



# DESIGN & CONSTRUCTION STANDARDS

March 13, 2014

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Available on the web at <http://www.lwwsd.org>

## TABLE OF CONTENTS

<b>CHAPTER 1</b>	<b>DRAWING STANDARDS .....</b>	<b>1-1</b>
1.1	Construction Drawings .....	1-1
1.2	Record Drawings .....	1-2
<b>CHAPTER 2</b>	<b>DESIGN STANDARDS .....</b>	<b>2-5</b>
2.1	Water Projects .....	2-5
2.2	Sewer Projects .....	2-6
<b>CHAPTER 3</b>	<b>CONSTRUCTION STANDARDS – GENERAL NOTES.....</b>	<b>3-8</b>
3.1	Construction Plan Notes .....	3-8
<b>CHAPTER 4</b>	<b>CONSTRUCTION STANDARDS - WATER SERVICES .....</b>	<b>4-9</b>
4.1	General Requirements .....	4-9
<b>CHAPTER 5</b>	<b>CONSTRUCTION STANDARDS - SEWER SERVICES .....</b>	<b>5-11</b>
5.1	General Requirements .....	5-11
5.2	Side Sewer Services into Gravity Mains.....	5-12
5.3	Pressure Side Sewer Services into Force Mains .....	5-13
<b>CHAPTER 6</b>	<b>CONSTRUCTION STANDARDS - DETAILS .....</b>	<b>6-15</b>

# CHAPTER 1      DRAWING STANDARDS

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## 1.1 Construction Drawings

### 1.1.1 Format and Content

Construction drawings for proposed public water and/or sewer facilities shall be prepared in accordance with the following drawing standards.

#### Format

- Drawings submitted for review: 50% reduced scale 11"x17" sheets
- Final drawings submitted for approval: full scale 24"x36" sheets
- Minimum text size 0.08" when plotted at full scale size.

#### Basic Drawing Elements

- North Arrow
- Scale Bar
- Legend (Clearly differentiate between existing and proposed features)
- Vicinity Map
- Overall Project Map
- Vertical Datum and Project Benchmark Information  
All projects in the District must be on the City of Bellingham Vertical Datum. Current conversions to USGS Datum shall be shown for the Geneva and North Shore areas, and conversions for the Sudden Valley assumed datum shall be shown for the Sudden Valley area.
- Horizontal Survey Reference Point Information  
Show bearing and distance information between survey reference points.
- Lake Whatcom Water and Sewer District General Notes. Water System Notes and/or Sewer System Notes as appropriate.
- Lake Whatcom Water and Sewer District Standard Details as applicable for type of improvements

#### Scale for Plan and Profile Drawings

- 1" = 20' horizontal in areas with existing utilities or improvements
- 1"=50' horizontal in areas with little or no existing utilities or improvements.
- 1"=2' or 1"= 5' or 1"=10' for vertical as appropriate

#### Topographic and Survey Information

- Right-of-way
- Easements
- Existing features and improvements
- Contour intervals of 1 or 2 feet as appropriate site and design

- Existing features and improvements such as pavement, concrete, gravel, sidewalks, curbs, utility poles, transformers, telephone pedestals, overhead and underground utilities.

#### Plans

- Proposed improvements clearly shown and noted
- Design alignment and stake out information. (Stationing, bearings, distances, and offsets)
- For water mains, lineal footage from water main fitting to fitting.
- For sewer mains, lineal footage between exterior faces of manholes.
- Pipe material type called out on each segment

#### Profiles

- All utility crossings with clearances noted.
- Distances from centerline of manhole to manhole
- Distances from exterior face of manhole to manhole
- Calculated slope between exterior face of manhole to manhole (actual pipe slope)
- Rim and invert elevations for existing and proposed manholes
- Trench dams shown

### **1.1.2 Plan Review Sets**

Submit two sets of 50% reduced scale 11"x17" drawings. If there are review comments, the District will return one redlined original set. For subsequent re-submittals, submit two sets of 50% reduced scale drawings.

### **1.1.3 Final Approval Sets**

Once all District review comments have been addressed, the District will request three full scale sets to stamp "Approved for Construction." The District will retain two sets and return one approved set.

## **1.2 Record Drawings**

### **1.2.1 Content**

Record drawings shall include the exact location of all water and sewer mains and services and the approximate location of all other underground and above ground utilities and shall include information listed below.

#### Basic Information

- Each drawing shall include "Record Drawing" boldly noted on each sheet.
- Line-out design text that has changed and note record information.
- Circle plan design elements that changed and show record information.

### Water Mains and Services

- Location of all vertical and horizontal bends in the water system. Stationing shall be along the length of the extension.
- Location of all water valves, hydrants, hydrant valves, and blow-offs with distance along centerline and distance from the centerline.
- Location of all utilities within easements. This includes distances to the utilities from the easement lines.
- Stationing of service taps on the main. Stationing shall be cumulative along the length of the extension.
- Distance from main to meter.
- Distance from tap to a point opposite (at 90 degrees) the meter along main, and station this point.
- Distance from this point on the main to the meter (distance 90 degrees).
- Depth of all services.

### Sewer Mains and Service Stubs

- Location of all sanitary manholes, inverts, valves and cleanouts on the sewer main.
- Location of all vertical and horizontal bends in the force main system.
- Location of all side sewer saddles on the sewer main from the back-station manhole.
- Stationing of all sewer wyes into the main, located from the back station manhole.
- Length of side service stub, lineal feet, and size of pipe.
- Distance along mainline from side sewer wye to where end equals 90 degrees from mainline.
- Distance from this point on the main to the end of stub. (distance 90 degrees).
- Depth of services at end of stub.
- Location of cleanouts on the sewer stub.

## **1.2.2 Construction Record Keeping**

All District projects must have full time inspection. A District Inspector will document and maintain construction asbuilt information. It is the Contractor's responsibility to ensure that the Inspector has all asbuilt information and measurements recorded prior to backfill of facilities.

## **1.2.3 Preparation**

A copy of the District inspector's notes and sketches will be given to the Engineer of Record for preparing the record drawings. For developer constructed facilities, the developer's engineer prepares and stamps the record drawings. For district constructed facilities, the District's consulting engineer prepares and stamps the record drawings.

## **1.2.4 Review and Submittal Format**

Submit one 50% reduced scale 11"x17" set to the District for review. Upon acceptance, the District will request final record drawings. Final records drawings include one set on Mylar, one set on paper, AutoCAD .dwg files, and an electronic PDF set.

### **1.2.5 Condition of Final Acceptance**

Final record drawings must be received and accepted by the District before final acceptance of the project by the Board of Commissioners.

## **CHAPTER 2      DESIGN STANDARDS**

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### **2.1    Water Projects**

#### **2.1.1    Minimum Design Requirements**

Minimum design criteria, unless the District criteria is more stringent, shall be in accordance with the current "Water System Design Manual", Washington State Department of Health and Washington Administrative Code Chapter 246-290 Public Water Supplies.

#### **2.1.2    Minimum Pipe Size**

Minimum pipe size for new or replaced water lines is eight (8) inches in diameter. Dead-end lines are only permitted where there is a cul-de-sac and where it is not possible to make a loop. Blow-offs or fire hydrants shall be installed at the end of a dead-end line.

#### **2.1.3    Comprehensive Plan Requirements**

Water system construction and reconstruction shall be done pursuant to a design that, when fully implemented, will provide the flow requirements of the District's Comprehensive Plan. Minimum pipe size shall be as identified by the District's Water Comprehensive Plan. A Latecomers agreement can be created if the sizing was in excess of that required by the Developer or Utility Local Improvement District.

#### **2.1.4    Minimum Allowable Pressure**

The minimum pressures allowed by the District at any time are 30 psi under peak hourly demand, or 20 psi under maximum day demand and fire flow combined.

#### **2.1.5    Increases in Flow Requirements**

When any new development increases the flow requirements, the Developer shall upgrade the existing water system to support the changes.

#### **2.1.6    Providing for Future Extensions**

Utilities shall be extended through the property to allow for future extension, expansion and continuation of the District's distribution system or for conformance with the Water Comprehensive Plan.

#### **2.1.7    Easements**

A minimum ten (10) feet of recorded easement must be provided on each side of the pipe, for a total width of twenty (20) feet.

### **2.1.8 Valves**

Valves shall be installed along the water main at intervals not to exceed 500 feet per NFPA 1142 G.7. Gate valves shall be placed at all junction points, such that there are valves on each leg of a tee (3 valves), or cross (4 valves).

### **2.1.9 Fire Hydrants**

Fire hydrants shall be installed every 600 feet.

### **2.1.10 Sampling Stations**

One sample station per zone is required for each new pressure zone. The District may require sample stations for new developments in existing pressure zones.

### **2.1.11 Separation from Sanitary Sewer**

Minimum separation of water mains and sanitary sewer lines shall be ten (10) feet horizontally for parallel pipe, and eighteen (18) inches vertically with water on top for perpendicular or oblique crossings, measured from the bottom of the water pipe to the crown of the sewer pipe. Situations occurring with less than the minimum separation as required shall be in accordance with Section C1-9.1 Required Separation Between Water Lines and Sanitary Sewers of the current edition of the "Criteria For Sewage Works Design" published by the Washington State Department of Ecology.

### **2.1.12 Pipe Slope and Air/Vacuum Release Valves**

Water mains shall be installed at an upward slope to a high point where a combination air/vacuum release valve shall be installed.

### **2.1.13 Water Booster Stations**

All public/District-owned water booster stations shall have at least two pumps.

## **2.2 Sewer Projects**

### **2.2.1 Minimum Design Requirements**

Minimum design criteria, unless the District criteria is more stringent, shall be in accordance with the current "Criteria for Sewage Works Design", State of Washington Department of Ecology.

### **2.2.2 Minimum Pipe Size**

Minimum pipe size for sewer gravity mains is eight (8) inches except that, in special cases, 6-inch diameter sewer lines may be approved by the District if they meet the Department of Ecology Guidelines for 6-inch sewer lines. Minimum size for side sewers shall be six (6) inches from main to property line. Minimum size pipe for force mains shall be four (4) inches.



### **2.2.3 Providing for Future Extensions**

Utilities shall be extended through the property to be developed to allow for future extension, expansion and continuation of the District's collection system or for conformance with Sewer Comprehensive Plan.

### **2.2.4 Easements**

A minimum ten (10) feet of recorded easement must be provided on each side of the pipe, for a total width of twenty (20) feet.

### **2.2.5 Separation from Water Mains**

Minimum separation of water mains and sanitary sewer lines shall be ten (10) feet horizontally for parallel pipe, and eighteen (18) inches vertically with water on top for perpendicular or oblique crossings, measured from the bottom of the water pipe to the crown of the sewer pipe. Situations occurring with less than the minimum separation as required shall be in accordance with Section C1-9.1 Required Separation Between Water Lines and Sanitary Sewers of the current edition of the "Criteria For Sewage Works Design" published by the Washington State Department of Ecology.

### **2.2.6 Manholes**

Manholes shall be installed in accordance with Standard Details and DOE Guidelines. Manholes shall be placed at each grade and direction change. Distances between manholes shall not exceed 350 feet. Manholes shall be a minimum of five feet deep to the invert of pipe. Manholes shall be installed at the end of each line of 8-inch diameter or greater. Cleanouts shall only be used on 8-inch or smaller lines and shall be located not more than 150 feet from a manhole.

### **2.2.7 Manhole Drop Connections**

An outside drop connection shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Inside drops may be used only at the discretion of the District on existing manholes.

## **CHAPTER 3      CONSTRUCTION STANDARDS – GENERAL NOTES**

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### **3.1    Construction Plan Notes**

The General Notes apply for all new public facility construction within the District and shall be included in every construction plan set. Water System Notes and Sewer System Notes shall be included in the plan set as relevant for the type of construction project.

#### **3.1.1    General Notes**

See District Standard Detail G1 for General Notes to be included in the construction plans.

#### **3.1.2    Water System Notes**

See District Standard Detail W1 for Water System Notes to be included in the construction plans.

#### **3.1.3    Sewer System Notes**

See District Standard Detail S1 for Sewer System Notes to be included in the construction plans.

## **CHAPTER 4      CONSTRUCTION STANDARDS - WATER SERVICES**

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### **4.1    General Requirements**

#### **4.1.1    District Water Permit**

A District water permit is required prior to installation of a water service.

#### **4.1.2    Uniform Plumbing Code**

All improvements shall be installed per the most current edition of the Uniform Plumbing Code (UPC).

#### **4.1.3    Easements**

Water services shall be installed on only the property being served and in appropriate recorded easements and rights-of-ways.

#### **4.1.4    Developer Extension Agreement Projects**

The Developer is responsible for installing the water service from the water main to property line for new main construction. The Property Owner is responsible for installing water service from property line to building. The Developer will provide the District with the meter assemblies. The District will install meter assemblies when the Property Owner requests service.

#### **4.1.5    Installation, Maintenance, & Repair**

The Property Owner is responsible for service line installation, maintenance and repair from the meter to the building. For new services, the District taps the water main, installs a service saddle, corp stop, service, meter assembly and meter box.

#### **4.1.6    Separation from Side Sewer Services**

Per 2012 UPC 603.2, water service lines located within five (5) feet of side sewer lines shall be installed above the side sewer pipe with a minimum vertical clearance of twelve (12) inches. Maintain a minimum horizontal clearance of twelve (12) inches at all locations except when crossing.

#### **4.1.7    Pressure Reducing Valves**

It is the responsibility of the Property Owner to supply and install a pressure reducing valve (PRV) for their service. Pressure reducing valves shall be installed downstream of the meter and dual check valve. Property Owners that elect not to install a PRV must record a hold harmless agreement with the Whatcom County Auditor. Hold harmless agreements are available at the District office.

#### **4.1.8 Privately Owned Water Booster Systems**

Privately owned water booster systems are not allowed as a means of obtaining water service where the pressure at the service's meter would be below 30 psi. The only exceptions are certain existing Sudden Valley lots covered by Resolution 410. Each application is subject to cross-connection control analysis by the District. Typical residential applications will require District standard dual check valves at the service meter. Higher risk applications will be required to install backflow prevention devices as determined by the cross-connection control analysis.

#### **4.1.9 Inspections**

The District must inspect and approve the pressure reducing valve prior to covering.

## **CHAPTER 5      CONSTRUCTION STANDARDS - SEWER SERVICES**

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### **5.1    General Requirements**

#### **5.1.1   Contractor Requirements**

Contractors installing side sewer services shall have a current Sewer Services Contractor's Certification Agreement and surety bond on file at the District.

#### **5.1.2   Uniform Plumbing Code**

All improvements shall be installed per the most current edition of the Uniform Plumbing Code.

#### **5.1.3   District Sewer Permit**

A District sewer permit is required prior to installation of any side sewer service.

#### **5.1.4   Easements**

Side sewer services shall be installed on only the property being served and in appropriate recorded easements and rights-of-ways.

#### **5.1.5   Authorization to Connect to Sewer Main**

Contractor shall connect the side sewer service to the sewer main at the location identified and authorized by the District. The Contractor shall schedule an onsite pre-construction meeting with the District to obtain authorization to connect prior side sewer installation.

#### **5.1.6   Other Permits**

Contractor shall obtain and abide by encroachment permits or other permissions which may be required from the County, State Highway Department, Sudden Valley Community Association, or other entity having jurisdiction over roads and streets, prior to commencing sewer service work. Restoration shall be done in a manner approved by the appropriate jurisdiction.

#### **5.1.7   Surveying and Staking**

Lots and/or property lines shall be surveyed and staked to assure sewer service is installed within the property, recorded easements, and/or right-of-ways. Surveying and staking are the responsibility of the Contractor and Property Owner.

#### **5.1.8   Surface Water Drain Connections Prohibited**

Downspouts, foundation/crawl space sump pumps, yard drains, or any outside drains shall not be connected to the sanitary sewer service.

## **5.2 Side Sewer Services into Gravity Mains**

### **5.2.1 Installation, Maintenance, & Repair**

The Property Owner is responsible to contract with a Contractor on the District's Bonded Side Sewer Contractor List. The Contractor installs the side sewer service from the sewer main to the residence, which includes installing a service tee on District sewer main, cleanout at property line, the private service line to the building, and restoration per the Standard Drawings.

The Property Owner is responsible for maintenance and repair of the side sewer service from the cleanout at the property line to the residence.

### **5.2.2 Grinder Pumps**

Grinder pumps may be installed in such special circumstances where installation of a gravity system is not possible. The District must authorize the use of a grinder pump system prior to installation. Grinder pump design shall be in accordance with Section C1-10.1 and C1-10.2 of the current edition of the "Criteria For Sewage Works Design" published by the Washington State Department of Ecology.

### **5.2.3 Pre-Construction Meeting**

The Contractor shall schedule a preconstruction meeting with the District prior to beginning construction. At the preconstruction meeting, the District will identify and authorize the location of connection to the sewer main.

### **5.2.4 Inspections**

The District must inspect all side sewer services prior to backfill. Services backfilled without an inspection must be re-exposed and the full length tested at Contractor's expense.

**Bedding & Backfill Inspection.** The entire sewer service pipe from the main to the cleanout adjacent to building must be inspected and approved by the District prior to backfill. Pipe backfilled before inspection will be rejected.

**Leak Test.** Contractor fills service line with water from a plug inserted in the cleanout at the property line up to the cleanout at the building. The line must hold water with no visible drop in elevation to pass. The test is observed by the District after all lines have been backfilled.

**Grinder Pump Inspection (if applicable).** The private grinder pump station may be located inside the residence or outside the residence. If located inside the residence, the installation shall be subject to inspection by the Whatcom County Building Official (or his or her designee). If located outside of the residence, the grinder pump station shall be subject to inspection by the District.

## **5.3 Pressure Side Sewer Services into Force Mains**

### **5.3.1 Design**

The Property Owner is responsible for the design of the pressure side sewer service installation including the grinder pump station at the residence. The Property Owner shall engage a civil engineer licensed in the State of Washington to prepare hydraulic calculations, determine pipe size, determine air release and air vacuum valve requirements, and select the appropriate model of grinder pump for the specific residential installation. Grinder pump design shall be in accordance with Section C1-10.1 and C1-10.2 of the current edition of the "Criteria For Sewage Works Design" published by the Washington State Department of Ecology.

The private grinder pump package shall consist of at least a grinder pump, basin, cover, check valve, controls, and interior and exterior visual and audible alarms (with battery backup for high level alarm), provided by a single supplier/manufacturer. Approved grinder pump package manufacturers include Environment-One (E-One Model 2010-IDU Package Grinder Pump System); Myers Residential Grinder Pump System Package; Hydromatic Grinder Pump System Package, and Liberty Pumps simplex grinder package (Models 2448LSG, 2472LSG, & 2484LSG).

Where required, air relief and combination air relief/ vacuum relief valves shall be as manufactured by Orenco, APCO, Crispin or equivalent for sewer service. All valves shall be fully accessible to enable Customer's operation, maintenance and repair.

### **5.3.2 Developer Extension Agreement Projects**

The Developer is responsible for installing the customer service shutoff valve, check valve, check valve vault and service line from the main to check valve for new main construction.

### **5.3.3 Installation, Maintenance and Repair**

The Property Owner is responsible for installation, maintenance and repair of the side sewer service from the property line to the residence including the grinder pump station, check valve, and check valve vault.

For individual permits, the District taps the force main, installs the saddle, customer service shutoff valve, and service line to the property line. (Note for Developer Extension Agreements, the developer installs these items during construction of the new main.)

### **5.3.4 Pre-Construction Meeting**

The Contractor shall schedule a preconstruction meeting with the District prior to beginning construction. At the preconstruction meeting, the District will identify and authorize a connection to the customer service line at the property line.

### **5.3.5 Inspections**

The District must inspect all side sewer services prior to backfill. Services backfilled without an inspection must be re-exposed and the full length tested at Contractor's expense.

**Bedding & Backfill Inspection.** Sewer service pipe from the main to the cleanout adjacent to building must be inspected and approved by the District prior to backfill.

**Pressure Test.** With all joints exposed, the District must witness a successful hydrostatic pressure test in accordance with WSDOT Section 7-09.3(23) at 150 psi for all pipe and fittings between the grinder pump and the customer service shut-off valve.

**Grinder Pump Inspection.** The private grinder pump station may be located inside the residence or outside the residence. If located inside the residence, the installation shall be subject to inspection by the Whatcom County Building Official (or his or her designee). If located outside of the residence, the grinder pump station shall be subject to inspection by the District.



