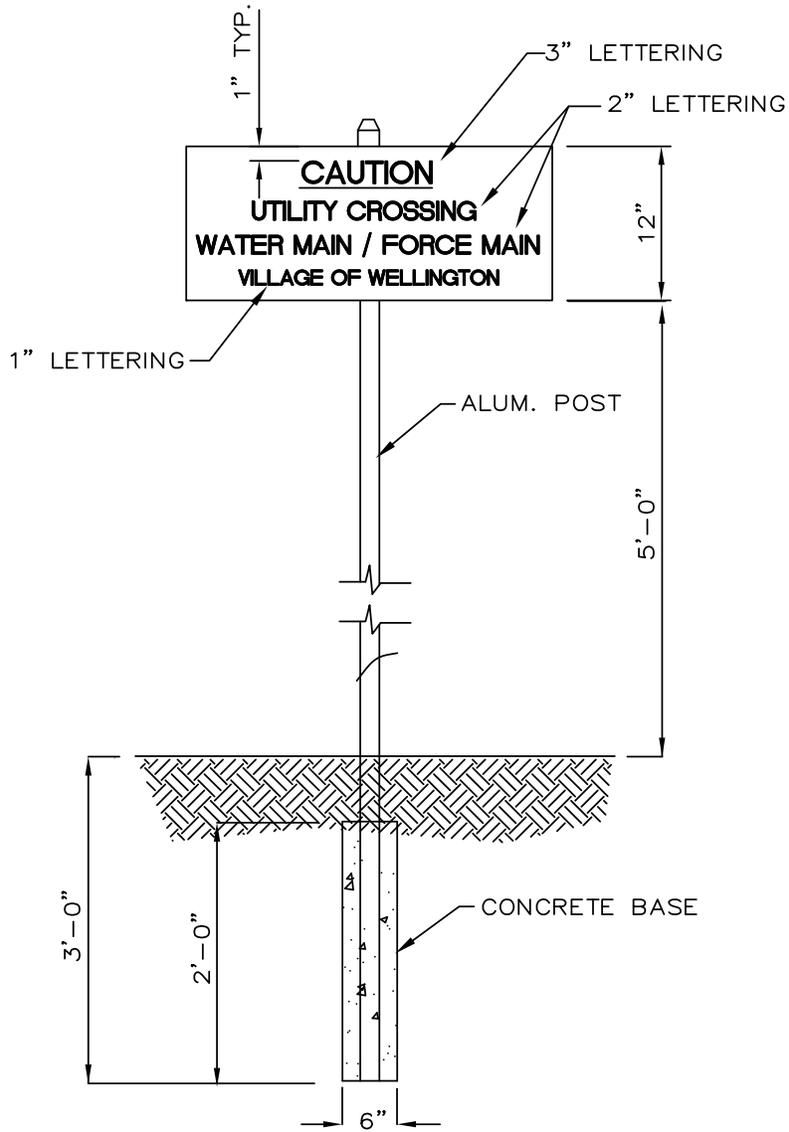
REVISION

PIPE BOLLARD DETAIL

PAGE No.

W-19

OCT. 2017



V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CAUTION SIGN DETAIL

PAGE No.

W-20

OCT. 2017

CONSTRUCTION PROCEDURES

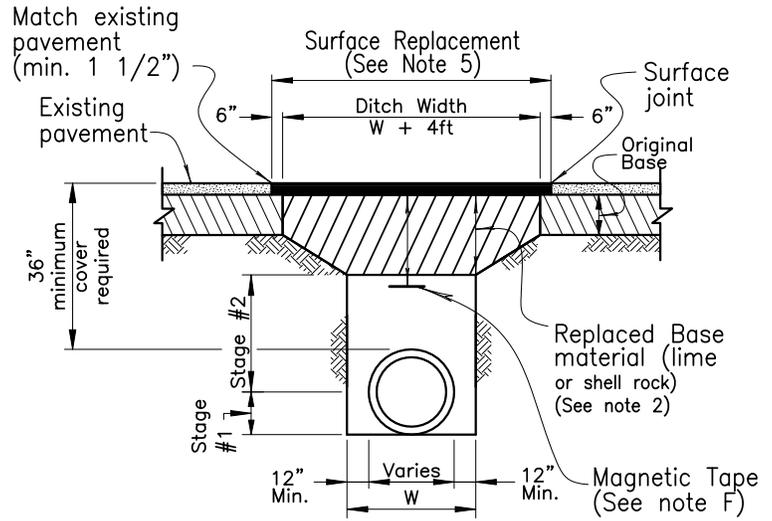
THE BACKFILL FOR THE FIRST AND SECOND STAGES SHALL BE PLACED IN 6" LIFTS. (COMPACTED THICKNESS) AND SHALL BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99.

STAGE 1:

THE CONTRACTOR 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.

STAGE 2:

THE CONTRACTOR SHALL OBTAIN A WELL-COMPACTED BED AND FILL ALONG THE SIDES OF THE PIPE AND TO A POINT INDICATING THE TOP OF SUB-GRADE MATERIAL.



REPLACEMENT OF FLEXIBLE PAVEMENT FOR PERMITTED PAVEMENT CUT

CONSTRUCTION NOTES

- 1) BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK 3/8" - 7/8" SIZING WITH EQUAL OR GREATER STRUCTURAL ADEQUACY AS EXISTING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED.
- 2) REPLACED BASE MATERIAL (PER LAND DEVELOPMENT DESIGN STANDARDS) OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE OR 12" MINIMUM, WHICHEVER IS GREATER.
- 3) ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED AND BUTT-JOINTED.
- 4) BASE MATERIAL SHALL BE PLACED IN TWO OR THREE LAYERS (6" MAX. PER LAYER) AND EACH LAYER THOROUGHLY ROLLED OR TAMPED TO THE SPECIFIED DENSITY.
- 5) SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE OR 1 1/2" SI ASPHALTIC CONCRETE WITH RC-70 PRIME COAT AT 0.10 GAL/SQ. YD.
- 6) PIPE SHALL BE PLACED IN A DRY TRENCH.

GENERAL NOTES

- A) ALL ROADWAY REPAIR WORK SHALL BE PERFORMED IN CONFORMANCE WITH APPLICABLE FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- B) DENSITY TESTS SHALL BE TAKEN IN 1 FT LIFTS ABOVE THE PIPE AT INTERVALS OF 400 FT MAXIMUM (1 SET MINIMUM) OR AS DIRECTED BY THE CONSTRUCTION COORDINATION DIVISION. RESULTS SHALL BE SUBMITTED TO CONSTRUCTION COORDINATION DIVISION AS PART OF THEIR FIELD REVIEW.
- C) ENGINEER-OF-RECORD SHALL PROVIDE FULL-TIME INSPECTION DURING THE ENTIRETY OF THE OPEN-CUT OPERATION, BEGINNING WITH THE EXCAVATION AND CONTINUING THROUGH THE COMPLETION OF THE PAVING.
- D) IF THE PAVEMENT IS NOT COMPLETELY RESTORED IMMEDIATELY FOLLOWING THE OPEN CUT, A SMOOTH TEMPORARY PATCH (MINIMUM 1.25" ASPHALT) SHALL BE INSTALLED, PROPERLY MATCHING THE EXISTING GRADING OF THE ROADWAY. THE TEMPORARY PATCH SHALL BE ALLOWED TO REMAIN IN PLACE AND BE MAINTAINED FOR A PERIOD NO LONGER THAN 45 DAYS. THE COUNTY RETAINS THE RIGHT TO USE POSTED SURETY TO COMPLETE ANY RESTORATION WORK THAT HAS NOT BEEN COMPLETED IN THE 45 DAYS PERIOD. ALTERNATIVE TEMPORARY TRENCH PROTECTION (STEEL PLATES OR OTHERS) MAY BE APPROVED BY THE CONSTRUCTION COORDINATION DIVISION.
- E) FOR THE FINAL RESTORATION, THE ROAD SHALL BE MILLED AND RESURFACED WITH 1-1/2" (ONE AND A HALF INCH) OF SIII OR SI ASPHALT SURFACE COURSE FOR A FULL LANE WIDTH ENCROACHED BY THE TRENCH.
- F) APPROVED MAGNETIC TAPE IS REQUIRED FOR ALL MAIN PRESSURE PIPES AND CONDUIT IN THE VILLAGE'S RIGHT-OF-WAY. INSTALL TAPE 24" BELOW FINISHED GRADE.
- G) CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP WATER MAINS (BLUE), DIP SANITARY MAINS (GREEN), DIP RECLAIMED WATER MAINS (PURPLE), GAS MAINS (YELLOW), OR AS REQUIRED BY THE APWA.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>OPEN CUT PIPE INSTALLATION NON-THOROUGHFARE ROAD</p>	<p>PAGE No.</p> <p>W-21</p>
----------------------------------	---	-----------------------------

CONSTRUCTION PROCEDURES

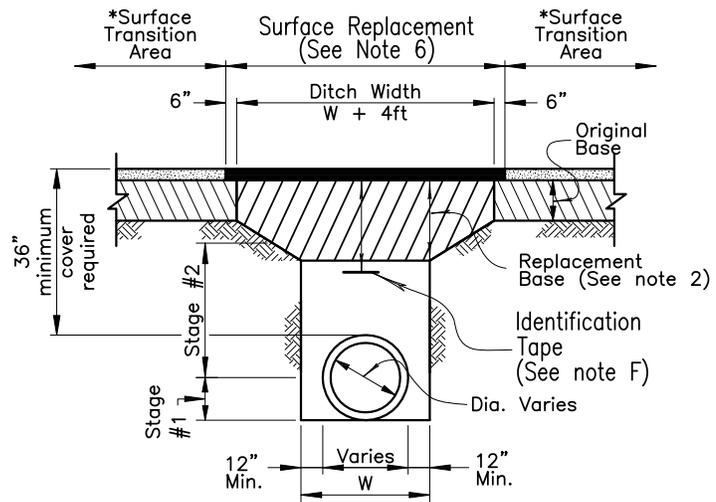
THE BACKFILL FOR THE FIRST AND SECOND STAGES SHALL BE PLACED IN 6" LIFTS (COMPACTED THICKNESS) AND SHALL BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99.

STAGE 1:

THE CONTRACTOR 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.

STAGE 2:

THE CONTRACTOR SHALL OBTAIN A WELL-COMPACTED BED AND FILL ALONG THE SIDES OF THE PIPE AND TO A POINT INDICATING THE TOP OF SUB-GRADE MATERIAL.



REPLACEMENT OF FLEXIBLE PAVEMENT FOR PERMITTED PAVEMENT CUT

CONSTRUCTION NOTES

- 1) BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK 3/8" - 7/8" SIZING WITH EQUAL OR GREATER STRUCTURAL ADEQUACY AS EXISTING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED.
- 2) REPLACED BASE MATERIAL OVER DITCH SHALL BE 16" MINIMUM FOR THOROUGHFARE PLAN ROADS.
- 3) ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED AND BUTT-JOINTED.
- 4) BASE MATERIAL (PER ROADWAY PRODUCTION DESIGN STANDARDS) SHALL BE PLACED IN TWO OR THREE LAYERS (6" MAX. PER LAYER) AND EACH LAYER THOROUGHLY ROLLED OR TAMPED TO THE SPECIFIED DENSITY.
- 5) * SURFACE TRANSITION AREA (SEE PLANS FOR LOCATION). OVERLAY OR MILL/RESURFACE FOR A DISTANCE OF 50' ON BOTH SIDES OF THE OPEN CUT AND FOR A FULL LANE WIDTH.
- 6) 1" SIII ASPHALTIC CONCRETE OVER 1 1/2" SI ASPHALTIC CONCRETE WITH RC-70 PRIME COAT AT 0.10 GAL/SQ. YD.
- 7) PIPE SHALL BE PLACED IN A DRY TRENCH.

GENERAL NOTES

- A) ALL ROADWAY REPAIR WORK SHALL BE PERFORMED IN CONFORMANCE WITH APPLICABLE FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- B) DENSITY TESTS SHALL BE TAKEN IN 1 FT LIFTS ABOVE THE PIPE AT INTERVALS OF 400 FT MAXIMUM (1 SET MINIMUM) OR AS DIRECTED BY THE CONSTRUCTION COORDINATION DIVISION. RESULTS SHALL BE SUBMITTED TO CONSTRUCTION COORDINATION DIVISION AS PART OF THEIR FIELD REVIEW.
- C) ENGINEER-OF-RECORD WILL PROVIDE FULL-TIME INSPECTION DURING THE ENTIRETY OF THE OPEN-CUT OPERATION, BEGINNING WITH THE EXCAVATION AND CONTINUING THROUGH THE COMPLETION OF THE PAVING.
- D) IF THE PAVEMENT IS NOT COMPLETELY RESTORED IMMEDIATELY FOLLOWING THE OPEN CUT, A SMOOTH TEMPORARY PATCH (MINIMUM 1.25" ASPHALT) SHALL BE INSTALLED, PROPERLY MATCHING THE EXISTING GRADING OF THE ROADWAY. THE TEMPORARY PATCH SHALL BE ALLOWED TO REMAIN IN PLACE AND BE MAINTAINED FOR A PERIOD NO LONGER THAN 45 DAYS. THE COUNTY RETAINS THE RIGHT TO USE POSTED SURETY TO COMPLETE ANY RESTORATION WORK THAT HAS NOT BEEN COMPLETED IN THE 45 DAYS PERIOD. ALTERNATIVE TEMPORARY TRENCH PROTECTION (STEEL PLATES OR OTHERS) MAY BE APPROVED BY THE CONSTRUCTION COORDINATION DIVISION.
- E) THE FINAL RESTORATION, THE ROAD SHALL BE MILLED/RESURFACED FOR A FULL LANE WIDTH OF THE TRAVEL LANES ENCRoACHED BY THE TRENCH AREA, INCLUDING A TRANSITION AREA OF 50 FT ON EACH SIDE OF THE TRENCH, THE PAVEMENT SHALL BE MILLED AND RESURFACED PER CONSTRUCTION NOTE 6.
- F) APPROVED MAGNETIC TAPE IS REQUIRED FOR ALL MAIN PRESSURE PIPES AND CONDUIT IN THE VILLAGE'S RIGHT-OF-WAY. INSTALL TAPE 24" BELOW FINISHED GRADE.
- G) CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP WATER MAINS (BLUE), DIP SANITARY MAINS (GREEN), DIP RECLAIMED WATER MAINS (PURPLE), GAS MAINS (YELLOW), OR AS REQUIRED BY THE APWA.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

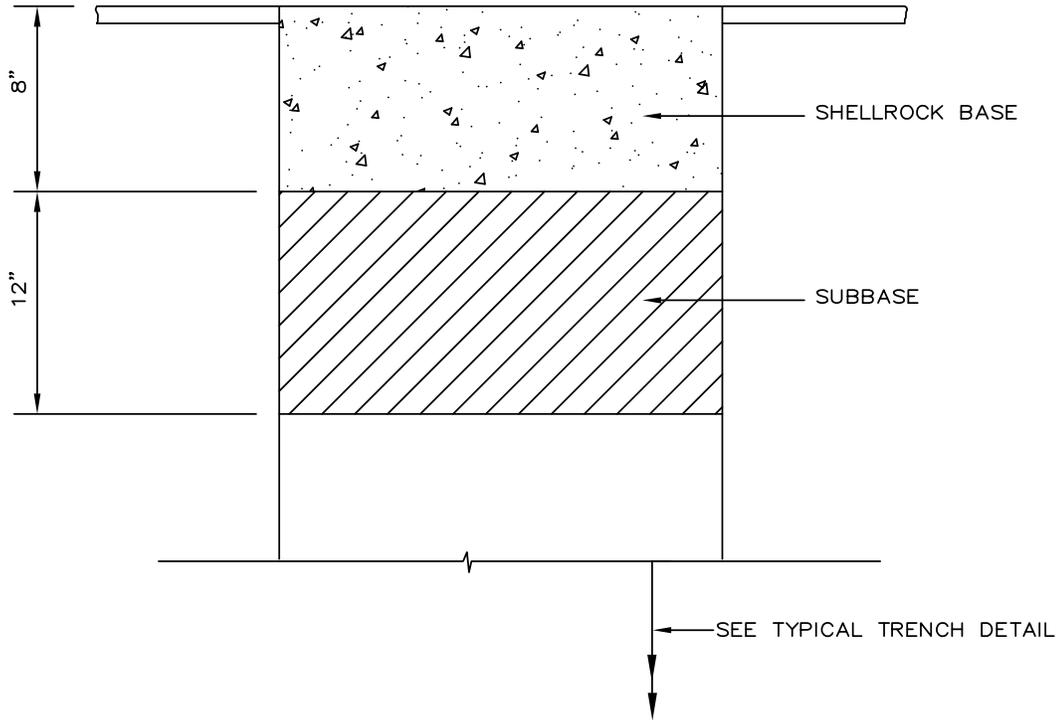
REVISION

OPEN CUT PIPE INSTALLATION
THOROUGHFARE ROAD

PAGE No.

W-22

OCT. 2017

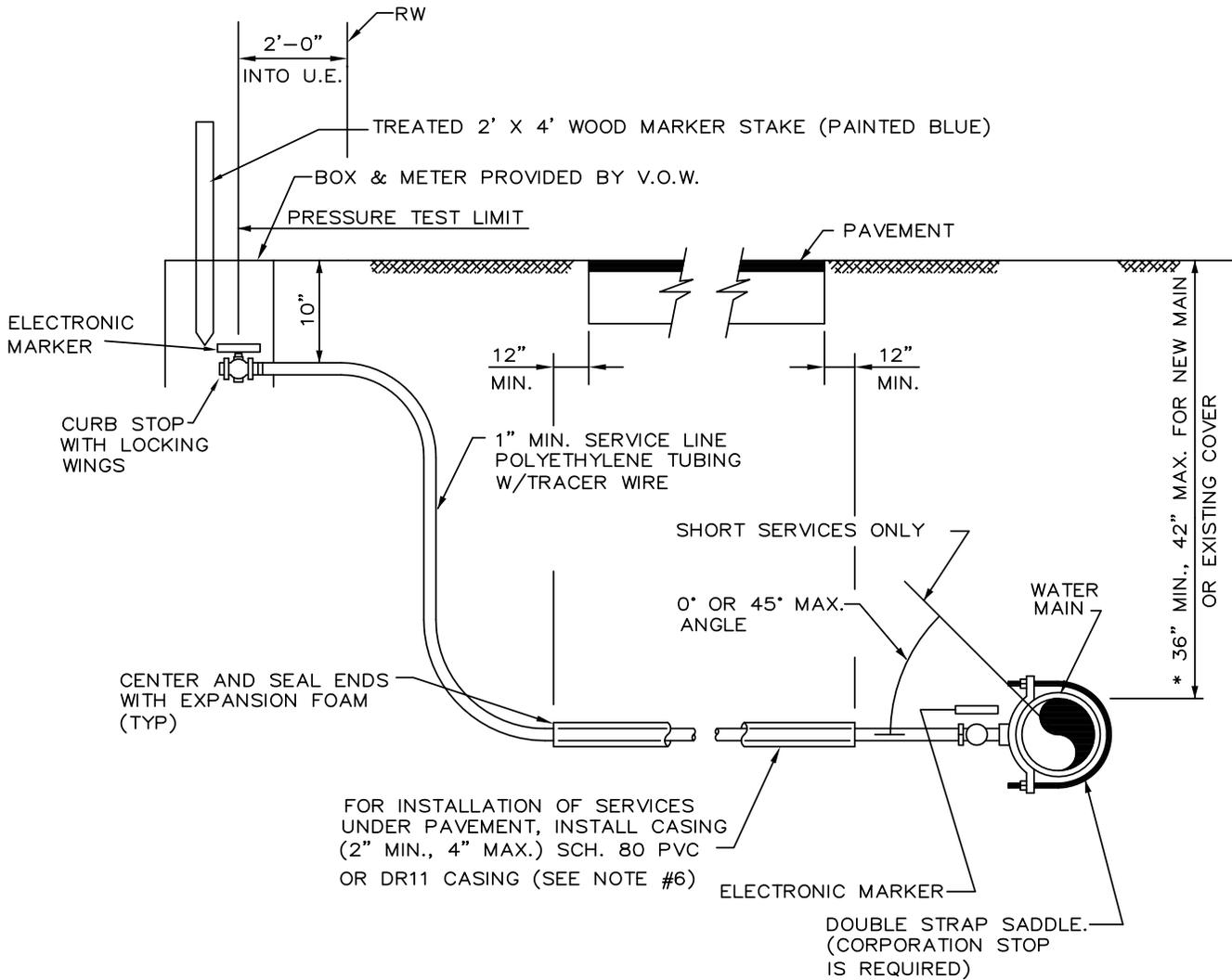


NOTE:

1. ROCK BASE SHALL BE 100 LBR, COMPACTED TO 98% AASHTO T-180.
2. SUBBASE SHALL BE 40 LBR, COMPACTED TO 98% AASHTO T-180.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>SHELLROCK ROAD / DRIVEWAY REPLACEMENT DETAIL</p>	<p>PAGE No.</p> <p>W-23</p>
----------------------------------	---	-----------------------------



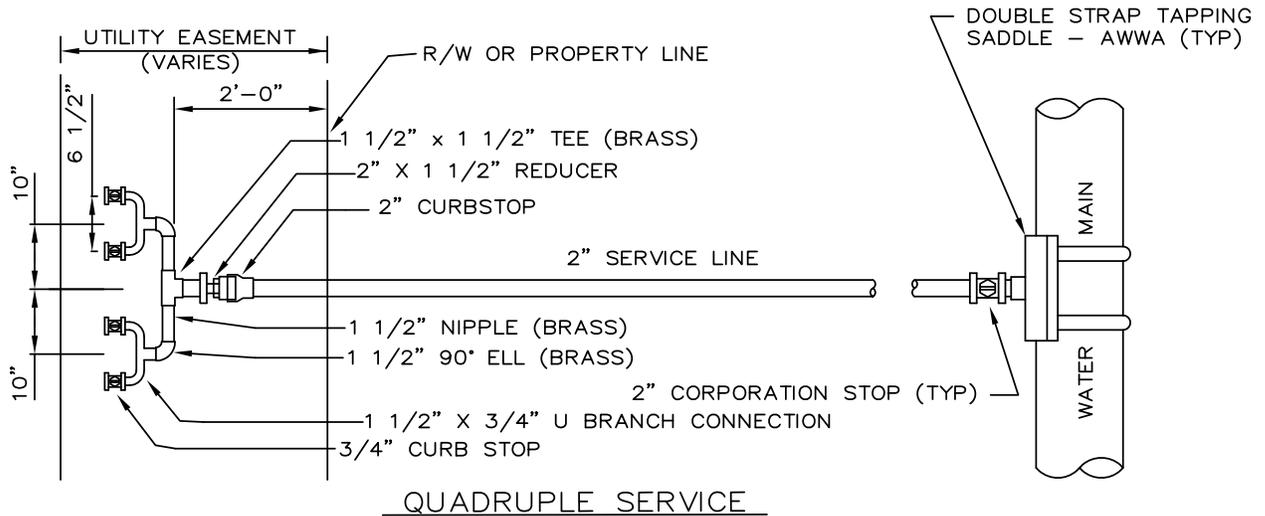
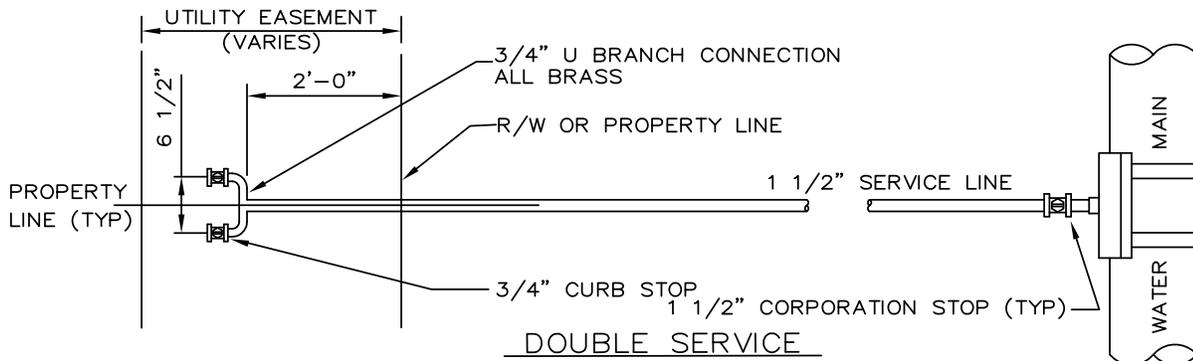
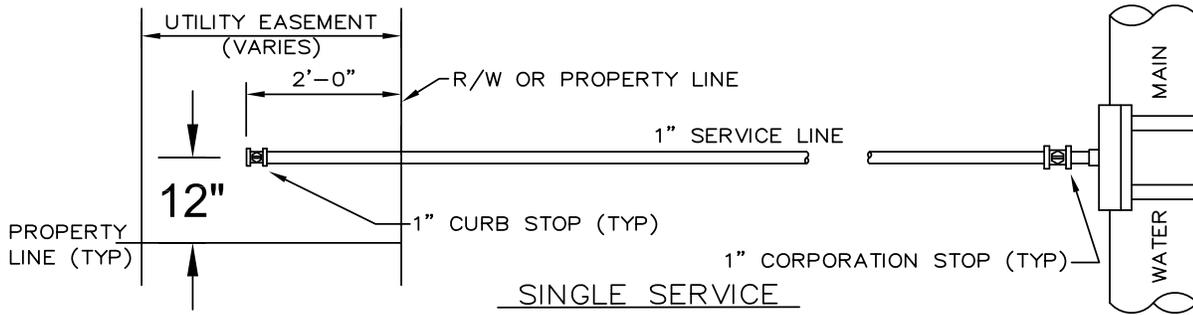
NOTES:

1. SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE SPACED A MINIMUM OF 18" APART. TAPS SPACED BETWEEN 18" TO 48" SHALL BE OFFSET TO EACH SIDE OF THE MAIN, OR OFFSET 45°.
2. METER BOX SHALL BE SET TO CONFORM TO FINISHED GRADE ADJACENT TO PROPERTY LINE. METER BOX SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS. SERVICE LINES SHALL NOT BE PLACED UNDER DRIVEWAYS.
3. TUBING TO BE POLYETHYLENE
4. ALL 5/8" & 1" METERS REQUIRE A 1" LOCKING METER VALVE RESPECTIVELY
5. MAXIMUM SERVICE LENGTH IS 100' TO METER.
6. METER SIZE AND QUANTITY – SERVICE SIZE – CASING SIZE

SINGLE 5/8" X 3/4" – 1" WITH 2" CASING
 SINGLE 1" – 1 1/2" WITH 3" CASING
 SINGLE 1 1/2" – 2" WITH 4" CASING
 SINGLE 2" – 2" WITH 4" CASING
 DOUBLE 5/8" X 3/4" – 1 1/2" WITH 3" CASING
 QUAD 5/8" X 3/4" – 2" WITH 4" CASING
 LIFT STATION – 1 1/2" WITH 3" CASING
 SERVICE EXCEEDING 50' – 1 1/2" WITH 3" CASING

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	TYPICAL SERVICE CONNECTION (UNDERGROUND) FOR 5/8", 1" OR 2" METER	PAGE No. W-24
---------------------------	---	----------------------



NOTES:

1. SERVICE LINE MATERIAL SHALL BE POLYETHYLENE TUBING WITH TRACER WIRE.
2. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS, SUBJECT TO APPROVAL OF THE UTILITY DIRECTOR.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

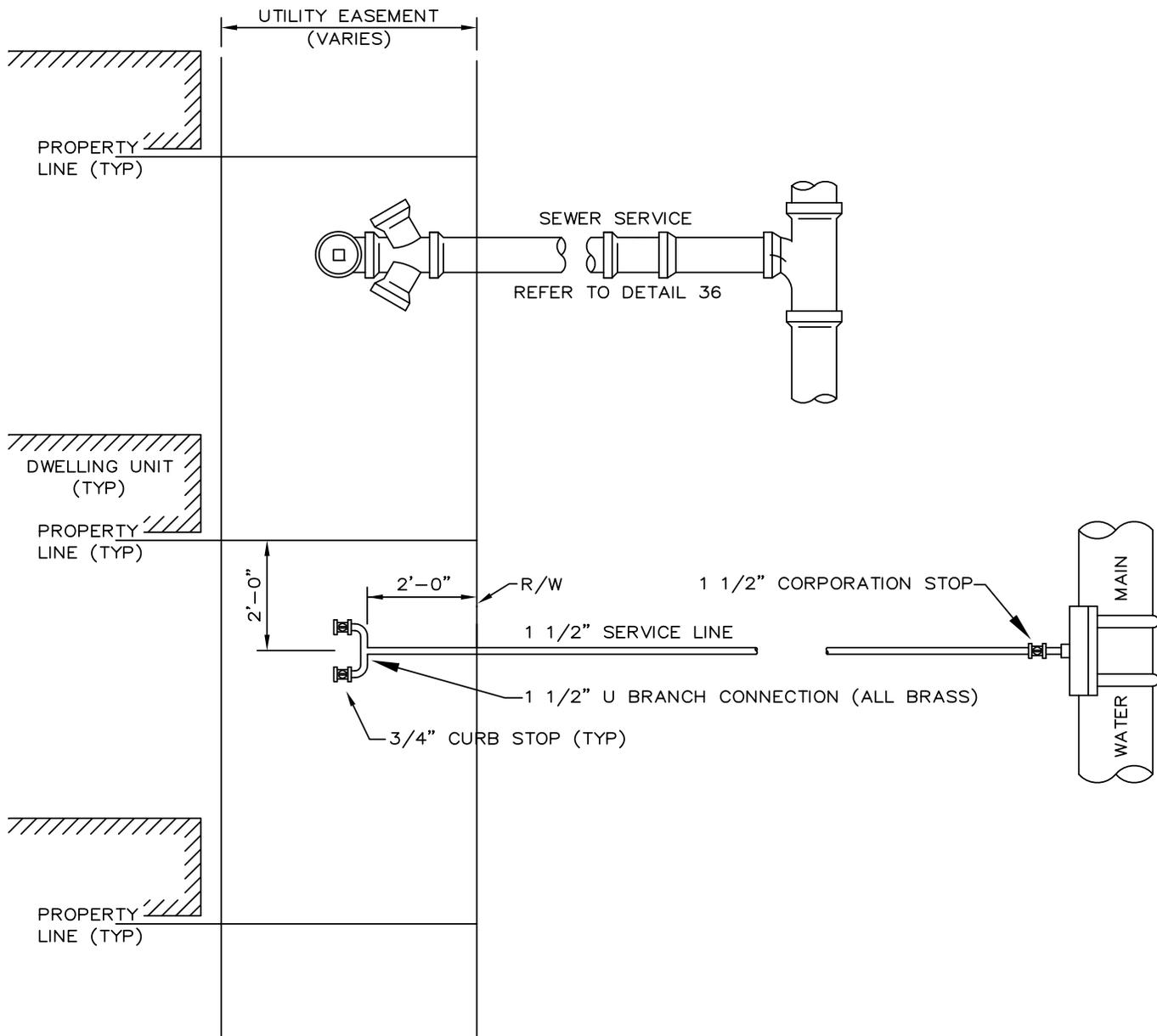
REVISION

TYPICAL SINGLE SERVICE AND
MULTIPLE SERVICES (TWO OR MORE)

PAGE No.

W-25

OCT. 2017

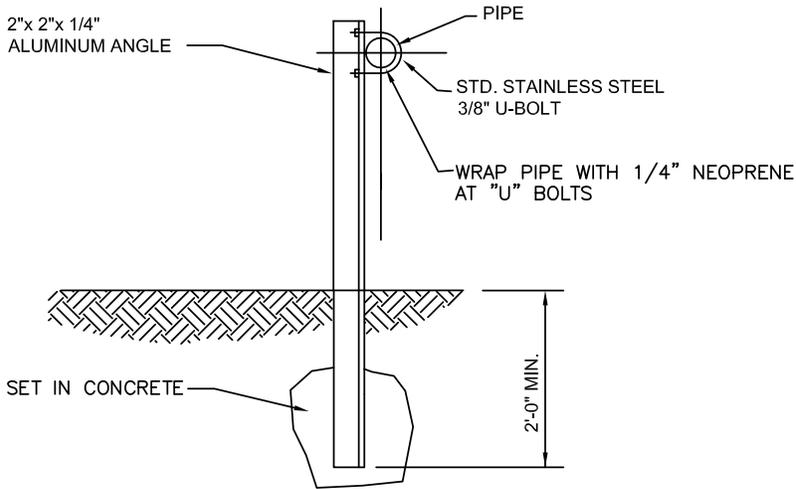


NOTES:

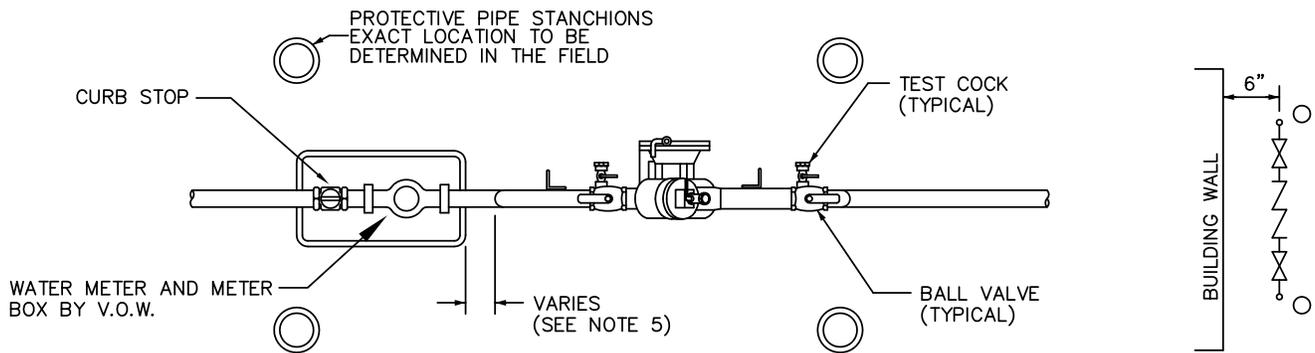
1. SERVICE LINE MATERIAL SHALL BE POLYETHYLENE TUBING WITH TRACER WIRE.
2. NO FITTINGS BETWEEN CORP. STOP & "U" BRANCH FOR MULTIMETER INSTALLATIONS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

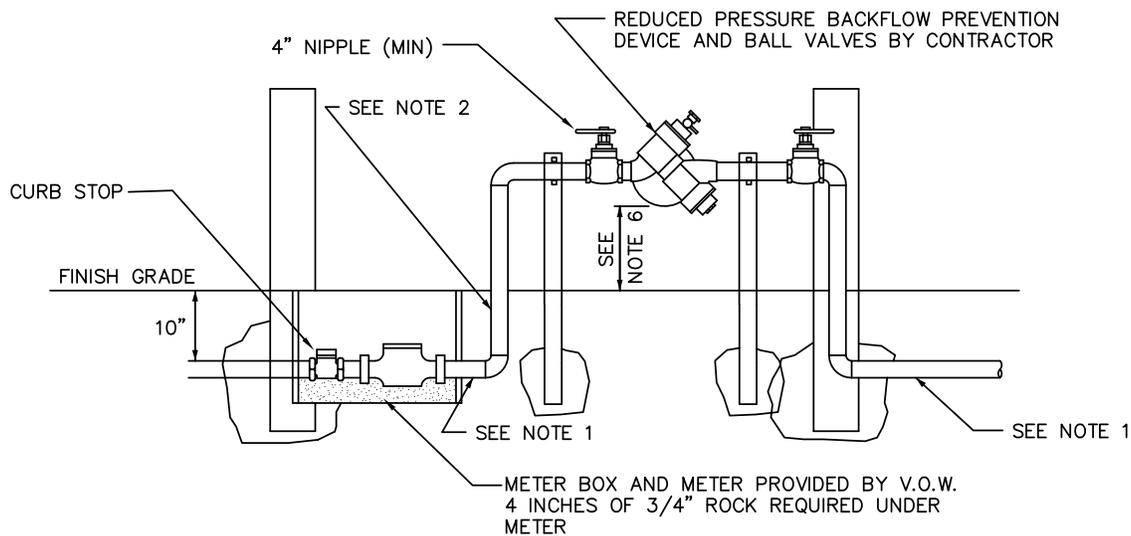
<p>REVISION</p> <p>OCT. 2017</p>	<p>ZERO LOT LINE SERVICE</p>	<p>PAGE No.</p> <p>W-26</p>
----------------------------------	------------------------------	-----------------------------



PIPE SUPPORT DETAIL



DETAIL "A"
(SEE NOTE 3)

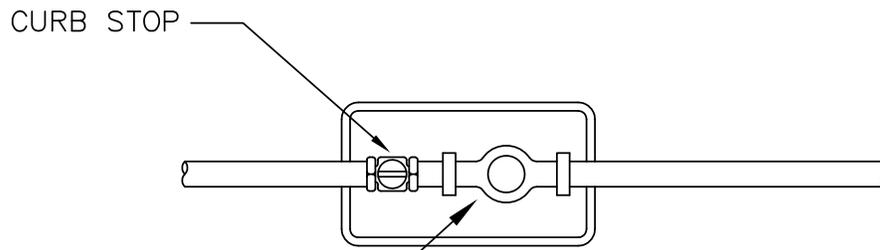


NOTES:

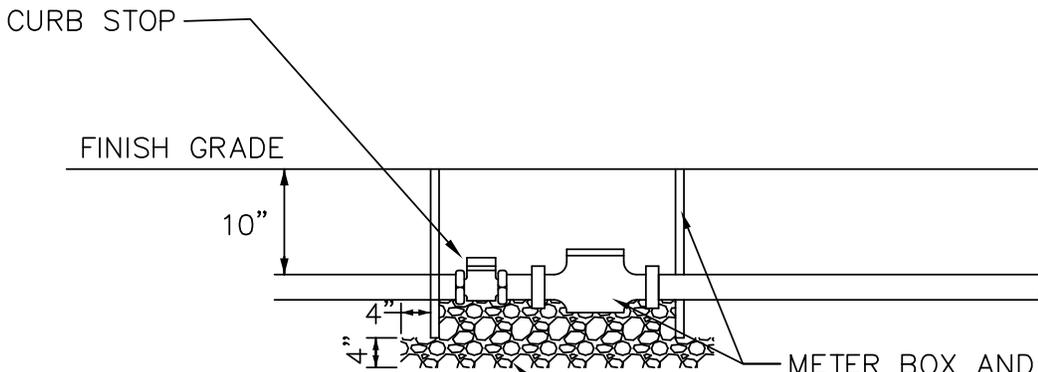
1. TYPE "K" COPPER TUBING (SOFT DRAWN) OR POLYETHYLENE TUBING SDR 9 COPPER TUBE SIZE.
2. BOTH RISERS SHALL BE TYPE "K" COPPER TUBING (HARD DRAWN) WITH COPPER/BRASS "SWEAT" FITTINGS AND ADAPTERS. ONLY LEAD FREE SOLDER AND FLUX SHALL BE PERMITTED.
3. WHEN THE DEVICE IS INSTALLED PARALLEL TO A BUILDING WALL THERE SHALL BE A MIN. OF 6" BETWEEN THE EDGE OF THE DEVICE AND THE BUILDING WALL.
4. BACKFLOW PREVENTION DEVICE SHALL BE EQUIPPED WITH BALL VALVES IN LIEU OF GATE VALVES.
5. BACKFLOW PREVENTOR MUST BE INSTALLED AS CLOSE TO SOURCE OF SUPPLY AS POSSIBLE.
6. 18" MIN. / 30" MAX. FROM LOWEST POINT OF BACKFLOW ASSEMBLY TO FINISH GRADE OR FLOOD PLANE.
7. ALL B.F.D. SHALL BE SIZED TO MATCH METER.
8. ONLY U.S.C. APPROVED DEVICES WILL BE ACCEPTED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>TYPICAL COMMERCIAL METER / BACKFLOW PREVENTION DETAIL (3/4" TO 2")</p>	<p>PAGE No.</p> <p>W-27</p>
----------------------------------	---	-----------------------------



METER BOX AND METER PROVIDED BY V.O.W.



METER BOX AND METER PROVIDED BY V.O.W.

PRIOR TO METER SETTING, CONTRACTOR SHALL PROVIDE MIN. 4" #57 STONE BELOW METER BOX AND 4" BEYOND ALL WALLS. AFTER METER IS SET, REMAINING AREA UNDER METER SHALL BE FILLED W/ROCK.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

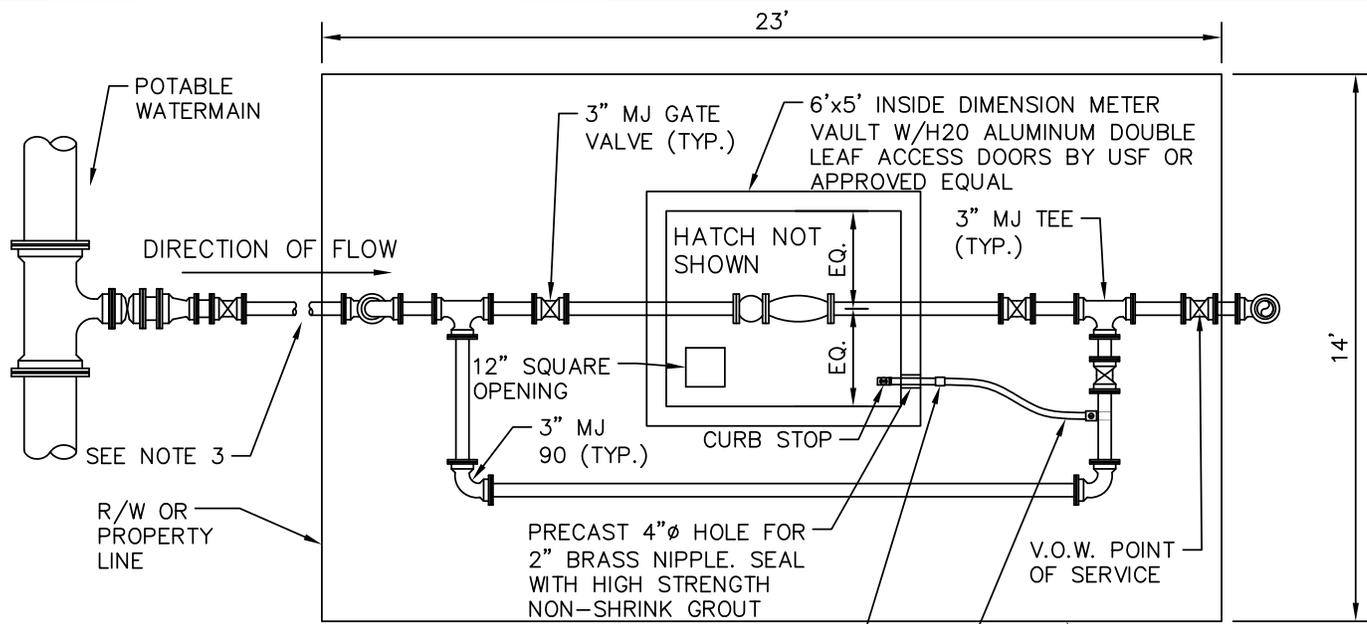
REVISION

METER AND METER BOX INSTALLATION

PAGE No.

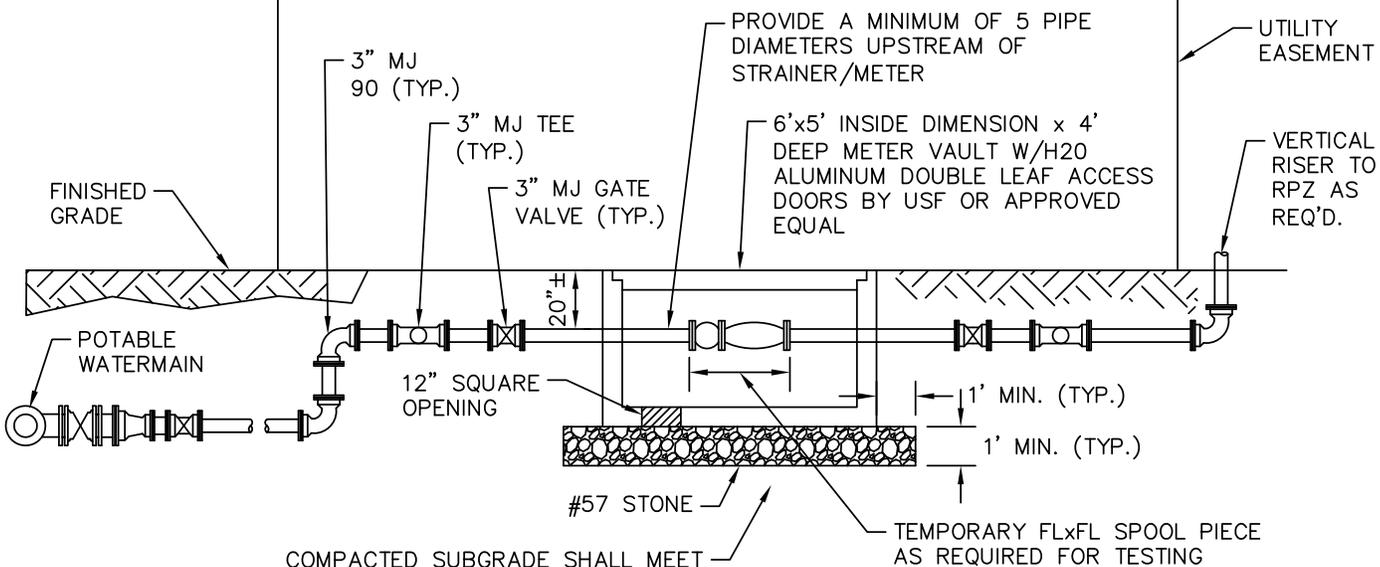
W-28

OCT. 2017



ALL PIPE AND FITTINGS SHALL BE CLASS 53 DUCTILE IRON CEMENT LINED.

PLAN



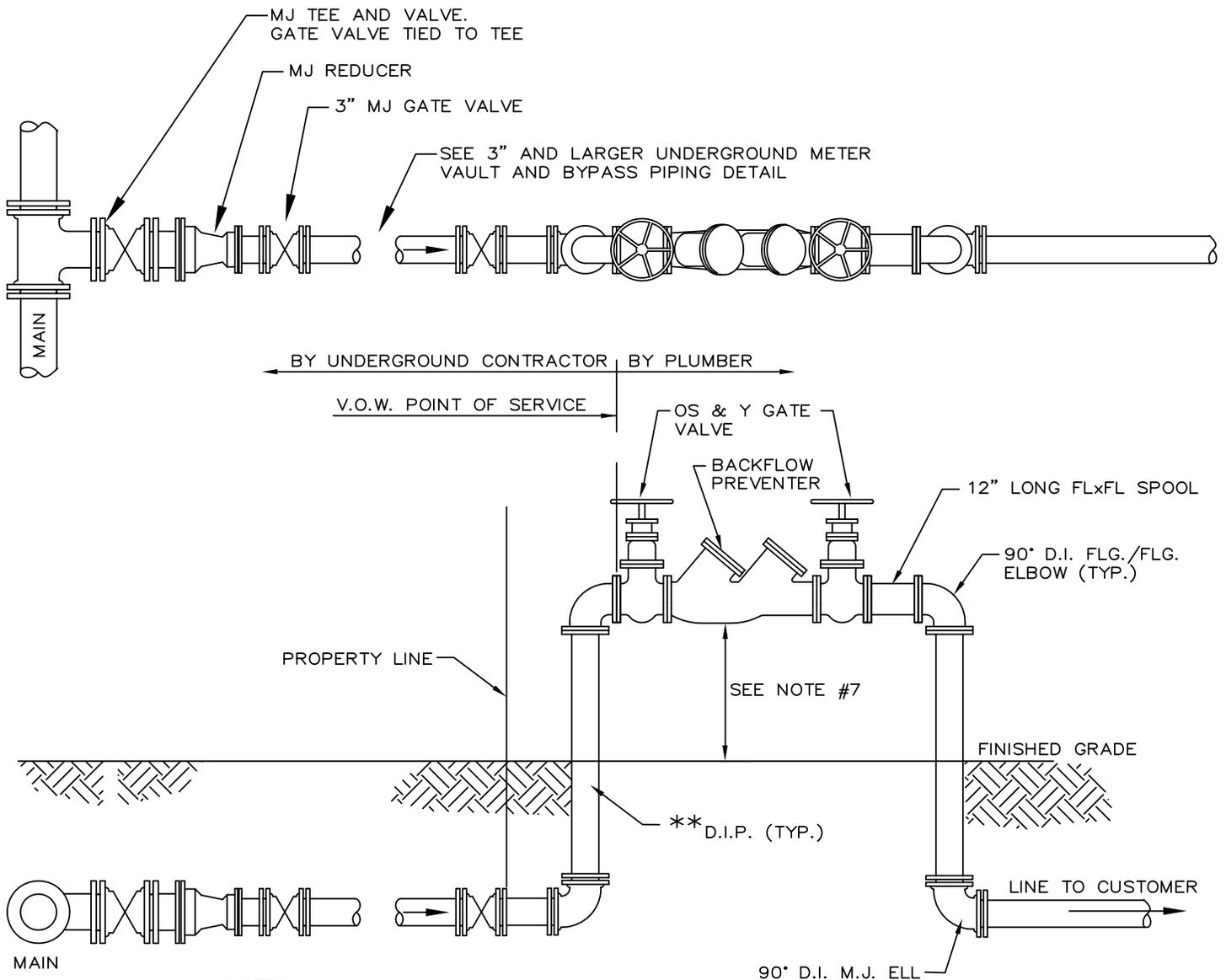
SECTION

NOTES:

1. CONTRACTOR SHALL PROVIDE A TEMPORARY FLxFL SPOOL PIECE IN PLACE OF METER AS REQUIRED FOR PRESSURE TESTING. SPOOL PIECE TO BE REMOVED AND REPLACED WITH STRAINER/METER AFTER PASSING PRESSURE TEST. STRAINER AND METER TO BE INSTALLED BY THE DEPARTMENT. CONTRACTOR TO CONFIRM LAY LENGTH.
2. EBAA IRON MEGAFLANGE ADAPTERS MAY BE USED AS REQUIRED TO ADJUST PIPE LENGTH UPSTREAM AND DOWNSTREAM OF METER/STRAINER ASSEMBLY.
3. IN SOME CASES, AN ADDITIONAL GATE VALVE MAY BE REQUIRED AT THE R/W / PROPERTY LINE.
4. ALL OTHER VILLAGE OF WELLINGTON APPLICABLE DETAILS SHALL BE APPLIED AS NECESSARY.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	3" UNDERGROUND METER AND BY-PASS PIPING	PAGE No. W-29
---------------------------	---	----------------------



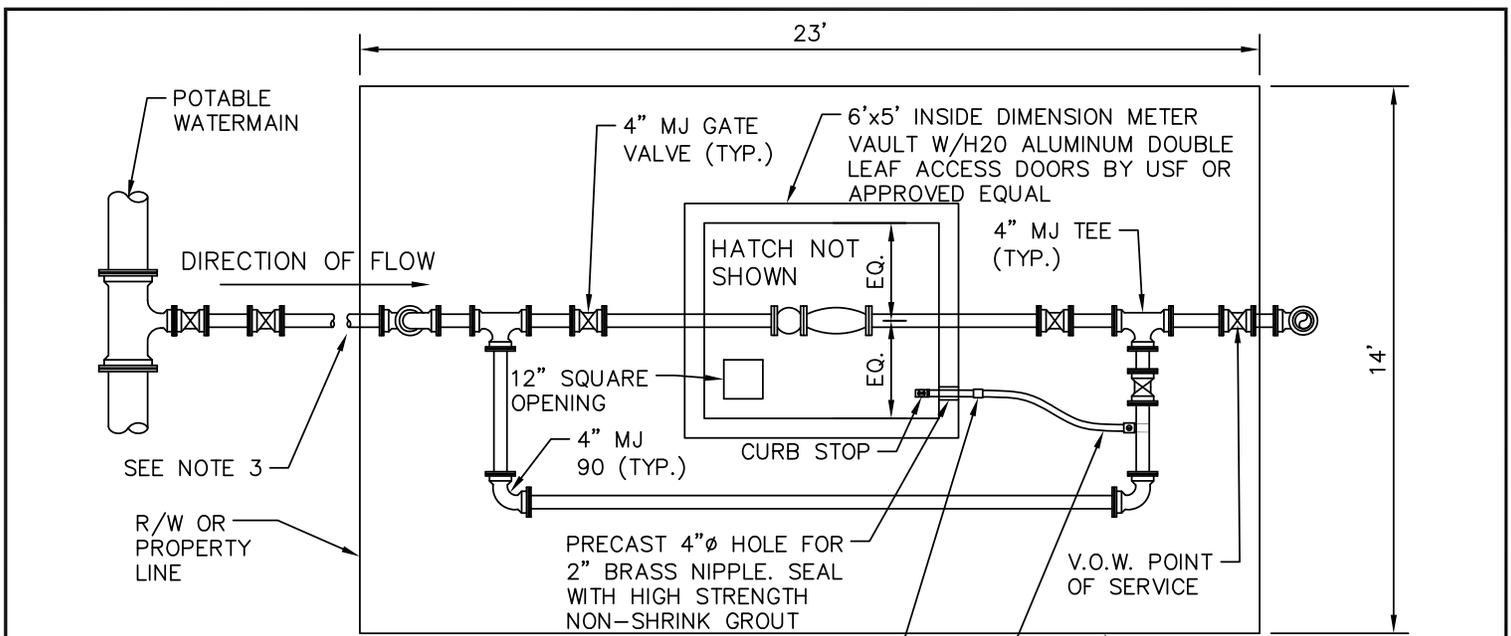
NOTES:

1. ALL PIPE AND FITTINGS SHALL BE CLASS 53 DUCTILE IRON CEMENT LINED.
2. MECHANICAL JOINT FITTINGS SHALL BE REQUIRED UNDERGROUND AND FLANGED FITTINGS FOR ABOVE GROUND USE, NO UNIFLANGES PERMITTED.
3. BACKFLOW PREVENTION DEVICES AND ASSOCIATED VALVES SHALL BE SUPPLIED BY THE CONTRACTOR.
4. ALL B.F.D. SHALL BE SIZED TO MATCH METER.
5. ONLY U.S.C. APPROVED DEVICES WILL BE ACCEPTED.
6. REDUCED PRESSURE ZONE (RPZ) ASSEMBLIES ONLY.
7. 18" MIN. / 30" MAX. TO LOWEST POINT OF BACKFLOW ASSEMBLY TO FINISH GRADE OR FLOOD PLANE.

