# General Requirements and Details

for the

# Design and Construction of Public Sanitary Sewers

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# Contents

# SECTION 3
# SANITARY SEWER DESIGN AND CONSTRUCTION REQUIREMENTS

## 3-1 INTRODUCTION

The City of Vancouver's (City) Public Works Department provides wastewater collection and treatment for a service area of about 56 square miles. The area includes residential, commercial, and industrial customers inside and outside of the City limits. The sanitary sewer collection system includes about 785 miles of piping. Piping is dedicated to wastewater and is separate from stormwater systems. Wastewater is delivered to two facilities for treatment.

### 3-1.01 Authority, Codes, and Standard Specifications

The City maintains the collection system in accordance with two wastewater discharge National Pollution Discharge Elimination System permits issued by Washington Department of Ecology for the Westside and Marine Park wastewater treatment facilities. The City's system satisfies and follows Ecology's *Criteria for Sewage Works Design* (CSWD, Orange Book). The Growth Management Act requires collection systems to maintain a General Sewer Plan (GSP). The City's two volume GSP plan was prepared by Kennedy/Jenks Consultants in April 2011.

The Vancouver Municipal Code (VMC) requires developing properties to be served by public sewer. Developments are required to connect to existing public sewers and to construct public sewers to the site and across developing frontages. Construction through properties is also required to allow extensions for service to adjacent parcels. On-site public sewers are typically required to serve commercial and industrial complexes with multiple buildings serving separate owners and/or tenants. Public sewers are also required for sites with multiple residential buildings, such as apartments and condominiums (WAC 173-240-104).

Sewers shall be designed according to GSP sizes, elevations, alignments, and capacity requirements as necessary for the fair and orderly development of the system. Off-site downstream capacity studies and improvements may also be required. The VMC also regulates discharges of commercial and industrial wastes. Code sections include VMC 14.04.280, 14.16.010, 14.10, 20.270.050, and 20.320.040.

In addition to these General Requirements and Details, construction of public sewers shall also conform to the current version of the *Standard Specifications for Road, Bridge & Municipal Construction* prepared by Washington State Department of Transportation and the Washington State Chapter of the APWA (Standard Specifications). These Standard Specifications are found on the WSDOT website (Home > Engineering & standards > All manuals & standards > Manuals > Standard Specifications for Road, Bridge, and Municipal Construction).

Finally, construction shall also conform to the *City of Vancouver Amendments to the 2022 WSDOT Standard Specifications for Road, Bridges and Municipal Construction (Water, Sanitary Sewer and Surface Water Construction)*.

These General Requirements and Details and other resources are found on the Permit Center's Engineering Services web page. (Copies of the latest Amendments are available on request.)

Navigate the City's website (www.cityofvancouver.us) through Business and Development to Engineering Services. The Permit Center is located at City Hall (415 West 6th Street). The Engineering Services phone number is (360) 487-7804 and the email address is citycddeng@cityofvancouver.us.

### 3-1.02 Proposal Review Requirements

Proposals for new public sewer construction, improvements, and/or new individual services require City review. Developing properties typically submit a pre-application proposal to the Community Development Department. City requirements, including public sanitary sewer, are provided in a pre-application report. Information about the pre-application conferences is found on the Community Development web pages. Additional requirements are included as conditions in the application's staff report.

Proposals and inquiries without land applications require submittal of a Request for Utility Service (utility review). Completed reviews provide the applicant with public sanitary sewer service and construction requirements. Utility review applications are found on the Permit Center's Engineering Services web page.

### 3-1.03 Civil Plan Requirements

All public sewer improvements require submittal of civil plans prepared, signed, and sealed by an engineer licensed in the State of Washington. Designs shall satisfy pre-application and utility review requirements, land entitlement (staff report) conditions, and the codes and standards. Civil plans associated with land applications are submitted and reviewed together with the land application. Plans without land entitlements are submitted and reviewed separately.
Civil plan submittal requirements are found on the Engineering Services web page. Civil plans are also required to include the following, where applicable:

1. Plans, profiles, details, and grading plans for new or extended sanitary sewers, new manholes, and new stubs (8" or greater).
2. City Standard Plans that apply to the project.
3. Construction Specifications for Sanitary Sewer in Standard Plan Number S-1.0. Special designs, installations or conditions may require additional notes.
4. All existing and proposed easements with dimensions.
5. All sanitary sewer lines and easements clearly identified as public or private.
6. Stationing in plan and profile views, beginning at station 0+00 at the downstream manhole. Stationing shall be based on the sewer centerline.
7. All existing manholes and cleanouts labeled with the City-assigned identifier number.
8. Pre-treatment structures, including manufacturer and capacity.
9. Locations of existing septic tanks.

Plan review and approval is required prior to construction. Final civil plan sets shall address all City review redlines. An applicant's submittal for civil plan approval constitutes their agreement to construct all of the sewer facilities shown on the approved plans. Plan approval is a declaration that sewer construction as specified and conditioned will be consistent with the following requirements:

1. Existing public sewers are available to serve the proposed development
2. The design satisfies the GSP, the VMC, and land entitlement conditions
3. Sewer construction is legally and physically buildable to specified standards
4. The design satisfies the Standard Specifications, their amendments, these General Requirements and Details, and other applicable standards, and
5. Completed construction will be suitable for public ownership

All design changes to approved plans require City review and approval.

### 3-1.04 Service Lateral Table Requirements

Each sewer service lateral shall be designed with upstream depths and elevations adequate for service to the intended lot or building, and to meet the minimum cover requirements.

Sanitary sewer designs (civil plan sets) require service lateral tables. Lateral tables are required for both gravity and pressure laterals.

This section summarizes intent, provides requirements, and provides examples

The intent of lateral tables is to:

1. Demonstrate that each lateral has been specifically considered and designed
2. Show how upstream end elevations are calculated
3. Compare upstream elevations to finish grades and/or finish floor elevations
4. Identify applicable standard details (S-1.4A, B, C, E, etc)
5. Indicate special design features (pipe materials and diameters)
6. Provide locations for direct comparison to construction inspections (TV) observations
7. Accommodate surveyed as-built information and provide clear and accurate records for permanent as-built records

Lateral tables shall include, at a minimum, the following columns:

1. Lateral ID/building name
2. Downstream manhole number
3. Distance to downstream manhole
4. Elevation of main at the connection
5. Depth at downstream end
6. Lateral diameter and material
7. Slope (Note: Where applicable, slope shall be calculated as the upstream invert minus the downstream invert at the wye divided by the lateral length)
8. IE at the upstream end (property line or edge of public sewer easement)
9. Depth at upstream end

The following may also be required, where applicable:

1. End location geometry notes (for angled laterals)
2. Identify lots that require private pump systems
3. Minimum finish floor elevations (FFE)
4. Invert elevation and ground cover over stormwater infiltration trench

### 3-1.05 Construction and Final Civil Project Acceptance

Public sewer construction shall satisfy all standards and details noted on the approved civil plans. Applicants are required to construct all sewer improvements shown on the approved plans. Escrow provisions are not available for underground utilities. Satisfy City Construction Services testing and inspection requirements and secure Construction Acceptance. Satisfy all requirements itemized in the plan approval letter and secure final civil project acceptance prior to submitting a final plat and/or utility connection applications.

## 3-2 GRAVITY SEWERS

### 3-2.01 Location

Whenever possible, public sewers shall be extended in public rights-of-way. The standard and desired location of sewer mains in the public right-of-way is either seven (7) feet south or west of centerline or center of travel lane. When a property cannot be served by gravity sewer extended in an existing or proposed public right-of-way, the sewer shall be extended in an easement dedicated to the City of Vancouver. See Sewer Detail S-6.0 for typical sewer locations in the public right-of-way.

### 3-2.02 Easements

Public sewers not located in the public right-of-way must be in an easement dedicated to the City. Easements allow direct access for maintenance by City staff. Public sanitary sewer maintenance access is provided by the public sewer easement language and/or VMC 14.04.035. Easements shall use standard required language and exhibits. Language is available on the Engineering Services web page.

Completed easement documents shall be submitted to the City for recording. Questions regarding easements can be directed to Engineering Services. The developer may also be required to submit easement release documents to Sewer Engineering for review and approval.

Public utility easements may be recorded by plats when associated with land divisions within the City limits. Plat recordings must include standard dedication language. Easements recorded by plats require plat alterations to modify or vacate.

In cases where off-site sewers require public easements submittal of recordable easements is a condition of civil plan approval.

Sewer facilities that require easements on private property include, but are not limited to, sewer mains, manholes and clean-outs. Pump stations require property ownership by the City.

Easements shall be 15 feet wide or greater. Shared utility easements with sanitary sewer and one other public utility such as water or storm water shall generally be a minimum of 20 feet wide. Shared utility easements with sewer and two other utilities shall generally be a minimum of 25 feet wide. Wider easements may be required depending on the depth and size of the utilities. The easements shall extend at least ten (10) feet past the end of the main. Sewer mains shall be located at least five (5) feet inside the edge of the easement.

Easements shall be located entirely on one parcel. Straddling lot lines will not be allowed. There

shall be no structures, including trees, overhanging objects, fences, retaining walls, or building foundations located within the sewer easement.

All existing and proposed public sewer easements shall be shown, noted, and specified on civil plans, site plans, landscaping plans. and plats.

Public sewer easements may also be required to provide direct maintenance access from the public right-of-way across private property to all parts of existing or proposed public sewer easements and facilities, or as needed for access to adjacent lots with public sewer. Direct access shall be designed, specified, and maintained for heavy maintenance vehicles (Sewer Detail S-6.1).

The largest sewer maintenance vehicles require a turning radius of over 40 feet. A turning template is available on the City's website. Navigate the *Transportation Standard Details* page to the *Various Truck Turning Radius Information* link.

Storm facilities in sanitary sewer easements shall be consistent with the following requirements:

1. Maintain adequate depth of cover over the sewer pipe. if the pipe has less than five (5) feet of coverage, C900/905 pipe shall be required.
2. Drywells are not allowed in sewer easements. If the outlet from a swale goes to a drywell, the flow must be piped to a drywell located outside of the sewer easement. Sanitary sewer manholes shall not be located in the swale. If unavoidable, special approval may be requested. If approved, manhole rims must be placed high enough to prevent inflow and the manhole shall be watertight to prevent infiltration. The rim shall be raised using standard sections and a cone section. Riser rings shall not be allowed.
3. Sanitary service laterals are not allowed in the swale.

### 3-2.03 Capacity

The flow rate of a sewer main is calculated using Manning's formula for open channel flow.

$$\mathbf{Q = (1.49/n)AR^{2/3}S^{1/2}}$$

Where:

Q = Discharge in cubic feet per second, (cfs)
n = Coefficient of roughness, 0.013 is used for sewer main design
A = Cross- sectional area of flow in square feet
R = Hydraulic radius (Area divided by wetted perimeter) in feet
S = Slope of the hydraulic gradient in feet per foot

Peak discharge for sloped circular sewers under the force of gravity occurs when the fluid level is about 93 percent of the diameter. These design standards define pipe capacity as the discharge at full pipe. See Table S-1 for required minimum slopes and resulting pipe capacities.

Flow rates for sewer are commonly expressed in million gallons per day (mgd). Multiply cubic feet per second (cfs) by 0.6463 to convert to million gallons per day (mgd = cfs x 0.6463).

### 3-2.04 Slope

Table S-1 shows minimum pipe slope requirements. The first column lists common nominal pipe diameters. Middle columns specify minimum design and allowable as-built slopes. Design slopes

for larger pipes are determined on a case-by-case basis.

Minimum Slope Calculation: Slopes shall be based on lineal feet between the center of a manhole to the center of the adjacent cleanout or manhole. Lineal feet of pipe shall be based on the center-to-center distance between adjacent manholes or cleanouts.

Minimum Design Slopes: Engineers shall design systems using the minimum design slopes in most cases. In general, steeper slopes are desirable and are recommended where the main will not be extended further and there are few connections.

Minimum as-built slopes are based on slopes required to produce a mean velocity of at least two (2) feet per second (fps) when flowing full or half full using a Manning's coefficient of 0.013. The differences between design slopes and as-built slopes in Table S-1 represent an allowable tolerance of 0.0005. Mains installed flatter than the as-built minimum shall be re-installed by the contractor to meet the minimum requirements.

Exceptions: The City reserves the right to allow design slopes flatter than those listed in Table S-1. Minimum as-built slopes may be allowed as design slopes when flatter slopes are required to serve the basin and the City determines that the use of a larger pipe size is detrimental to the system. In such cases the construction tolerance of 0.0005 (for eight (8) inch to eighteen (18) inch pipe) will still be allowed.

Maximum Allowable Slope: Maximum pipe slope shall be governed by terrain and available fall between manholes. Maximum velocity in the pipes shall not exceed eight (8) fps, unless specifically approved by the City. In some cases, it may be necessary to use drop connections to reduce slope and velocities.

**Table S-1. Required Minimum Slopes and Pipe Capacities**

| Inside Diameter (inches) | Minimum Pipe Slope (ft\ft) | | Pipe Capacity at Minimum Design Slope (mgd) |
|---|---|---|---|
| | Design | As Built | |
| 8 | 0.0045 | 0.0040 | 0.50 |
| 10 | 0.0033 | 0.0028 | 0.75 |
| 12 | 0.0027 | 0.0022 | 1.1 |
| 15 | 0.0020 | 0.0015 | 1.6 |
| 18 | 0.0017 | 0.0012 | 2.4 |

Notes:
1. Pipe capacities are defined at full pipe
2. Pipes larger than 18 inches require review and approval

### 3-2.05 Design Flows

Design flow calculations typically include estimates of average, maximum, and minimum daily flows. The submission of design calculations will not ordinarily be required, but engineers should be prepared to substantiate pipe sizes, layout, population estimates, land uses, fixture units, and other design assumptions.

The sanitary sewers shall be designed with the capacity to handle peak flows at full pipe and to transport suspended solids during low flows. Average design flows are determined by the following factors:

1. Drainage basin characteristics
2. Population densities
3. Per capita wastewater contribution rates
4. Land use within the area to be served
5. Commercial, industrial, or institutional users to be served

**Average Baseflow**: Values in Table S-2 are approved to estimate the average buildout baseflow. Alternate estimates can use flow monitoring data or other reliable industry-standard rates. Alternate estimates require comparisons to the rates in Table S-2.

**Table S-2. Sanitary Sewer Contribution Rates**

| Type | Average Flow |
|---|---|
| Residential | 75 gpd/person |
| Commercial | 800 gpd/acre (1) |
| Industrial | 800 gpd/acre (1) |
| Infiltration and Inflow | 200-2000 gpd/acre (2) |

(1) Based on total site acreage
(2) Estimates vary by basin

**Peaking Factor** (PF): The formula below is approved to calculate the baseflow's peaking factor.

$$PF = 2.63 - 0.26\ln(Q_{ave}\text{-mgd})$$

**Infiltration & Inflow** (I&I): Groundwater and rainfall-related inflows sometimes enter sanitary sewers. Sewer designs must estimate and account for I&I. Estimates vary by basin and are maintained by the Sewer Engineering office (and Sewer Master Plans).

**Required Pipe Capacities** shall accommodate total peak buildout flows according to the following formula:

$$\text{Required Pipe Capacity} = \text{Average Baseflow} \times PF + I\&I$$

Where:

PF = Peak Flow Factor
I&I = Infiltration and Inflow

### 3-2.06 Pipe Materials

All public sewer piping material and construction shall conform to the Standard Specifications. Table S-3 specifies approved pipe materials.

**Table S-3 Approved Pipe Materials and Specifications**

| | Approved Material | Specifications |
|---|---|---|
| Gravity Sewers | Polyvinyl Chloride (PVC) 4" to 15" | ASTM D 3034, SDR 35, or AWWA C900 |
| | Polyvinyl Chloride (PVC) 18" or greater | ASTM F 679, Type 1or AWWA C905 |
| | Concrete Sewer Pipe (CSP) Non-reinforced | ASTM C 14, Class 2 or 3 |
| | Reinforced Concrete Pipe (RCSP) | ASTM C 76 Class III, IV, or V |
| | SaniTite HP; 12"-30" Polypropylene dual wall | ASTM F2736 |
| | SaniTite HP; 30"-60" Polypropylene triple wall(1) | ASTM F2764 |

Notes:
1. PVC pipe shall be installed in 14 feet maximum lengths without specific approval.
2. Concrete sewer pipe requires City approval.
3. CSP and RCSP are rigid pipe. Follow Sewer Details S1.1.
4. PVC, HDPE, and SaniTite HP are flexible pipe. Follow Sewer Detail S1.2.
5. See table S-4 on page 18 for approved pressure sewer pipe materials.

Wyes and fittings shall be of the same size and material as the new sewer main. Laterals connecting to existing mains of ductile iron or C900 shall be constructed of C900.

Pipe materials for special uses will be considered on a case-by-case basis. These designs might include materials proposed for temporary construction, bridge crossings, and others. Submit civil plans detailing proposed material types, installation procedures, and specifications for approval through the engineering plan review process. Pipe materials for special uses (such as for liner pipe, temporary construction, stream crossings, and bridge crossings) will be considered special design cases.

### 3-2.07 Pipe Diameter

Mainline sewers shall be a minimum of eight (8) inches inside diameter. Sewers shall not be reduced in diameter when the slope in the downstream section is increased except when approved by the City.

In certain cases, the City may require a sewer main that is larger than needed by the development alone. If the oversized main is 12 inches or larger in diameter, then the City may participate in the difference between the cost of required main and the cost of a main needed to serve the development alone (VMC 14.04.280(G)).

### 3-2.08 Installation

Installation of sewer pipe shall conform to Sections 7-17.3 and 7-18.3 of the Standard

Specifications and its Amendments. PVC pipe shall also be installed in accordance with UNI-BELL specification, UNI-PUB-6. Water settling of backfill material is prohibited.

### 3-2.09 Depth and Cover

All public sanitary sewers shall be laid at a depth sufficient to be protected against damage by frost and traffic. Public sewers laid in areas subject to wheel loads shall have a minimum cover of five (5) feet measured from top of pipe to finished grade or be otherwise protected from damage by traffic. This minimum cover may be reduced to three (3) feet provided C900/905 pipe is used. In addition, mains in roadways, right-of-way, or other paved areas must be deep enough to accommodate proposed and future laterals with a minimum clearance between the top of the lateral and the bottom of the roadway section of at least six (6) inches.

Plans proposing lateral cover of five (5) feet or less shall specify minimum finished floor elevations (FFEs). Indicate lots that require minimum finish floor elevations on site plans and plats. Include brief notes referring to the civil record drawings. Remaining laterals requirements are specified in Section 3-4.01.

Depths are defined as the distance from the main or lateral invert to the finished grade directly above.
Under normal conditions public sewers in residential areas without basements should be laid at a depth of eight (8) feet. Service laterals to adjacent properties should be laid at a depth of at least six (6) feet at the property. Plans with public sewers less than six (6) feet deep shall show minimum building finished floor elevations on all adjacent parcels. In residential areas with basements, public sanitary sewers shall be of sufficient depth to serve existing basements, if possible. Parcels with basements that cannot be reasonably served by gravity sewer shall be clearly indicated on the plans.

### 3-2.10 Separation

Sanitary sewers shall be a minimum of 50 feet from any well, spring, or other source of domestic water supply. All sanitary sewers or parts thereof which are located within 50 feet from any such source of domestic water supply shall be constructed of C900. Public sanitary sewer mains and domestic water mains shall not be laid in the same trench.

Follow Ecology's *Criteria for Sewage Works Design* (CSWD, Orange Book) for separation of sewer and water mains (Section C1-9.1). Paragraphs below repeat some of the parallel and perpendicular criteria. See Figure 3-2 for pipe separation requirements.

Parallel Pipes: A minimum horizontal separation of ten (10) feet between gravity sanitary sewers and any existing potable water lines shall be maintained, whenever possible. The sewer shall also be a minimum of 18 inches below the water main. The distance shall be measured edge to edge. When physical conditions render this spacing impossible or impractical, a gravity sewer may be laid closer than ten (10) feet provided the elevation of the crown of the gravity sewer is at least 18 inches below the invert of the water line. When these separations cannot be obtained, the gravity sewer shall be constructed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to assure water tightness before backfilling.

**Figure 3-2 Pipe Separation**
See Sewer Detail S-6.2

Perpendicular Pipes: Sewer lines crossing water lines shall be laid below the water lines to provide a separation of at least 18 inches between the invert of the water pipe and the crown of the sewer, whenever possible. If this is not possible then either a) The sewer main shall be constructed of approved pressure rated pipe with a minimum 18-foot length of pipe centered on the water main, or b) piping shall be encased (Sewer Detail S-1.6).

Sewer laterals without the clearance from water mains shown in Fig. 3-2 shall be constructed of approved pressure-rated pipe. Where the sewer line is above the water main a minimum of 18 inches of clearance is required in addition to the above requirements (Sewer Detail S-6.2).

Separation requirements are for the normal conditions found with sewage and water systems. These basic requirements apply to sewers of 24-inch diameter or less. Larger sewers may have additional requirements because of flow volumes and joint types. More stringent requirements may be necessary in areas of high ground water, unstable soil conditions, etc.

### 3-2.11 Pipe Joints
All pipe joints must be watertight. Rubber rings or other approved joint sealing material shall be used. Any approved joint deflections in pressure sewer mains shall be controlled such that the watertight integrity of the joint is maintained. See Standard Specifications Section 7-08.3(2)E (Rubber Gasketed Joints) for requirements.

### 3-2.12 Pipe End Connections
Extensions connecting to existing PVC spigot ends of the same diameters require injection molded, factory welded, and fully gasketed (PVC GXG) fittings according to WSDOT 9-05.12 (1). When manholes cannot be installed and when specifically approved by the City transition connections between dissimilar materials shall only be made with approved adaptors (Fernco, Romac, or MaxAdaptor).

### 3-2.13 Anchor Walls
Sewer mains with slopes of twenty percent (20%) or greater shall be secured by anchor walls. Minimum anchor wall requirements are shown on Sewer Detail S-1.5.

## 3-3 MANHOLES AND CLEANOUTS

### 3-3.01 Location
Manholes are required at the following locations:
1. Changes in slope or alignment
2. Changes in size or pipe material
3. Each sewer main intersection or junction
4. Upstream ends of mains longer than 150 feet
5. At intervals of 400 feet or less (unless otherwise approved)
6. Existing and future roadway alignments

### 3-3.02 Construction

A watertight frame and cover shall be used if groundwater or surface drainage can be expected to flood the top of a sanitary manhole. A 100- year- recurrence-interval storm shall be used in determining flooding elevations. The manhole joints and frame shall be sealed with manufactured seals such as the external "Seal Wrap" system (Infi-Shield), Wrapid Seal, or approved equal. See Sewer Detail S-2.9.

Watertight frame and cover assemblies are required for sanitary sewer manholes installed within the 100-year flood plain or where storm water may accumulate according to Sewer Detail S-2.2D.

There shall be flexible connections provided at the inlets and outlets of each manhole in the form of an expansion type rubber boot. Sand collars will not be accepted without specific approval from the City Refer to Sewer Detail S-2.4.

Cones, frames, and covers shall be rotated to avoid anticipated wheel traffic and gutters.

Manholes that accept pressure sewer discharge will require manhole epoxy lining (sealing) according to Section 3-8.05 and Sewer Detail S-5.5.

Precast concrete manholes, including riser rings, are to be infused with Anti-Microbial Induced Corrosion additive (Con MicShield, Con-Block or approved equal) at the time of production. A color additive is required to provide a visual identification of treated manholes.

### 3-3.03 Design Considerations

The key consideration in designing and constructing a manhole is that it will provide convenient access to the sewer for observations and maintenance operations and will result in minimum interference with sewer hydraulics. Manholes will be circular with inside dimensions sufficient to perform inspections and maintenance. The minimum inside diameter for a manhole is 48 inches. Manholes that require drop connections shall be a minimum diameter of 60 inches per Sewer Detail S-2.5.

Provide a 0.2 foot minimum and 0.4-foot maximum drop in flow line elevation through manholes. Provide the 0.4-foot drop when the flow is being turned more than ninety (90) degrees. The drop may be reduced to 0.1 foot for straight through manholes, or to no drop if the pipe is laid through the manhole with approval from the City.

Inside drop connections into manholes over 0.4-feet in height and less than the minimum possible height using the pipe and fittings shown on Sewer Detail S-2.5 shall be designed on a case-by- case basis.

Where a smaller sewer joins a larger one at a manhole, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. Approximate methods for achieving these results are:

1. Place the 80% depth point of both sewers at the same elevation.

2. Match the elevations of the pipe crowns.

Manholes built over large diameter sewers require special construction. Refer to the most current year Standard Specifications Section 7-05 (Manholes, Inlets, Catch Basins, and Drywells).

### 3-3.04 Drop Manholes

City approval is required for all connections entering a manhole at a distance of more than 24 inches above the invert. Inside drop assemblies are required for all main sizes and will require a 60-inch diameter manhole per Sewer Detail S-2.5.