## **CHAPTER 6      CONSTRUCTION STANDARDS - DETAILS**

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### General Details

- G1      General Notes
- G2      Typical Trench and Backfill Detail
- G3      Water Project Record Drawing Documentation
- G4      Sewer Project Record Drawing Documentation
- G5      Maintenance Vehicle Turnaround
- G6      Water Main / Side Sewer Non-Standard Crossing
- G7      Private Water Service Line and Side Sewer Trench Detail

### Water Details

- W1      Water System Notes
- W2      Concrete Thrust Block
- W3      Concrete Thrust Block for Convex Vertical Bends
- W4      Fire Hydrant Assembly
- W5      2-inch Blowoff Assembly
- W6      Combination Air Release / Air Vacuum Valve Assembly
- W7      Water Sampling Station
- W8      Water Meter Assembly
- W9      Deadman Tie-Back Thrust Block

### Sewer Details

- S1      Sewer System Notes
- S2      Sanitary Sewer Manhole
- S3      Inside Drop Sewer Manhole Connection
- S4      Outside Drop Sewer Manhole Connection
- S5      Sewer Main Cleanout
- S6      Sewer Service Stub Connection to Main
- S7      Sewer Service Stub and Cleanout
- S8      Gravity Side Sewer Installation
- S9      Grinder Pump Service to Gravity Main Installation
- S10    Grinder Pump Service to Force Main Installation
- S11    Connection to Force Main
- S12    Force Main Service Check Valve
- S13    Shared Force Main Service Tap
- S14    Manhole Adjustment Detail

### Electrical/Telemetry Details

- E1      Telemetry Panel
- E2      Utility Equipment Rack
- E3      Schedule 80 PVC Trench
- E4      Handhole
- E5      Tracer Wire

## GENERAL NOTES

1. All work and materials shall conform to the most current edition of the Standard Specifications for Road, Bridge and Municipal Construction (WSDOT) as prepared by Washington State Department of Transportation and the Washington State Chapter of the American Public Works Association, Lake Whatcom Water and Sewer District Design and Construction Standards, and the instructions and recommendations of the Manufacturer of the material concerned. In case of a conflict between the above standards, the more stringent shall apply. All work and materials shall be subject to the approval of the District Engineer.
2. Contractor shall obtain encroachment permits or other permissions which may be required from the County, State Highway Department, Sudden Valley Community Association, or other entity having jurisdiction over roads and streets, prior to commencing work.
3. Backfill under pavement shall consist of material conforming to WSDOT 9-03.19. Backfilling of trenches shall be in accordance with WSDOT 7.08.3(3). Backfill shall be compacted to 95% modified Proctor within traffic areas, 90% modified Proctor in landscape and open areas.
4. Tracer wire installation is required on all District owned pipe and communication lines. Tracer wire is also required on private side sewers. Install tracer wire per District Standard Detail E5. In addition to tracer wire, install 2-inch wide detectable marking tape 8 to 12 inches below the finish surface. Detectable marking tape shall meet WSDOT 9-15.18 and be color coded blue for water and green for sewer.
5. All pipe shall be bedded in bedding material meeting WSDOT 9-03.12(3). The bedding cross-section shall be blocked with impervious material (i.e. clay or concrete) a minimum of every 800 feet and the trench drained to daylight or to a storm drain.
6. Water mains crossing over sewers stub service line with less than 18-inches of vertical clearance shall be stabilized with Control Density Fill (CDF) per WSDOT 2-09.3(1)E.
7. From the main to the property line, sewer laterals and water service lines shall maintain a minimum horizontal separation of 5-feet. Separation may be reduced to 1-foot if water service line is a minimum of 12-inches above the top of the sewer lateral.
8. Contractor shall remove all debris and excess excavation; repair all damage, and restore the site, public or private, to pre-construction conditions.



GENERAL NOTES

STANDARD DETAIL

G1

3/13/2014

## UNPAVED AREAS

RESTORE SURFACE MATERIAL  
TO EXISTING CONDITIONS.

BACKFILL TRENCH WITH  
NATIVE MATERIAL PER  
WSDOT 9-03.15 COMPACTED  
TO 90% MODIFIED PROCTOR.

## EXISTING PAVED AREAS

CLASS 'B' ASPHALT PVMT  
MIN 2" (MATCH EXIST)  
PER WSDOT 5-04.2

SAW CUT

EXISTING PAVEMENT SECTION

2" CSTC PER WSDOT 9-03.9(3)

MIN 8" (MATCH EXIST PVMT)

BANK RUN GRAVEL FOR TRENCH  
BACKFILL PER WSDOT 9-03.19  
COMPACTED 95% MODIFIED  
PROCTOR.

2" METALLIC DETECTOR  
TAPE 8" TO 12" BELOW  
FINISH GRADE.

#10 TRACER WIRE ON ALL  
WATER & SEWER MAINS (IN  
ADDITION TO 2" DETECTOR  
TAPE). USE SILICONE FILLED  
WIRE NUTS.

36" MINIMUM COVER  
(WATER & SEWER MAINS)

6"

O.D.

6"

GRAVEL BACKFILL FOR PIPE  
ZONE BEDDING PER WSDOT  
9-03.12(3). COMPACT TO  
95% MODIFIED PROCTOR.

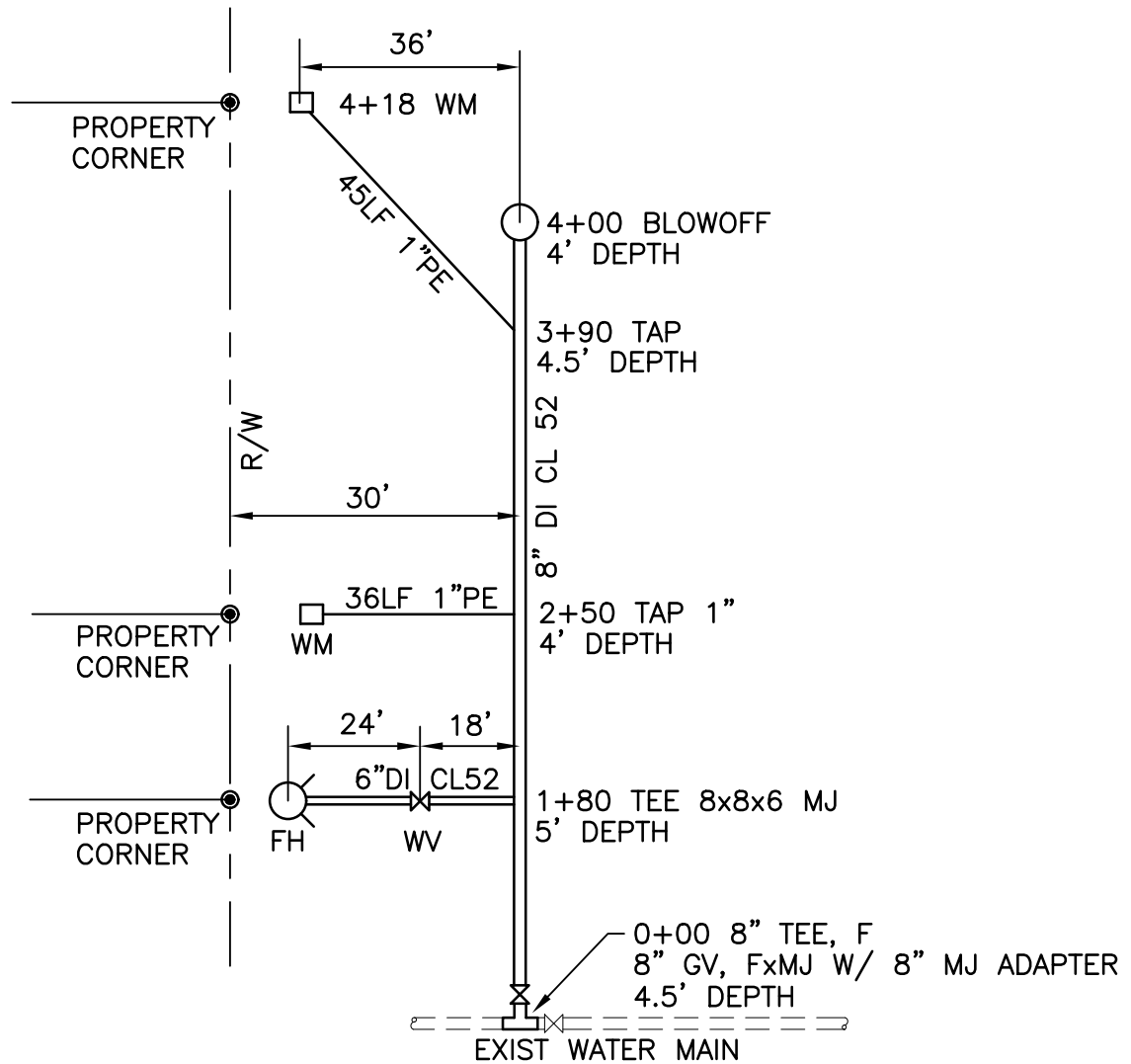


TYPICAL TRENCH AND BACKFILL DETAIL

STANDARD DETAIL

G2

3/13/2014

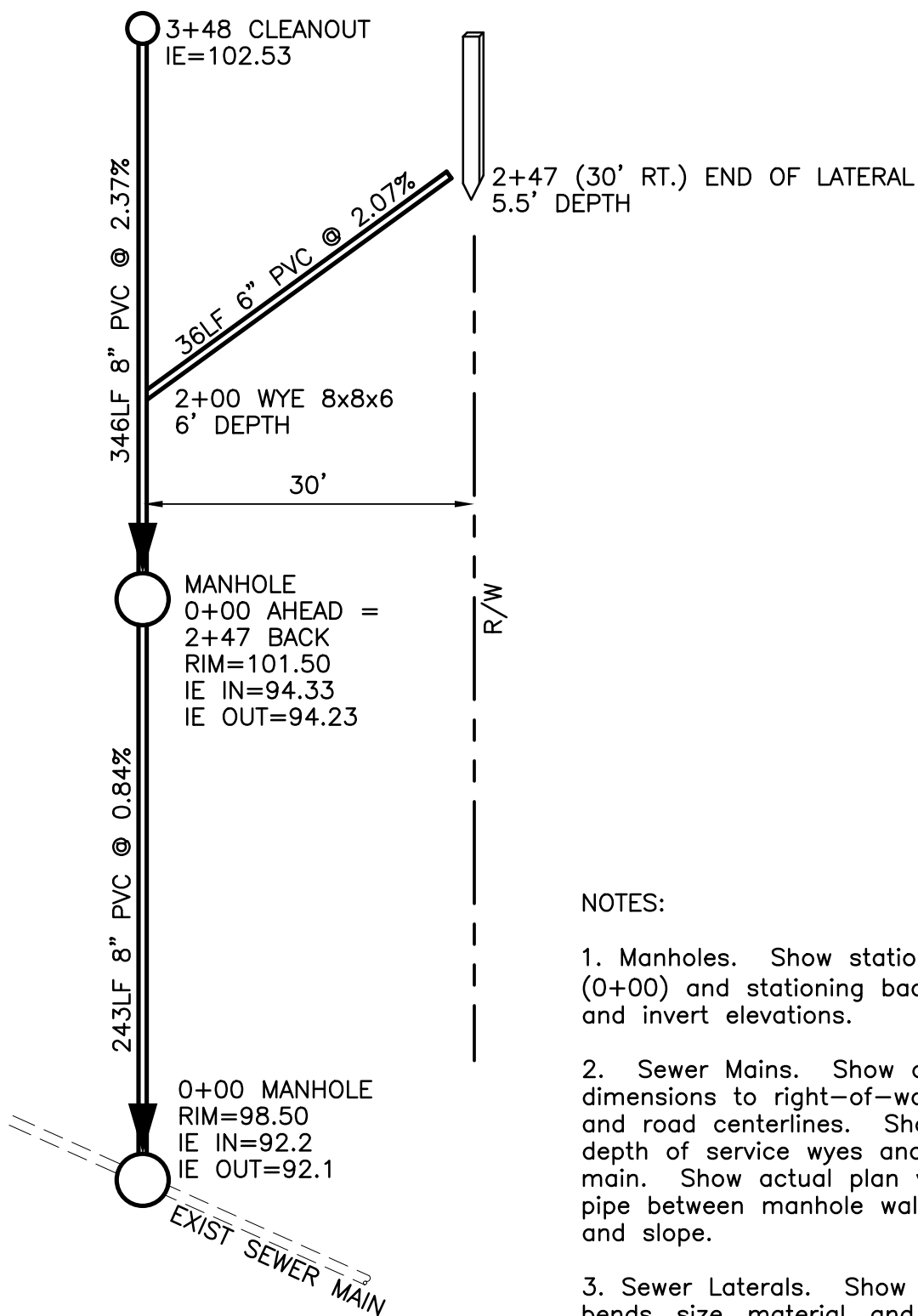


EXAMPLE RECORD DRAWING

#### NOTES:

1. Water Mains. Show alignment dimensions to right-of-way, easements, and road centerlines. Show stationing and depth of fittings, valves, and service taps along the main.
2. Fire Hydrants, Blowoffs, and other Appurtenances. Show length & material between tees, valves, hydrants, blowoffs, etc. Show station/offset of appurtenance if skewed from 90-degrees from main.
3. Water Services & Sampling Stations. Show tap station along main and size of tap. Show length & material of service line from main to meter box or sampling station.



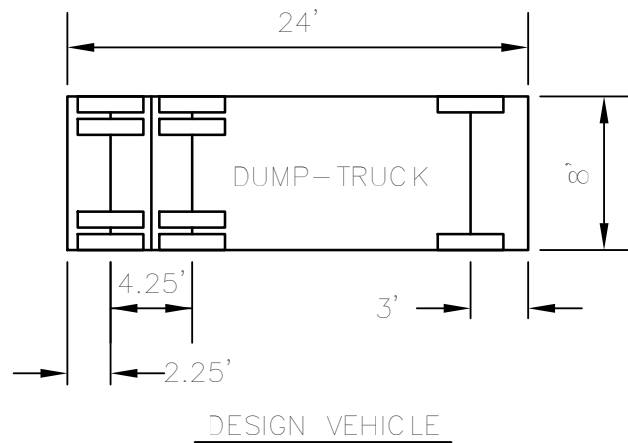
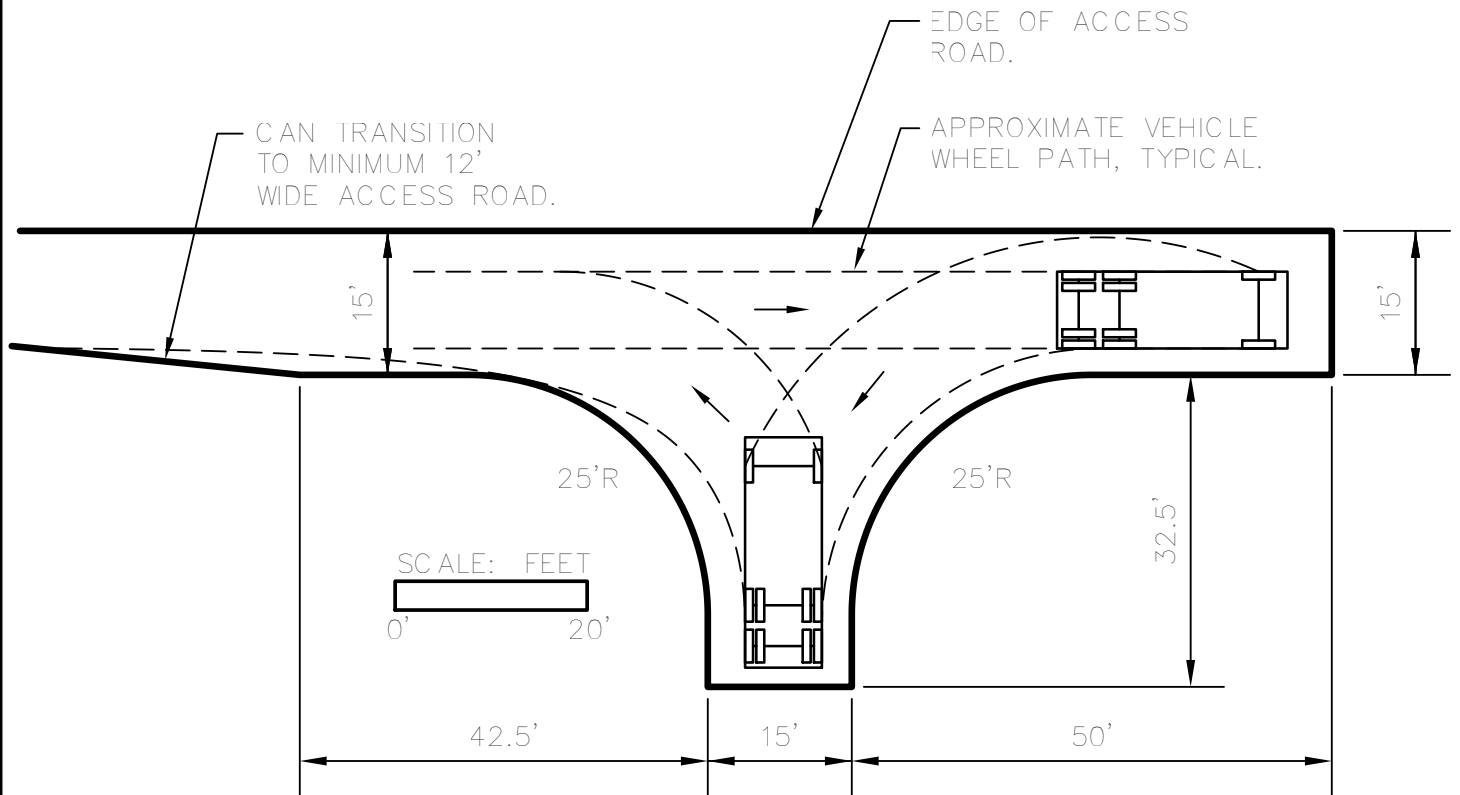


EXAMPLE RECORD DRAWING

#### NOTES:

1. Manholes. Show stationing ahead (0+00) and stationing back, rim elevation, and invert elevations.
2. Sewer Mains. Show alignment dimensions to right-of-way, easements, and road centerlines. Show station and depth of service wyes and tees along the main. Show actual plan view length of pipe between manhole walls with material and slope.
3. Sewer Laterals. Show distances between bends, size, material, and length of pipe. Show station, offset, and depth at end of stub or cleanout.



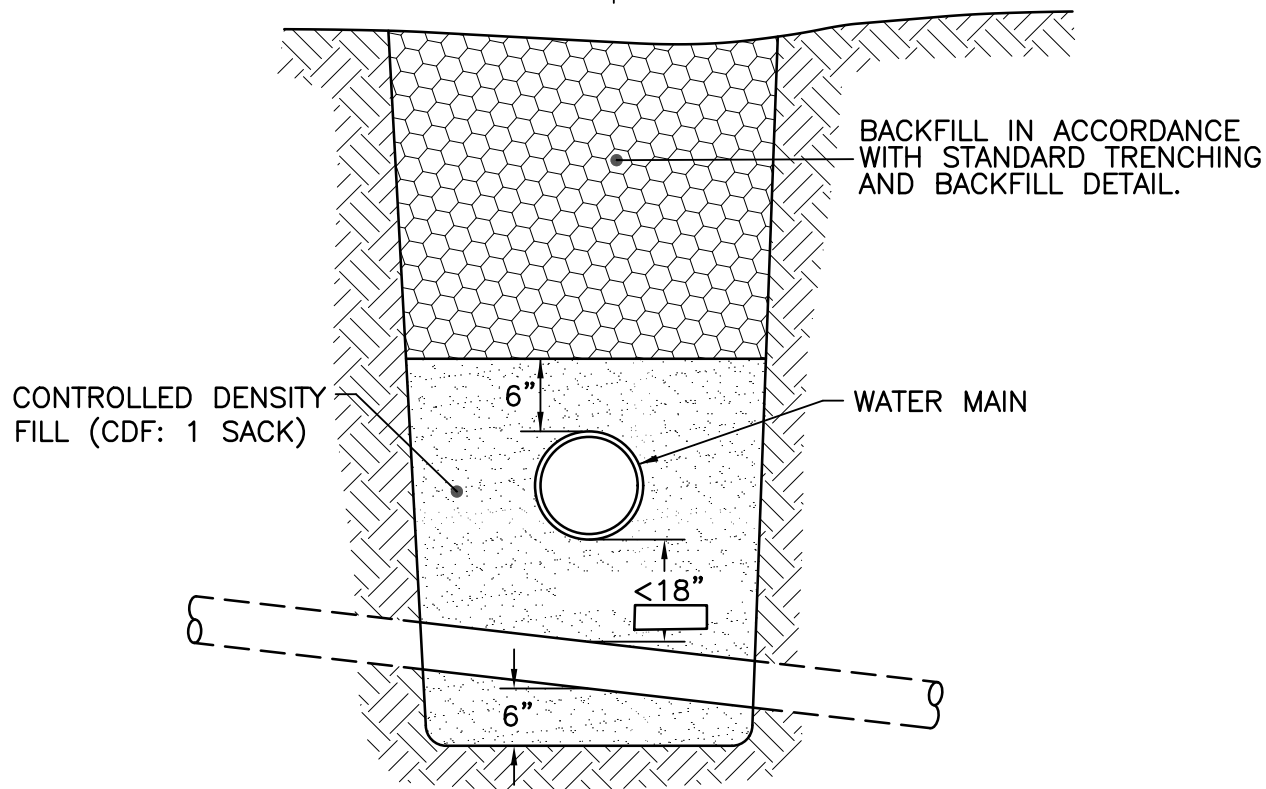
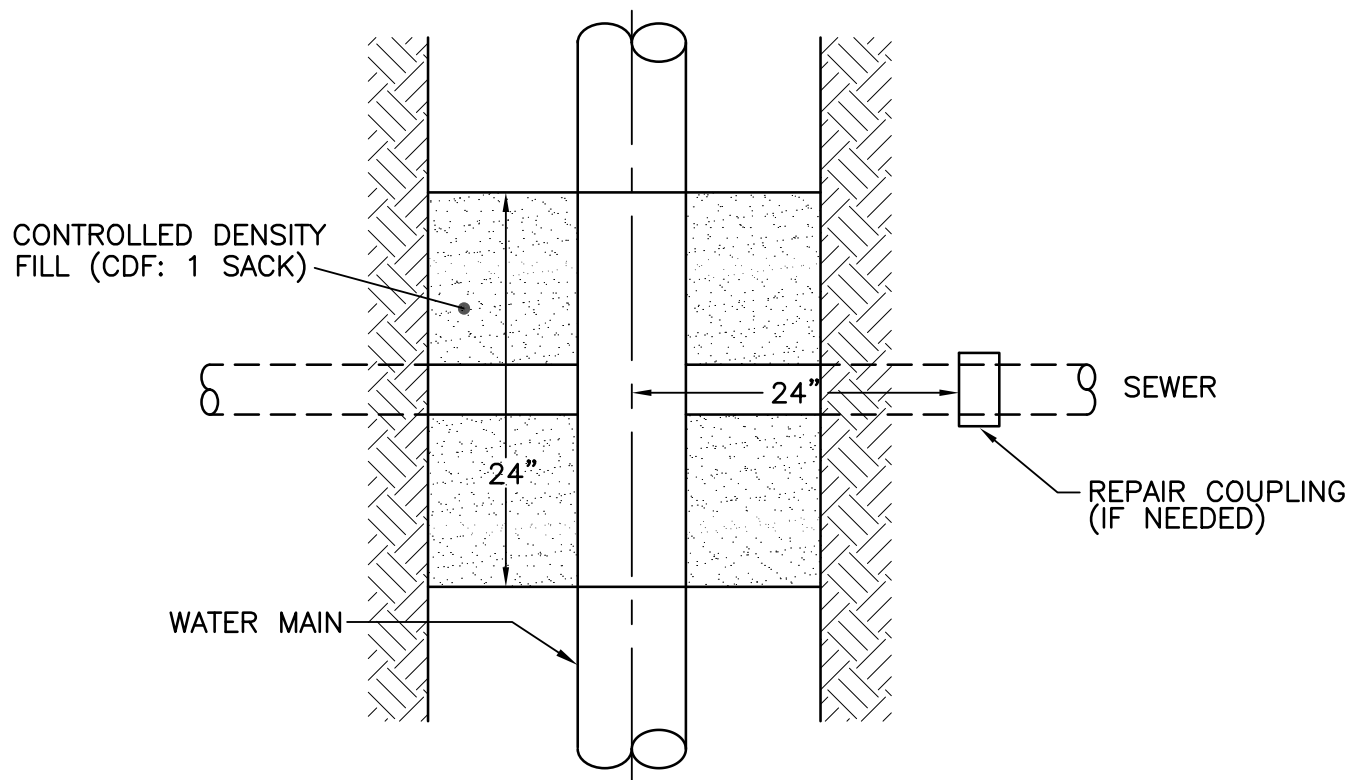


# MAINTENANCE VEHICLE TURNAROUND

STANDARD DETAIL

G5

3/13/2014



#### NOTES:

1. Minimum required distance from center of sewer to water main joint is 5'.
2. Minimum required distance from center of water main to sewer joint is 2'.
3. Controlled Density Fill shall surround both pipes with minimum 6" thick.