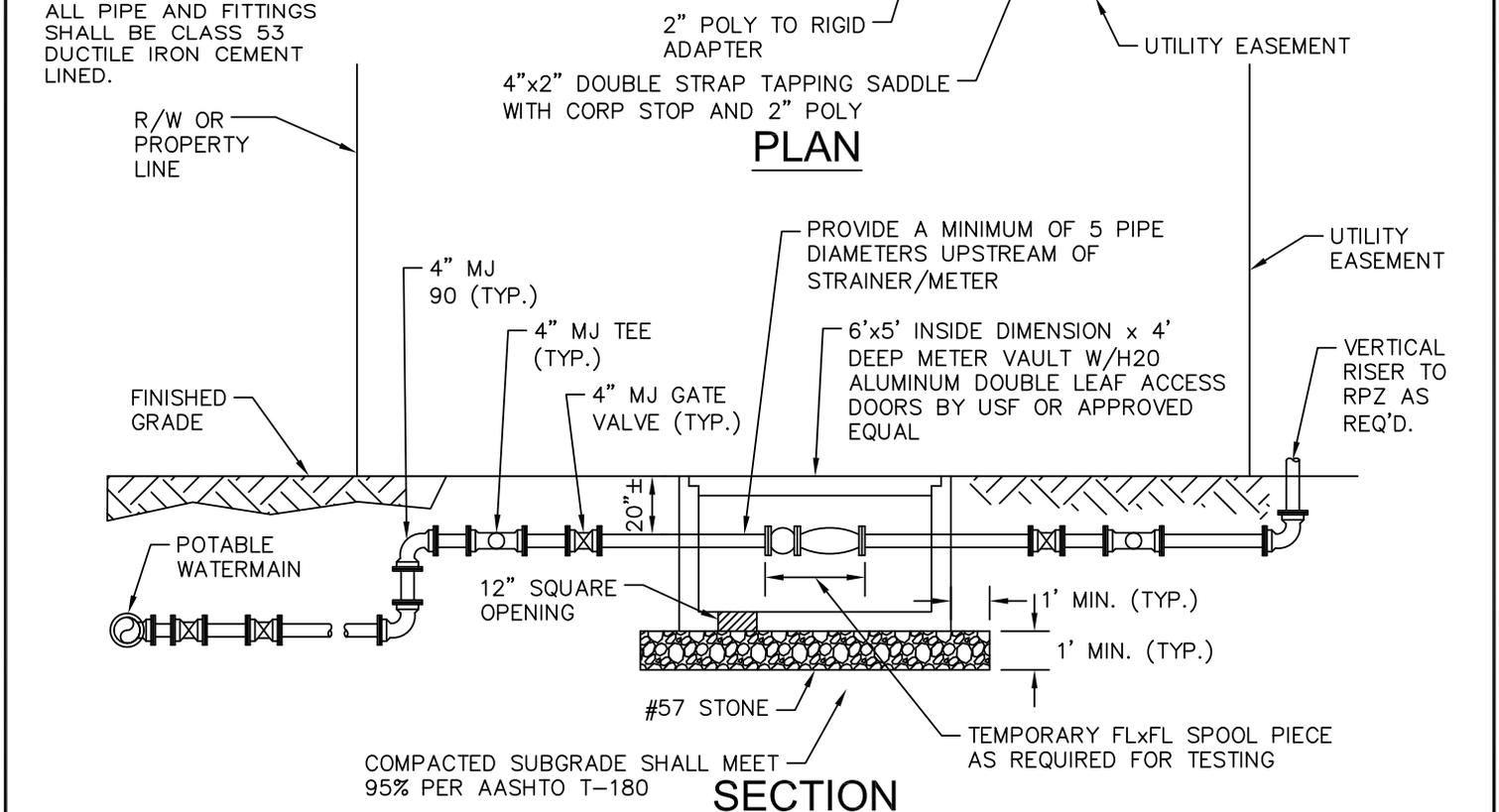
** RISER PIPE MUST BE ONE CONTINUOUS PIECE FROM BOTTOM BEND TO TOP BEND.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>3" BACKFLOW ASSEMBLY DETAIL</p>	<p>PAGE No.</p> <p>W-30</p>
----------------------------------	------------------------------------	-----------------------------



PLAN



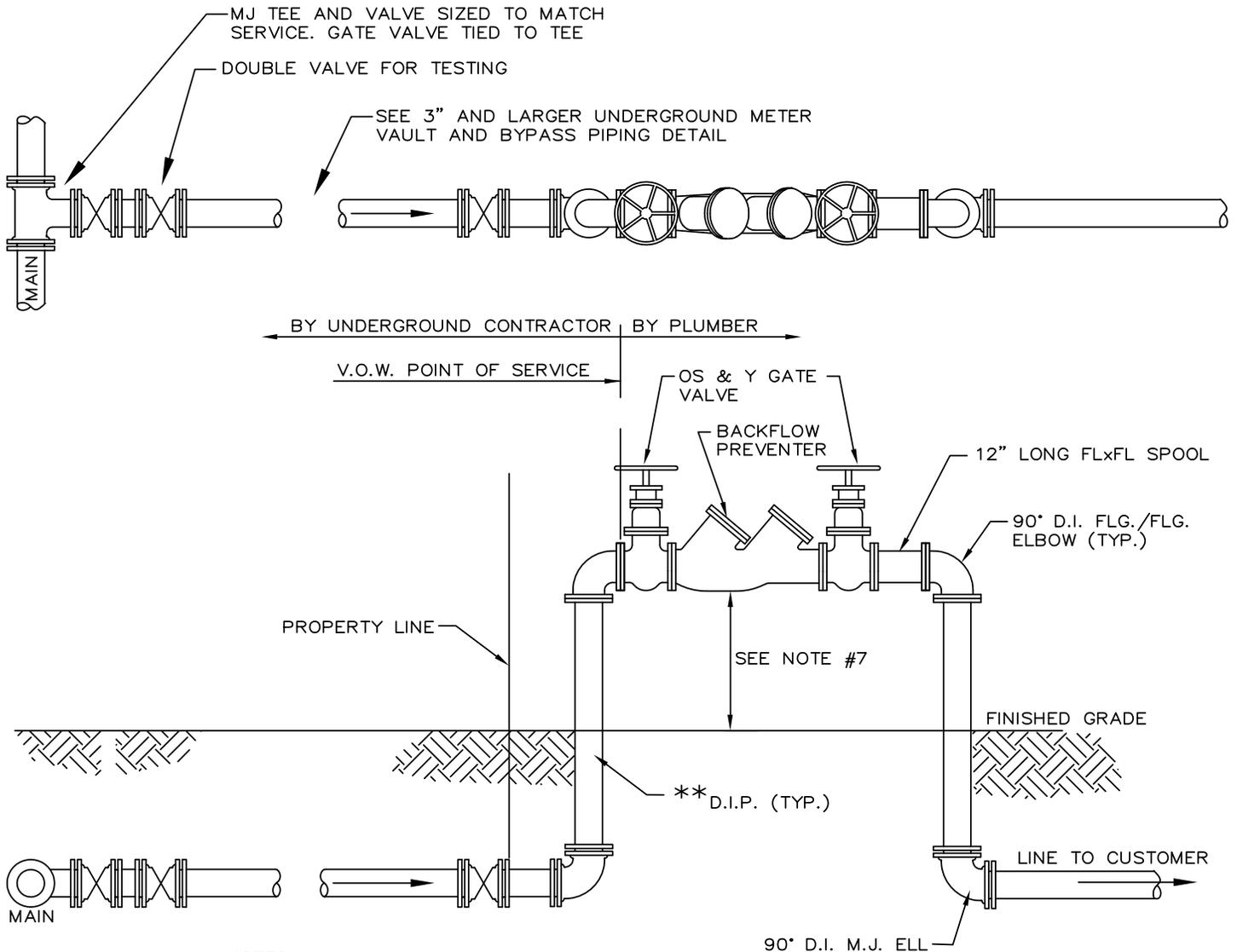
SECTION

NOTES:

1. CONTRACTOR SHALL PROVIDE A TEMPORARY FLxFL SPOOL PIECE IN PLACE OF METER AS REQUIRED FOR PRESSURE TESTING. SPOOL PIECE TO BE REMOVED AND REPLACED WITH STRAINER/METER AFTER PASSING PRESSURE TEST. STRAINER AND METER TO BE INSTALLED BY THE DEPARTMENT. CONTRACTOR TO CONFIRM LAY LENGTH.
2. EBAA IRON MEGAFLANGE ADAPTERS MAY BE USED AS REQUIRED TO ADJUST PIPE LENGTH UPSTREAM AND DOWNSTREAM OF METER/STRAINER ASSEMBLY.
3. IN SOME CASES, AN ADDITIONAL GATE VALVE MAY BE REQUIRED AT THE R/W / PROPERTY LINE.
4. ALL OTHER VILLAGE OF WELLINGTON APPLICABLE DETAILS SHALL BE APPLIED AS NECESSARY.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	4" UNDERGROUND METER AND BY-PASS PIPING	PAGE No. W-31
OCT. 2017		

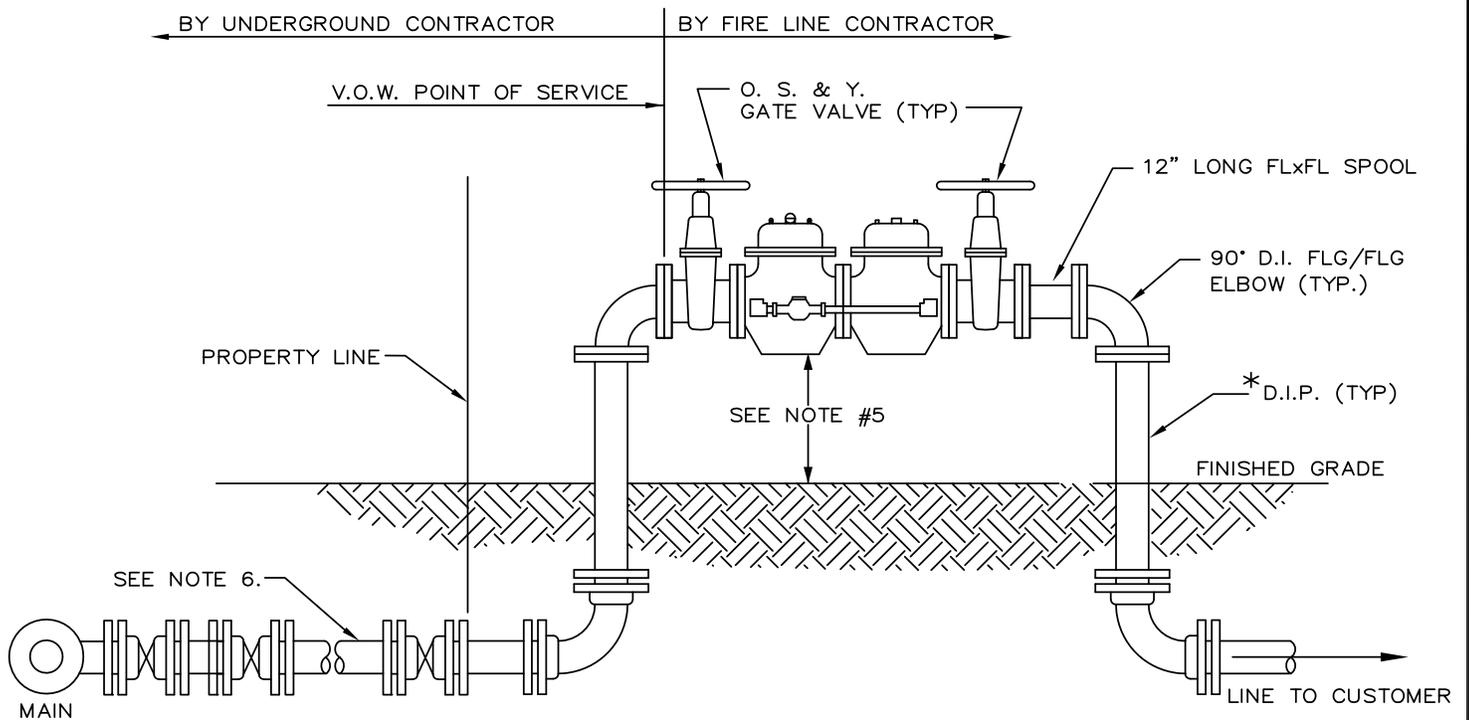
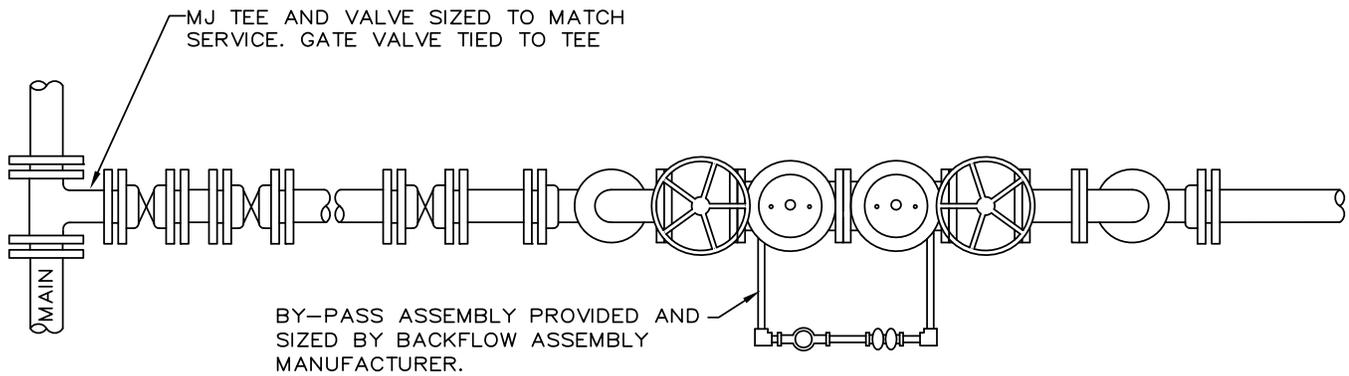


NOTES:

1. ALL PIPE AND FITTINGS SHALL BE CLASS 53 DUCTILE IRON CEMENT LINED.
 2. MECHANICAL JOINT FITTINGS SHALL BE REQUIRED UNDERGROUND AND FLANGED FITTINGS FOR ABOVE GROUND USE, NO UNIFLANGES PERMITTED.
 3. BACKFLOW PREVENTION DEVICES AND ASSOCIATED VALVES SHALL BE SUPPLIED BY THE CONTRACTOR.
 4. ALL B.F.D. SHALL BE SIZED TO MATCH METER.
 5. ONLY U.S.C. APPROVED DEVICES WILL BE ACCEPTED.
 6. REDUCED PRESSURE ZONE (RPZ) ASSEMBLIES ONLY.
 7. 18" MIN. / 30" MAX. TO LOWEST POINT OF BACKFLOW ASSEMBLY TO FINISH GRADE OR FLOOD PLANE.
- ** RISER PIPE MUST BE ONE CONTINUOUS PIECE FROM BOTTOM BEND TO TOP BEND.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>4" BACKFLOW ASSEMBLY DETAIL</p>	<p>PAGE No.</p> <p>W-32</p>
----------------------------------	------------------------------------	-----------------------------

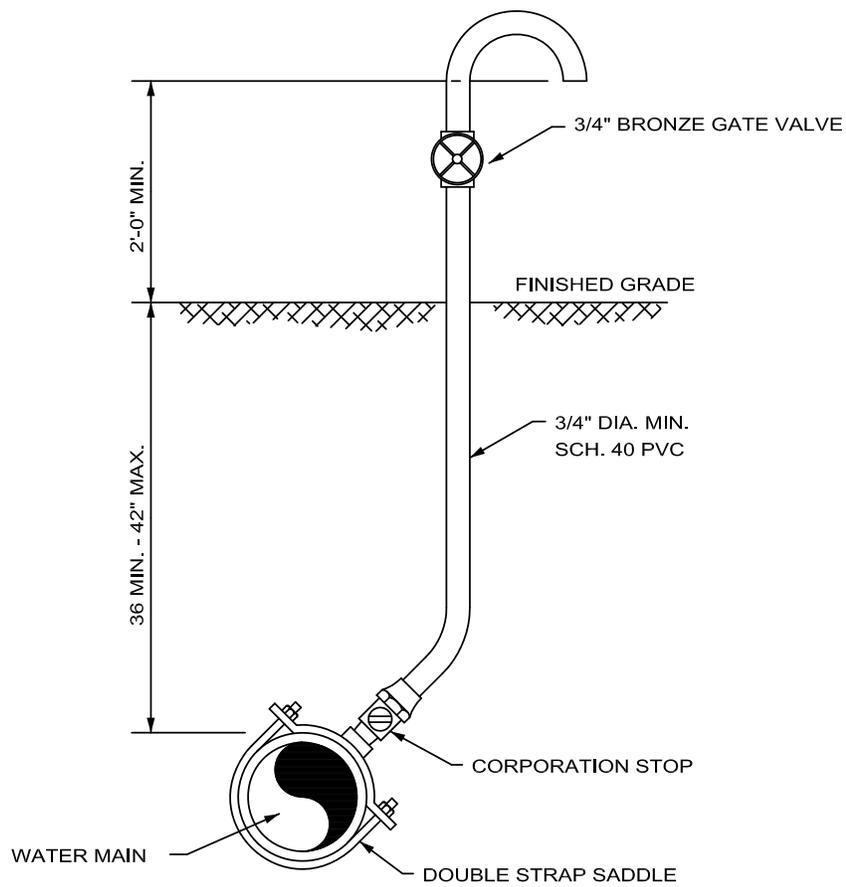


NOTES:

1. ALL PIPE AND FITTINGS SHALL BE CLASS 53 DUCTILE IRON CEMENT LINED.
 2. MECHANICAL JOINT FITTINGS SHALL BE REQUIRED UNDERGROUND AND FLANGED FITTINGS FOR ABOVE GROUND USE, NO UNIFLANGES PERMITTED.
 3. ONLY U.S.C. APPROVED DEVICES WILL BE ACCEPTED
 4. REDUCED PRESSURE ZONE (RPZ) ASSEMBLIES ONLY.
 5. 18" MIN. / 30" MAX. FROM LOWEST POINT OF BACKFLOW ASSEMBLY TO FINISH GRADE OR FLOOD PLANE.
 6. DOUBLE VALVE AT CONNECTION POINT AND ADDITIONAL VALVE BEFORE FIRST BOTTOM 90 DEGREE BEND IS REQUIRED WHEN CROSSING A ROADWAY OR MORE THAN TWO (2) FULL STICKS OF PIPE ARE USED. NO PARTIAL LENGTHS OF PIPE ARE ACCEPTABLE. ALL JOINTS TO BE RESTRAINED. A JUMPER AND VENT WILL BE REQUIRED FOR TESTING. WHEN WATERMAIN IS ON THE SAME SIDE OF THE ROAD AS THE RPZ, ONLY TWO (2) VALVES WILL BE REQUIRED. BOTH CASES WILL REQUIRE BACTERIOLOGICAL TESTING AND PRESSURE TESTING TO 150 p.s.i. FOR TWO (2) HOURS WITH ZERO LOSS.
- * RISER PIPE MUST BE ONE CONTINUOUS PIECE FROM BOTTOM BEND TO TOP BEND.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	FIRE LINE BACKFLOW	PAGE No.
OCT. 2017		W-33



NOTE:

SAMPLE POINT SHOULD BE A SERVICE LINE OR FIRE HYDRANT
IF POSSIBLE.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

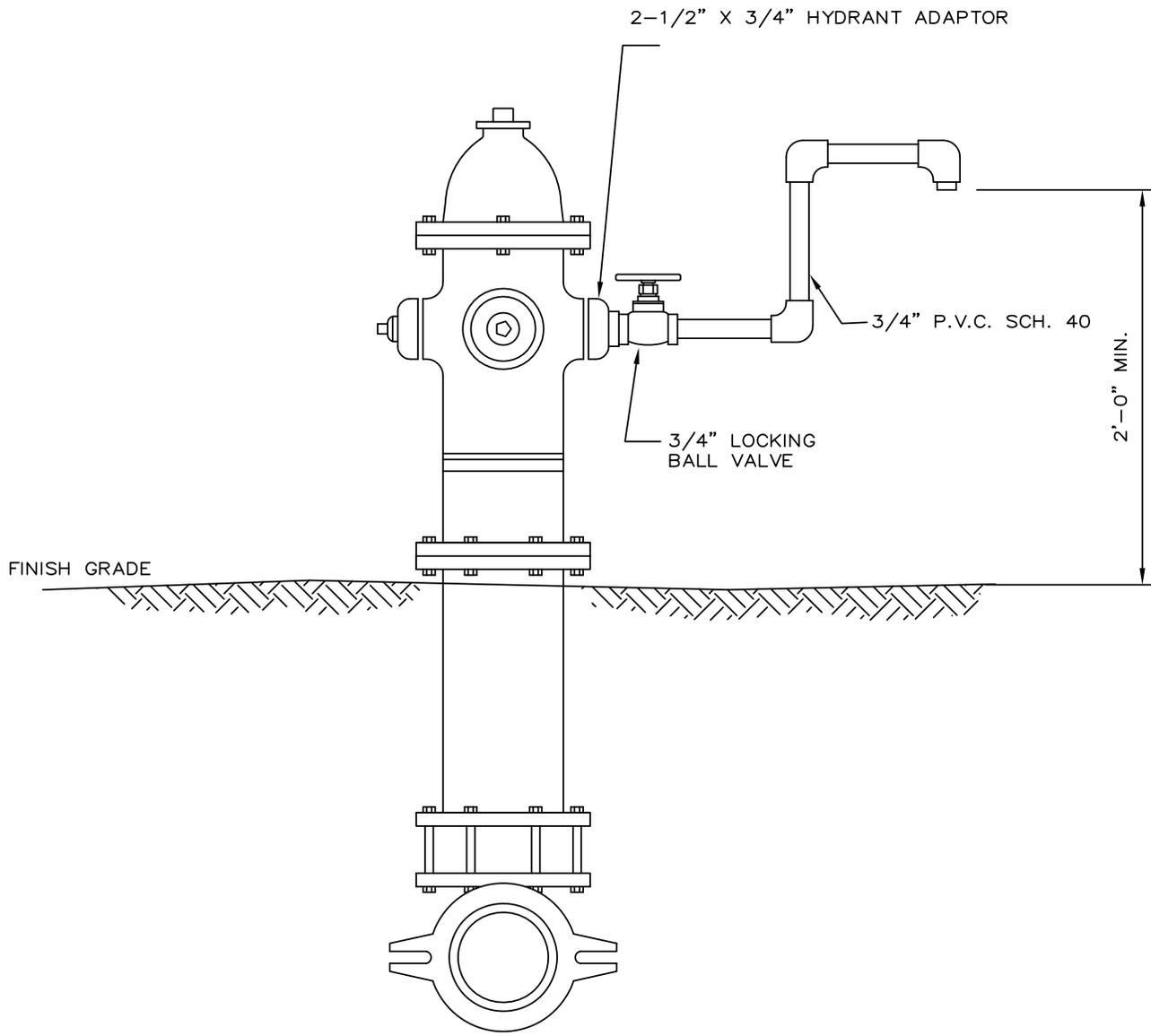
REVISION

SAMPLING POINT (ON MAIN)

PAGE No.

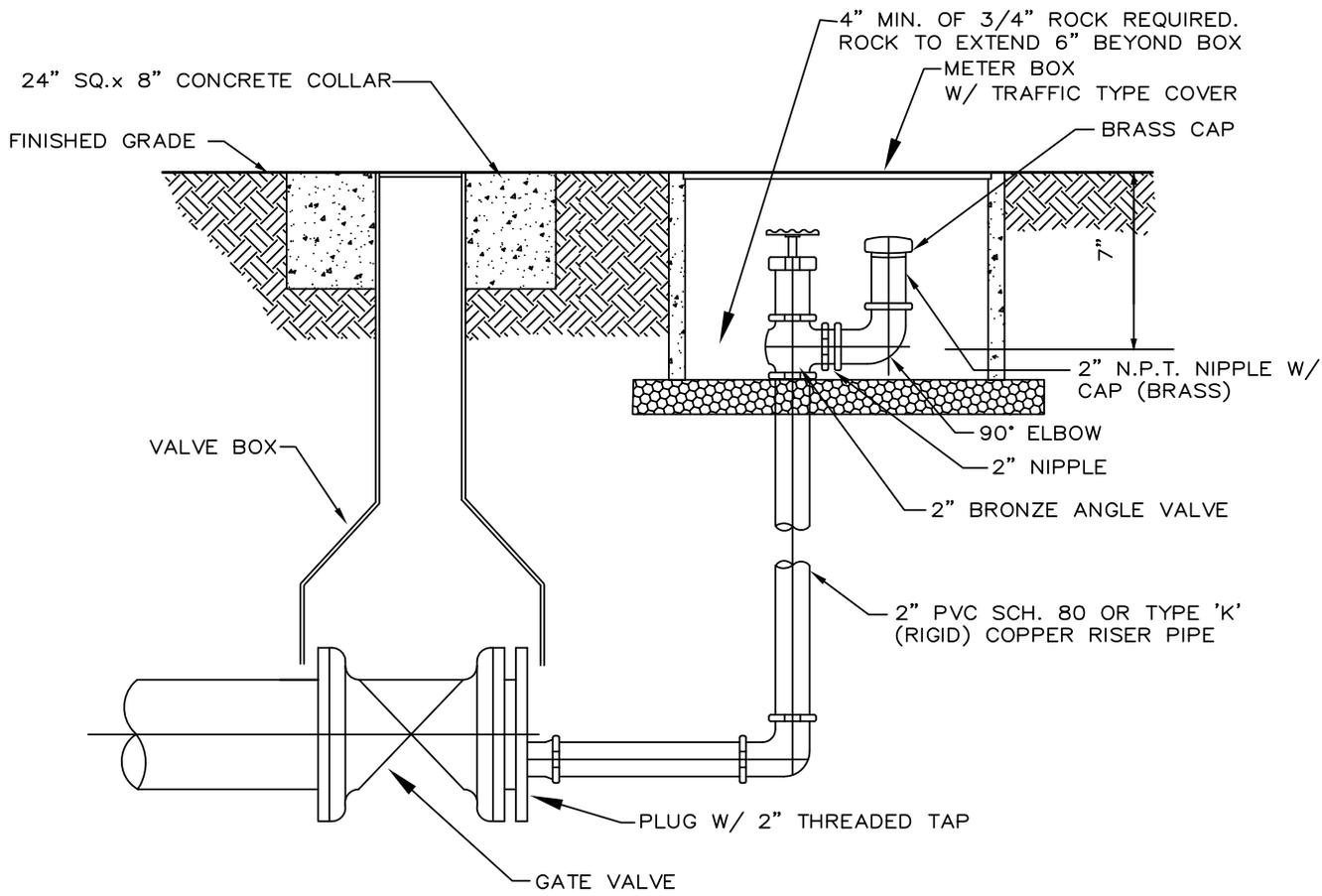
W-34

OCT. 2017

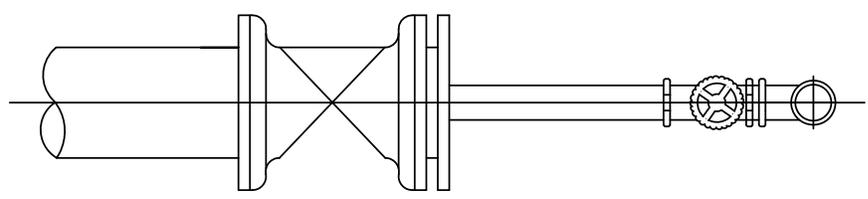


V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>SAMPLING POINT (ON HYDRANT)</p>	<p>PAGE No.</p> <p>W-35</p>
----------------------------------	------------------------------------	-----------------------------



ELEVATION



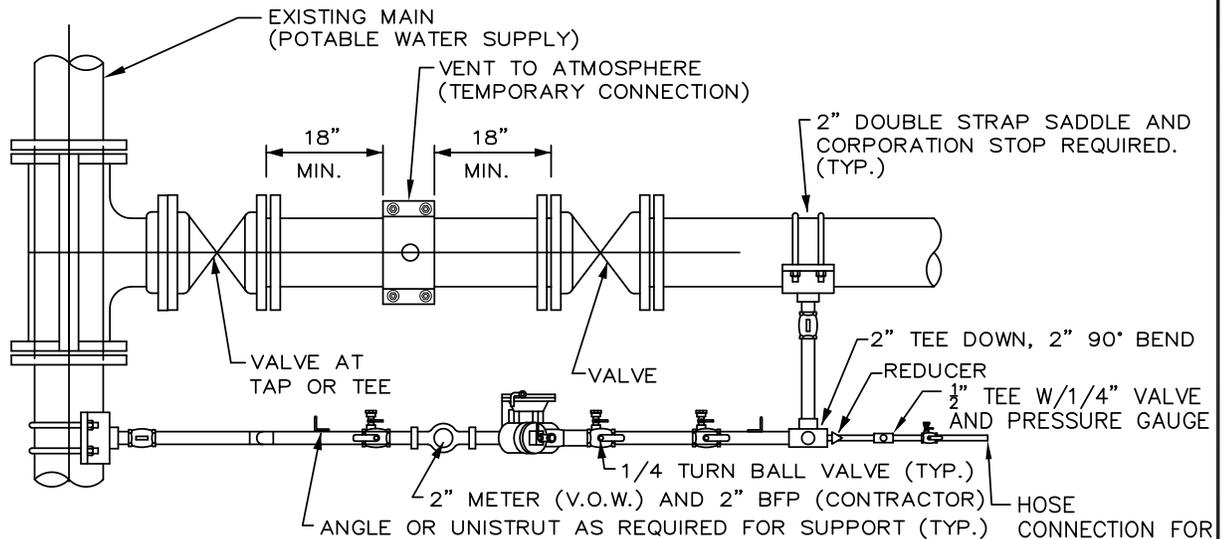
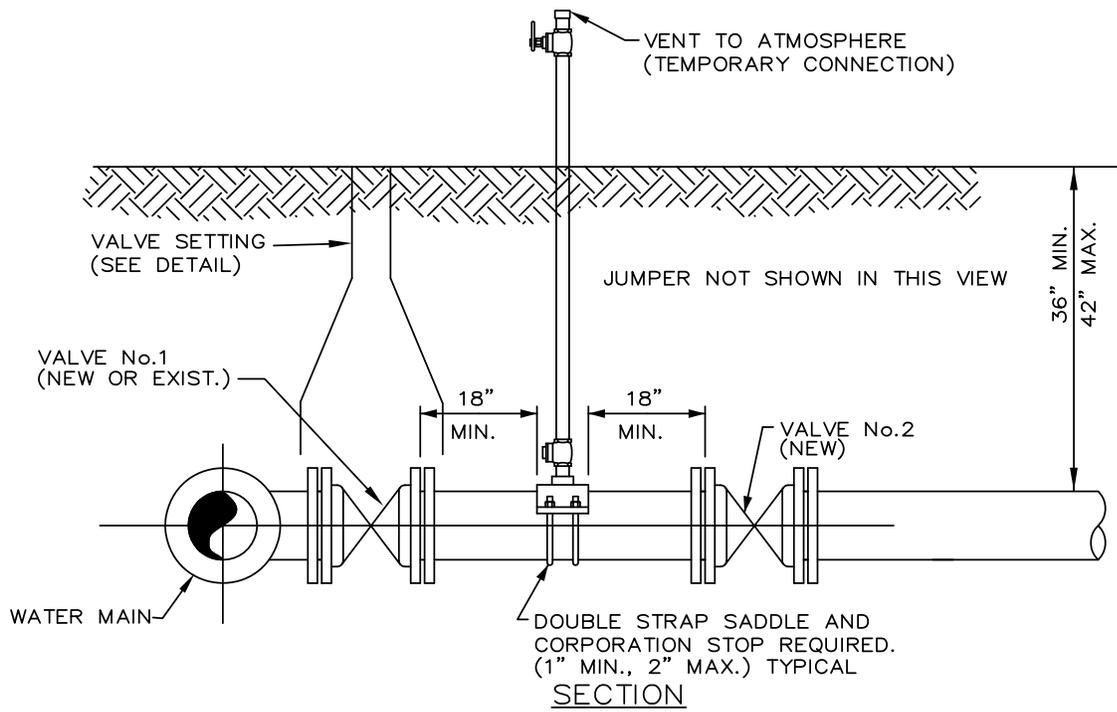
PLAN

NOTES:

1. GALVANIZED PIPING AND FITTINGS SHALL NOT BE USED ON TEMPORARY OR PERMANENT BLOWOFFS.
2. THE MAIN SHALL BE MECHANICALLY RESTRAINED IN ACCORDANCE WITH THE V.O.W. STANDARDS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>TYPICAL TERMINAL END WITH 2" BLOWOFF</p>	<p>PAGE No.</p> <p>W-36</p>
----------------------------------	---	-----------------------------



NOTES:

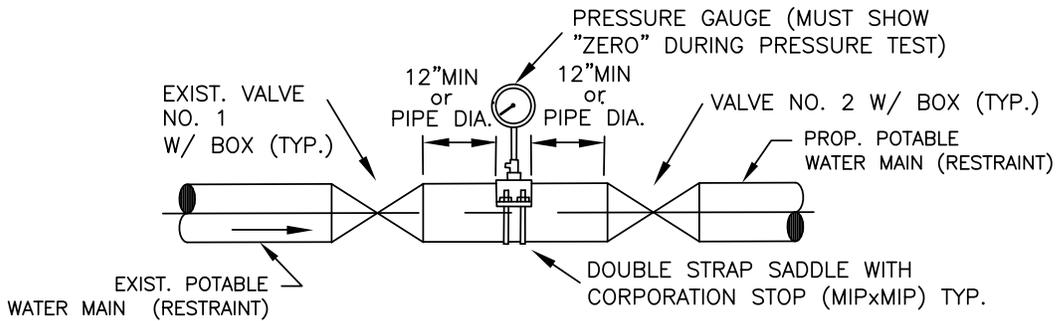
PLAN

1. BOTH VALVES SHALL BE KEPT CLOSED EXCEPT FOR FILLING, FLUSHING AND BACTERIOLOGICAL TESTING PURPOSES.
2. ALL CORPORATION STOPS MUST BE REMOVED AND BRASS PLUG INSTALLED IN SADDLE FOLLOWING SUCCESSFULL COMPLETION OF ALL TESTING. FILLING AND FLUSHING LOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR, ENGINEER, AND V.O.W.
3. THE V.O.W. SHALL BE NOTIFIED BEFORE FILLING AND FLUSHING. VALVES ON EXISTING SYSTEM SHALL BE OPERATED ONLY BY V.O.W. PERSONNEL.
4. PRESSURE TEST PUMP CONNECTS TO SERVICE LINE TAPS OR BLOWOFF. NO EXTRA TAPS ARE PERMITTED UNLESS APPROVAL HAS BEEN BY THE V.O.W.
5. VENT TO ATMOSPHERE SHALL REMAIN OPEN DURING ALL PHASES OF PRESSURE TESTING.
6. JUMPER WILL REQUIRE A METER AND BFP. CONTRACTOR SHALL CONTACT CUSTOMER SERVICE AT 561.791.4010 FOR CONSTRUCTION METER.

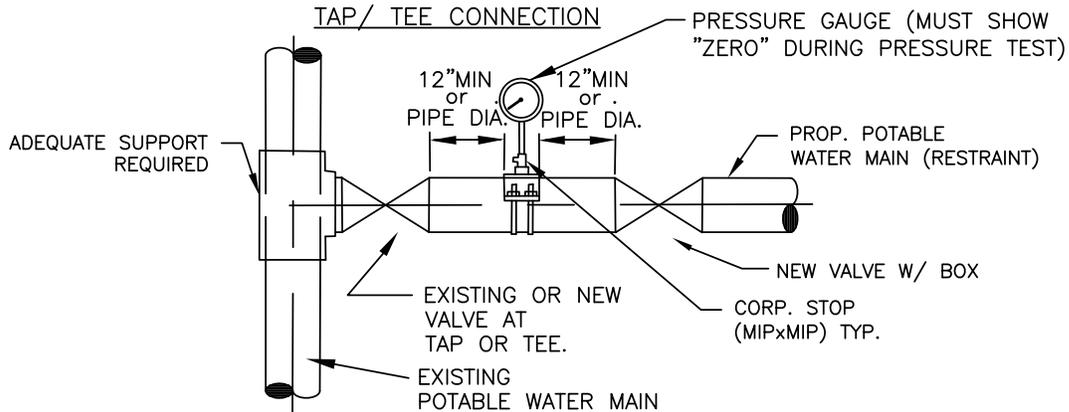
V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>DOUBLE VALVE DETAIL WITH ATMOSPHERIC VENT AND JUMPER WITH BFP AND METER</p>	<p>PAGE No.</p> <p>W-37</p>
----------------------------------	--	-----------------------------

IN-LINE CONNECTION



TAP/ TEE CONNECTION



NOTES:

1. THE "ALTERNATIVE" PROCEDURE MUST BE APPROVED BY WUD IN ADVANCE. IT ALLOWS THE NEW PIPE TO BE PRESSURE TESTED PRIOR TO BACTERIOLOGICAL TESTING.
2. BOTH VALVES SHALL BE KEPT CLOSED EXCEPT FOR FILLING AND FLUSHING.
3. WUD SHALL BE NOTIFIED BEFORE FILLING AND FLUSHING.
4. PRESSURE TEST PUMP MAY BE CONNECTED TO SERVICE LINE, FIRE HYDRANT OR BLOWOFF IN THE TESTED WATER MAIN. NO EXTRA TAPS ARE PERMITTED UNLESS UNAVOIDABLE.
5. GAUGE AND RISER TO BE REMOVED AFTER PRESSURE TEST, HOLE TO BE PLUGGED AT SADDLE WITH BRASS PLUG.
6. THREAD AREAS OF CORPORATION STOP SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
7. ENSURE PROPER RESTRAINT OF EXISTING VALVE(S) AND PIPE PRIOR TO NEW CONNECTION.
8. SEE ALSO DETAIL FOR "STANDARD POTABLE WATER MAIN TIE-IN PROCEDURE"
9. RECORD DRAWINGS TO SHOW DATA FOR ALL TEST TAPS.
10. ALL BRASS SHALL BE "LEAD FREE".

V.O.W. CONSTRUCTION STANDARDS & DETAILS

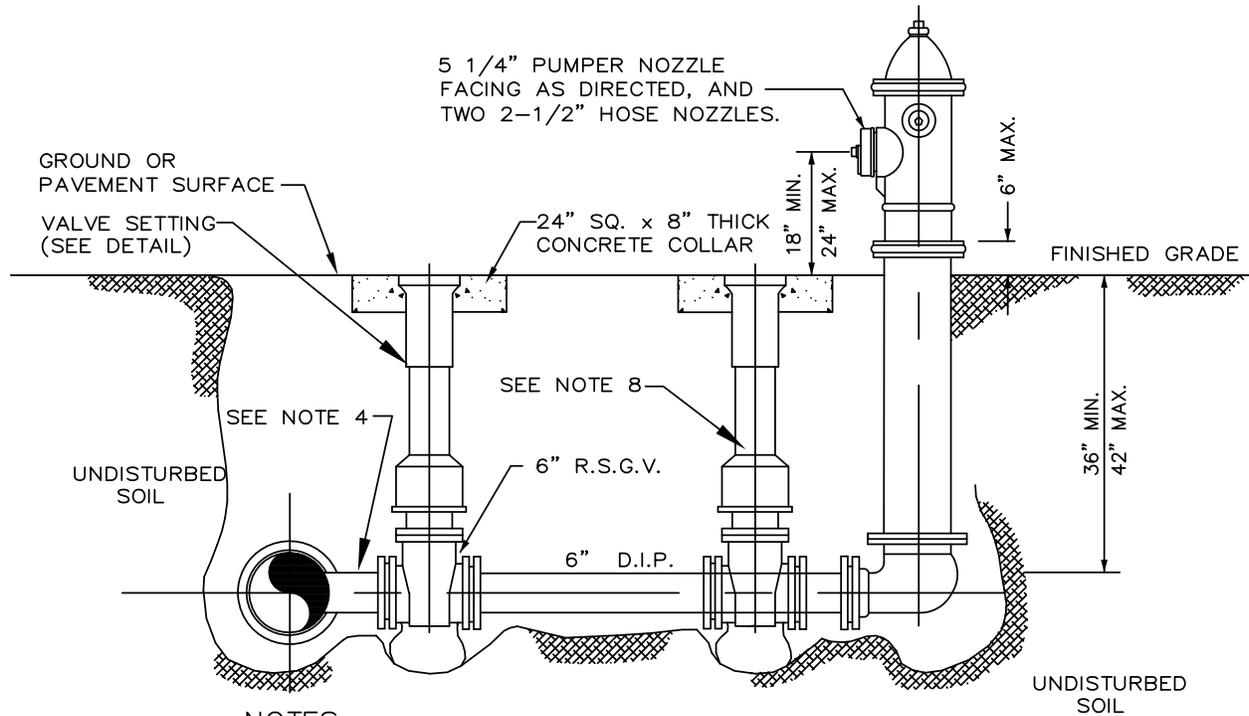
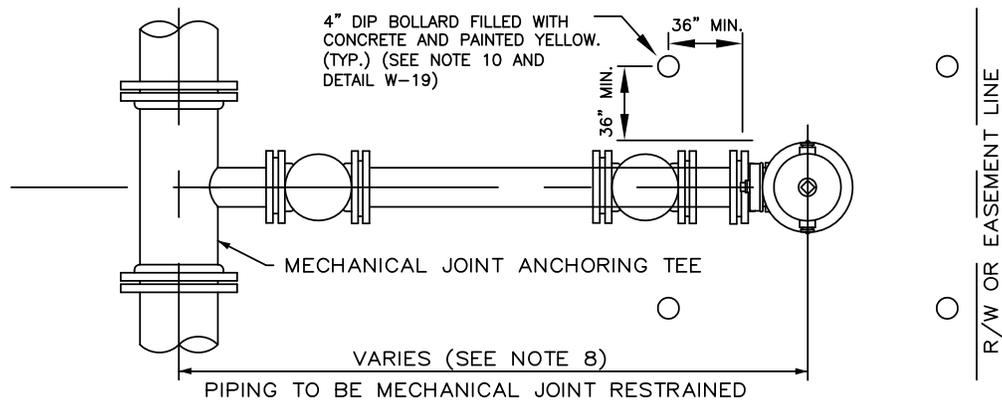
REVISION

ALTERNATE WATERMAIN TIE-IN DETAIL

PAGE No.

W-38

OCT. 2017

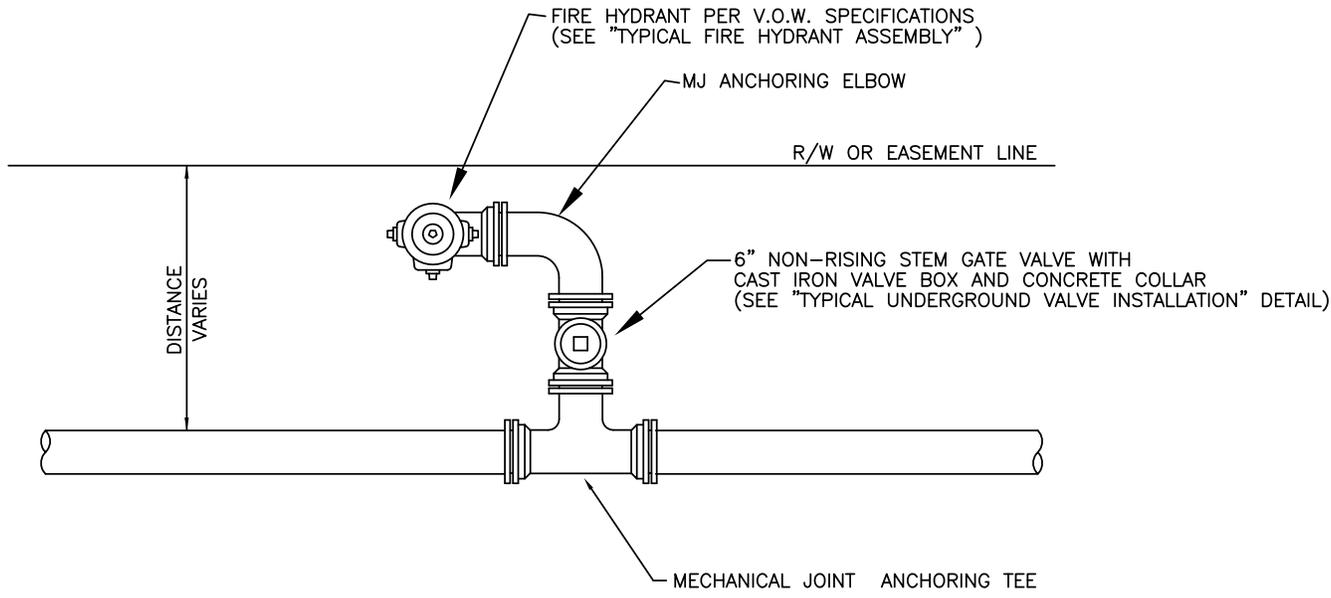


NOTES:

1. HYDRANT SHALL BE INSTALLED PLUMB AND TRUE.
2. THE MODEL AND COLOR SHALL BE PER V.O.W. REQUIREMENTS.
3. VALVE SHALL BE PLACED ADJACENT TO MAIN, TIED TO TEE.
4. MECHANICAL JOINT ANCHORING FITTINGS WILL BE USED AS NOTED.
5. ALL HYDRANTS SHALL BE TEE'D OFF OF MAINS.
6. HYDRANTS SHALL NOT BE PLACED IN OR INTERFERE WITH SIDEWALKS, ROADWAYS OR BIKEPATHS.
7. ALL JOINTS TO BE MECHANICALLY RESTRAINED.
8. ANY FIRE HYDRANT THAT IS INSTALLED 50 FEET OR MORE FROM THE MAIN WILL REQUIRE AN ADDITIONAL VALVE & BOX AT THE HYDRANT.
9. NO CONNECTIONS ARE ALLOWED ON THE FIRE HYDRANT LATERAL.
10. BOLLARDS MAY BE REQUIRED FOR HYDRANTS WITH LESS THAN 7 FEET TO EDGE OF PAVEMENT (WITHOUT RAISED CURBING). NO BOLLARDS SHALL BE INSTALLED IN COUNTY RIGHT-OF-WAY "CLEAR ZONE".

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>TYPICAL FIRE HYDRANT ASSEMBLY</p>	<p>PAGE No.</p> <p>W-39</p>
----------------------------------	--------------------------------------	-----------------------------

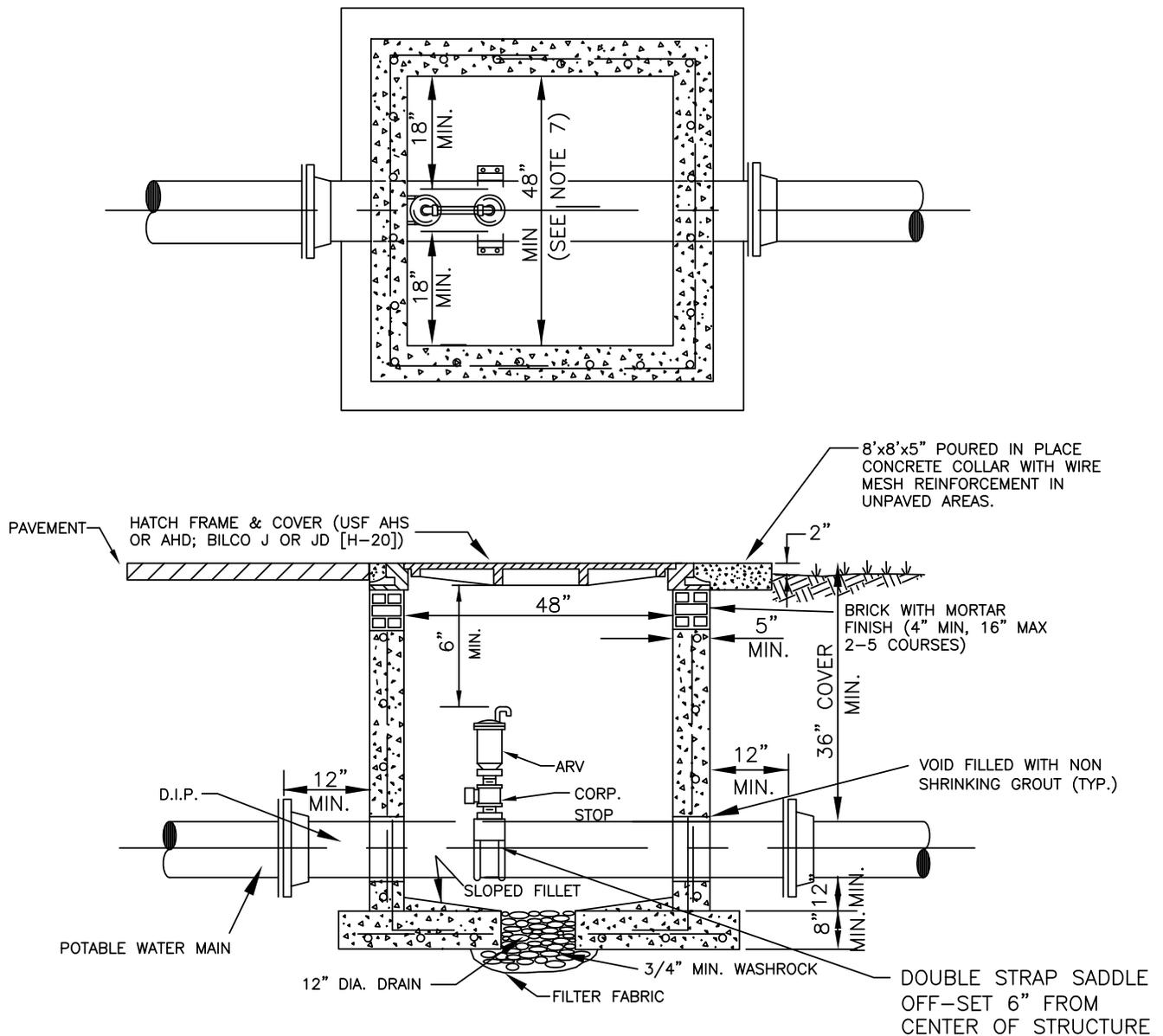


NOTES:

1. HYDRANT SHALL BE INSTALLED PLUMB AND TRUE.
2. THE MODEL AND COLOR HYDRANT SHALL BE PER V.O.W. REQUIREMENTS.
3. VALVE SHALL BE PLACED ADJACENT TO MAIN, TIED TO TEE.
4. MECHANICAL JOINT (MJ) ANCHORING FITTINGS WILL BE USED AS NOTED.
5. ALL HYDRANTS SHALL BE TEE'D OFF OF MAINS.
6. HYDRANTS SHALL NOT BE PLACED IN SIDEWALKS, ROADWAYS OR BIKEPATHS.
7. ALL JOINTS TO BE MECHANICAL RESTRAINED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>ALTERNATE FIRE HYDRANT INSTALLATION</p>	<p>PAGE No.</p> <p>W-40</p>
----------------------------------	--	-----------------------------



NOTES:

1. 4000 P.S.I. TYPE II PRECAST CONCRETE WITH STEEL REINFORCEMENT. SHOP DRAWING IS REQUIRED
2. AIR RELEASE VALVE SHALL BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED. FORCE MAINS REQUIRE 2" MIN.
3. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF NON-SHRINKING GROUT.
4. OTHER VAULT AND COVER DESIGNS MAY BE USED UPON SUBMITTAL AND APPROVAL OF SHOP DRAWINGS.
5. DUCTILE IRON PIPE IS REQUIRED THROUGH THE VAULT. NO PIPE JOINTS INSIDE OR WITHIN 12" OF THE VAULT.
6. THREADED AREAS OF BRASS FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
7. LARGER VAULTS WILL BE REQUIRED FOR PIPES LARGER THAN 12"

PIPE SIZE	MIN. VAULT SIZE
16"-24"	4'x5'
30"-42"	4'x6'

V.O.W. CONSTRUCTION STANDARDS & DETAILS

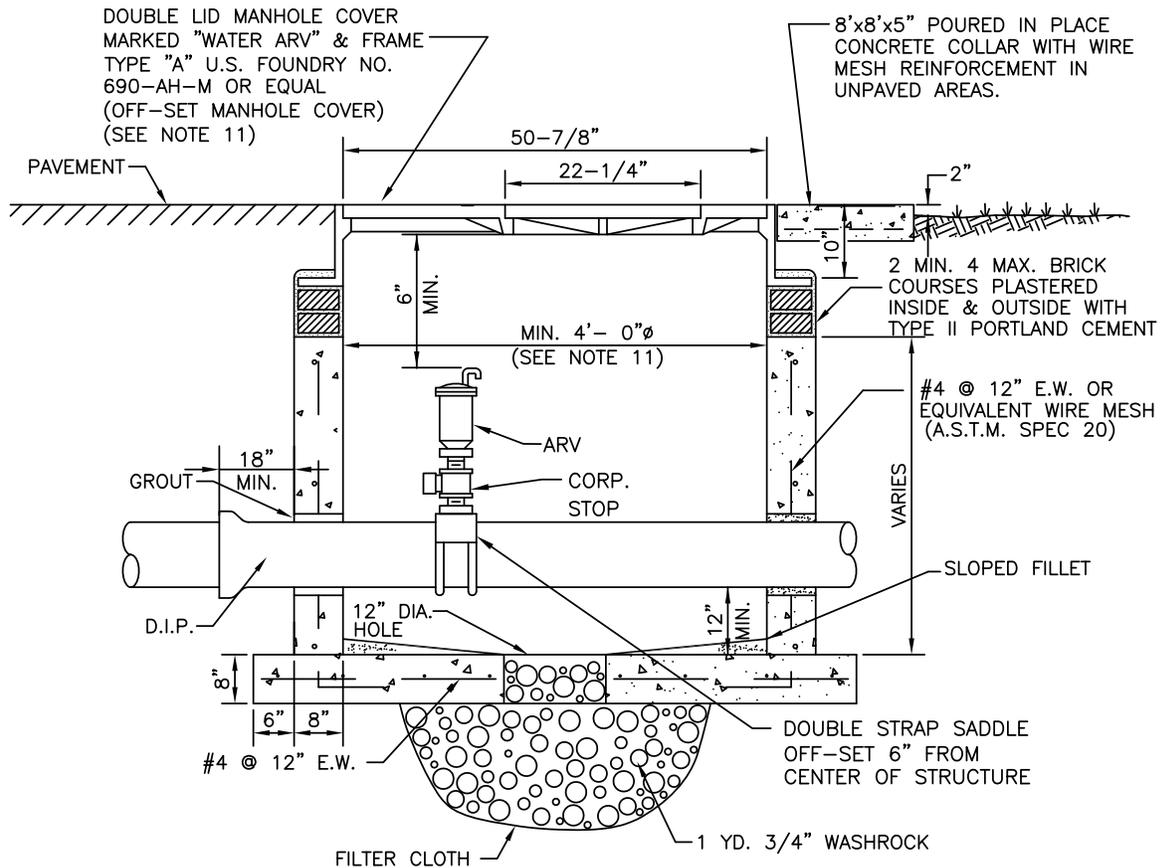
REVISION

POTABLE WATERMAIN UNDERGROUND AIR RELEASE VALVE
AND VAULT IN NON-TRAFFIC AREAS
AND OUTSIDE OF ROAD R/W

PAGE No.