### 3-3.05 New Manholes over Existing Sewer Mains

New manholes constructed over an existing sewer main require City approval. If the existing sewer main material is PVC or VCL Pipe, a new manhole shall be constructed per Sewer Detail S-2.1D. if the existing pipe material is concrete follow Sewer Detail S-2.1C.

### 3-3.06 Connections to Manholes

Connections to manholes, whether existing or new construction, shall be designed and constructed to provide a smooth transition of flow and have minimum interference with sewer hydraulics and access.

Laterals connecting to manholes shall enter the manhole at bench elevation, and transition to the flow line. Laterals connecting to end of main manholes require a minimum 0.3 tenths drop. Inside drops for private service laterals will need approval from City.

### 3-3.07 Frames, Covers and Steps

Frames, covers, and steps shall meet the requirements of Sewer Details S-2.1, S-2.2, and S2.3. Grade adjustments shall require concrete riser rings located below the frame. Cover type shall be as follows:

1. Standard per Sewer Detail S-2.2A.
2. Locking for unimproved, easements located outside of the right-of-way, or remote areas. per Sewer Detail S-2.2B.
3. Pamrex in identified areas of odor control measures. Per Sewer Detail S-2.2C

Steps shall be wide enough for a worker to place both feet on a step and should be designed with some type of slip prevention. Steps shall be spaced at vertical intervals between 12 and 16 inches. See Sewer Detail S-2.3.

### 3-3.08 Sewer Main Stubs

Public sewer stubs are required for future street alignments, service to adjoining parcels, and other locations need for future basin development. Stubs shall be a minimum one full stick of pipe extending from a manhole. Alignment shall be parallel to a future road centerline and/or perpendicular to the receiving sewer main. Piping shall typically extend to a property line, right-of-way, and/or beyond road improvements. Stub piping shall be laid at minimum slope (Table S-1).

Existing sanitary stubs less than one standard stick of pipe shall be removed and replaced prior to extension. Pipe condition and slope on longer stubs shall be field verified

### 3-3.09 Stub Markers and Cleanouts

Upstream ends of public sewer stubs shall terminate with a Stub Marker. Stub markers may also be required on service laterals and other select locations. The City may approve stub markers in lieu of a manhole if the sewer of less than 250 feet long and when the sewer is very most likely to extend. Stub markers are not approved substitutes for manholes or in other mid-run locations. See Sewer Detail S-3.0.

Cleanouts are allowed on upstream ends of sewers less than 150 feet long that are not candidates for future extension and that also have accessible downstream manholes. Cleanouts are not approved substitutes for manholes. See Sewer Detail S-3.1.

### 3-3.10 Discharge Manhole Lining (Sealing) Requirements

Both new and existing manholes receiving discharges from public pump stations, shared public pressure sewers, or private pump systems serving commercial or industrial properties require lining (sealing). The receiving manhole and the next downstream manholes shall be lined. (Additional manhole lining may also be required.) Lining material shall be Raven 405 (ultra-high build, 100% solids based, epoxy coating) or an approved equal. Minimum thickness shall be 125 mils. Equipment, preparation, application, and curing shall satisfy manufacturer specifications and requirements. See Sewer Detail S-5.5. Pull testing is required by a 3rd party.

## 3-4 SERVICE CONNECTIONS

### 3-4.01 Service Laterals (Side Sewers)

Sanitary service laterals extending from the public sewer main to the property line to serve individual parcels and /or buildings shall be constructed and inspected to public standards. Each building on a parcel shall be served by a separate service lateral. Mixed-use buildings require separate service lateral connections for the separate uses. (Separate system development charges will apply.)

Connection, ownership, and responsibilities for service laterals are outlined in VMC 14.04.100 and VMC 14.08.50. On-site plumbing from the property line to the building is private and discussed in Section 3-4.04. All lots created by a Plat will require their own service lateral per VMC 20.320.070.

Sanitary service lateral connections to the public sewer main shall be installed according to Sewer Detail S-1.4A. All laterals are required to be laid at an adequate depth to serve the entire lot. Lateral construction shall conform to the same standards as for main sewer construction. If laterals are directional drilled, HDPE pipe with solvent welded joints is allowed. All laterals connecting to ductile iron pipe shall also be constructed of C900 or ductile iron.

Sanitary service laterals in the public right-of way or public easement shall typically be a minimum of six (6) inches diameter. In the case of a single-family residence, on a parcel zoned low density residential, a minimum four (4) inch diameter lateral is acceptable. Service laterals shall be laid at a minimum slope of two percent (2%). A slope of one percent (1%) may be approved for unusual conditions provided a six (6) inch lateral is installed. Approval is required for any service laterals greater than six (6) inches.

Service laterals may be connected to manholes if such placement does not interfere with other present or future connections to the manhole.

The following service lateral connections and/or locations require City approval:

1. Lateral connections (taps) to mains larger than 15 inches in diameter
2. Laterals connecting to manholes on large mains may be placed in the same easement as the sanitary interceptor where necessary
3. Pressure Sewers from grinder pumps
4. New service laterals or existing lateral repairs by trenchless methods
5. New laterals greater than six (6) inches in diameter.

Refer to Section 3-1.05 for lateral table requirements.

### 3-4.02 Building Reconnection Requirements

Reconnection of new or existing lots and buildings may be required to eliminate existing or proposed public or private sanitary sewer easements. Building plumbing reversal may also be required.

### 3-4.03 Trenchless Methods for Service Lateral Construction and Repair

Trenchless methods are generally approved for service lateral repairs and new construction (including the connection at the public main and piping within the right-of-way or public sewer easement). Lateral repairs in the right-of-way are subject to public construction standards, Engineering Services reviews, and Construction Services testing and inspections. (Trenchless repairs for private on-site building sewers are outlined below.)

Trenchless repair methods are an option and are not typically required by the City. Methods must be appropriate for existing lateral piping and repairs shall not conflict with existing public standards. Installation shall not hinder, reduce, or limit any existing shared service connections.

Notify the Engineering Services and Construction offices of the proposed trenchless repair method prior to securing permits. Prepare and submit a repair plan showing all key features. Submittal of pre-construction video may also be required. Secure Engineering and Construction approval prior to obtaining permits.

Installation requires qualified contractors. Secure all related construction (right of way, traffic control, and other) permits. (Public Works permits do not authorize on-site private building sewer repairs.) Construct trenchless service lateral repairs according to related ASTM standards and the manufactures specifications. Submit post-repair inspection video to the Construction inspector. Clearly show sealed ends and no protrusions into the public sewer main and/or lateral. Other testing and inspection requirements may also apply.

Trenchless Service Lateral Repair Information | City of Vancouver, Washington, USA

### 3-4.04 On-Site Plumbing (Private Building Sewers)

On-site building sewers are private and governed by the Building Department's plumbing code

(UPC) along with other applicable local and state requirements.

Roof runoff, surface water, foundation drainage, and all other stormwater discharges to public sanitary sewers are prohibited.

Commercial and industrial complexes serving multiple owners or tenants, and multiple residential dwelling facilities (such as apartments and condominiums) typically require on-site public sanitary sewers (WAC 173-240-104).

Campus Provision: Shared private on-site building sewers are allowed for certain qualifying non-residential, industrial, or commercial parcels (WAC 173-240-104). Qualifying parcels shall not be dividable or likely or divide. The parcel must not require construction of public sewer through the site to provide service to other parcels. Buildings and parcels shall be owned, and business operated under a single ownership. Qualifying parcels include, but are not limited to, hospitals, public schools, and municipal facilities. Private sewers can serve multiple buildings as allowed by the plumbing code. Parcels can connect with a single service lateral connected to a dedicated public manhole. Other conditions may also apply.

### 3-4.05 Private Building Sewer Easements

Building sewer easements will only be approved for situations where no other feasible service options exist (UPC 721). Building Department and/or Sewer Engineering review is required prior to easement signatures and recording. Private easement recordings are required prior to civil plan approval and issuance of construction and connection permits.

### 3-4.06 Trenchless Methods for Private Building Sewers

All on-site building sewers are private and governed by the Building Department's plumbing code. Plumbing permits and inspections are required. Plumbing permit jurisdiction ends at the property line. Repairs on the service lateral piping within the right-of-way require Public Works permits and Construction Services inspections according to Section 3-4.03.

### 3-4.07 Accessory Building Service Options

Accessory buildings and Accessory Dwelling Units (ADUs) have two service connection options. If the accessory building's water is supplied by the parcel's main building, then the accessory building can connect to the main building's private on-site sewers. If each building has its own water meter, then the main building and accessory building shall have separate service lateral connections to the public main. This separate arrangement will trigger connection (SDC) charges (VMC 14.04.235).

Future land divisions that establish an ADUs on their own parcels will require separate service lateral connections.

## 3-5 OTHER DESIGN AND CONSTRUCTION REQUIREMENTS

### 3-5.01 Phased and Contingent Development

Civil plans can propose upstream (adjoining) sewers that depend on downstream sewer construction according to the following two ownership situations:

1. Upstream Projects Proposed by Different Property Owners: Upstream civil plan approval requires downstream Construction Acceptance and Final Civil Project Acceptance. An option is to include complete downstream sewer designs in the upstream civil plans.

2. Phases Proposed by Same Property Owner: Upstream phases owned and constructed by the same developer require both contingent civil plan approval and contingent final civil project acceptance. Civil plan approval of an upstream phase requires civil plan approval of the downstream phases. Also, final civil project acceptance of an upstream phase requires civil project acceptance of downstream phases.

### 3-5.02 Decommissioning Sanitary Sewer Mains and Appurtenances

Prior to decommissioning any existing sewer main, dye testing shall be performed to ensure all live connections have been transferred to the new sewer main. In most cases, the City will allow decommissioned sewer mains and appurtenances to be left in place if shown that they will be properly decommissioned according to Federal, State, and local health regulations or as directed by the City.

Sewer mains shall be decommissioned by plugging the ends with Portland Cement concrete after they are flushed. The concrete plugs shall extend into the pipe from the pipe ends a minimum distance of three times the inside diameter of the pipe. The Portland Cement concrete shall meet the requirements for Commercial Concrete, WSDOT/APWA, and most current version of the Standard Specifications Section 6- 02.3(2)B. The space between the plugged ends of the abandoned main shall be required to be filled with sand or a pumpable, flowable cement slurry. See Sewer Detail S-3.5.

Manholes shall be decommissioned by removing the cover, frame, riser rings, cone, or flat slab, and filling the manhole with compacted sand. The parts removed from the manhole shall be disposed of according to Federal, State, and local health regulations or as directed by the City. The sand shall meet the grading requirements for backfill for sand drains, WSDOT/APWA, and most current version of the Standard Specifications Section 9-03.13. The sand shall be compacted to at least 95 percent of the maximum density value determined according to Section 2- 03.3(14)D. The remainder of the hole, from the top of the compacted sand to finished grade, shall be backfilled, paved and/or landscaped, as directed by the City, to match the surrounding pavement or landscaping. See Sewer Detail S-3.5.

Service connections shall be decommissioned by installing a mechanical plug at the tee or wye, on the sewer main, or by installing a watertight patch on the main at the lateral-to-main connection point. See Sewer Detail S-3.4.

Civil plans and record drawings must clearly indicate whether features are to be abandoned in place or removed.

### 3-5.03 Stream Crossings and Storm Facilities

Sewer mains entering or crossing streams, drainage ponds or swales shall be constructed of pressure rated pipe or PVC pipe installed in an approved casing. They shall be designed,

constructed, and protected against anticipated hydraulic, physical, longitudinal, vertical, and horizontal loads, and erosion impacts.

Sewers laid on piers across ravines, streams, drainage ponds or swales shall be allowed only when it can be demonstrated that no other practical alternative exists. Sewers on piers shall be constructed in accordance with the above requirements for sewers entering or crossing under streams. Designs shall be submitted for review and approved on a case-by-case basis.

Additional permits may be required for stream crossings and may include shorelines management, state fish and wildlife, and other permits. The developer shall obtain all necessary permits prior to construction. Construction shall meet or exceed the following requirements:

1. The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. In general, this will be three feet of cover or more.
2. Less cover will be approved only if the proposed sewer crossing will not interfere with the future improvements to the stream channel.
3. Sewers crossing streams should be designed to cross the stream as nearly perpendicular to the stream flow as possible and shall be free from change in grade.
4. Sewer systems shall be designed to minimize the number of stream crossings
5. Sewers located along streams shall be located outside of the stream bed and sufficiently removed from there to provide for future possible stream widening and to prevent pollution by siltation during construction.
6. Sanitary sewer manholes shall not be located in the swale. If unavoidable, special approval may be requested. If approved, manhole rims must be placed high enough to prevent inflow and the manhole shall be sealed to prevent infiltration. The rim shall be raised using standard sections and a cone section. Riser rings shall not be allowed.

Infiltration trenches shall be lower than existing adjacent sewer mains where possible. Horizontal separation between public sanitary sewer pipes and soil-confined drainage trenches shall be a minimum of five (5) feet edge-to-edge. Vertical separation of more than eighteen (18) inches between this type of storm water trench and public sewer pipes, and other conditions, may also require a greater horizontal separation (see Sewer Detail S-6.2).

### 3-5.04 Railroad Crossings

Railroad crossing locations and alignments require early City approval. Permits or easements with annual fees are prohibited. The developer shall obtain and make full payment for all required railroad permits and easements early in the design process (and prior to civil plan approval). Specify permit number and other permit details on the civil plans. Design and construct crossings according to railroad standards and permit requirements. Include a crossing detail on the civil plans specifying all construction requirements. (Bored steel casing and cathodic protection are typically required).

### 3-5.05 Modeling and Capacity Simulation

The Sewer Engineering office maintains hydraulic modeling simulations results for the wastewater collection system. Details and the results of the model are discussed in 2011 GSP.

Proposed developments may be required to perform additional model simulations. Cases may include proposals with higher flows, discharges to alternate basins, and locations where sufficient downstream capacity is not certain. If modeling is necessary, then minimum requirements will be provided in a utility review or pre-application report. City coordination will be required. Complete simulation results are required early in the development process. City review and approval is required prior to land application submittal and/or civil plan approval.

## 3-6 ALTERNATIVES TO GRAVITY SYSTEMS

### 3-6.01 Public Pump Stations

Construction of public pump stations may be necessary to serve low-lying or flat areas within the City's service area. Areas are generally identified in the GSP. Pump stations are not allowed in areas that can be served by public gravity sewers. Pump station and force main design and other requirements are published in the City's *General Requirements and Details for Submersible Lift and Pump Stations*.

### 3-6.02 Shared Public Pressure Sewers

Shared public pressure sewers are designed to serve multiple private grinder pumps. Shared (or common) public pressure sewers serve areas where gravity sewer is not required and not available and where a public pump station is not warranted. Proposals to for shared public pressure sewer are reviewed on a case-by-case basis. Design calculations and other submittals are required. The S-5 series of Sewer Details address public pressure sewers.

The minimum pressure sewer size shall be two-inch (2") diameter. The minimum depth of the pressure sewer shall be three feet (3'). The shared public pressure sewer shall contain no bends greater than 45 degrees, downstream of the valve vault.

Restrained mechanical joints for pipe joints, where noted on the plans shall be U.S. Iron Pipe "TR Flex". Restrained mechanical joints for fitting joints, where noted on the plans, shall be EBAA Iron "Megalug" series 1100, or equal.

Test Stations shall be required at every bend in the pressure sewer main as well as every 450ft. Test stations shall be shown and detailed on the engineering plans. Toning wire and marking tape are required.

Design the pressure sewer to minimize the number of high points along the profile. However, topographic considerations and the desire to minimize the depth of the pressure sewer may not always make this practical. Install a Sewage Combination Air Release Valve. Note the manufacturer and model number on the plans, at each high point. (See City of Vancouver Pump Station Construction Standard Detail PS-2.5A).

### 3-6.03 Public Pressure Sewer Design and Construction

Table S-4 on the next page lists approved pressure pipe materials. These materials are approved for both pump station force mains and shared public pressure sewers.

**Table S-4. Pressure Sewer Pipe Materials**

| Material | Specifications |
|---|---|
| Polyvinyl Chloride (PVC) | Schedule 80 (*For pipes less than 4" diameter*) |
| Polyvinyl Chloride (PVC) | AWWA C900 |
| High Density Polyethylene (HDPE), PE 3408 | ASTM F-714, ASTM D-3350, PE:345434C & ASTM D-1248, type III, Class C, Category 5, grade P34 |
| Ductile Iron Pipe; Class 52 min. | ANSI A21.51 or AWWA C151 |

### 3-6.04 Private Individual Grinder Pumps

Private pump systems are approved for service in the following cases:

1. Where gravity service is not required to serve remaining basin properties
2. Where gravity service is not available, planned, or feasible
3. To serve single buildings on single lots
4. To serve low-lying areas that do not warrant a public pump station
5. To serve areas where excessive depth would be required to reach the site
6. To eliminate existing or proposed public sanitary sewer easements and/or private building sewer easements
7. To eliminate septic system in the immediate vicinity of Burnt Bridge Creek when all the following additional conditions are met. Where:
    a. Septic systems are located within 1,000 feet of Burnt Bridge Creek
    b. Septic systems are completely eliminated and properly abandoned
    c. Private sewers are not required in the right-of-way (except perpendicular service laterals)
    d. Private building sewer easements are justified, approved, and obtained when required

Ownership and Maintenance: On-site grinder pumps and building (pressure) sewers are private and are governed by Building Department requirements. All on-site maintenance is the responsibility of the property owner. (Property owners are also responsible for service laterals within the right-of-way and/or public sanitary sewer easements.)

Connection Requirements: Pressure lateral connections to existing or new manhole are preferred. Parcels discharging to public gravity sewers require a gravity service lateral according to Sewer Detail S-5.6. (A high point at the lateral connection is recommended.)

Civil, Site Plans, and Plat Requirements: Specify private pump requirements on the civil plans. Indicate lots that require private grinder pumps on related plats and site plans. Include brief notes referring to the civil record drawings.

Refer to Section 3-3.10 for discharge manhole lining requirements.

## 3.7 INDUSTRIAL PRETREATMENT REQUIREMENTS

### 3-7.01 Industrial/Commercial Wastewater

Pretreatment may be required to remove pollutants from industrial and commercial wastewaters. Pretreating a waste stream serves to protect the treatment plant, protect the receiving stream, and protects workers, both in sewer operations and at the plant. An Industrial Pretreatment review may be required to determine whether a pretreatment permit will be issued to conditionally authorize the discharge of process wastewater. Further requirements and guidance can be found in VMC 14.10 – Pretreatment Ordinance.

If process wastewater discharges to sanitary sewer are proposed, or if the industry is defined as "categorical" according to the Code of Federal Regulations, 40 CFR 405 through 471, an Industrial Information Form (IIF) or other environmental survey form must be submitted to Industrial Pretreatment. If a permit is required, preparation and approval may take 6 months. There is no fee for the permit. In some cases, a sampling manhole or other pretreatment devices may be required. Contact Industrial Pretreatment at (360) 487-7130 for more information regarding industrial permits.

Grease Removal Devices: Commercial establishments that discharge food grease to the sanitary sewer system shall install a grease trap or interceptor (see Sewer Details S-4.0 and S-4.1). The City shall approve the sizing, design, and plan for installation in accordance with the Uniform Plumbing Code and other City requirements. Minimum size for an interceptor shall be 1,000 gallons. Contact the City Grease Trap program at (360) 487- 8177.

Oil/Water Separators: Automotive shops and other commercial establishments which discharge wastewater containing petroleum-based oil or grease shall install an oil/water separator (see Sewer Detail S-4.2). The separator size, design and installation shall be in accordance with City and State standards. For more information, contact Industrial Pretreatment at (360) 487-7130. Indicate the Grease Trap and Oil/Water Separator makes and models on applicable civil, site, and building plans.

System Development Charges: For industrial users that plan to discharge over 4,000 gpd of process wastewater, an additional SDC may be assessed by Industrial Pretreatment, phone (360) 487-7130. Guidance on non-domestic discharges from sources such as swimming pool water, mobile pressure washers, septage haulers, trucked wastewater, and RV holding tank disposal is available from the Pretreatment/Wastewater work group at (360) 487-7130.

### 3-7.02 Prohibited Discharges

Prohibitions and regulations of wastewater discharges are addressed in the pretreatment ordinance (VMC 14.10, https://vancouver.municipal.codes/VMC/14.10). The following are some specifically prohibited discharges.

Gas Station/Fueling Center: No fuel shall be discharged into the public sewer mains. All fuel spillages shall be contained in a Dead-End Sump.

Stormwater: Discharge of storm runoff to the sanitary sewer is prohibited. Street, roof, or footing

drainage shall be removed by a system of storm sewers as required by local building codes. Drainage from gas station island runoff is also prohibited.

Industrial/Commercial: Sewer customers shall not introduce or cause to be introduced into the treatment plant any pollutant or wastewater which causes pass-through or interference. Specifically, wastewater must not be toxic, flammable, explosive, excessively acidic or alkaline (pH <5.5 or >10). Discharge of solid or viscous material that could cause obstruction in the sewer piping is prohibited. Wastewater excessively high in temperature or biochemical oxygen demand (BOD) may not be discharged to the City sewer. Refer to VMC 14.10 – Pretreatment Ordinance to review all general and specific prohibitions.

Other: Trucked or hauled wastewater is not accepted without special approval. Discharges from local environmental cleanup are the most commonly accepted hauled wastes. Wastewater characterizations, a special discharge permit, and approval from the Industrial Pretreatment workgroup are all required. Contact the Industrial Pretreatment workgroup at (360) 487-7130.

## 3.8 SEWER CONNECTION INCENTIVE PROGRAM

The City of Vancouver is working to protect and enhance the quality of our urban water resources, improve wastewater service, and eliminate environmental health problems. We recognize the quality of life in our community is enhanced with healthy rivers, streams, lakes and wetlands, and the importance of protecting our ground water, the source of the local drinking water supply. The Sewer Connection Incentive Program (SCIP) was developed to help eliminate water quality and service problems from failing septic systems by replacing them with safe, public sanitary sewers.

The SCIP provides for construction of sanitary sewers while offering easy and affordable financing to homeowners of single-family residences. The goal of the program is to protect our water resources and assist homeowners in removing septic systems, especially systems that are failing or aging.

The program includes a two-year guaranteed maximum sewer main line fee for timely connections, and an economical and comprehensive financing package for homeowners of single-family residences.

Program details are found on the City's SCIP webpage.
https://www.cityofvancouver.us/publicworks/page/sewer-connection-incentive-program- scip

## 3.9 AS-BUILT RECORD DRAWINGS

Engineers are required to prepare and submit accurate record drawings for all publicly constructed utilities. Pre-paving as-builts and final project record drawing submittals are both required. Prepare and submit according to Section 1-4.01 of the City of Vancouver General Requirements for Water, Sewer, and Storm.

## 3.10 SANITARY SEWER DETAILS

| | |
|---|---|
| **S-1.0** | Selected Sanitary Sewer Construction Specifications |
| **S-1.1** | Pipe Bedding Details (Rigid Pipe) |
| **S-1.2** | Pipe Bedding Details (Flexible Pipe) |
| **S-1.3** | Typical Trench Section |
| **S-1.4A** | Standard Service Lateral for New Mains |
| **S-1.4B** | Minimum Slope Service Lateral for New Mains |
| **S-1.4C** | Saddle Tapping Tee Connection |
| **S-1.4D** | Existing Service Lateral to New Mains |
| **S-1.4E** | New Service Lateral to Existing CIPP Main |
| **S-1.5** | Standard Anchor Wall |
| **S-1.6** | Concrete Encased Sewer Pipe |
| **S-2.1A** | Standard Pre-cast Manhole |
| **S-2.1B** | Top Slab Manhole |
| **S-2.1C** | Pre-cast Doghouse Manhole |
| **S-2.1D** | New Manhole Connection to Ex PVC Sewer Main |
| **S-2.2A** | Standard Manhole Lid and Frame |
| **S-2.2B** | Locking Manhole Lid and Frame |
| **S-2.2C** | Pamrex (watertight) Manhole Lid and Frame |
| **S-2.2D** | Composite (Odor Control) Manhole Lid and Frame |
| **S-2.2E** | Adjustable Manhole Frame (Rim-Riser) |
| **S-2.3** | Standard Manhole Step |
| **S-2.4** | Standard Manhole Connection |
| **S-2.5** | Standard Drop Connection |
| **S-2.6** | Standard Manhole Joints |
| **S-3.0** | Standard Gravity Sewer Stub Marker |
| **S-3.1** | Standard Gravity Sewer Cleanout |
| **S-3.2** | RV Disposal Station – Commercial |
| **S-3.3** | RV Disposal Station – Residential |
| **S-3.4** | Sewer Service Lateral Abandonment |
| **S-3.5** | Sewer Manhole and Sewer Main Abandonment |
| **S-4.0** | Standard Grease Interceptor |
| **S-4.1** | Standard Indoor Hydromechanical Grease Interceptor |
| **S-4.2** | Oil / Water Separator |
| **S-4.3** | Elevator Sump Pump – w/ Oil Water Separator |
| **S-4.4** | Elevator Sump Pump – w/ Oil Sensing Alarm |
| **S-5.0** | Pressure Sewer Main Isolation Valve |
| **S-5.1** | Standard Pressure Sewer Cleanout |
| **S-5.2** | Toning Wire and Marking Tape |
| **S-5.3** | Standard Pressure Service Lateral |
| **S-5.4** | Standard Locating Test Station |
| **S-5.5** | Pressure Sewer Discharge Manhole |
| **S-5.6** | Pressure to Gravity Service Connection |
| **S-6.0** | Standard Zone Locations |
| **S-6.1** | Standard Sewer Easement Access Roads |
| **S-6.2** | Sewer Separation and Crossing Requirements |

1. ALL MATERIALS AND INSTALLATION OF PUBLIC SANITARY SEWERS SHALL BE IN CONFORMANCE WITH THE MOST CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS", PREPARED BY THE WASHINGTON STATE CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (APWA) AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, EXCEPT AS NOTED HEREIN OR ON THE STANDARD PLANS. WHEREVER THE STANDARD SPECIFICATIONS REFER TO THE OWNER AS EITHER THE "STATE" OR "SECRETARY" OR WHEN REFERENCE IS MADE TO THE DEPARTMENT OF TRANSPORTATION IT SHALL BE UNDERSTOOD THAT THE STANDARD SPECIFICATIONS SHOULD READ THE "CITY"

2. ALL PUBLIC SANITARY SEWER CONSTRUCTION IS SUBJECT TO INSPECTION AND APPROVAL BY THE CITY OF VANCOUVER'S DEPARTMENT OF PUBLIC WORKS. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION OFFICE (360-487-7750) AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION. THE CITY MAY REQUIRE THAT A PRE-CONSTRUCTION CONFERENCE BE HELD.