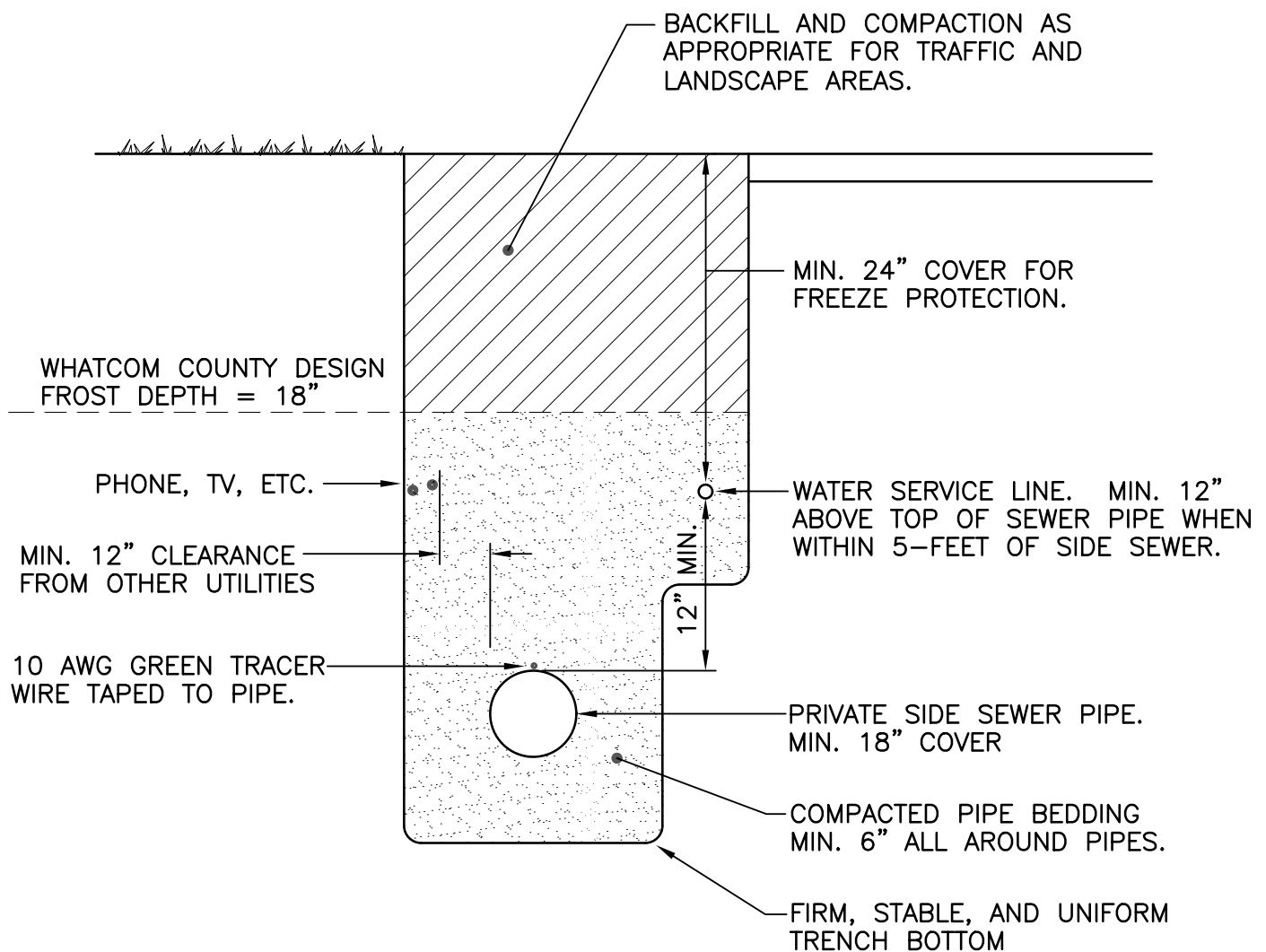


WATER MAIN / SEWER NON-STANDARD CROSSING

STANDARD DETAIL

**G6**

3/13/2014



NOTES:

1. District side sewer pipe material standards (PVC ASTM D3034 SDR 35) comply with 2012 International Plumbing Code (IPC) Table 702.3 Building Sewer Pipe. Separation of water service and side sewer as detailed above complies with IPC 603.2 requirements.

2. Water service lines and side sewers shall be bedded in material meeting WSDOT 9-03.12(3) Gravel Backfill for Pipe Zone Bedding as shown in following table:

Sieve Size	Percent Passing by Weight
1.5"	99-100
1"	75-100
5/8"	50-100
U.S. No. 4	20-80
U.S. No. 40	3-24
U.S. No 200	10.0 max
Sand Equivalent	35 min.



PRIVATE WATER SERVICE LINE AND SIDE SEWER TRENCH DETAIL

STANDARD DETAIL

G7

3/13/2014



## WATER SYSTEM NOTES

1. Water distribution system materials, trenching, bedding, installation, backfilling, disinfection, and testing shall conform to WSDOT 7-09.
2. Water main pipe shall be class 52 ductile iron per WSDOT 9-30.1(1) and encased in polyethylene encasement per WSDOT 9-30.1(2). HDPE may be substituted with the approval of the District Engineer subject to pipe rating based on the specific design/installation conditions and materials conforming to WSDOT 9.30.1(6) and 9.30.2(10). Fittings for ductile iron pipe shall conform to WSDOT 9-30.2 (1).
3. Valves shall have a minimum pressure rating of 200 psi. Gate valve installation shall conform to WSDOT 7-12. Gate valves shall be resilient-seated gate valves conforming to WSDOT 9-30.3(1) and AWWA C509 Standard for Resilient Seated Gate Valves. A cast iron valve box with a commercial concrete collar (18" x 18" x 6") shall be installed with each valve. An approved marking post shall be installed with each valve in accordance with WSDOT 7-12.3(1) for all valves not installed in pavement. Valves not in pavement shall have a 24" x 24" x 6" concrete collar cast around the valve box. Where a valve operating nut is more than 4-feet lower than grade, an American Flow Control Trench Adapter valve box and stem extension combination (or approved equal) must be installed.
4. Pressure reducing valves (2" and larger) shall be manufactured by Cla-Val, Watts, or approved alternate.
5. Service connections shall be installed per WSDOT 7-15. Lot corners shall be staked prior to service connection installations to assure service are installed in correct locations as shown on the approved plans.
6. District Engineer or their appointed representative shall witness pressure testing and bacteriological test sampling. Contractor shall provide the District Engineer 48 hours notice prior to conducting tests or sampling.
7. Water lines and appurtenances shall be pressure tested in accordance with WSDOT 7-09.3(23).
8. District Engineer must receive a satisfactory bacteriological report before new water mains are connected to existing mains and placed in service. Contractor shall disinfect, flush and provide a satisfactory bacteriological report to the District Engineer in accordance with WSDOT 7-09.3(24). Contractor shall provide two chlorine concentration test reports to show the initial chlorine concentration is at least 50 mg/L, and to show the 24-hour residual chlorine concentration is at least 25 mg/L. All tests must be performed by a DOH-certified testing laboratory and sample-taking shall be witnessed by the District Engineer or their appointed representative. Chlorinated flush water must be disposed of into the sanitary sewer. Contractor shall coordinate with District staff to ensure the rate of disposal does not overload the sewer.
9. New services shall be pressure tested along with the new main. No use of water through a newly installed service shall be allowed until water main and service installation has been inspected, pressure tested, chlorinated and a satisfactory bacteria test received. After installation, the service connection shall be flushed prior to connecting the meter. No service is to be covered until the District's Inspector has inspected the initial installation. All corporations must be in an ON position and all angle valves must be in the OFF position.
10. Service flow testing shall be done after water main pressure testing. During the inspection, every service shall be turned on to its full capacity to check flow and guarantee that each service line has been flushed.

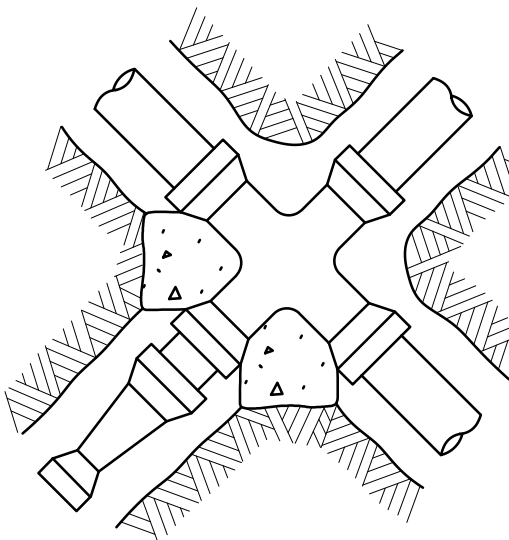


## WATER SYSTEM NOTES

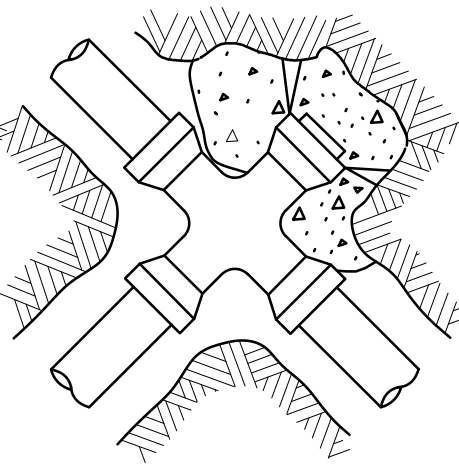
STANDARD DETAIL

W1

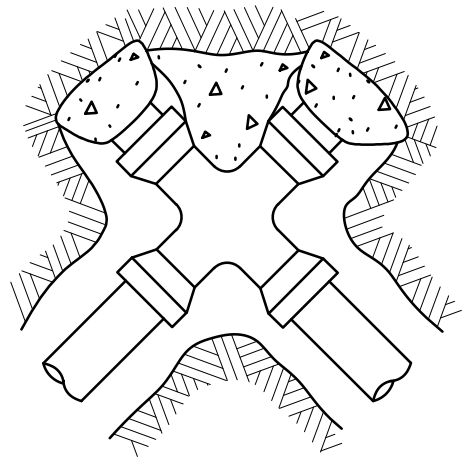
3/13/2014



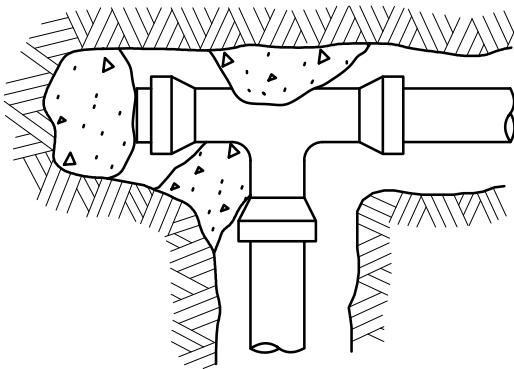
UNBALANCED CROSS  
(Use column A)



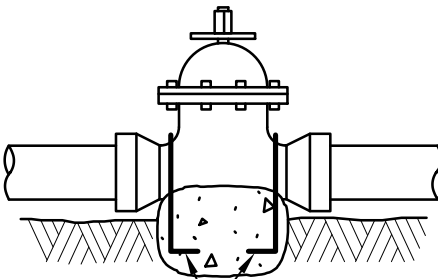
PLUGGED CROSS  
(Use column A)



PLUGGED CROSS  
(Use column B)

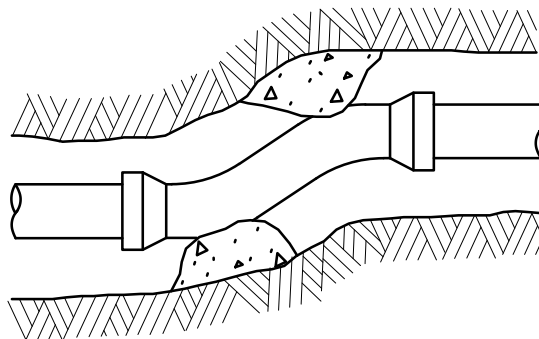
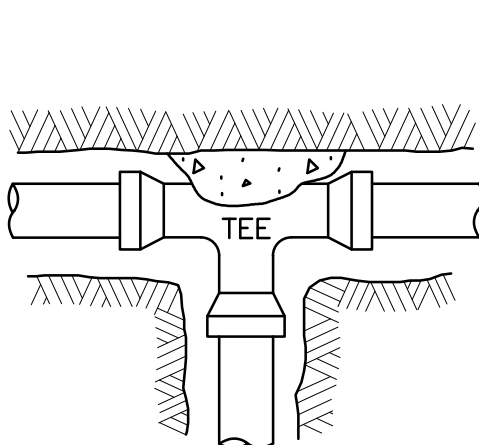
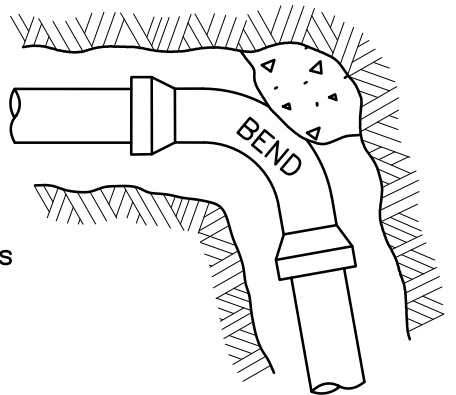


PLUGGED TEE  
(Use column B)

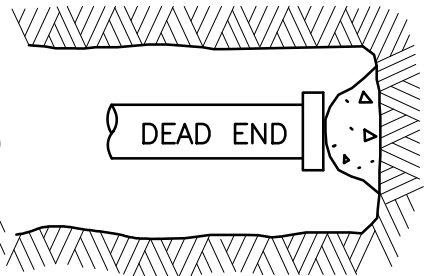


Two 1" DIA rods  
(See Note 4)

VALVE  
(Use column A)



OFFSET  
(Use columns B - E)



BASED ON WSDOT STANDARD PLAN  
B-90.40-00 DATED 6/8/06.



NOTES:

1. Contractor may substitute restrained joints & fittings with the approval of the district engineer. Calculation of the restrained pipe required length on each side of fittings for max pressure and soil type are required. Calculations shall be sealed by a professional engineer and submitted for review and approval.
2. Contractor to provide blocking adequate to withstand full test pressure.
3. Divide thrust by safe bearing load to determine required area (in square feet) of concrete to distribute load.
4. Areas to be adjusted for other pressure conditions.
5. Provide two 1" minimum diameter rods on valves up through 10" diameter. Valves larger than 10" require special tie rod design.

Size	Test Pressure PSI	Thrust at Fittings in Pounds				
		A	B	C	D	E
		Tee and Dead Ends	90° Bend	45° Bend	22.5° Bend	11.25° Bend
4"	250	3,140	4,440	2,405	1,225	615
6"	250	7,070	9,995	5,410	2,760	1,385
8"	250	12,565	17,770	9,620	4,905	2,465
10"	250	19,635	27,770	15,030	7,660	3,850
12"	250	28,275	39,985	21,640	11,030	5,545
14"	250	38,485	54,425	29,455	15,015	7,545
16"	250	50,265	71,085	38,470	19,615	9,855

Soil Type	Safe Bearing Load PSF
Muck, peat, etc.*	0
Soft clay	1,000
Sand	2,000
Sand and gravel	3,000
Sand and gravel cemented with clay	4,000
Hard shale	10,000

\*Restrained joints required in all cases.

BASED ON WSDOT STANDARD PLAN  
B-90.40-00 DATED 6/8/06.

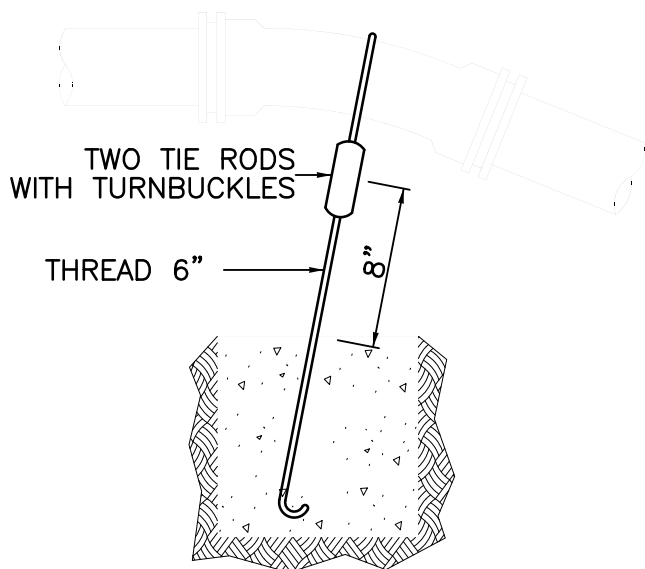


CONCRETE THRUST BLOCK  
Sheet 2 of 2

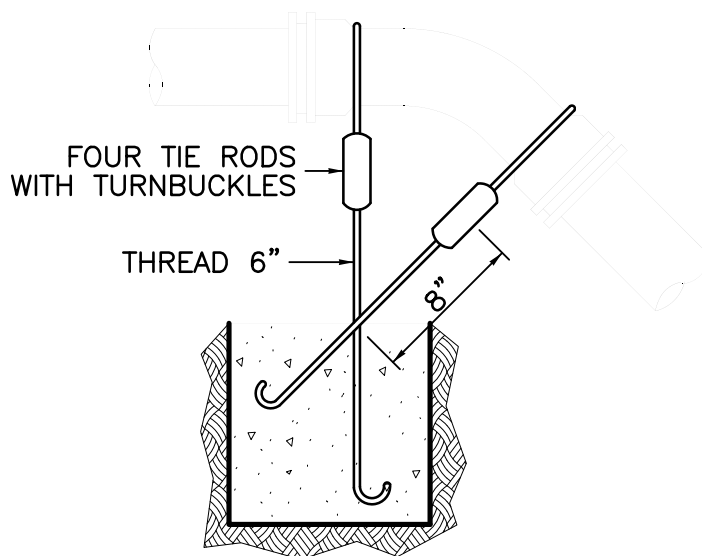
STANDARD DETAIL

W2

3/13/2014



BLOCKING FOR 11.25° OR 22.5°  
VERTICAL BENDS



BLOCKING FOR 45°  
VERTICAL BENDS

NOTE: STEEL TIE RODS SHALL BE HEAVILY COATED  
WITH ASPHALT AFTER INSTALLATION.

DIMENSION TABLE						
PIPE DIAM.	TEST PRESSURE (PSI)	BEND ANGLE	CONCRETE VOLUME (Cubic-Ft)	CUBE SIZE (Ft)	TIE ROD DIAM.	TIE ROD EMBEDMENT
4"	250	11.25°	6	1.8	5/8"	17"
		22.5°	12	2.3		
		45°	22	2.8		
6"	250	11.25°	14	2.4	5/8"	17"
		22.5°	27	3.0		
		45°	50	3.7		
8"	250	11.25°	25	2.9	5/8"	17"
		22.5°	48	3.6		
		45°	89	4.5		
10"	250	11.25°	38	3.4	5/8"	17"
		22.5°	75	4.2		
		45°	139	5.2		
12"	250	11.25°	55	3.8	5/8"	17"
		22.5°	108	4.8		
		45°	200	5.8	7/8"	24"
14"	250	11.25°	75	4.2	5/8"	17"
		22.5°	147	5.3	3/4"	20"
		45°	272	6.5	1"	27"
16"	250	11.25°	98	4.6	5/8"	17"
		22.5°	192	5.8	7/8"	24"
		45°	355	7.1	1 1/8"	30"

BASED ON WSDOT STANDARD PLAN  
B-90.50-00 DATED 6/8/06.