W-41

OCT. 2017



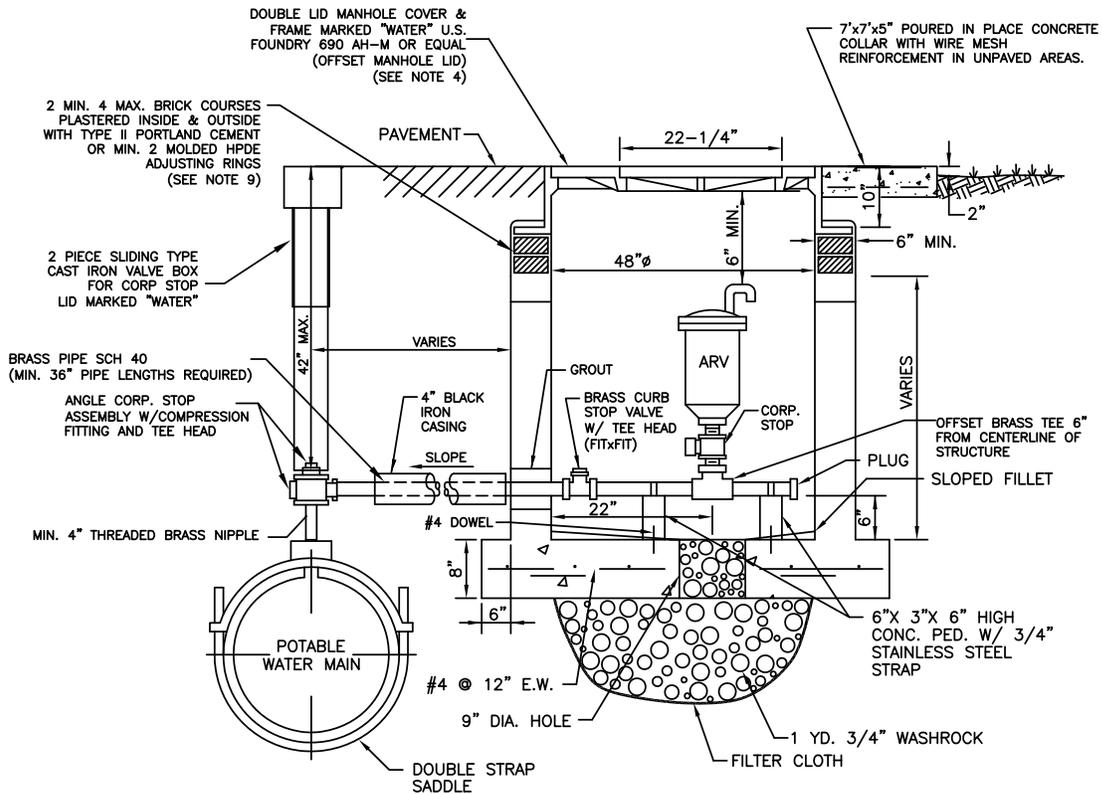
NOTES:

1. PRECAST CONCRETE TYPE # 4000 P.S.I. A SHOP DRAWING IS REQUIRED.
2. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
3. LIFT HOLES ARE PERMITTED.
4. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
5. MANHOLE FABRICATION SHALL BE IN ACCORDANCE WITH A.S.T.M. C-478 LATEST STANDARD.
6. CONCRETE COLLAR REQUIRED WHEN MANHOLE IS OUTSIDE OF PAVEMENT, SEE DETAIL.
7. AIR RELEASE VALVE SHALL BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED. FORCE MAINS REQUIRE 2" MIN.
8. DUCTILE IRON PIPE IS REQUIRED THROUGH THE VAULT. NO PIPE JOINTS INSIDE OR WITHIN 18" OF THE MANHOLE.
9. THREADED AREAS OF BRASS FITTINGS SHALL BE SPIRAL WRAP WITH TWO WRAPS OF TEFLON TAPE.
10. FOR PIPES 12" AND SMALLER, AN ALTERNATIVE DESIGN WITH APPROVED 32" DIAMETER HINGED MANHOLE COVERS WILL BE CONSIDERED.
11. LARGER MANHOLES WILL BE REQUIRED FOR PIPES LARGER THAN 12"

PIPE SIZE	MIN. MANHOLE DIAMETER
16"-24"	60"
30"-42"	72"

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	POTABLE WATERMAIN UNDERGROUND AIR RELEASE VALVE IN MANHOLE IN PAVED AREAS AND ROAD R/W	PAGE No. W-42
OCT. 2017		



NOTES:

1. MONOLITHICALLY Poured STRUCTURE IS REQUIRED (ASTM C-478)
2. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
3. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
4. ALTERNATIVE DESIGN WILL BE CONSIDERED USING APPROVED 32" DIAMETER HINGED MANHOLE COVER
5. ARV, TAP AND PIPING TO BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED. I.E. ONE (1) INCH FOR WATER OR TWO (2) INCH FOR SEWER.
6. CONCRETE COLLAR REQUIRED IN UNPAVED AREAS.
7. SHOP DRAWING IS REQUIRED FOR REVIEW AND APPROVAL.
8. THREADED AREAS OF BRASS FITTINGS AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
9. IN LIEU OF BRICK WORK, APPROVED PRECAST CONCRETE ADJUSTING RINGS MAY BE USED. INSTALLATION SHALL FOLLOW MANUFACTURERS RECOMMENDATIONS.
10. SHOP DRAWINGS ARE REQUIRED FOR CUSTOM MADE BRACKETS
11. PIPE AND FITTINGS SHALL BE NO LEAD BRASS.
12. 1" CHECK VALVE IS REQUIRED BETWEEN CORPORATION AND ARV ASSEMBLY (WATER ONLY).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

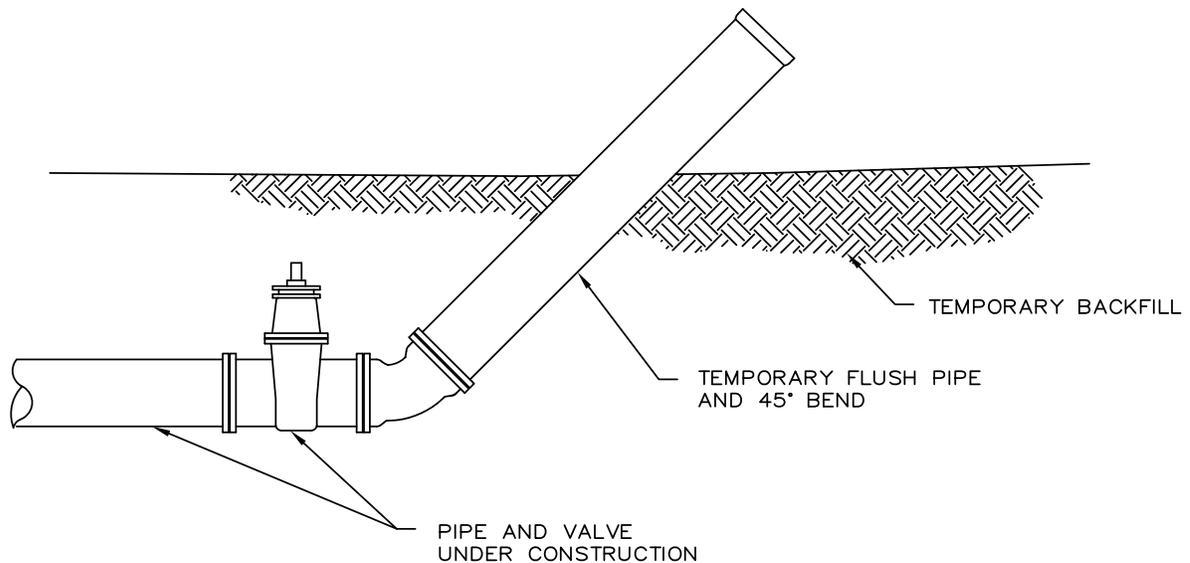
**POTABLE WATERMAIN
OFF-SET UNDERGROUND AIR RELEASE VALVE**

REVISION

OCT. 2017

PAGE No.

W-43



NOTES:

1. UPON COMPLETION OF THE PIPE INSTALLATION FOR ANY SECTION, THE MAINS SHALL BE CANNON FLUSHED TO REMOVE DIRT AND ANY OTHER FOREIGN MATTER BY ACHIEVING A MINIMUM VELOCITY OF 2.5 FEET PER SECOND IN THE PIPE.
2. INSTALL A 45° BEND AND ASSOCIATED PIPING AS SHOWN TO DIRECT THE FLUSHING WATER AWAY FROM THE IMMEDIATE WORK AREA AND EXERCISE DUE CARE SO AS TO ENSURE THAT THE WATER USED IN FLUSHING DOES NOT CAUSE A NUISANCE OR INFLICT PROPERTY DAMAGE.
3. BENDS AND PIPING SHALL BE THE SAME SIZE AS THE LINE TO BE FLUSHED.
4. PRIOR TO THE ACTUAL LINE FLUSHING OPERATION. THE CONTRACTOR SHALL PROPERLY NOTIFY THE ENGINEER AND V.O.W. INSPECTOR OF SUCH INTENDED WATER USE.
5. NO EXISTING VALVES SHALL BE TURNED ON OR OFF, EXCEPT BY AUTHORIZED V.O.W. PERSONNEL.
6. FLUSHING SHALL NOT BE ACCOMPLISHED WITHOUT THE ACTUAL PRESENCE OF THE V.O.W. INSPECTOR.
7. AFTER THE LINE UNDER CONSTRUCTION HAS BEEN SUCCESSFULLY FLUSHED THE CONTRACTOR SHALL REMOVE THE TEMPORARY PIPING ARRANGEMENT AND PROCEED WITH THE REMAINING CONSTRUCTION AS SPECIFIED.
8. ALL PIPING SHALL BE MECHANICALLY RESTRAINED IN ACCORDANCE WITH V.O.W. STANDARDS. THE NUMBER OF PIPE LENGTHS TO BE RESTRAINED SHALL BE PER MANUFACTURERS RECOMMENDATION.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

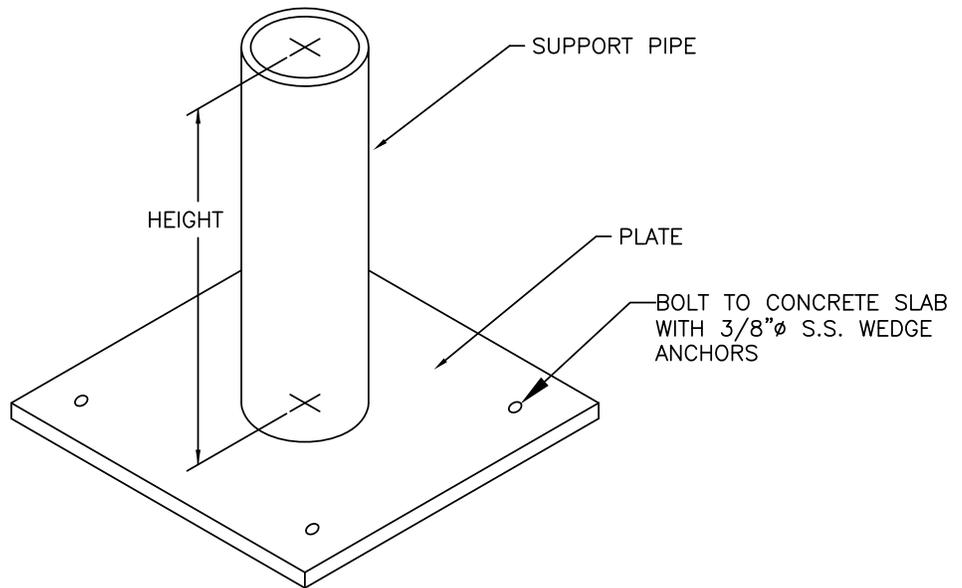
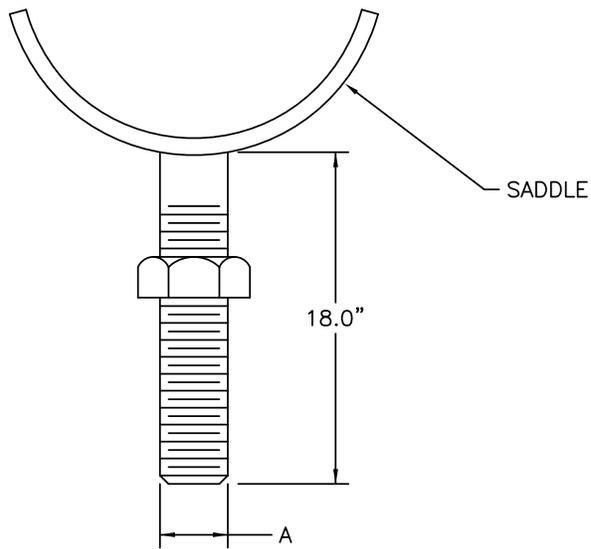
REVISION

CANNON FLUSHING DETAIL

PAGE No.

W-44

OCT. 2017



PIPE SIZE	A	SUPPORT PIPE	SADDLE	PLATE	HEIGHT
3"	3/4"	1"	1/4" x 2"	4" x 4"	1' - 6"
4"	3/4"	1"	1/4" x 2"	4" x 4"	1' - 6"
6"	3/4"	1"	1/4" x 2"	4" x 4"	1' - 6"
8"	3/4"	1"	1/4" x 2"	4" x 4"	1' - 6"
10"	1"	1 1/4"	3/8" x 3"	6" x 6"	1' - 6"
12"	1"	1 1/4"	3/8" x 3"	6" x 6"	1' - 6"
14"	1"	1 1/4"	3/8" x 3"	6" x 6"	1' - 6"
16"	1 1/4"	1 1/2"	1/2" x 3"	6" x 6"	1' - 6"
18"	1 1/4"	1 1/2"	1/2" x 3"	6" x 6"	1' - 6"

V.O.W. CONSTRUCTION STANDARDS & DETAILS

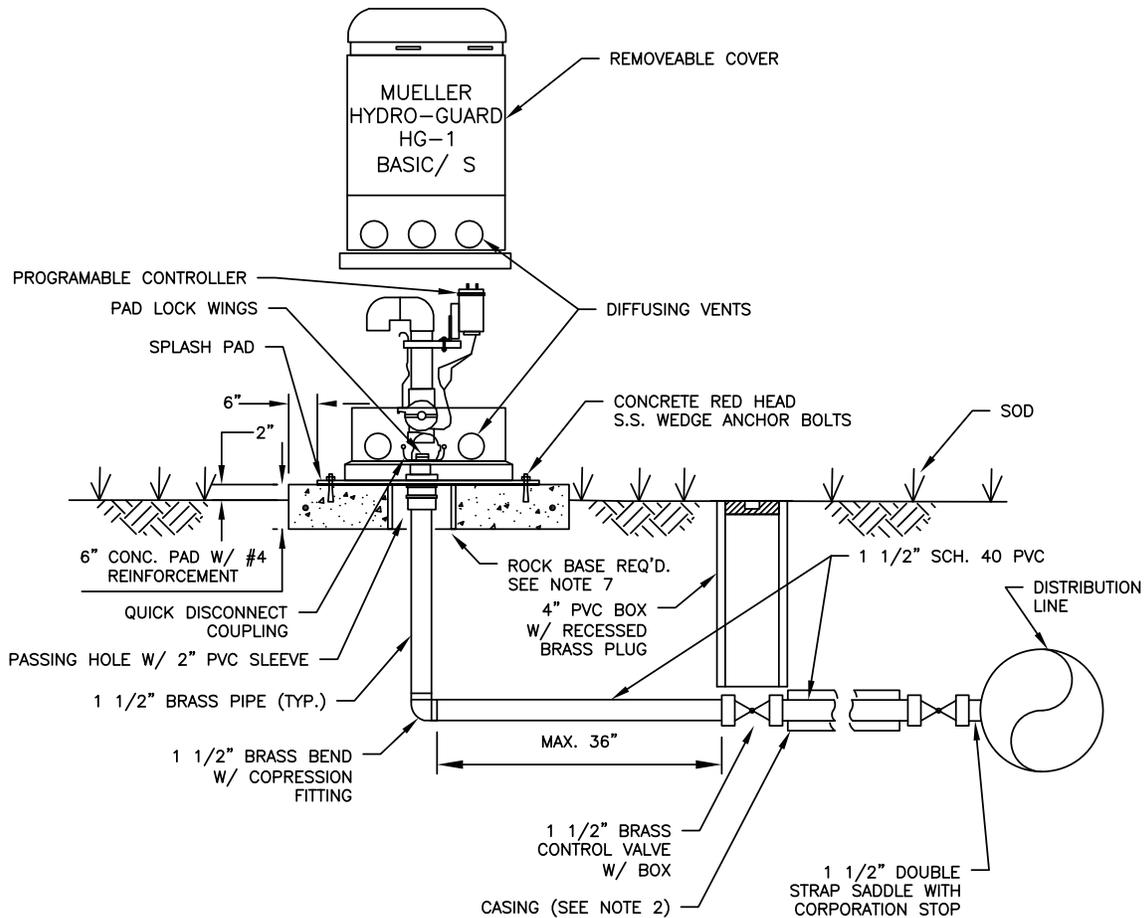
REVISION

PIPE SUPPORT DETAIL

PAGE No.

W-45

OCT. 2017



NOTES:

1. 12" MINIMUM CLEARANCE TO BE MAINTAINED BETWEEN AUTOMATIC FLUSHING SYSTEM PAD AND ANY OBSTRUCTION.
2. FOR INSTALLATION OF SERVICES UNDER DRIVEWAYS AND ROADWAYS, USE MIN. 4" DIAMETER BLACK IRON, PVC SCH 40, OR HDPE SDR 9 CASING. CASING SHALL EXTEND MIN. 24" BEYOND EDGE OF PAVEMENT. CASING TO BE SEALED WITH CEMENT. CASING SHALL BE COLOR-CODED BLACK, WHITE, BLUE, OR BLUE STRIPED.
3. AUTOMATIC FLUSHING ASSEMBLY TO BE INSTALLED AS CLOSE AS POSSIBLE TO THE WATER MAIN.
4. BEDDING (MIN. 4") AND COVER (MIN. 4") OVER SERVICE LINE OR CASING SHALL CONSIST OF FINE GRANULAR MATERIAL. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED WITH 2" MAXIMUM SIZE.
5. ALL HARDWARE FOR FLANGED CONNECTIONS (BOLTS, ETC.) TO BE STAINLESS STEEL.
6. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO (2) WRAPS OF TEFLON TAPE. ALL BRASS SHALL BE "LEAD FREE".
7. A 4" THICK COMPACTED 3/4" ROCK BASE IS REQUIRED. THE BASE SHALL EXTEND MINIMUM 12" BEYOND AUTOMATIC FLUSHING ASSEMBLY PAD PERIMETER.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

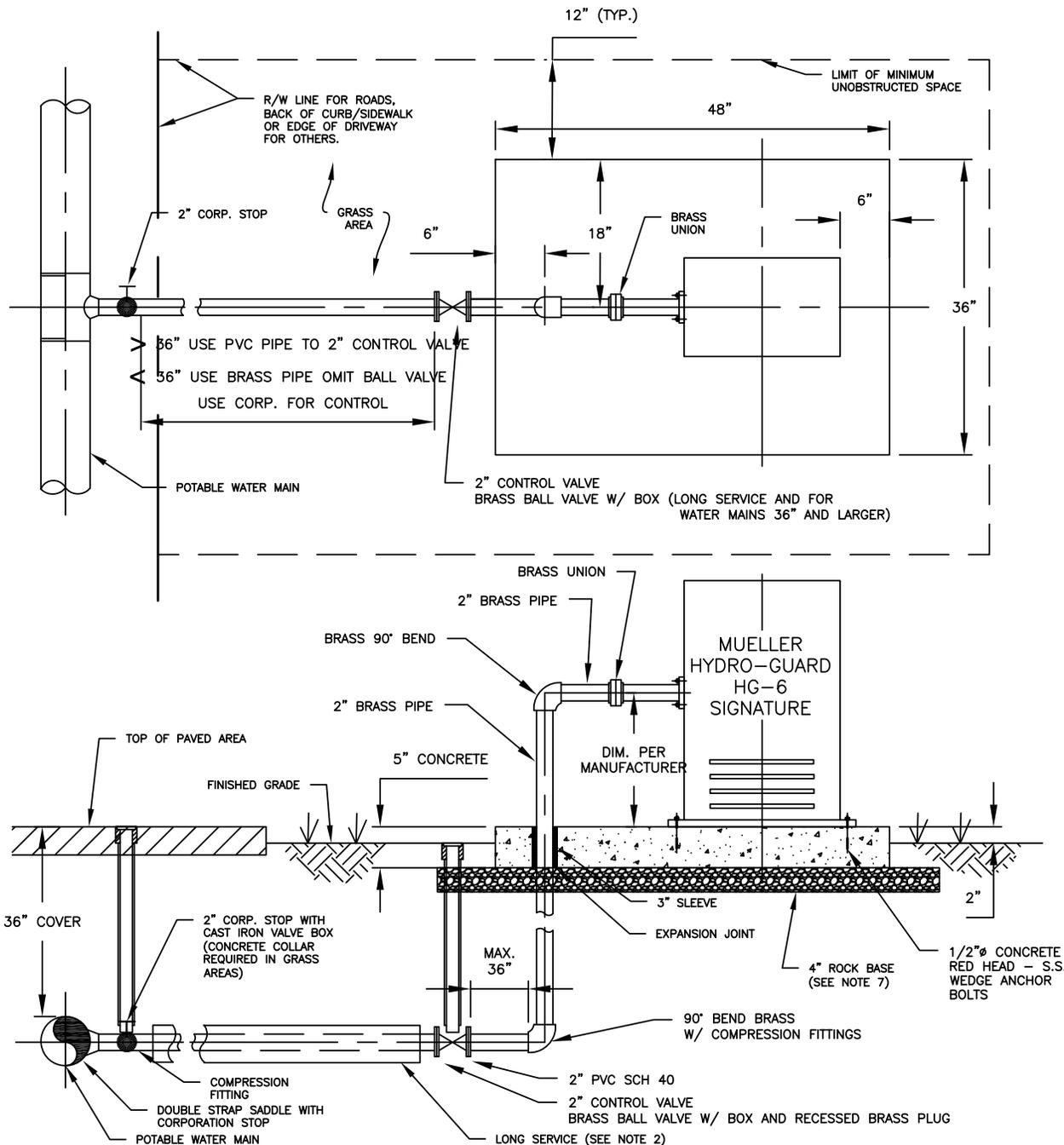
REVISION

**AUTOMATIC FLUSHING ASSEMBLY
(TYPE A)**

PAGE No.

W-46

OCT. 2017

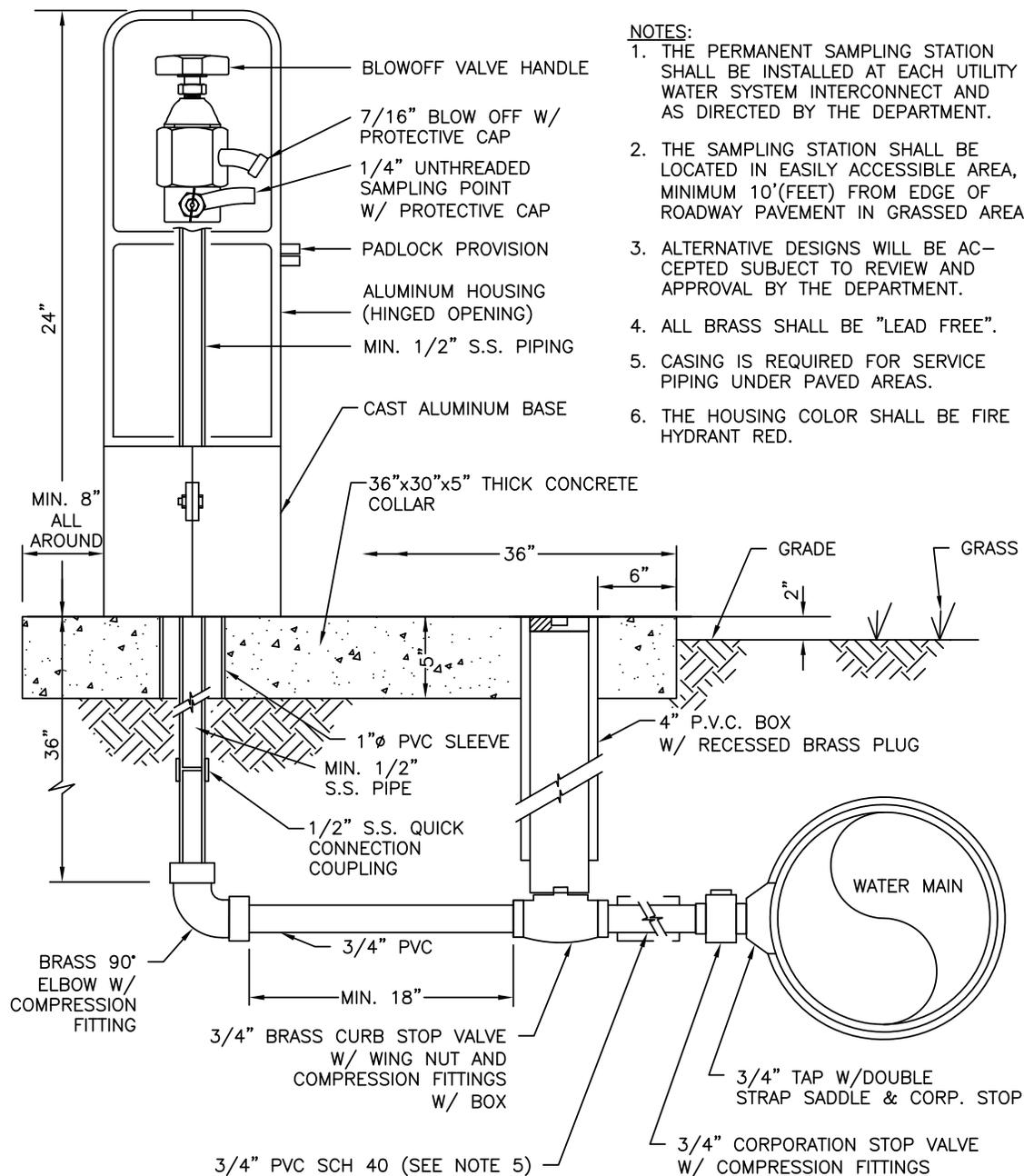


NOTES:

1. 12" MINIMUM CLEARANCE TO BE MAINTAINED BETWEEN AUTOMATIC FLUSHING SYSTEM PAD AND ANY OBSTRUCTION.
2. FOR INSTALLATION OF SERVICES UNDER DRIVEWAYS AND ROADWAYS, USE MIN. 4" DIAMETER BLACK IRON, PVC SCH 40, OR HDPE SDR 9 CASING. CASING SHALL EXTEND MIN. 24" BEYOND EDGE OF PAVEMENT. CASING TO BE SEALED WITH CEMENT. CASING SHALL BE COLOR-CODED BLACK, WHITE, BLUE, OR BLUE STRIPED.
3. AUTOMATIC FLUSHING ASSEMBLY TO BE INSTALLED AS CLOSE AS POSSIBLE TO THE WATER MAIN.
4. BEDDING (MIN. 4") AND COVER (MIN. 4") OVER SERVICE LINE OR CASING SHALL CONSIST OF FINE GRANULAR MATERIAL. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED WITH 2" MAXIMUM SIZE.
5. ALL HARDWARE FOR FLANGED CONNECTIONS (BOLTS, ETC.) TO BE STAINLESS STEEL.
6. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO (2) WRAPS OF TEFLON TAPE. ALL BRASS SHALL BE "LEAD FREE".
7. A 4" THICK COMPACTED 3/4" ROCK BASE IS REQUIRED. THE BASE SHALL EXTEND MINIMUM 12" BEYOND AUTOMATIC FLUSHING ASSEMBLY PAD PERIMETER.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	AUTOMATIC FLUSHING ASSEMBLY (TYPE B)	PAGE No. W-47
OCT. 2017		



NOTES:

1. THE PERMANENT SAMPLING STATION SHALL BE INSTALLED AT EACH UTILITY WATER SYSTEM INTERCONNECT AND AS DIRECTED BY THE DEPARTMENT.
2. THE SAMPLING STATION SHALL BE LOCATED IN EASILY ACCESSIBLE AREA, MINIMUM 10'(FEET) FROM EDGE OF ROADWAY PAVEMENT IN GRASSED AREA.
3. ALTERNATIVE DESIGNS WILL BE ACCEPTED SUBJECT TO REVIEW AND APPROVAL BY THE DEPARTMENT.
4. ALL BRASS SHALL BE "LEAD FREE".
5. CASING IS REQUIRED FOR SERVICE PIPING UNDER PAVED AREAS.
6. THE HOUSING COLOR SHALL BE FIRE HYDRANT RED.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	PERMANENT SAMPLING POINT	PAGE No. W-48
---------------------------	--------------------------	----------------------

1. THE CONTRACTOR SHALL HAVE AVAILABLE AT THE JOB SITE AT ALL TIMES ONE (1) COPY OF THE CONTRACT DOCUMENTS, INCLUDING PLANS, SPECIFICATIONS AND COPIES OF ALL REQUIRED CONSTRUCTION PERMITS.
2. THE CONTRACTOR SHALL CONTACT ALL CONCERNED UTILITIES AT LEAST 48 HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS.
3. 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 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 THE VILLAGE 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.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE HIS COMPLETE FAMILIARITY WITH THE PROJECT SITE AND ITS COMPONENTS TO INCLUDE SUBSURFACE CONDITIONS OF SOIL AND GROUNDWATER TABLE. BY SUBMITTAL OF A BID FOR THIS PROJECT, THE CONTRACTOR ACKNOWLEDGES HIS COMPLETE UNDERSTANDING AND RESPONSIBILITIES WITH RESPECT TO THE CONSTRUCTION ACTIVITIES REQUIRED UNDER THE SCOPE OF THIS PROJECT.
5. 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 STRUCTURES, LANDSCAPING, ETC.
6. PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE FOLLOWING 48 HOURS BEFORE DIGGING:
 1. VILLAGE OF WELLINGTON
 2. FLORIDA POWER & LIGHT
 3. SOUTHERN BELL TELEPHONE
 4. ADELPHIA CABLE TV
 5. SUNSHINE STATE ONE CALL OF FLORIDA INC.
7. VILLAGE OF WELLINGTON (VOW) WRITTEN SPECIFICATIONS AND STANDARD DETAILS (LATEST EDITION) ARE TO BE CONSIDERED PART OF THIS PROJECT AND CONSTRUCTION SHALL BE ENFORCED TO AT LEAST THESE MINIMUM STANDARDS.
8. ALL MATERIAL MUST CONFORM TO APPROVED SHOP DRAWINGS. ANY CHANGES MUST BE APPROVED BY ENGINEER AND VOW PRIOR TO INSTALLATION. FAILURE OF THE INSPECTOR TO CALL TO THE ATTENTION OF THE CONTRACTOR ANY ITEM NOT IN CONFORMANCE WITH PLANS AND SPECS SHALL NOT CONSTITUTE ACCEPTANCE OF THE ITEM.
9. VOW REPRESENTATIVES SHALL BE PRESENT DURING ALL OPERATIONS INVOLVING EXISTING UTILITIES.
10. NO CONCRETE THRUST BLOCKS WILL BE ALLOWED. ALL JOINTS SHALL BE MECHANICALLY RESTRAINED AS REQUIRED BY THE APPROVED PLANS.
11. SERVICE INTERRUPTIONS REQUIRE MINIMUM OF TWO (2) WEEKS PRIOR NOTIFICATION.

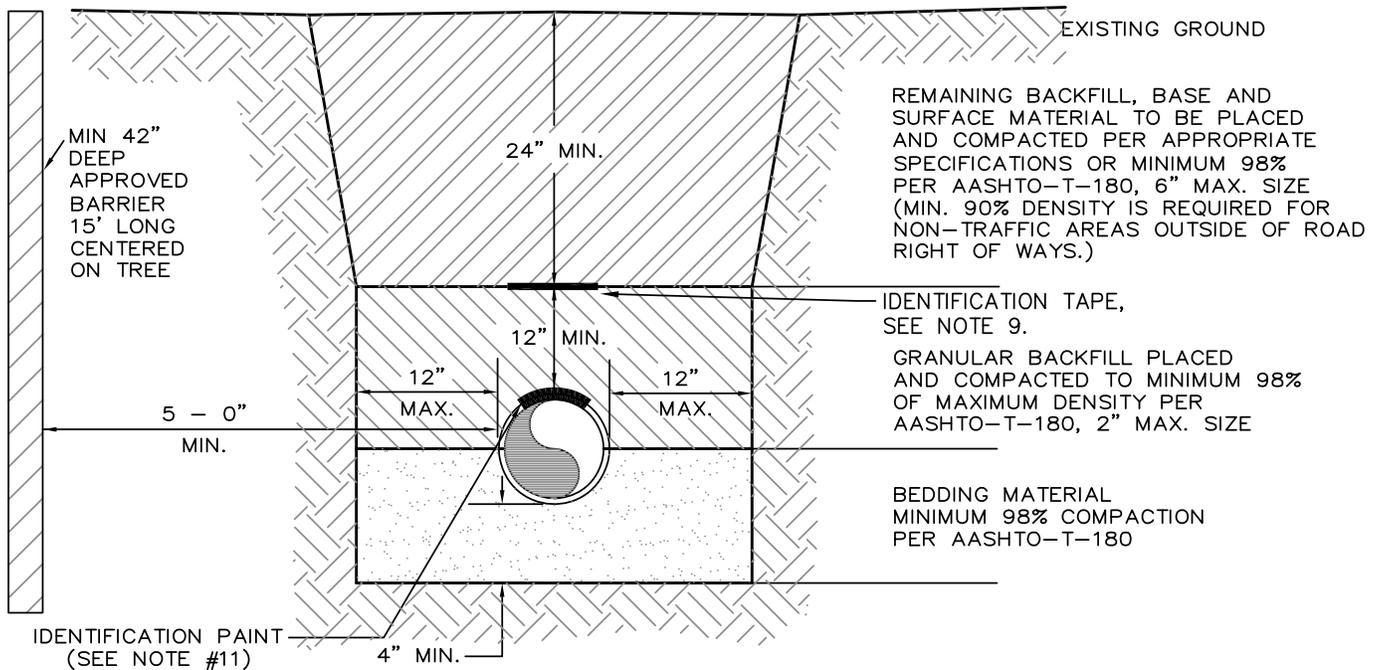
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	GENERAL CONSTRUCTION NOTES (WASTEWATER)	PAGE No.
OCT. 2017		S-1

12. ALL PIPING MUST BE INSTALLED DRY.
13. MINIMUM COVER SHALL BE 36 INCHES FROM FINISH GRADE.
MINIMUM COVER UNDER DITCH SHALL BE 2' AND CANAL BOTTOMS SHALL BE 5' BELOW THE TYPICAL DESIGN SECTION.
MAXIMUM COVER SHALL BE 42 INCHES FROM FINISHED GRADE.
14. C-900 PVC DR 18 MIN. SHALL BE REQUIRED IN THE FOLLOWING CIRCUMSTANCES (GRAVITY SEWER):
 - A. WHEN A SEWER LINE PASSES OVER OR UNDER ANY OTHER PIPE OR CABLE WITH LESS THAN 12 INCHES CLEARANCE (A MINIMUM OF 6 INCHES OF CLEARANCE MUST BE MAINTAINED).
 - B. WITHIN EASEMENTS.
 - C. WHEN MAKING CONNECTION FOLLOWING CORE DRILLING A MANHOLE.
 - D. INSIDE DROP MANHOLE PIPING.
 - E. WHEN GRAVITY SEWER IS LESS THAN 4.5' COVER TO THE INVERT OF THE PIPE. 4.5' OF COVER IS MIN. STANDARD COVER, LESS THAN 4.5' WILL NOT BE ACCEPTED UNLESS APPROVED BY THE UTILITY DIRECTOR.
15. DIP SHALL BE REQUIRED IN THE FOLLOWING CIRCUMSTANCES (FORCE MAIN OR GRAVITY MAIN):
 - A. WHEN PIPE RUNS THROUGH A STRUCTURE FOR AN ARV INSTALLATION.
 - B. THE LAST RUN OF GRAVITY SEWER FROM THE TERMINAL MANHOLE TO THE LIFT STATION WET WELL. THIS SECTION OF PIPE IS ALSO REQUIRED TO BE LINED PER THE APL.
16. MANHOLES SHALL BE COATED INSIDE, OUTSIDE AND BOTTOM. OUTSIDE COATINGS SHALL INCLUDE SEAMS AND MASONRY WORK ON TOPS AND PIPING ENTERING / EXITING MANHOLE.
17. ALL GRAVITY SEWER LINES WILL BE INSPECTED AND TESTED IN ACCORDANCE WITH VOW STANDARDS.
18. PAVEMENT REPLACEMENT, INCLUDING CURB, GUTTERS AND STRIPING SHALL OCCUR WITHIN SEVEN (7) WORKING DAYS FOLLOWING COMPLETION OF OPEN CUT WORK.
19. TAPPING SLEEVES SHALL BE A MINIMUM OF THREE (3) FEET FROM A PIPE JOINT.
20. ALL EXPOSED (ABOVE GRADE) DUCTILE IRON FORCE MAIN SHALL BE COLOR CODED TNEMEC SAFETY GREEN.
21. ALL OPENINGS AND PIPING ENTERING / EXITING MANHOLE SHALL BE SEALED WITH WATERPROOF NON SHRINKING GROUT OR APPROVED EQUAL.
22. RUBBER BOOT CONNECTIONS MUST BE SECURED USING TWO (2) STAINLESS STEEL STRAPS.
23. ELECTRONIC SERVICE LOCATORS MUST BE SEWER (GREEN).
24. USE OF REPAIR SLEEVES AND OR REPAIR COUPLINGS IS PROHIBITED WITHOUT PRIOR APPROVAL FROM THE VILLAGE UTILITY DIRECTOR.
25. MAXIMUM DEPTH FROM FINISH GRADE TO INVERT OF SERVICE LATERAL WYE IS THREE (3) FEET UNLESS APPROVED BY VILLAGE UTILITY DIRECTOR.
26. LIFT STATION START UP WILL BE ACCOMPLISHED USING BOTH F.P.L. POWER AND EMERGENCY GENERATOR PROVIDED FOR PROJECT.
27. DROP MANHOLE INTERIOR RECEIVES THE SAME COATING REQUIREMENTS AS LIFT STATION INTERIORS.
28. MECHANICAL PLUG REQUIRED IN EXISTING MANHOLE TO PROTECT SYSTEM FROM CONTAMINATION. PLUG IS NOT TO BE REMOVED UNTIL PROJECT ACCEPTANCE. VIOLATION OF THIS COULD IN TURN REQUIRE INSPECTION AND CLEANING OF EXISTING SYSTEM BACK TO LIFT STATIONS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	GENERAL CONSTRUCTION NOTES (WASTEWATER)	PAGE No.
OCT. 2017		S-2

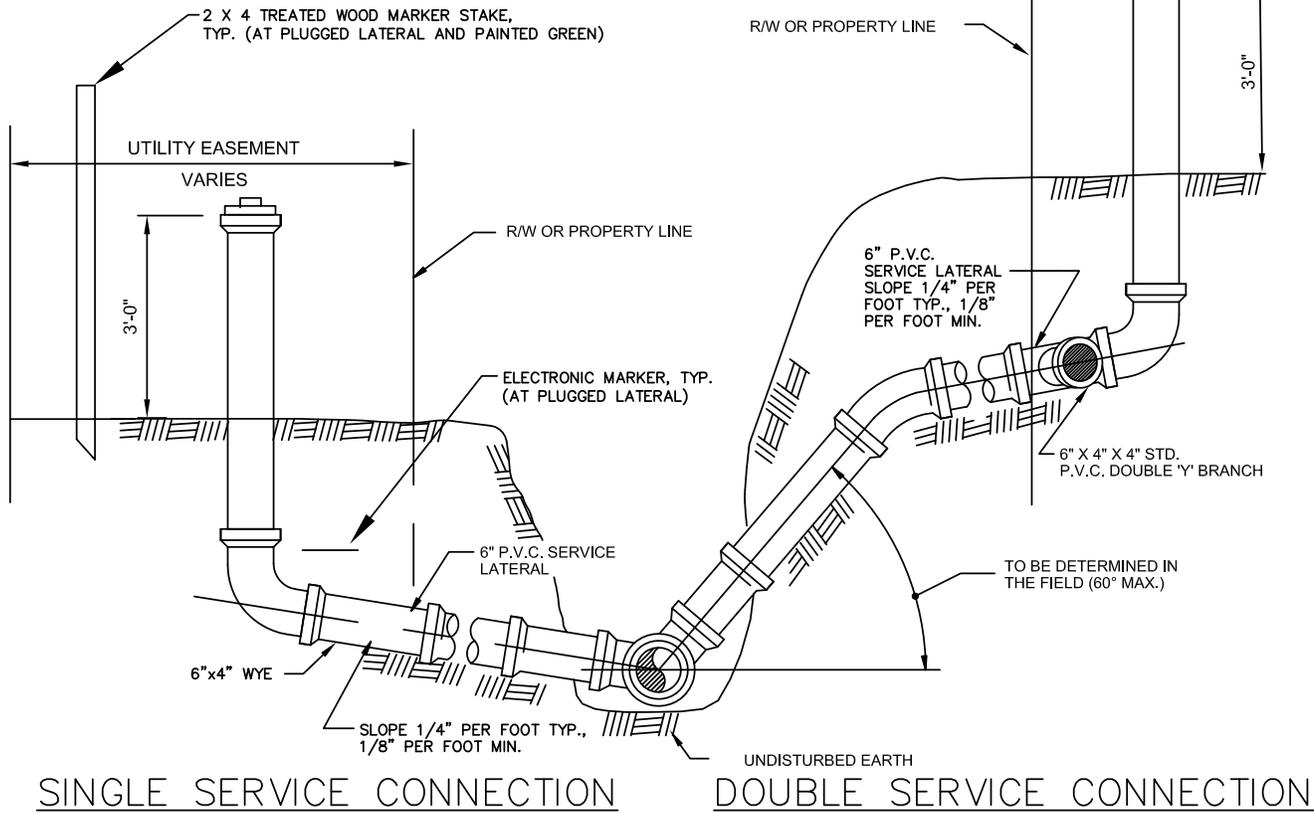
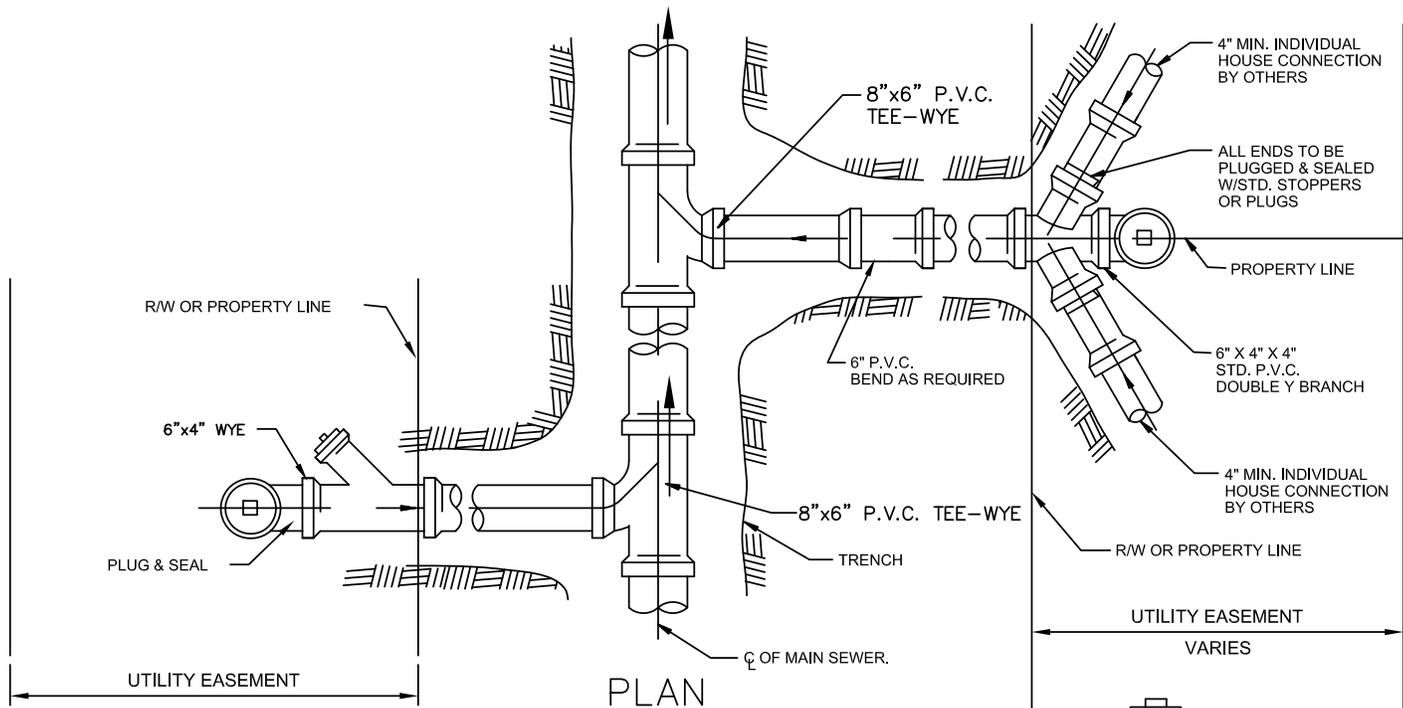


NOTES:

1. BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK $\frac{3}{8}$ " TO $\frac{7}{8}$ " SIZING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK DEBRIS AND LARGER ROCKS 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 FREE OF UNSUITABLE MATERIAL SUCH AS LARGE ROCK, MUCK, ROOTS AND DEBRIS.
5. DENSITY TESTS ARE REQUIRED IN 1 FOOT LIFTS ABOVE THE PIPE AT INTERVALS OF 400' MAXIMUM. MINIMUM 1 SET SET OF TESTS FOR EACH WASTELAND GRAVITY MAIN RUN, OR AS DIRECTED BY THE INSPECTOR.
6. THE DEVELOPER/CONTRACTOR SHALL BE RESPONSIBLE TO COMPLY WITH ALL TRENCH SAFETY LAWS AND REGULATIONS.
7. SEE SEPERATE DETAIL FOR "PIPE INSTALLATION UNDER EXISTING PAVEMENT – OPEN CUT."
8. THE AFFECTED AREA SHALL BE RESTORED TO EQUAL OR BETTER CONDITION OR AS SPECIFIED IN PERMIT/CONTRACT DOCUMENTS.
9. APPROVED MAGNETIC TAPE IS REQUIRED FOR ALL MAINS. THE TAPE SHALL BE INSTALLED 12" ABOVE PIPE.
10. ROOT BARRIER IS REQUIRED FOR APPROVED TREE INSTALLATION 10' OR CLOSER FROM UTILITY FACILITIES AS APPROVED BY THE DEPARTMENT.
11. CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP SEWER MAINS (GREEN) AND DIP RECLAIMED WATER MAINS (PURPLE).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>TYPICAL TRENCH DETAIL</p>	<p>PAGE No.</p> <p>S-3</p>
----------------------------------	------------------------------	----------------------------



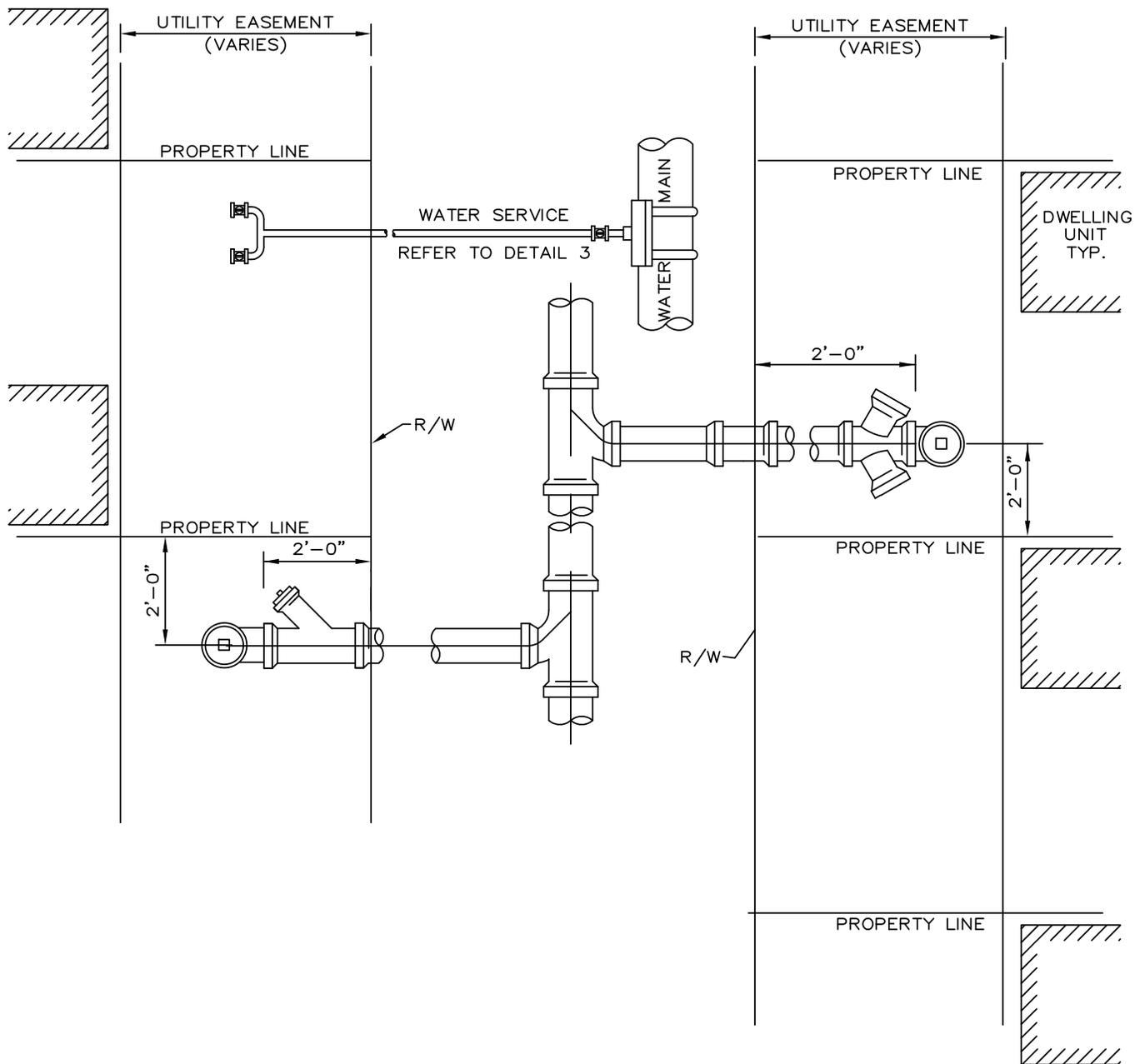
NOTES:

1. SERVICE LATERALS SHALL TERMINATE 2' INSIDE U.E. AT PROPERTY LINE AT A MAXIMUM DEPTH OF 3 FEET, PLUGGED WATERTIGHT AND MARKED WITH A 2"x2" TREATED STAKE AND ELECTRONIC MARKER (GREEN).
2. THE MINIMUM DIAMETER OF ALL SERVICE LATERALS SHALL BE 6 INCHES.
3. CONNECTION TO VILLAGE LATERAL SHALL BE MADE WITH A CLEANOUT.