3. THE CONTRACTOR IS REQUIRED TO NOTIFY ALL UTILITIES 48 HOURS PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR MAY CONTACT THE NORTHWEST UTILITY NOTIFICATION CENTER AT 1-800-424-5555 IN LIEU OF CONTACTING INDIVIDUAL UTILITIES.

4. FINAL ACCEPTANCE OF PUBLIC SANITARY SEWERS ARE SUBJECT TO SECTIONS 1-05.11, 1-05.12, 7-17.3(2)E, 7-17.3(2)F, 7-17.3(2)G AND 7-17.3(2)H OF THE STANDARD SPECIFICATIONS. TELEVISION INSPECTION SHALL INCLUDE VIDEO OF ALL MANHOLES IN ADDITION TO THE PIPE. THIS MAY BE DONE WITH EITHER A HAND HELD VIDEO CAMERA OR USE OF A PAN AND TILT VIDEO CAMERA. THE CONTRACTOR SHALL GUARANTEE ALL WORK DONE FOR A PERIOD OF TWO (2) YEARS AS PER OF THE CITY OF VANCOUVER GENERAL REQUIREMENTS FOR MUNICIPAL CONSTRUCTION. THE VIDEO SHALL INCLUDE VIDEO OF PIPE SEGMENTS FROM THE NEAREST DOWNSTREAM EXISTING MANHOLES TO THE MANHOLES CONSTRUCTED BY THE PROJECT.

5. LOCAL VARIATIONS IN SLOPE (I.E. "BELLIES") MUST BE NO MORE THAN 1 /2 OF AN INCH IN ALL SIZES OF PIPE. VARIATIONS IN EXCESS OF THESE TOLERANCES MUST BE REPAIRED AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE CITY.
6. ALL PIPE AND FITTINGS SHALL CONFORM TO THE FOLLOWING:

7. CONCRETE PIPE, NON-REINFORCED, SHALL CONFORM TO ASTM C 14, CLASS 2, EXCEPT AS OTHERWISE NOTED. CONCRETE PIPE, REINFORCED, SHALL CONFORM TO ASTM C 76, AND SHALL BE OF THE CLASS NOTED ON THE PLANS OR IN THE SPECIAL PROVISIONS.

8. POLYVINYL CHLORIDE (PVC) SEWER PIPE 15" DIAMETER OR LESS SHALL CONFORM TO ASTM D3034, SDR 35. IT SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI. PVC PIPE 18" DIAMETER SHALL CONFORM TO ASTM F 679. ALL PVC PIPE SHALL HAVE AN INTEGRAL BELL GASKETED JOINT WITH ELASTOMERIC GASKET AND SHALL BE FURNISHED IN 12-1/2 FOOT LAYING LENGTHS. HIGH STRENGTH PVC PIPE SHALL CONFORM TO AWWA C900 OR C905.

9. DUCTILE IRON (DI) PIPE SHALL CONFORM TO ANSI A21.51 OR AWWA C151, WITH PUSH-ON JOINTS, CLASS 52, UNLESS OTHERWISE NOTED. DUCTILE IRON PIPE WILL ONLY BE ALLOWED WITH EXPLICIT CITY ENGINEERING APPROVAL.

10. INSTALLATION OF PIPE AND MANHOLES SHALL CONFORM TO THE FOLLOWING:

11. CONCRETE PIPE SHALL BE INSTALLED IN CONFORMANCE WITH STANDARD PLANS S-1.1 (CLASS C, UNLESS OTHERWISE NOTED) AND S-1.3.

12. PVC PIPE SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND SHALL CONFORM TO STANDARD PLANS S-1.2 AND S-1.3.

13. MANHOLES SHALL CONFORM WITH STANDARD PLANS S-2.1 THROUGH S-2.9.

14. MANHOLES, CLEANOUTS, SERVICE LATERAL CONNECTIONS, TRENCH EXCAVATION, PIPE BEDDING AND STREET RESTORATION, AND APPURTENANCES SHALL CONFORM TO THE DETAILS SHOWN ON THE STANDARD PLANS. ALL OTHER CONSTRUCTION SHALL CONFORM TO THE STANDARD DETAILS CONTAINED IN THE STANDARD PLANS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION.

15. THE CONTRACTOR SHALL COMPLY WITH THE PROVISIONS OF ALL PERMITS ISSUED, OR EASEMENTS GRANTED TO THE CITY IN CONJUNCTION WITH THE CONSTRUCTION OF SANITARY SEWERS. THE CONTRACTOR SHALL OBTAIN A STREET CUT PERMIT FOR WORK WITHIN THE PUBLIC RIGHT-OF-WAY.

16. THE CONTRACTOR SHALL SUBMIT AN APPROVED TRAFFIC CONTROL PLAN. INSIDE THE CITY THIS PLAN SHALL BE APPROVED BY THE TRANSPORTATION DIVISION (360-487-7700) AND OUTSIDE THE CITY IT SHALL BE APPROVED BY THE CLARK COUNTY TRAFFIC ENGINEER (360-397-2446). VERIFICATION OF APPROVAL SHALL BE OBTAINED PRIOR TO BEGINNING CONSTRUCTION.

CITY OF Vancouver WASHINGTON

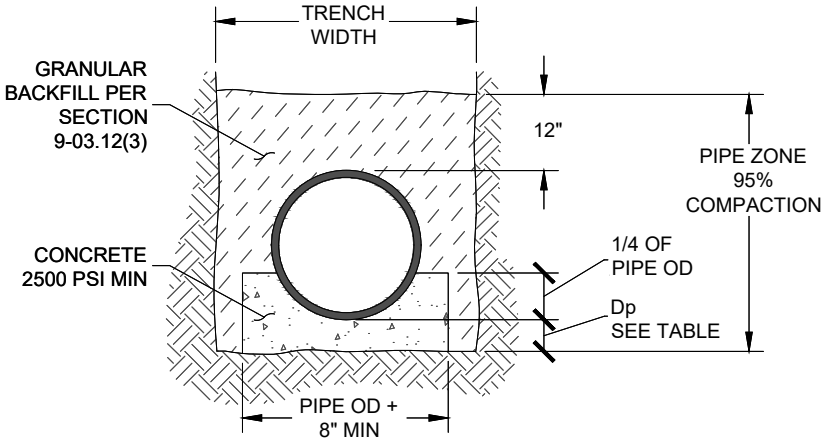
# CONSTRUCTION SPECIFICATIONS FOR SANITARY SEWER

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SANITARY SYSTEMS PLANNING AND DESIGN

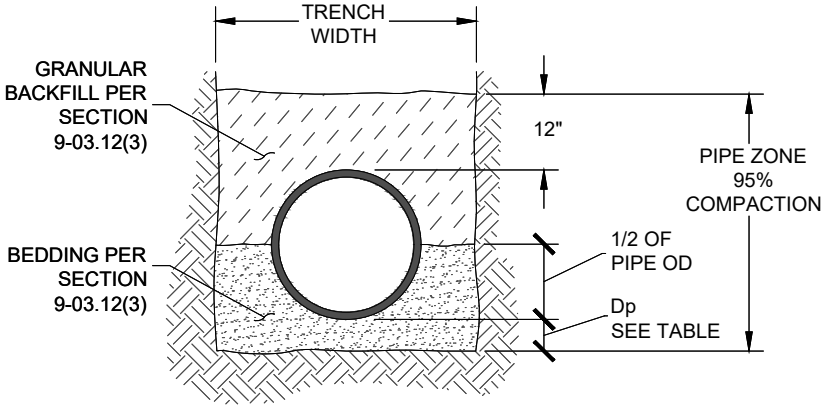
| DATE ISSUED | APPROVED BY |
|---|---|
| 01 - 2023 | SLH |
| REVISION DATE | APPROVED BY |
| - | - |

STD PLAN NO.

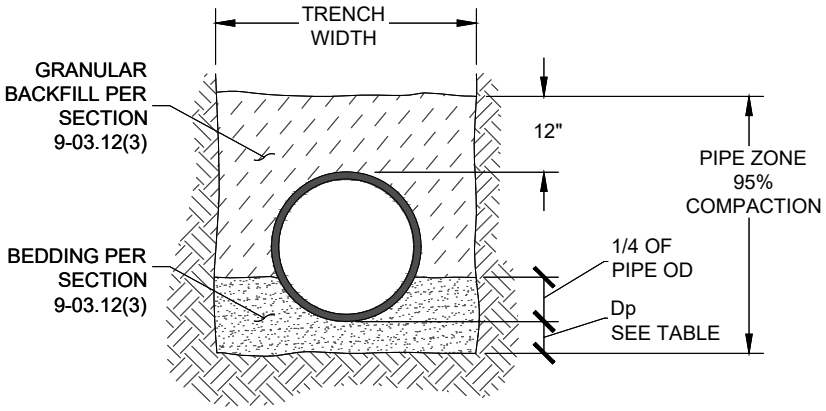
**S-1.0**




CLASS A
CONCRETE CRADLE




CLASS B
GRANULAR FOUNDATION




CLASS C
GRANULAR FOUNDATION

| DEPTH OF BEDDING MATERIAL BELOW PIPE | |
|---|---|
| PIPE DIA | Dp (MIN) |
| 27" & SMALLER | 4" |
| LARGER THAN 27" | 6" |

NOTES

1. WHERE DIRECTED BY THE ENGINEER, GRANULAR TRENCH FOUNDATION STABILIZATION SHALL BE PLACED PRIOR TO PLACEMENT OF THE BEDDING. SIZE AND DEPTH ARE DEPENDENT ON SOIL CONDITIONS.
2. BEDDING AND BACKFILL MATERIALS IN THE PIPE ZONE SHALL BE COMPACTED AS SPECIFIED PRIOR TO BACKFILLING THE REMAINDER OF THE TRENCH.
3. FOR ROCK AND OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHALL BE OVER-EXCAVATED A MINIMUM OF 6" AND REFILLED WITH GRANULAR MATERIALS AS DIRECTED BY THE ENGINEER
4. BACKFILL AND COMPACTION ABOVE THE PIPE ZONE SHALL BE INSTALLED AS SHOWN ON SEWER DETAIL S-1.3.
5. NATIVE MATERIAL MAY BE USED IN LIEU OF IMPORTED MATERIAL FOR BEDDING SPECIFIED, PROVIDED THAT THE NATIVE MATERIAL CONFORMS TO SECTION 9-03.12(3) OF THE STD SPECIFICATIONS, AND IS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A SAMPLE OF THE NATIVE MATERIAL TO A GEOTECHNICAL ENGINEER FOR LABORATORY TESTING AND ANALYSIS. THE GEOTECHNICAL ENGINEER SHALL PROVIDE A REPORT OF THE SUITABILITY OF THE NATIVE MATERIAL FOR PIPE BEDDING PRIOR TO USE.
6. TRENCH WIDTH SHALL NOT EXCEED ONE AND ONE-HALF THE OUTSIDE DIAMETER OF THE PIPE PLUS 18" AT THE TOP OF THE PIPE ZONE.
7. FOR FLEXIBLE PIPE BEDDING SEE SEWER DETAIL S-1.2

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CITY OF Vancouver WASHINGTON

# PIPE BEDDING (RIGID PIPE)

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SANITARY SYSTEMS PLANNING AND DESIGN

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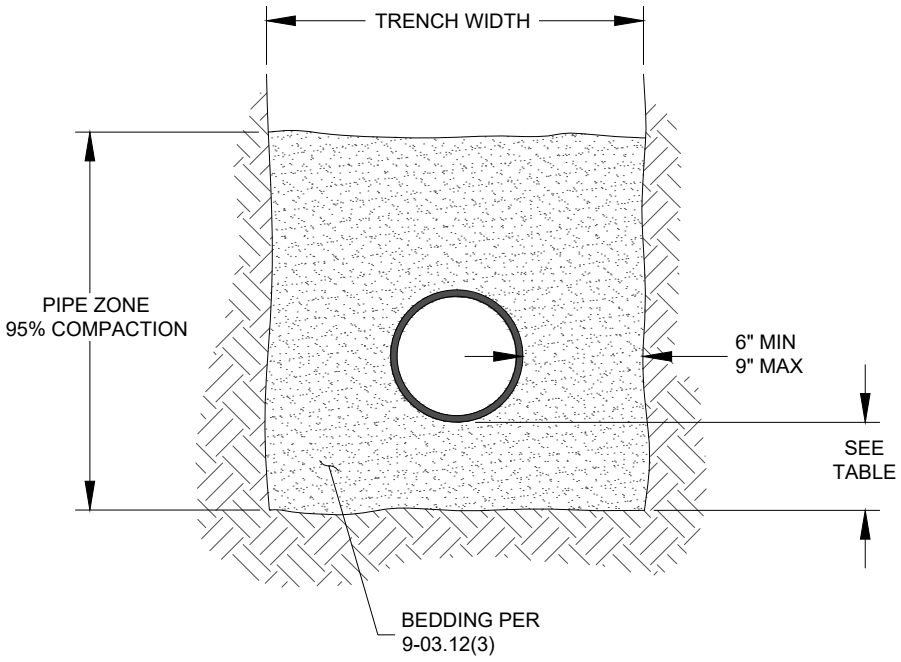
STD PLAN NO.

**S-1.1**

| DEPTH OF BEDDING MATERIAL BELOW PIPE | |
|---|---|
| PIPE DIA | Dp (MIN) |
| 27" & SMALLER | 4" |
| LARGER THAN 27" | 6" |




NOTES

1. WHERE DIRECTED BY THE ENGINEER, GRANULAR TRENCH FOUNDATION STABILIZATION SHALL BE PLACED PRIOR TO PLACEMENT OF THE BEDDING. SIZE AND DEPTH ARE DEPENDENT ON SOIL CONDITIONS.
2. BEDDING AND BACKFILL MATERIALS IN THE PIPE ZONE SHALL BE COMPACTED AS SPECIFIED PRIOR TO BACKFILLING THE REMAINDER OF THE TRENCH.
3. FOR ROCK AND OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHALL BE OVER-EXCAVATED A MINIMUM OF 6" AND REFILLED WITH GRANULAR MATERIALS AS DIRECTED BY THE ENGINEER
4. BACKFILL AND COMPACTION ABOVE THE PIPE ZONE SHALL BE INSTALLED AS SHOWN ON SEWER DETAIL S-1.3.
5. INSTALLATION SHALL CONFORM TO SECTION 7.08 OF THE STANDARD SPECIFICATIONS EXCEPT AS NOTED. REFER TO THE UNI-BELL UNI-PUB-6 "INSTALLATION GUIDE FOR SOLID-WALL PVC SEWER PIPE" FOR RECOMMENDED CONSTRUCTION PRACTICES.
6. FINAL INSTALLATION TO BE TESTED PER SECTION 7-17.3(2)G OF THE STANDARD SPECIFICATIONS.
7. ALTERNATIVE PRE-COVER MATERIALS ARE ALLOWABLE FROM THE PIPE CENTERLINE TO ONE FOOT ABOVE THE TOP OF PIPE. ALTERNATE PRE-COVER MATERIALS MUST BE PRE-APPROVED BY THE INSPECTOR AND MAY BE SAND, CRUSHER SCREENINGS, GRAVEL, OR OTHER CLEAN GRANULAR MATERIAL CONTAINING NO ROCK LARGER THAN 1-1/4" IN LENGTH.

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# PIPE BEDDING (FLEXIBLE PIPE)

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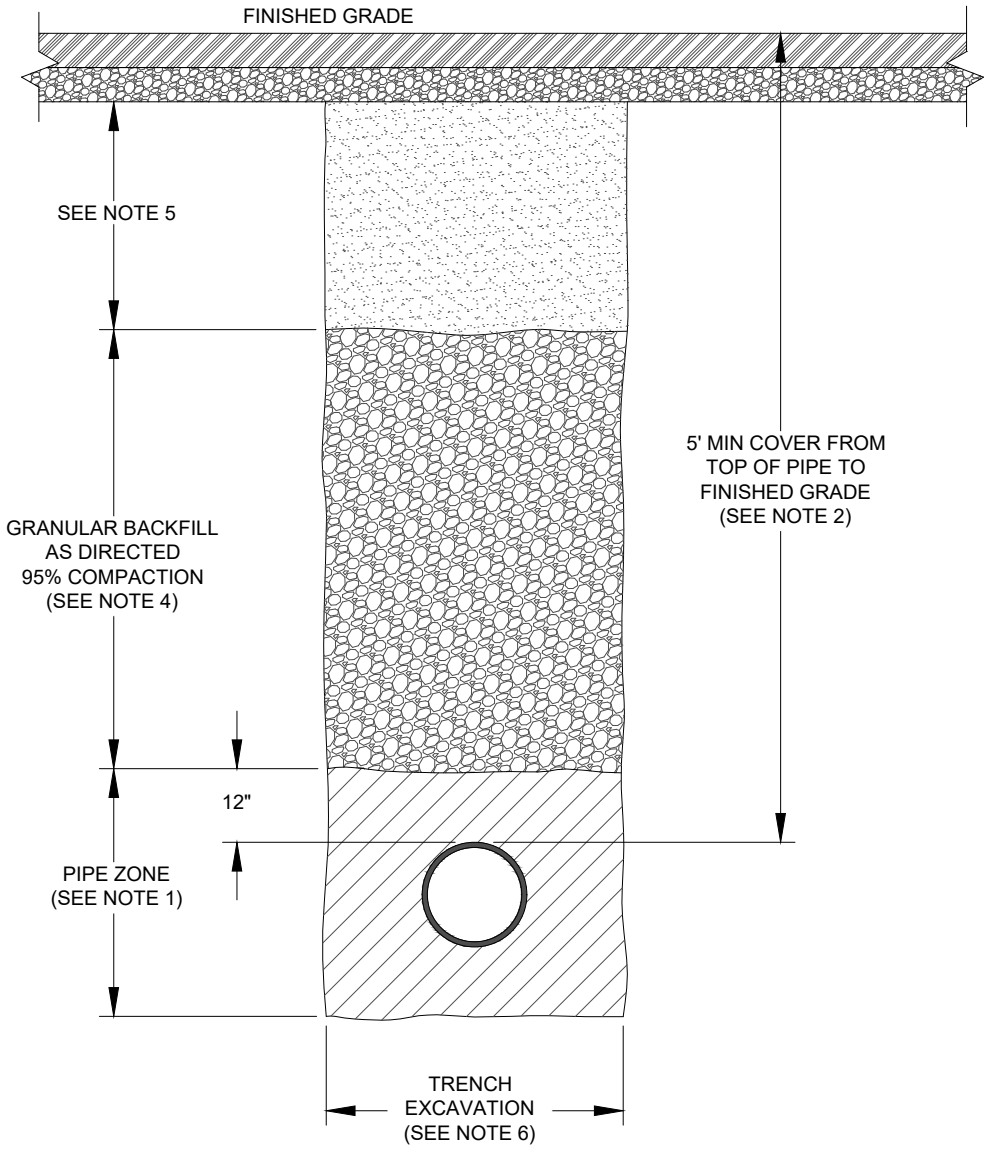
STD PLAN NO.

**S-1.2**




NOTES

1. FOR PIPE ZONE BEDDING, BACKFILL & COMPACTION REQUIREMENTS SEE SEWER DETAILS S-1.1 (RIGID PIPE) & S-1.2 (FLEXIBLE PIPE).

2. MINIMUM COVER FROM TOP OF PIPE TO FINISHED GRADE MAY BE REDUCED TO 3' WHEN APPROVED BY THE CITY, IF C900 PVC PIPE IS USED FOR THE SEWER, AND 5' OF COVER CANNOT BE ACHIEVED USING THE CITY'S STANDARDS FOR DESIGN SLOPE AND ELEVATION DROP THROUGH MANHOLES.

3. CONTROLLED DENSITY FILL (CDF) MAY BE REQUIRED BASED ON LOCAL JURISDICTION STANDARDS.

4. FOR THE TOP ZONE OF THE TRENCH REFER TO APPROVED PROJECT PLANS OR SEE CITY, COUNTY, OR WSDOT STANDARD PLANS AND/OR PERMIT CONDITIONS. FOR NON-PAVED SURFACES, MATCH EXISTING GRAVEL OR SEEDED LAWN.

5. REFER TO SEWER DETAIL S-6.0 FOR PREFERRED SEWER TRENCH LOCATION WITHIN PUBLIC RIGHT-OF-WAY.

6. APPROVAL FOR NATIVE ALTERNATE MATERIALS WILL BE GRANTED UPON CONFIRMATION BY TEST OF ITS COMPLIANCE WITH THESE REQUIREMENTS. THE CONTRACTOR SHALL SUBMIT A SAMPLE OF THE NATIVE MATERIAL TO A GEOTECHNICAL ENGINEER FOR LABORATORY TESTING AND ANALYSIS. THE GEOTECHNICAL ENGINEER SHALL PROVIDE A REPORT OF THE SUITABILITY OF THE NATIVE MATERIAL FOR PIPE BEDDING PRIOR TO USE.