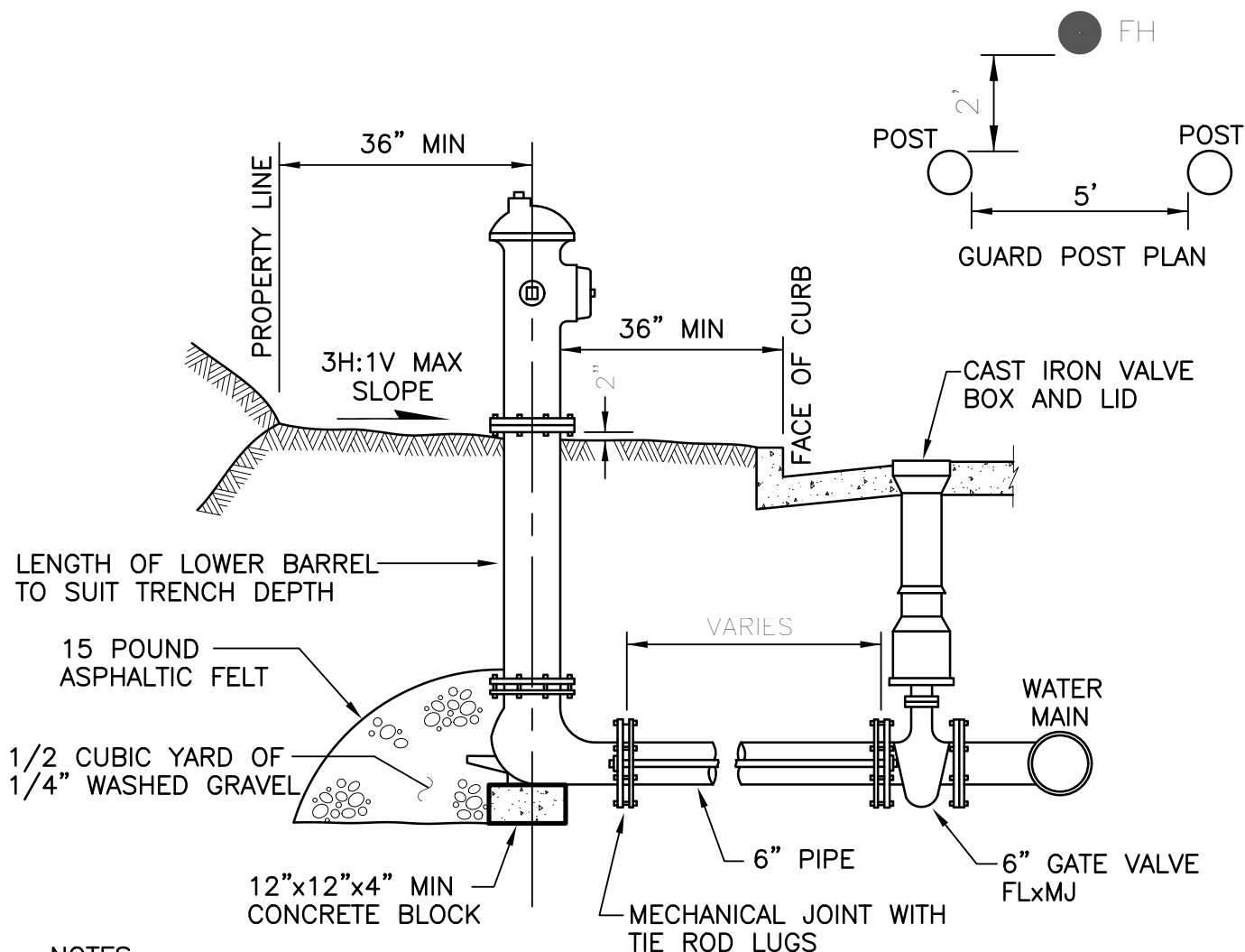


CONCRETE THRUST BLOCK  
FOR CONVEX VERTICAL BENDS

STANDARD DETAIL

W3

3/13/2014



NOTES:

1. Fire hydrants shall be 5-1/4" compression type MJ foot with National Standard Thread on 2-1/2" side ports, and 5" Stortz connection fitting on the steamer port. District standard fire hydrant manufacturers/models are: American Flow Control – Waterous Pacer 250, M&H – Style 929 Reliant, and Clow – Medallion. Hydrant caps & bells shall be painted bright industrial yellow in accordance with Whatcom County Fire District #2 and #4 requirements. Hydrant barrel extensions shall be provided and installed as required.
2. Shackle rods shall be threaded each as required and installed with Romac ductile lugs. Tie rods shall be heavily coated with asphalt after installation or be stainless steel with stainless steel hardware. Restrained joints may be substituted for tie rods.
3. Ground surface within 48" of hydrant shall be smooth and clear of obstructions.
4. A minimum of two guard posts shall be provided. Guard posts shall be reinforced concrete having a compressive strength of 3,500 psi and shall be 6-feet in length by 9-inches in diameter. Reinforcing shall consist of a minimum of five No. 3 deformed steel bars. Guard posts shall be buried 3-feet deep and painted bright white.

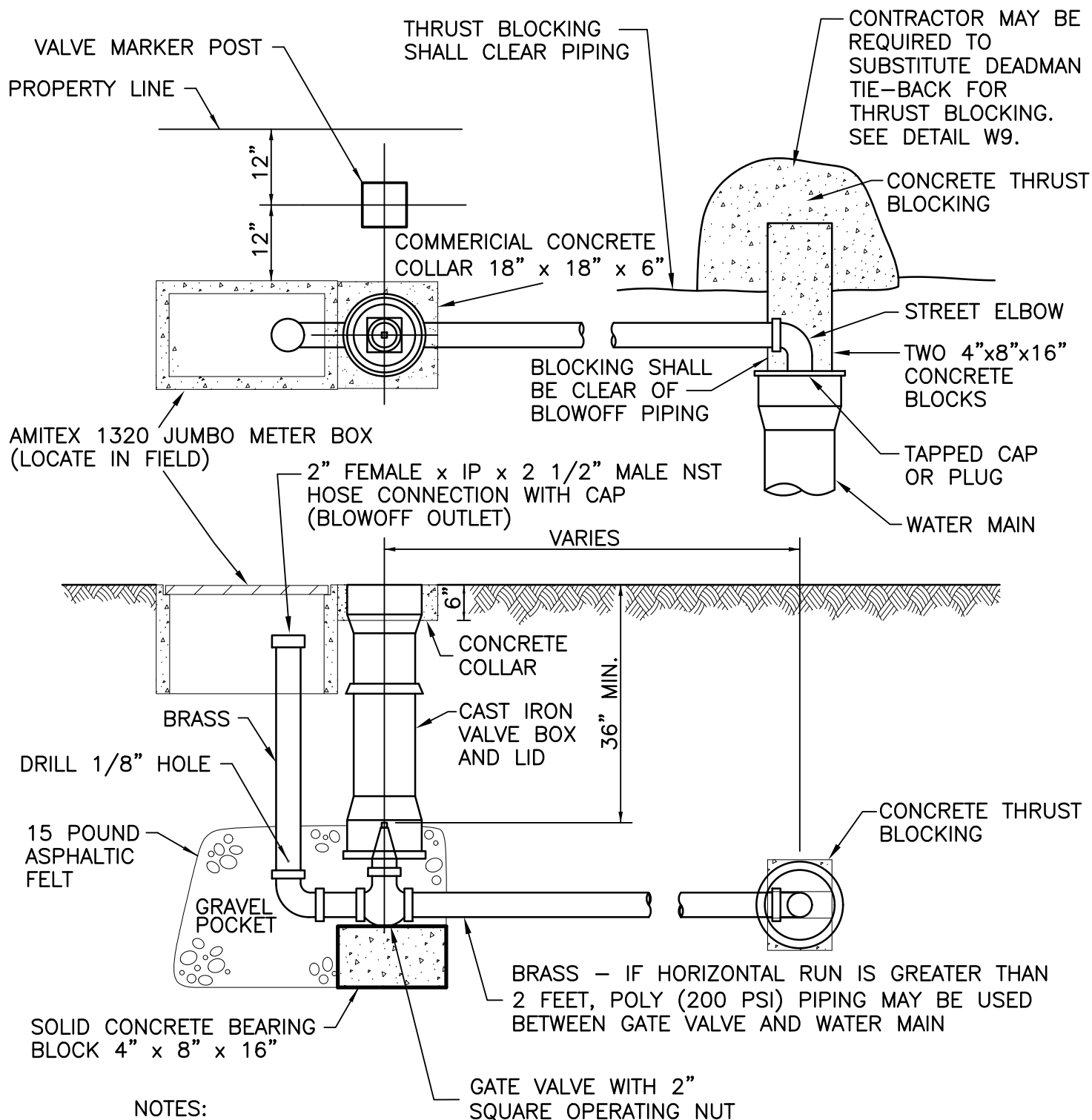


FIRE HYDRANT ASSEMBLY

STANDARD DETAIL

W4

3/13/2014



1. Paint pipe threads with asphalt paint after assembly.
2. Valve and piping to valve shall be 2" unless otherwise noted on plans.
3. Locate blowoff outlet near property corner if possible.

BASED ON WSDOT STANDARD PLAN  
B-90.20-00 DATED 6/8/06.

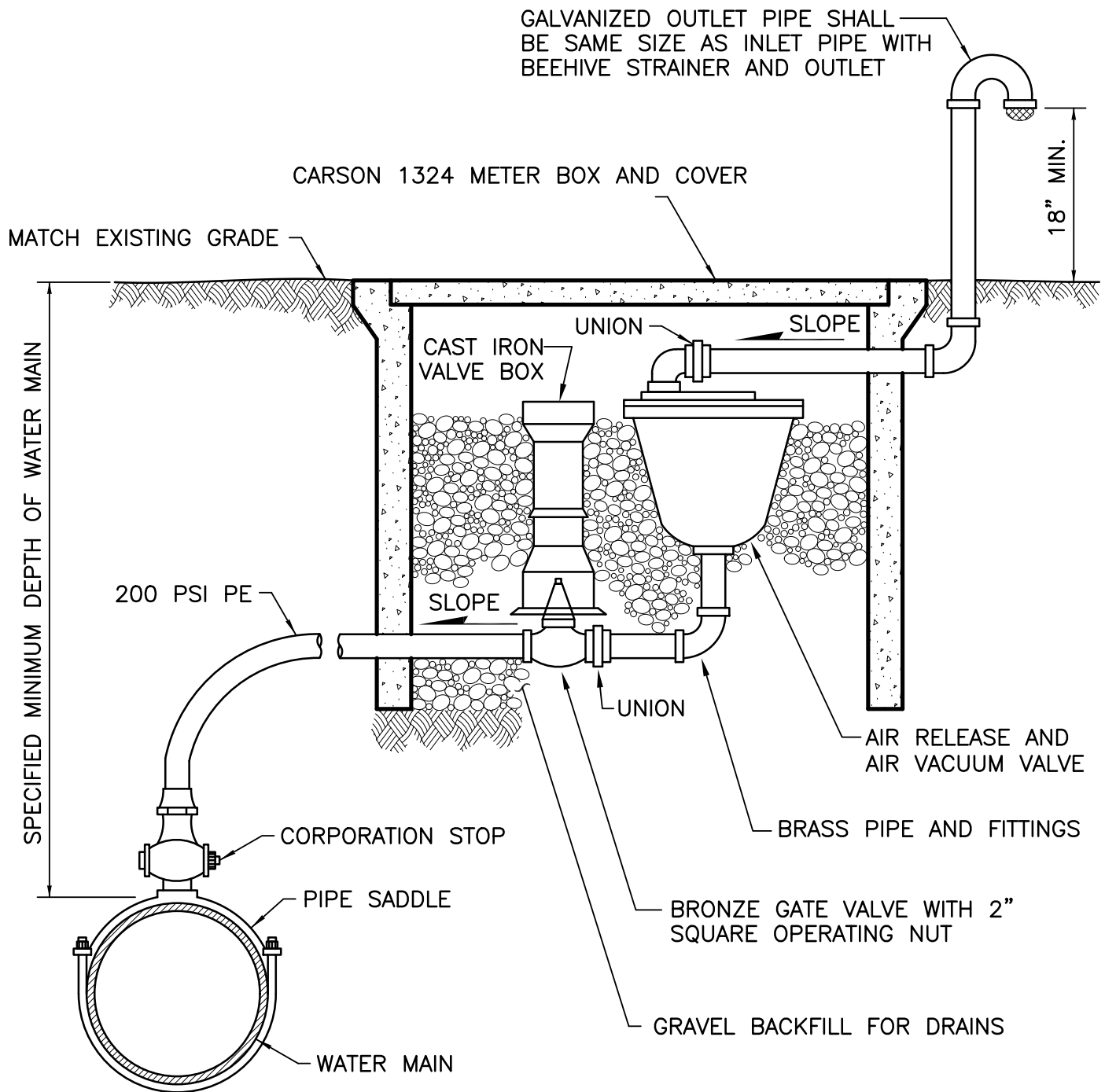


## 2 INCH BLOWOFF ASSEMBLY

STANDARD DETAIL

# W5

3/13/2014



NOTES:

1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.
2. Locate at the high point of the main, tap top of main.

BASED ON WSDOT STANDARD PLAN  
B-90.30-00 DATED 6/8/06.



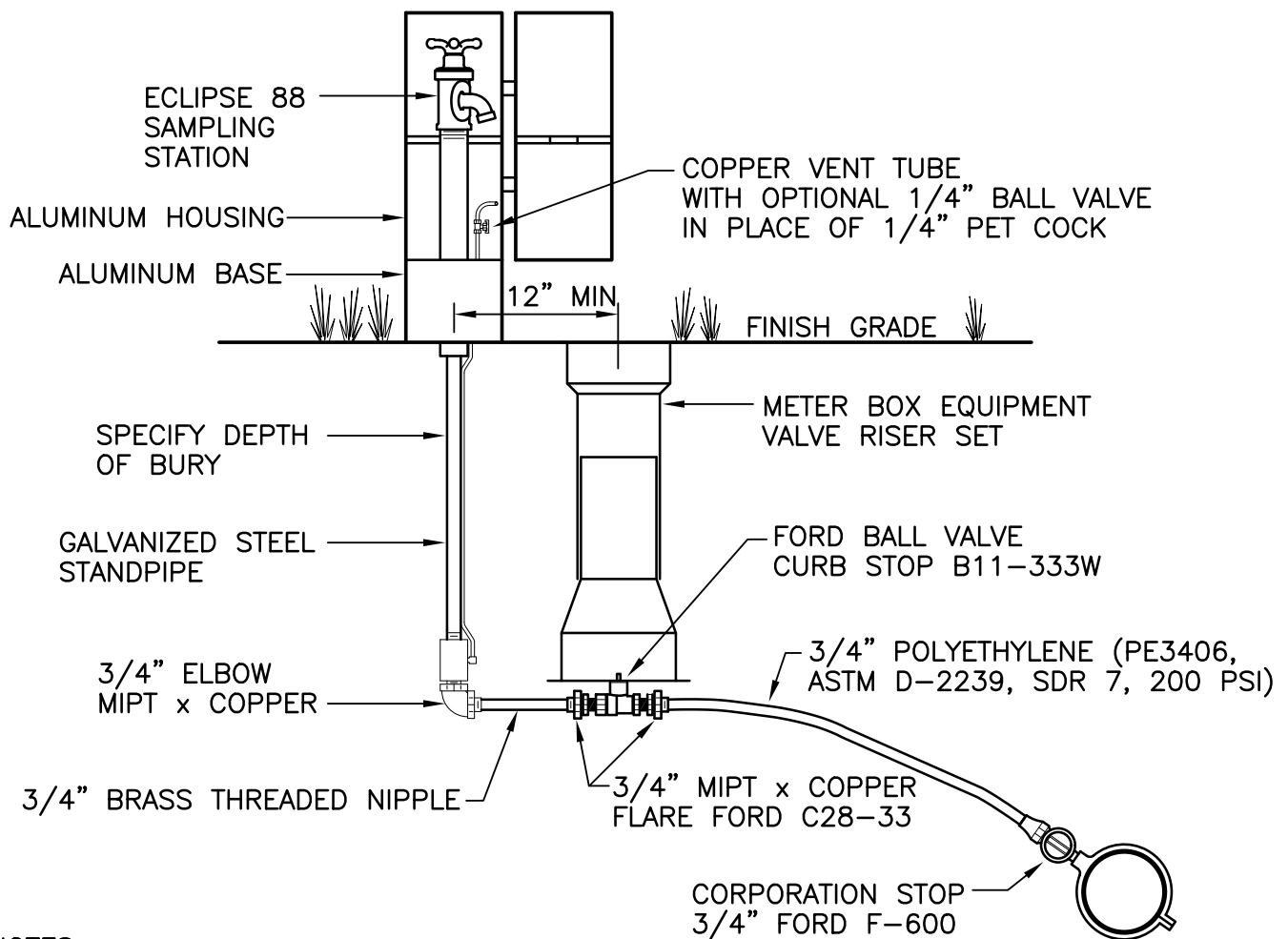
COMBINATION  
AIR RELEASE / AIR VACUUM  
VALVE ASSEMBLY

STANDARD DETAIL

W6

3/13/2014





#### NOTES:

1. Sampling stations shall be buried 2.4' bury, with a 3/4-inch FIP inlet, and a (3/4-inch hose or unthreaded) nozzle.
2. All stations shall be in a lockable, nonremovable, aluminum cast housing. Housing shall be painted green.
3. When opened, the station shall require no key for operation, and the water will flow in an all brass waterway.
4. All working parts will be of brass and be removable from above ground with no digging.
5. Exterior piping shall be galvanized steel or brass pipe.
6. A copper vent tube will enable each station to be pumped free of standing water to prevent freezing and to minimize bacteria growth.
7. Sampling station shall be Eclipse No. 88, manufactured by Kupferle Foundry, St. Louis, MO 63102.



WATER SAMPLING STATION

STANDARD DETAIL

W7

3/13/2014



FORD U-BRANCH (UN63-42W6.5) FOR  
FOR DUAL SERVICE AND FORD ANGLE  
VALVE FOR SINGLE SERVICE

AMITEX 1320 JUMBO  
METER BOX

MASTER 3G WIRELESS METER

FORD GA13-332 ANGLE  
METER VALVE

MATCH EXISTING GRADE

DUAL CHECK VALVE  
McDONALD INLINE  
MODEL 11-3MP 33  
OR FORD HHC81-333

10 GAUGE TRACER WIRE  
WITH SILICONE FILLED  
WATER RESISTANT NUT(S)

$\frac{3}{4}$ " 90°  
ELBOW

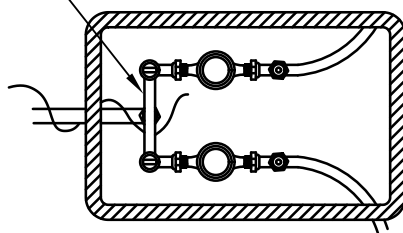
$\frac{3}{4}$ " IP X 1"  
COMPRESSION  
FITTING (NOT  
SUPPLIED BY  
DISTRICT)

200 PSI POLYETHYLENE SERVICE LINE

CORP STOP, FORD F1101. SIZE TO  
MATCH POLYETHYLENE 200 PSI PIPE.

ROMAC 101-S SINGLE  
STRAP SERVICE SADDLE

DUAL SERVICES INCLUDE  
FORD U-BRANCH



RIGHT-OF-WAY

LOT LINE

PROPERTY  
CORNER

### NOTES

1. All fittings shall be brass.
2. The water service pipe shall have a minimum of 24 inches depth and a maximum of 36 inches depth, including under ditch sections.
3. Meter boxes in traffic areas shall be concrete with a reader lid.



WATER METER ASSEMBLY

STANDARD DETAIL

W8

3/13/2014

## SEWER SYSTEM NOTES

1. Sewer system materials, trenching, bedding, installation, backfilling, and testing shall conform to WSDOT 7-05 and 7-17.
2. Gravity sewer pipe shall be ASTM D3034-SDR 35 PVC per WSDOT 9-05.12(1). In certain applications, the District may require class 52 ductile iron pipe, per WSDOT 9-30.1(1) encased in polyethylene encasement per WSDOT 9-30.1(2).
3. Pressure sewer pipe shall be class 52 ductile iron pipe per WSDOT 9-30.1(1) encased in polyethylene encasement per WSDOT 9-30.1(2) or PVC C900 class 150 per WSDOT 9-30.1(5). HDPE may be substituted with the approval of the District Engineer and the pipe rating shall be based on the specific design conditions.
4. Side sewers, from main to private property line, shall be installed per WSDOT 7-18. Side sewers shall have a minimum slope of 2%. Side sewer shall maintain a minimum cover of 30 inches under ditches. Side sewers and cleanout/test tee at property line shall be minimum 6-inches in diameter. Inspection prior to backfill.
5. Sewer cleanouts shall be installed per WSDOT 7-19.
6. Grout for manholes shall be a non-shrinking cementitious grout, containing no gypsum or calcium sulfate Di-hydrate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ), conforming to WSDOT 9-04.3, such as Blueline Speedcrete (Pacific Concrete), Rapid Set Cement All, or approved equivalent. Grout shall be installed according to manufacturer's instructions. JET SET AND QUICKCRETE ARE NOT ALLOWED!
7. All sewer pipe and appurtenances shall be flushed and cleaned prior to being put into service. Debris shall not be allowed into the existing sewer system.
8. District Engineer or their appointed representative shall witness testing. Contractor shall provide the District Engineer 48 hours notice prior to conducting tests or sampling.
9. Pipe shall be tested after backfill by the low-pressure air test method per WSDOT 7-17.3(2)F. PVC pipe shall have a mandrel passed through it to check for any deflections in the pipe per WSDOT 7-17.3(2)G. The District at their option may require any or all sewers to be inspected by the use the District television camera before final acceptance. The costs incurred in making the inspection shall be borne by the Contractor. Connection to the existing system is not permitted until final acceptance.
10. Downspouts, foundation/crawl space sump pumps, yard drains, or any outside drains shall not be connected to sanitary sewer mains or services.