SECTION

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPICAL SEWER SERVICE CONNECTION	PAGE No.
OCT. 2017		S-4

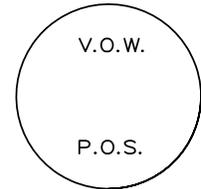
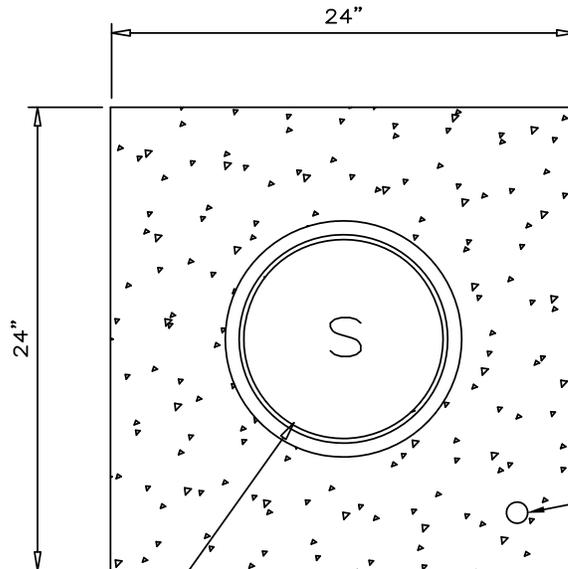


N O T E S:

1. SERVICE LATERALS SHALL TERMINATE 2' INSIDE U.E. AT PROPERTY LINE AT A MAXIMUM DEPTH OF 3 FEET, PLUGGED WATERTIGHT AND MARKED WITH A 2"x2" TREATED STAKE AND ELECTRONIC MARKER (GREEN).
2. THE MINIMUM DIAMETER OF ALL SERVICE LATERALS SHALL BE 6 INCHES.
3. CONNECTION TO VILLAGE LATERAL SHALL BE MADE WITH A CLEANOUT.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

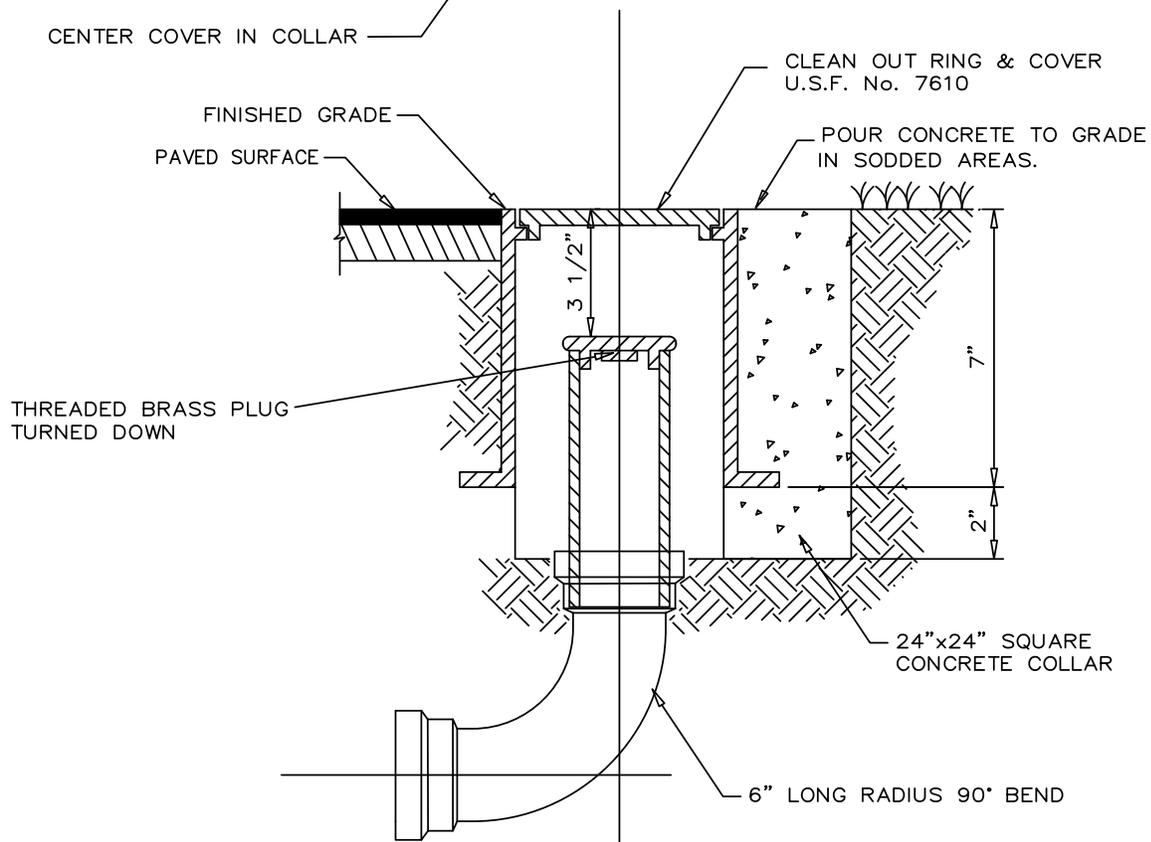
<p>REVISION</p> <p>OCT. 2017</p>	<p>TYPICAL ZERO LOT LINE SEWER SERVICE CONNECTION</p>	<p>PAGE No.</p> <p>S-5</p>
----------------------------------	---	----------------------------



BRASS MARKER
 IDENTIFIES THE
 VILLAGE OF WELLINGTON'S
 SANITARY
 POINT OF SERVICE
 BRASS MARKER IS NOT
 REQUIRED IN PAVED
 AREAS

CENTER COVER IN COLLAR

BRASS MARKER

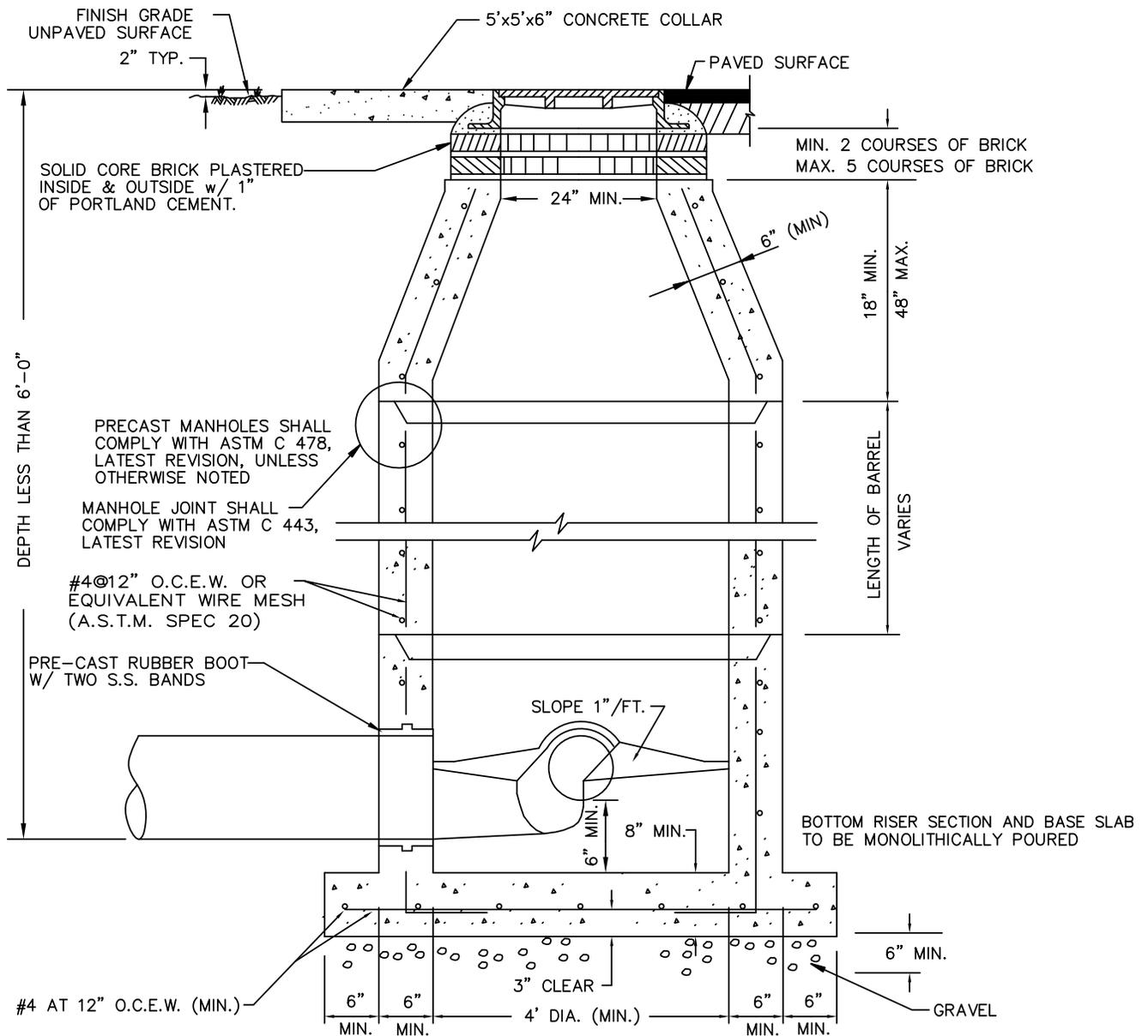


NOTES:

1. CLEANOUTS TO BE LOCATED IN GRASS AREA WHENEVER POSSIBLE.
2. THE COVER SHALL BE MARKED WITH AN "S".
3. LATERALS TO BE SDR 26.
4. CLEANOUTS TO BE INSTALLED PRIOR TO C/O (CERTIFICATE OF OCCUPANCY).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	SANITARY SEWER CLEANOUT	PAGE No. S-6
---------------------------	-------------------------	---------------------

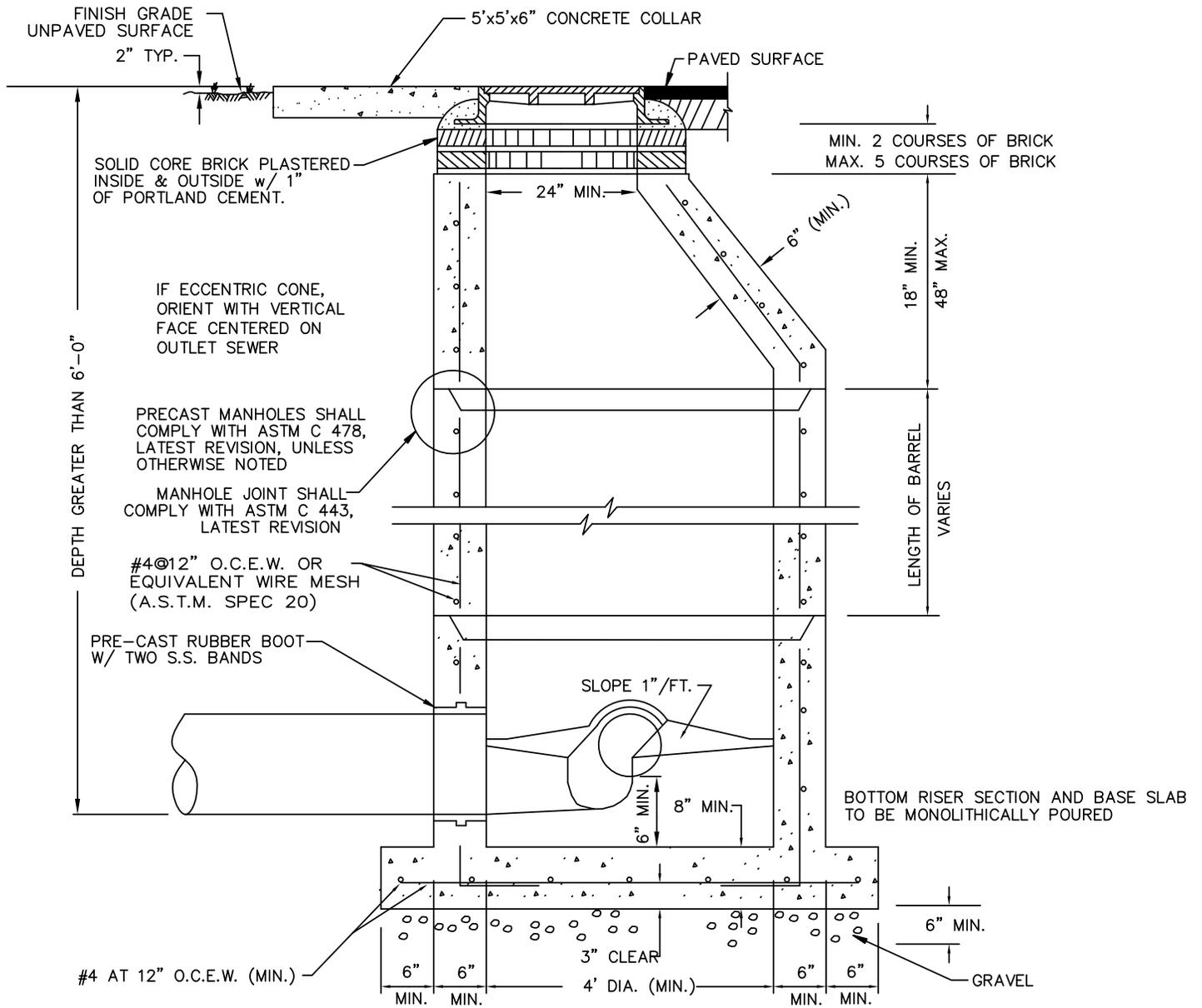


NOTES:

1. PRECAST CONCRETE TYPE II 4000 P.S.I.
2. "RAMNEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH WIDTH AT LEAST 1/2 THE WALL THICKNESS) WITH GROUT INSIDE AND OUTSIDE.
3. ALL OPENINGS AND PIPING ENTERING OR EXITING MANHOLE SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT OR APPROVED EQUAL.
4. FLOW CHANNELS SHALL BE CONSTRUCTED TO DIRECT INFLUENT INTO FLOW STREAM (SEE DETAIL).
5. LIFT HOLES ARE PERMITTED AND SHALL BE SEALED AFTER PLACEMENT OF RISER.
6. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
7. APPROVED PRECAST RUBBER BOOTS MUST BE USED WITH PVC PIPE.
8. AN INSIDE DROP MAY EXCEED 2.0 FEET PER DETAIL D-10.
9. COAT INTERIOR & EXTERIOR WITH 2 COATS COAL TAR EPOXY, 8 mil. MIN. DRY FILM THICKNESS EACH COAT.
10. 5'x5'x6" CONCRETE COLLAR AND RAIN GUARD IS REQUIRED WHEN MANHOLE IS OUT OF PAVEMENT
11. WHEN MANHOLE IS CORE DRILLED, ALL PIPING SHALL BE C-900 PVC W/SANDED PVC COUPLING.
12. MINIMUM DEPTH OF MANHOLE TO BE 4.5' FROM RIM ELEVATION TO INVERT.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	STANDARD MANHOLE (CONCENTRIC CONE)	PAGE No.
OCT. 2017		S-7

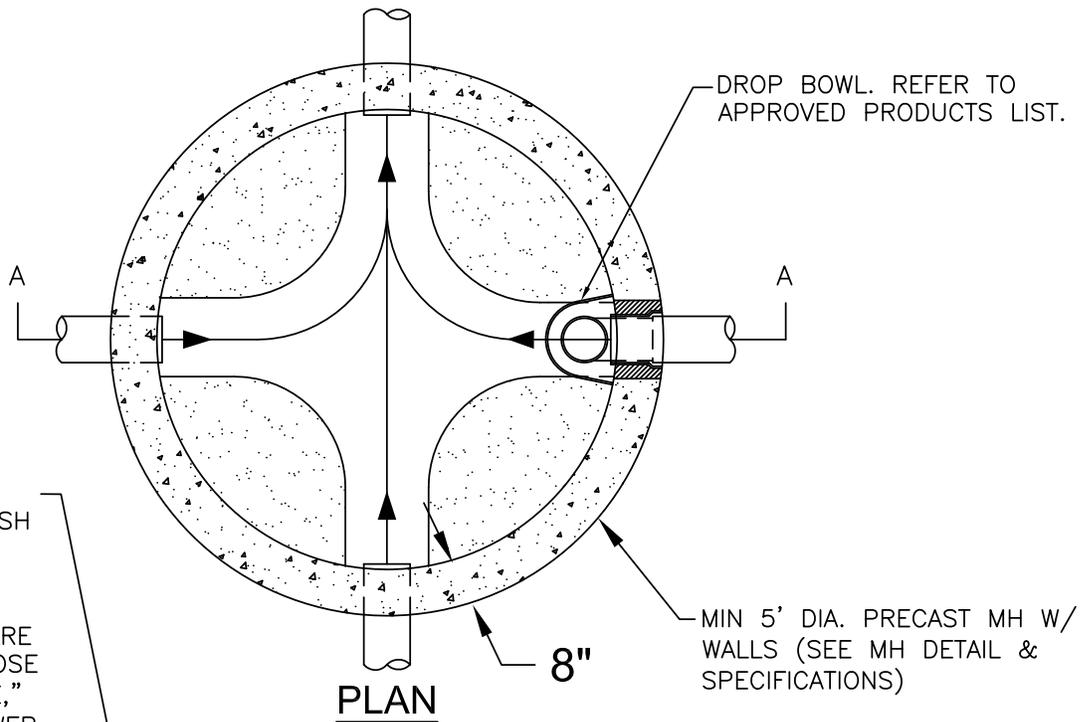


NOTES:

1. PRECAST CONCRETE TYPE II 4000 P.S.I.
2. "RAMNEK" OR EQUAL AT ALL RISER JOINTS (1/2" THICK WITH WIDTH AT LEAST 1/2 THE WALL THICKNESS) WITH GROUT INSIDE AND OUTSIDE.
3. ALL OPENINGS AND PIPING ENTERING OR EXITING MANHOLE SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT OR APPROVED EQUAL.
4. FLOW CHANNELS SHALL BE CONSTRUCTED TO DIRECT INFLUENT INTO FLOW STREAM (SEE DETAIL).
5. LIFT HOLES ARE PERMITTED AND SHALL BE SEALED AFTER PLACEMENT OF RISER.
6. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
7. APPROVED PRECAST RUBBER BOOTS MUST BE USED WITH PVC PIPE.
8. AN INSIDE DROP MAY EXCEED 2.0 FEET PER DETAIL D-10.
9. COAT INTERIOR & EXTERIOR WITH 2 COATS COAL TAR EPOXY, 8 mil. MIN. DRY FILM THICKNESS EACH COAT.
10. 5'x5'x6" CONCRETE COLLAR AND RAIN GUARD IS REQUIRED WHEN MANHOLE IS OUT OF PAVEMENT
11. WHEN MANHOLE IS CORE DRILLED, ALL PIPING SHALL BE C-900 PVC W/SANDED PVC COUPLING.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	STANDARD MANHOLE (ECCENTRIC CONE)	PAGE No.
OCT. 2017		S-8

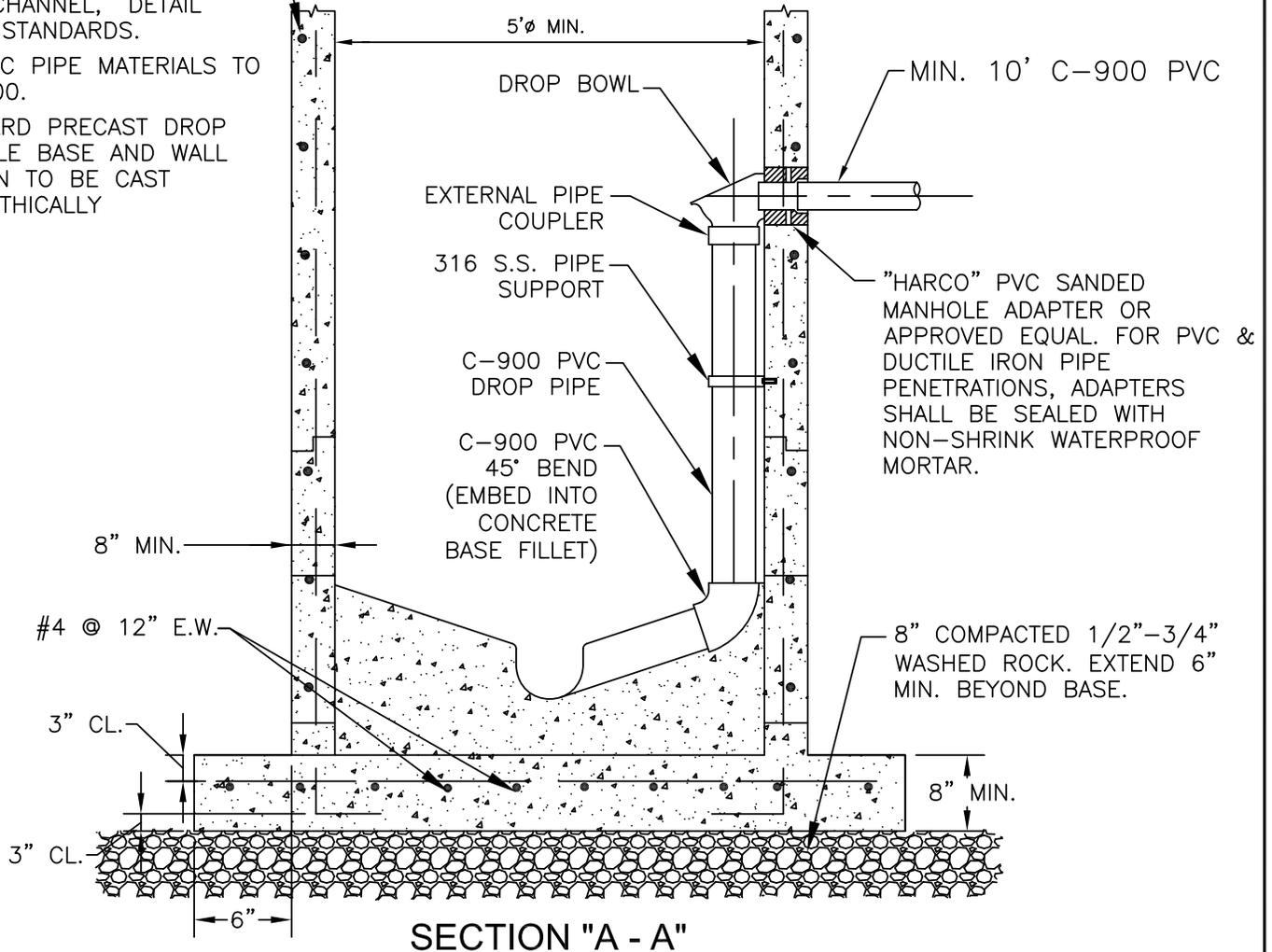


#4@12" O.C.E.W. OR
EQUIVALENT WIRE MESH
(A.S.T.M. SPEC 20)

1. DETAILS NOT SHOWN ARE
TO BE SIMILAR TO THOSE
SHOWN FOR "MANHOLE,"
DETAIL S-7, AND "SEWER
FLOW CHANNEL," DETAIL
S-13, STANDARDS.

2. ALL PVC PIPE MATERIALS TO
BE C900.

3. STANDARD PRECAST DROP
MANHOLE BASE AND WALL
SECTION TO BE CAST
MONOLITHICALLY



V.O.W. CONSTRUCTION STANDARDS & DETAILS

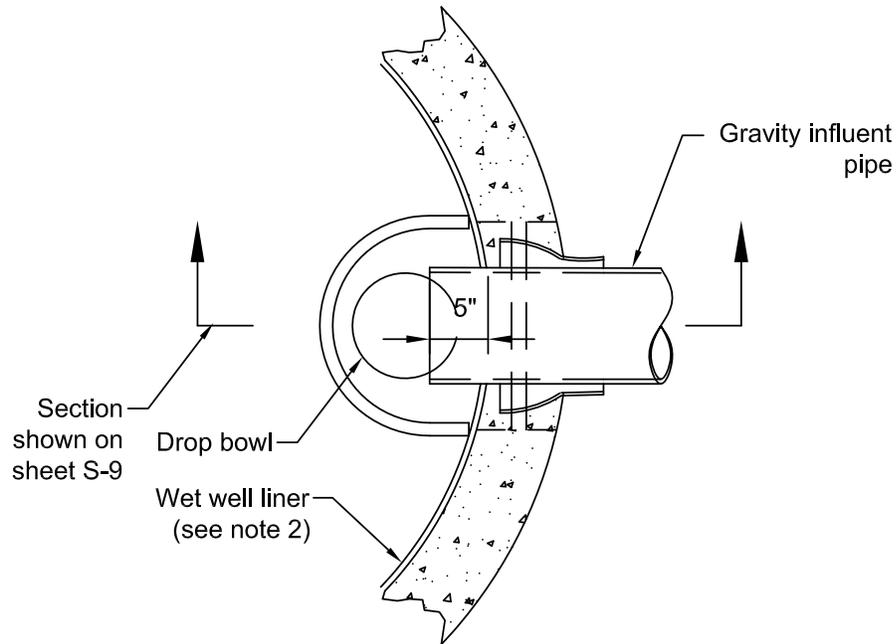
REVISION

INSIDE DROP CONNECTION FOR STANDARD MANHOLE

PAGE No.

OCT. 2017

S-9



PLAN VIEW

DROP BOWL NOTES:

1. Anchors to be constructed of 316 stainless steel "H.A.S." rod by HILTI or equal. The anchoring system shall include adhesive (HILTI H.V.U. or equal) with an embedment depth of 4 1/4".
2. Install drop bowl after the wet well liner is installed. This will ensure easy removal of the drop bowl (in the future).

V.O.W. CONSTRUCTION STANDARDS & DETAILS

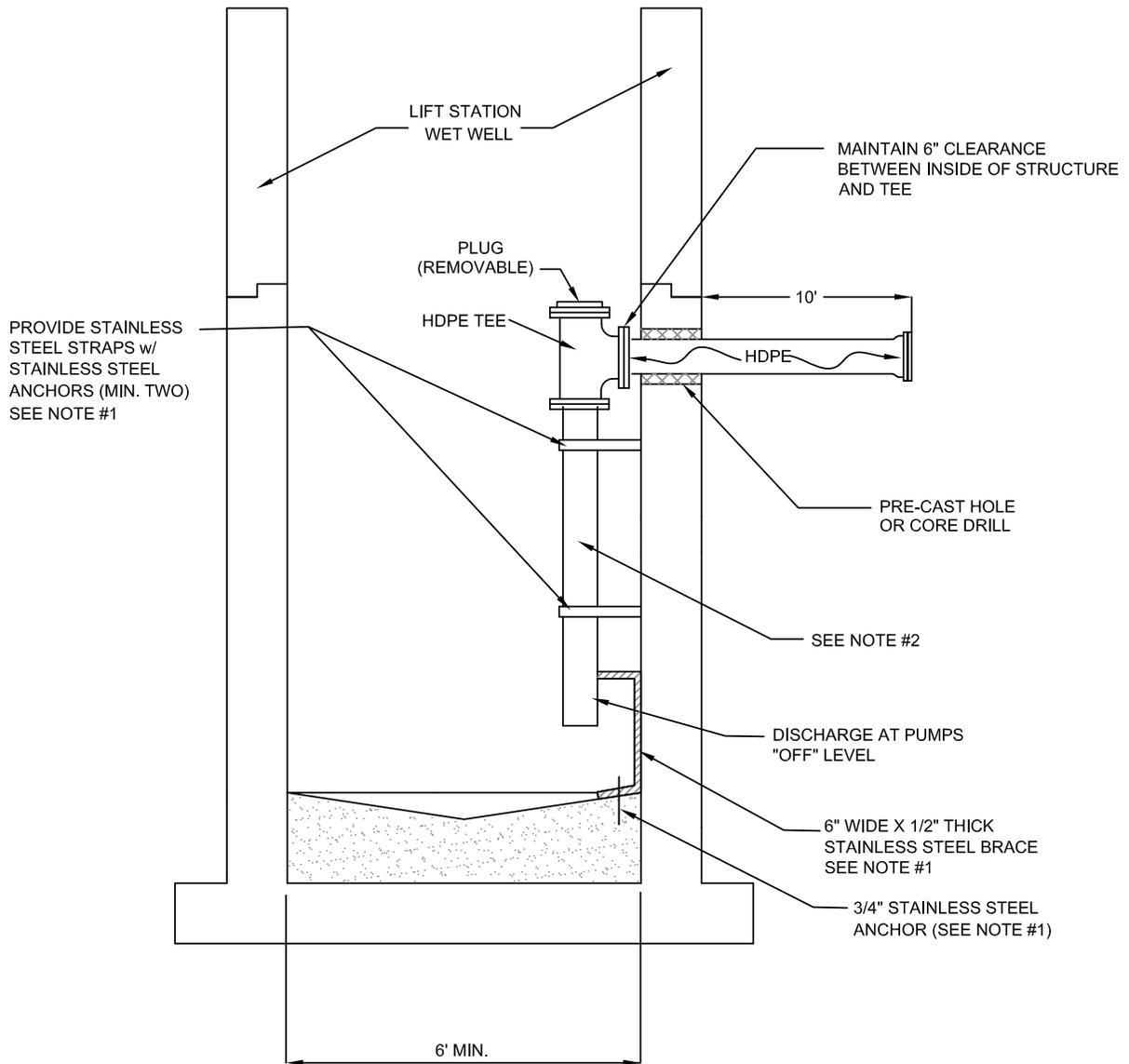
REVISION

INSIDE DROP BOWL

PAGE No.

S-10

OCT. 2017

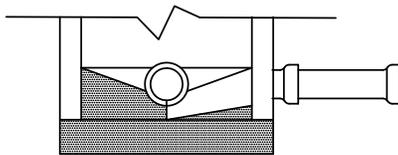
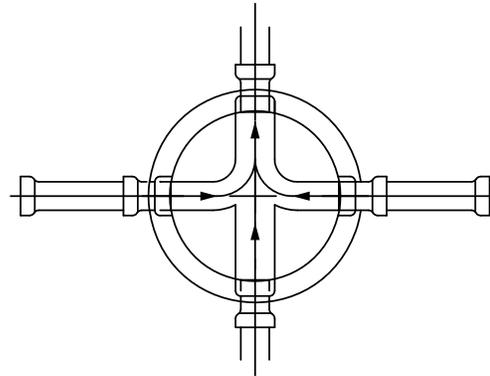
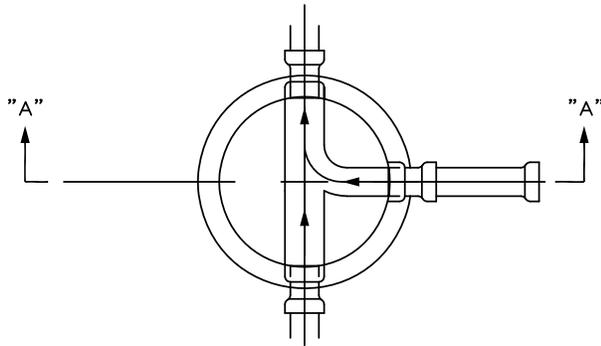
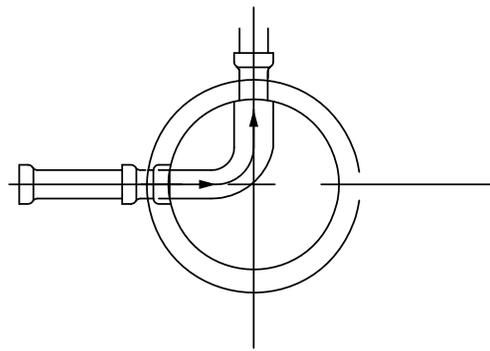
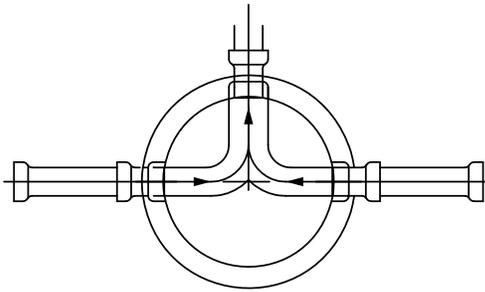


NOTES:

1. ALL HARDWARE TO BE STAINLESS STEEL (TYPE 316).
2. DROP TO BE ALL ONE PIECE, MANUFACTURED OUT OF HDPE (SDR 11).
3. SUPPORT STRAPS TO BE INSTALLED AT A MAXIMUM SPACING OF 5' O.C.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>INSIDE FORCE MAIN DROP CONNECTION</p>	<p>PAGE No.</p> <p>S-12</p>
----------------------------------	--	-----------------------------



SECTION "A-A"

NOTES:

1. INVERT CHANNELS TO BE CONSTRUCTED FOR SMOOTH FLOW WITH NO OBSTRUCTIONS.
2. SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS PROVIDING FOR SMOOTH FLOWS.
3. CHANNELS FOR FUTURE CONSTRUCTION (STUBS) SHALL BE CONSTRUCTED, FILLED WITH SAND, AND COVERED WITH 1" OF MORTAR.
4. SLOPE MANHOLE WITH A 1:2 SLOPE FROM MANHOLE WALL TO CHANNEL.
5. INVERT SHALL BE A MINIMUM OF 1/2 THE DIAMETER OF THE LARGEST PIPE OR MIN. OF 4" DEEP.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

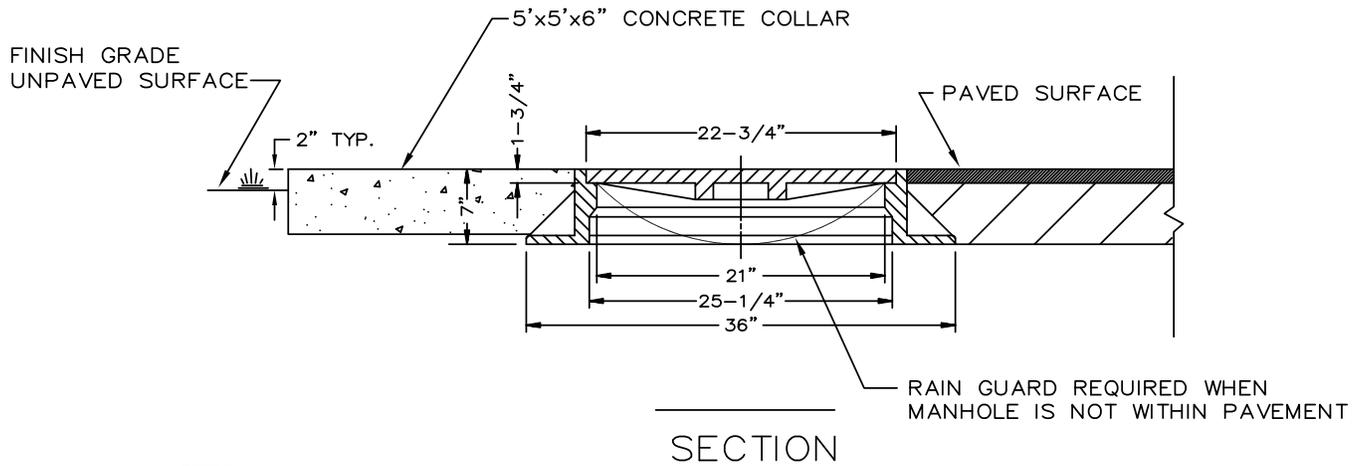
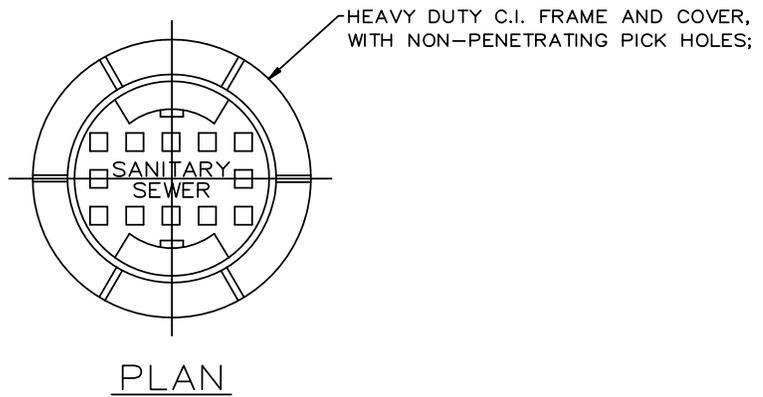
REVISION

FLOW PATTERNS FOR MANHOLE INVERTS

PAGE No.

S-13

OCT. 2017



NOTES:

1. A WATER-TIGHT MANHOLE SELF SEALING LID SHALL BE INSTALLED IN ALL MANHOLES.
2. DETAIL TYPICAL TO SANITARY MANHOLES. SEE APPROPRIATE DETAIL FOR OTHER STRUCTURES

V.O.W. CONSTRUCTION STANDARDS & DETAILS

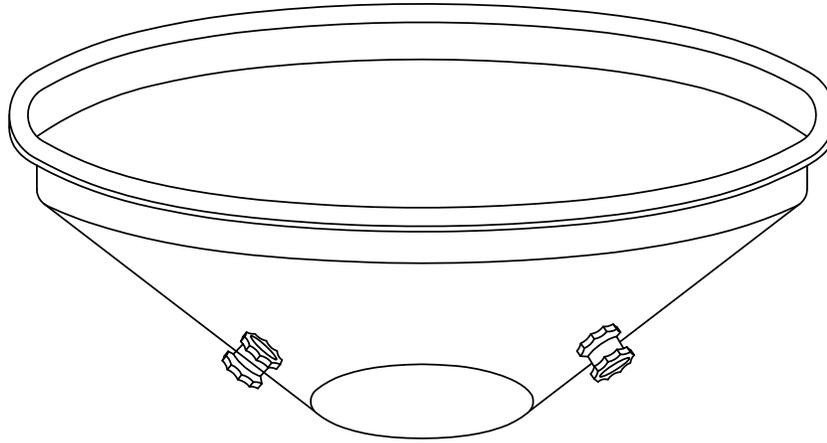
REVISION

STANDARD MANHOLE FRAME AND COVER

PAGE No.

S-14

OCT. 2017



NOTE:

1. SEWER RAIN GUARDS ARE REQUIRED ON ALL MANHOLES.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

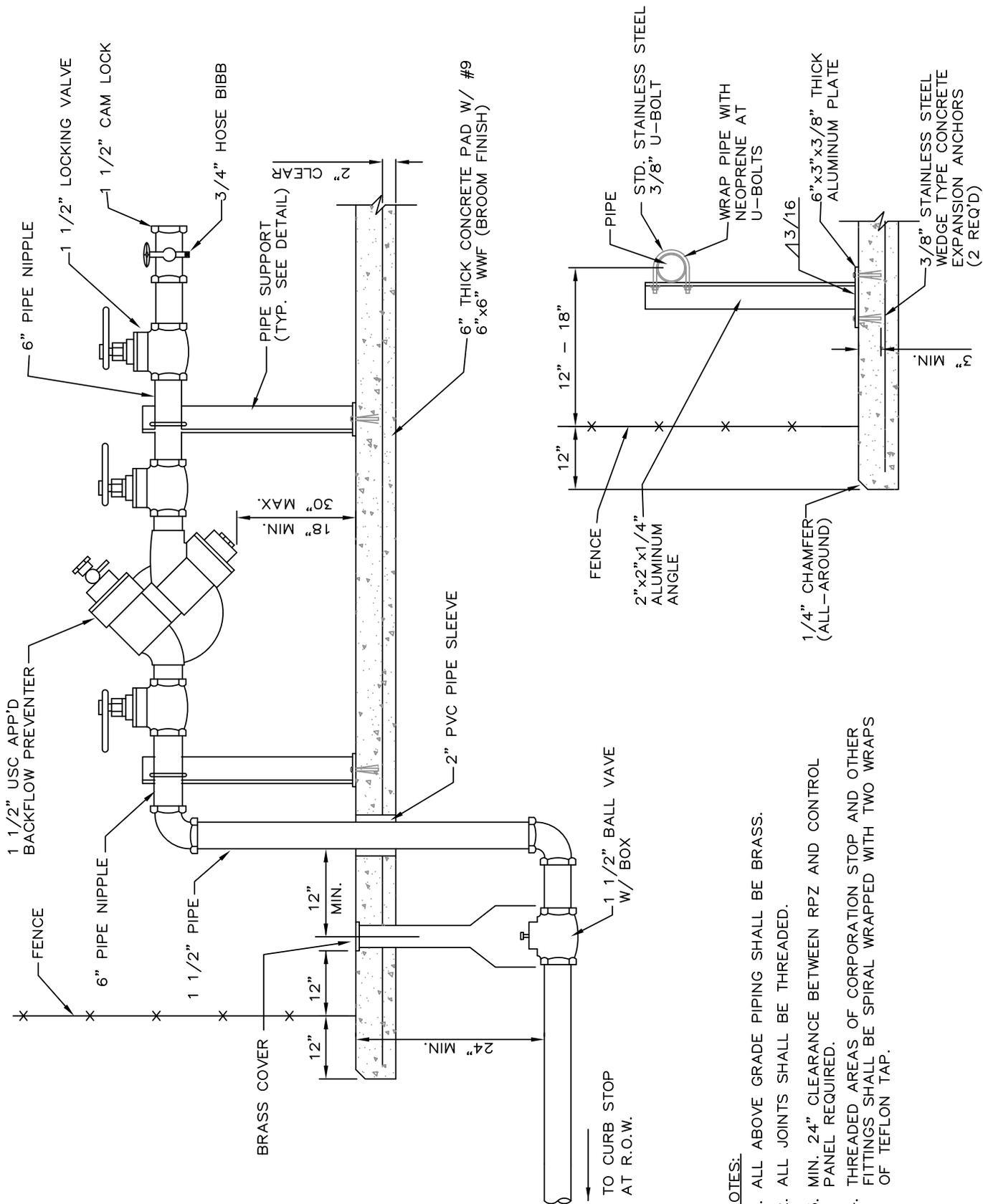
REVISION

MANHOLE RAIN GUARD

PAGE No.

OCT. 2017

S-15

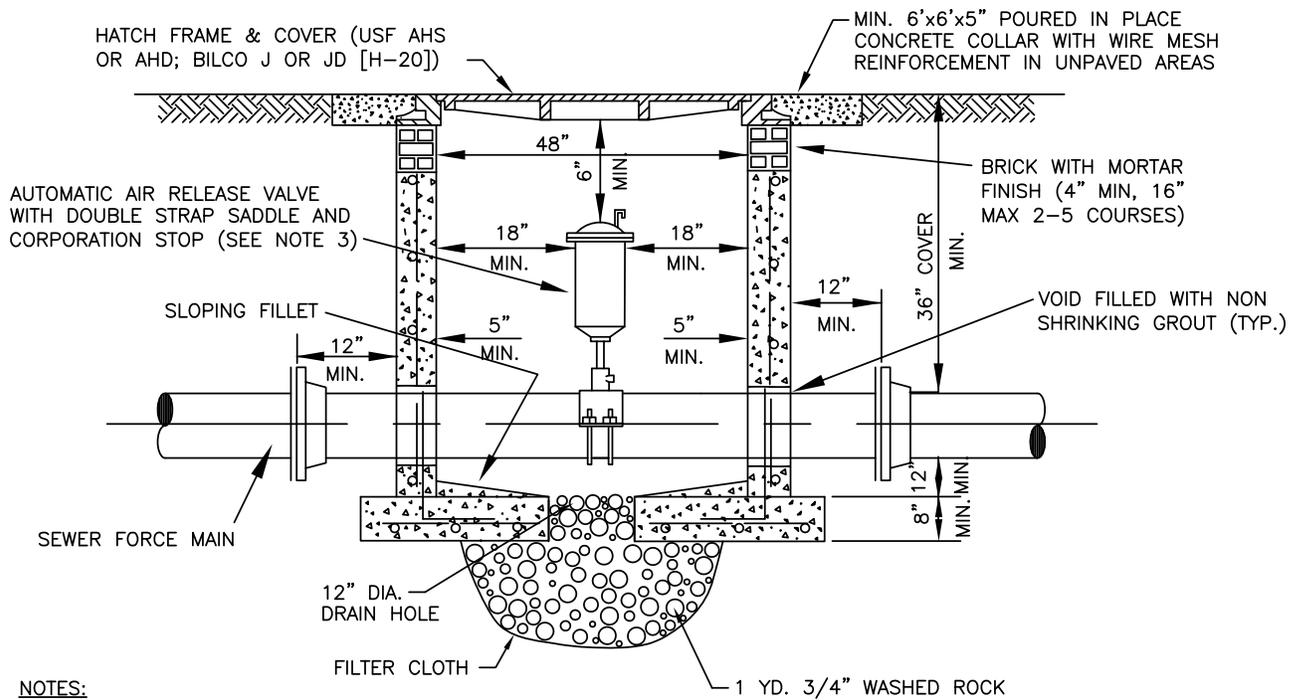
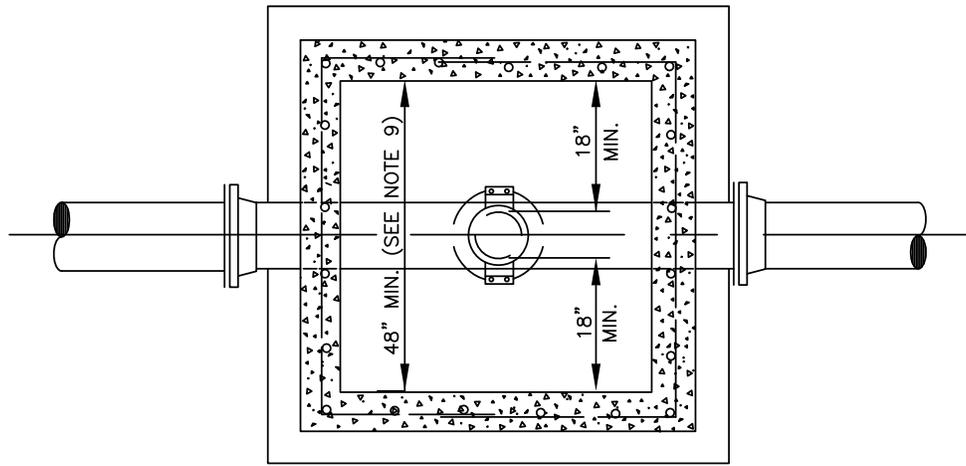


- NOTES:**
1. ALL ABOVE GRADE PIPING SHALL BE BRASS.
 2. ALL JOINTS SHALL BE THREADED.
 3. MIN. 24" CLEARANCE BETWEEN RPZ AND CONTROL PANEL REQUIRED.
 4. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAP.