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# TYPICAL TRENCH SECTION

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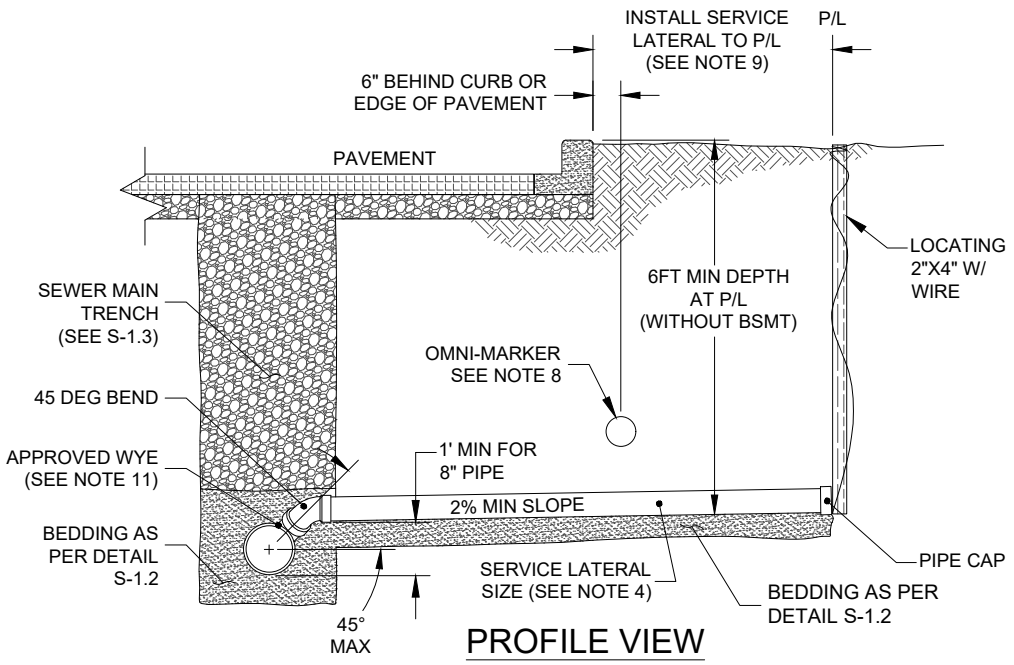
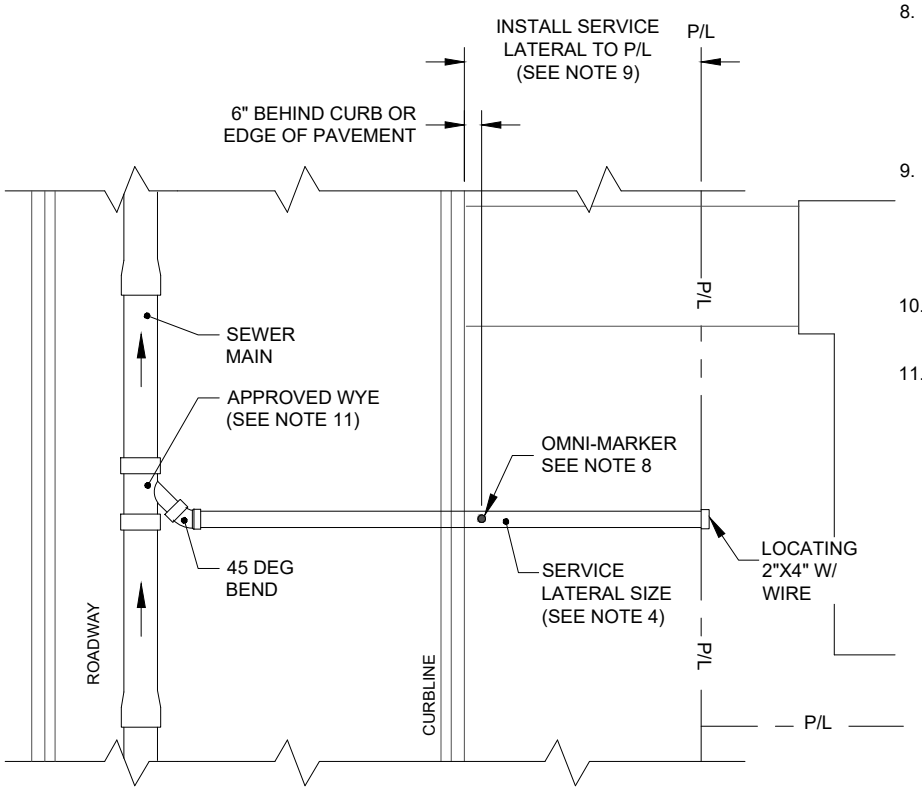
STD PLAN NO.

**S-1.3**




PROFILE VIEW




PLAN VIEW

NOTES

1. SERVICE LATERALS SHALL BE INSTALLED PER SECTION 7-08.3 OF THE STANDARD SPECIFICATIONS.
2. SERVICE LATERALS SHALL BE CAPPED PER SECTION 7-08.3(2)F OF THE STANDARD SPECIFICATIONS.
3. SERVICE LATERALS SHALL BE CLEARLY MARKED PER SECTION 7-18.3(5) OF THE STANDARD. SPECIFICATIONS.
4. ALL SERVICE LATERALS SHALL BE A MINIMUM OF 6-INCHES IN DIAMETER, LOTS ZONED SINGLE FAMILY RESIDENTIAL BY THE COMPREHENSIVE PLAN CAN USE 4-INCH DIAMETER.
5. SEE S-1.4C FOR APPROVED COMMERCIAL TAP DETAIL.
6. SERVICE LATERALS CONNECTING TO EXISTING DUCTILE IRON OR C-900 MAINS SHALL BE THE SAME MATERIAL AS THE MAIN.
7. TRANSITIONS BETWEEN DISSIMILAR PIPE MATERIALS OR SIZES SHALL BE MADE WITH APPROVED ADAPTORS (FERNCO, MAX-ADAPTER OR EQUAL).
8. INSTALL 3M #1404XR, OMNIMARKER OR APPROVED EQUAL SEWER UTILITY MARKER DIRECTLY OVER SERVICE LATERAL PER MANUFACTURERS INSTRUCTIONS (MAXIMUM DEPTH = 5 FEET).
9. IN NEW SUBDIVISIONS AND OTHER CONSTRUCTION INVOLVING NEW ROADS, INSTALL LATERALS UP TO PROPERTY LINE FOR SEWERS IN STREET RIGHT-OF-WAY.
10. LATERALS WITH LESS THAN 5-FEET OF COVER SHALL USE C900 PVC.
11. WYES SHALL BE USED FOR ALL NEW LATERAL-MAIN CONNECTIONS. TEES SHALL REQUIRE SPECIAL CITY APPROVAL.

N.T.S.

CITY OF Vancouver WASHINGTON

# STANDARD SERVICE LATERAL FOR NEW MAINS

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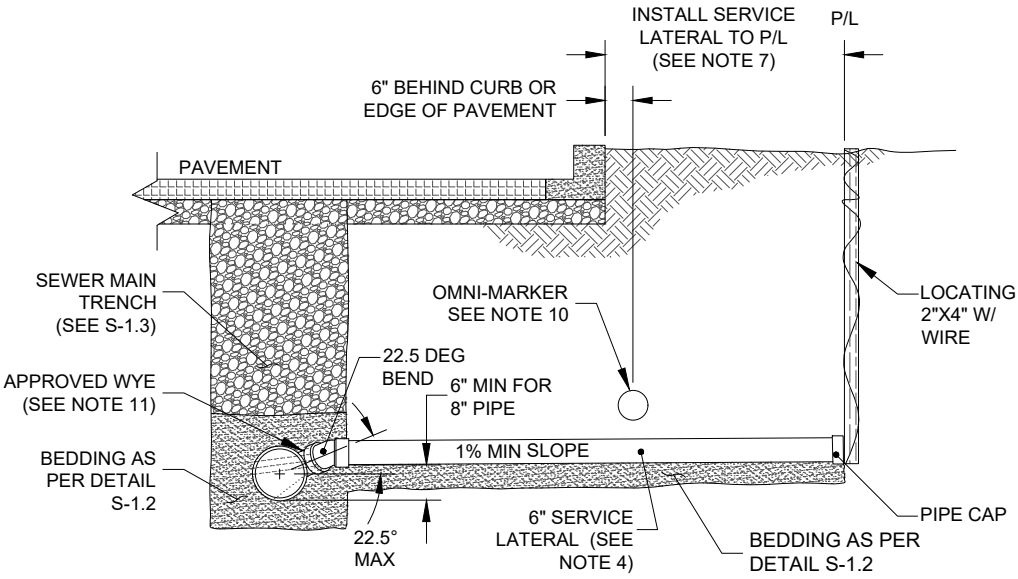
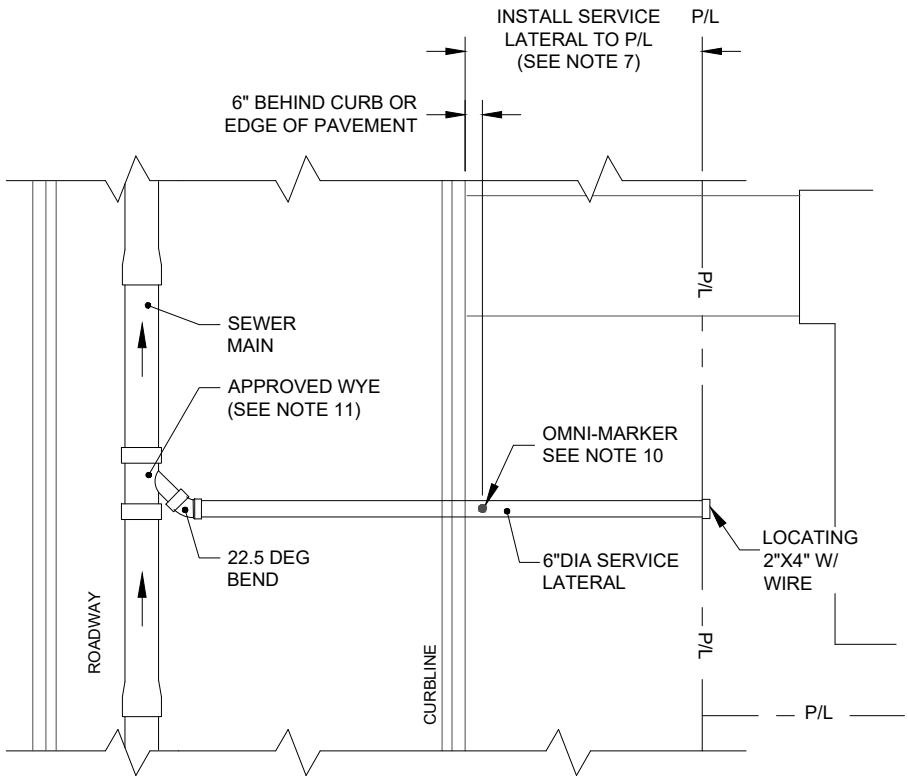
STD PLAN NO.

**S-1.4A**

SHEET: 1 OF 5




PROFILE VIEW




PLAN VIEW

NOTES

1. SERVICE LATERALS SHALL BE INSTALLED PER SECTION 7-08.3 OF THE STANDARD SPECIFICATIONS.
2. SERVICE LATERALS SHALL BE CAPPED PER SECTION 7-08.3(2)F OF THE STANDARD SPECIFICATIONS.
3. SERVICE LATERALS SHALL BE CLEARLY MARKED PER SECTION 7-18.3(5) OF THE STANDARD. SPECIFICATIONS.
4. ALL SERVICE LATERALS SHALL BE A MINIMUM OF 6-INCHES IN DIAMETER.
5. SEE S-1.4C FOR APPROVED COMMERCIAL TAP DETAIL.
6. SERVICE LATERALS CONNECTING TO EXISTING DUCTILE IRON OR C-900 MAINS SHALL BE THE SAME MATERIAL AS THE MAIN.
7. TRANSITIONS BETWEEN DISSIMILAR PIPE MATERIALS OR SIZES SHALL BE MADE WITH APPROVED ADAPTORS (FERNCO, MAX-ADAPTER OR EQUAL).
8. INSTALL 3M #1404XR, OMNIMARKER OR APPROVED EQUAL SEWER UTILITY MARKER DIRECTLY OVER SERVICE LATERAL PER MANUFACTURERS INSTRUCTIONS (MAXIMUM DEPTH = 5 FEET).
9. IN NEW SUBDIVISIONS AND OTHER CONSTRUCTION INVOLVING NEW ROADS, INSTALL LATERALS UP TO PROPERTY LINE FOR SEWERS IN STREET RIGHT-OF-WAY.
10. LATERALS WITH LESS THAN 5-FEET OF COVER SHALL USE C900 PVC.
11. WYES SHALL BE USED FOR ALL NEW LATERAL-MAIN CONNECTIONS. TEES SHALL REQUIRE SPECIAL CITY APPROVAL.

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CITY OF Vancouver WASHINGTON

# MIN. SLOPE SERVICE LATERAL FOR NEW MAINS

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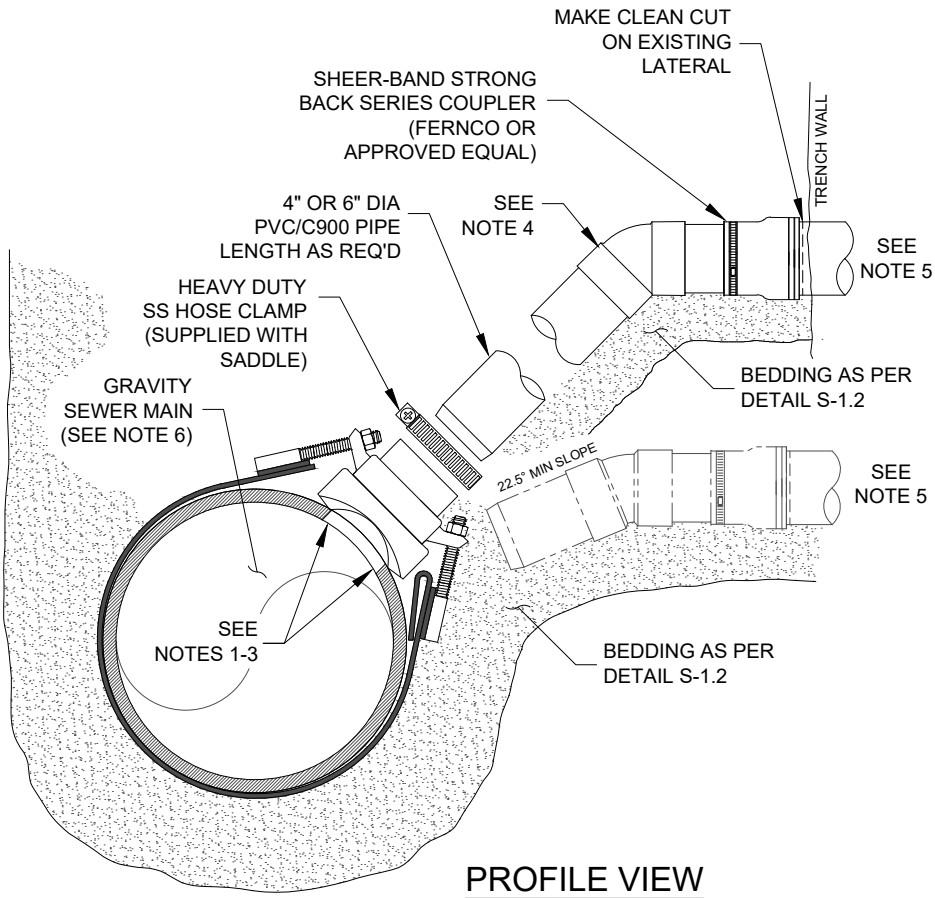
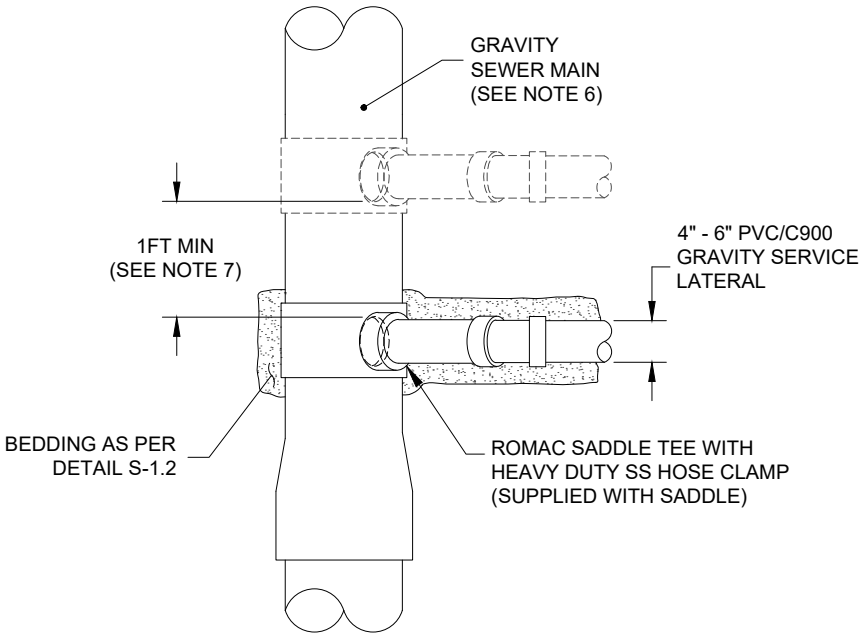
STD PLAN NO.

**S-1.4B**




PROFILE VIEW




PLAN VIEW

NOTES:

1. USE ROMAC INDUSTRIES STYLE "CB" SEWER SADDLE FOR CONNECTIONS TO PVC, C900, C.I, D.I, CLAY, AND CONCRETE MAINS (8" THROUGH 15").
2. FOLLOW MANUFACTURERS INSTALLATION REQUIREMENTS; SADDLE TEE HEX NUTS TO BE TORQUED TO 15-20FT-LBS FOR 6"-12" DIA PIPE.
3. CORE NEW TAP CONNECTION ON CENTER OF PIPE TO ALLOW FOR BEST FIT.
4. FITTINGS GREATER THAN 45 DEG ARE NOT ALLOWED
5. FOR NEW CONSTRUCTION, LATERALS SHALL BE 4" DIA CONNECTION = 2% MIN SLOPE; 6" DIA CONNECTION = 1% MIN SLOPE
6. CONTACT CITY OF VANCOUVER PAVEMENT MANAGEMENT FOR HMA RESTORATION REQUIREMENTS.
7. 1 FT MINIMUM SPACING FROM EDGE TO EDGE OF LATERAL CONNECTION CORES
8. FOR LATERAL CONNECTIONS TO EXISTING CIPP LINED SEWER MAINS SEE DETAIL S-1.4E
9. LATERAL CONNECTIONS LARGER THAN 6" REQUIRE A CITY APPROVED SADDLE TEE

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# SADDLE TAPPING TEE CONNECTION

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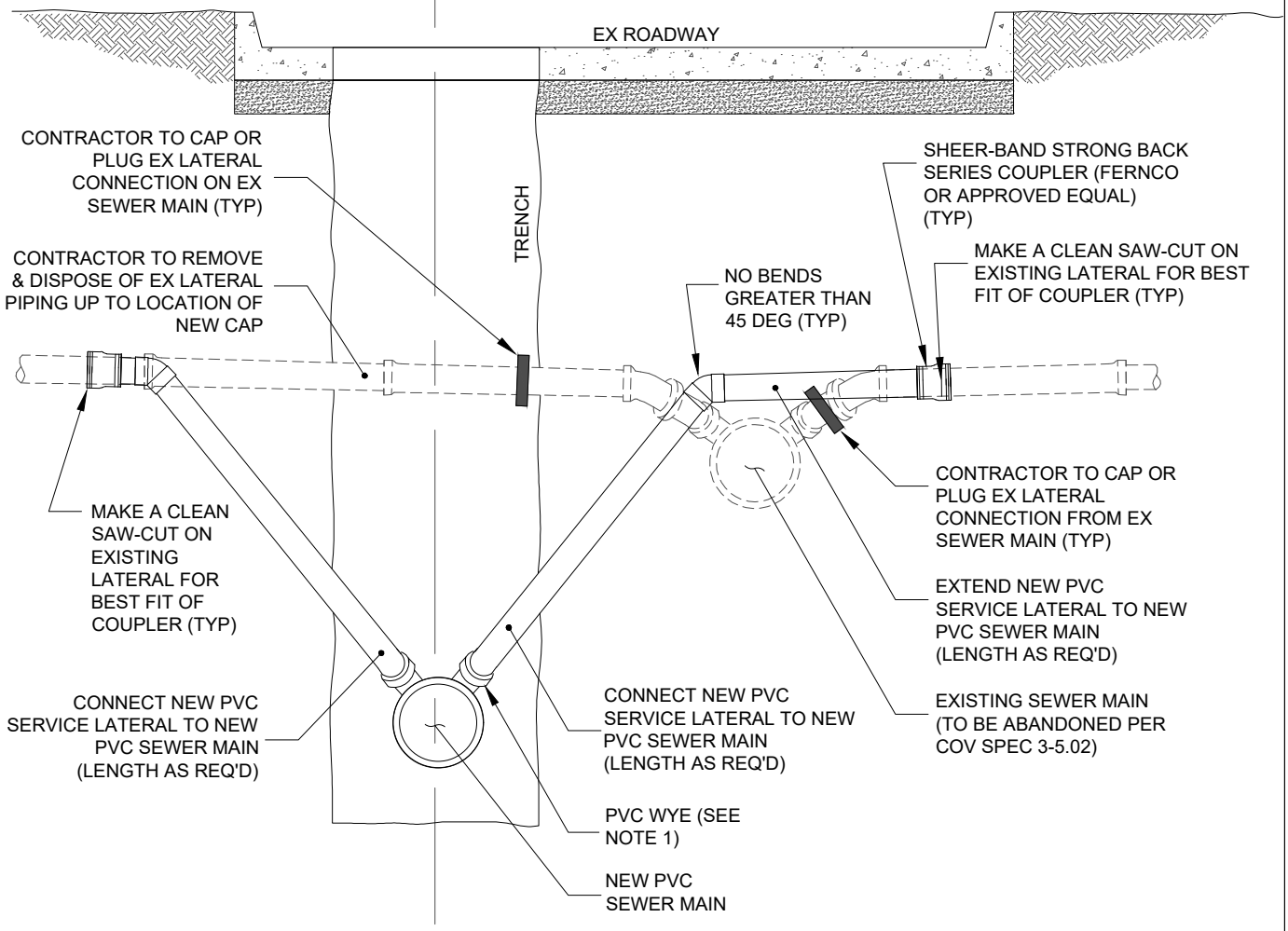
STD PLAN NO.

**S-1.4C**

SHORT-SIDE LATERAL CONNECTION

LONG-SIDE LATERAL CONNECTION




NOTES:

1. CONTRACTOR SHALL USE WYES PER COV DETAIL S-1.4A, CONTRACTOR MAY USE ROMAC CONNECTIONS PER COV DETAIL S-1.4C IF APPROVED BY CITY INSPECTOR.
2. CONTRACTOR RESPONIBLE FOR LOCATING EXISTING SEWER LATERALS BEFORE RE-CONNECTION IS MADE.

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# EXISTING SERVICE LATERAL TO NEW MAINS

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DEPARTMENT OF PUBLIC WORKS
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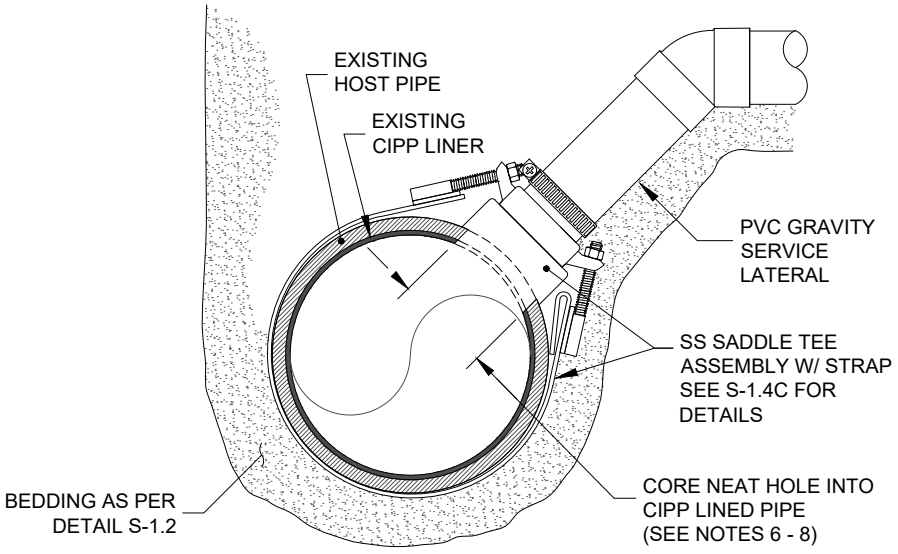
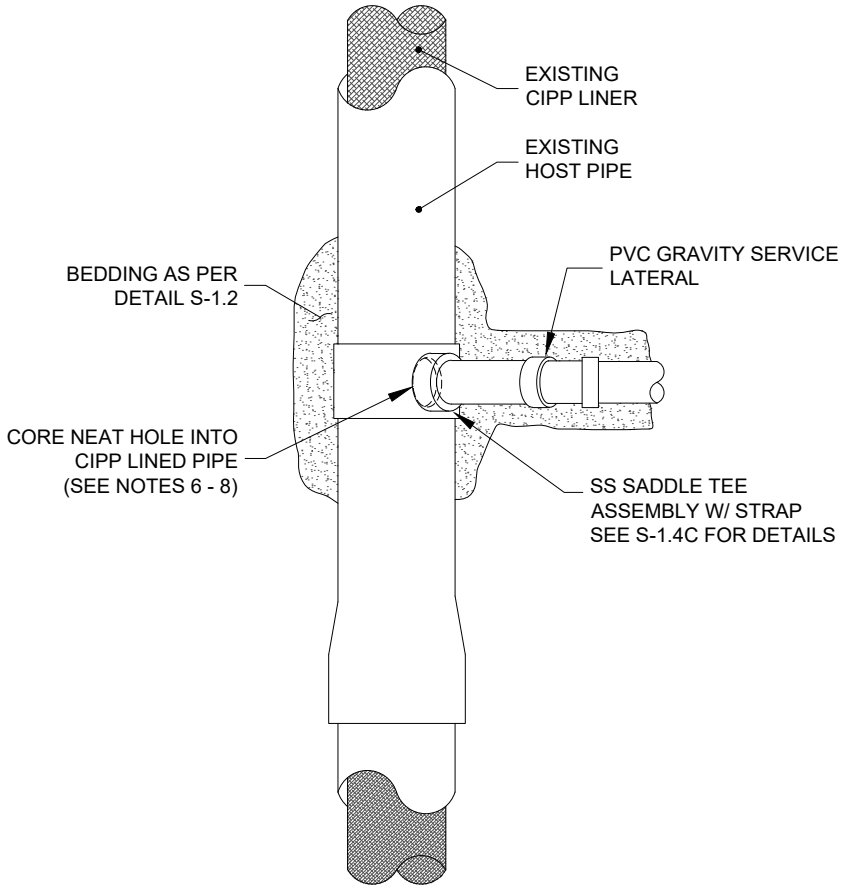
STD PLAN NO.