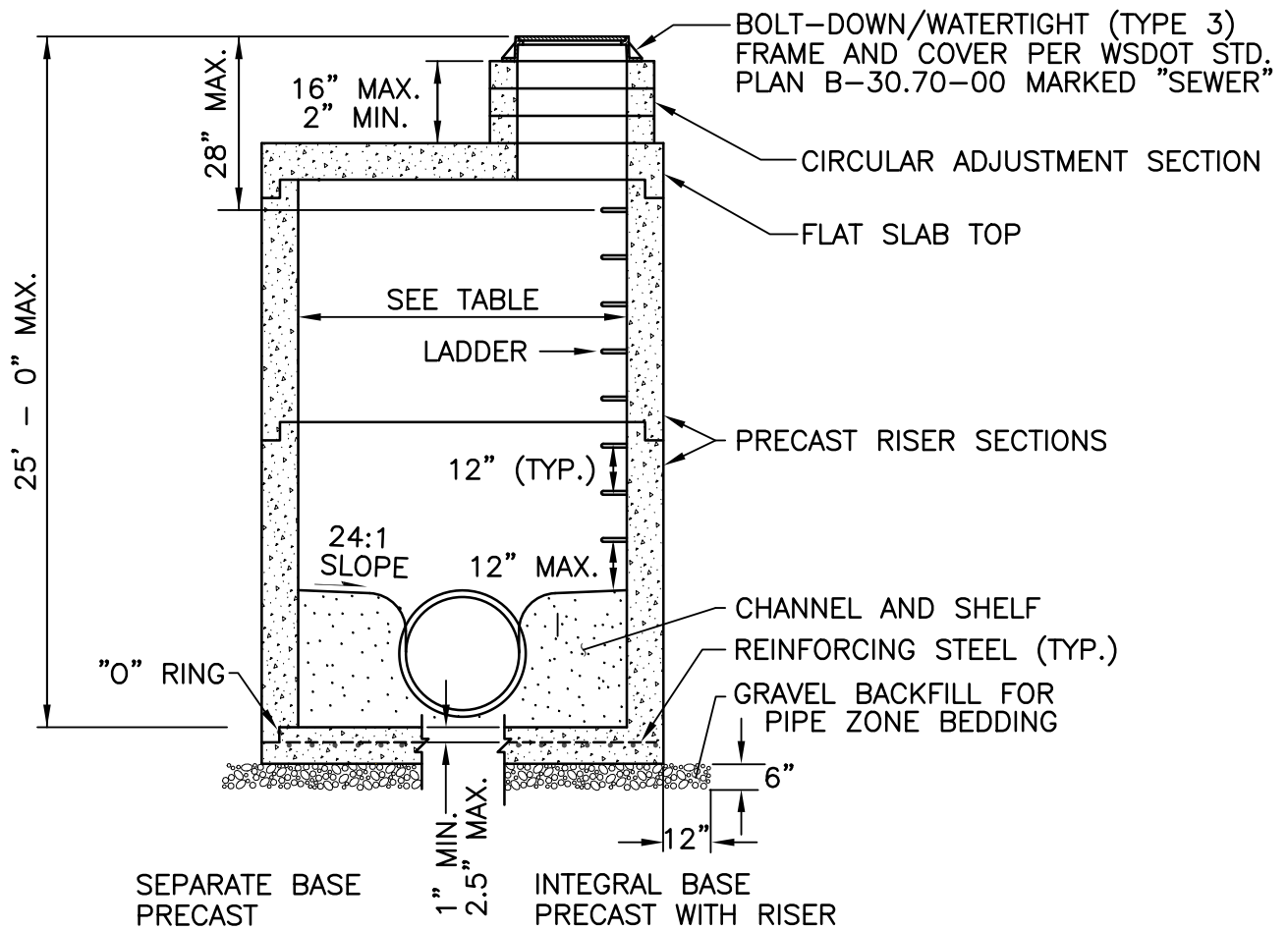


## SEWER SYSTEM NOTES

STANDARD DETAIL

S1

3/13/2014



MANHOLE DIMENSION TABLE

DIAM	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	PIPE ALLOWANCES PIPE MATERIAL WITH MAX. INSIDE DIAM.	
					ALL METAL	SOLID WALL PVC
48"	4"	6"	36"	8"	30"	30"
54"	4.5"	8"	42"	8"	36"	36"
60"	5"	8"	48"	8"	42"	42"
72"	6"	8"	60"	12"	54"	48"
84"	8"	12"	72"	12"	60"	48"
96"	8"	12"	84"	12"	72"	48"

NOTES:

- Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
- No steps are required when height is 4' or less.

BASED ON WSDOT STANDARD PLANS  
B-15.60-01 AND B-10.20-01  
DATED 2/7/12.

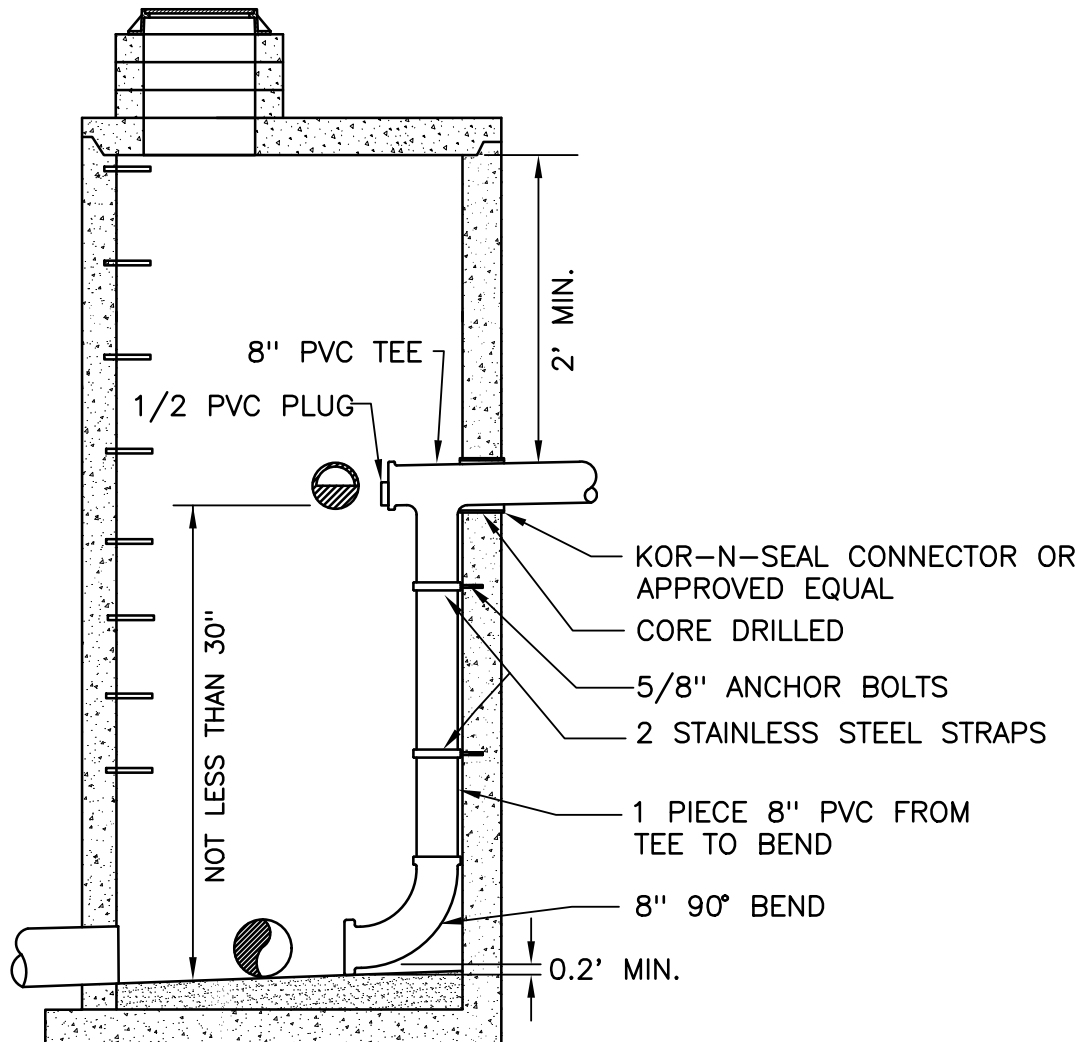


SANITARY SEWER MANHOLE TYPE 3

STANDARD DETAIL

S2

3/13/2014



NOTES:

1. Drop tee to be installed minimum of 2' below ceiling.
2. Inside drop manhole shall be installed only where approved the District.
3. Size of manhole will increase with larger diameter pipe and shall be approved by the District Engineer.
4. Channel to outlet.

BASED ON CITY OF BELLINGHAM  
DRAWING SS-715 DATED 11/29/04.

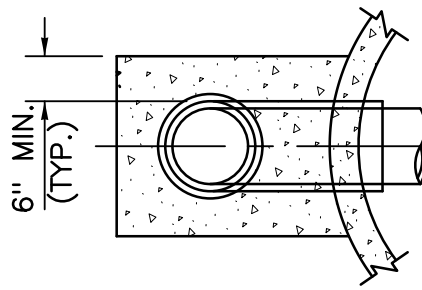


INSIDE DROP SEWER MANHOLE CONNECTION

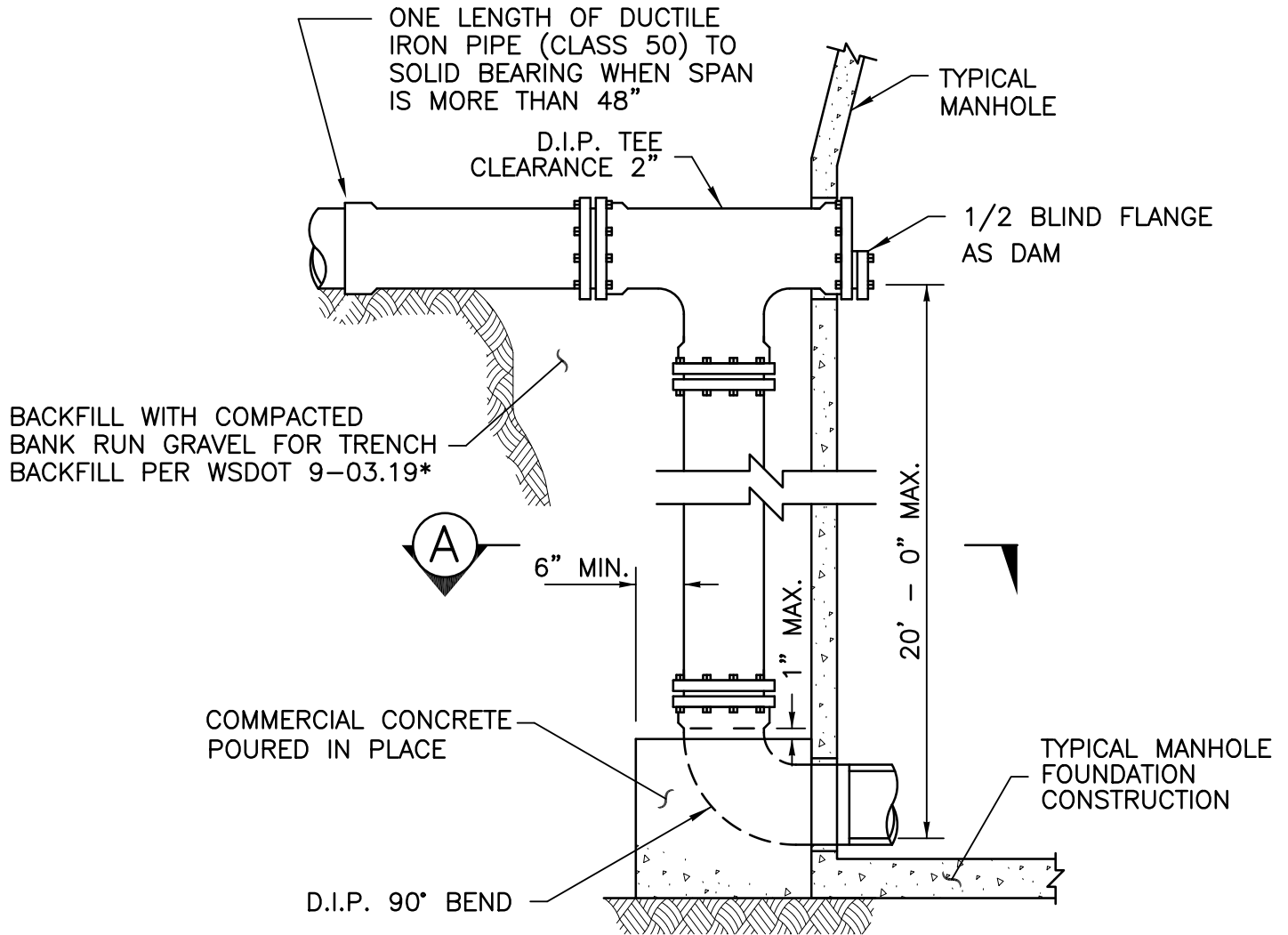
STANDARD DETAIL

S3

3/13/2014



SECTION (A)

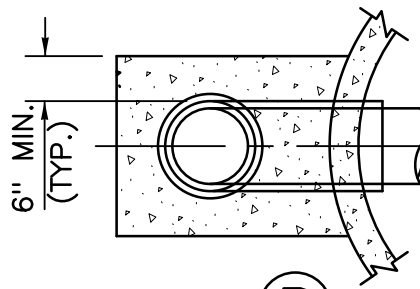


NOTES:

1. \* Differs from WSDOT Std. Plan B-85.50-01

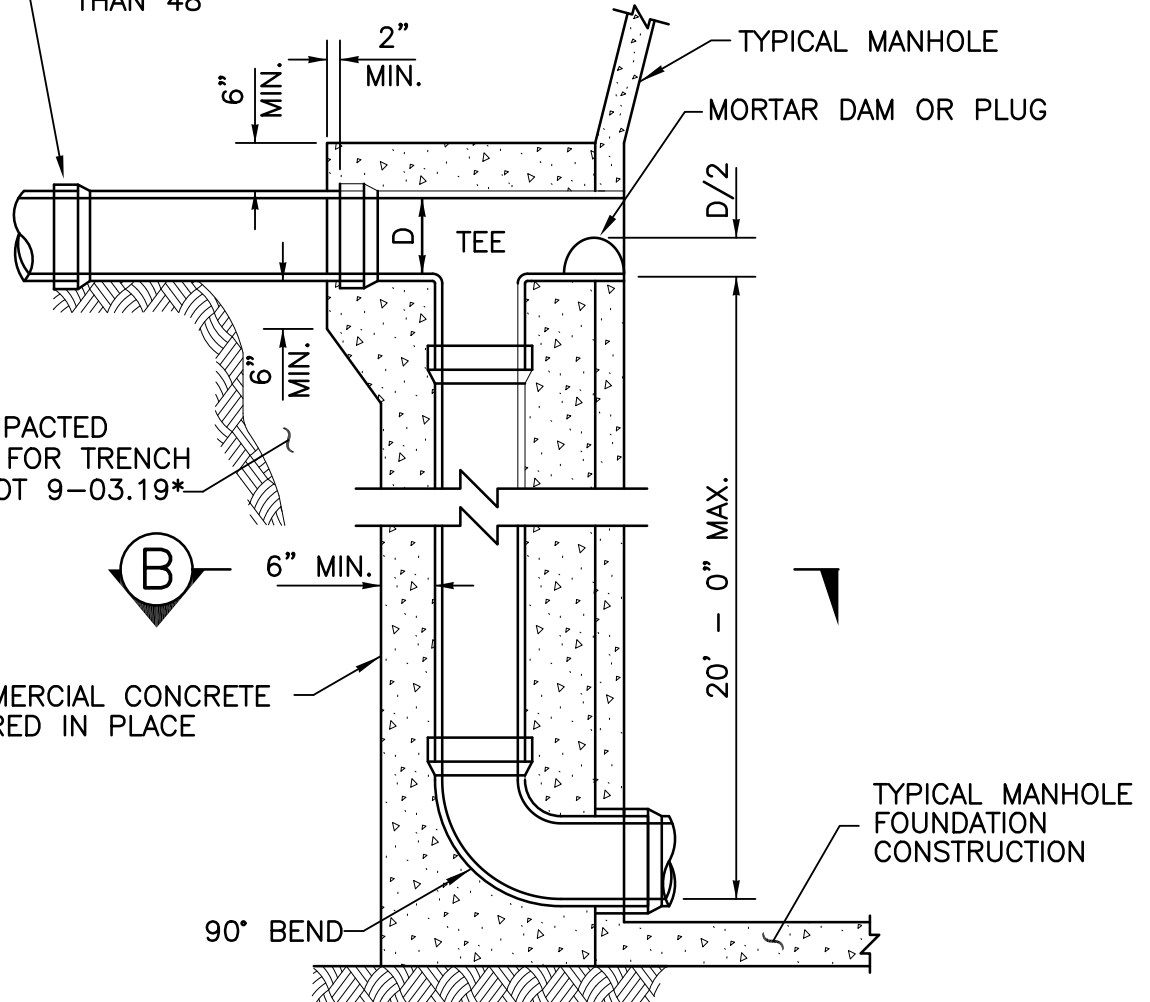
BASED ON WSDOT STANDARD PLAN  
B-85.50-01 DATED 6/10/08.





SECTION (B)

ONE LENGTH OF DUCTILE IRON PIPE (CLASS 50) TO SOLID BEARING WHEN SPAN IS MORE THAN 48"

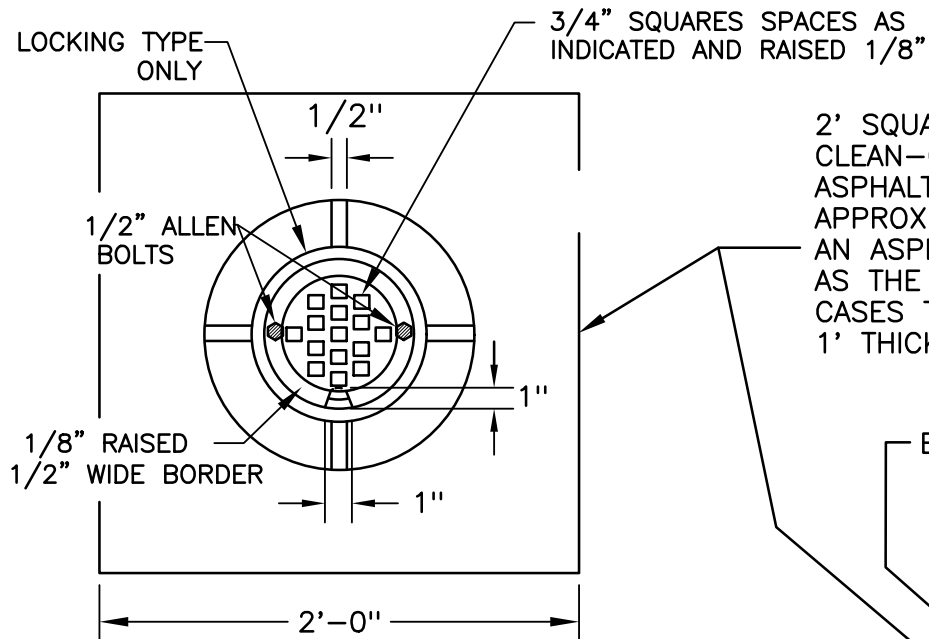


NOTES:

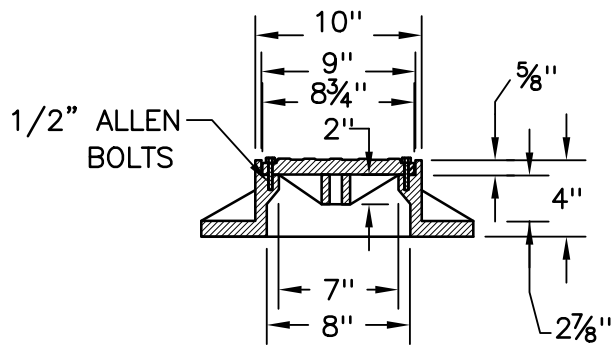
1. All pipe, except ductile iron pipe, shall be concrete encased.
2. Inside drop manhole shall be installed only where approved by the district.
3. \* Differs from WSDOT Std. Plan B-85.50-01.

BASED ON WSDOT STANDARD PLAN  
B-85.50-01 DATED 6/10/08.