PIPE SUPPORT DETAIL

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	WATER CONNECTION DETAIL AT LIFT STATION	PAGE No. S-16
---------------------------	---	----------------------



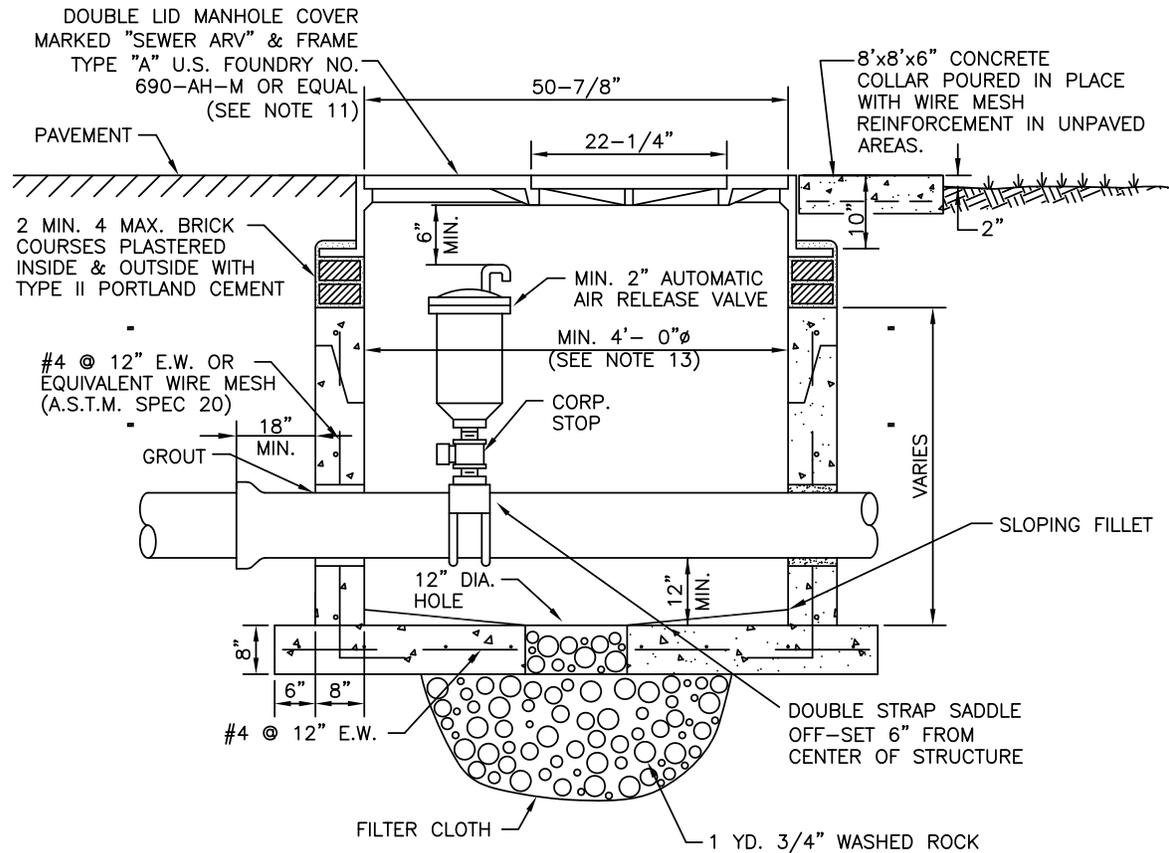
NOTES:

1. 4000 P.S.I. TYPE II CONCRETE
2. VAULT SHALL BE PRECAST WITH STEEL REINFORCING. SHOP DRAWING IS REQUIRED.
3. AIR RELEASE VALVE SHALL BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED. FORCE MAINS REQUIRE 2" MIN.
4. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF NON-SHRINKING GROUT.
5. OTHER VAULT AND COVER DESIGNS MAY BE USED UPON SUBMITTAL AND APPROVAL OF SHOP DRAWINGS.
6. COAT INSIDE, OUTSIDE AND BOTTOM WITH AN APPROVED CORROSION BARRIER SYSTEM.
7. DUCTILE IRON PIPE IS REQUIRED THROUGH THE VAULT. NO PIPE JOINTS WITHIN THE VAULT.
8. THREADED AREAS OF CORPORATION STOP SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
9. LARGER VAULTS WILL BE REQUIRED FOR PIPES LARGER THAN 12"

PIPE SIZE	MIN. VAULT SIZE
16"-24"	4'W x 5'L
30"-42"	4'W x 6'L

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	FORCE MAIN AIR RELEASE VALVE AND VAULT OUTSIDE OF R/W AND NON-TRAFFIC AREAS OUTSIDE OF R/W	PAGE No. S-17
OCT. 2017		



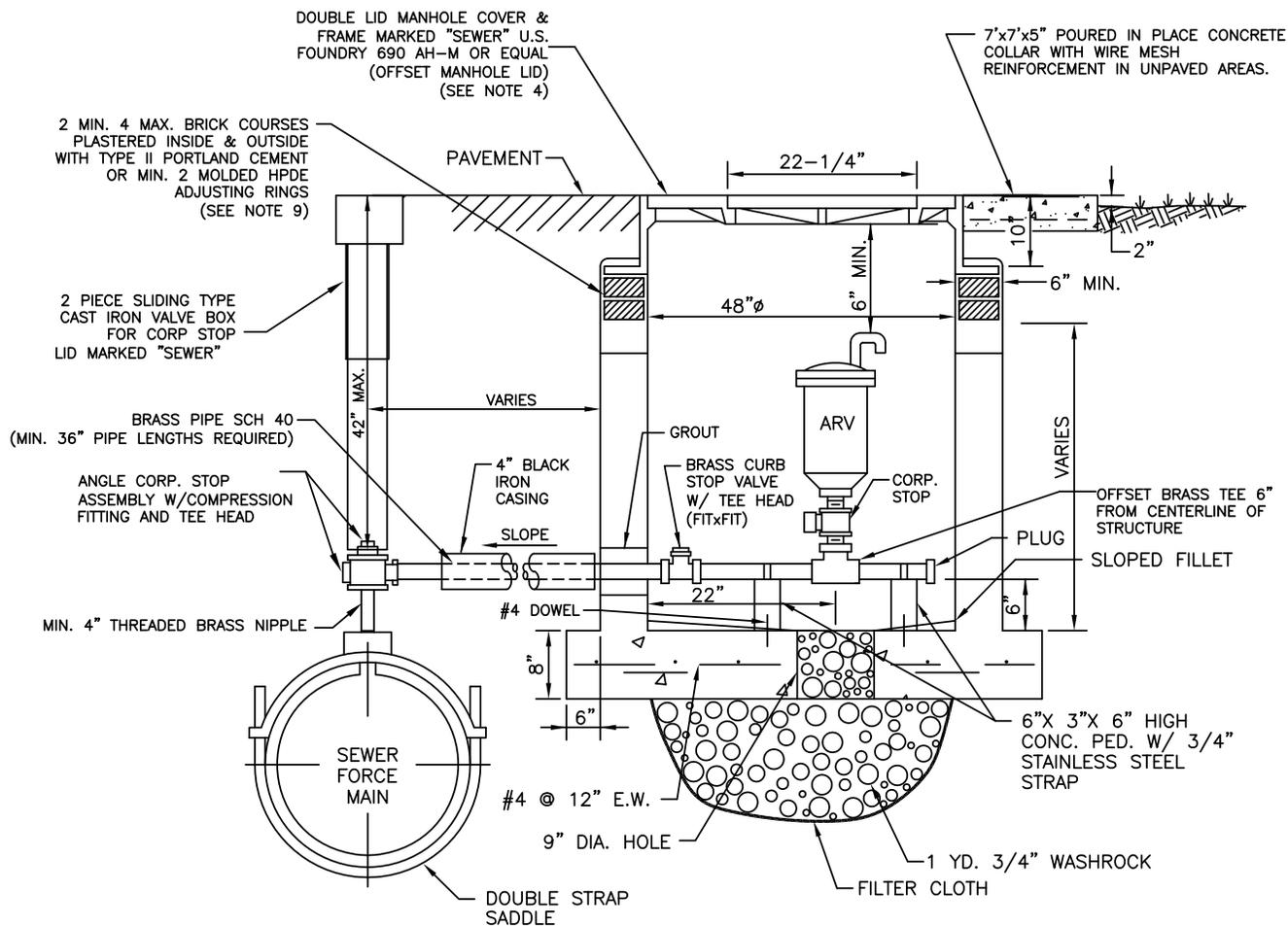
NOTES:

1. PRECAST CONCRETE TYPE # 4000 P.S.I. A SHOP DRAWING IS REQUIRED.
2. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
3. LIFT HOLES ARE PERMITTED.
4. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
5. MANHOLE FABRICATION SHALL BE IN ACCORDANCE WITH A.S.T.M. C-478 LATEST STANDARD.
6. COAT INSIDE, OUTSIDE AND BOTTOM WITH AN APPROVED PROTECTIVE CORROSION BARRIER SYSTEM.
7. CONCRETE COLLAR REQUIRED WHEN MANHOLE IS OUTSIDE OF PAVEMENT, SEE DETAIL.
8. AIR RELEASE VALVE SHALL BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED (2" MIN.).
9. DUCTILE IRON PIPE IS REQUIRED THROUGH THE MANHOLE. NO PIPE JOINTS INSIDE THE MANHOLE.
10. THREADED AREAS OF CORPORATION STOP SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
11. FOR PIPES 12" AND SMALLER, AN ALTERNATIVE DESIGN WITH APPROVED 32" DIAMETER HINGED MANHOLE COVERS WILL BE CONSIDERED.
12. LARGER MANHOLES WILL BE REQUIRED FOR PIPES LARGER THAN 12"

PIPE SIZE	MIN. MANHOLE DIAMETER
16"-24"	60"
30"-42"	72"

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	FORCE MAIN AIR RELEASE VALVE AND MANHOLE IN PAVED AREAS AND ROAD R/W	PAGE No.
OCT. 2017		S-18

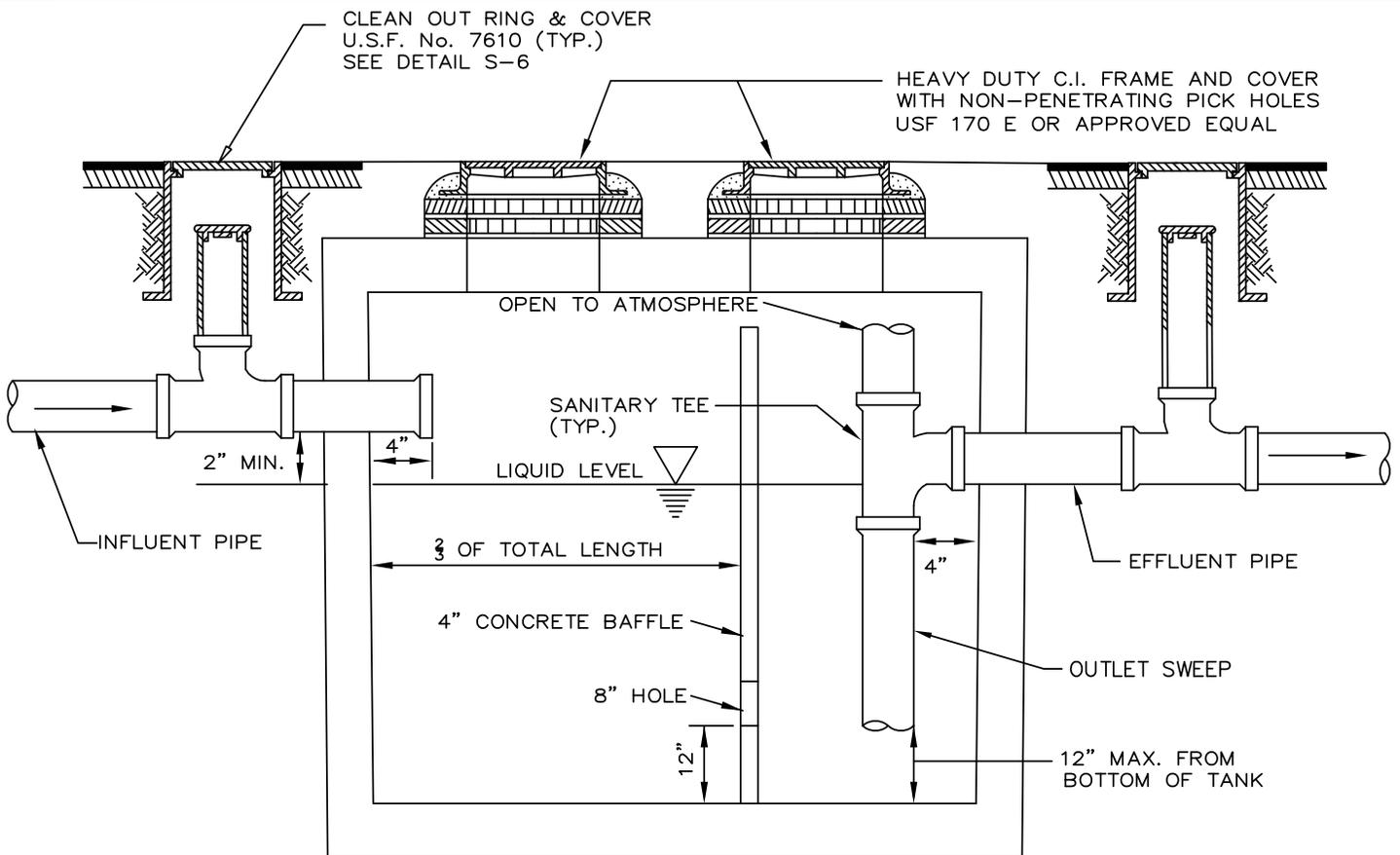


NOTES:

1. MONOLITHICALLY POURED STRUCTURE IS REQUIRED (ASTM C-478)
 2. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
 3. ALL PIPE HOLES SHALL BE PRECAST OR CORE-DRILLED.
 4. ALTERNATIVE DESIGN WILL BE CONSIDERED USING APPROVED 32" DIAMETER HINGED MANHOLE COVER
 5. ARV, TAP AND PIPING TO BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED. I.E. ONE (1) INCH FOR WATER OR TWO (2) INCH FOR SEWER.
 6. CONCRETE COLLAR REQUIRED IN UNPAVED AREAS.
 7. SHOP DRAWING IS REQUIRED FOR REVIEW AND APPROVAL.
 8. THREADED AREAS OF BRASS FITTINGS AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
 9. IN LIEU OF BRICK WORK, APPROVED PRECAST CONCRETE ADJUSTING RINGS MAY BE USED. INSTALLATION SHALL FOLLOW MANUFACTURERS RECOMMENDATIONS.
 10. SHOP DRAWINGS ARE REQUIRED FOR CUSTOM MADE BRACKETS
 11. PIPE AND FITTINGS SHALL BE NO LEAD BRASS.
 12. 2" CHECK VALVE IS REQUIRED BETWEEN CORPORATION AND ARV ASSEMBLY (SEWER ONLY).
10. ALL MATERIAL FOR BOTH APPLICATIONS MUST BE STAINLESS STEEL (316) EXCEPT FOR ARV ASSEMBLY, SADDLE, CORP. STOP AND CURB STOP.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>FORCE MAIN</p> <p>OFF-SET UNDERGROUND AIR RELEASE VALVE</p>	<p>PAGE No.</p> <p>S-19</p>
----------------------------------	--	-----------------------------

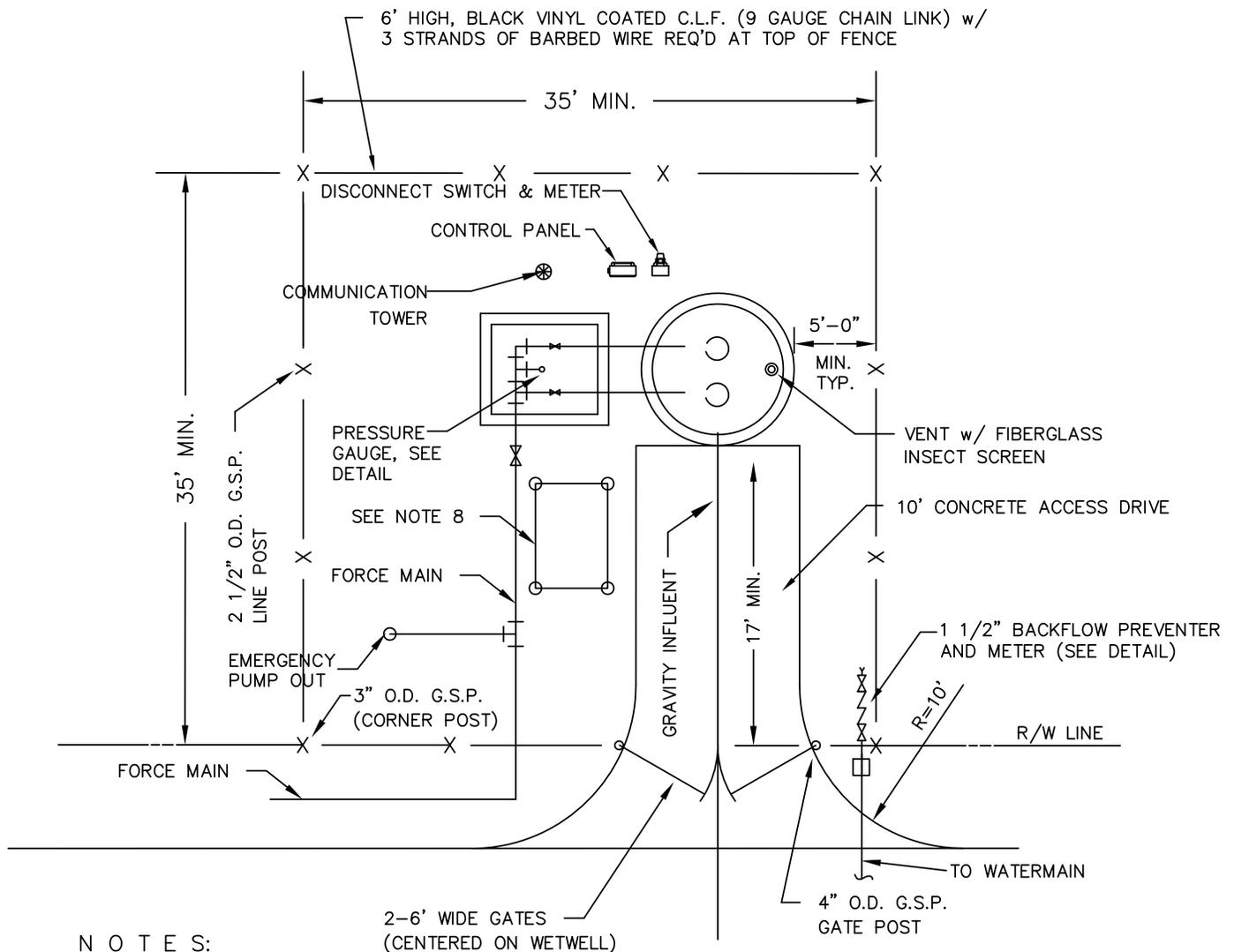


NOTES:

1. SHOP DRAWINGS SUBMITTAL REQUIRED FOR REVIEW AND APPROVAL PRIOR TO PRE-CONSTRUCTION MEETING.
2. TANK SIZING SHALL BE PER VILLAGE OF WELLINGTON REQUIREMENTS AND ORDINANCE NO. 98-30.
3. TANK SHALL BE A MINIMUM OF 750 GALLONS AND A MAXIMUM OF 1,250 GALLONS.
4. WHEN THE REQUIRED EFFECTIVE CAPACITY OF THE TANK IS GREATER THAN 1,250 GALLONS, INSTALLATION OF MULTIPLE GREASE TRAPS IN SERIES IS REQUIRED.
5. TANK SHALL BE TRAFFIC BEARING AND CONCRETE SHALL COMPLY WITH ASTM C 476, LATEST REVISION.
6. WALLS AND BOTTOM SLABS SHALL BE A MINIMUM 4" THICK REINFORCED CONCRETE.
7. TOP SLAB SHALL BE A MINIMUM OF 6" THICK REINFORCED CONCRETE.
8. SECTIONS SHALL BE JOINED AND SEALED WITH MINIMUM 1" RAM-NEK SEALER WITH GROUT INSIDE AND OUT.
9. RISER JOINTS SHALL COMPLY WITH ASTM @ 443, LATEST REVISION.
10. FRAME @ COVER FLUSH WITH PAVEMENT OR MINIMUM 2" ABOVE NON-PAVED FINISHED GRADE.
11. PRECAST CONCRETE RISERS WITH STEEL CAN BE USED TO ADJUST FRAME COVER TO GRADE (MAX. 12").
12. PIPING SHALL BE INSTALLED USING PRECAST RUBBER BOOT.
13. ALL PIPING SHALL BE A MINIMUM OF 4" PVC.
14. SANITARY "T" OUTLET SHALL BE INSTALLED 4" INSIDE OF WALL.
15. ALL OPENINGS AND PIPE ENTERING OR EXITING GREASE TRAP SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT OR APPROVED EQUAL.
16. STRUCTURE TO LOCATED AS CLOSE AS POSSIBLE TO BUILDING.
17. ALL PIPING SHALL BE SOLVENT WELD PVC.
18. INSPECTION OF TANK IS REQUIRED BY VOW PRIOR TO PLACEMENT AND AFTER TANK IS PIPED.
19. GREASE TRAPS IN SERIES REQUIRE BAFFLES IN ALL TANKS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p style="text-align: center;">GREASE INTERCEPTOR</p>	<p>PAGE No.</p> <p style="text-align: center;">GT-1</p>
----------------------------------	---	---

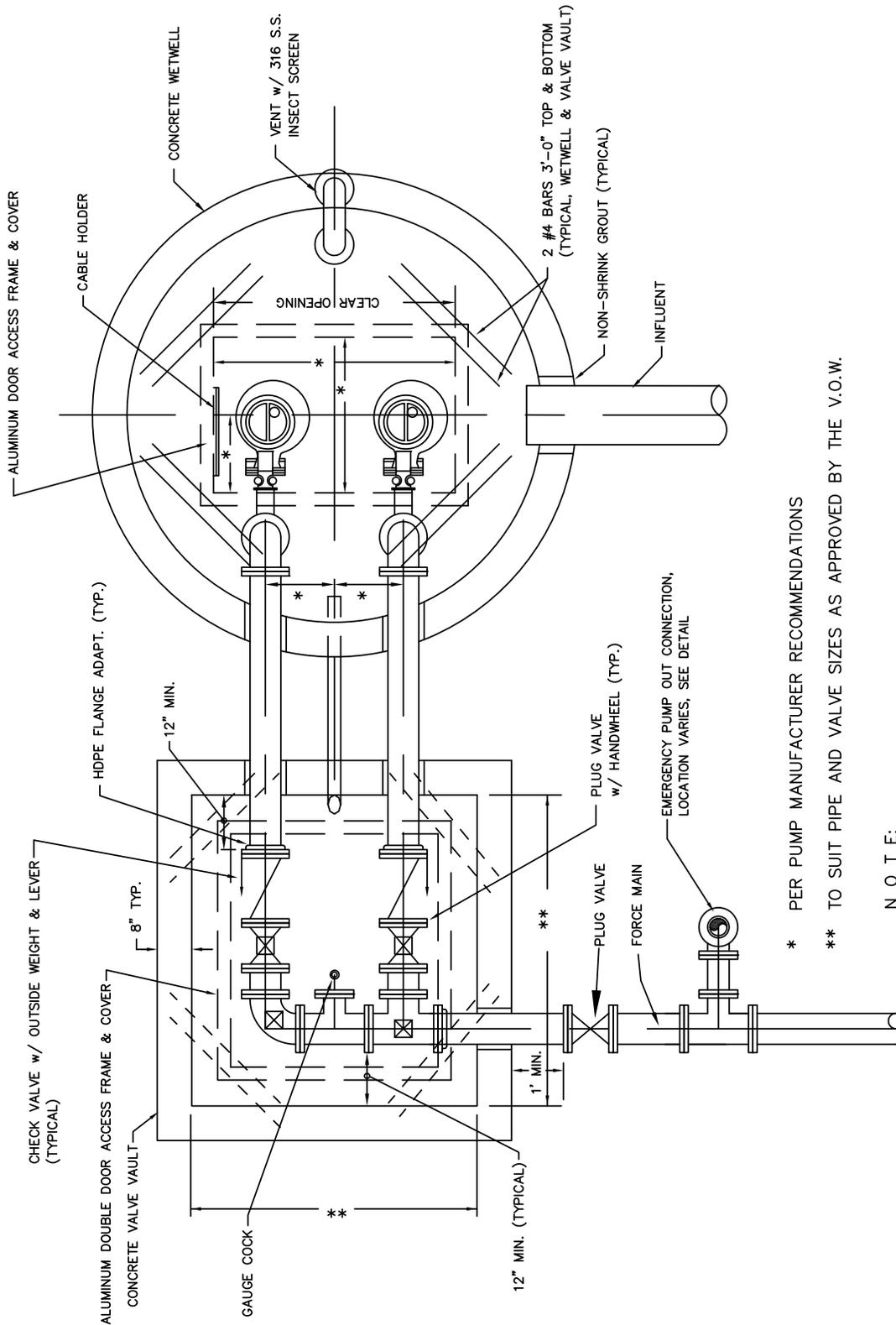


N O T E S:

1. FENCED AREA TO BE 4" THICK 3000# CONCRETE W/ 6x6 WWF, ON 12" COMPACTED SUBGRADE, COMPACTED TO NOT LESS THAN 98% AASHTO T-180.
2. INFLUENT MAIN SHALL BE CLEAR OF PANEL AND VAULT.
3. PLAN MAY VARY BASED UPON SPECIFIC SITE REQUIREMENTS UPON APPROVAL FROM THE V.O.W.
4. ACCESS DRIVE TO BE 6" THICK 3000# CONCRETE W/ 6x6 WWF, ON 12" COMPACTED SUBGRADE, COMPACTED TO NOT LESS THAN 98% AASHTO T-180.
5. AN EMERGENCY GENERATOR MUST BE PROVIDED IN ACCORDANCE WITH SECTION 1, PARAGRAPH 1.6, OF THE V.O.W. CONSTRUCTION SPECIFICATIONS AND STANDARD DETAILS MANUAL.
6. FENCE, CROSS BARS AND ALL POSTS TO BE BLACK VINYL COATED.
7. TYPICAL CONFIGURATION SHOWN IS SUBJECT TO CHANGE AS REQUIRED TO ACCOMODATE VARIABLE SITE CONDITIONS.
8. PROVIDE FOUR (4) GENERATOR TIE DOWN 3/4" EYE BOLTS @ 7'x8' GRID W/ 1/2" THREADED STUD IN 3/4"Ø SS WEDGE ANCHOR. LOCATION VARIES AS DIRECTED BY VOW

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	TYPICAL LIFT STATION LAYOUT (WITHIN EASEMENT)	PAGE No.
OCT. 2017		LS-1



* PER PUMP MANUFACTURER RECOMMENDATIONS

** TO SUIT PIPE AND VALVE SIZES AS APPROVED BY THE V.O.W.

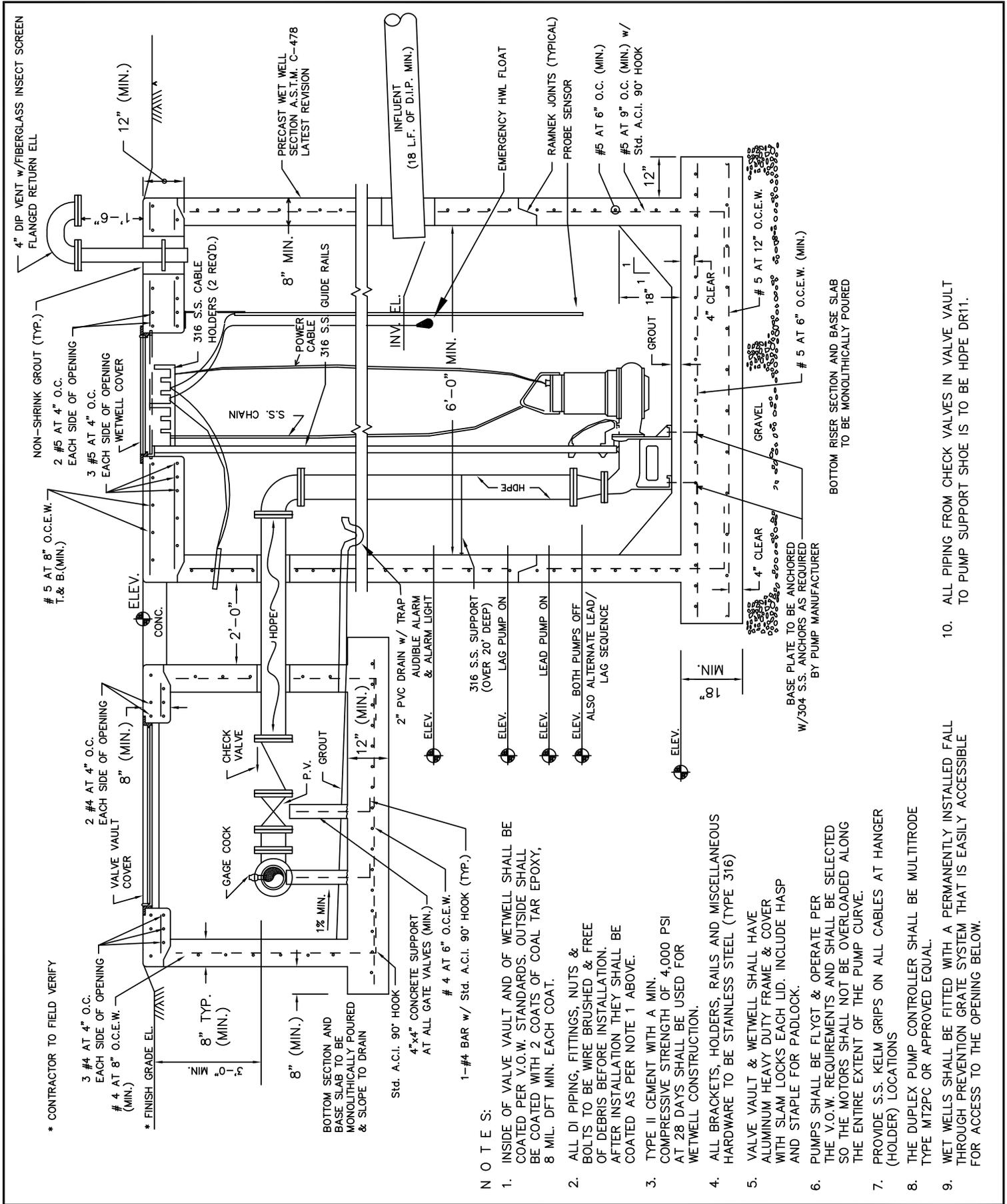
N O T E:
 PUMP DISCHARGE PIPING & FITTINGS IN WETWELL SHALL BE HDPE.
 FORCE MAIN PIPING & FITTINGS IN VAULT SHALL BE DIP.
 INTERIOR OF WETWELL AND VAULT TO BE COATED IN ACCORDANCE WITH V.O.W. STANDARDS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION
OCT. 2017

TYPICAL LIFT STATION (PLAN)

PAGE No.
LS-2

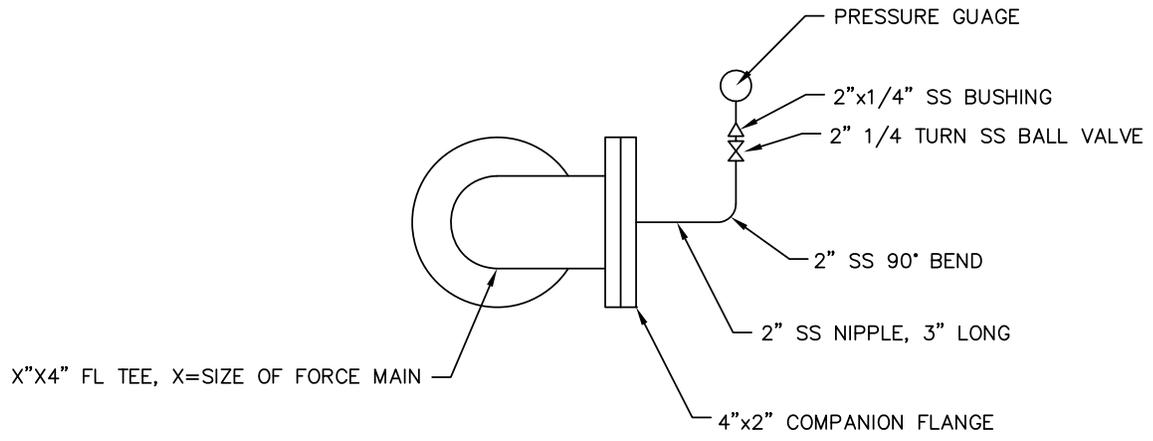


N O T E S :

- INSIDE OF VALVE VAULT AND OF WETWELL SHALL BE COATED PER V.O.W. STANDARDS. OUTSIDE SHALL BE COATED WITH 2 COATS OF COAL TAR EPOXY, 8 MIL. DFT MIN. EACH COAT.
- ALL DI PIPING, FITTINGS, NUTS & BOLTS TO BE WIRE BRUSHED & FREE OF DEBRIS BEFORE INSTALLATION. AFTER INSTALLATION THEY SHALL BE COATED AS PER NOTE 1 ABOVE.
- TYPE II CEMENT WITH A MIN. COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS SHALL BE USED FOR WETWELL CONSTRUCTION.
- ALL BRACKETS, HOLDERS, RAILS AND MISCELLANEOUS HARDWARE TO BE STAINLESS STEEL (TYPE 316)
- VALVE VAULT & WETWELL SHALL HAVE ALUMINUM HEAVY DUTY FRAME & COVER WITH SLAM LOCKS EACH LID. INCLUDE HASP AND STAPLE FOR PADLOCK.
- PUMPS SHALL BE FLYGT & OPERATE PER THE V.O.W. REQUIREMENTS AND SHALL BE SELECTED SO THE MOTORS SHALL NOT BE OVERLOADED ALONG THE ENTIRE EXTENT OF THE PUMP CURVE.
- PROVIDE S.S. KELM GRIPS ON ALL CABLES AT HANGER (HOLDER) LOCATIONS
- THE DUPLEX PUMP CONTROLLER SHALL BE MULTITRODE TYPE MT2PC OR APPROVED EQUAL.
- WET WELLS SHALL BE FITTED WITH A PERMANENTLY INSTALLED FALL THROUGH PREVENTION GRATE SYSTEM THAT IS EASILY ACCESSIBLE FOR ACCESS TO THE OPENING BELOW.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	TYPICAL LIFT STATION (SECTION)	PAGE No. LS-3
-----------------------	--------------------------------	------------------



PRESSURE GAUGE IN VAULT

V.O.W. CONSTRUCTION STANDARDS & DETAILS

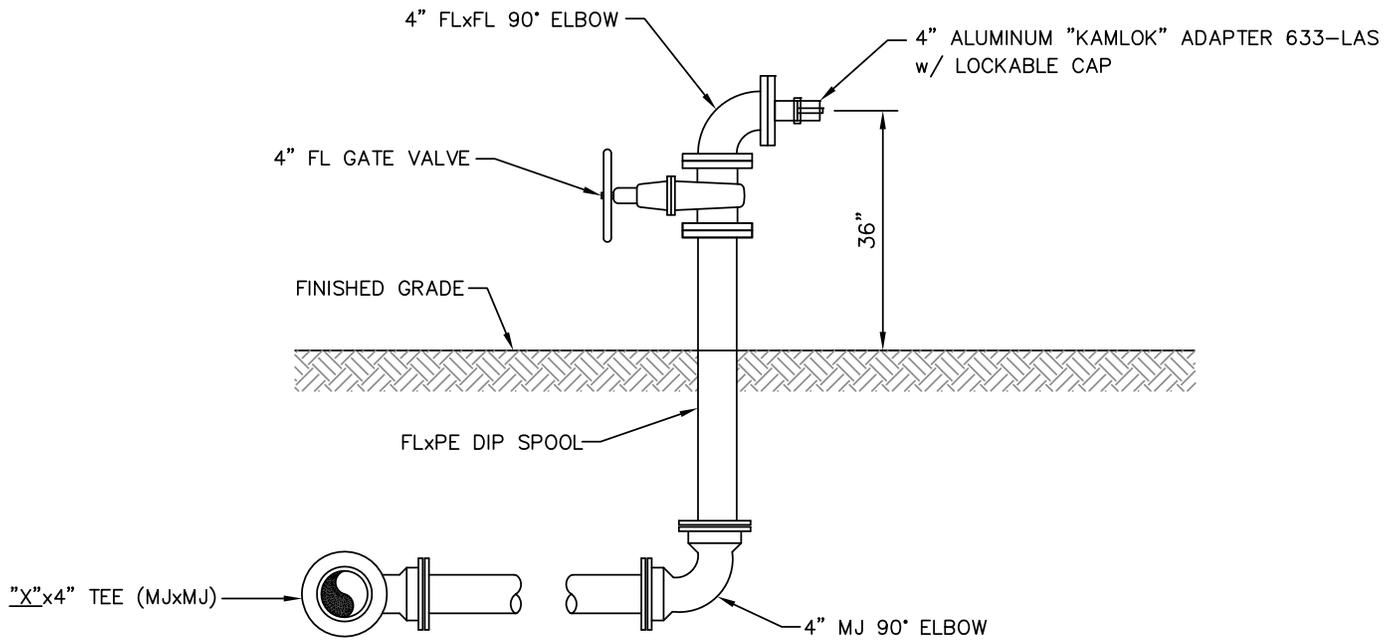
REVISION

PRESSURE GAUGE IN VAULT DETAIL

PAGE No.

LS-4

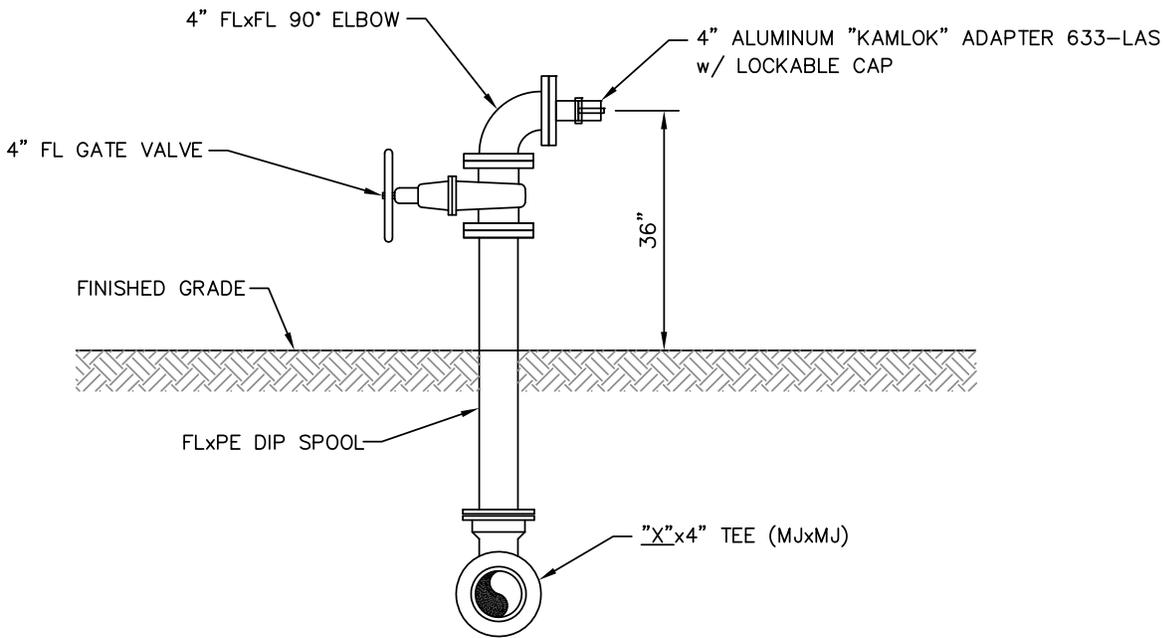
OCT. 2017



N O T E:

"X" EQUALS DISCHARGE PIPING SIZE

LAYOUT OPTION 1
PUMP OUT OFFSET FROM FORCE MAIN



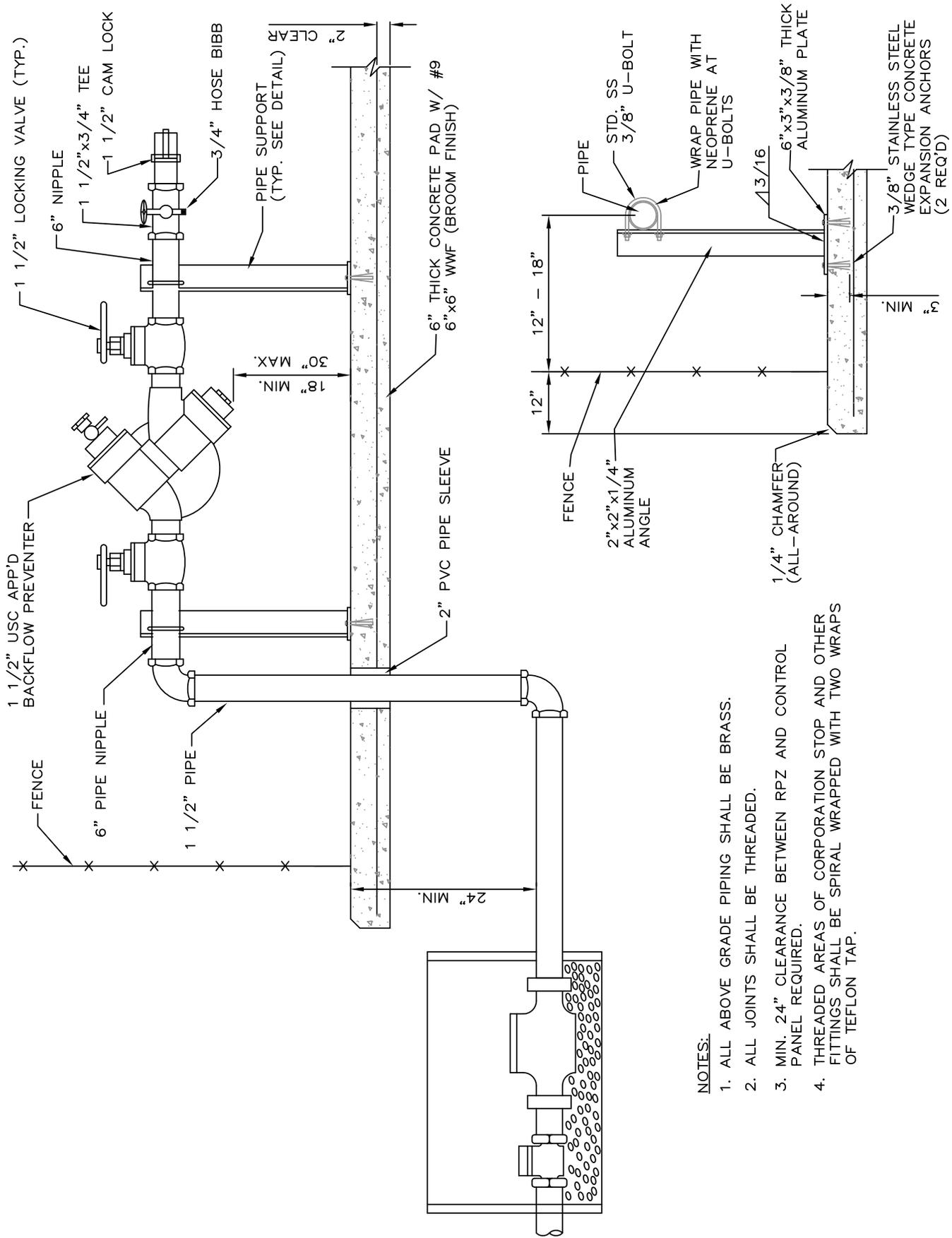
N O T E:

"X" EQUALS DISCHARGE PIPING SIZE

LAYOUT OPTION 2
PUMP OUT IN LINE WITH FORCE MAIN

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>EMERGENCY PUMP OUT CONNECTION</p> <p>OPTION 1 AND 2</p>	<p>PAGE No.</p> <p>LS-5</p>
----------------------------------	--	-----------------------------



- NOTES:**
1. ALL ABOVE GRADE PIPING SHALL BE BRASS.
 2. ALL JOINTS SHALL BE THREADED.
 3. MIN. 24" CLEARANCE BETWEEN RPZ AND CONTROL PANEL REQUIRED.
 4. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAP.

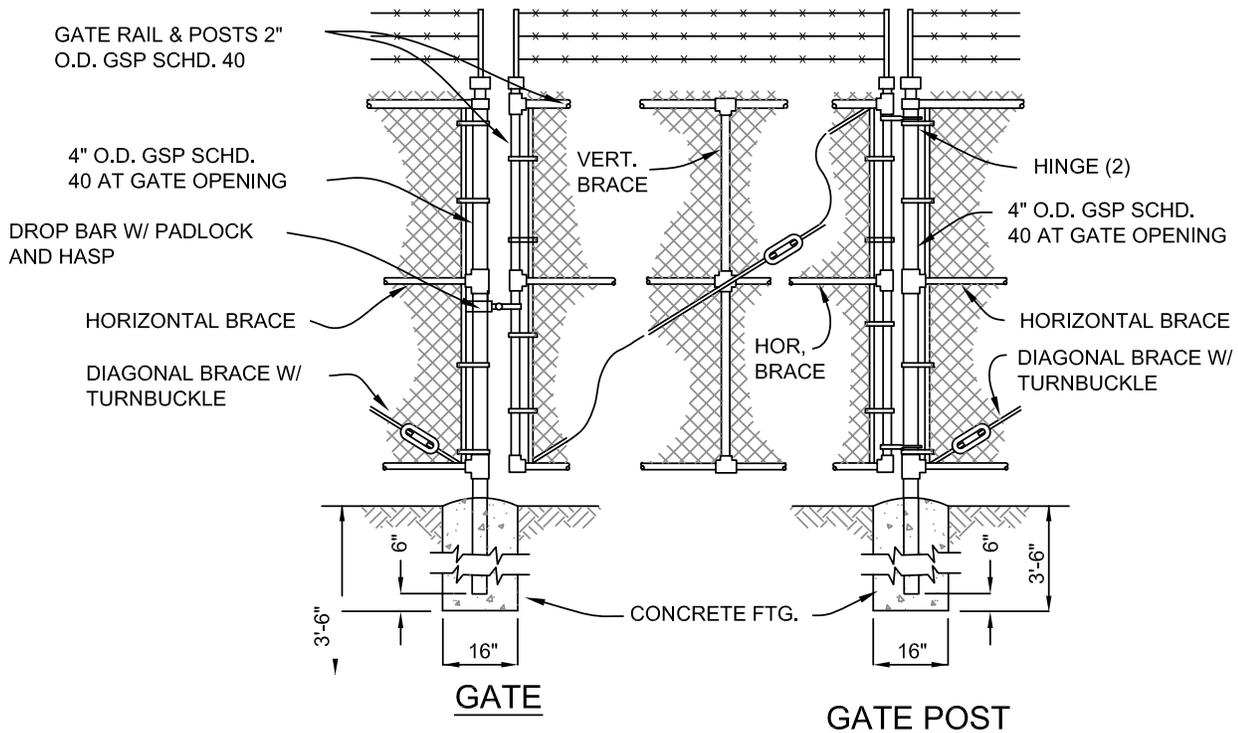
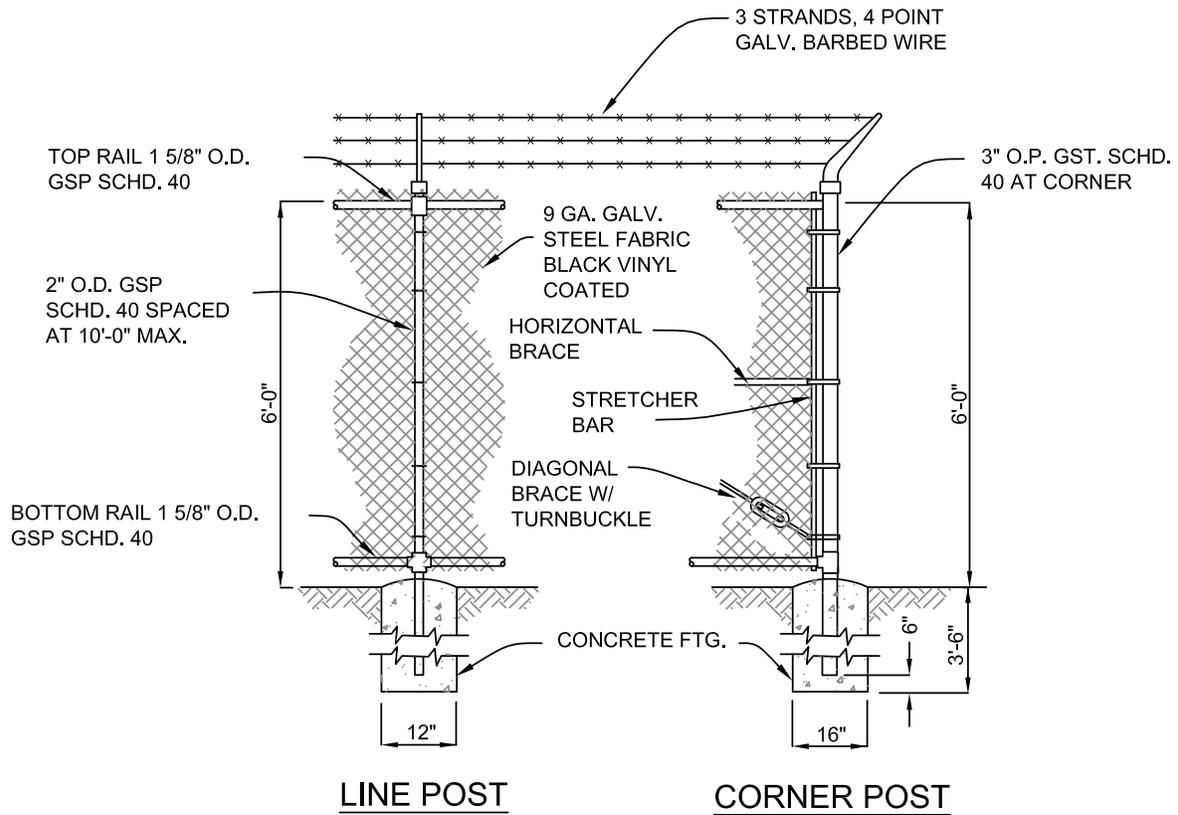
PIPE SUPPORT DETAIL

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION
OCT. 2017

WATER SERVICE AT LIFT STATION DETAIL

PAGE No.
LS-6



NOTES:

1. SEE PLAN FOR GATE SIZE.
2. GALVANIZED 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.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

FENCING DETAIL

PAGE No.