**S-1.4D**

SHEET: 4 OF 5




PROFILE VIEW




PLAN VIEW

NOTES

1. SERVICE LATERALS SHALL BE INSTALLED PER SECTION 7-08.3 OF THE STANDARD SPECIFICATIONS (LATEST EDITION) AND COV GEN. REQUIREMENTS AND AMENDMENTS.
2. SERVICE LATERALS SHALL BE CLEARLY MARKED PER SECTION 7-18.3(5) OF THE STANDARD SPECIFICATIONS.
3. ALL SERVICE LATERALS SHALL BE A MINIMUM OF 6-INCHES IN DIAMETER, LOTS ZONED SINGLE FAMILY RESIDENTIAL BY THE COMPREHENSIVE PLAN CAN USE 4-INCH DIAMETER.
4. SEE S-1.4C FOR APPROVED COMMERCIAL TAP DETAIL.
5. TRANSITIONS BETWEEN DISSIMILAR PIPE MATERIALS OR SIZES SHALL BE MADE WITH APPROVED ADAPTORS (FERNCO, MAX-ADAPTER OR EQUAL).
6. AFTER CORING INTO EXISTING MAIN AND PRIOR TO LATERAL INSTALLATION THE CONTRACTOR SHALL VERIFY WITH THE CITY INSPECTOR THAT THE CIPP LINER HAS NOT BEEN DAMAGED.
7. FOLLOWING INSTALLATION OF LATERAL, CONTRACTOR SHALL TV THE MAIN TO VERIFY THAT THE TAP WAS PROPERLY MADE. A VIDEO OF THE TAP SHALL BE SUBMITTED TO THE CITY FOR FINAL APPROVAL.
8. NO PROTRUSIONS, BURRS, OR SHARP EDGES OF ANY KIND ARE ALLOWED AT THE CONNECTION TO THE SEWER MAIN.
9. LATERALS WITH LESS THAN 5-FEET OF COVER SHALL USE C900 PVC.

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# NEW SERVICE LATERAL TO EXISTING CIPP MAIN

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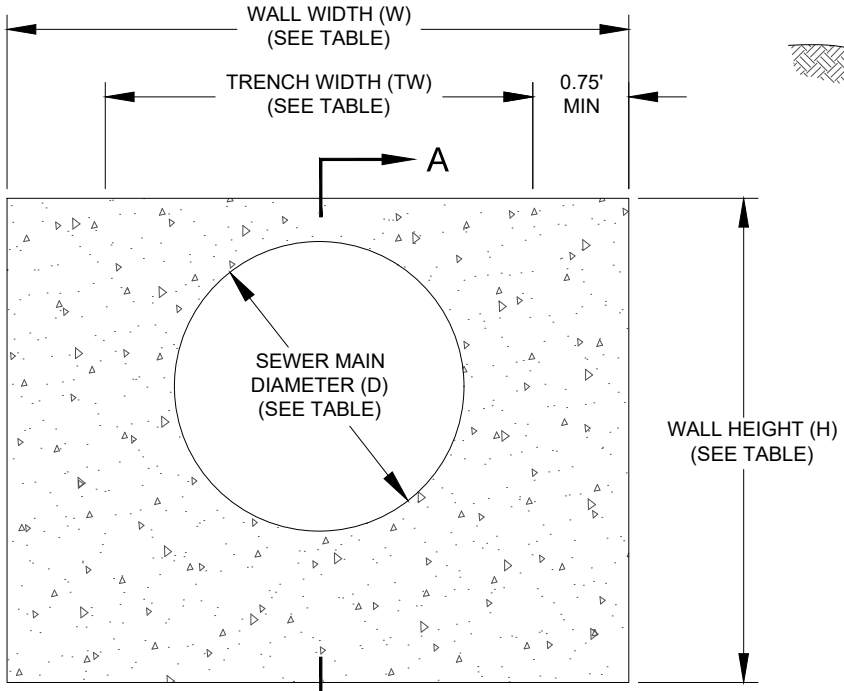
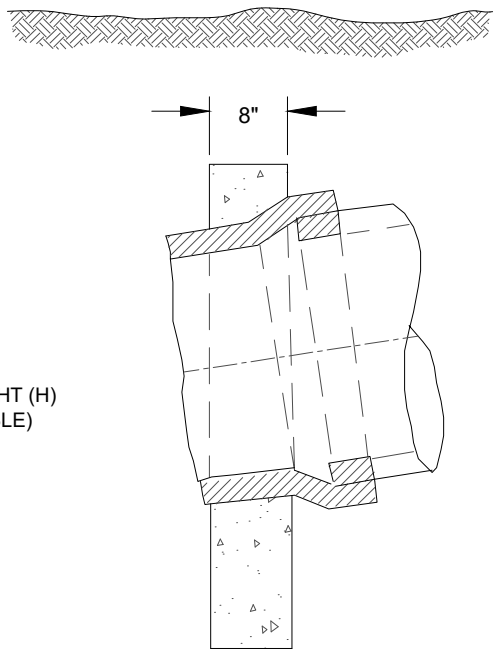
STD PLAN NO.

**S-1.4E**

SHEET: 5 OF 5




PROFILE VIEW




SECTION A-A

| TABLE A | | |
|---|---|---|
| SLOPE % | | MAXIMUM ALLOWABLE SPACING (FT) (MEASURED ON SLOPE) |
| OVER | TO | |
| 20 | 35 | 36 |
| 35 | 50 | 24 |
| 50 | 100 | 16 |

| TABLE B | | | | |
|---|---|---|---|---|
| PIPE SIZE (D) | TRENCH WIDTH MAX (TW) | HEIGHT (H) | WIDTH (W) | VOLUME OF CONCRETE (APPROX.) |
| 6", 8", 10" | 2.5' | 3.0' | 4.0' | 0.29 CY |
| 6", 8", 10" | 2.5' | 4.0' | 4.0' | 0.37 CY |
| 6", 8", 10" | 3.5' | 4.0' | 5.0' | 0.42 CY |
| 6", 8", 10" | 4.5' | 5.0' | 6.0' | 0.62 CY |

NOTES

1. WALLS SHALL BE APPROVED ON A CASE-BY-CASE BASIS.
2. ALL CONCRETE TO BE 3000 PSI, 2" TO 4" SLUMP.
3. WALLS WILL BE PLACED WHERE GRADE IS 20% OR OVER; WALLS TO BE AS SHOWN IN TABLE A.
4. ANCHOR WALLS TO BE EQUALLY SPACED WITH MAXIMUM DISTANCE BETWEEN WALLS.
5. PLACE WALL IMMEDIATELY BELOW BELL OF PIPE WHERE POSSIBLE.
6. CONCRETE SHALL BE POURED AGAINST FORMS OR STABLE UNDISTURBED SOIL.

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# STANDARD ANCHOR WALL

CITY OF VANCOUVER
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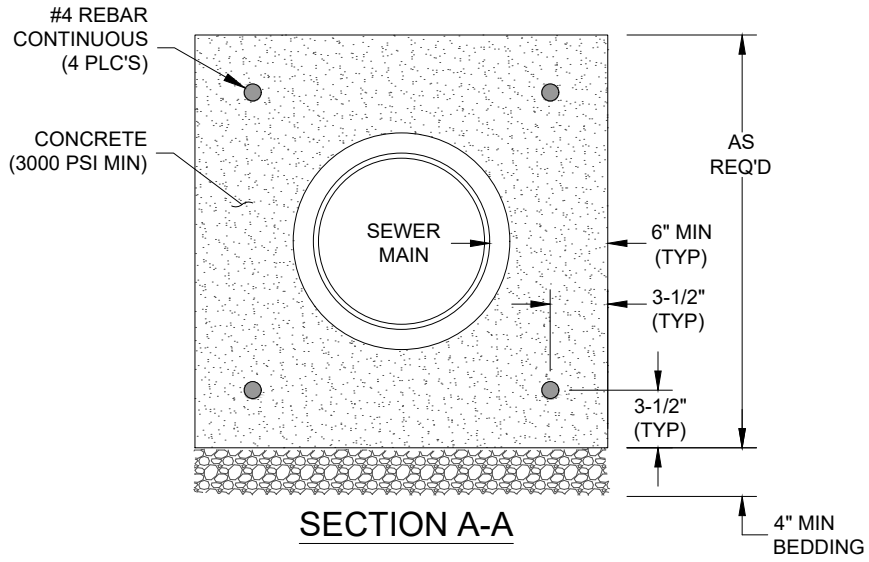
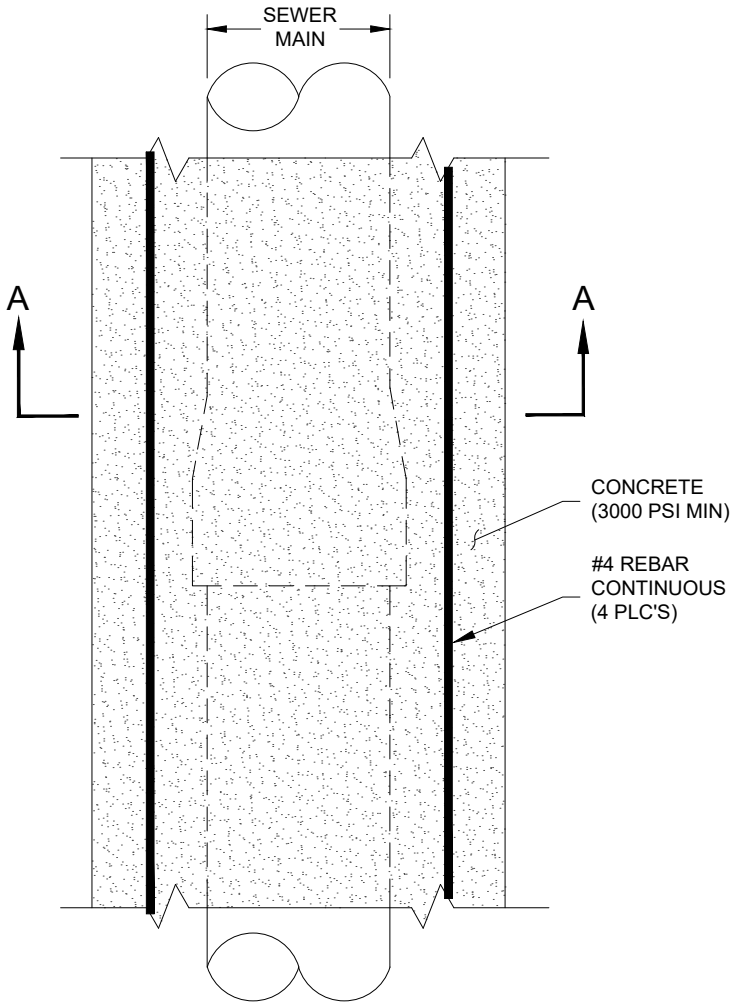
STD PLAN NO.

**S-1.5**




SECTION A-A




PLAN VIEW

NOTES

1. PIPE SECTIONS MAY BE ENCASED IN CONCRETE WHEN SEPARATION BETWEEN WATER AND SEWER LINE AT CROSSING IS LESS THAN 18".
2. PIPE WILL BE LAID IN AN AREA WITH POTENTIAL FOR SETTLING SUCH AS IN A ROADWAY OR BELOW A STREAM.
3. OPTIONALLY, CDF W/O REINFORCEMENT MAY BE APPROVED BY THE CITY ON A CASE-BY-CASE BASIS.

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# CONCRETE ENCASED SEWER PIPE

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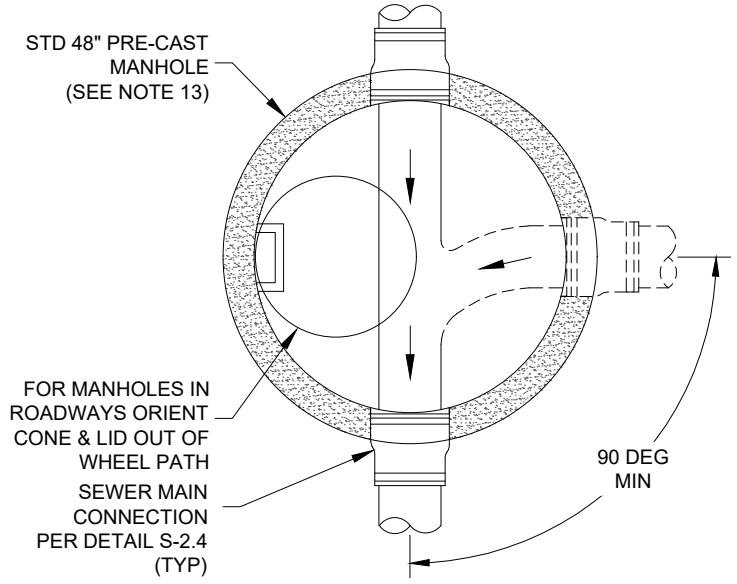
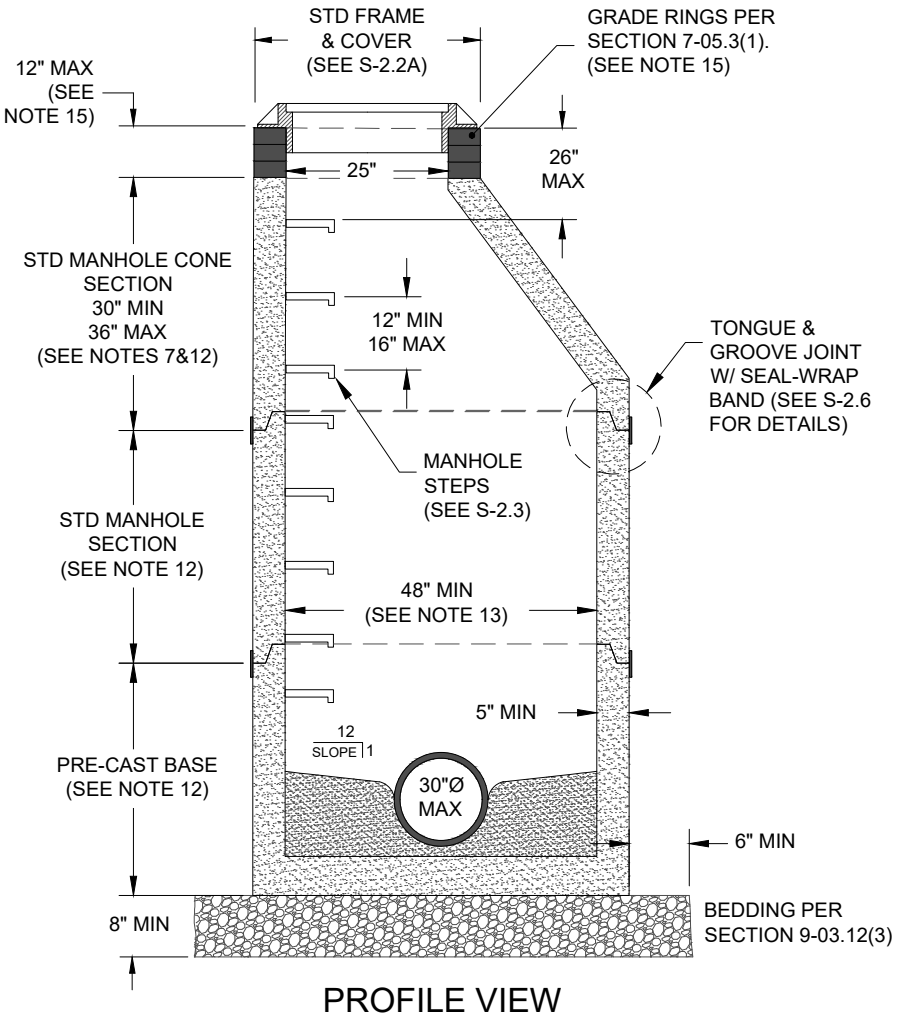
STD PLAN NO.

**S-1.6**




PLAN VIEW




PROFILE VIEW

NOTES

1. ALL PRECAST MANHOLE RINGS AND CONES SHALL CONFORM TO ASTM C-478 WITH CAST IN STEPS (SEE DETAIL S-2.3).
2. IN OVER EXCAVATED AREAS, PROVIDE SUPPORT FOR THE PIPE AS FOLLOWS: PLACE 3/4" MINUS CRUSHED ROCK OVER UNDISTURBED GROUND IN 6" LAYERS AND COMPACT USING HAND TAMPER.
3. BASE CONCRETE SHALL BE 3,000 P.S.I., 2-4 IN. SLUMP. FLOW LINES AND INSIDE SURFACES SHALL BE TROWELED SMOOTH & UNIFORM AT TIME OF POUR. CHANNELS SHALL CONFORM ACCURATELY TO SEWER GRADE. INSTALL BENCHES TO ELEVATION OF SPRINGLINE OF PIPE.
4. PRE-CAST DOGHOUSE MANHOLES MAY BE SUBSTITUTED WITH SPECIFIC APPROVAL OF THE ENGINEER (SEE DETAIL S-2.1C).
5. JOINTS SHALL BE CONSTRUCTED SO AS TO BE WATERTIGHT (SEE DETAIL S-2.6).
6. SEAL ALL MANHOLE JOINTS AND FRAME WITH INFI-SHIELD "SEAL WRAP" EXTERIOR SEAL SYSTEM OR EQUAL.
7. MANHOLES UNDER 6'-0" IN DEPTH FROM RIM TO BENCH SHALL HAVE A TOP SLAB IN LIEU OF CONE (SEE DETAIL S-2.1B).
8. VACUUM TESTING OF MANHOLES WILL BE REQUIRED.
9. LOCKING MANHOLE LIDS ARE REQUIRED IN EASEMENTS, UNIMPROVED AREAS OR AT THE DISCRETION OF THE CITY INSPECTOR (SEE DETAIL S-2.2B)
10. SEE DETAIL S-5.5 FOR PRESSURE SEWER DISCHARGES INTO MANHOLES.
11. GROUT SHALL BE ALL-CRETE 20 OR CITY-APPROVED EQUAL.
12. ALL NEW MANHOLES SHALL BE CAST W/ CON-SHIELD MIX PRIOR TO MANHOLE BEING INSTALLED. SEE SECTION 3-3.03 OF THE SEWER STANDARD SPECIFICATIIONS.
13. 60" MANHOLES REQUIRED FOR DROP CONNECTIONS (SEE DETAIL S-2.5).
14. 0.2 FT MINIMUM DROP THROUGH MANHOLES FOR SEWER MAINS, 0.3' MINIMUM DROP FOR SERVICE LATERALS; UNLESS OTHERWISE APPROVED.
15. EACH JOINT MUST BE SEALED W/ EXTERNAL SEALANT (MUST BE GROUTED BETWEEN EACH RING) POLYETHYLENE RINGS MUST BE APPROVED BY THE CITY

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# STANDARD PRECAST MANHOLE

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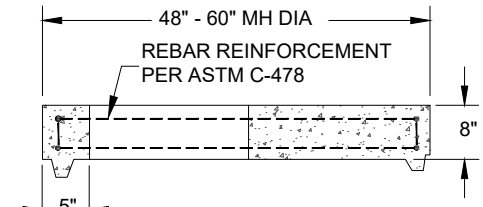
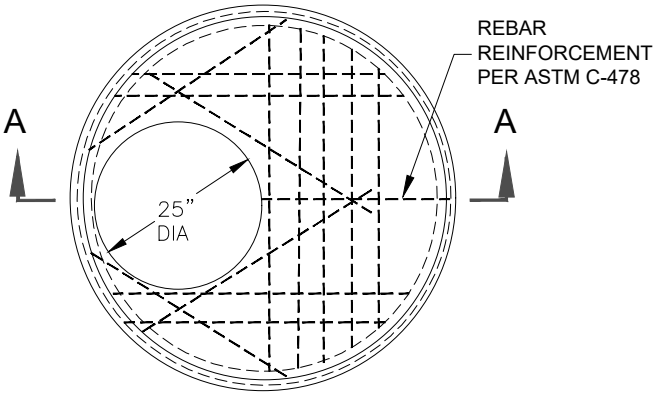
STD PLAN NO.

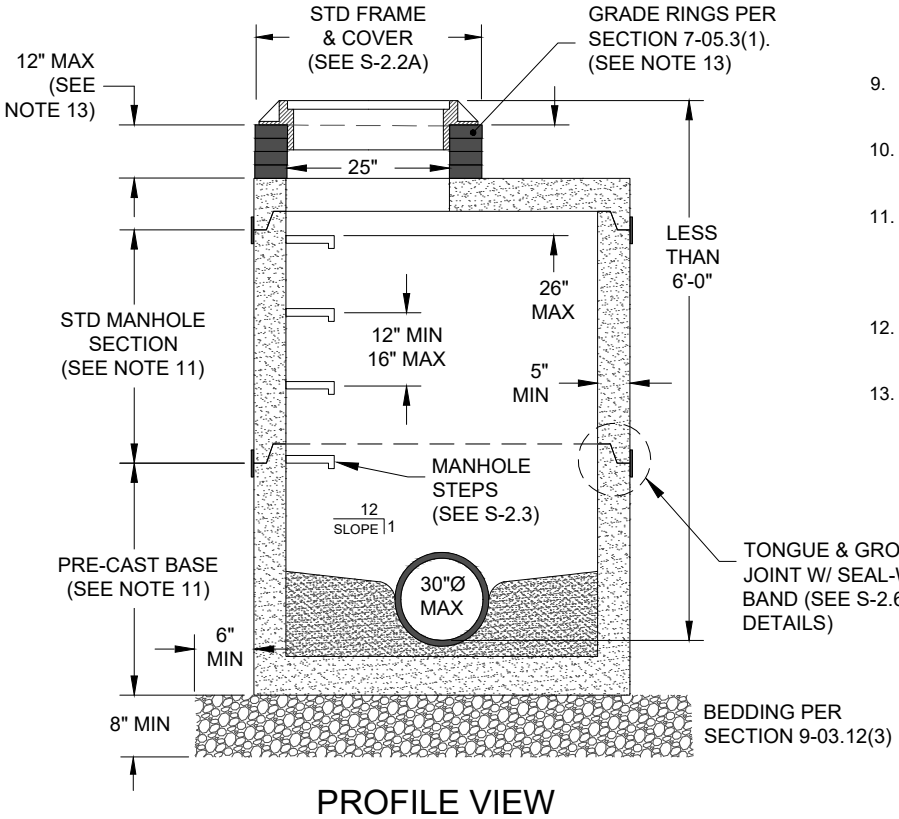
**S-2.1A**




SECTION A-A




FLAT-TOP DETAIL




PROFILE VIEW

NOTES

1. ALL PRECAST MANHOLE RINGS AND CONES SHALL CONFORM TO ASTM C-478 WITH CAST IN STEPS (SEE DETAIL S-2.3).
2. IN OVER EXCAVATED AREAS, PROVIDE SUPPORT FOR THE PIPE AS FOLLOWS: PLACE 3/4" MINUS CRUSHED ROCK OVER UNDISTURBED GROUND IN 6" LAYERS AND COMPACT USING HAND TAMPER.
3. BASE CONCRETE SHALL BE 3,000 P.S.I., 2-4 IN. SLUMP. FLOW LINES AND INSIDE SURFACES SHALL BE TROWELED SMOOTH & UNIFORM AT TIME OF POUR. MANHOLE BASE MAY BE MONOLITHICALLY CAST TO 8" ABOVE BARREL OF MAIN SEWER. CHANNELS SHALL CONFORM ACCURATELY TO SEWER GRADE. INSTALL BENCHES TO ELEVATION OF SPRINGLINE OF PIPE.
4. PRE-CAST DOGHOUSE MANHOLES MAY BE SUBSTITUTED WITH SPECIFIC APPROVAL OF THE ENGINEER (SEE DETAIL S-2.1C).
5. JOINTS SHALL BE CONSTRUCTED SO AS TO BE WATERTIGHT (SEE DETAIL S-2.6).
6. SEAL ALL MANHOLE JOINTS AND FRAME WITH INFI-SHIELD "SEAL WRAP" EXTERIOR SEAL SYSTEM OR EQUAL.
7. VACUUM TESTING OF MANHOLES WILL BE REQUIRED.
8. LOCKING MANHOLE LIDS ARE REQUIRED IN EASEMENTS, UNIMPROVED AREAS OR AT THE DISCRETION OF THE CITY INSPECTOR (SEE DETAIL S-2.2B).
9. SEE DETAIL S-5.5 FOR PRESSURE SEWER DISCHARGES INTO MANHOLES.
10. GROUT SHALL BE ALL-CRETE 20 OR CITY-APPROVED EQUAL.
11. ALL NEW MANHOLES SHALL BE CAST W/ CON-SHIELD MIX PRIOR TO MANHOLE BEING INSTALLED. SEE SECTION 3-3.03 OF THE SEWER STANDARD SPECIFICATIONS.
12. 0.2 FT MIN DROP THROUGH MANHOLES UNLESS OTHERWISE APPROVED.
13. ADJUST W/ GRADE RINGS PER SECTION 7-05.3(1). EACH JOINT MUST BE SEALED W/ EXTERNAL SEALANT (MUST BE GROUTED BETWEEN EACH RING) POLYETHYLENE RINGS MUST BE APPROVED BY THE CITY