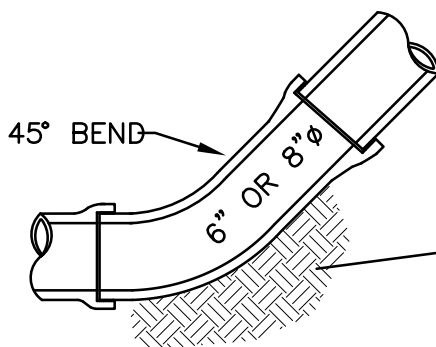




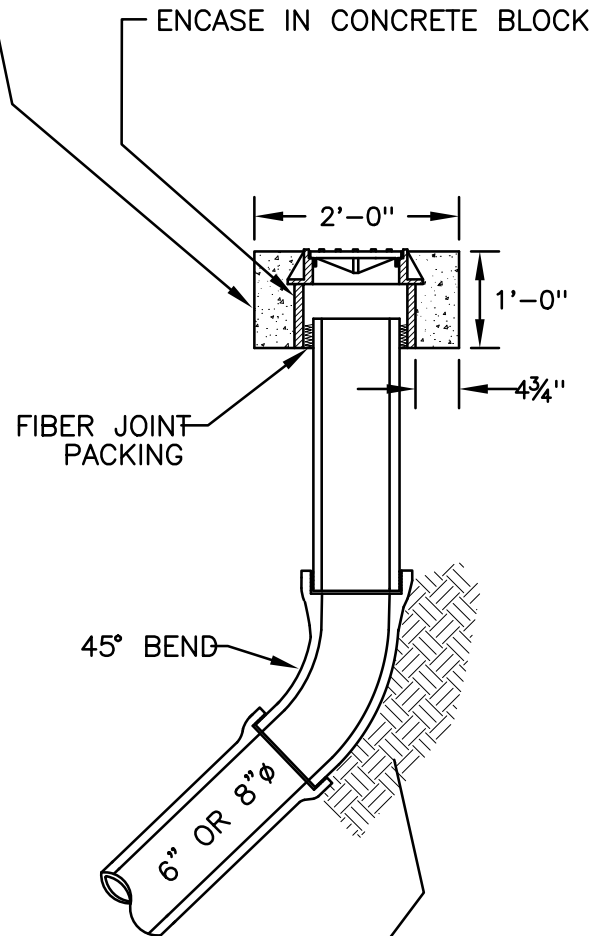
2' SQUARE CONCRETE BLOCK TO ENCASE CLEAN-OUT. IF CLEAN-OUT IS IN ASPHALT, THE BLOCK IS TO BE LEFT APPROXIMATELY 1.5" LOW TO ALLOW FOR AN ASPHALT TOPPING OF LIKE MIXTURE AS THE SURROUNDING AREA. IN ALL CASES THE CONCRETE BLOCK WILL BE 1' THICK.



CAST IRON RING AND COVER



PLACE PIPE ON UNDISTURBED SOIL OR COMPACTED SOIL



NOT TO SCALE

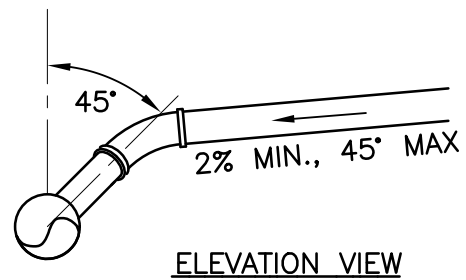
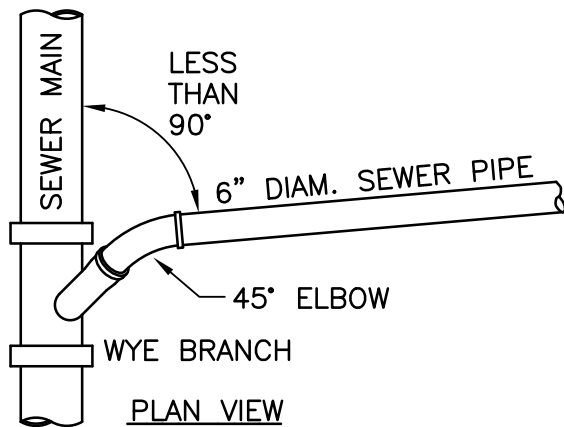


SEWER MAIN CLEANOUT

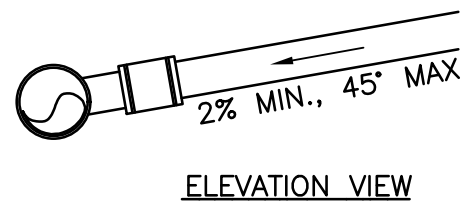
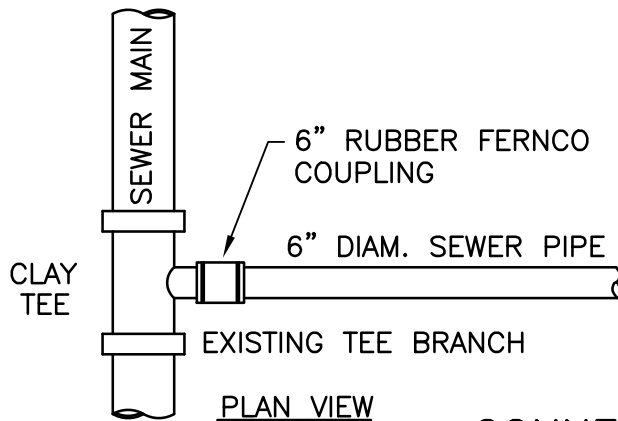
STANDARD DETAIL

S5

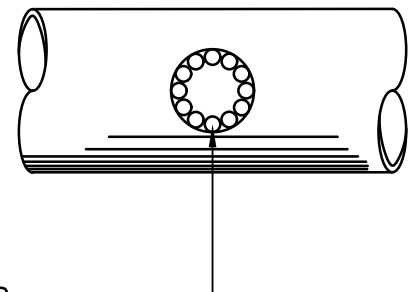
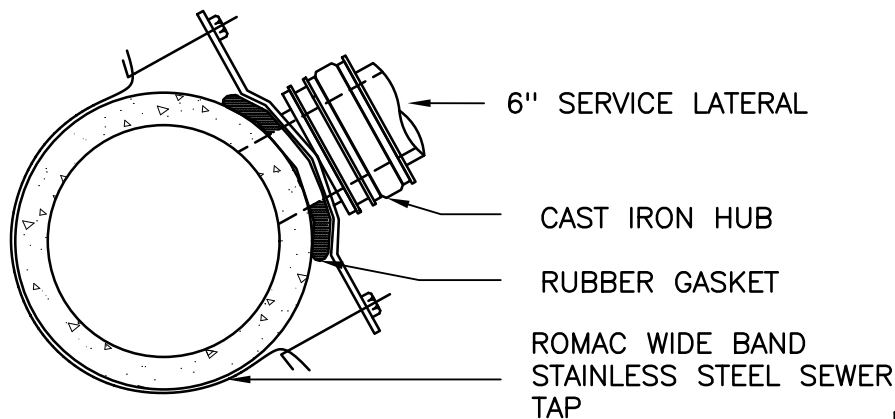
3/13/2014



## SERVICE LATERAL INSTALLED WITH NEW MAINS



## CONNECTION TO EXISTING TEE



MIN 20,  $\frac{3}{4}$ " BORE HOLES FOR  
TAPPING SANITARY SEWER MAIN

### NOTES;

1. Install wye fitting with gaskets for new sewer installations
2. Pipe bedding shall be sand or pea gravel 6" all around.
3. Minimum cover to finish grade is 30".
4. Drill multiple  $\frac{3}{4}$ " holes (20 min for 6") then break out

## CONNECTION TO EXISTING SEWER (TAP)



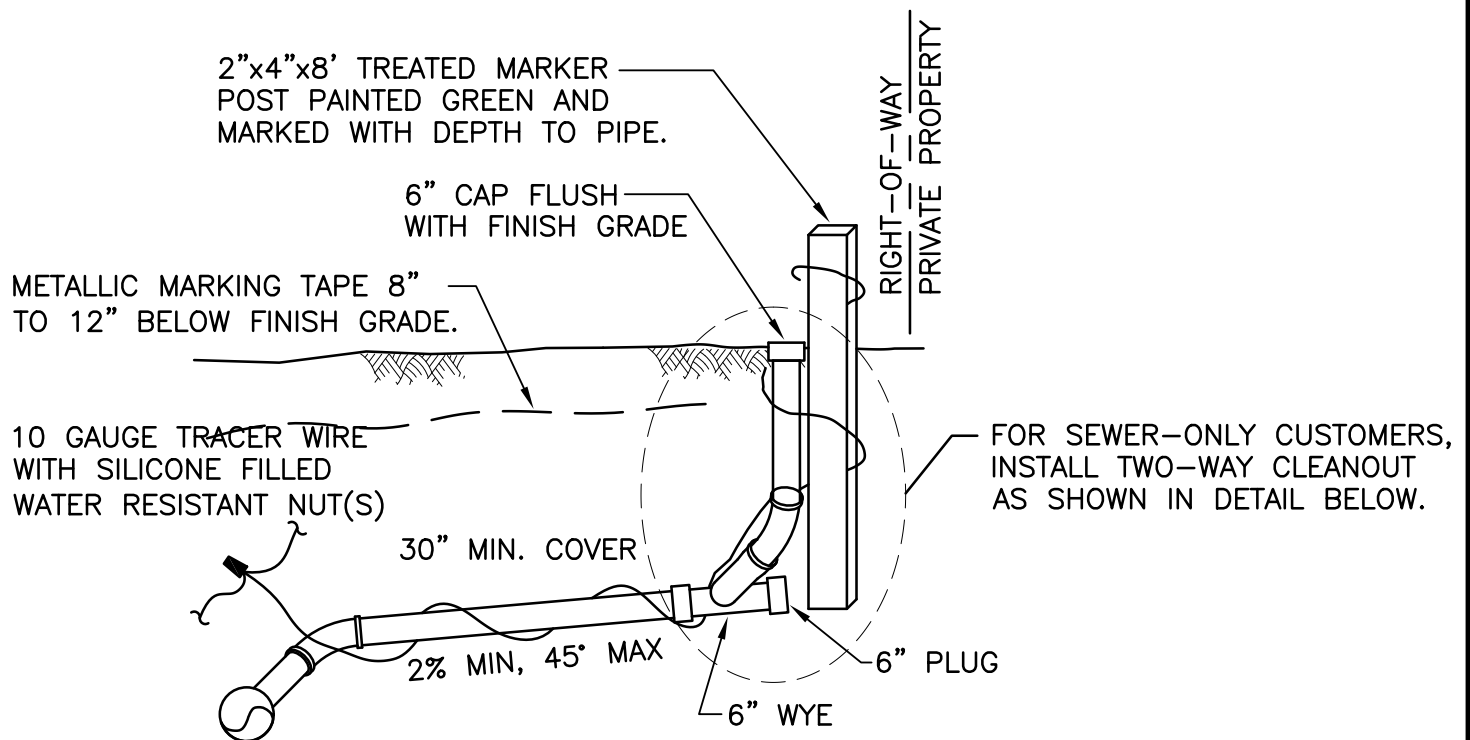
SEWER LATERAL CONNECTION TO MAIN

STANDARD DETAIL

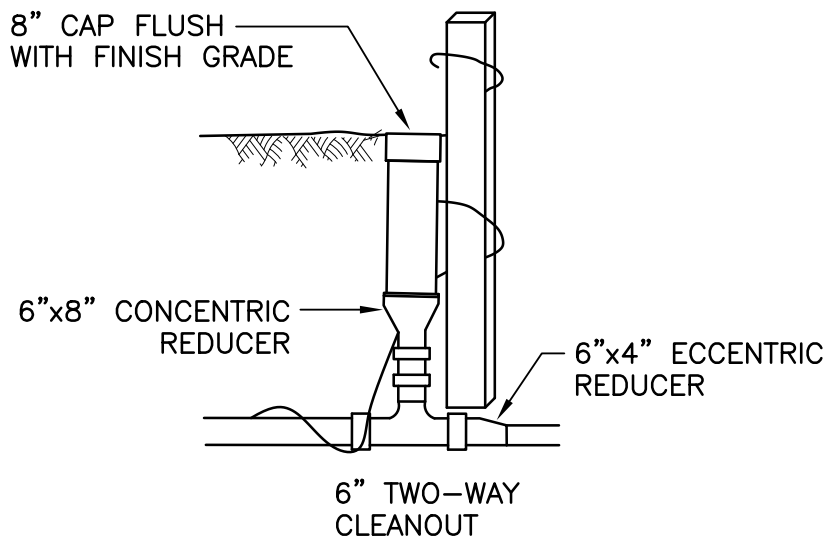
**S6**

3/13/2014





## TYPICAL SEWER LATERAL & CLEANOUT



## CLEANOUT FOR SEWER-ONLY CUSTOMERS.

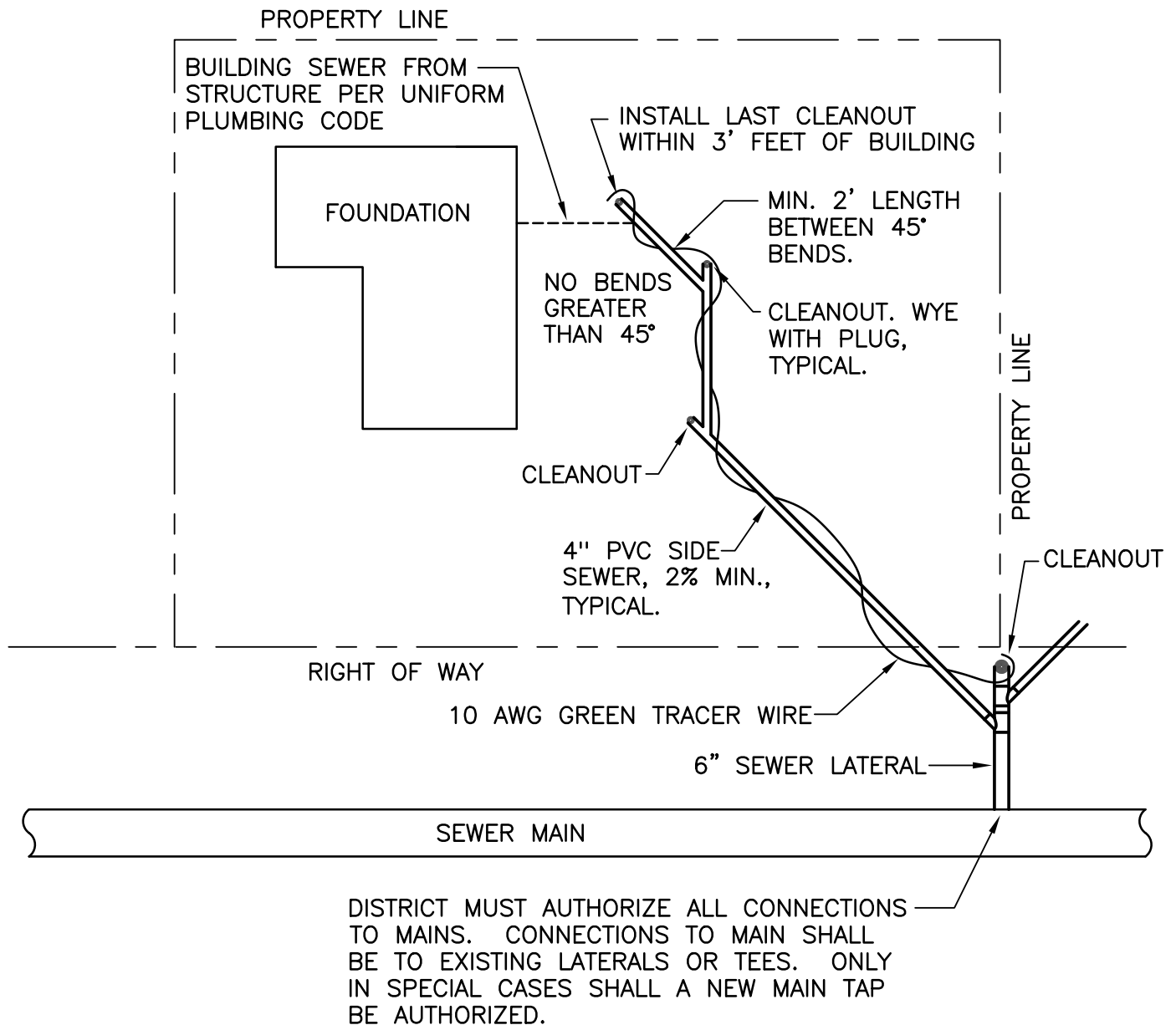


SEWER LATERAL AND CLEANOUT

STANDARD DETAIL

**S7**

3/13/2014



Notes:

1. All pipe from main to cleanout at foundation shall be PVC ASTM D3034 SDR 35, joints shall conform to ASTM D3212 using elastomeric gaskets conforming to ASTM F477. Fittings shall be injection molded, factory welded, or factory solvent cemented.
2. Minimum 18" of cover from property line to building.
3. Down spouts, sump pumps, and outside drains shall not be connected to the sewer line.
4. Bends greater than 45° will not be accepted.
5. Minimum size for sewer lines will be 4" for single family residence and 6" for multi-family residence up to a 4 plex.
6. Cleanouts on service lines shall be installed at every change in alignment or grade in excess of 22 1/2 degrees.
7. Cleanouts shall be spaced no greater than 100' apart.
8. A cleanout shall be installed within 3' of the building.

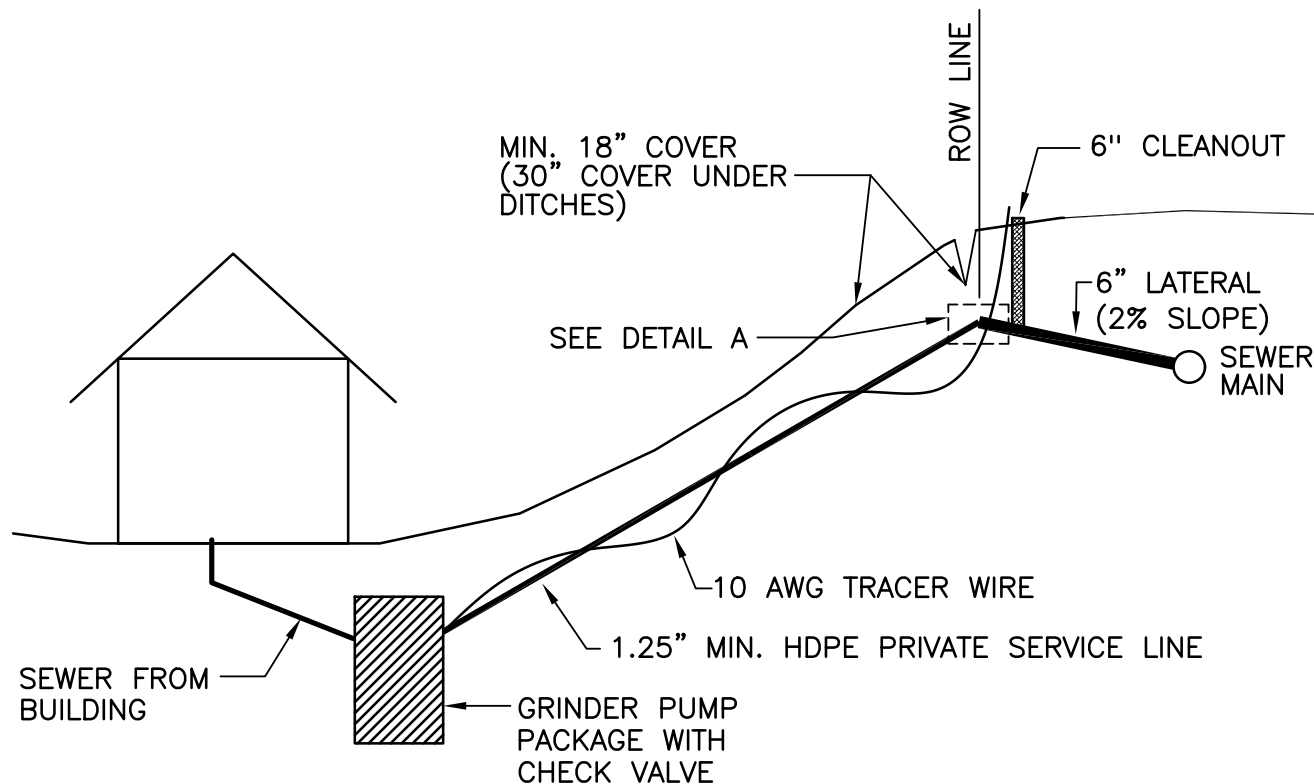
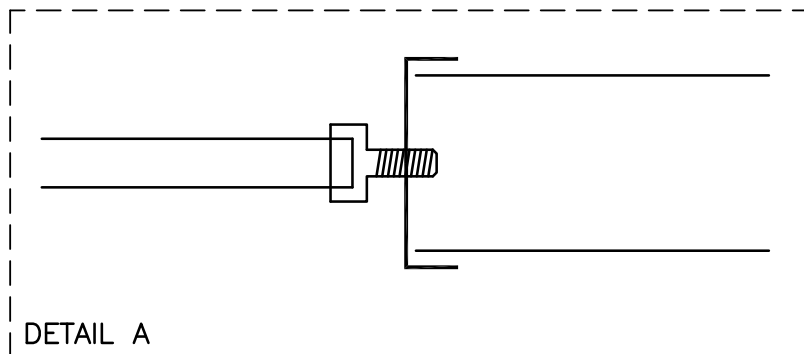


GRAVITY SIDE SEWER INSTALLATION

STANDARD DETAIL

S8

3/13/2014



SEE DOE'S CRITERIA FOR  
SEWAGE WORKS DESIGN,  
SECTIONS C1-10.1 & C1-10.2  
FOR GRINDER PUMP DESIGN &  
COMPONENT INFORMATION

#### NOTES:

1. Pressure sewer service pipe shall be PE 3408 HDPE conforming to the requirements of ASTM D-3350. Piping shall be SDR11, IPS (OD), pressure rated at 160 PSI, conforming to the requirements of AWWA C901 and ASTM F714.
2. Brass compression fittings only – no hose clamps.