OCT. 2017

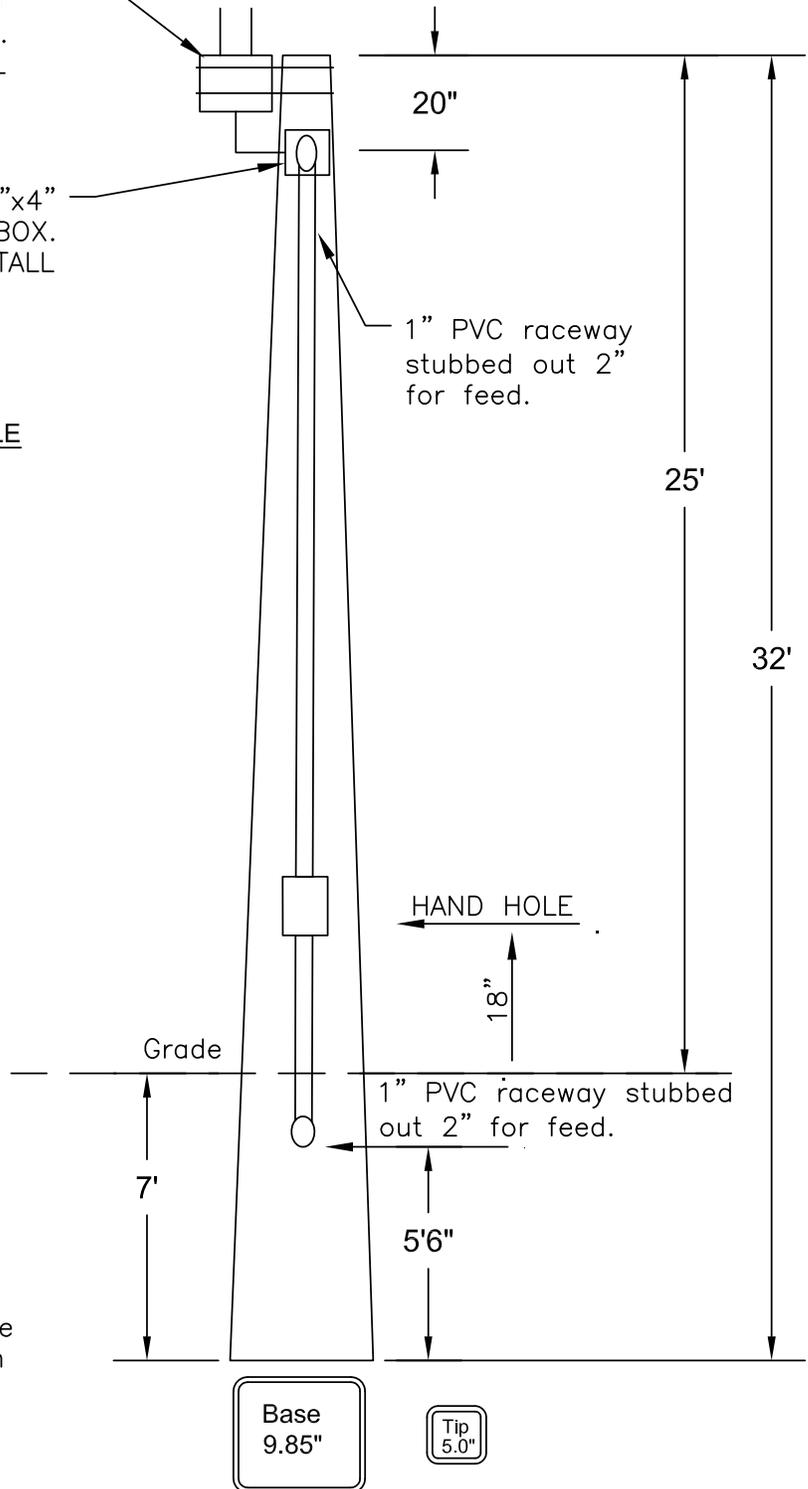
LS-7

CONTRACTOR TO FURNISH ABB TROPOS MODEL 6420 WIRELESS MESH ROUTER OR CURRENT EQUAL, SS CLAMPS AS REQ'D. VOW TO INSTALL

CONTRACTOR TO FURNISH 4"x4" WEATHERPROOF JUNCTION BOX. VOW TO INSTALL

PRESTRESSED CONCRETE POLE

- Pole Weight = 1,652 lbs
- EPA capacity = 16.8
- Wind speed = 170 mph V-ult
- Exposure "C"
- Wind Gust = 3 seconds
- Gust factor = 1.2
- 2014 FBC 1609,1819
- ASCE 7-10
- Min. Brk. Strength = 1900#
- Concrete = 6,500 lbs @ 28 days
- Grd. Wire = #6 str. copper
- Strand = 1/2" @ 70% Ultimate
- Tenon = N/A 2.375" od
- Color = Natural Concrete

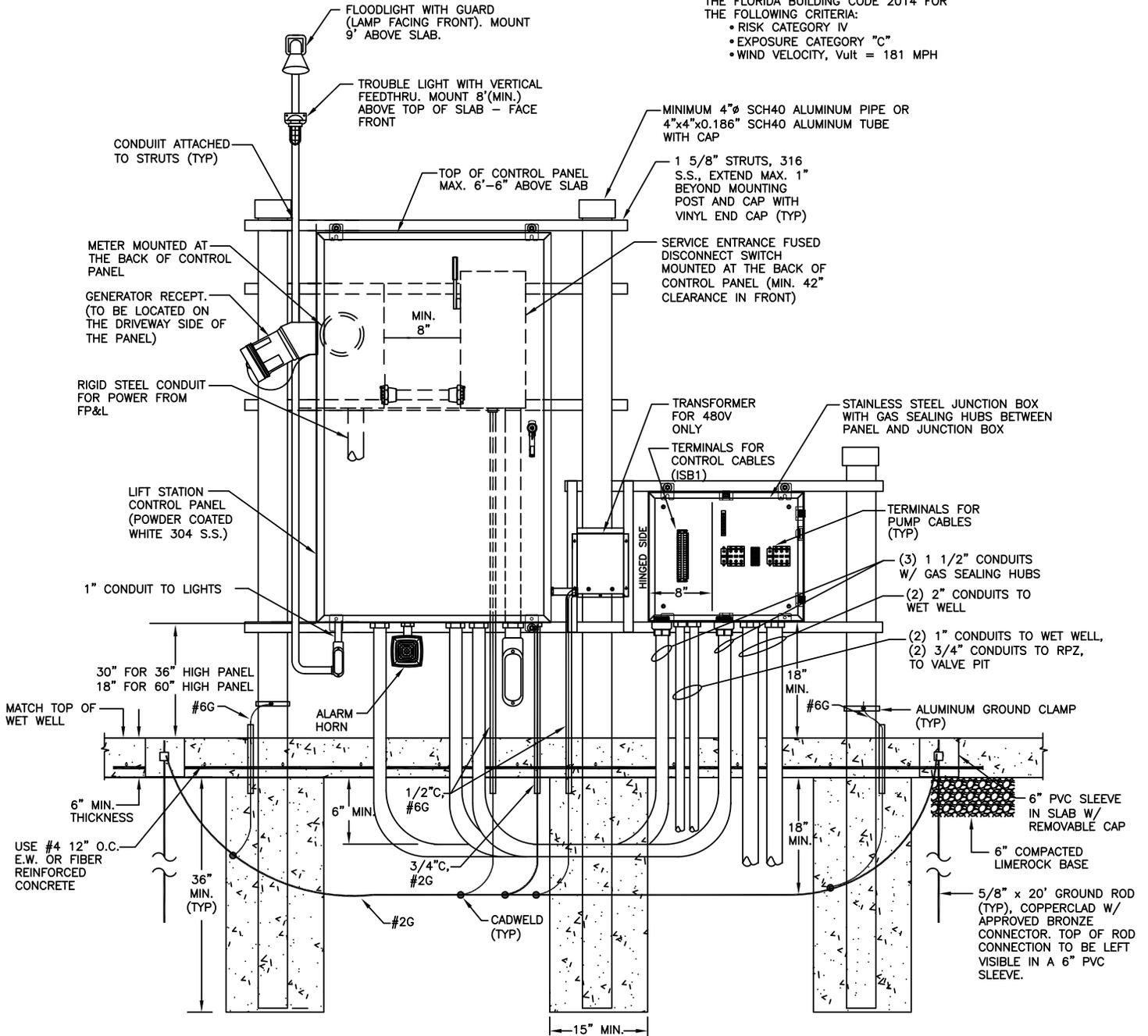


NOTE:
Pole embedded 7' into soils is structurally adequate to resist the local wind speeds of Palm Beach Co. With the 4.0EPA attached.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>PRESTRESSED CONCRETE COMMUNICATIONS POLE DETAIL</p>	<p>PAGE No.</p> <p>LS-8</p>
----------------------------------	--	-----------------------------

NOTE:
 1. ELECTRICAL PANEL SUPPORT STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE 2014 FOR THE FOLLOWING CRITERIA:
 • RISK CATEGORY IV
 • EXPOSURE CATEGORY "C"
 • WIND VELOCITY, $V_{ult} = 181$ MPH



**TYPICAL LIFT STATION ELECTRICAL RACK DETAIL
 FOR GENERATOR RECEPTACLE LOCATED ON LEFT SIDE**
 (NOTE: GEN. RECEPT. SHALL BE LOCATED ON DRIVEWAY SIDE)

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	TYPICAL CONTROL PANEL INSTALLATION	PAGE No. LS-9
---------------------------	------------------------------------	----------------------

INSTALLATION NOTES

1. PANEL, METER, JUNCTION BOX AND 480 VOLT TRANSFORMER ARE TO BE MOUNTED ON STAINLESS STEEL STRUTS, WITH STAINLESS STEEL FASTENING DEVICES, AND SHALL BE SUPPORTED BY MINIMUM OF THREE POSTS, MIN. FOUR (4) INCH DIAMETER PIPE OR MIN. FOUR (4) INCH SQUARE TUBE (ALUMINUM OR STAINLESS STEEL) CAPPED AT THE TOP. PAINT BELOW GRADE SUPPORTS WITH ASPHALTUM PAINT TO FOUR (4) INCHES ABOVE GRADE.
2. PANEL SHALL BE AT 42 INCHES FROM THE WET WELL OPENING MEASURED FROM THE FRONT OF THE PANEL UNLESS OTHERWISE SHOWN IN THE DRAWINGS. FRONT OF CONTROL PANEL SHALL FACE TO THE WET WELL.
3. WIFI TO MATCH VILLAGE OF WELLINGTON'S SYSTEM INCLUDING RUN TIME TRANSMITTAL. LIVE TEST OF THE TELEMETRY SYSTEM MUST BE DONE AND APPROVED AT THE PUMP STATION START-UP. WIFI ANTENNA AND CABLE SHALL BE PART OF THE WIFI SYSTEM. ANTENNA SHALL BE SEPARATELY GROUNDED TO THE GROUND ROD OF THE STATION.
4. ALL STAINLESS STEEL SHALL BE 316 UNLESS INDICATED OTHERWISE.
5. MOUNT FLOOD LIGHT AND FLASHING RED LIGHT AT NINE (9) FEET AND EIGHT (8) FEET ABOVE GRADE.
6. CONDUIT TO THE POWER COMPANY SERVICE POINT SHALL BE PVC SCHEDULE 80 AND ON ALL RISERS TO 12 INCHES ABOVE GRADE. CONDUIT FROM SERVICE ENTRANCE FUSED DISCONNECT SWITCH TO THE PANEL SHALL BE RIGID GALVANIZED CONDUIT ENTERING THE BOTTOM OF THE PANEL. ALL WIRE SHALL BE COPPER. HIGH LEG ON 240 VOLT SHALL BE TAPED ORANGE AND PUT ON CENTRAL TERMINAL IN PANEL AND RIGHT TERMINAL IN METER.
7. PROVIDE PVC SCHEDULE 80 CONDUITS WITH SWEEP BENDS FROM THE JUNCTION BOX TO THE WET WELL.
8. SUPPORT PUMP CABLES WITH STAINLESS SPLIT BASKET KELLUM (OR EQUAL) GRIPS IN WET WELL. SUPPORT FLOAT CABLE ON S.S. THIMBLE FROM THE RACK. ALL HARDWARE IN THE WET WELL AND ALL FASTENERS SHALL BE STAINLESS STEEL. CABLES SHALL BE CONTINUOUS FROM THE JUNCTION BOX TO THE MOTORS OR SENSORS.
9. WHEN CONNECTIONS ARE COMPLETE IN THE JUNCTION BOX, COAT THE TERMINAL BLOCKS AND WIRE ENDS WITH PROTECTIVE COMPOUND, NO-OXIDE OR EQUAL, TO PREVENT CORROSION.
10. PROVIDE 3/4 INCH RIGID GALVANIZED CONDUIT FROM THE PANEL TO 120 VOLT TRANSFORMER. ALL CONDUITS ENTER BOTTOM OF THE PANEL UNLESS OTHERWISE SHOWN. SEAL ALL CONDUITS WITH DUCT SEAL TO KEEP OUT MOISTURE.
11. PAINT PVC PIPES, CONDUITS AND ANY PARTS NOT STAINLESS OR ALUMINUM WITH TWO (2) COATS OF ALUMINUM PAINT.
12. LIFT STATION START UP SHALL BE PERFORMED DURING THE ANTICIPATED PEAK FLOW CONDITIONS. TEST AS FOLLOWS (PUMP SUPPLIER'S FIELD REPRESENTATIVE MUST BE PRESENT AT THE START UP).
 - A. MEGGER MOTORS, MOTORS SHALL BE 20 MEGOHMS OR MORE TO GROUND, DO NOT MEGGER LOW VOLTAGE CONTROLS.
 - B. CHECK VOLTAGE, CHECK PUMP ROTATION, RECORD VOLTAGE AND AMPS UNDER LOAD.
 - C. DEMONSTRATE PROPER OPERATION OF ALL CONTROLS.
 - D. CONDUCT DRAWDOWN TESTS AS REQUIRED TO CONFIRM PROPER PUMP/IMPELLER INSTALLATION.
 - E. CHECK OPERATION WITH OWNER'S PORTABLE GENERATOR CHANGE WIRE CONNECTIONS IN THE PANEL TO GIVE CORRECT ROTATION.
13. TEST AND DEMONSTRATE PROPER OPERATION OF THE WIFI TELEMETRY SYSTEM. SUPPLIER'S FIELD REPRESENTATIVE SHALL MOUNT AND CONNECT THE WIFI ANTENNA AND MAKE THE FINAL CONNECTIONS TO THE SYSTEM.
14. PROVIDE LIQUID TIGHT NONMETALLIC FLEXIBLE CONDUIT (CARLON CARFLEX) WITH SEAL TYPE FITTINGS FOR LEVEL TRANSMITTER CABLE INSIDE THE WET WELL.
15. PROVIDE GAS SEALOFF WITH CHICO COMPOUND FOR CONDUITS BETWEEN JUNCTION BOX AND CONTROL PANEL.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

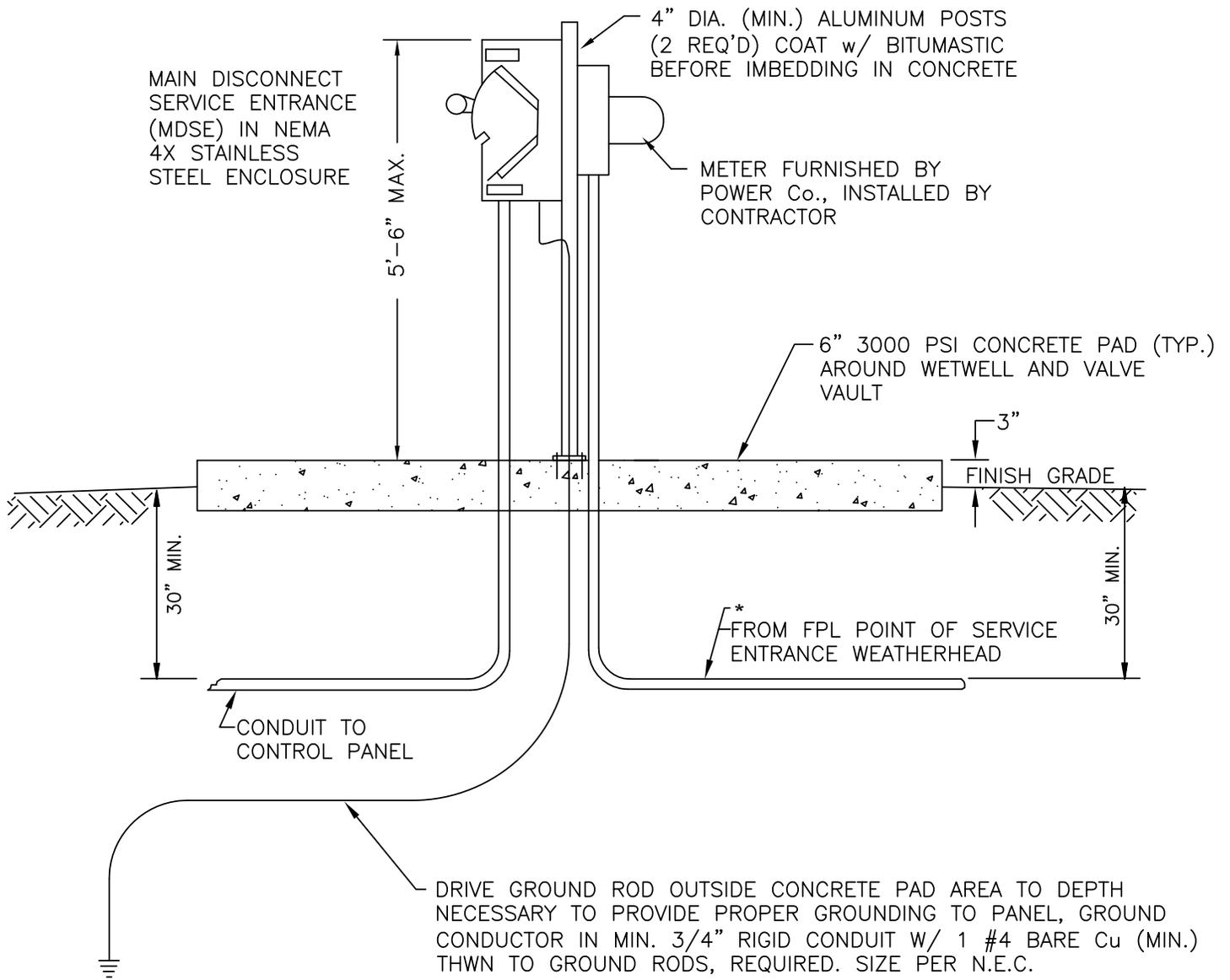
REVISION

TYPICAL CONTROL PANEL NOTES

PAGE No.

OCT. 2017

LS-10



* MAXIMUM ELECTRIC SERVICE LENGTH FROM STATION TO FPL POINT OF SERVICE IS 50 FEET.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	MAIN DISCONNECT SWITCH	PAGE No. LS-11
---------------------------	------------------------	-------------------

AH	-	ALARM HORN
AL	-	ALARM LIGHT
ASB	-	ALARM SILENCE BUTTON
CCB	-	CONTROL CIRCUIT BREAKER
DPDT	-	DOUBLE POLE DOUBLE THROW
DRB	-	DUPLEX RECEPTACLE BREAKER
ECB	-	EMERGENCY CIRCUIT BREAKER
ETM	-	ELAPSED TIME METER
F	-	FUSE
FB	-	FUSE BLOCK
FL	-	FLASHER
GFI	-	GROUND FAULT INTERRUPT
GFDR	-	GROUND FAULT DUPLEX RECEPTACLE
GND	-	GROUND
GR	-	GENERATOR RECEPTACLE
HOA	-	HAND-OFF-AUTO SELECTOR SWITCH
MB	-	MOTOR BREAKER
MCB	-	MAIN CIRCUIT BREAKER
MS	-	MOTOR STARTER
MT2PC	-	MULTITRODE 2 PUMP CONTROLLER
OL	-	OVERLOAD
PB	-	POWER BLOCK
PM	-	PHASE MONITOR
R	-	RELAY
TB	-	TERMINAL BLOCK
TTS	-	THERMAL TERMINAL STRIP
XFMR	-	TRANSFORMER
LA	-	LIGHTING ARRESTOR
SS	-	SURGE SUPPRESSOR

NOTES:

1. PROVIDE THE FOLLOWING SPARE PARTS WITH EACH CONTROL PANEL:
 ONE SET OF OVERLOAD HEATERS
 ONE SET OF MOTOR STARTER CONTACTS
 ONE PHASE MONITOR
 2 PLUG-IN-RELAYS – POTTER & BRUMFIELD

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL PANEL LEGEND

PAGE No.

LS-12

OCT. 2017

BILL OF MATERIALS (CONTROL PANEL)

(ALL ELECTRICAL COMPONENTS AND ASSEMBLIES MUST BE UL LISTED/APPROVED)

ITEM	NAME	DESCRIPTION	MANUFACTURER	TYPE
1	Main Breaker	3p-100 Amp, 240 volt, 25k AIC (minimum)	Square D	Powerpact H-Frame
2	Generator Breaker	(Same as Main)		
3	Generator Receptacle	4-wire, 100 Amp	Russellstoll	JRS1034HR
4	TVSS/SPD	120/240 volt, 3 phase, 4 wire high leg delta (connect high leg to terminal L3) or 480 volt as Req'd	Atlantic Scientific	Zone-Sentinel 12102
5	Level Transmitter	Level sensor Range: 0 - 23 feet Min. cable length 33 feet	Flygt DueProbe	3.0/10-10DUO
6	Motor Circuit Breaker	Magnetic only 3p 600 volt size per motor (25k AIC min.)	Square D	Powerpact H-Frame
7	120 volt Transformer	3 kVA, 240/480 to 120/240 Painted 316 Stainless Steel	Square D	3S1FSS
8	Motor Starter	3p, NEMA size 1 (min.) w/Transient Suppression Module	Square D	Class 8536
9	Phase Monitor	Plug-in 8 pin 240 volt, 3p	Diversified	SUA-230-ALAU
10	Fuse	600 volt, amps as shown w/ Finger-safe Fuseholder	Bussmann	KTK for Phase Monitor
11	120V Circuit Breakers	Thermal Magnetic	Square D	Type QOU
12	Outside Floodlight	Par 38, LED	Stonco	Catalog 40L with 207 guard
13	Panel Outlet	120V GFI Duplex, 20A, Spec Grade	Hubbell	GF 5362I
14	Control Relay 120Vac	Plug-in, Round Base, 11 Cylindrical Pin with LED light, 120V	Square D	RUMC3AB2F7
15	Pump Selector	Hand-Off-Auto (Manual Return)	Square D	SKS43B
16	Power Distribution Block	3p - (2) 500KCM - #4, (8) #2/0 - #14	Marathon	1453586 with lexan cover
17	Running Time	2 inch Square, 120 volt	Redington	711-0190
18	Time Delay Relay Delay on Make	1 to 1023 Second, 8 Pin Base, 120 volt	SSAC Diversified	TDM120AL TBC-120-ABA
19	Transformer Breaker	2p-30 Amps, 25k AIC (Min.)	Square D	HGL 26030
20	Motor Temperature and Moisture Detector	Relay - 120Vac or 24Vdc (Provide if required)	As Specified by Pump Supplier	
21	Flasher	2 amp, 75 F.P.M.	SSAC	FS127
22	Outside Alarm Light	Red Globe with Guard, 25W LED Lamp	RAB Lighting	VXBR100DG w/ GL100R Globe
23	Outside Alarm Horn	120 volt Weatherproof	Edwards Signals	876-N5
24	TVSS/SPD Breaker	3p-30 Amps, 25k AIC (Min.)	Square D	HGL 36030
25	Pilot Lights 120 Volt	LED Pilot Light	Square D	Type SK
26	Time Delay Relay Delay On Break	1 to 1023 Second, 11 Pin Base, 120 volt	SSAC Diversified	TDB120ALD TBD-120-ABD
27	Control Relay 24Vdc	DPDT 8 Cylindrical Pin, Round base with LED light, 24Vdc	Square D	RUMC2AB2BD
28	Float Switch	Encapsulated Switch, Integral cord w/ NO and NC Contacts Min. 40' cord	Anchor Scientific Flygt	GS140NONC ENM-10
29	Wire Terminal	Feed-Through Modular Block	Phoenix	UTTBA
30	Junction Box Power Terminal Blocks	Insulated 3pole Power Splicer	Marathon	1323572 for phase 1320572 for ground
31	Control Panel	Min. 36"Wx36"Hx12"D	Hoffman	See Panel Specification
32	Junction Box	Min. 24"Wx20"Hx8"D	Hoffman	See Panel Specification
33	Gas Sealing Hub	1 1/2" Sealing Hub	O.Z. Gedney	EYH 1520 SG
34	Raintight Conduit Hub	Size as shown	O.Z. Gedney	CHM
35	Control Wire Terminal	Box Lug Type - Rail Mount	Square D	Class 9080 GR6
36	Ground Terminal	Copper Tin Plated	Square D	Class 9080
37	WiFi Router	Outdoor Mesh Router	ABB TROPOS Networks	6420
38	DC Miniature Breaker	Pole and Amp As Shown	Square D	C60 Multi 9
39	Soft Starter/SSRVS	w/ integral bypass and fan	Square D	ATS22D75S6U
40	Motor Circuit Breaker w/ Shunt Trip	Magnetic only 3p 600 volt size per motor (25k AIC min.)	Square D	Powerpact H-Frame
41	Service Entrance Fused Disconnect Switch	600V, 3p, Nema 4X 316SS w/ class RK1 fuses (size same as Main)	Square D	H363SS
42	Service Fuse	600V, Dual element, time delay fuses class RK1 (size same as Main)	Bussmann	LPS-RK
43	POE Injector	120V AC Input /48V DC Output	AIR802	PDCPO8DR
44	WiFi Switch	5 Port Gigabit PoE+ Ethernet Switch	Antaira	LNP-500G Series
45	Control Unit	Station Pump Controller	Flygt	MultSmart

NOTE: MODIFY THE ABOVE AS REQUIRED BY OTHER PAGES AND SPECIFIC PROJECT REQUIREMENTS.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	CONTROL PANEL BILL OF MATERIAL	PAGE No.
OCT. 2017		LS-13

CONTROL PANEL SPECIFICATIONS

A. Panel Builder

1. The panel builder shall be experienced in the construction of lift station control panels, shall have a UL approved shop. Panel shall be UL listed and UL labeled as service entrance equipment.
2. The panel builder shall warrant the panel for one (1) full year minimum from the date of final project certification.
3. The panel builder or qualified technical representative shall check-out and test the panel as part of the lift station start-up.

B. Panel Components

1. The panel components are specified on the drawings with the exception of items described in these specifications. Items are listed by manufacturer and catalog number, other equal quality components may be substituted but they must be fully interchangeable with those specified in size, function, mounting dimensions, plug in connections, and ampacity. Any substitutions or changes must be approved in advance and in writing by the utility department. All components shall be new with no signs or evidence of corrosion.

C. Enclosure

1. The panel with size 1, or 2 starters shall be minimum 36 inch wide x 36 inch high x 12 inch deep (36"W x 36"H x 12"D). The panel with soft starters shall be minimum 36 inch wide x 60 inch high x 16 inch deep (36"W x 60"H x 16"D). Larger panel may be installed if required by UL and NEC specifications for service intended. A shop drawing must be submitted prior to preconstruction meeting. Top of panel shall not be higher than 6'-6" above slab, unless approved in advance by the department. The panel shall be of a modified NEMA 3R construction with the following features:
 - a. Constructed of 304 stainless steel 14 gauge. Enclosure shall have powder coated white stainless steel body and door. All seams to be continuously welded, spot welded panels will not be accepted.
 - b. All external hardware shall be stainless steel with piano hinge, three-point latch with roller fitting top and bottom and single handle with padlock fitting and stainless steel external parts.
 - c. Full length welded drip shield to deflect water from the door, a continuous closed cell neoprene gasket on the door.
 - d. Blank outer door with dead front inner door of 1/8" thick aluminum hinged on the left with the operators controls mounted on or projecting through it.
 - e. Provide stainless steel or Aluminum back mounting plate for heavy components (min. .090 thickness).
 - f. A removable min. 1/8 inch thick lexan cover shall be provided on the incoming line terminals.
 - g. The outer door is to have nine inch by eleven inch (9" x 11") stainless steel or aluminum pocket for log book, tack weld to door.
 - h. Arms and latches shall hold both outer door and inner door in an open position, these must be sufficiently rigid and secure to hold doors open under windy weather conditions any may be placed one on top and one on bottom.
 - i. Sliding locking bar to allow only main or emergency breaker to be closed. Bar shall be aluminum with stainless steel hardware.
 - j. No penetration through the panel will be allowed except for conduits on bottom, and for generator receptacle and transformer conduit on the side, i.e. no screws through panel, outer door or frame.
2. The enclosure shall be the product of a UL approved manufacturer and shall be a modified NEMA-3R enclosure. Manufacturer shall be Hoffman or approved equal. Enclosure shall have lugs for mounting.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	CONTROL PANEL SPECIFICATIONS	PAGE No. LS-14
---------------------------	------------------------------	-----------------------

D. Wiring

1. All wiring shall be copper THWN or approved equal, AWG 14 minimum. Color code wires as follows:

Ground	–	Green
Grounded Neutral	–	White
120 Volt Power	–	Black
Control	–	Red
24/48 Volt Control	–	Blue

Different control wiring colors are acceptable if clearly identified. Power wiring shall be kept separate from control wiring, and shall be identified by phase. The high leg shall be the center terminal on the main breaker.

2. All wires shall be numbered with machine made plastic wrap around labels at both ends.
3. All external connection and internal connections, where shown on the drawings, shall be brought to the numbered terminals.
4. Wiring shall be enclosed in panduct or equivalent wireways and wiring between the doors and the panel shall be enclosed in a spiral wrap or approved equal with sufficient slack to allow full opening of the door.
5. Wiring shall be secured with screw-on tabs, tabs with adhesives shall not be used.
6. All wiring shall be front accessible.
7. All electrical wiring must meet or exceed National Electric Code and Local Code Standards.
8. Any place that electrical wire passes through a metal cover or shield, insulating grommet is required to protect the wire.

E. Component Mounting

1. All components shall be securely mounted with stainless steel hardware. Self tapping screws are not acceptable.
2. All relay bases shall be front mounted with screw terminals, no soldered connections shall be used. All base terminals shall be numbered to correspond to relay numbers. Where plug-in components are not firmly secured in bases, hold down clamps shall be provided.

F. Identification

1. All components shall be identified in accordance with the schematic diagram, using permanent name tags on the panel of laminated micarta or approved equal. The permanent name tags shall be securely attached and in a position where they are clearly visible.
2. All operator's controls shall be provided with laminated micarta name tags attached with stainless steel screws, with minimum lettering height of 1/8 inch.
3. Provide a laminated schematic drawing attached to the inside of the outer door – minimum size 11 inches by 17 inches (11" x 17").

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL PANEL SPECIFICATIONS

PAGE No.

OCT. 2017

LS-15

4. Attach a separate stick-on label showing the following details:

- | <u>PUMP</u> | <u>MOTOR</u> |
|-----------------------------|-------------------|
| a. Brand | a. Horsepower |
| b. Catalog number | b. Speed |
| c. Impeller number and size | c. Voltage |
| d. Design head | d. Full load amps |
| e. G.P.M. | e. Catalog number |
| f. Serial numbers | f. Serial numbers |

G. Junction Box

1. The "RAIN TIGHT" junction box shall be NEMA-4X, 316 stainless steel, Hoffman or approved equal with padlock fitting, continuous hinge clamped cover construction. Junction box shall be minimum of 24 inches wide by 20 inches high by 8 inches deep (24" W x 20" H x 8" D) and shall have a stainless steel or aluminum back mounting plate for terminal blocks. Provide a stainless steel or aluminum partition between the control and power terminals as shown on the drawings. Junction box design shall allow for venting as required by code.
2. Provide gas sealing hubs, conduit, terminals, and wire as shown on the drawings. Provide four (4) extra wires for future control.
3. Pour seals into gas sealing hubs between panel and junction box with compound approved by seal manufacturer.
4. Provide plated copper ground lug and wire to the panel ground.

H. Drawings

1. Panel builder shall provide the following drawings:
 - a. Schematic drawing showing all components. Components shall be properly identified by number and function. All connections shall be numbered to correspond to the component numbers. All wires and terminals shall be clearly numbered and identified.
 - b. Bill of material listing all parts as follows, in tabular form:

1)	Drawing Reference
2)	Description
3)	Manufacturer
4)	Catalog Number
5)	Type
6)	Notes
 - c. Layout drawing showing the front with the operators panel and with the panel open. Layout drawings shall also show the outside dimensions of the panels and dimensioned mounting supports.
 - d. Plastic encased drawing inside the panel as previously noted herein.
2. Drawings shall be clear and readable and a minimum of 11 inches by 17 inches (11" x 17"). "Fuzzy" reductions will be rejected.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL PANEL SPECIFICATIONS

PAGE No.

OCT. 2017

LS-16

I. Loose Components

1. Ship the following for mounting by the site electrician.

- a. Alarm Light – Item 22
- b. Outside Floodlight – Item 12
- c. 120 Volt Transformer – Item 7
- d. Junction Box – Item 32
- e. Alarm Horn – Item 23

J. Soft Starters (SSRVS – item 39)

1. Soft Starters shall be provided in the control panel for the lift stations which have 50HP motors and larger. Soft Starters shall be solid state reduced voltage starter type with integral bypass, fan and display. Soft starters line voltage shall be rated from 240V to 480V, 3 ϕ . Control supply voltage, control logic inputs and fan supply voltage for soft starters shall be 120V. Soft Starters shall be rated to operate at higher ambient temperature. Oversize soft starter rating minimum one size higher than motor HP. All soft starter settings shall be set and adjusted properly for functional operation of lift station. Set ramp up time to "5 sec", ramp down time to "Off", overload protection to "On", over current time delay to "5 sec", under and over voltage time delay to "10 sec", the line voltage, and motor full load amp per motor nameplate, etc. Disable all the protection features including phase loss, phase reverse, under, unbalance and ground current. Only overload protection shall be enable.

V.O.W. CONSTRUCTION STANDARDS & DETAILS

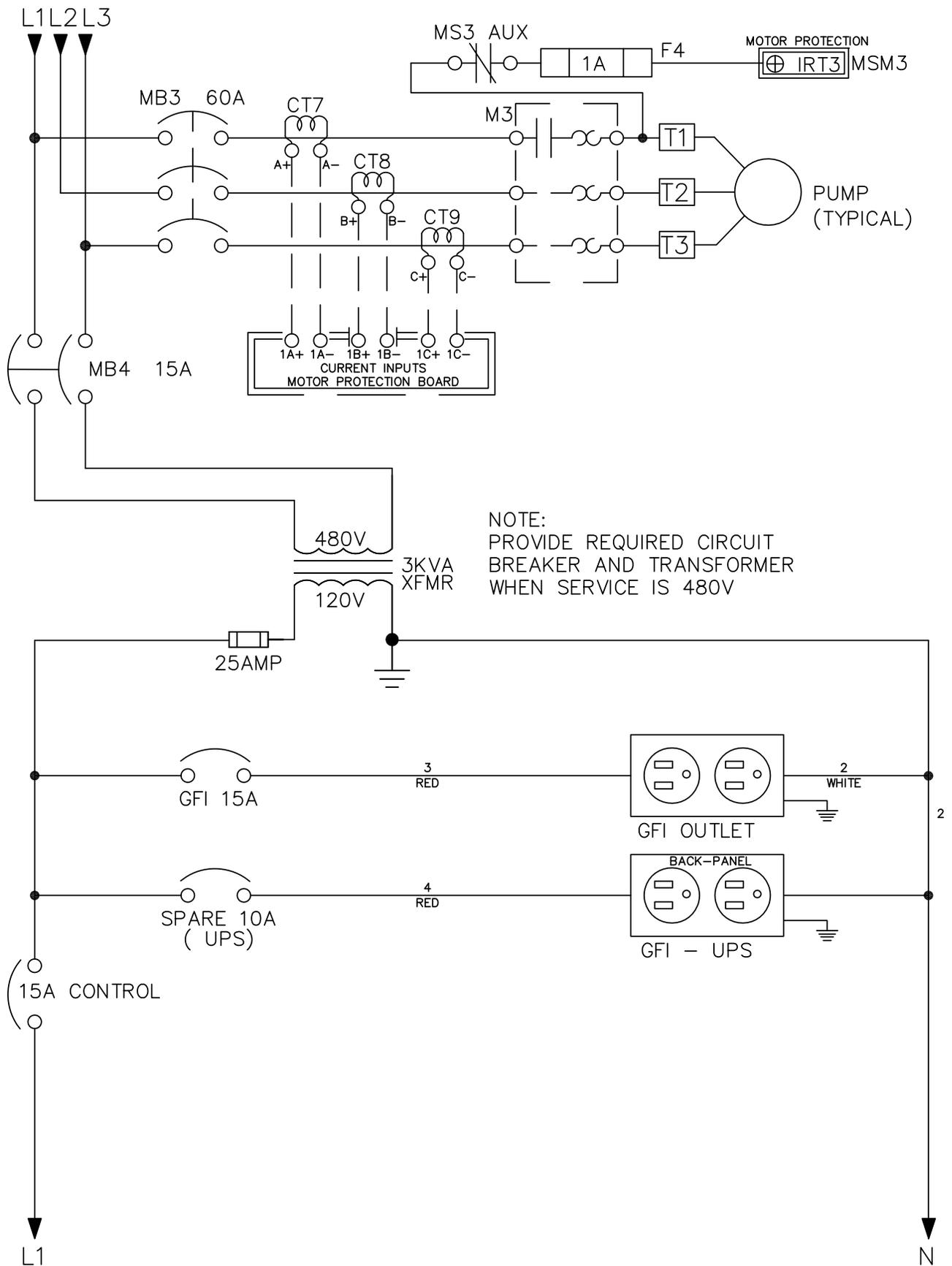
REVISION

CONTROL PANEL SPECIFICATIONS

PAGE No.

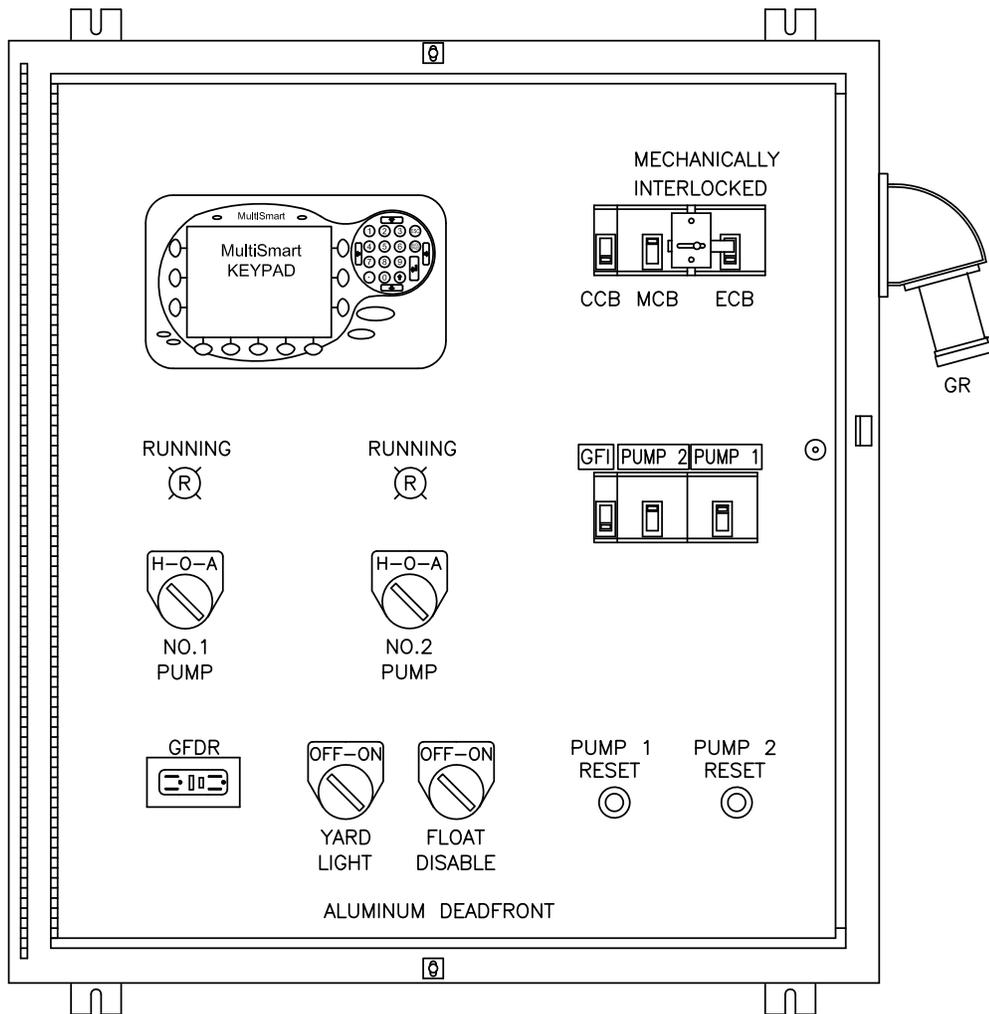
OCT. 2017

LS-17



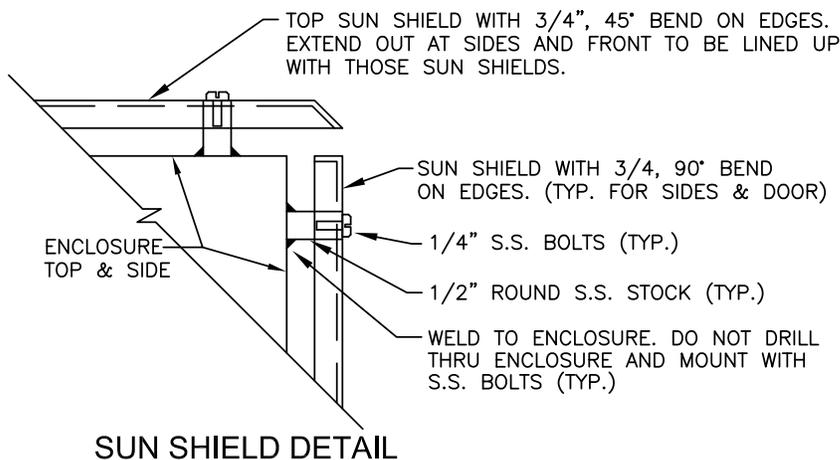
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION OCT. 2017	CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (480V)	PAGE No. LS-18
---------------------------	---	-------------------



NOTES:

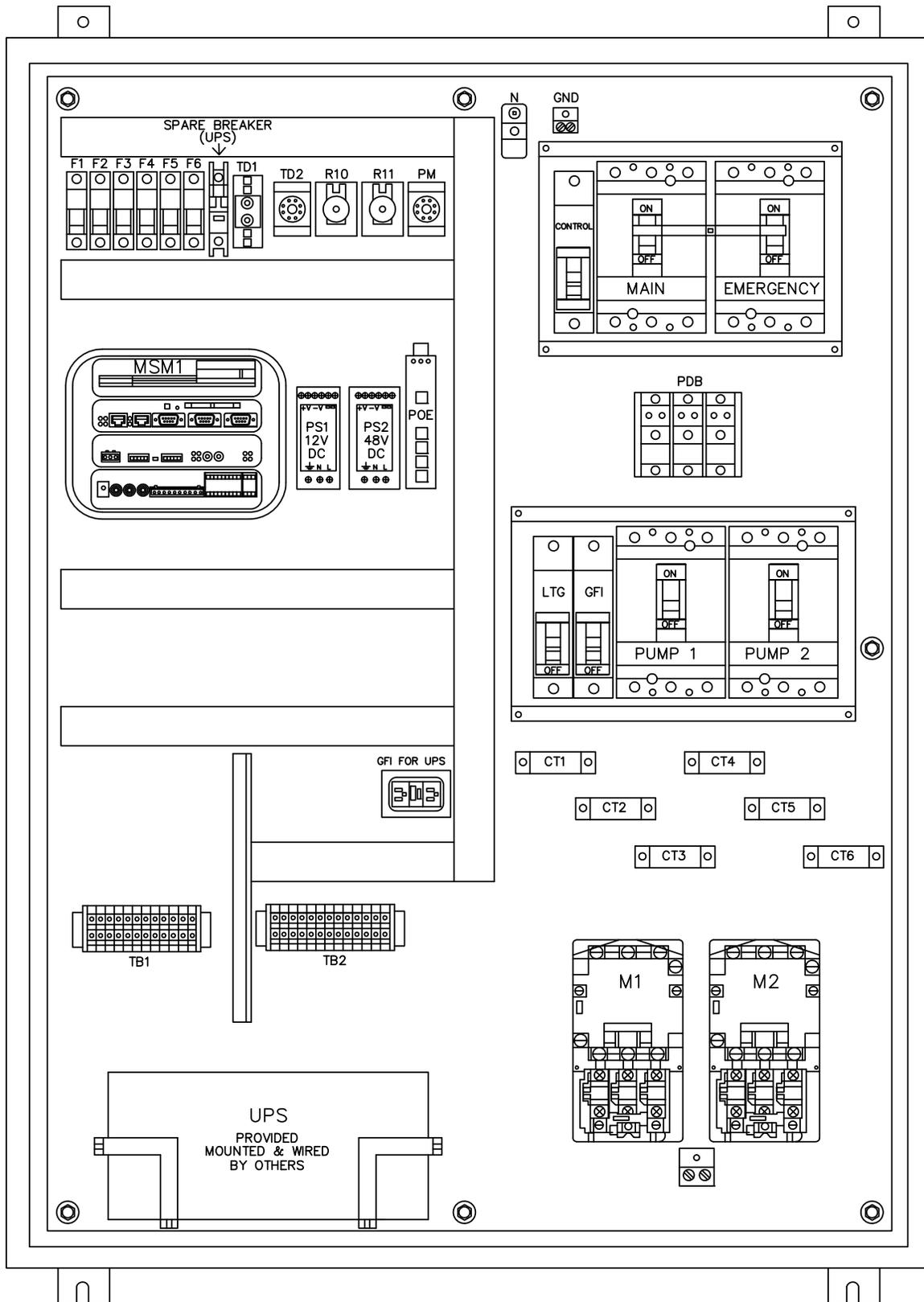
1. OUTER DOOR REMOVED TO SHOW DEADFRONT LAYOUT.
2. GASKET WEATHER DOOR WITH GROUND STRAP AND INTERNAL "DEAD FRONT" SAFETY DOOR.
3. 316 SS SUN SHIELDS REQ'D. ON TOP, FRONT, BACK & 2 SIDES.
4. CABINET SHALL BE 316 SS ENCLOSURE, RATED NEMA 4X. WITH QUICK RELEASE LATCHES, AND CONTINUOUS HINGE
5. ACTUAL LAYOUT MAY VARY WITH HORSEPOWER



SUN SHIELD DETAIL

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	CONTROL CABINET (2 PUMPS)	PAGE No.
OCT. 2017		LS-19



V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL CABINET (2 PUMPS)

PAGE No.

OCT. 2017

LS-20

SELECTION CHART (2 PUMPS, 240 VOLTS, 3 PHASE)								
MOTOR 3 PHASE		SERVICE WIRE SIZE	SERVICE CONDUIT SIZE	MAIN BREAKER SIZE (MCB)	EMERGENCY BREAKER SIZE (ECB)	MOTOR		
HP	FLA					MOTOR BREAKER SIZE	MOTOR FEEDER SIZE	MOTOR STARTER SIZE
1	4.2	6	2"	60	60	15	12	1
2	6.8	6	2"	60	60	15	12	1
3	9.6	6	2"	60	60	20	12	1
5	15.2	4	2"	70	70	30	10	1
7.5	22	2	2"	100	100	45	8	2
10	28	2	2"	100	100	60	6	2
15	42	1/0	3"	150	150	80	6	3
20	54	3/0	3"	200	200	90	4	3

SELECTION CHART (2 PUMPS, 480 VOLTS, 3 PHASE)								
MOTOR 3 PHASE		SERVICE WIRE SIZE	SERVICE CONDUIT SIZE	MAIN BREAKER SIZE (MCB)	EMERGENCY BREAKER SIZE (ECB)	MOTOR		
HP	FLA					MOTOR BREAKER SIZE	MOTOR FEEDER SIZE	MOTOR STARTER SIZE
5	7.6	6	2"	60	60	15	12	1
7.5	11	6	2"	60	60	20	12	1
10	14	6	2"	60	60	30	10	2
15	21	2	2"	100	100	40	8	2
20	27	1/0	3"	125	125	60	8	2
25	34	1/0	3"	150	150	70	6	3
30	40	1/0	3"	150	150	80	4	3
50	65	3/0	3"	200	200	100	2	4*
70	84	3/0	3"	200	200	125	1	4*

* REDUCED-VOLTAGE, SOLID-STATE, SOFT START TYPE STARTER

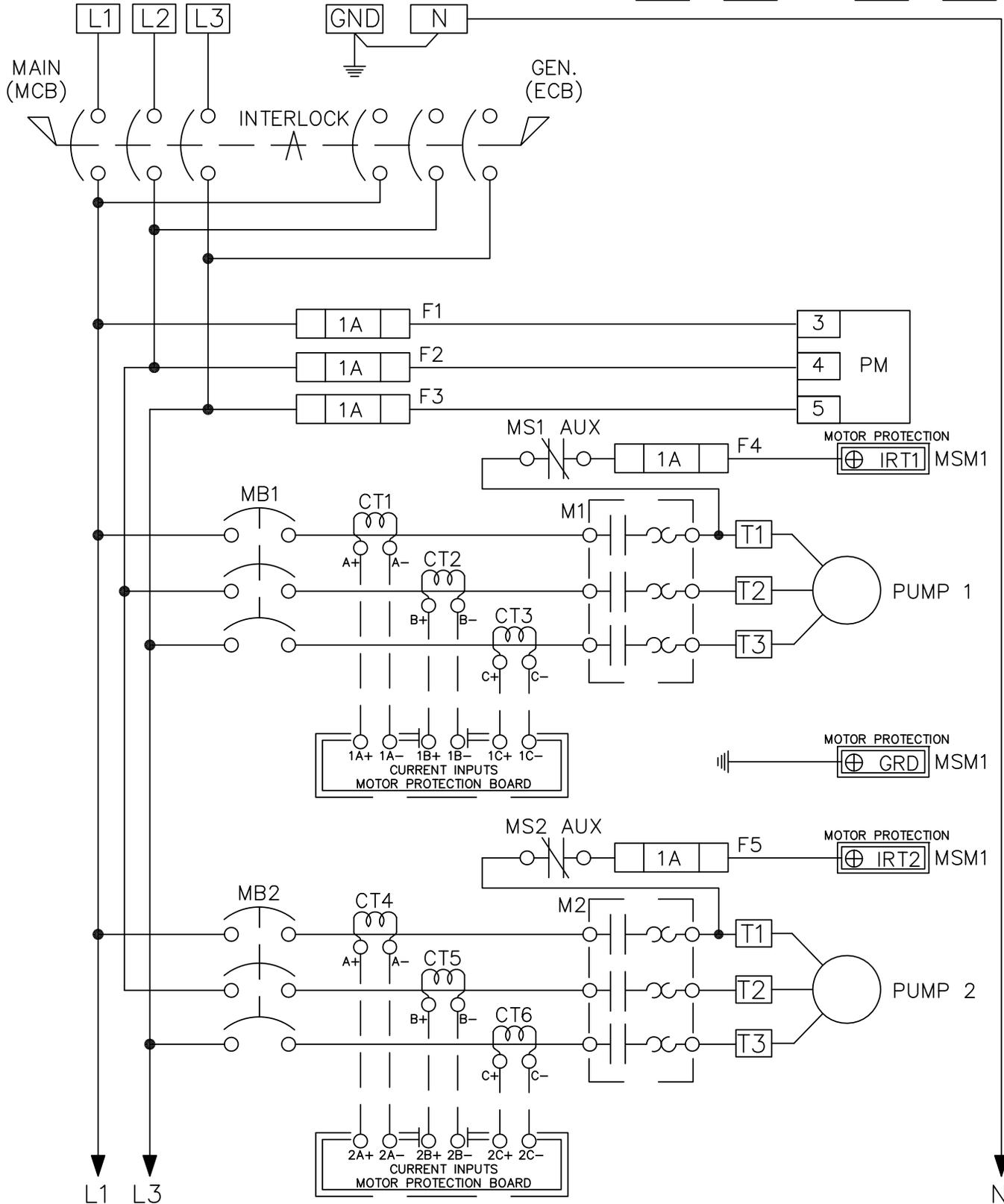
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	DUPLEX STATION SELECTION CHART (2 PUMPS)	PAGE No.
OCT. 2017		LS-21

--- VOLT, 3 PHASE
60 HZ, 4 WIRE

SURGE
CAPACITOR

LIGHTNING
ARRESTOR



V.O.W. CONSTRUCTION STANDARDS & DETAILS

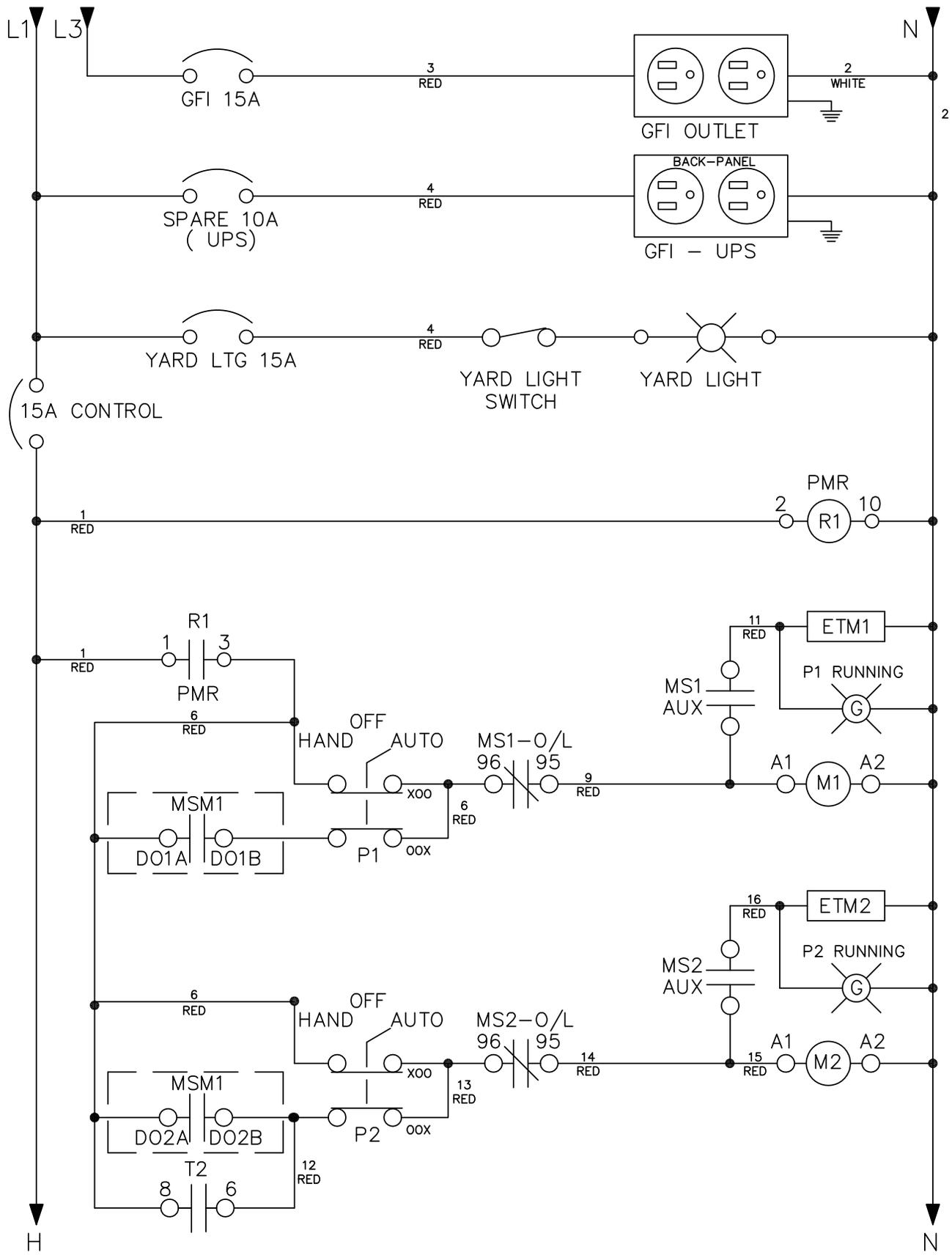
REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (2 PUMPS)

PAGE No.