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CITY OF Vancouver WASHINGTON

# TOP SLAB MANHOLE

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SANITARY SYSTEMS PLANNING AND DESIGN

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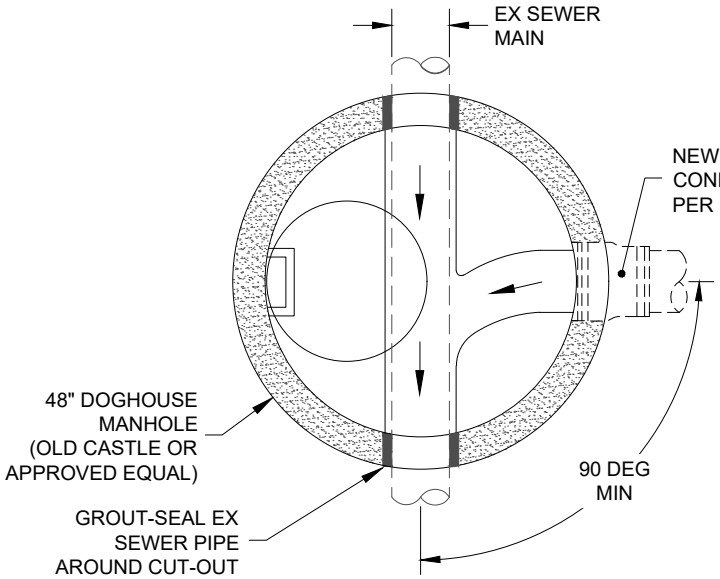
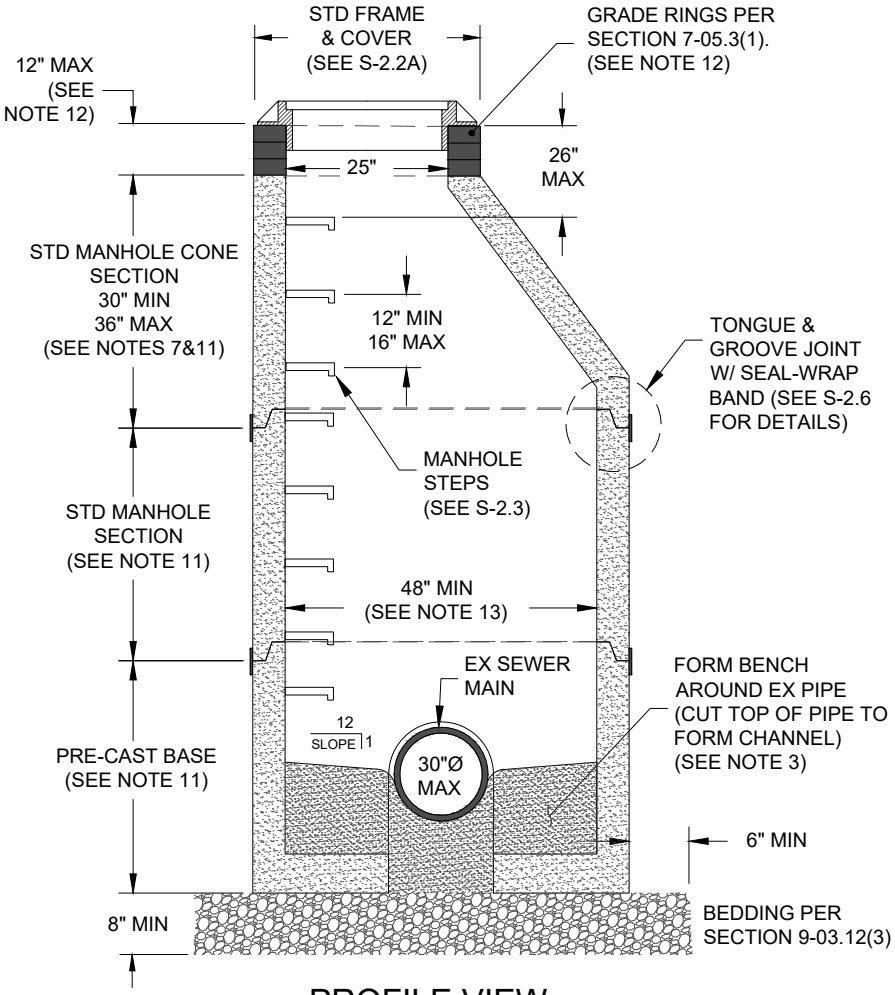
STD PLAN NO.

**S-2.1B**




PLAN VIEW




PROFILE VIEW

NOTES

1. ALL PRECAST MANHOLE RINGS AND CONES SHALL CONFORM TO ASTM C-478 WITH CAST IN STEPS (SEE DETAIL S-2.3).
2. IN OVER EXCAVATED AREAS, PROVIDE SUPPORT FOR THE PIPE AS FOLLOWS: PLACE 3/4" MINUS CRUSHED ROCK OVER UNDISTURBED GROUND IN 6" LAYERS AND COMPACT USING HAND TAMPER.
3. BASE CONCRETE SHALL BE 3,000 P.S.I., 2-4 IN. SLUMP. FLOW LINES AND INSIDE SURFACES SHALL BE TROWELED SMOOTH & UNIFORM AT TIME OF POUR. CHANNELS SHALL CONFORM ACCURATELY TO SEWER GRADE. INSTALL BENCHES TO ELEVATION OF SPRINGLINE OF PIPE.
4. JOINTS SHALL BE CONSTRUCTED SO AS TO BE WATERTIGHT (SEE DETAIL S-2.6).
5. SEAL ALL MANHOLE JOINTS AND FRAME WITH INFI-SHIELD "SEAL WRAP" EXTERIOR SEAL SYSTEM OR EQUAL.
6. MANHOLES UNDER 6'-0" IN DEPTH FROM RIM TO BENCH SHALL HAVE A TOP SLAB IN LIEU OF CONE (SEE DETAIL S-2.1B).
7. VACUUM TESTING OF MANHOLES WILL BE REQUIRED.
8. LOCKING MANHOLE LIDS ARE REQUIRED IN EASEMENTS, UNIMPROVED AREAS OR AT THE DISCRETION OF THE CITY INSPECTOR (SEE DETAIL S-2.2B).
9. SEE DETAIL S-5.5 FOR PRESSURE SEWER DISCHARGES INTO MANHOLES.
10. GROUT SHALL BE ALL-CRETE 20 OR CITY-APPROVED EQUAL.
11. ALL NEW MANHOLES SHALL BE CAST W/ CON-SHIELD MIX PRIOR TO MANHOLE BEING INSTALLED. SEE SECTION 3-3.03 OF THE SEWER STANDARD SPECIFICATIONS.
12. ADJUST W/ GRADE RINGS PER SECTION 7-05.3(1). EACH JOINT MUST BE SEALED W/ EXTERNAL SEALANT (MUST BE GROUTED BETWEEN EACH RING) POLYETHYLENE RINGS MUST BE APPROVED BY THE CITY.
13. 60" MANHOLES REQUIRED FOR DROP CONNECTIONS (SEE DETAIL S-2.5).
14. DOGHOUSE MANHOLES SHALL NOT BE USED OVER EXISTING PVC SEWER MAINS, SEE S-2.1D FOR DETAILS

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# PRE-CAST DOGHOUSE MANHOLE

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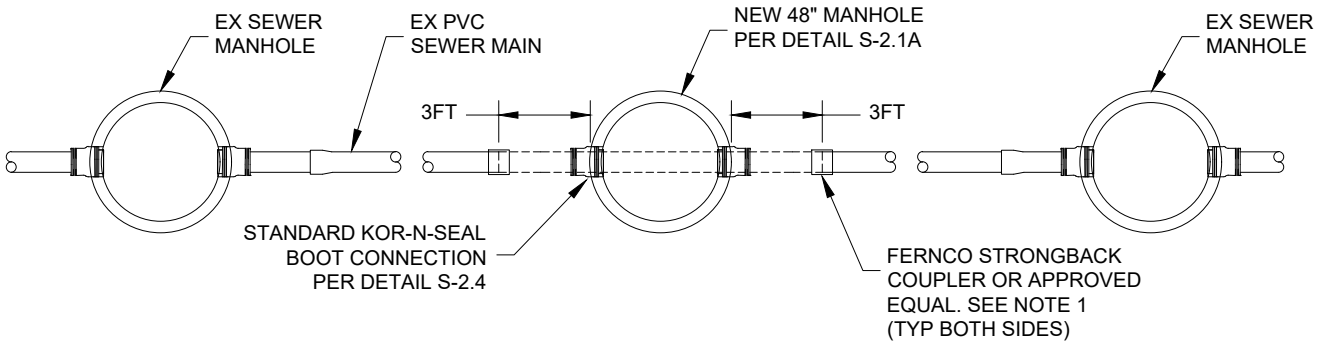
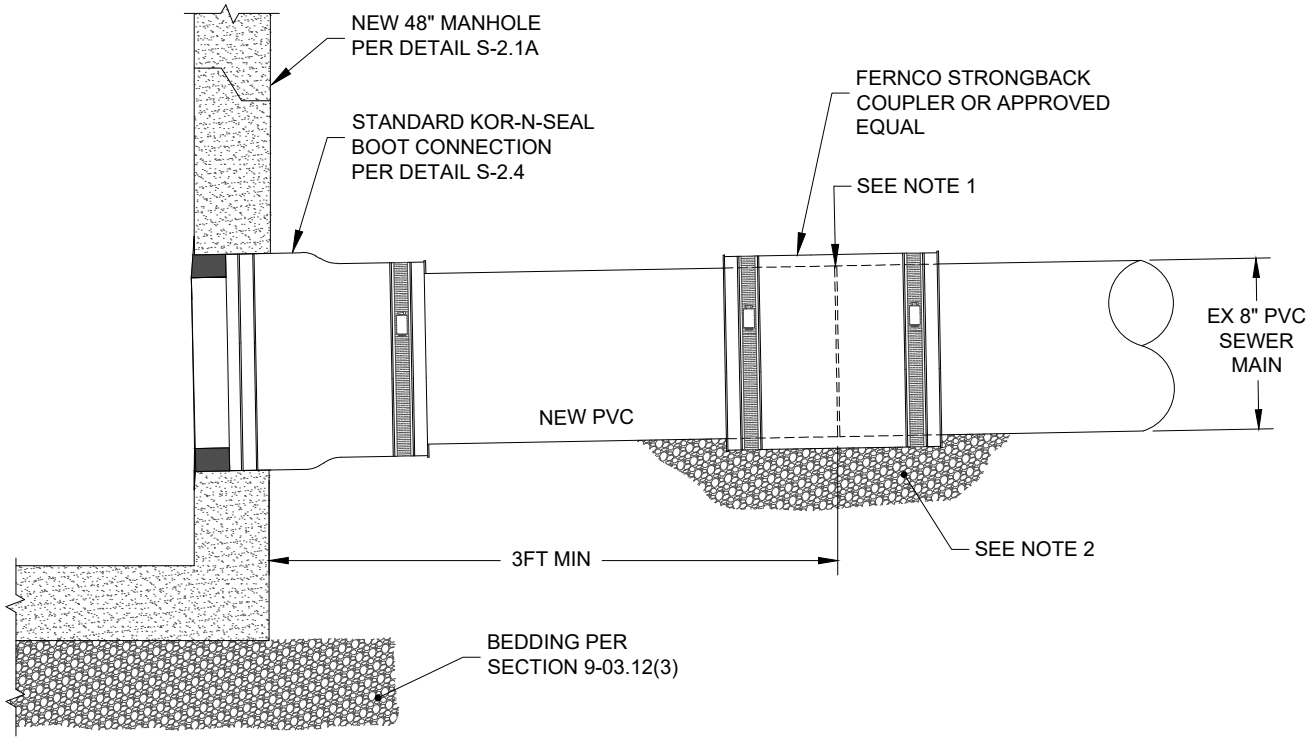
**S-2.1C**




PLAN VIEW




PROFILE VIEW

NOTES:

1. PIPE ENDS SHALL BE CUT TRUE AND FLUSH, THE PIPE SHALL BUTT TOGETHER EVENLY AND TIGHT.
2. CRUSHED SURFACING TOP COURSE SHALL BE PLACED AND COMPACTED AROUND CONNECTION TO ASSURE PIPE STAYS TRUE AND NO SETTLEMENT OCCURS.
3. CCTV INSPECTION AND APPROVAL REQUIRED FOR INSTALLATION.

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**NEW MANHOLE CONNECTION TO EX. PVC SEWER MAIN**

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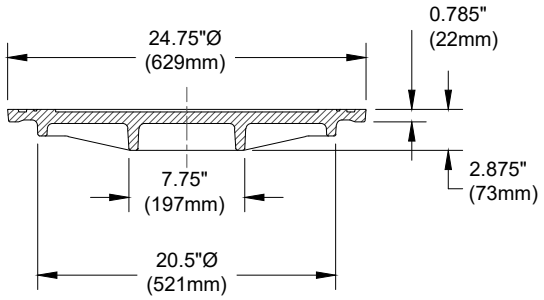
STD PLAN NO.

**S-2.1D**

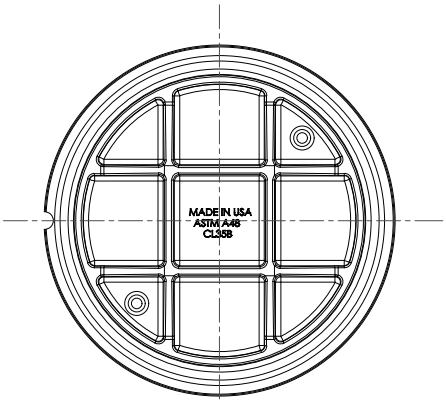
SHEET: 4 OF 4

NOTES

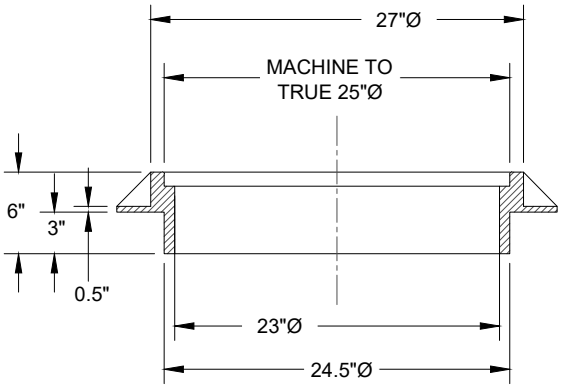
1. STANDARD MANHOLE LID TO BE USED IN ALL PAVED PUBLIC RIGHT OF WAY AREAS.



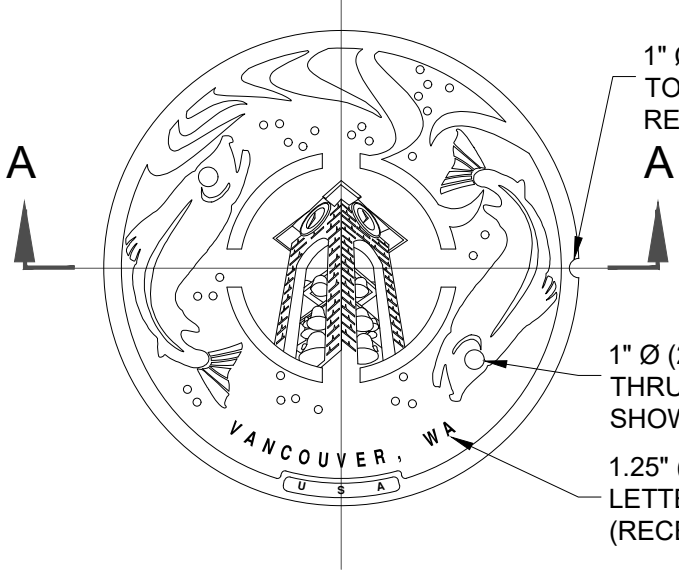

SECTION A-A



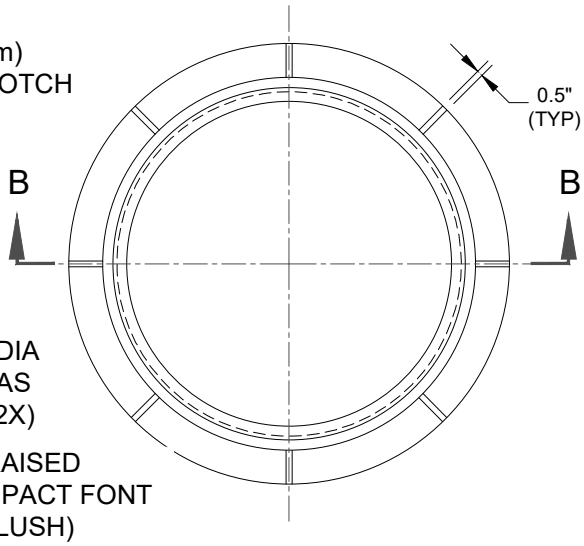

BOTTOM VIEW




SECTION B-B




STANDARD MANHOLE LID
PLAN VIEW




SUBURBAN MANHOLE FRAME
PLAN VIEW

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# STANDARD MANHOLE LID AND FRAME

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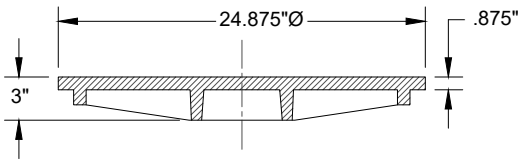
STD PLAN NO.

**S-2.2A**

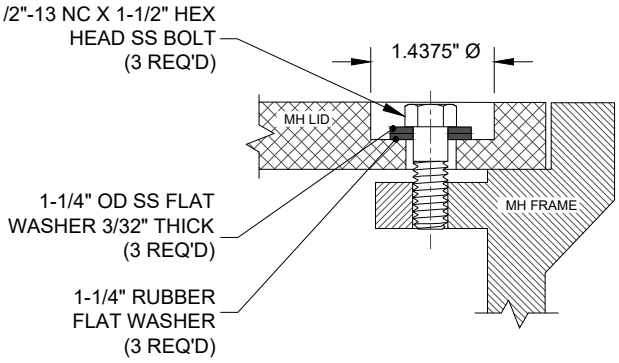
SHEET: 1 OF 5

NOTES

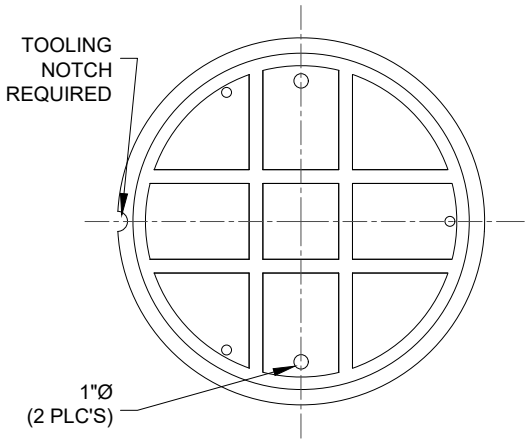
1. LOCKING MANHOLE LID TO BE USED IN NON PAVED AREAS OR WITHIN EASEMENTS.



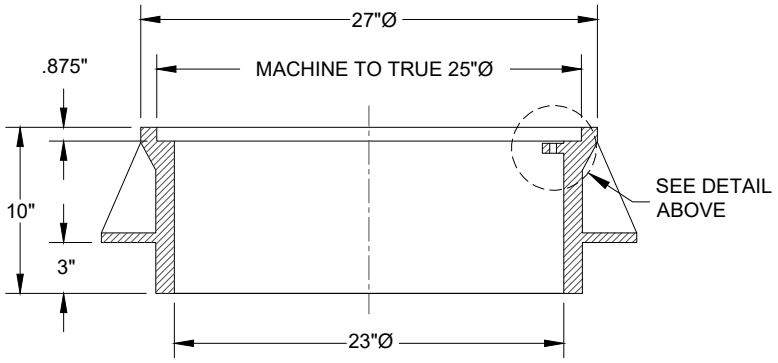

SECTION A-A



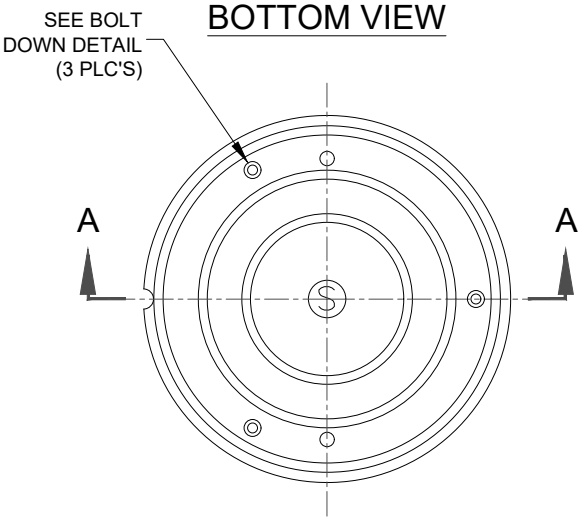

BOLT DOWN DETAIL



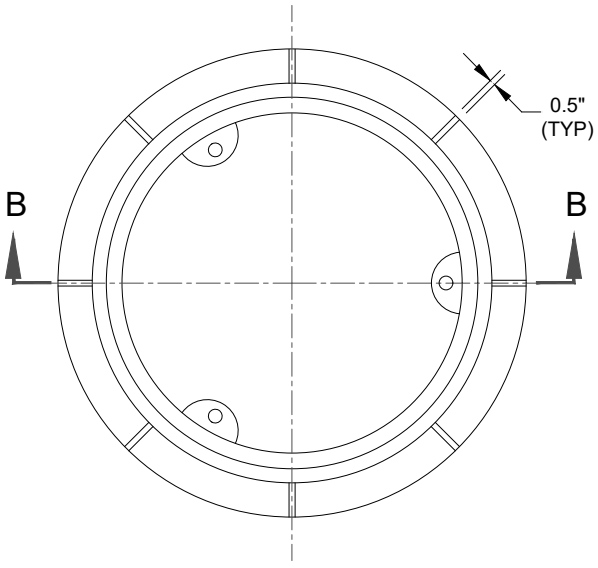

BOTTOM VIEW




SECTION B-B




LOCKING MANHOLE LID
PLAN VIEW




LOCKING MANHOLE FRAME
PLAN VIEW

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# LOCKING MANHOLE LID AND FRAME

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
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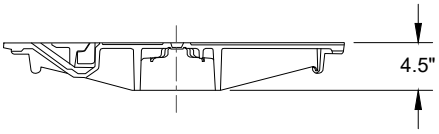
STD PLAN NO.

**S-2.2B**

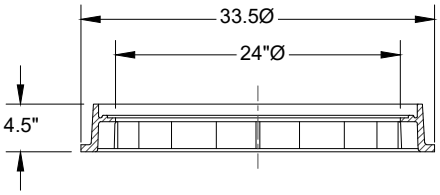
SHEET: 2 OF 5

NOTES

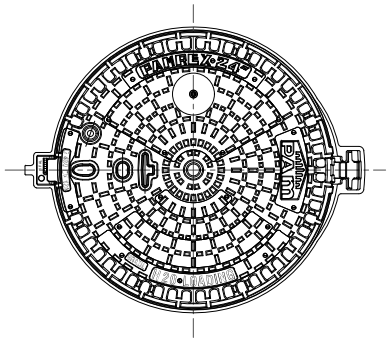
1. PAMREX OR APPROVED EQUAL MANHOLE COVER AND FRAME.
2. COVERS SHALL BE ONE-MAN OPERABLE USING STANDARD TOOLS.
3. FRAMES SHALL BE CIRCULAR AND SHALL INCORPORATE A SEATED GASKET.
4. PAMREX COVERS AND LIDS ARE REQUIRED FOR SEWER MANHOLES INSTALLED WITHIN THE 100-YEAR FLOOD PLAIN OR WHERE STORM WATER MAY ACCUMUALATE.
5. SEE S-2.1A FOR STANDARD RISER RING INSTALLATION; COMPOSITE RISER RINGS NEED CITY APPROVAL.