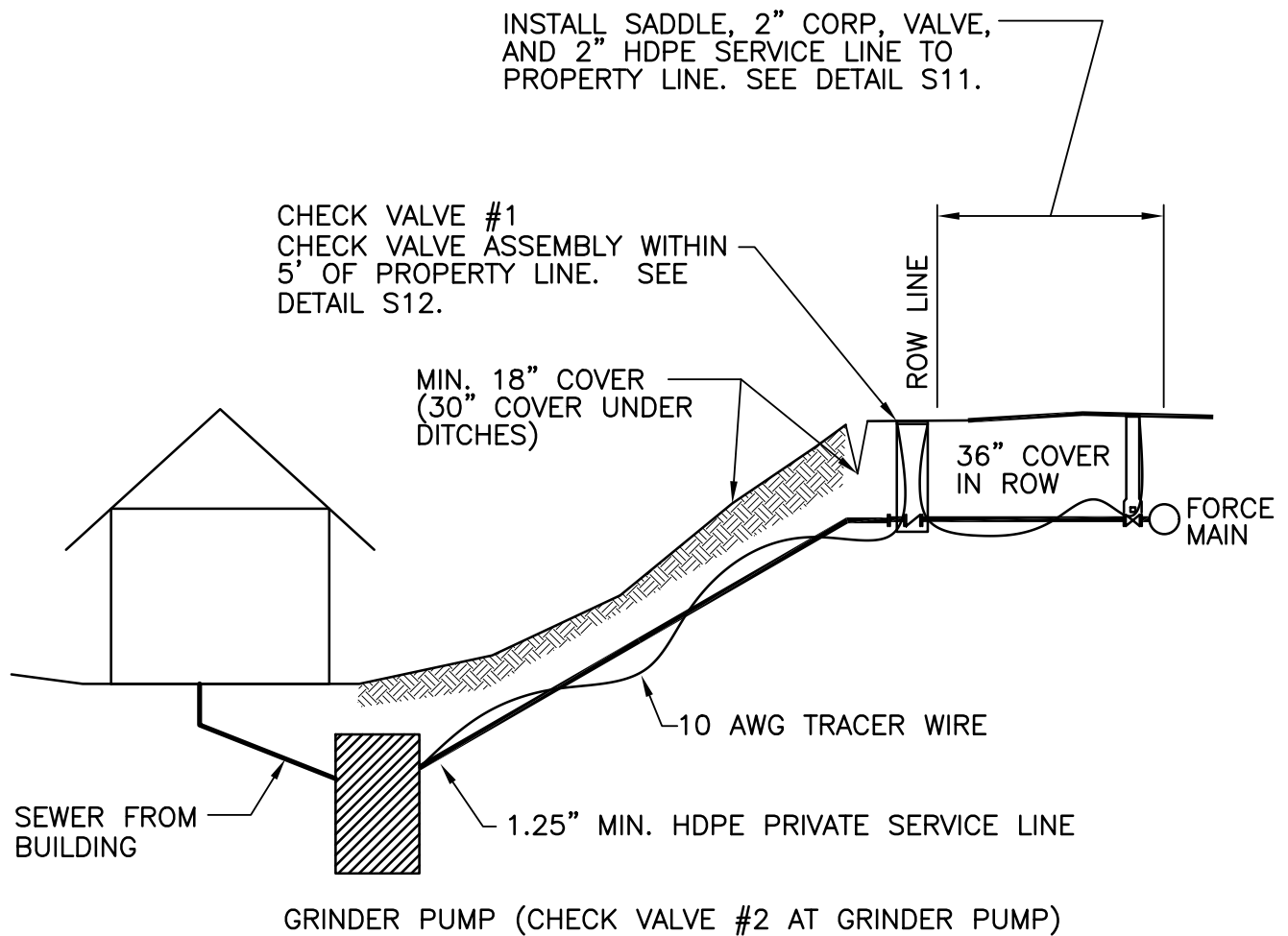


GRINDER PUMP SERVICE TO GRAVITY MAIN INSTALLATION

STANDARD DETAIL

S9

3/13/2014



SEE DOE'S CRITERIA FOR  
SEWAGE WORKS DESIGN,  
SECTIONS C1-10.1 & C1-10.2  
FOR GRINDER PUMP DESIGN &  
COMPONENT INFORMATION

#### NOTES:

1. Pressure sewer service pipe shall be PE 3408 HDPE conforming to the requirements of ASTM D-3350. Piping shall be SDR11, IPS (OD), pressure rated at 160 PSI, conforming to the requirements of AWWA C901 and ASTM F714.
2. Two check valves are required between the pump station and the force main. One check valve shall be installed within 5' of the right-of-way in the check valve vault. The second valve shall be installed at the grinder pump.

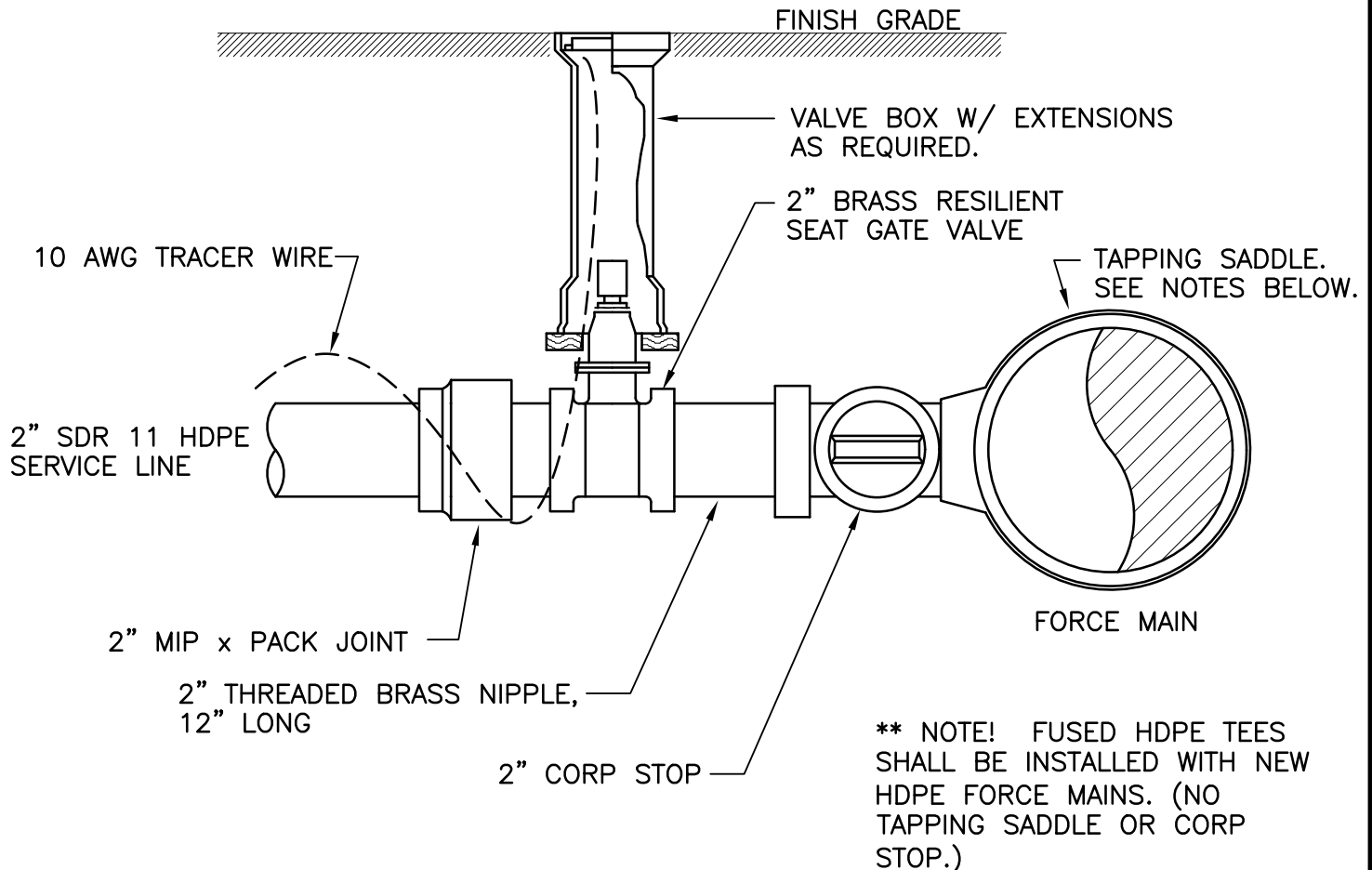


GRINDER PUMP SERVICE TO FORCE MAIN INSTALLATION

STANDARD DETAIL

**S10**

3/13/2014



#### NOTES:

1. HDPE Service Saddles. Saddles for use on SDR 17 HDPE mains shall be epoxy or nylon coated ductile iron tapping saddles with a double stainless steel strapping mechanism specifically recommended by the manufacturer for use on HDPE piping. Saddles shall be Romac style 202N-H or approved equal.
2. PVC Service Saddles. Saddles for use on AWWA C900 PVC mains shall have epoxy or nylon coated ductile iron tapping saddles with a double strap stainless steel strapping mechanism. Service saddles shall be Romac style 202N or approved equal.
3. Ductile Iron Service Saddles. Saddles for use on ductile iron mains shall have epoxy or nylon coated ductile iron tapping saddles with stainless steel tapping mechanism. Service saddles shall be Romac style 101NS or approved equal.
4. Customer Service Shutoff Valves. Shutoff valves shall be resilient wedge type gate valves in conformance with AWWA C509. Valves shall be suitable for sewage service and be equipped with transition gaskets where needed. Gate valves shall have a non-rising stem and be fusion-bonded epoxy coated inside and out meeting AWWA C550. Gate valves shall be Clow resilient wedge gate valves or approved equal.
5. Valve boxes shall have the word "SEWER" cast into the cover.
6. Fittings. All fittings shall be brass.

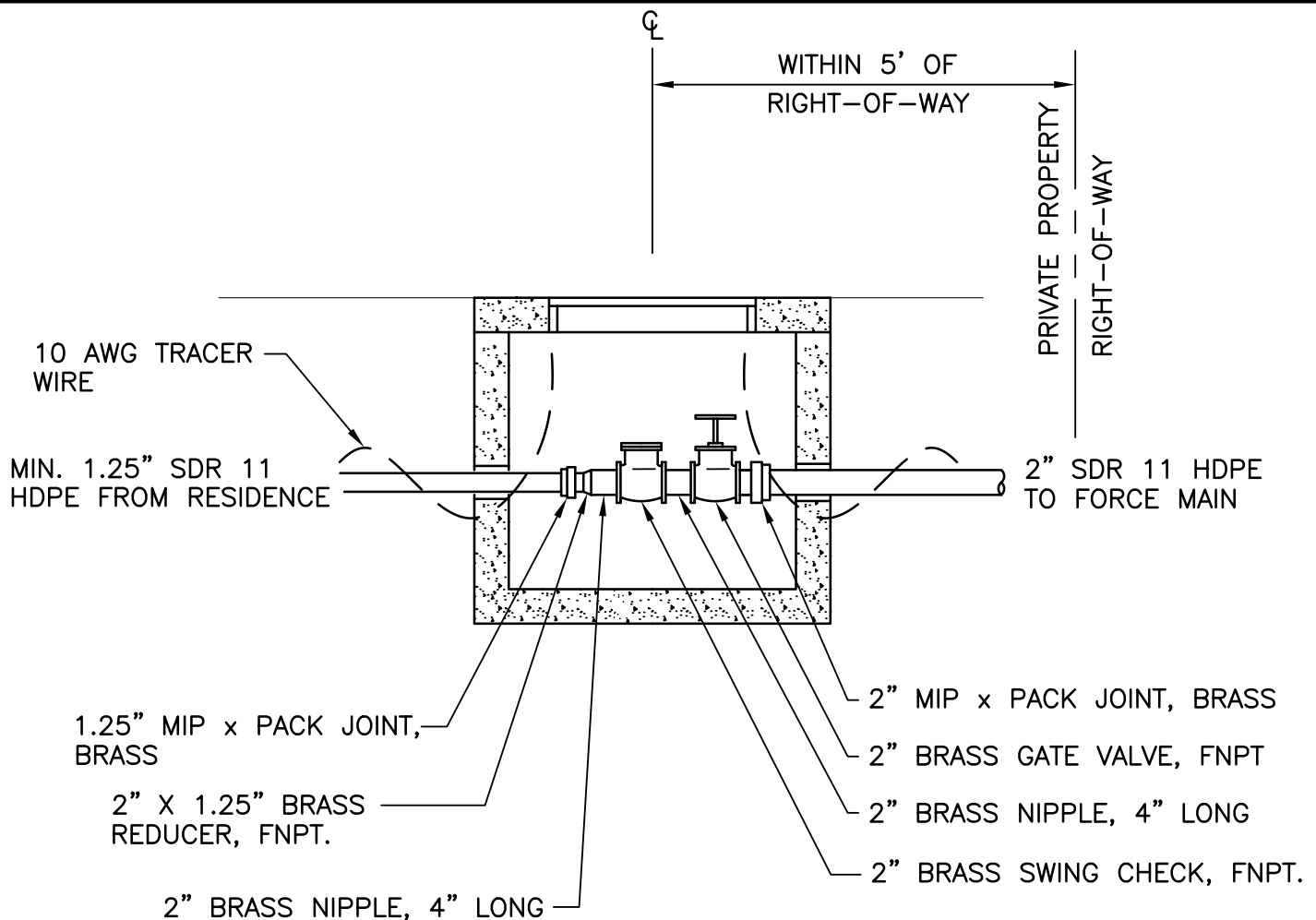


CONNECTION TO FORCE MAIN

STANDARD DETAIL

**S11**

3/13/2014



#### Notes

1. Check Valve. Check valve shall be horizontal swing type manufactured out of brass and be pressure rated to 125 psi. Valve shall have metal to metal seal and threaded NPT end connections. Valve shall be a Watts Regulator Company Series WCV or equal.
2. Gate Valve. Gate valve shall be manufactured out of brass and be pressure rated to 200 psi. Valve shall have threaded bonnet and non-rising stem. Valve shall be a Watts Regulator Company Series WGV or equal.
3. Vault. Vault shall be a pre-cast concrete hand hole with a 2'-0" by 3'-0" inside diameter and a maximum 4'-0" inside depth. Hand hole and access hatch shall be traffic rated. Access hatch shall be galvanized steel checker plate with pick holes and bolt down holes in plate. Check valve vaults shall be Utility Vault Model 2436 hand hole or approved equal.
4. Air/Vacuum Valve. Where required, air relief and combination air relief/ vacuum relief valves shall be as manufactured by Orenco, Apco, Crispin or equivalent for sewer service. All valves shall be fully accessible to enable customer's operation, maintenance and repair.
5. Fittings and Adapters. All fittings and adapters shall be brass.

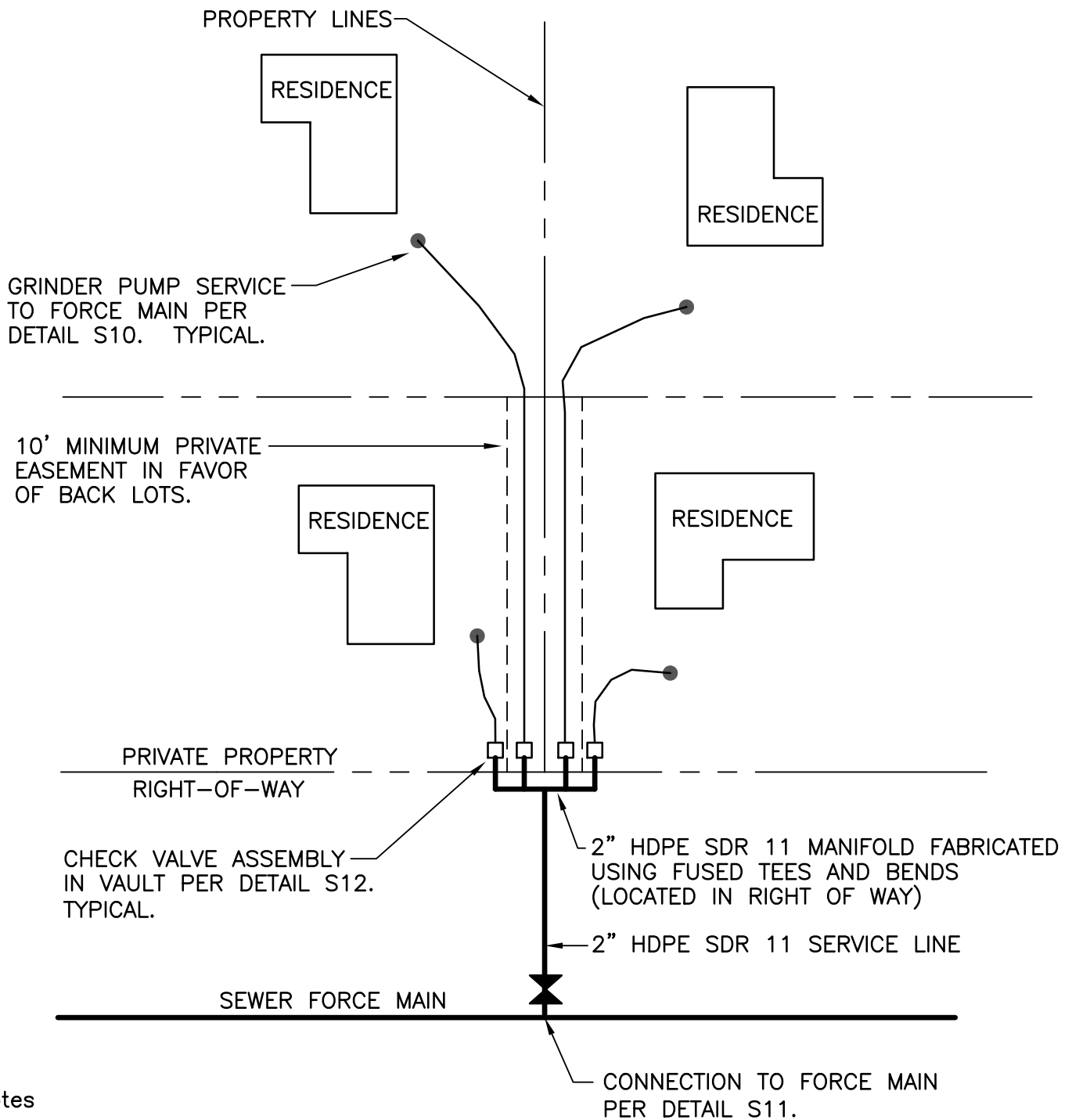


FORCE MAIN SERVICE CHECK VALVE

STANDARD DETAIL

**S12**

3/13/2014



#### Notes

1. If approved by the District Engineer, a single 2" service tap may be shared with multiple residences. District will review requests for shared taps on a case by case basis. Property owners desiring to install a shared tap, shall individually but at the same time, submit a sewer permit application with the grinder pump check list for review by the District.
2. Manifold must be fabricated using fused HDPE tees and bends by a contractor certified by a HDPE pipe or fusion machine manufacturer.

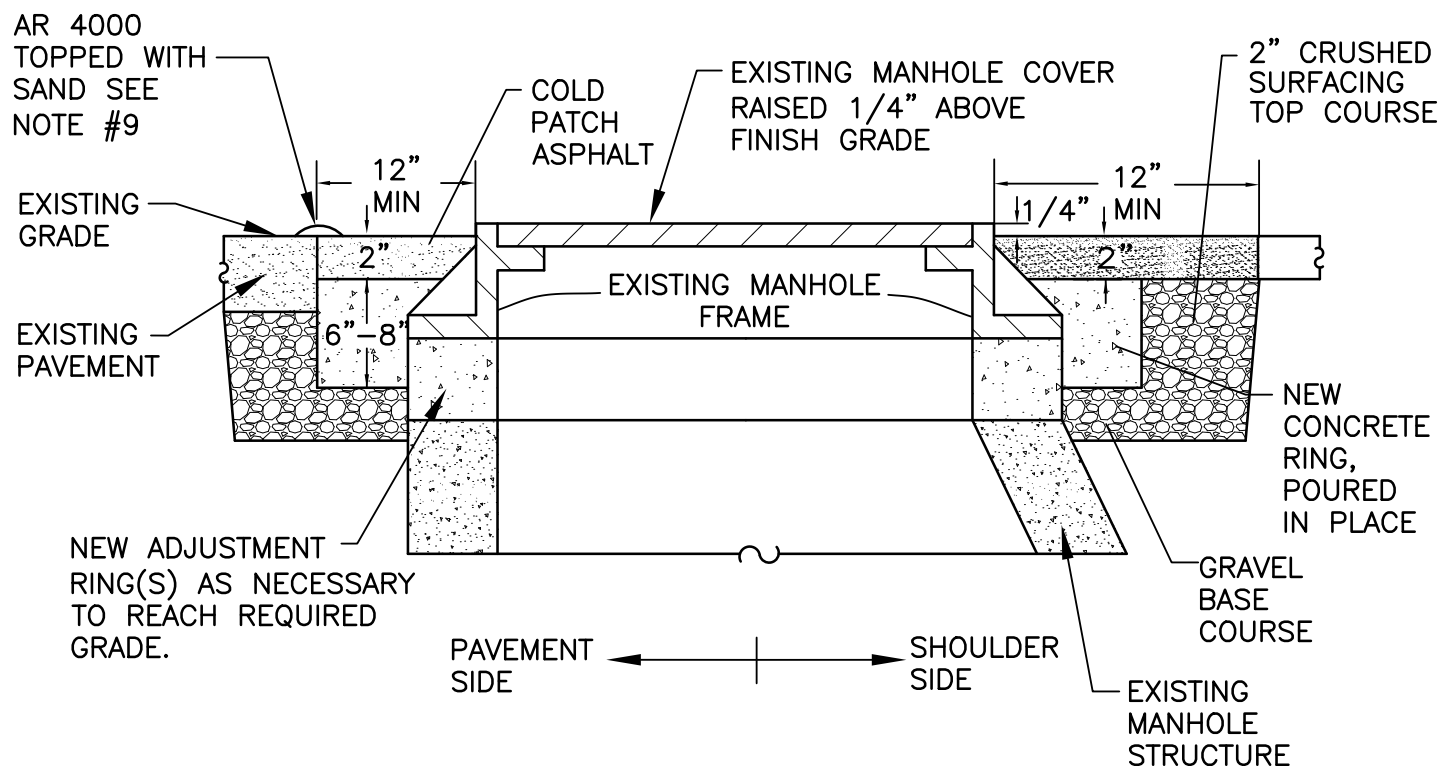


SHARED FORCE MAIN SERVICE TAP

STANDARD DETAIL

**S13**

3/13/2014



#### Notes

1. All manhole frames and covers shall be removed, cleaned and raised to finished grade.
2. Cut the asphalt or remove shoulder ballast in an even circle around the structure casting to be adjusted.
3. Remove the fill material within the cut pavement or shoulder area to 8 inches below finish grade, or to expose adjustment ring.
4. All joints shall be AASHTO M85, Type I or type II mortar.
5. Place Portland Cement concrete to within the top 2 inches of finish grade.
6. Apply tack to the structure casting, cut pavement, and PC concrete.
7. Place and compact 2 inches cold asphalt patch to finish grade.
8. Seal pavement joints with hot AR4000 and top with sand.