OCT. 2017

LS-22

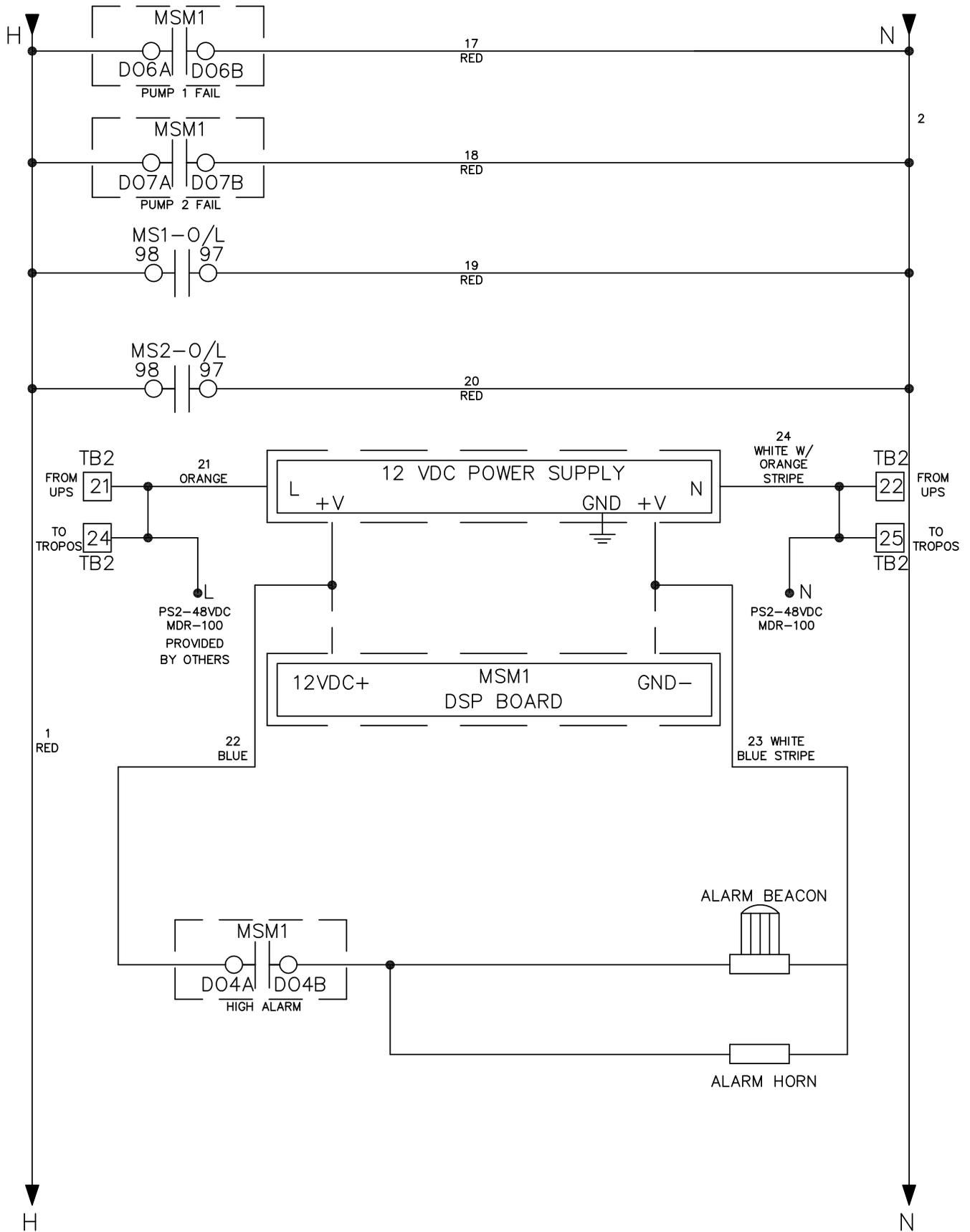


V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION
OCT. 2017

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (2 PUMPS)
--

PAGE No.
LS-23



V.O.W. CONSTRUCTION STANDARDS & DETAILS

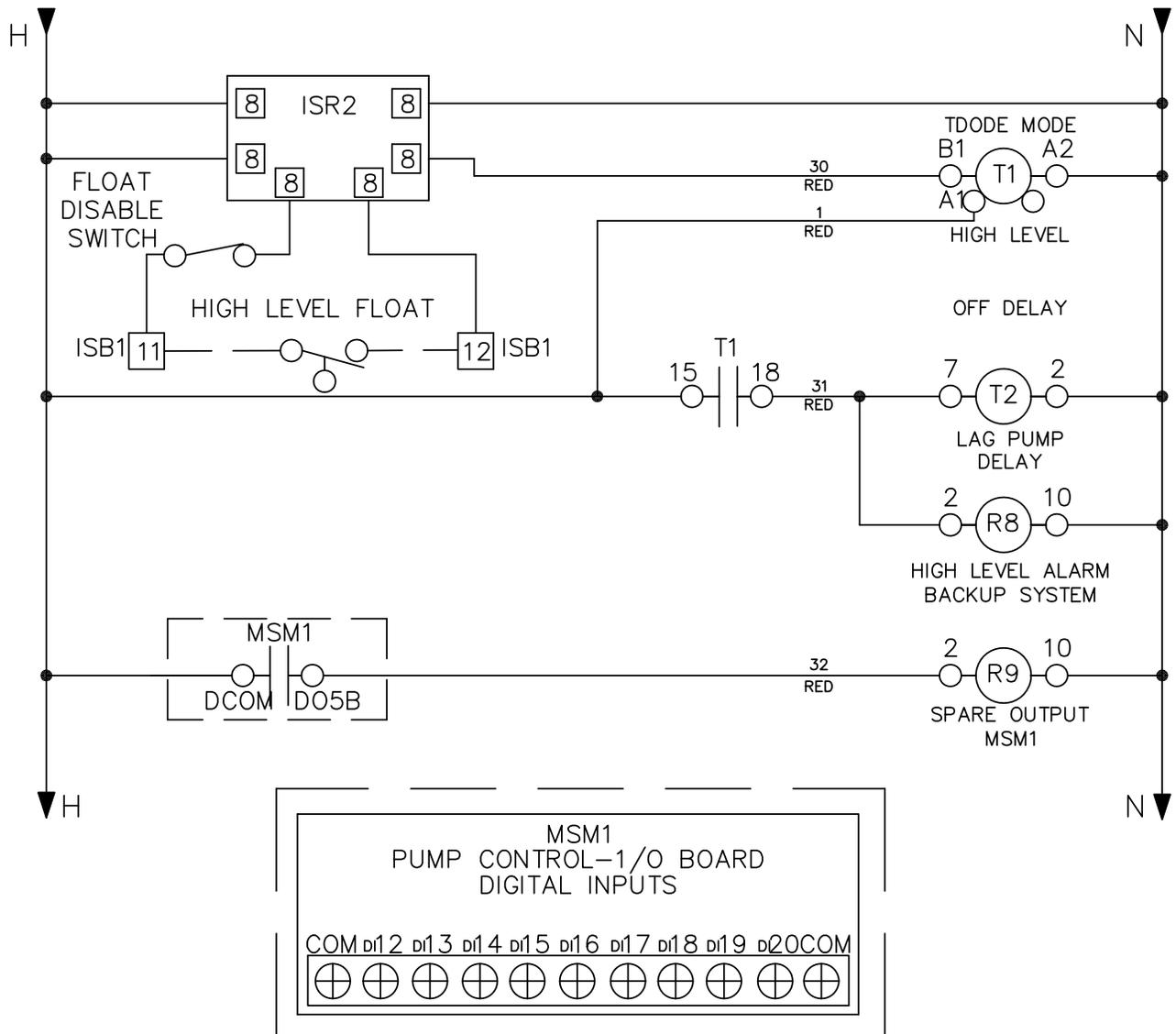
REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (2 PUMPS)

PAGE No.

OCT. 2017

LS-24



V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (2 PUMPS)

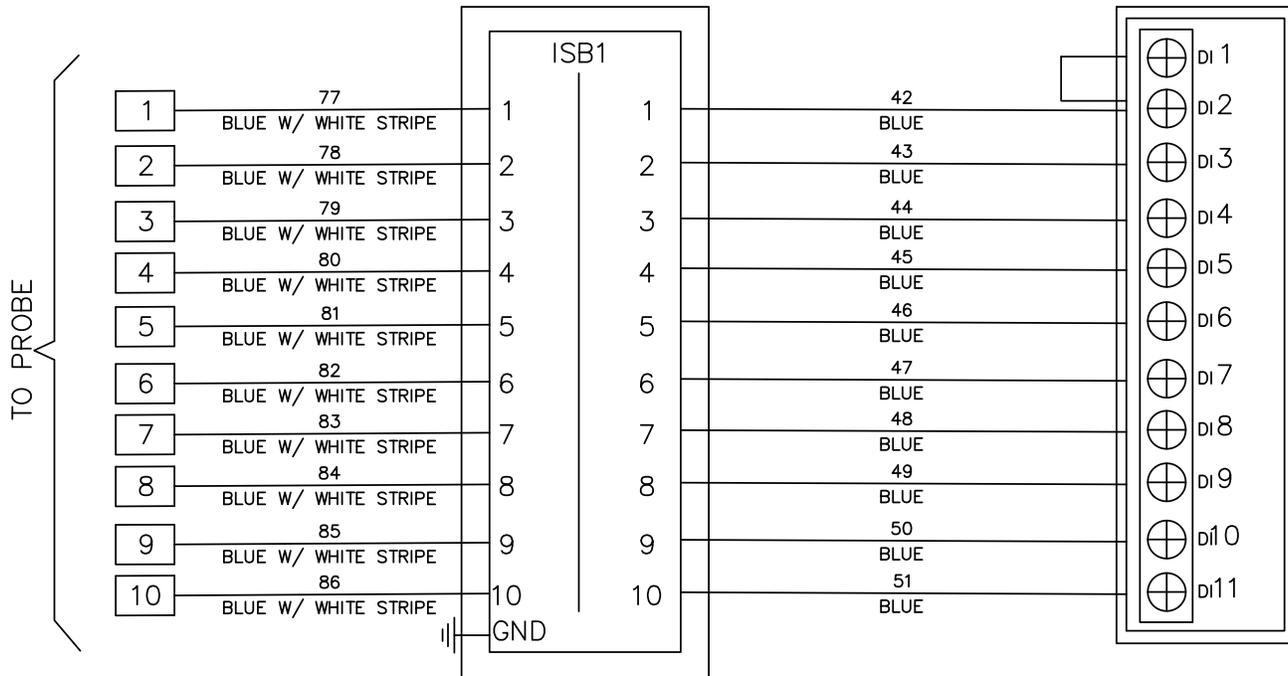
PAGE No.

LS-25

OCT. 2017

INTRINSIC BARRIER
LOCATED IN JUNCTION BOX

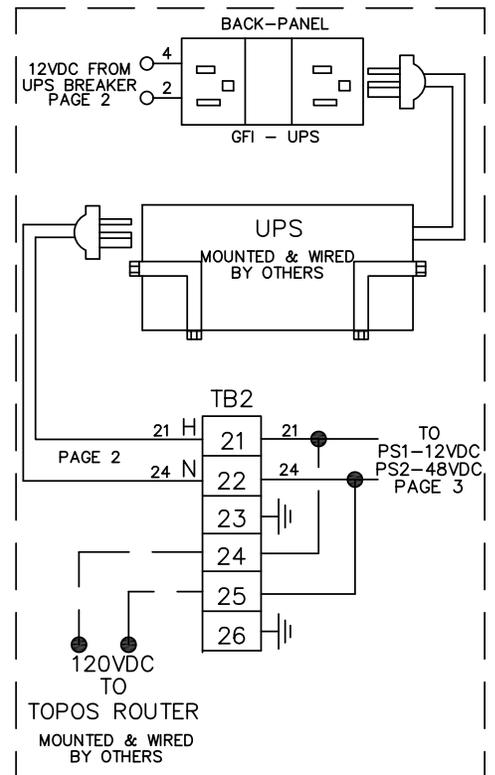
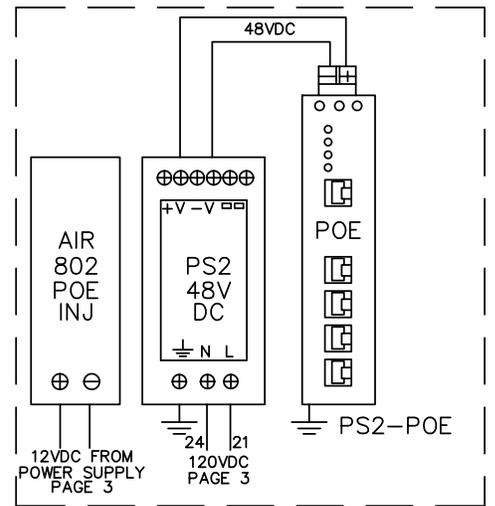
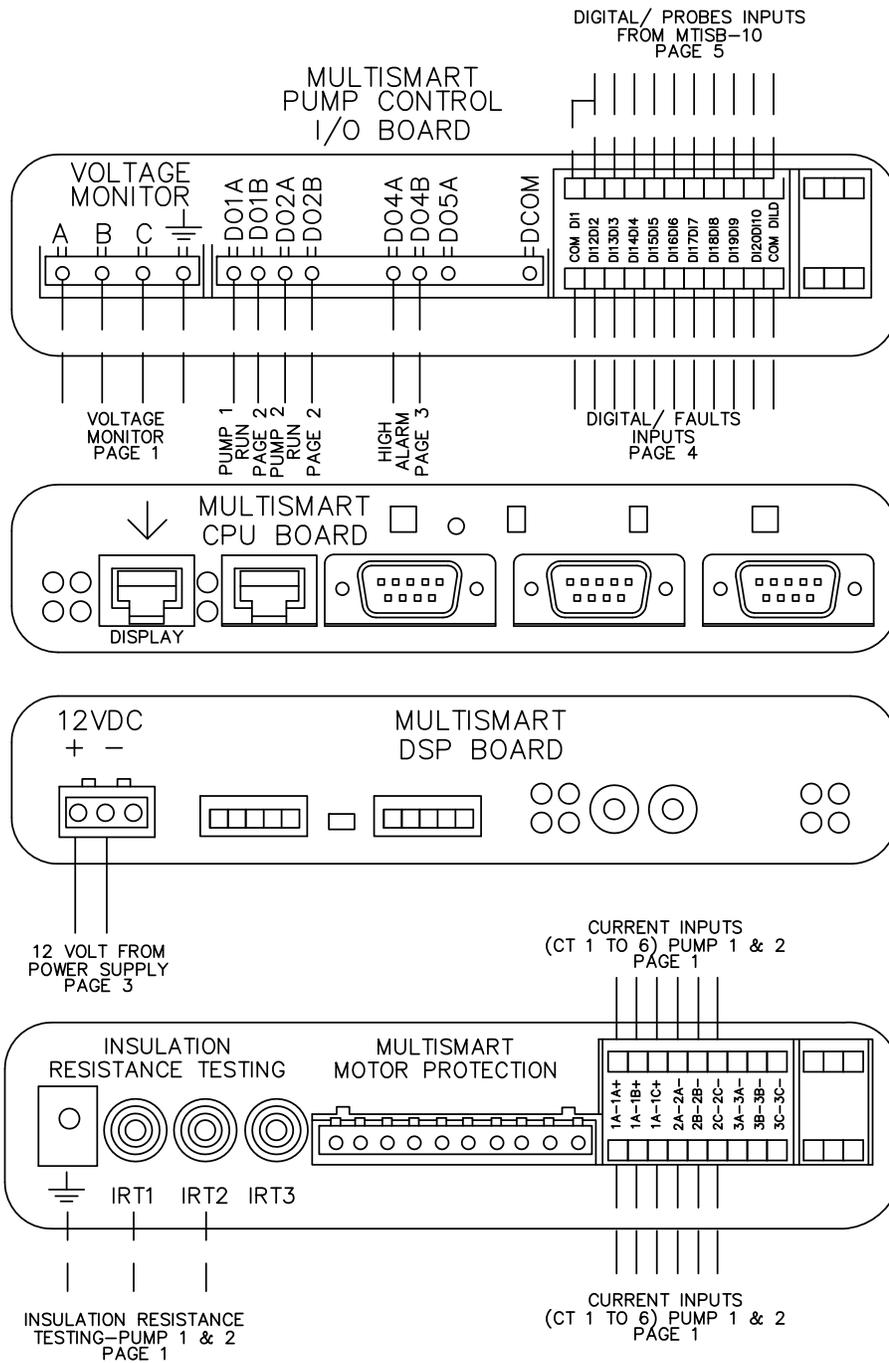
DIGITAL/ PROBE INPUTS
LOCATED IN CONTROL PANEL



<p>VOLTS <u> </u> FREQ <u>60HZ</u> PHASE <u>3</u></p> <p>LARGEST HP <u> </u></p> <p>LARGEST FLA <u> </u></p> <p>TOTAL FLA <u> </u></p> <p>SHORT CIRCUIT RATING <u> </u> AT <u> </u></p> <p>NOTE: HEADER AND PLUGS USE COPPER CONDUCTORS ONLY. TORQUE REQUIREMENT: PLUGS - 1.47 FT. LBS. UTIT OPERATES AT "POLLUTION DEGREE 2"</p> <p>POWER CIRCUIT WIRING TEMP RATING 75 DEGREES C</p>
--

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (2 PUMPS)</p>	<p>PAGE No.</p> <p>LS-26</p>
----------------------------------	---	------------------------------

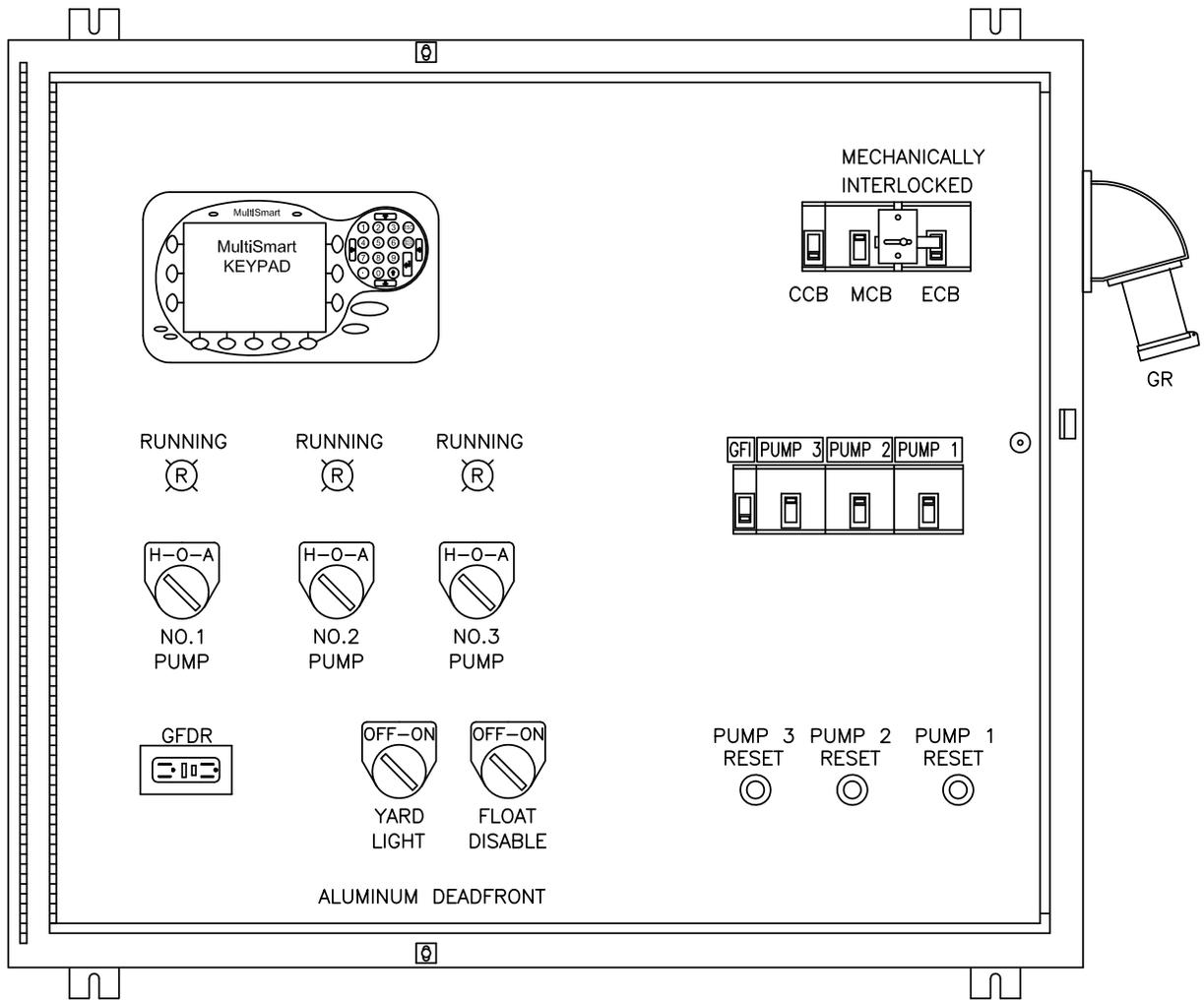


WIRE COLOR DESIGNATIONS

- BLACK = POWER WIRING & 120V ON THE LINE SIDE OF TRANSFORMER, BREAKERS & FUSES
- BLACK = POWER WIRING TO FEED GFCI
- RED = 120VAC - CONTROL ANYTHING AFTER THE CONTROL CIRCUIT BREAKERS OR FUSES
- WHITE = 120VAC - NEUTRAL (GROUNDED CONDUCTOR)
- RED W/ BLACK STRIPE - 24VAC - HOT
- GRAY = 24VAC - NEUTRAL
- BLUE = UNGROUNDED DC CIRCUITS
- WHITE W/ BLUE STRIPE - GROUNDED DC CIRCUITS
- YELLOW = SCADA CIRCUITS & DRY CONTACTS
- BLUE W/ WHITE STRIPE - INTRINSICALLY SAFE CIRCUITS
- ORANGE = UNGROUNDED AC CIRCUITS THAT REMAIN ENERGIZED WHEN MAIN POWER IS TURNED OFF (UPS)
- WHITE W/ ORANGE STRIPE = GROUNDED AC CIRCUITS THAT REMAIN ENERGIZED WHEN MAIN POWER IS TURNED OFF (UPS)

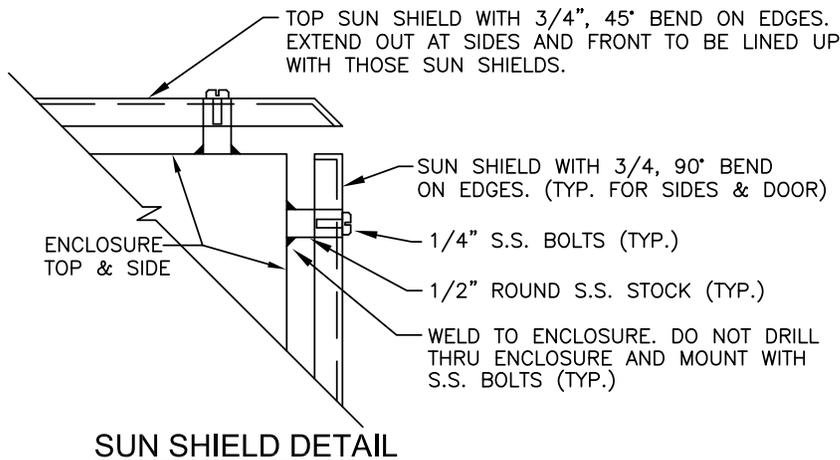
V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (2 PUMPS)	PAGE No.
OCT. 2017		LS-27



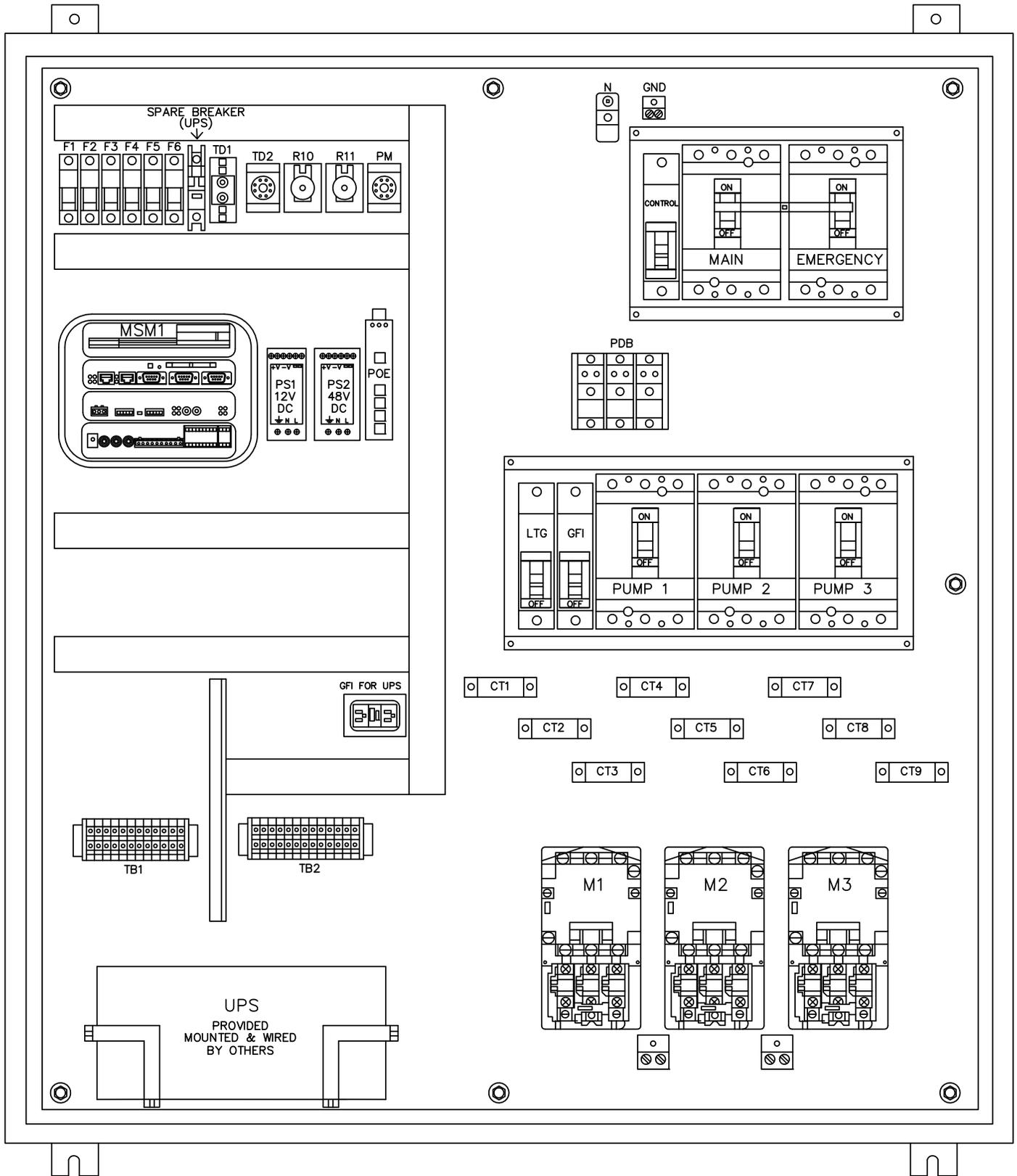
NOTES:

1. OUTER DOOR REMOVED TO SHOW DEADFRONT LAYOUT.
2. GASKET WEATHER DOOR WITH GROUND STRAP AND INTERNAL "DEAD FRONT" SAFETY DOOR.
3. 316 SS SUN SHIELDS REQ'D. ON TOP, FRONT, BACK & 2 SIDES.
4. CABINET SHALL BE 316 SS ENCLOSURE, RATED NEMA 4X. WITH QUICK RELEASE LATCHES, AND CONTINUOUS HINGE
5. ACTUAL LAYOUT MAY VARY WITH HORSEPOWER



V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>CONTROL CABINET (3 PUMPS)</p>	<p>PAGE No.</p> <p>LS-28</p>
----------------------------------	----------------------------------	------------------------------



V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL CABINET (3 PUMPS)

PAGE No.

OCT. 2017

LS-29

SELECTION CHART (3 PUMPS, 240 VOLTS, 3 PHASE)								
MOTOR 3 PHASE		SERVICE WIRE SIZE	SERVICE CONDUIT SIZE	MAIN BREAKER SIZE (MCB)	EMERGENCY BREAKER SIZE (ECB)	MOTOR		
HP	FLA					MOTOR BREAKER SIZE	MOTOR FEEDER SIZE	MOTOR STARTER SIZE
1	4.2	6	2"	60	60	15	12	1
2	6.8	6	2"	60	60	15	12	1
3	9.6	6	2"	60	60	20	12	1
5	15.2	2	2"	100	100	30	10	1
7.5	22	1/0	3"	125	125	45	8	2
10	28	1/0	3"	150	150	60	6	2
15	42	3/0	3"	200	200	80	6	3
20	54	3/0	3"	200	200	90	4	3

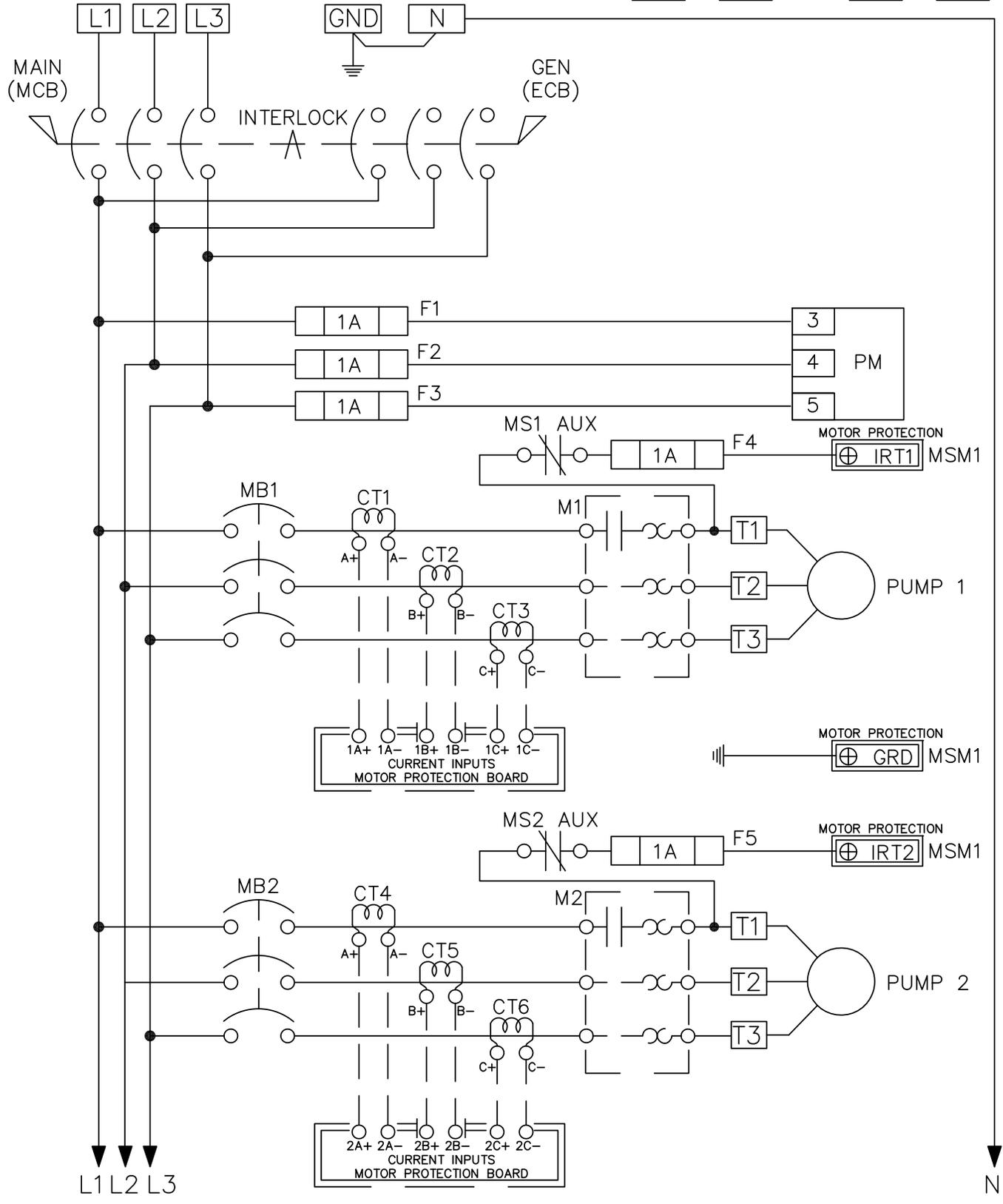
SELECTION CHART (3 PUMPS, 480 VOLTS, 3 PHASE)								
MOTOR 3 PHASE		SERVICE WIRE SIZE	SERVICE CONDUIT SIZE	MAIN BREAKER SIZE (MCB)	EMERGENCY BREAKER SIZE (ECB)	MOTOR		
HP	FLA					MOTOR BREAKER SIZE	MOTOR FEEDER SIZE	MOTOR STARTER SIZE
5	7.6	6	2"	60	60	15	12	1
7.5	11	6	2"	60	60	20	12	1
10	14	2	2"	100	100	30	10	2
15	21	1/0	3"	125	125	40	8	2
20	27	1/0	3"	150	150	60	8	2
25	34	1/0	3"	150	150	70	6	3
30	40	3/0	3"	200	200	80	4	3
50	65	250 KCMIL	3"	250	250	100	2	4*
70	84	500 KCMIL	4"	350	350	125	1	4*

* REDUCED-VOLTAGE, SOLID-STATE, SOFT START TYPE STARTER

V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION	TRIPLEX STATION SELECTION CHART (3 PUMPS)	PAGE No.
OCT. 2017		LS-30

___ VOLT, 3 PHASE
60 HZ, 4 WIRE



V.O.W. CONSTRUCTION STANDARDS & DETAILS

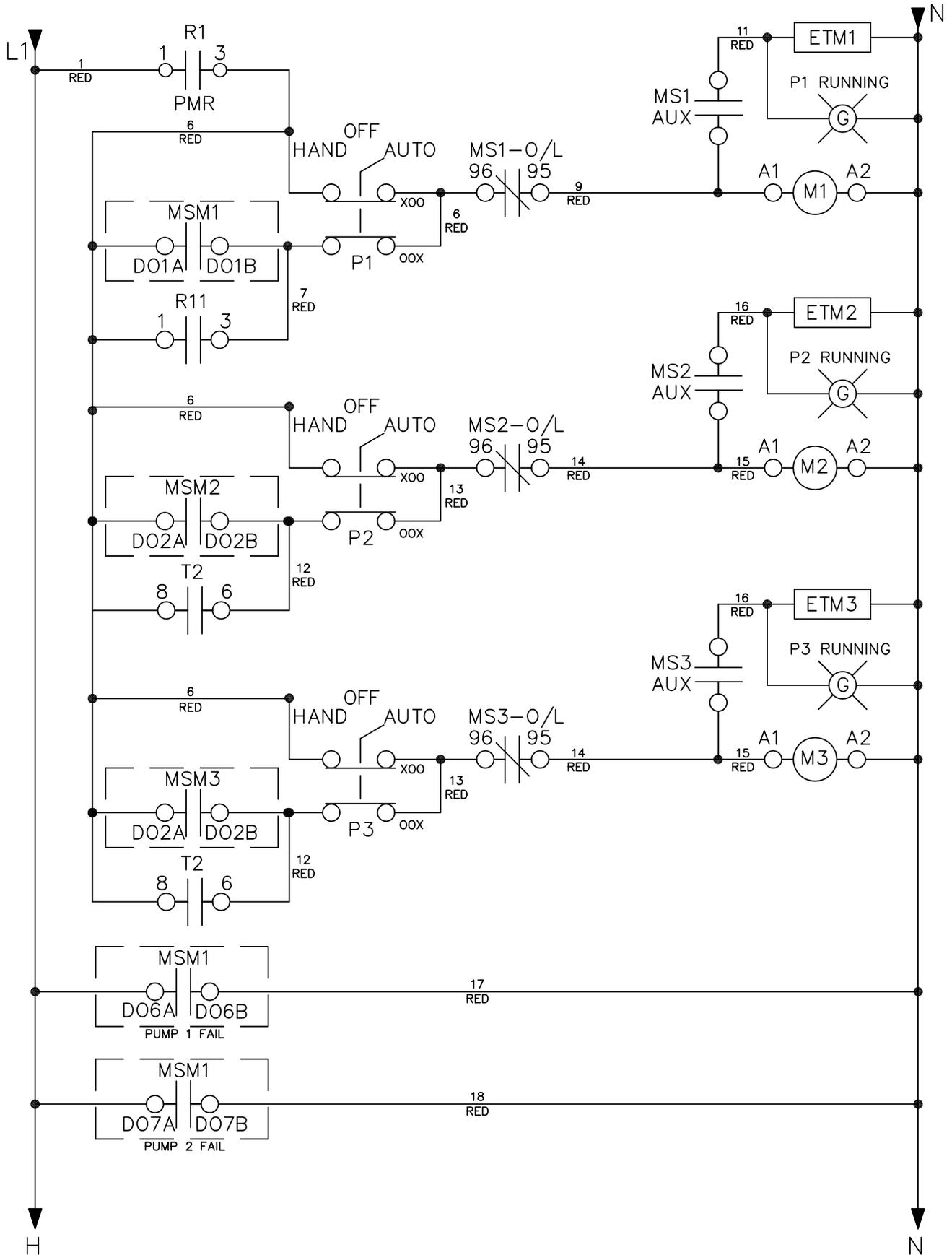
REVISION

OCT. 2017

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (3 PUMPS)

PAGE No.

LS-31



V.O.W. CONSTRUCTION STANDARDS & DETAILS

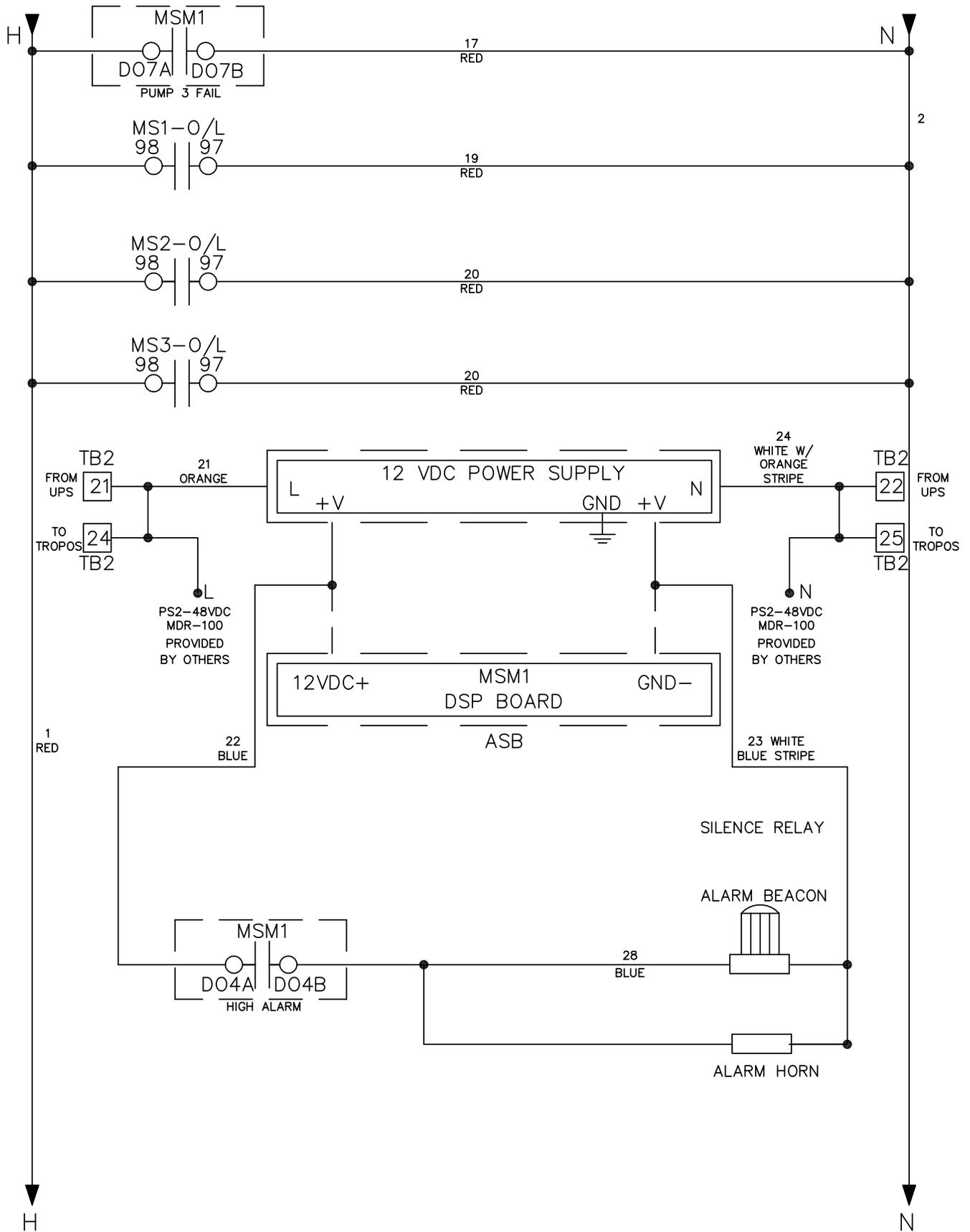
REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (3 PUMPS)

PAGE No.

OCT. 2017

LS-33



V.O.W. CONSTRUCTION STANDARDS & DETAILS

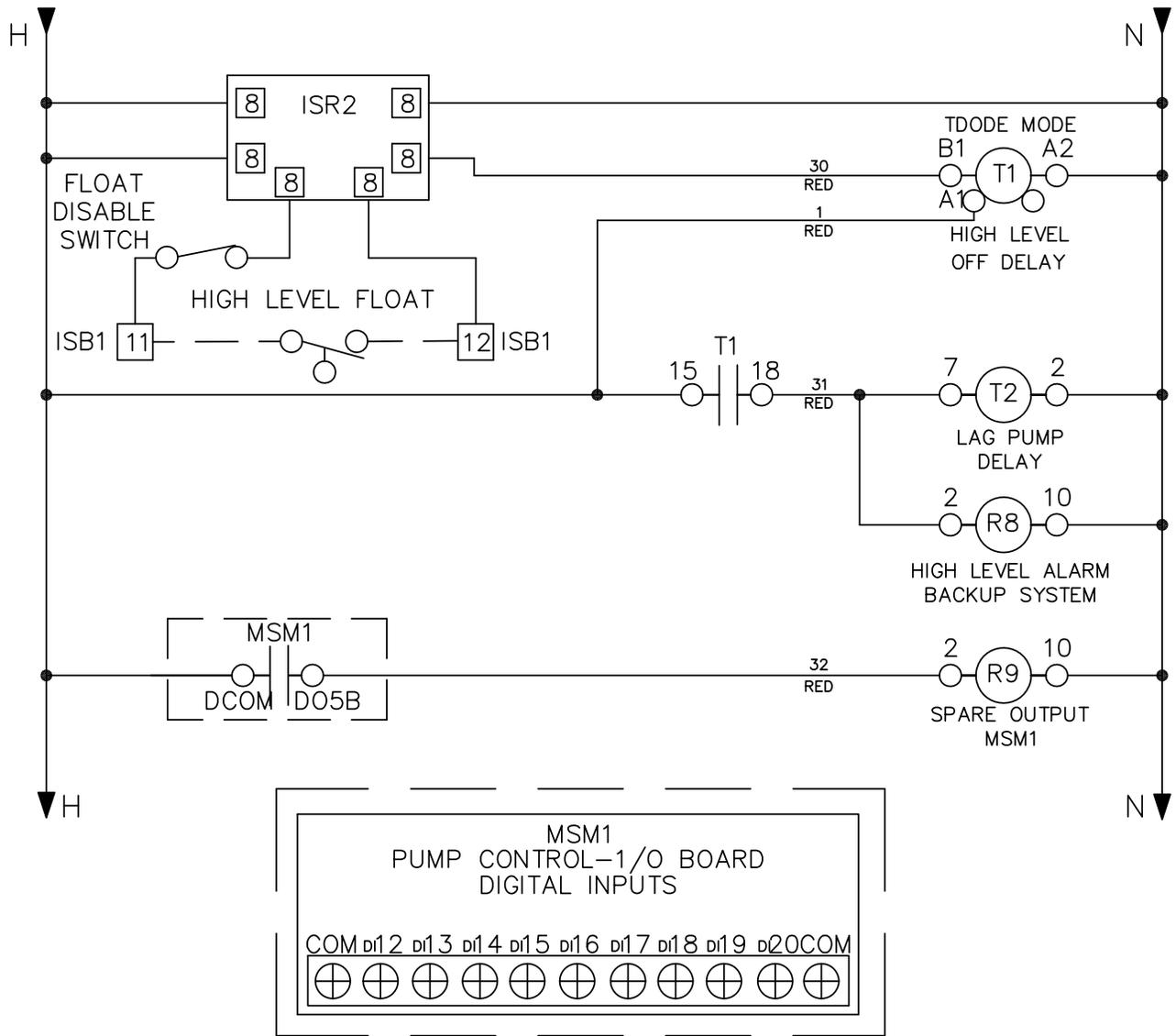
REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (3 PUMPS)

PAGE No.

OCT. 2017

LS-34



V.O.W. CONSTRUCTION STANDARDS & DETAILS

REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (3 PUMPS)

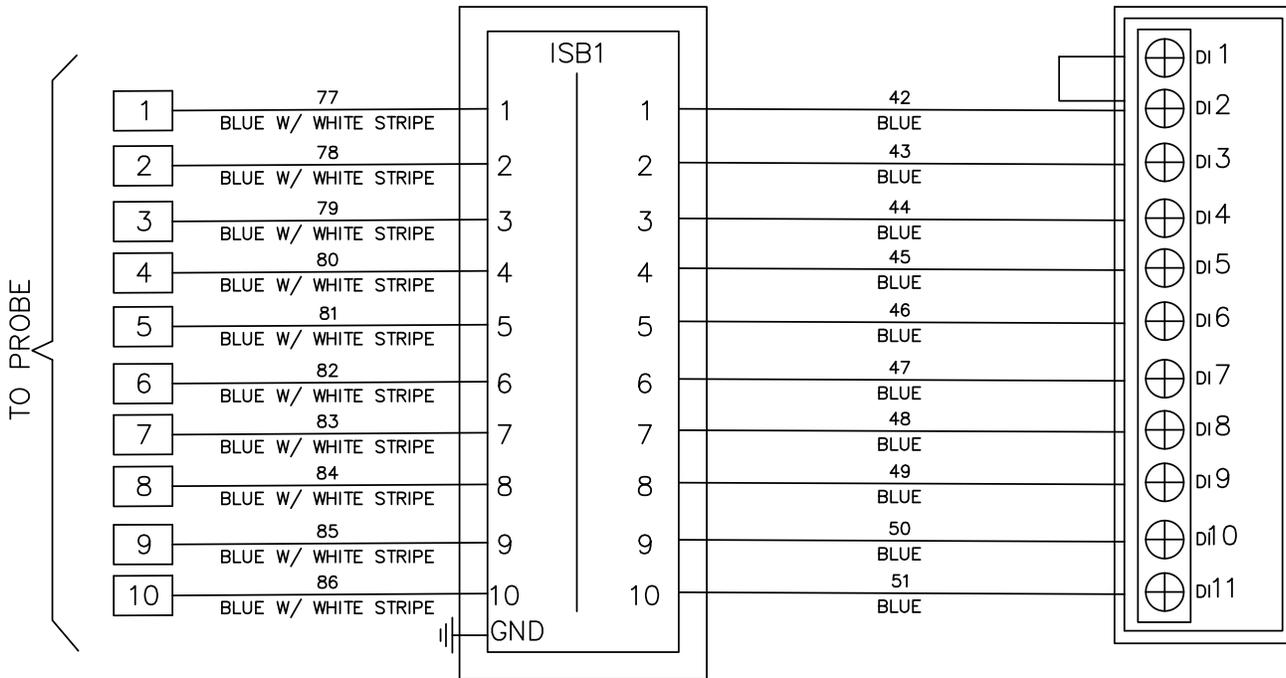
PAGE No.

LS-35

OCT. 2017

INTRINSIC BARRIER
LOCATED IN JUNCTION BOX

DIGITAL/ PROBE INPUTS
LOCATED IN CONTROL PANEL



VOLTS___ FREQ 60HZ PHASE 3

LARGEST HP ___

LARGEST FLA ___

TOTAL FLA ___

SHORT CIRCUIT RATING _____ AT _____

NOTE: HEADER AND PLUGS USE COPPER CONDUCTORS ONLY.
TORQUE REQUIREMENT: PLUGS - 1.47 FT. LBS.
UTIT OPERATES AT "POLLUTION DEGREE 2"

POWER CIRCUIT WIRING TEMP RATING 75 DEGREES C

V.O.W. CONSTRUCTION STANDARDS & DETAILS

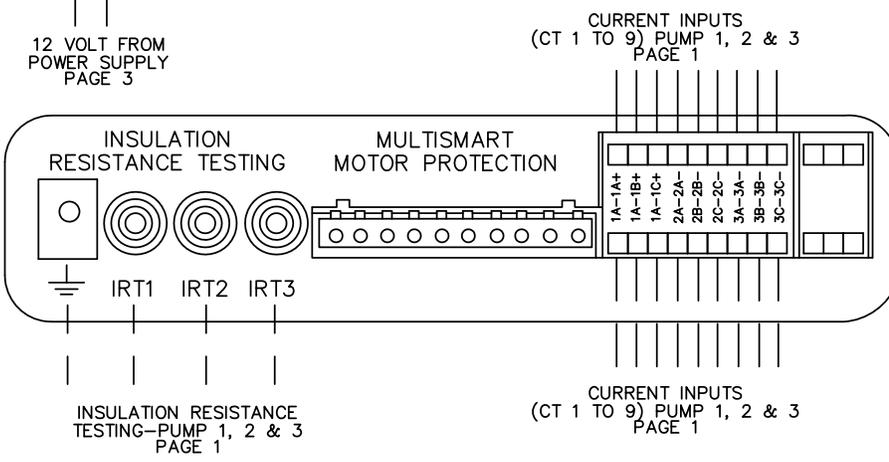
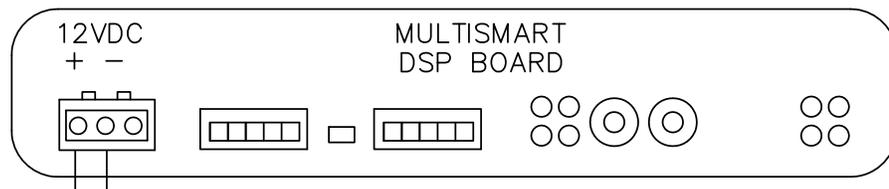
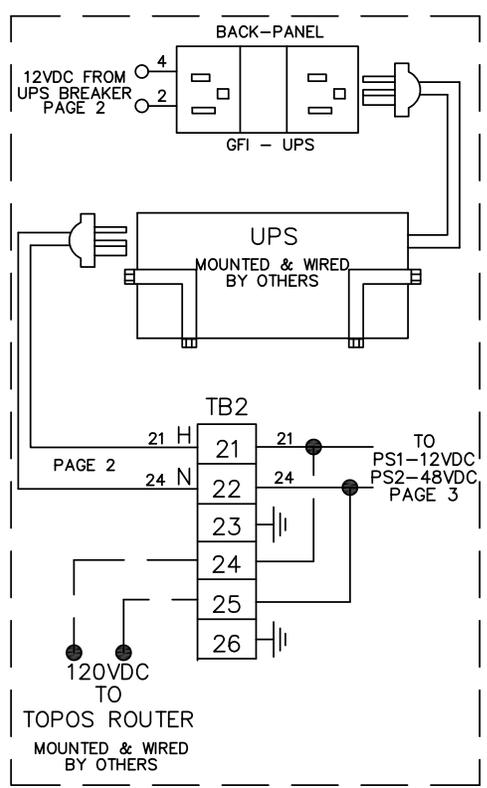
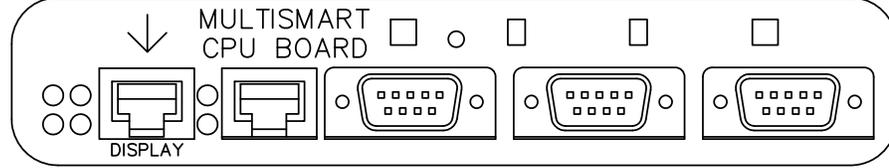
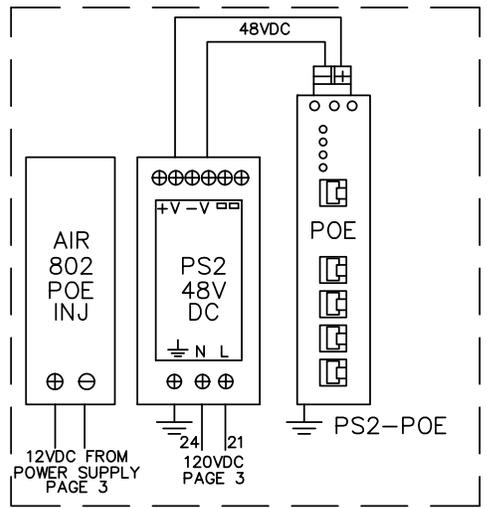
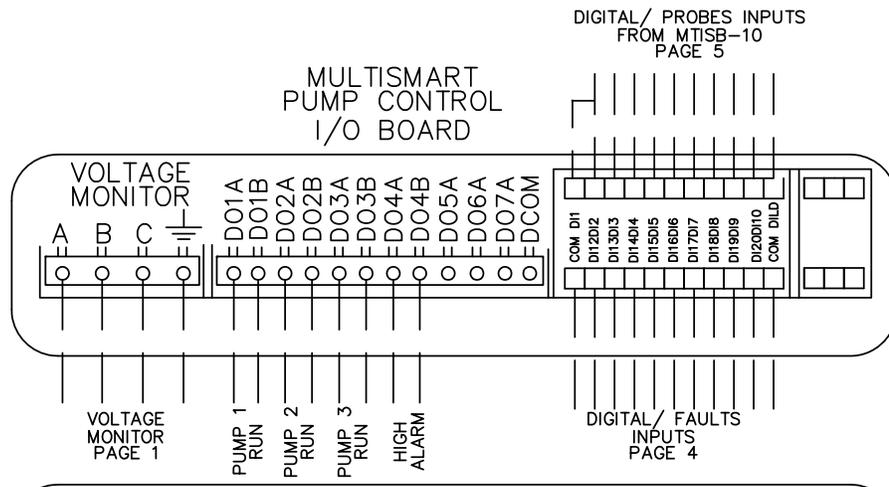
REVISION

CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (3 PUMPS)

PAGE No.