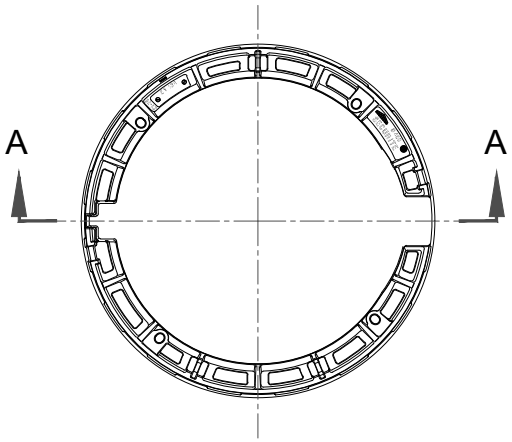

PROFILE VIEW




SECTION A-A




PAMREX MANHOLE LID
PLAN VIEW




PAMREX MANHOLE FRAME
PLAN VIEW

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# PAMREX (WATERTIGHT) LID AND FRAME

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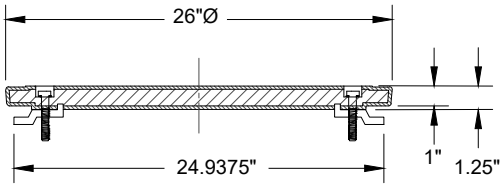
STD PLAN NO.

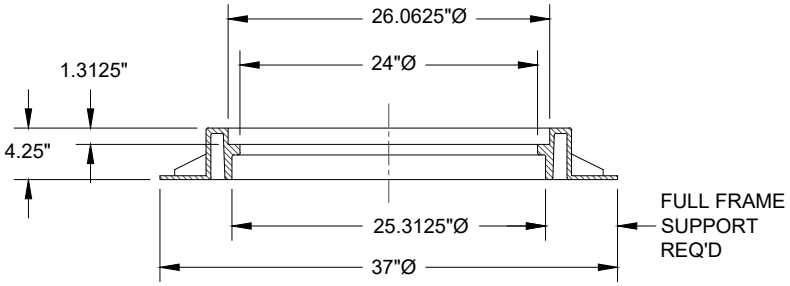
**S-2.2C**

NOTES

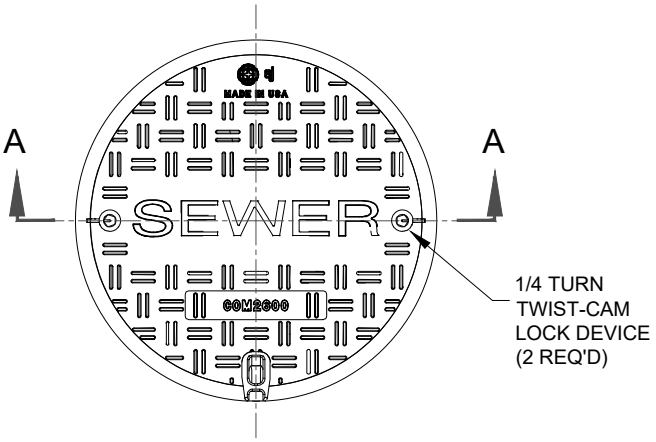
1. GMI COMPOSITES OR APPROVED EQUAL COMPOSITE MANHOLE COVER AND FRAME.
2. COVERS SHALL BE ONE-MAN OPERABLE USING STANDARD TOOLS.
3. FRAMES SHALL BE CIRCULAR.
4. GMI COMPOSITE COVERS AND LIDS FOR USE IN LOCATIONS WITH HIGH H2S/ODOR AND UN-IMPROVED AREAS.



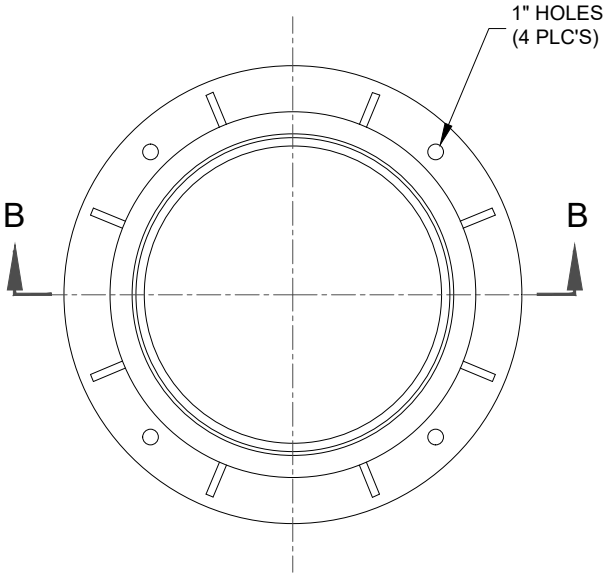

SECTION A-A




SECTION B-B




COMPOSITE MANHOLE LID
PLAN VIEW




COMPOSITE MANHOLE FRAME
PLAN VIEW

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CITY OF Vancouver WASHINGTON

# COMPOSITE LID AND FRAME FOR H2S

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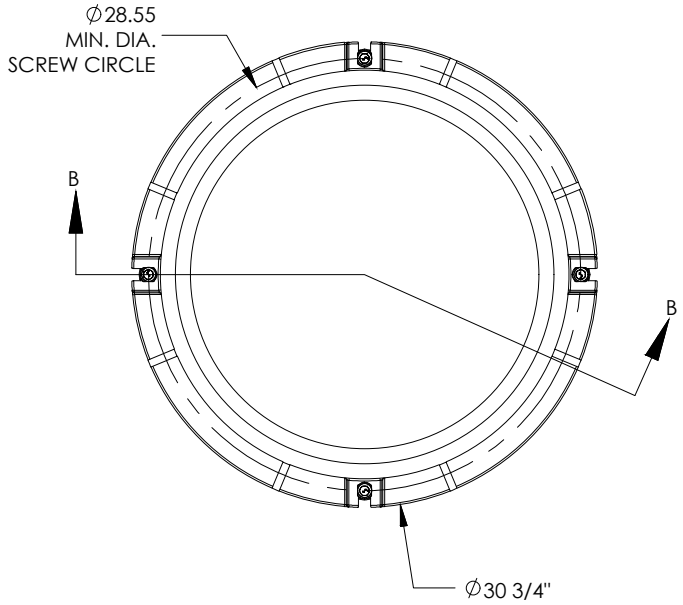
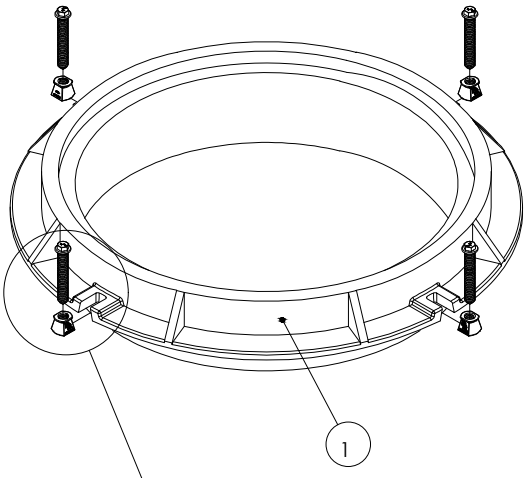
STD PLAN NO.

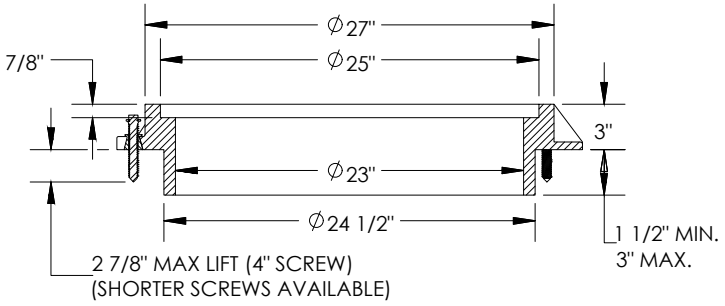
**S-2.2D**

SHEET: 4 OF 5

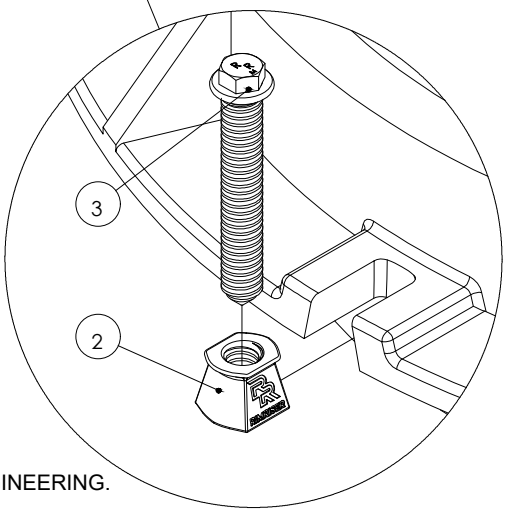
| ITEM NO. | PART NUMBER | DESCRIPTION | QTY. |
|---|---|---|---|
| 1 | 23" X 3" MH | RIMRISER ADJUSTABLE 3" (SUBURBAN) MANHOLE | 1 |
| 2 | RR-0001 | 5/8" SLOT NUT INSERT | 4 |
| 3 | RR-0058-4 | 5/8" X 4" JACK SCREW / 5/8" HEX HEAD | 4 |




SECTION B-B




DETAIL A

NOTES:

1. ADJUSTABLE MANHOLE FRAMES REQUIRE APPROVAL FROM CITY ENGINEERING.
2. NO SHIMS REQUIRED. ADJUST SCREWS TO MEET FINISHED GRADE.
3. CASTING ASSEMBLY: AASHTO M-306 CERTIFIED; H-20 OR “TRAFFIC-RATED”.
4. CASTINGS: GRAY IRON CONFORMS TO ASTM A48 CL35B.
5. SCREWS: ZINC-PLATED, MILD STEEL CONFORMS TO ASTM A1018.
6. NUTS: ZINC ALLOY CONFORMS TO ASTM C41A.
7. FILL AND PACK GAP BETWEEN FRAME AND SUPPORTING BASE WITH NON-SHRINK GROUT AND FINISH SMOOTH/FLUSH WITH INTERIOR AND EXTERIOR OF ADJOINING SURFACES.
8. USE ONLY GENUINE RIMRISER PARTS.
9. SEE STANDARD DETAIL S-2.1A FOR APPROVED MANHOLE LID.

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CITY OF Vancouver WASHINGTON

# ADJUSTABLE MANHOLE FRAME (RIM-RISER)

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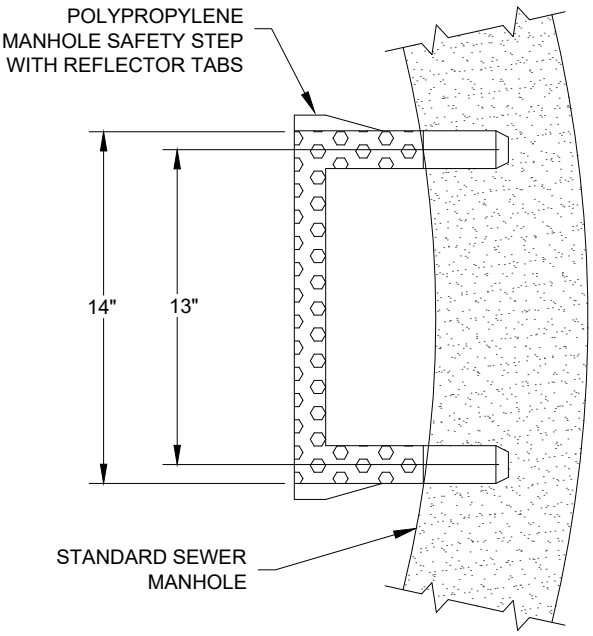
STD PLAN NO.

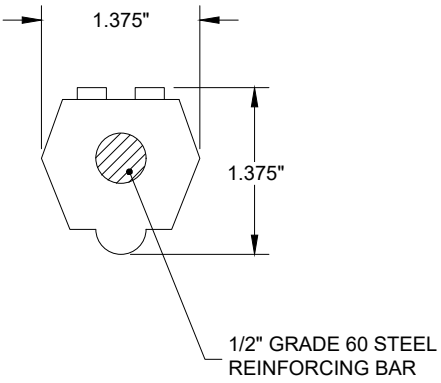
**S-2.2E**

NOTES

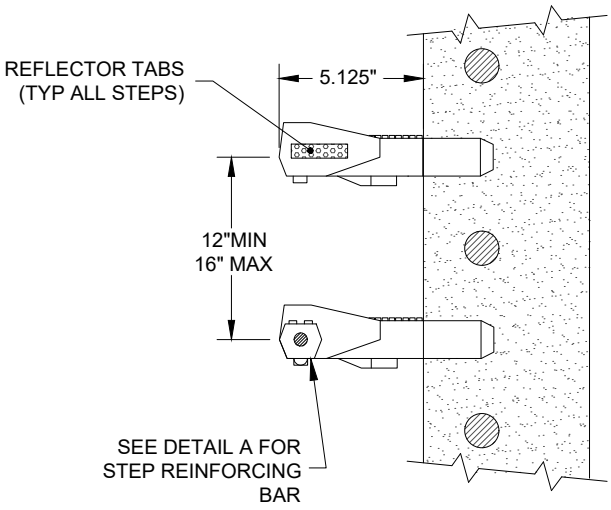
1. ALL STEPS SHALL MEET ASTM C-478 & AASHTO M-199 SPECIFICATIONS. POLYPROPYLENE ASTM D-4104, THE 1/2" GRADE 60 STEEL REINFORCED BARS SHALL MEET ASTM A-615.
2. INSTALLATION METHOD MUST RESIST 1500LBS HORIZONTAL PULL-OUT FORCE AND 500LB VERTICAL LOAD.
3. LOCATE STEPS OVER BENCH WHENEVER POSSIBLE (NOT OVER MAIN).




PLAN VIEW




DETAIL A




ELEVATION VIEW

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# STANDARD MANHOLE STEPS

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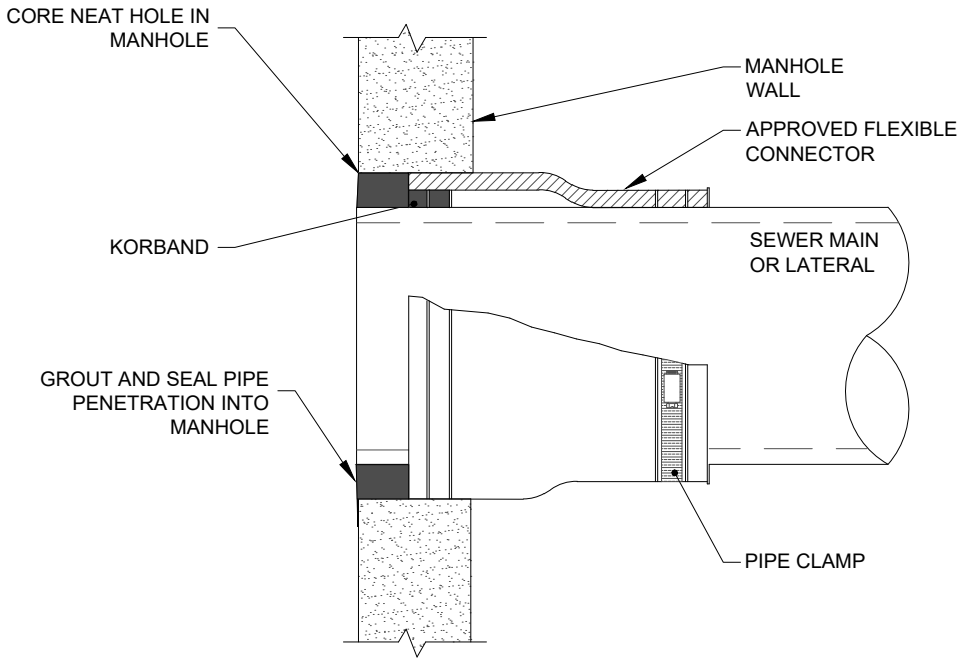
STD PLAN NO.

**S-2.3**




NOTES

1. SEWER MAIN AND LATERALS CONNECTING TO MANHOLES SHALL BE MADE WITH AN APPROVED EXPANSION TYPE RUBBER BOOT; KOR-N-SEAL ® OR SEALTITE ®, (NO FLEX JOINT REQUIRED),

2. FOR ALL PIPES UP TO 18". LARGER PIPES WILL BE HANDLED ON A CASE-BY-CASE BASIS. CORE NEAT HOLE IN MANHOLE AND INSTALL BOOT AS REQUIRED PER MANUFACTURER'S SPECIFICATIONS.

3. STUB-OUTS CONSTRUCTED FOR FUTURE EXTENSIONS ARE TO BE INSTALLED WITH STUB MARKERS PER DETAIL S-3.0.

4. SAND-COLLAR CONNECTIONS ARE NOT ALLOWED WITHOUT CITY ENGINEERING APPROVAL

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CITY OF Vancouver WASHINGTON

# STANDARD MANHOLE CONNECTION

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SANITARY SYSTEMS PLANNING AND DESIGN

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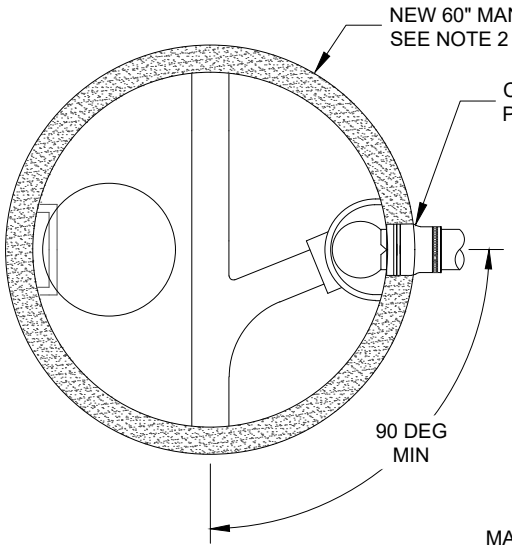
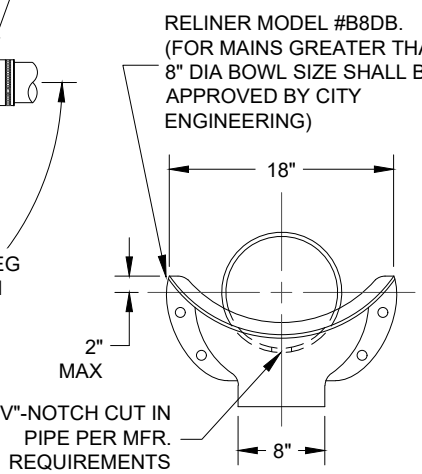
STD PLAN NO.

**S-2.4**



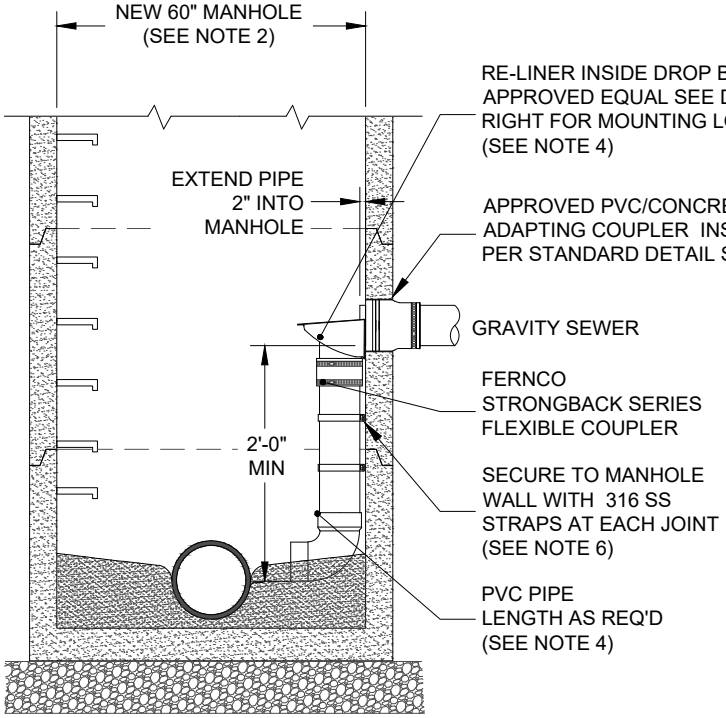

PLAN VIEW
NEW MANHOLES



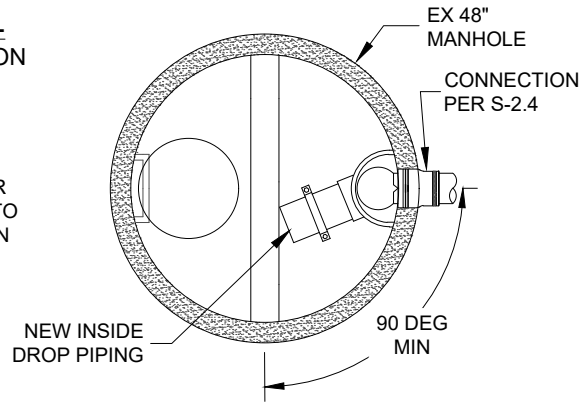

DROP BOWL
MOUNTING POSITION

NOTES

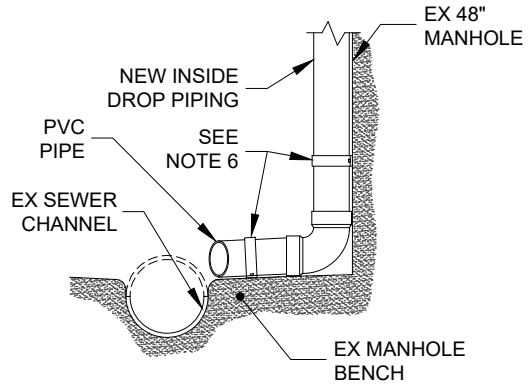
1. INSIDE DROP ASSEMBLY MAY BE USED ONLY WHEN SPECIFICALLY APPROVED BY COV SEWER ENGINEERING, MAX OF ONE (1) ASSEMBLY PER MANHOLE.
2. NEW MANHOLES WITH AN INSIDE DROP ASSEMBLY SHALL BE A 60" ECCENTRIC CONE MANHOLE, COLUMBIA PRECAST OR APPROVED EQUAL.
3. CONNECTING TO EXISTING MANHOLE W/ INSIDE DROP SHALL BE APPROVED BY COV SEWER ENGINEERING.
4. RE-LINER BOWL OUTLET DIA SHALL BE SIZED TO MATCH INCOMING GRAVITY SEWER PIPE.
5. ORIENT CONE AND LADDER STEPS TO NOT INTERFERE WITH MAINTENANCE OF DROP CONNECTION
6. SECURE TO MANHOLE WALL/ BENCH WITH MIN 1-1/2" 16GA 316 SS STRAPS AT EACH JOINT, USE 1/4"x 4"LG 316 SS EXPANSION ANCHORS W/ 316 SS BOLTS




PROFILE VIEW
NEW MANHOLES




PLAN VIEW
EXISTING MANHOLES




PROFILE VIEW
EXISTING MANHOLES

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CITY OF Vancouver WASHINGTON

# STANDARD DROP CONNECTION

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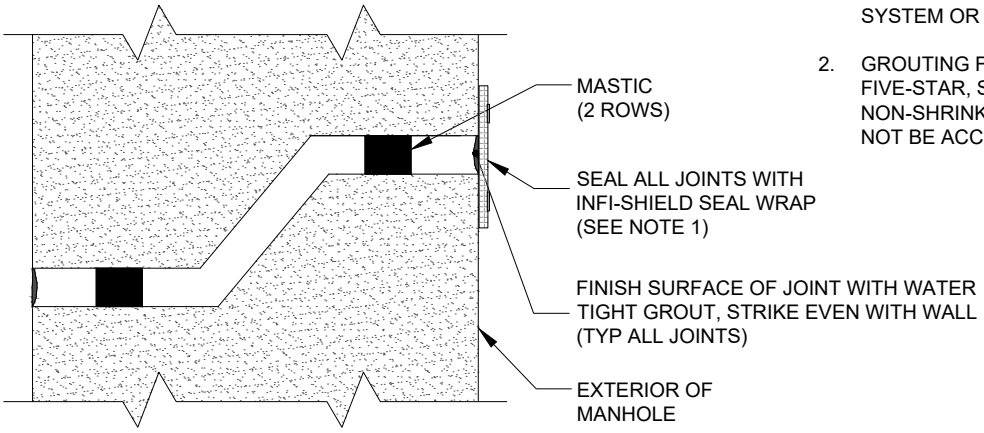
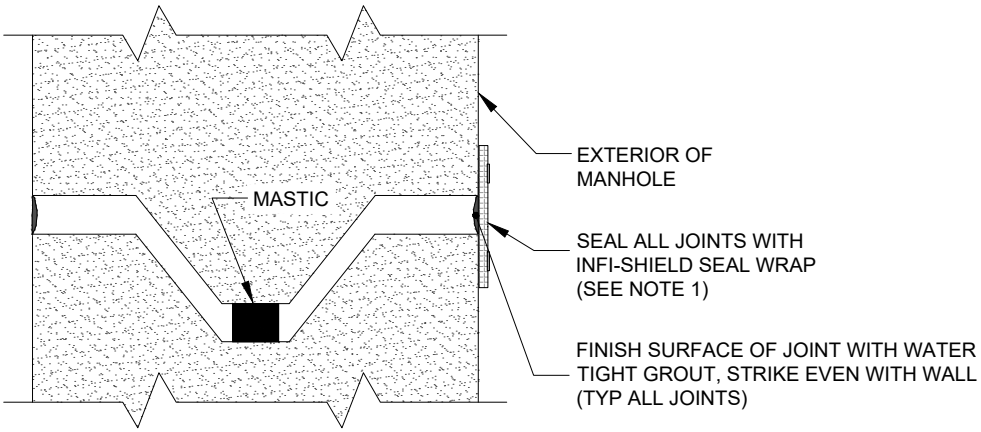
**S-2.5**

NOTES

1. SEAL THE MANHOLE JOINTS AND FRAME WITH INFI-SHIELD "SEAL WRAP" EXTERNAL SEAL SYSTEM OR APPROVED EQUAL
2. GROUTING FOR SEALING JOINTS SHALL BE FIVE-STAR, SIKA 212, EUCO N5, OR APPROVED NON-SHRINK GROUT. STANDARD GROUT WILL NOT BE ACCEPTED.