MANHOLE RIM & VALVE BOX RE-ADJUSTMENT

STANDARD DETAIL

**S14**

3/13/2014



NUMBER AND SPACING  
OF CROSS MEMBERS  
AS REQUIRED (2 MIN)

CONNECTOR UNISTRUT  
P-1047, SUPERSTRUT  
BN-250 OR EQUAL

TELEPHONE SERVICE  
BOX.

CHANNEL UNISTRUT  
P-1000 SUPERSTRUT  
A-1200, OR EQUAL

POST BASE UNISTRUT  
P-2072A, SUPERSTRUT  
AP-232, OR EQUAL

1/4" STEEL PLATE

GROUT AFTER  
LEVELING

1/2" X 8" ANCHOR BOLT  
OT EXPANSION ANCHOR  
(4) WITH LEVELING NUTS  
(TYPICAL)

PLASTIC END  
CAPS (TYP)

72" FROM SLAB TO  
TOP OF PANEL

CONCRETE SLAB

FRONT

4-1/4"

SIDE

UNISTRUT SUPPORTS

PANEL

48"

4" CONCRETE SLAB,  
BROOM FINISH. SLOPE  
2% TO DRAIN.

PLAN

NOTES:

1. Rack channels and fittings shall be hot dipped galvanized steel.
2. Telephone service lines shall be installed in conduit, both above and underground.



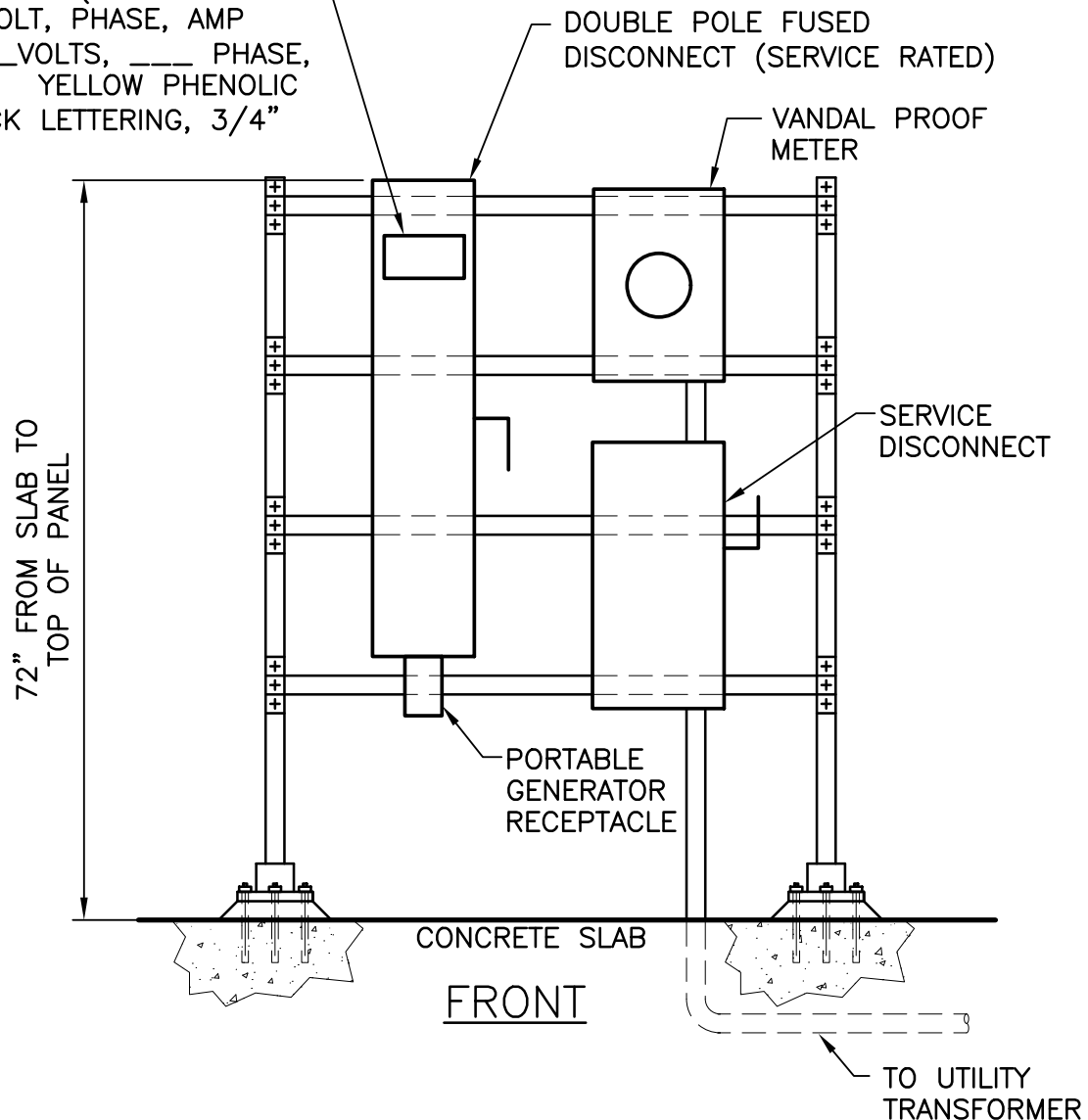
TELEMETRY PANEL

STANDARD DETAIL

E1

3/13/2014

PROVIDE 4"x6" NAMEPLATE.  
TEXT TO READ (BLANKS FILLED  
IN WITH VOLT, PHASE, AMP  
INFO): \_\_\_\_VOLTS, \_\_\_\_ PHASE,  
\_\_\_\_ AMP. YELLOW PHENOLIC  
WITH BLACK LETTERING, 3/4"  
LETTERS.



NOTES:

1. See LWWSD Standard Detail E1 – Telemetry Control Panel for unistrut system and concrete slab requirements. Concrete slab shall extend out 48" from face of panels.
2. Utility equipment may be mounted on back of telemetry panel rack.
3. Portable generator receptacle shall 480 volt, 3-phase, 4 wire service, 100 amp with reversed contacts (female). Receptacle shall be provided complete with cast back box, angle adapter, gaskets, and a gasketed screw-type, weathertight cap with chain fastener. Receptacle shall be Crouse-Hinds "Arktite", Appleton "Powertite", or approved equal.
4. Manual transfer switch shall be a heavy duty (not general or light duty) double-throw MTS, fused as required to comply with NEC as manufactured by Cutler Hammer, Square D, Westinghouse, or equal.

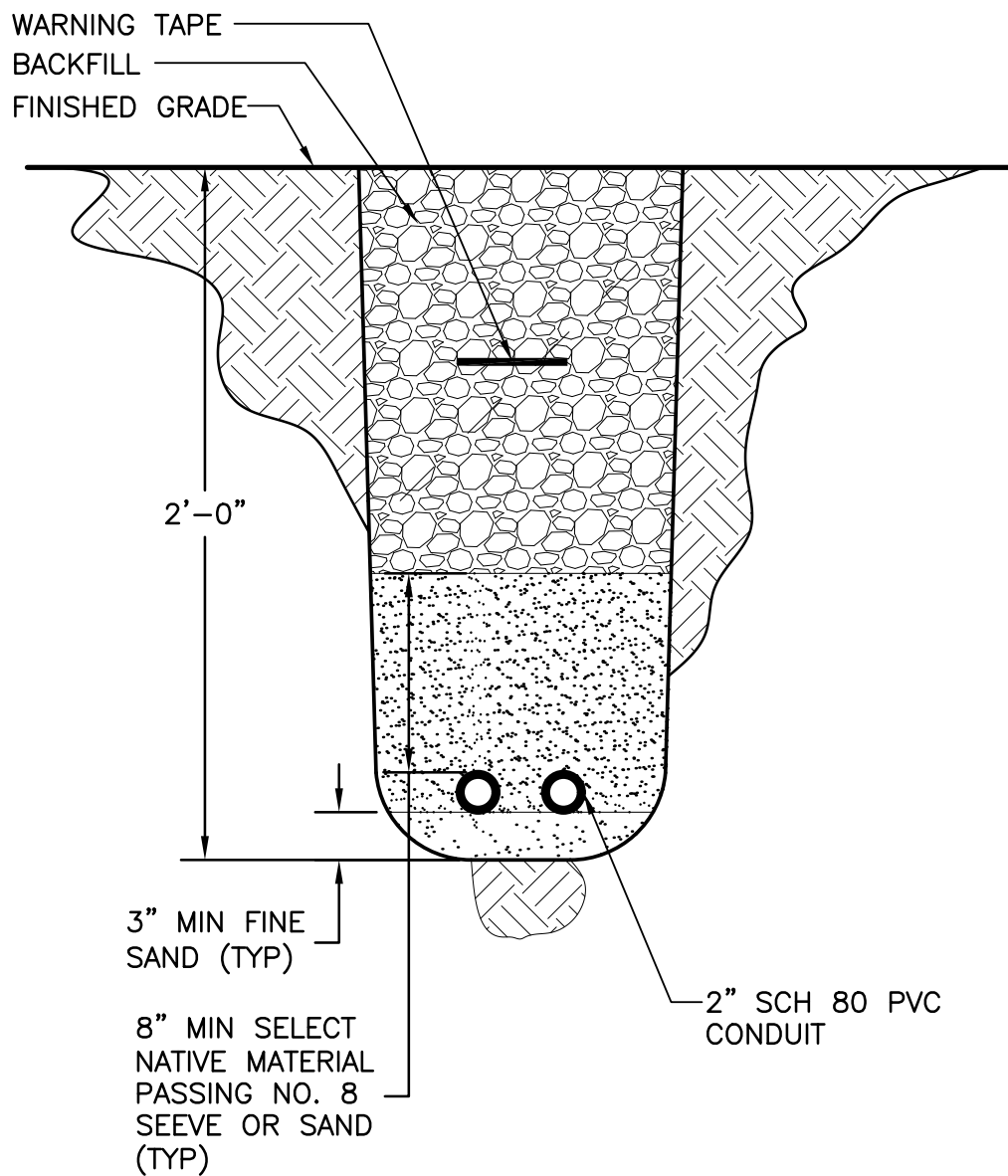


UTILITY EQUIPMENT RACK

STANDARD DETAIL

E2

3/13/2014

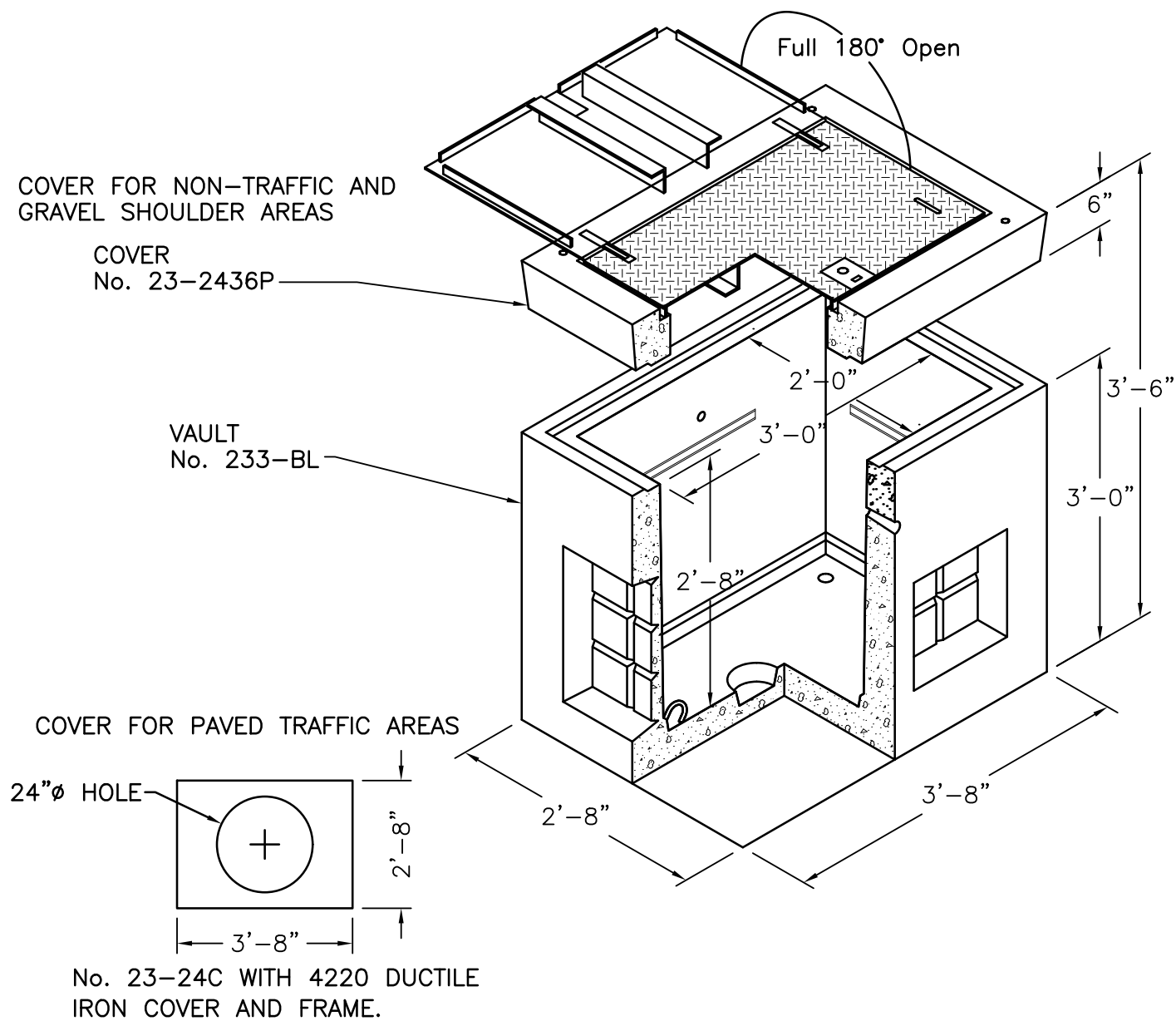


# SCHEDULE 80 PVC TRENCH

STANDARD DETAIL

E3

3/13/2014



#### NOTES:

1. Utility Vault base No. 233-LA or approved equal. Dimensions shown as minimum.
2. Covers shall be rated for H-20 traffic loads. In non-traffic and gravel shoulder areas install hatch cover No. 23-2436P. In paved traffic areas install 4220 Ductile Iron Cover and Frame.
3. Sump knockout in floor.
4. Handholes shall be spaced every 500 to 1000 feet and installed at changes in conduit direction.

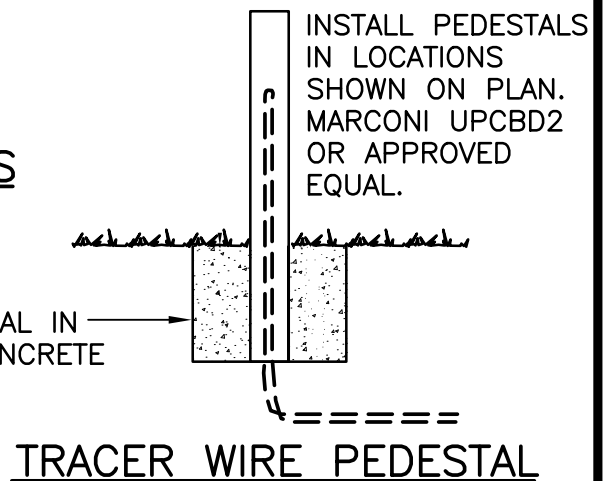
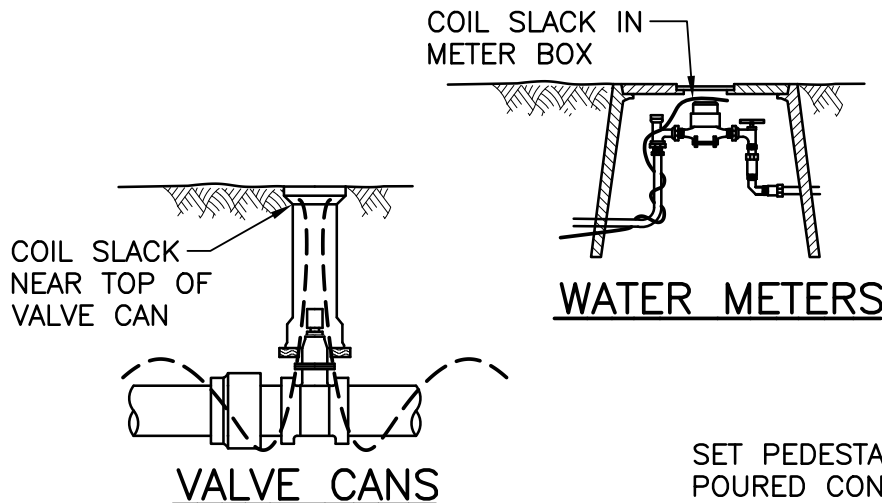
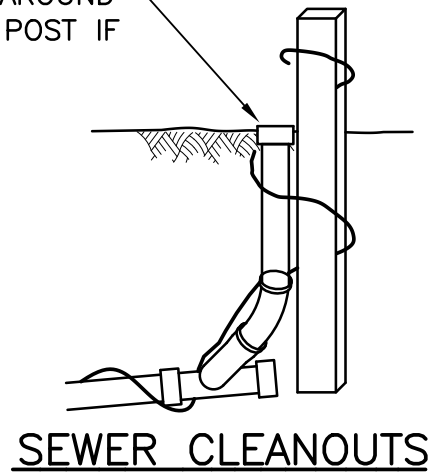
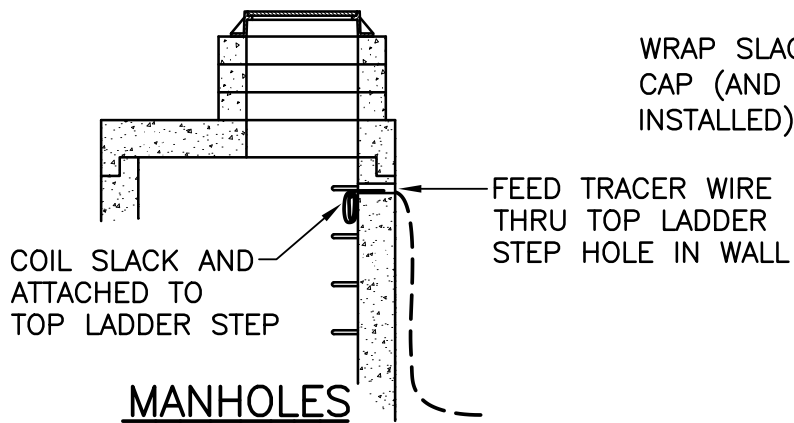


HANDHOLE

STANDARD DETAIL

E4

3/13/2014



#### NOTES:

1. Tracer wire installation is required on all District owned pipe and communication lines. Tracer wire is also required on private side sewers.
2. Tracer wire shall be 10 AWG insulated copper wire rated for direct burial in wet locations. Use green insulation for sewer, blue insulation for water, and orange insulation for fiber/communication related utilities.
3. Install tracer wire in continuous lengths (no splices) between surface access points. Any direct bury splices shall be approved and inspected by the District Engineer prior to cover. Splices shall be made with silicone filled wire nuts rated for direct burial in wet locations such as "Ideal Underground Wire Connectors", "Ideal Mudbug Connectors", "Copperhead Snakebite Connectors," or "3M DBR Direct Bury Splice Kit."
4. Tape tracer wire to pipe at 10-foot intervals.
5. Provide at least 2-feet of coiled tracer wire slack at surface access points.



TRACER WIRE

STANDARD DETAIL

E5

3/13/2014