OCT. 2017

LS-36



- WIRE COLOR DESIGNATIONS**
- BLACK = POWER WIRING & 120V ON THE LINE SIDE OF TRANSFORMER, BREAKERS & FUSES
 - BLACK = POWER WIRING TO FEED GFCI
 - RED = 120VAC - CONTROL ANYTHING AFTER THE CONTROL CIRCUIT BREAKERS OR FUSES
 - WHITE = 120VAC - NEUTRAL (GROUNDED CONDUCTOR)
 - RED W/ BLACK STRIPE - 24VAC - HOT
 - GRAY = 24VAC - NEUTRAL
 - BLUE = UNGROUNDED DC CIRCUITS
 - WHITE W/ BLUE STRIPE - GROUNDED DC CIRCUITS
 - YELLOW = SCADA CIRCUITS & DRY CONTACTS
 - BLUE W/ WHITE STRIPE - INTRINSICALLY SAFE CIRCUITS
 - ORANGE = UNGROUNDED AC CIRCUITS THAT REMAIN ENERGIZED WHEN MAIN POWER IS TURNED OFF (UPS)
 - WHITE W/ ORANGE STRIPE = GROUNDED AC CIRCUITS THAT REMAIN ENERGIZED WHEN MAIN POWER IS TURNED OFF (UPS)

V.O.W. CONSTRUCTION STANDARDS & DETAILS

<p>REVISION</p> <p>OCT. 2017</p>	<p>CONTROL PANEL ELECTRICAL SCHEMATIC DIAGRAM (3 PUMPS)</p>	<p>PAGE No.</p> <p>LS-37</p>
----------------------------------	---	------------------------------

APPROVED PRODUCT LIST (APL)

A copy of the most current Approved Product List may be obtained on our web site
or by contacting the Utility Department

**Village of Wellington
Utility Department**

Water/Sewer Approved Product List

OCTOBER 2017

**ALL PRODUCTS TO BE DOMESTIC AND LEAD FREE BRASS
– NO EXCEPTIONS –**

Project Name: _____

The following products and specifications have been found to be acceptable and/or desirable in their respective groups. **Please indicate specific choice by circling manufactures name and submitting a minimum of two (2) sets for approval. The VOW will keep one set for our records and return one for your use. Submit additional sets for your use as required.** Shop drawings need not be submitted for approval if the Contractor uses products on this list. Any product not on this list will require prior approval by submitting shop drawings to the Village of Wellington. Shop drawings will also be required for non-standard items, such as manholes, wet wells, other castings and pumps.

All materials shall conform to this listing or shop drawings as approved prior to construction. All requests for material substitutions shall be approved prior to delivery to the job site.

By our signature on sheet # 2, the Underground Contractor agrees to adhere to the following product specifications. It is understood that the Village of Wellington will reject construction not in accordance with this document.

Note: The following items will be provided to the Village of Wellington prior to project acceptance.

1. One repair kit for every five (5) fire hydrants or fraction thereof.
2. One operating wrench for every ten (10) fire hydrants or fraction thereof.
3. One manhole hook.
4. One valve key (minimum 5' long).

Concurrence of Utilities Contractor:

Print Company Name

Print Name

Signature & Date

Concurrence of the Engineer of Record:

Print Company Name

Print Name

Signature & Date

Approval by Village of Wellington:

Print Name

Signature & Date

WATER

1. Ductile Iron Pipe (Submit only one (1) manufacturer per project)
(Pipe shall be color coded with blue stripe painted on top)
Interior of pipe shall be Cement Mortar Lined and sealed per AWWA C-104/A21.50

- A. American
- B. U.S. Pipe
- C. McWane

I. Water:	<u>Pipe Size</u>	<u>Special Thickness Class</u>
	3" to 12"	51*
	14" to 36"	52
II. Fire Lines:	3" & Up	53

**3" to 12" pipe shall be Class 53 from main to BFP for all underground meter and bypass piping.*

2. Polyvinyl Chloride (PVC) Pipe (Submit only one (1) manufacturer per project)
(Pipe to be color coded blue)

- A. JM Manufacturing Company* *no pipe deflection allowed at joint
- B. Diamond Plastic Corporation*
- C. North American Pipe Corp., NAPCO*
- D. National Pipe and Plastics** **up to two (2) degrees deflection at pipe joint allowed

I. Water:	4" to 12"- AWWA C-900 DR 18
	14" to 36"- AWWA C-905 DR 25

3. Mechanical Joint Pipe (Submit only one (1) manufacturer per project)
Interior of pipe shall be Cement Mortar Lined and sealed per AWWA C-104/A21.50

- A. American
- B. U.S. Pipe
- C. McWane

I.	Water:	<u>Pipe Size</u>	<u>Special Thickness Class</u>
		4" to 12"	51
		14" to 36"	52
II.	Fire Lines:	3" & Up	53

4. DIP Flexible Joint Restraint Pipe (Submit only one (1) manufacturer per project)
Interior of pipe shall be Cement Mortar Lined and sealed per AWWA C-104/A21.50

- A. American – Flex Ring, Lok Ring, push-on joint pipe with Fast Grip Gaskets
- B. U.S. Pipe – TR Flex, push-on joint pipe with Field Lok 350 Gasket
- C. McWane – TR Flex

5. Mechanical Joint (AWWA/ANSI) Class 153 Compact
 (Submit only one (1) manufacturer per project)
Fittings shall be ductile iron meeting the requirements of AWWA C-110, AWWA C-153 and must be Cement Mortar Lined and sealed per AWWA C-104/A21.50

- A. Tyler/Union
- B. Star* **will be approved on a project by project basis only*
- C. Sigma*

6. Flanged Fittings (AWWA/ANSI) Class 110 Full Body

(Submit only one (1) manufacturer per project)

Fittings shall be ductile iron meeting the requirements of AWWA C-110, AWWA C-153 and must be Cement Mortar Lined and sealed per AWWA C-104/A21.50

A. Tyler/Union

B. Star* **will be approved on a project by project basis only*

C. Sigma*

7. Mechanical Joint Fitting Restraint for Ductile Iron Pipe

A. EBAA Megalug – Series 1100

B. Sigma One-Lok – Series D-SLDE

C. Star Pipe Products Stargrip – Series 3000D

D. EBAA IRON Series 1100 SD – if split ring required for existing pipe

E. Sigma One-Lok SLCE – if split ring required for existing pipe

8. Mechanical Joint Fitting Restraint for PVC Pipe

A. EBAA Megalug – Series 2000PV

B. Sigma One-Lok – Series D-SLCE

C. Star Pipe Products – Series 4000D

D. EBAA IRON Series 1600 TD – if split ring required for existing pipe

E. Sigma PV Lok Series PWH

9. Mechanical Joint Restraining Devices for DIP (Bell Restraint)

A. EBAA – 1600 TDSS

B. Sigma – PV-Lok Model PWP (304 S.S. Nuts & Bolts)

10. Mechanical Joint Restraining Devices for PVC (Bell Restraint)

- A. EBAA – 1600 TDSS
- B. Sigma – PV-Lok Model PWP (304 S.S. Nuts & Bolts)

11. Pipe Joint Restraining option

- A. American Pipe – Fast Grip (amarillo gasket)
- B. US Pipe – Titon Joint (blue gasket)

12. Mechanical Joint Follower Gland (Bolts, Gaskets, Nuts)

(Submit only one (1) manufacturer per project)

- A. Tyler
- B. Star* **will be approved on a project by project basis only*
- C. Sigma*

13. Resilient Seat Gate Valves (AWWA C509, C515, Ductile Iron Body)

- A. Mueller – Series A2361
- B. Clow – Series F6100
- C. American – Series 2500

14. Insertion Valves

- A. Team INSERT VALVE
- B. HYDRA-STOP INSERT VALVE 250 Patriot Series
- C. Advance Valve Technology (AVT) EZII

**15. Valve Stem Extensions (with centering plate and set screw at bottom)
material to be aluminum or galvanized**

- A. U.S. Fabricators – submit shop drawing for approval
- B. Raptor – submit shop drawing for approval
- C. Proselect – submit shop drawing for approval.

**16. Butterfly Valves – 14” and larger (AWWA C504) when using BFV’s with HDPE
Pipe, provide spacers with shop drawings as required**

- A. Pratt – Groundhog
- B. Dezurik – Class 250B

17. Fire Hydrants (Red in color, 5 ¼” valve opening)

- A. American – Darling No. B-84-B
- B. Clow Medallion
- C. Mueller Super Centurion

18. Fire Hydrant Paint

- A. Krylon Industrial Iron Guard – Safety Red

19. Tapping Sleeve – Mechanical Joint (DIP)

(Allowed when tapping existing DIP or C-900 PVC Mains)

- A. American – Series 2800
- B. Mueller – Series H-615
- C. Tyler

20. Tapping Sleeve (Stainless Steel or Carbon Steel Epoxy Coated)

(Allowed only when tapping existing Class 160 or Class 200 PVC Mains)

- A. JCM 432 (stainless) or 412 (epoxy)
- B. Ford
- C. Smith-Blair 662 (stainless) or 622 (epoxy)

21. Tapping Valves (AWWA C509, C515, Ductile Iron Body)

- A. American – 2500 TM
- B. Mueller – T-2361 or T-2362

22. Line Stop Tapping Sleeve

- A. JCM 440
- B. Smith-Blair 680
- C. If a specific tapping company has been selected to perform tap, submit shop drawing of the tapping sleeve for approval.

23. Valve Boxes

- A. Tyler – Series 6850
- B. Bingham/Taylor – Series 4906

24. Valve Box Extensions

- A. Tyler
- B. Bingham/Taylor
- C. C-900 PVC

25. Corporation – Ball Valve - “Iron Pipe Thread Only”

- A. Ford – Series FB1100 for 1”, 1 ½” & 2” Services
- B. McDonald – Series 4704B-22 for 1”, 1 ½” & 2” Services

26. Curb Stop - Ball Valve with locking wing - “Iron Pipe Thread Only”

- A. Ford – Series B41-444W for 1” Service
- B. Ford – Series B41-666W for 1 ½”
- C. Ford – Series B41-777W for 2” Services
- D. McDonald – Series 76102W-22 for 1”, 1 ½” & 2” Services

27. Curb Stop- Angle Type - “Iron Pipe Thread Only” Case by Case

- A. Ford – Series BA41-333W for Single Services
- B. Ford – Series BA11-333 W used with U Branch
- C. McDonald – Series 74606B-22 for Single Services
- D. McDonald – Series 74604BF/74644BF used with U Branch

28. U-Branch

- A. Ford – Series U41-43 for 1” Service
- B. Ford – Series U48-63 for 1 ½” Service
- C. McDonald – Series 08U2M for 1” & 1 ½” Services

29. Potable Service Saddles (Double Strap Brass Only) - “Iron Pipe Thread Only”

- A. Ford – Series 202B
- B. McDonald – Series 3826
- C. Mueller – Series BR2B
- D. Smith-Blair – Series 325

30. Polyethylene Tubing (PE 3408 IAW AWWA C901, SDR 9) (CTS) water services 1-2”

- A. Endot ENDOPOLY PE 4710 HDPE Black Tubing

31. Stainless Steel Stiffening Inserts for HDPE CTS Tubing (up to 2”)

- A. Ford 50 – Series (51, 52, 54, 55)
- B. McDonald – Series 6133T (3/4, 1, 1 ½, 2)

32. Conflict Manhole, Air Release Manhole or Offset Air Release Manhole Frame and Cover

- A. U.S. Foundry AHS or AHD (H-20) – landscape areas
- B. Bilco J or JD (H-20) – landscape areas
- C. U.S. Foundry Double Lid Offset Manhole Cover (690-AH-M) Type “A” - roadway

33. High Density Polyethylene Pipe (HDPE), greater than or equal to 3”

- A. CP Chem – Performance Pipe
- B. JM Manufacturing Company
- C. WL Plastics
- D. Flying W Plastics
- E. ENDOT
- F. Charter Plastics

34. HDPE/DIP Electro-Fusion Couplings and Fittings

- A. GF/Central Plastics Company
- B. Ipex Friatec
- C. Integrity Fusion Products

35. HDPE/DIP MJ Adapter

- A. Improved Piping Products, Inc.
- B. GF/Central Plastics Company
- C. Integrity Fusion Products
- D. Specified Fittings

36. Stainless Steel Stiffening Inserts for HDPE Pipe Restraint, greater than or equal to 3”

- A. Cascades
- B. JCM 231

37. Open-Cut Tracer Wire (Service or Main)

- A. Solid wire 10 gauge

38. Directional Drill Tracer Wire (APWA Color Coded-Blue) AWG 12

- A. Copperhead 1245 EHS
- B. Pro-Line Products Protrace HDD-CCS PE45

39. Automatic Flushing Assembly

- A. Hydro-Guard HG-1 – Mueller
- B. Hydro-Guard HG-6 Hydrant Based Flushing System – Mueller

40. Permanent Sample Point

- A. Kupferly Foundry, Eclipse No. 88 WC-SS

41. Paint for Buried DIP Pipe

- A. Induron Aquanaut (Color: Alaskan Blue) Min. 8 mils WFT, Min. 3 mils DFT

**42. Coating Specifications for Exposed Ductile Iron Pipe
(Water Mains: Blue - Fire Lines: Safety Red)**

- A. Tnemec
 - I. Omnithane – Series 1 - 3.0 mils per coat
 - II. Endura Shield II – Series 1075U - 2.5 mils per coat
 - III. Hi-Build Epoxoline – Series 66 – 4.0 mils

Primer coat and second coat to be two completely distinct colors as required to clearly differentiate each coat applied.

Surface must be sandblasted as required per paint manufacturers specifications.

**43. Coating Requirement for Underground Concrete Structures
(Bottom of Structure is required to be coated)**

- A. Kop-Coat – 300M
- B. Florida Liners Protectar 150
- C. MAB Coal Tar Epoxy
- D. Protech A & B

44. Air Release Valves – 1” Minimum (Water)

- A. A.R.I. USA Inc.- Automatic Air Release Valve – S-050

45. Casing Spacers

- A. Cascade Waterworks – Stainless Steel

46. Two Inch (2”) Terminal Blow off Box

- A. CDR Systems Corp. – 11” X 17” flared wall Series Box – WB03-1118-12 with Optional Bolt/down Cover Marked Water

47. Potable Service Backflow Prevention RPZ (must be USC certified & lead free)

- A. Zurn/Wilkins ¾”-2” (975XL2) 3” or larger (375)
- B. Ames 3” or larger (Colt 400)
- C. Watts ¾”-2” (LF919), (LF909) or (LF009) 3” or larger (957)
- D. Conbraco ¾”-2” (RPLF4A) 3” or larger (RPLF4A)

48. Fire Main Backflow Prevention RPZ w/bypass (must be USC certified & lead free)

- A. Ames 3" or larger (Colt 500)
- B. Watts 3" or larger (957 RPDA)
- C. Zurn/Wilkins 3" or larger (375DA)
- D. Conbraco 3" or larger (RPDA40)

49. Water Meters

- A. Badger

50. Water Meter Boxes (CDR Flared Wall)

- A. Single meter up to and including 1" (11"x17")
- B. Double 5/8"x3/4" meter (15"x17")
- C. Single meter 1 1/2" to 2" (17"x30")

51. Three Inch (3") and Larger Water Meter Vault Hatch

- A. USF AHS or AHD (H-20)
- B. Bilco J or JD (H-20)

52. Root Barrier

- A. Century Root Barrier Panels CPU 48-2

53. Marking Tape for PVC Mains (Detectable Mylar tape 6" wide/2" lettering with applicable coloring)

- A. Magnatec by Thor Enterprise
- B. T. Christy Enterprise – TA-TD-6-BRFM
- C. Proline
- D. Presco

54. Electronic Marker

- A. Scotchmark Electronic Markers (3M) No. 1252 (Blue)
- B. EMS 1403 Water XR 3M (Blue) Balls
- C. 3M wagon wheel

55. Above Ground Utility Markers

A. Canal Crossings

- I. Rocal, Inc. – RI-UPLPBC 12-6

B. Miscellaneous Locations

- I. Rhino Marking & Protection Systems, Inc. – Triview Marker Post, color coded with decals
- II. Rhino Marking & Protection Systems, Inc. – Rhino 3-Rak (66"), color coded with decals

SEWER

1. Ductile Iron Pipe (Submit only one (1) manufacturer per project)
(Pipe shall be color coded with green paint)

- A. American
- B. U.S. Pipe
- C. McWane

I. Force Main:	<u>Pipe Size</u>	<u>Special Thickness Class</u>
	4" to 12"	51
	14" to 36"	52
II. Gravity Main:	4" to 12"	51
	14" to 36"	52

Pipe must be ceramic epoxy lined with "PROTECTO 401", or "PERMITE 9043 type 2" or Permax CTF. The lining must be factory applied and warranted by the pipe manufacturer. Toruseal or Flange-Tyte gaskets are required for flanged pipe.

Approved Fabricators for "Flanged" pipe:

- *ASAP Fabrication, Inc. (1-813-752-1999)*
- *Custom Fab, Inc. (1-407-859-3954)*
- *US Pipe Fabrication Inc. (1-800-950-8525)*

Note: *The Fabricators must use pipe supplied by approved manufacturers.*

3. Mechanical Joint Pipe (Submit only one (1) manufacturer per project)
(Pipe shall be color coded with green paint)

- A. American
- B. U.S. Pipe
- C. McWane

I.	Force Main:	<u>Pipe Size</u>	<u>Special Thickness Class</u>
		4" to 12"	51
		14" to 36"	52
II.	Gravity Main:		
		4" to 12"	51
		14" to 36"	52

Pipe must be ceramic epoxy lined with "PROTECTO 401", or "PERMITE 9043 type 2" or Permax CTF. The lining must be factory applied and warranted by the pipe manufacturer. Toruseal or Flange-Tyte gaskets are required for flanged pipe.

Approved Fabricators for "Flanged" pipe:

- *ASAP Fabrication, Inc. (1-813-752-1999)*
- *Custom Fab, Inc. (1-407-859-3954)*
- *US Pipe Fabrication Inc. (1-800-950-8525)*

Note: *The Fabricators must use pipe supplied by approved manufacturers.*

4. Mechanical Joint (AWWA/ANSI) Class 153 Compact

(Submit only one (1) manufacturer per project)

A. Tyler/Union

B. Star*

C. Sigma*

**will be approved on a project by project basis only*

*Fittings must be **Ductile Iron** and epoxy lined*

Fittings must be ceramic epoxy lined with “PROTECTO 401”, or “PERMITE 9043 type 2” or Permox CTF. The lining must be factory applied and warranted by the pipe manufacturer.

5. Flange Fittings (AWWA/ANSI) Class 110 Full Body

A. Tyler/Union

B. Star*

C. Sigma*

**will be approved on a project by project basis only*

*Fittings must be **Ductile Iron** and epoxy lined*

Fittings must be ceramic epoxy lined with “PROTECTO 401”, or “PERMITE 9043 type 2” or Permox CTF. The lining must be factory applied and warranted by the pipe manufacturer. Toruseal or Flange-Tyte gaskets are required for flanged pipe.

6. Mechanical Joint Fitting Restraint for Ductile Iron

- A. EBAA Megalug – Series 1100
- B. Sigma One-Lok – Series D-SLDE
- C. Star Pipe Products Stargrip – Series 3000D
- D. EBAA IRON Series 1100 SD – if split ring required for existing pipe
- E. Sigma One-Lok SLCE – if split ring is required for existing pipe.

7. Mechanical Joint Fitting Restraint for PVC Pipe

- A. EBAA Megalug – Series 2000PV
- B. Sigma One-Lok – Series D-SLCE
- C. Star Pipe Products – Series 4000D
- D. EBAA IRON Series 1600 TD – if split ring required for existing pipe
- E. Sigma PV Lok Series PWH

8. Mechanical Joint Restraining Devices for DIP (Bell Restraint)

- A. EBAA – 1600 TDSS
- B. Sigma – PV-Lok Model PWP (304 S.S. Nuts & Bolts)

9. Mechanical Joint Restraining Devices for PVC (Bell Restraint)

- A. EBAA – 1600 TDSS
- B. Sigma – PV-Lok Model PWP (304 S.S. Nuts & Bolts)

10. Mechanical Joint Follower Glands (Bolts, Gaskets, Nuts)

- A. Tyler
- B. Star*
- C. Sigma*

** will be approved on a project-by-project basis only*

11. Resilient Seat Gate Valves

- A. Mueller – Series A2361
- B. Clow – Series F6100
- C. American – Series 2500

12. Flanged Check Valves

- A. Mueller – Series A2361
- B. Clow – Series F6100
- C. American – Series 2500

13. Lift Station Cam-Loks (aluminum)

- A. Dixon

14. Valve Stem Extensions (with centering plate and set screw at bottom) material to be aluminum or galvanized

- A. U.S. Fabricators – submit shop drawing for approval
- B. Raptor – submit shop drawing for approval
- C. Proselect – submit shop drawing for approval

15. Plug Valves (gear operated)

- A. Dezurik
- B. Milliken – Series 600 or 601

16. Tapping Sleeve – Mechanical Joint (DIP) (Ceramic Epoxy Lined P-401)

(Allowed when tapping existing DIP or C-900 PVC Mains)

- A. American – Series 2800
- B. Mueller – Series H-615
- C. Tyler

17. Tapping Valves (AWWA C509, C515, Ductile Iron Body)

- A. American – 2500 TM
- B. Mueller – T-2361 or T-2362

18. Line Stop Tapping Sleeve

- A. JCM 440
- B. Smith-Blair 680
- C. If a specific tapping company has been selected to perform tap, submit shop drawing of the tapping sleeve for approval.

19. Sanitary Service Saddles (Double Strap S.S. Only) – “Iron Pipe Thread Only”

- A. Mueller – DR2S
- B. Ford – FC202 Epoxy base with S.S. Straps
- C. Romac – 202 NS Nylon base with S.S. Straps
- D. Smith-Blair – Series 317 Epoxy base with S.S. Straps

20. Valve Boxes

- A. Tyler
- B. Bingham/Taylor

21. Valve Box Extensions

- A. Tyler
- B. Bingham/Taylor
- C. C-900 PVC

22. Sanitary Manhole Frame and Cover

- A. U.S. Foundry 420-C-ORS Series Ring
- B. U.S. Foundry 465-B-ORS Ring with Type A (4” only)

23. Conflict Manhole, Air Release Manhole or Offset Air Release Manhole Frame and Cover

- A. U.S. Foundry AHS or AHD (H-20) – landscape areas
- B. Bilco J or JD (H-20) – landscape areas
- C. U.S. Foundry Double Lid Offset Manhole Cover (690-AH-M) Type “A” - roadway

24. Manhole Adjusting Rings – (Max. 4” on existing structures only)

- A. U.S. Foundry Adjusting Ring – Type A
- B. U.S. Foundry Adjusting Ring – Type B
- C. RELL Corp. – Custom Manhole Risers

25. Manhole Inflow Protectors (To be furnished on a case by case basis)

- A. Southwest Packing & Seals Inc. – Rain Stopper PBC-1
- B. L.F. Manufacturing Inc. Rain Guard LFN-SV

26. Sanitary Cleanout Handhold Ring and Cover

- A. USF 7610 – Roadway and Landscape Areas

27. Sanitary PVC Fittings (SDR-26)

- A. Harco
- B. Plastic Trend
- C. TIGRE-ADS USA
- D. Multi Fittings

28. Sanitary PVC Fittings (C-900)

- A. Harco – Inside and outside drop applications

29. Sanitary Manhole – PVC sanded manhole adapters

- A. Harco
- B. Specified Fittings
- C. GPK

30. High Density Polyethylene Pipe (HDPE)

- A. CP CChem – Performance Pipe
- B. JM Manufacturing Company
- C. WL Plastics
- D. Flying W Plastics
- E. ENDOT
- F. Charter Plastics

31. HDPE/DIP Electro-Fusion Couplings and Fittings

- A. Central Plastics Company
- B. IPEX Frigate
- C. Integrity Fusion Products

32. HDPE/DIP MJ Adapter

- A. Improved Piping Products, Inc.
- B. Central Plastics
- C. Integrity Fusion Products
- D. Specified Fittings

33. Stainless Steel Stiffening Inserts for HDPE Pipe Restraint

- A. Cascades
- B. JCM 231

34. Cured in place pipe (CIPP)

- A. Insituform
- B. Manufactured Technologies Corporation (MTC)
- C. Global Materials Company, Global Liner-S

35. Open Cut Tracer Wire (Lateral or Main)

- A. Solid wire 10 gauge

36. Directional Drill Tracer Wire (APWA Color Coded-Green) AWG12

- A. Copperhead 1245 EHS
- B. Pro-Line Products Protrace HD-CCS

37. Coating Specifications for Exposed Ductile Iron Pipe (Force Mains – Safety Green)

- A. Tnemec
 - I. Omnithane - Series 1 - 3.0 mils per coat
 - II. Endura Shield II - Series 1075U - 2.5 mils per coat
 - III. Hi-Build Epoxoline - Series 66 - 4.0 mils

Primer coat and second coat to be two completely distinct colors as required to clearly differentiate each coat applied.

Surface must be sandblasted as required per paint manufacturers specifications.

38. Coating Requirement for Underground Concrete Structures

- A. Kop-Coat – 300M
- B. Florida Liners Protector 150
- C. MAB Coal Tar Epoxy
- D. Protech A & B

39. Coating Specifications for Drop Manholes, Wet Well and Valve Vault Interiors (SewperCoat, Strong-Seal or Refratta are required on Lift Station interior, check valve and plug valve vault interior, Terminal Manholes and all drop manholes-inside and outside). Depending on the existing condition of any manhole to be refurbished, all products are options and will be selected by the department on a case by case basis.

- A. SewperCoat – PG
- B. Refratta
- C. Spectrashield
- D. Raven
- E. Strong-Seal – High Performance Mix

40. Air Release/Vacuum Valve – 2” Minimum (Wastewater)

- A. A.R.I. USA Inc. – Air and Vac Valve – SP-AD025P
- B. H-Tec 986 Stainless Steel

41. Casing Spacers

- A. Cascade Waterworks – Stainless Steel

42. Grease Trap Manhole Ring & Cover

- A. U.S. foundry – 107E Series or Approved Equal – marked “GREASE”

43. Root Barrier

- A. Century Root Barrier Panels CPU 48-2

44. Marking Tape for PVC Mains (Detectable Mylar tape 6” wide/2” lettering with applicable coloring)

- A. Magnatec by Thor Enterprise
- B. T. Christy Enterprise – TA-TD-6-BRFM

45. Electronic Marker

- A. Scotchmark Electronic Markers (3M) No. 1252 (Green)
- B. EMS 1404 Sewer XR 3M (Green) Balls
- C. 3M wagon wheel

46. Above Ground Utility Markers

A. Canal Crossings

- I. Rocal, Inc. – RI-UPLPBC 12-6

B. Miscellaneous Locations

- I. Rhino Marking & Protection Systems, Inc. – Triview Marker Post, color coded with decals
- II. Rhino Marking & Protection Systems, Inc. – Rhino 3-Rak (66”), color coded with decals

CROSS-CONNECTION CONTROL



Village of Wellington

MANUAL FOR CROSS-CONNECTION CONTROL

**Prepared by:
Village of Wellington
Utilities Department**

**Approved by:
Village of Wellington Council**

**Re: Ordinance 2000-01 – May 1999
Addendum: Ordinance 2002-09 – May 2002**

Table of Contents

Section	Title	Page
	REGULATIONS FOR CROSS-CONNECTION CONTROL	
	Introduction	1
	Purpose	1
	History	1-2
1	Responsibilities	
	1.1. The Village of Wellington Utilities Department	3
	1.2. The Consumer	3
2	Definitions	
	2.1. The Village of Wellington Utilities Department	4-7
3	Rules and Regulations Governing Cross-Connection Control	
	3.1. Protection of the VOW Water Supply System	8
	3.2. Results of Non-Compliance	8
	3.3. Termination of Service	8
	3.4. Hazard Review Process (within VOW limits)	9
	3.5. Hazard Review Process (outside VOW limits)	9
	3.6. Effected Facilities	9
	3.7. Exterminating Companies	9
	3.8. Construction Sites	10
	3.9. Installations Requiring Continuous Service	10
	3.10. Miscellaneous Uses of Water from Fire Hydrants	10
4	Procedures	
	4.1. Existing Facilities	11
	4.2. New and Expanded or Remodeled Facilities	11-12
	4.3. Emergency Procedures	12
	4.4. Certification of Backflow Prevention Assembly Testers	12-13

Table of Contents

Section	Title	Page
4.5.	Installation of Backflow Prevention or Assemblies on Existing and New Facilities	13
4.6.	Records	13
4.7.	Notification	13
4.8.	Fees	14
5	Maintenance	
5.1.	Annual Testing	15
5.2.	Inspections	15
5.3.	Repairs	15-16
	APPENDICES	
A.	Ordinance No. 2000-01 and Addendum No. 2002-09	
B.	Violations	
C.	Notification Letter	
D.	Second Notice - Backflow Assembly Requirements	
E.	Disconnection Notice - Backflow Assembly Requirements	
F.	Annual Backflow Testing Notice	
G.	Second Notice - Annual Backflow Testing	
H.	Final Notice Disconnection Notice - Backflow Testing Overdue	

REGULATIONS FOR CROSS-CONNECTION CONTROL

INTRODUCTION

A cross-connection is defined by the American Water Works Association (AWWA) as "any connection or structural arrangement between a public or a consumer's potable water system and any non-potable source or system through which backflow may occur." Backflow, literally a reversal in the normal direction of water flow within the Utility water system, is what causes a cross-connection to become a health hazard. Consequently, either cross-connections or the chance of backflow must be reduced to prevent these "potential hazards" from degrading the high quality of water the Village of Wellington (VOW) strives to maintain.

PURPOSE

The purpose of a cross-connection control program is to prevent waterborne diseases and contaminants from entering the distribution system. Specifically, the program is intended to prevent delivered water potable water that has passed beyond the public water system and into the private distribution systems of consumers from re-entering the public distribution system and being delivered to other consumers. The program aims to protect VOW and its consumers from those water-using establishments that could possibly harm the quality and safety of VOW's water supply through backflow and/or cross-connections.

HISTORY

Initially, the primary responsibility for safeguarding water quality on private property was left to local health agencies and building and inspection departments. As a result of the passage of the Safe Drinking Act into law by Federal guidelines in December 16, 1974, a chain of regulations has evolved that resulted in the State requirement (Florida Safe Drinking Water Act, Sections 403.850-403.864, Florida Statutes) for all the public water systems to have a cross-connection control program. Contained within the Rules of the Department of Environmental Protection (FDEP), Chapter 17-555, the State of Florida, on January 18, 1989, adopted the following policy:

"Community water systems shall establish a routine cross-control program to detect and prevent cross-connections that create or may create an imminent and substantial danger to public health. Such program shall be developed using accepted practices of the AWWA guidelines as set forth in AWWA manuals M14, *Backflow Prevention and Cross-Connection Control*. Upon discovery of a prohibited cross-connection, public water systems shall either eliminate the cross-connection by installation of an appropriate backflow prevention device acceptable to the Village or shall discontinue service until the contaminant source is eliminated:"

In compliance with this mandate and in order to safeguard our potable water supply, this manual, titled *Village of Wellington Manual for Cross-Connection Control*, has been adopted by VOW Council pursuant to Ordinance No. 2000-01 and represents the policies and requirements of VOW.

We urge you to acquaint yourself with the policies and information presented with these Regulations. It is only through education and a commitment of the consumers we serve, that we can control the hazards presented by cross-connections within our public drinking water supply. VOW stands behind this policy and its enforcement and will offer assistance to all who share the responsibility of promoting safe drinking water standards.

SECTION 1

RESPONSIBILITIES

1.1. The Village of Wellington Utilities Department

VOW, as authorized by Ordinance No. 2000-01 adopted by the VOW Council, is primarily responsible for adopting policies and regulations to prevent contamination or pollution of our potable water supply system by instituting a program of Cross-Connection Control. Such regulations shall control cross-connections to VOW's water system and the consumers' private water system. The Utilities Department of VOW is responsible for the administration of the policies and regulations adopted by the VOW Council. The required consumer supplied backflow prevention assembly at the service-connection shall be installed by the consumer as directed by the Utilities Director or his/her designee.

1.2. The Consumer

The consumer has the responsibility for (a) protecting both the potable water in their own system from degradation due to conditions originating on their premises; and (b) protecting the quality of water in the VOW water supply/system against any potential or actual health hazard(s) generated on or from their premises through uncontrolled cross-connections by the installation of backflow prevention assemblies at the service connection. The consumer is then responsible for the costs of procurement, installation, testing, repair, and maintenance of said assembly.

SECTION 2

DEFINITIONS

Air-Gap Separation

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 vessel with a minimum distance of one (1) inch.

Approved

Accepted by the Director of the Utilities Department or his designee as meeting an applicable specification of the Utilities Department.

Assembly

One that is capable of being tested.

Auxiliary Water Supply

Any water supply on or available to the premises other than the consumer's approved public potable water supply. These auxiliary waters may include water from a private potable or 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 purveyor does not have sanitary control.

AWWA

American Water Works Association.

Backflow

The undesirable reversal of flow of water or mixtures of water and other liquids, gases or other substances into the distribution pipes of the Village of Wellington potable water supply from any source (s) other than its intended source.

Backflow Prevention Assembly

An approved assembly, method, or construction used to prevent backflow into a potable water system. The type of assembly used shall be based on the degree of hazard, either existing or potential.

Double Detector Check Valve Assembly

An assembly of two independently operating approved Double Detector Check Valve Assemblies, plus properly located test cocks for the testing of each check valve and an approved water meter incorporated within the assembly for detection of leaks, and unauthorized use of water.

Dual Check Valve

A device containing two independently acting spring loaded check valves with a bronze body.

Pressure Vacuum Breaker Assembly

An assembly containing an independently operating loaded check valve and an independently operating loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with properly test cocks and, tightly closing shut-off valves located at each end of the assembly.

Reduced Pressure Principle Assembly

An assembly containing within its structure a minimum of two independently acting approved check valves, together with an automatically operating pressure differential relief valve located between the two check valves. The first check valve reduces the supply pressure a predetermined amount so that during normal flow and at cessation of normal flow the pressure between the checks shall be less than the supply pressures. In case of leakage of either check valve, the differential relief valve, by discharging to atmosphere, shall operate to maintain the pressure between the checks less 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.

Reduce Pressure Detector Assembly

An assembly of two independently operating approved Reduced Pressure Principle Assemblies, plus properly located test cocks for the testing of each valve and an approved water meter incorporated within the assembly for detection of leaks, and unauthorized use of water.

Backflow Prevention Device Assembly Approved

The term approved backflow prevention assembly/device shall mean an assembly/device that has met the requirements of the following standards:

USC – FCCC	University of Southern California Foundation for Cross-Connection Control and Hydraulic Research
Village (VOW)	Village of Wellington

Contamination

An impairment of the quality of the potable water by any solid, liquid, gaseous compounds or mixtures to a degree, which would create an imminent danger to the public health, or would create an unacceptable taste, odor or color to the potable water.

Cross-Connection

Any physical arrangement, whereby VOW's 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. Bypass arrangements, jumper connections, removable sections, swivel or changeable devices through which or because of which backflow could occur are considered to be cross-connections.

Health Hazard

Health hazard shall mean an actual or potential threat of contamination or pollution of a physical or toxic nature to the public potable water system or the consumer's potable water system to such a degree or intensity that there would be a danger to health.

Industrial Fluids System

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, conduits, tanks, receptacles, fixtures, equipment and appurtenances to produce, convey or store substances, which are or may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a hazard if introduced into VOW's water system. This may include, but not be limited to, polluted or contaminated waters; all types of processed water and "used water" originating from the public water system which may have deteriorated in sanitary quality; chemicals in fluid form; plating acids or alkalies; circulated cooling towers that are chemically or biologically treated or stabilized with toxic substances; contaminated natural waters such as from wells, springs, streams, rivers, irrigation canals or systems, etc.; oils, gases, paraffin, caustic, and acid solutions and other liquids and gaseous fluids used in industrial or other purposes or for fire-fighting purpose.

Pollution

The presence of any foreign substance (organic, inorganic, or biological) in the water system which tends to degrade its quality so as to constitute a hazard or impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health, but which does adversely and unreasonably effect such waters for domestic use.

Water - Non-Potable

Water that is not safe for human consumption.

Water - Potable

Water, which according to recognized standards is safe for human consumption.

Water Purveyor

The owner or operator of the public potable water system supplying an approved water supply to the public. As used herein, the terms water purveyor and VOW's Utilities Department may be used synonymously.

Water System - Consumer's

The term consumer's water system shall include any water system located on the consumer's premises, whether supplied by a public potable water system or an auxiliary water supply. The system or systems may be either a potable water system or an industrial fluids system.

Water - Service Connections

The terminal end of a service connection from the public potable water system; i.e., where the water purveyor loses jurisdiction and sanitary control over the water at its point of delivery to the consumer's water system. Where 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 takeoffs from the service line ahead of any meter or backflow prevention device located at the point of delivery to the consumer's water system. Service connections shall also include water service connections from a fire hydrant and all other temporary or emergency water service connections from the public water system.

Water - Used

Any water supplied by a water purveyor from a public potable water system to a consumer's water system after it has passed through the point of delivery and is no longer under the sanitary control of the water purveyor.

SECTION 3
RULES AND REGULATIONS GOVERNING
CROSS-CONNECTION CONTROL

3.1. Protection of the VOW Water Supply System

In order to protect VOW's public water supply system from contamination due to cross-connections, no private potable water supply piping or part thereof shall be connected to VOW's public water system. This includes any method where it will be possible for used, unclean, polluted or contaminated water, mixtures, or substances to enter any portion of such piping from any tank, receptacle, equipment, plumbing fixture, or any portion of a consumer's water system. This may occur by reason of back-siphonage or back-pressure, either during normal use and operation thereof when any such tank, receptacle, equipment or plumbing fixture is flooded, or subject to pressure in excess of the potable water supply pressure, unless there is provided an approved backflow prevention assembly. The approval of VOW Utilities Department must be obtained before any connection is made between the domestic supply and any contaminated polluted or auxiliary water system.

3.2. Results of Non-Compliance

Any person failing to comply with this program or part hereof shall be deemed to be in non-compliance and service of potable water to any premise shall be subject to being disconnected by VOW if a backflow assembly, as required by these rules and regulations, is not installed, tested and maintained; or if it is found that a backflow prevention assembly has been removed or bypassed, or if unprotected cross-connections exist on the premises and there is inadequate backflow protection at the service connection. Water service will not be restored until such conditions or defects are corrected. All applicable charges, as contained in VOW's Customer Service Manual, including turn-off and service charges and inspection fees, shall be paid by the Consumer.

3.3. Termination of Service

In emergency conditions, when the public water supply is being contaminated or is in immediate danger of contamination, water service shall be disconnected immediately by VOW Utilities Department without notification.

Where a violation of this policy exists, but where the situation does not constitute an emergency condition, the water service shall be disconnected if the consumer has been duly notified of the violation and has not corrected the problem within a specified time period.

3.4. Hazard Review Process (within VOW limits)

VOW Planning, Zoning and Building (PZ&B) Department shall notify VOW Engineering Department when building plans are received to review them not only for water and sewer service, but also for backflow prevention requirements. Plans are reviewed for the type of assembly, manufacturer, size, and location. The VOW Engineering Department will sign off as accepted or, if changes are needed, they are noted on the plan review comment sheet and sent back to PZ&B Department to be returned to the consumer for changes and re-submittal. Failure to comply with these requirements shall be a violation of this program, and deemed to be in non-compliance.

3.5. Hazard Review Process (outside VOW limits)

VOW Engineering Department or other appropriate department conducting building plan reviews for any municipality, which are serviced by VOW, shall be responsible for its review of water and sewer service, including the requirement for the installation of backflow prevention assemblies. Plans shall be reviewed for the type of assembly, manufacturer, size, and location. All applicants submitting plans for development outside VOW limits shall comply with the Standards, policies, and procedures of VOW Water and Sewer System, including the provisions of the Manual. Failure to comply with these adopted standards, policies and procedures shall be a violation of this program and deemed to be in non-compliance.

3.6. Effected Facilities

Plan review as defined in Sections 3.4. and 3.5. of these regulations, shall be performed for all new commercial, industrial, institutional, single, and multifamily facilities at the time of application for the Building Permit. Existing commercial, multifamily and other residential customers with existing wells or alternate water sources available to their property, irrigation systems, or any who are considered of possibly having a cross-connection to VOW's public water system shall also be reviewed by the Utilities Department and shall install the appropriate backflow prevention assembly as directed by the Utilities Director or his/her designee.

3.7. 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 a reduced pressure principle assembly backflow preventer on the fill line. All filling locations must be approved by VOW Utilities Department. All rates, fees, and charges as contained in VOW's Customer Service Manual shall apply.

3.8. Construction Sites

All construction sites using VOW's potable water system shall have backflow prevention assemblies installed as directed by the Utilities Director or his/her designee.

3.9. Installations Requiring Continuous Service

The testing of backflow prevention assemblies requires that the water service to the facility be shut down for approximately ten (10) to forty (40) minutes. For facilities that require continuous uninterrupted water service, and where it is not possible to provide service from two separate meters, provisions shall be made for a "parallel installation" of backflow prevention assemblies.

VOW Utilities Department will not accept an unprotected bypass around a backflow prevention assembly.

3.10. Miscellaneous Uses of Water from Fire Hydrants

The operation of fire hydrants by other than authorized personnel, as determined by VOW Utilities Department, is prohibited. The Utilities Department may permit the use of water from a fire hydrant for construction or other purposes provided the applicant properly applies for a hydrant meter through the Utilities Department Customer Services Division and adheres to the backflow prevention assembly requirements.

Note:

Any assembly, equipment, or situation not covered by this cross-connection policy where water is connected or used, which may constitute a potential health hazard, will be handled at the discretion of the VOW Utilities Department Director or his/her designee.

SECTION 4

PROCEDURES

4.1. Existing Facilities

- A. All premises where cross-connections are likely or have a potential of occurring, shall be surveyed by VOW Utilities Department to determine if a detailed inspection will be required.
- B. The owner/consumer of an identified premise shall be notified at least thirty (30) days in advance to secure an appointment for inspection of the premises. If the facility is deemed to be in an emergency situation, Emergency Procedures, as outlined in Section 4.3. of these regulations, shall be followed. The owner/consumer or his authorized representative shall accompany the Utilities representative during the inspection of the premises.
- C. An inspection form will be completed by the Utilities representative and signed by the owner/consumer or his representative. The owner/consumer shall be made aware of any corrective measures that need to be made.
- D. A letter of notification shall be sent to the owner/consumer indicating what corrective measures must be taken, type of device or assembly, which needs to be installed and time limit for the installation.
- E. Upon conformance to the requirements in the notification letter, the owner/consumer shall immediately notify VOW Utilities Department to schedule a date for re-inspection.
- F. If the owner/consumer does not conform to the requirements of this regulation after notification, water service will be discontinued in accordance with the policies established herein.

4.2. New and Expanded or Remodeled Facilities

- A. Each applicant for commercial or multifamily water service will be required to comply with Section 3.4. and 3.5. of these regulations.
- B. Applicants for water service to new single-family residences shall be reviewed for possible or potential cross-connections to VOW's Water system, and if such possible conditions exist, shall be subject to Sections 3.4. and 3.5. of these regulations.
- C. If VOW determines that a potential cross-connection exists, the Utilities Department shall make a determination as to whether the possibility of a hazard exists. Such determination shall utilize AWWA standards as minimum guidelines, and may require a specific type of backflow prevention assembly be provided for the premises.

- D. The Utilities Department may notify the new applicant for water service in writing and arrange a meeting to discuss the requirements for backflow prevention. Procedures for inspection of the backflow prevention assembly will be discussed at this meeting.
- E. The Utilities Department shall provide a letter notifying the applicant for water service what backflow measures must be taken. In the alternative, the requirements will be noted on the plan review comment sheet indicating what backflow prevention measures must be taken.

4.3. Emergency Procedures

In the event that a cross-connection is discovered or a water meter is found running backwards, VOW water system shall be assumed to be in imminent danger of contamination and VOW shall use the following procedures:

1. Shut off water to the premises and if possible remove the water meter.
2. The Water Treatment Facility Control Room will be notified.
3. The Control Room will immediately send units to the area to confirm the area as contaminated, and isolate the water system within the area.
4. The Control Room will then notify the Water Treatment Supervisor, Customer Service and VOW Lab at the Water Treatment Plant.
5. VOW Lab shall take water samples at various stations within and outside the isolated area of the water system to determine the extent of the contamination.
6. The Supervisor will notify the Department of Health and Rehabilitation Services and the Department of Environmental Protection.
7. The Utilities Department shall begin flushing all nearby fire hydrants and blow-offs within the affected area.
8. Service shall be returned to the affected area upon clearance notification from the VOW Laboratory.

Water Service to a cross-connection WILL NOT BE RESTORED until the contaminated source is either removed or safely protected by an approved backflow prevention assembly.

4.4. Certification of Backflow Prevention Assembly Testers

A person, wishing to be certified as a Backflow Prevention Device Tester, must have attended and successfully completed an approved comprehensive training program and passed an AWWA approved examination.

All individuals desiring to test their Backflow Prevention Devices within VOW Utilities Department's service area must be a Certified Plumber, and have an up-to-date copy of their backflow testing and repair certification on file with the Utilities Department. It is the responsibility of the individual to make sure the Utilities Department is in possession of their current certification. A copy of a current VOW occupational license is also required.

4.5. Installation of Backflow Prevention or Assemblies on Existing and New Facilities

The Consumer or applicant for water service shall be responsible for the installation of the backflow prevention assembly if required by VOW. Installation of said assembly shall be in accordance with all ordinances, rules, and regulations of VOW.

After initial installation, the customer will notify the Utilities Department so that the assembly can be inspected by the Utilities Department. The Utilities Department shall also determine and affirm whether the backflow prevention assembly has been installed satisfactorily.

4.6. Records

All records of tests, inspections, surveys, and repairs will be kept on file by VOW Utilities Department. Records of backflow assemblies, containing location, type, size, use, model, manufacturer, serial number, etc., shall be cross-referenced with records of tests, inspections, surveys, and repairs.

4.7. Notification

- A. Assembly Required. A letter shall be sent to the Consumer allowing thirty (30) days to have backflow prevention assembly installed, tested and inspected. If on the thirty-first (31st) day, the Utilities Department *has* not received any notification for inspection by the Consumer, a second notice shall be sent giving the customer an additional twenty (20) days. A final notice shall be sent to the Consumer if still no notification for inspection is received. The final notice gives the customer ten (10) days to comply before disconnect occurs by the Utilities Department.
- B. Annual Inspection Required. Thirty (30) days before the test is due, a letter shall be sent to the Consumer giving them thirty (30) days from the date of the letter in which to have the test conducted by a Certified Backflow Prevention Assembly Tester and the passing results provided to the Utilities Department. If a favorable test *is* not received by the Utilities Department within twenty (20) days of notification, a second notice shall be sent to the consumer providing the consumer ten (10) days to have a test be performed with favorable results. If such notification is not received by the Utilities Department within that time period, a disconnection notice will be sent to the consumer notifying them of our intent to disconnect their service due to their failure to comply with this regulations, policies and procedures of this ordinance.

4.8. Fees

A one-time, non-refundable application fee, as set in the Utilities Fee Schedule, shall be paid at the time of application for Water Service.

An inspection fee shall be paid for each inspection required to ensure compliance with the Utilities Rules and Regulations governing the installation, operation and maintenance of backflow prevention or assemblies on new or existing facilities. The inspection fee shall be paid in accordance with the Utilities Fee Schedule.

SECTION 5

MAINTENANCE

5.1. Annual Testing

Annual testing shall be required on all backflow prevention assemblies. Testing is to be performed by a Certified Backflow Prevention Assembly Tester as defined in Section 4.4. of these regulations and as approved by VOW Utilities Department.

All backflow prevention assemblies shall be tested a minimum of once every twelve (12) months. If VOW Utilities Department determines that a backflow prevention assembly is being used in extremely high hazard applications or has a history of frequent failures, the Utilities Department may require the assembly be tested more often.

The first annual test shall be required of the owner/consumer twelve (12) months from the date VOW representative initially inspected the assembly upon installation. Subsequent tests shall be required every twelve (12) months thereafter. Upon notification by VOW, the owner/consumer shall have the required testing performed and the passing results returned within thirty (30) days of *said* notification, along with information on repairs made, to the Utilities Department.

5.2. Inspections

A. Potential Cross-Connection on Site Surveys

Duly authorized employees or agents for VOW shall be permitted to enter upon properties for the purpose of sampling or testing the potable water supply, or to make inspections or observations of connections to the potable water supply. If VOW Utilities Department is not permitted to make an inspection, the facility shall be required to install a Reduced Pressure Principle Assembly. Failure to install the required assembly shall constitute non-compliance of this program and potable water service shall be subject to discontinuance.

B. Inspection of Newly Constructed Facilities

Upon making application for water service and prior to connection to VOW's water system, the owner/consumer or their agent having obtained the appropriate building permit, shall have installed the correct backflow prevention assembly as determined by the Utilities Department; and shall have obtained an inspection by the Utilities Department representative.

5.3. Repairs

Any assembly failing any test shall be immediately repaired. Repairs are necessary to maintain the good working condition of the backflow prevention equipment. Repair of

said backflow prevention equipment shall be in accordance with the appropriate Federal, State, and Local governing authority's rules and regulations.

After repair of any assembly, the assembly shall be tested by a Certified Backflow Prevention Assembly Tester as defined in Section 4.4. of these regulations. Said tester shall determine and affirm to VOW Utilities Department the satisfactory repair and compliance of the backflow prevention assembly equipment.

The owner/consumer of a backflow prevention assembly that falls a test or does not meet the standards of this program must have the backflow prevention assembly repaired to meet the standards of this program. A test report submitted by a Certified Backflow Prevention Assembly Tester must be filed with the Utilities Department after the repairs or alternations have been made but within the time limits as stated in Section 5.1.

Test results report include and itemize ALL repairs that were made and that the assembly is in proper working order.

APPENDICES



Village of Wellington

**Approved by:
Village of Wellington Council**

ORDINANCE No. 2000-01



Village of Wellington

ADDENDUM
**MANUAL FOR CROSS-CONNECTION
CONTROL**

Approved by:
Village of Wellington Council

Re: Ordinance 2002-09 – May 2002

VILLAGE OF WELLINGTON
MANUAL FOR CROSS-CONNECTION CONTROL

ADDENDUM
ORDINANCE No. 2002-09

This document forms a part of the Village of Wellington's (VOW) Manual for Cross-Connection Control and modifies the original manual dated March 2002.

PURPOSE

VOW is implementing a Reclaimed Water System. With this addition, VOW is required to update their Cross-Connection Control Program to take into consideration the regulatory requirements applicable to a Reclaimed Water System. The following sections will supplement the existing Cross-Connection Control Program Manual.

SECTION 2

DEFINITIONS

Reclaimed Water

Treated wastewater effluent for irrigation purposes only. Reclaimed water is a non-potable water source that is not safe for human consumption.

SECTION 3

RULES AND REGULATIONS GOVERNING

CROSS-CONNECTION CONTROL

In addition to the requirements stipulated within VOW's Manual for Cross-Connection Control, the requirements outlined within the Florida Administrative code (Chapter 62-610.469 (7) and 62-555.360) will apply to the Reclaimed Water System Cross-Connection program.

SECTION 4
PROCEDURES

Guidelines

1. No Cross-Connections to potable water systems shall be allowed.
2. There shall be no reclaimed water entering a dwelling unit or a building containing a dwelling unit.
3. The maximum obtainable separation between a reclaimed water line and a potable water line shall be maintained in accordance with the following:
 - A. A minimum horizontal separation of three (3) feet (outside to outside) shall be maintained between reclaimed water lines and either potable watermains or sewage collection lines.
 - B. The minimum vertical separation between the top of the reclaimed water line and the bottom of a potable water line is 18 inches.
4. VOW shall adhere to their maintenance procedures (testing/inspection/repairs) for the reclaimed water system as outlined with Section 5 of the Manual for Cross-Connection Control.
5. VOW will not allow the return of reclaimed water back into the reclaimed water distribution system after the reclaimed water has been delivered.
6. All reclaimed water valves and outlets shall be tagged or labeled to warn the public and employees that the water is not intended for drinking. All tags or labels shall bear the words in English and Spanish: "DO NOT DRINK", (together with the equivalent standard international symbol).
7. All PVC reclaimed water-piping, valves and outlets shall be color-coded using Pantone Purple 522C.