TONGUE & GROOVE

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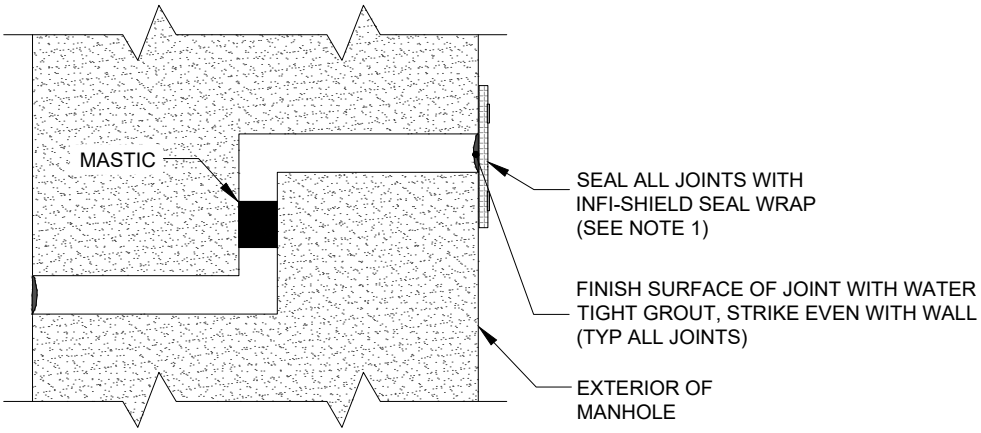


RUBBER JOINT GASKET

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# STANDARD MANHOLE JOINTS

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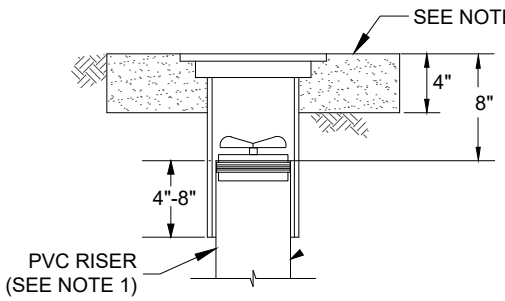
STD PLAN NO.

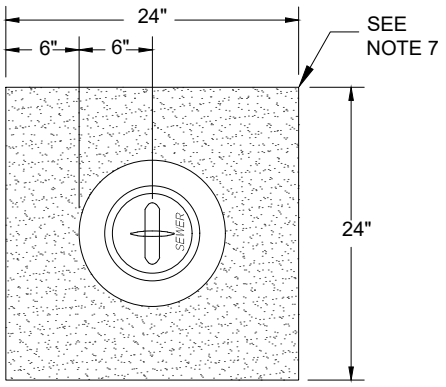
**S-2.6**



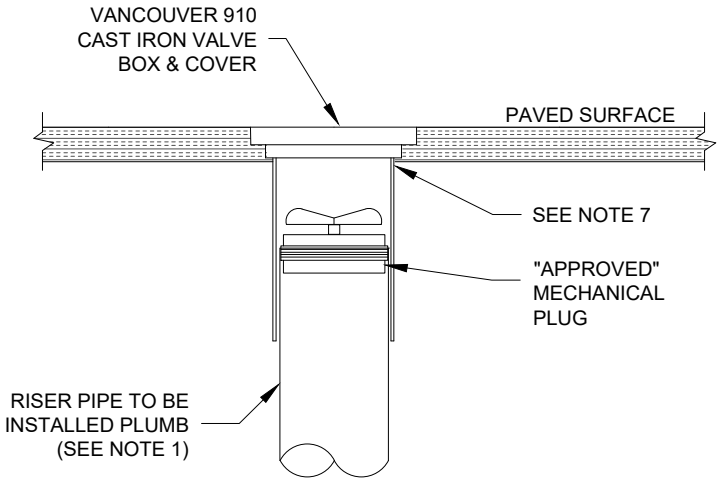

SEWER PLUG
DETAIL VIEW

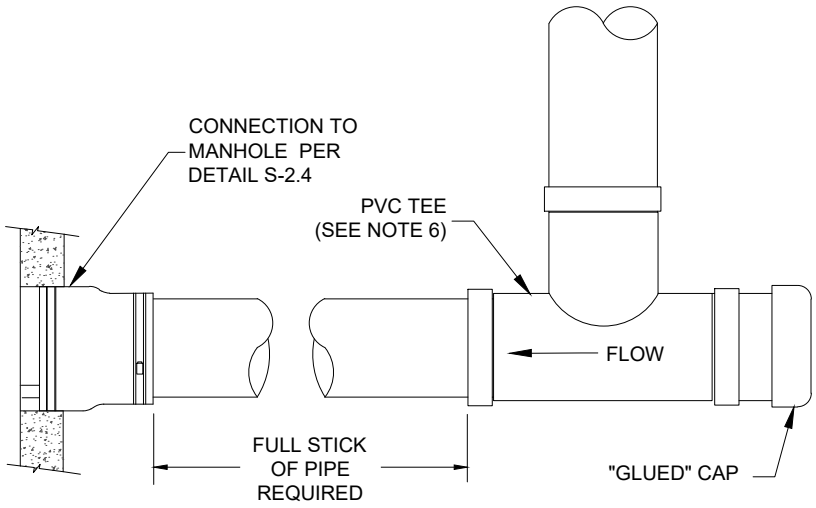
NOTES:

1. RISER PIPE SHALL BE 6" ASTM D3034 SDR 35 PVC PIPE
2. VALVE BOX SHALL BE "VANCOUVER 910".
3. THERE SHALL BE 1/2" CLEARANCE UNDER THE PIN CAST INTO THE LID.
4. CONCRETE COLLAR SHALL BE MINIMUM STRENGTH OF 3000PSI
5. PIPE BEDDING SHALL CONFORM TO SEWER STANDARD DETAIL S-1.2.
6. FOR LATERAL STUB MARKERS; 4" LATERALS WILL USE 4"X4"X4" TEE WITH A 4" RISER.
   6" LATERALS WILL USE A 6"X6"X4" TEE WITH A 4" RISER.
7. CONCRETE COLLAR REQUIRED FOR VALVE BOXES PLACED IN UNPAVED AREAS.
8. STUB MARKERS 8" OR GREATER SHALL REQUIRE A PROFILE ON CIVIL PLANS FOR CITY REVIEW AND APPROVAL.




SEWER CONCRETE PAD
PLAN VIEW




STUB-MARKER
PROFILE VIEW

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# STANDARD GRAVITY SEWER STUB MARKER

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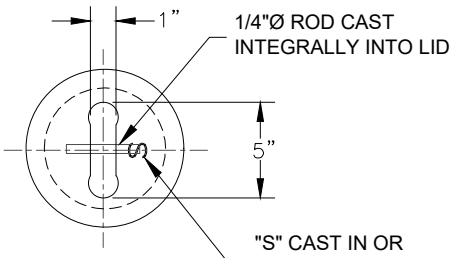
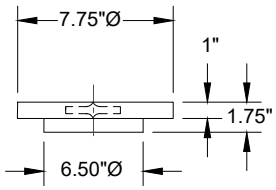
**S-3.0**

NOTES

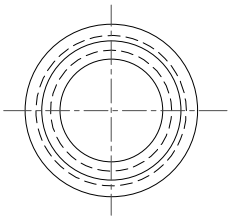
1. VALVE BOX SHALL BE FORT VANCOUVER PATTERN NO 910 CAST IRON OR APPROVED EQUAL.
2. MATERIAL TO BE GREY CAST IRON CONFORMING TO ASTM A46 CLASS 30.
3. CLEANOUT PIPE TYPE TO MATCH MAINLINE.
4. CONCRETE COLLAR REQUIRED FOR CLEANOUTS LOCATED IN UNPAVED AREAS (SEE S-3.0 FOR CONCRETE DETAILS).



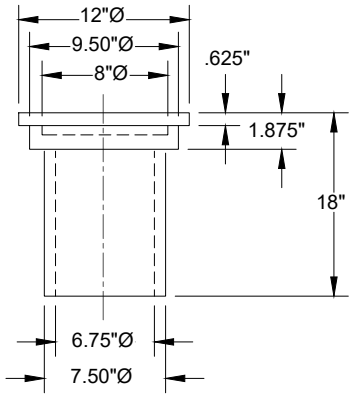

PLAN VIEW



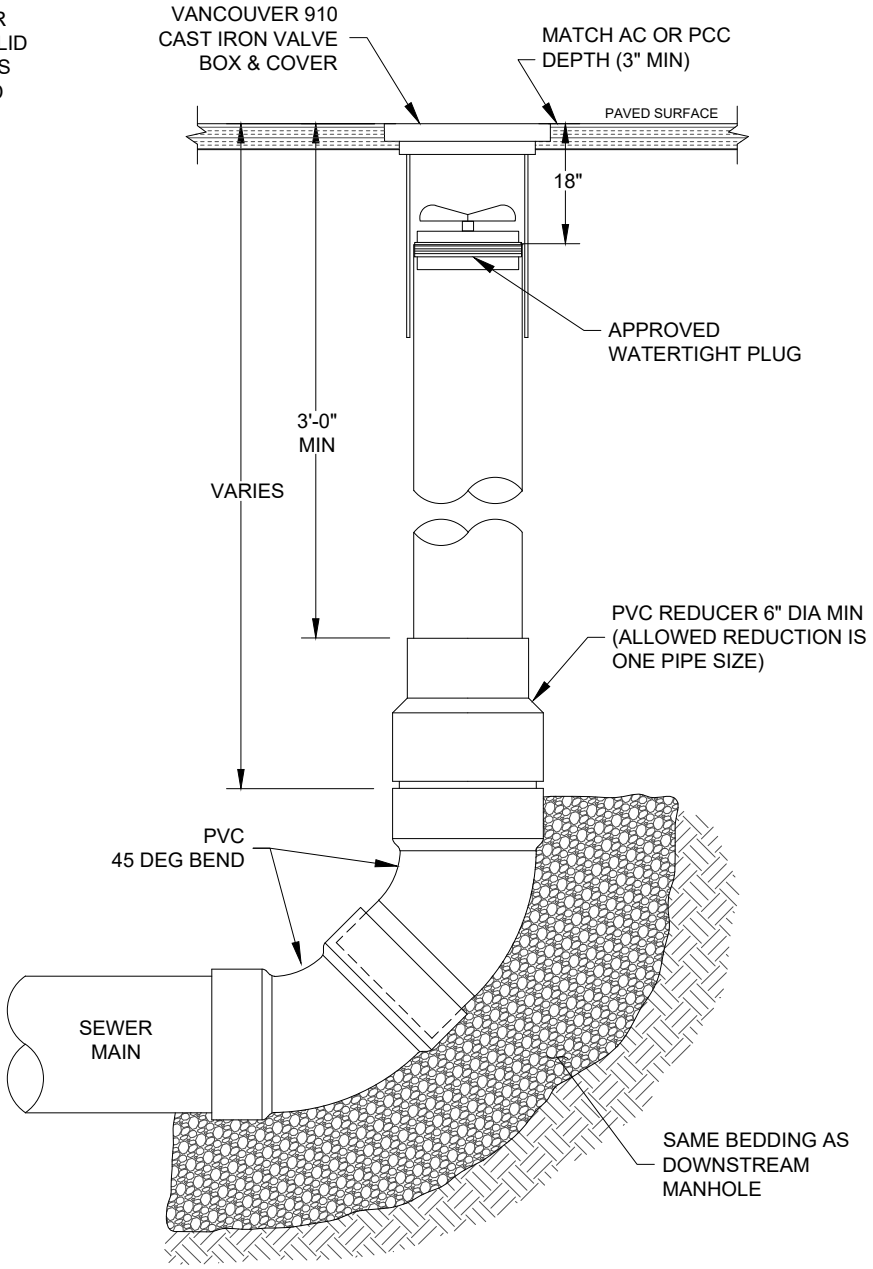

VALVE COVER
PROFILE VIEW



PLAN VIEW




CAST IRON VALVE BOX
PROFILE VIEW




SEWER CLEANOUT
PROFILE VIEW

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# STANDARD GRAVITY SEWER CLEANOUT

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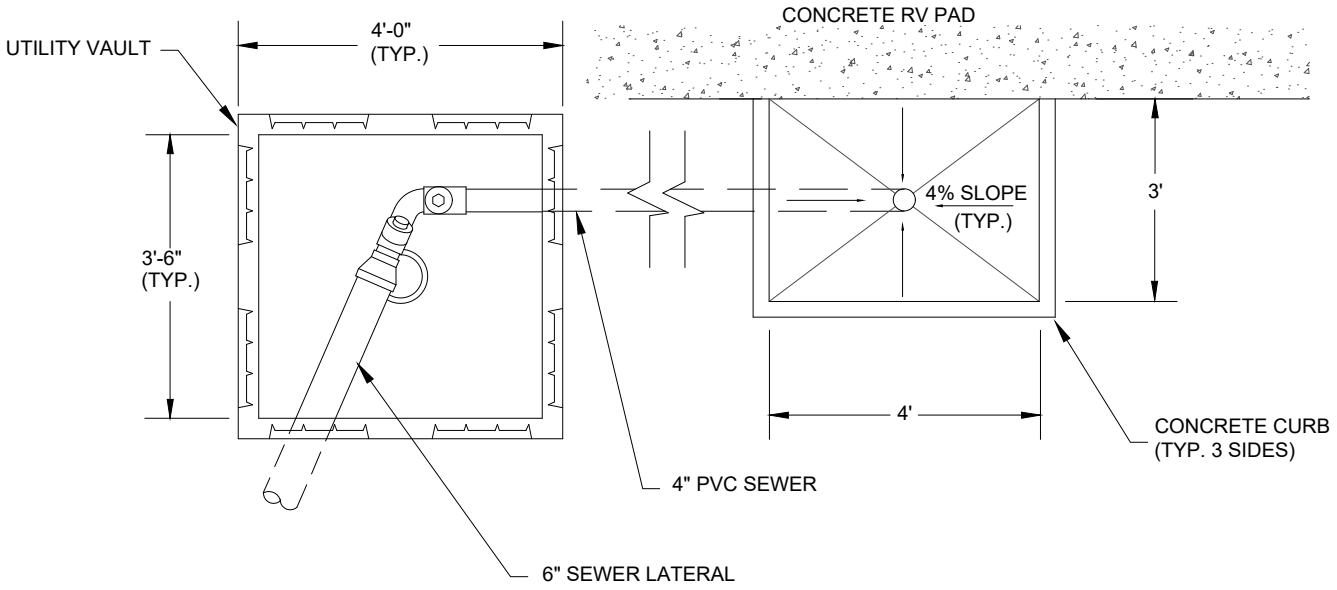
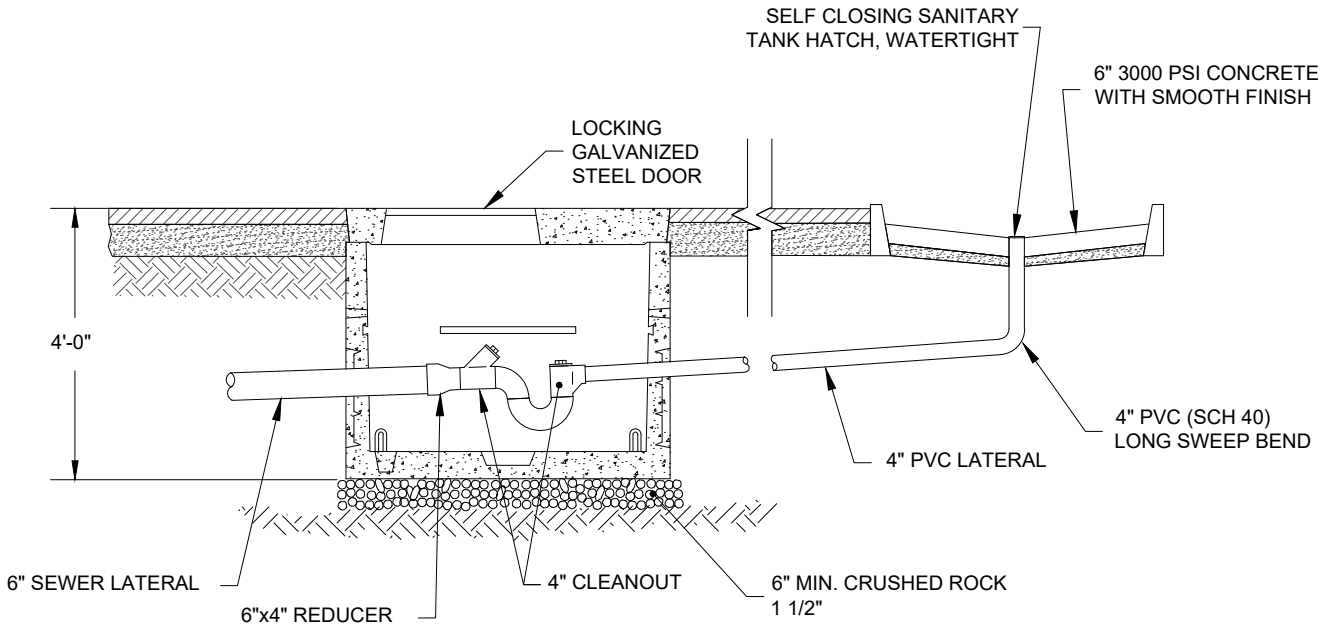
**S-3.1**




PLAN VIEW




PROFILE VIEW

NOTES:

1. APPROVED VAULT SHALL BE UTILITY VAULT CO. 444-LA WITH COVER NO. 44-38C, OR PIPE ENTERPRISES, INC. 444-13 WITH COVER NO. 440-13.
2. ALL ONSITE PLUMBING IS GOVERNED BY THE BUILDING DEPARTMENT PLUMBING CODE. PERMITS AND INSPECTIONS ARE REQUIRED.

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CITY OF Vancouver WASHINGTON

# RV SEWER DISPOSAL STATION - COMMERCIAL

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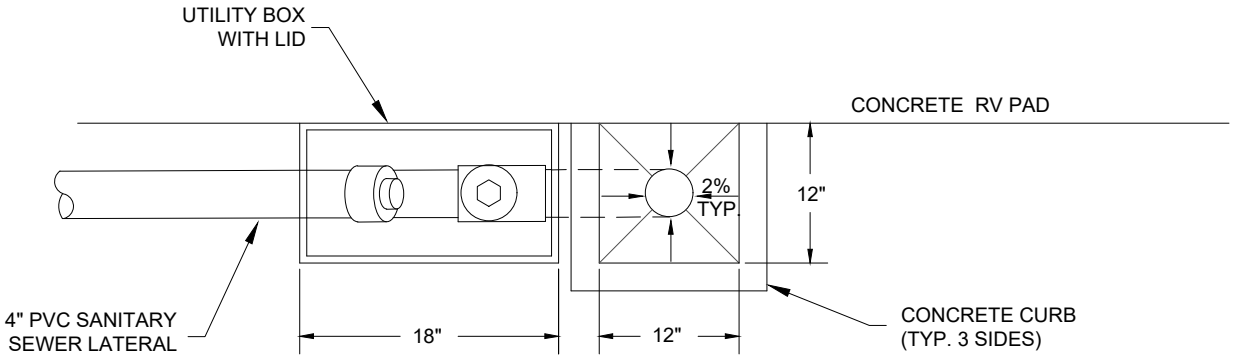
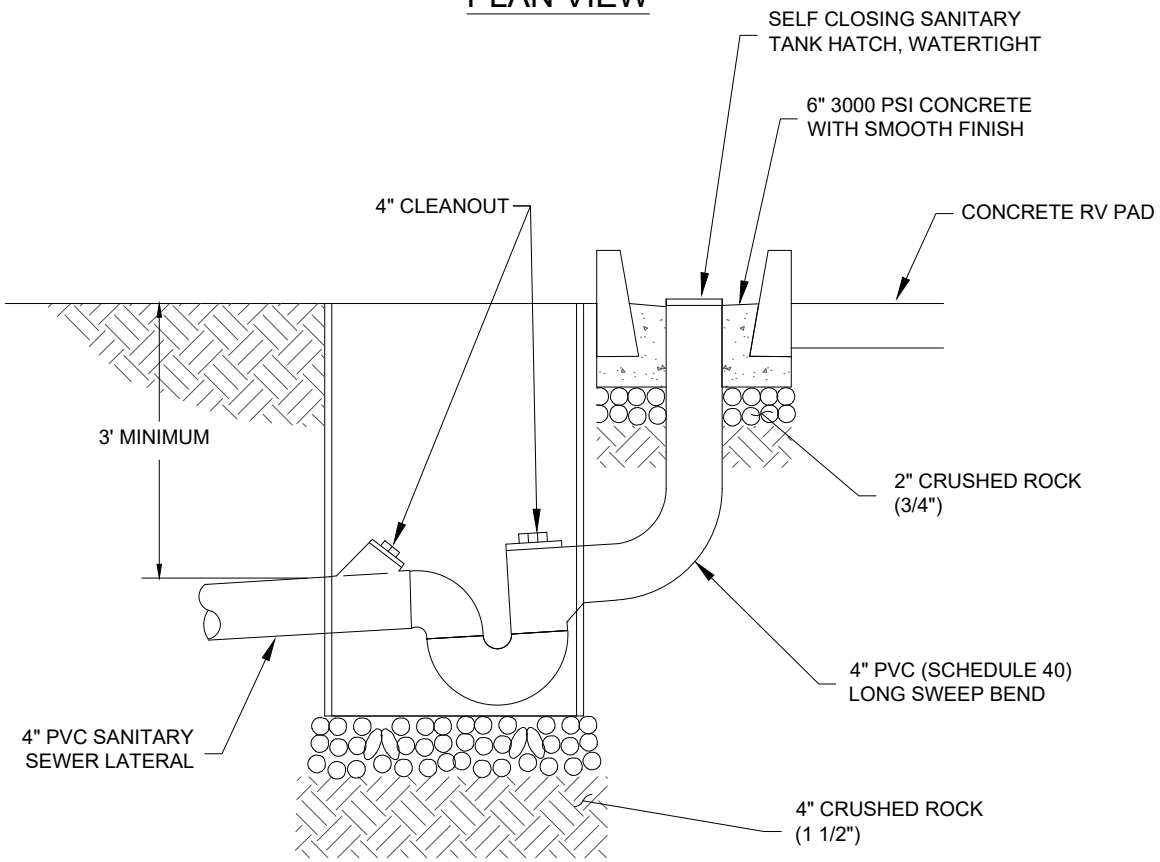
STD PLAN NO.

**S-3.2**




PLAN VIEW




PROFILE VIEW

NOTES:

1. ALL ONSITE PLUMBING IS GOVERNED BY THE BUILDING DEPARTMENT PLUMBING CODE. PERMITS AND INSPECTIONS ARE REQUIRED.

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# RV SEWER DISPOSAL STATION - RESIDENTIAL

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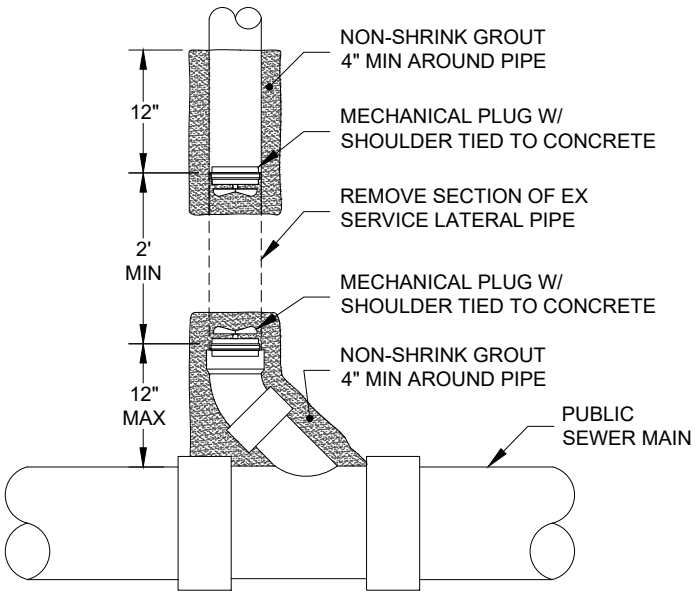
STD PLAN NO.

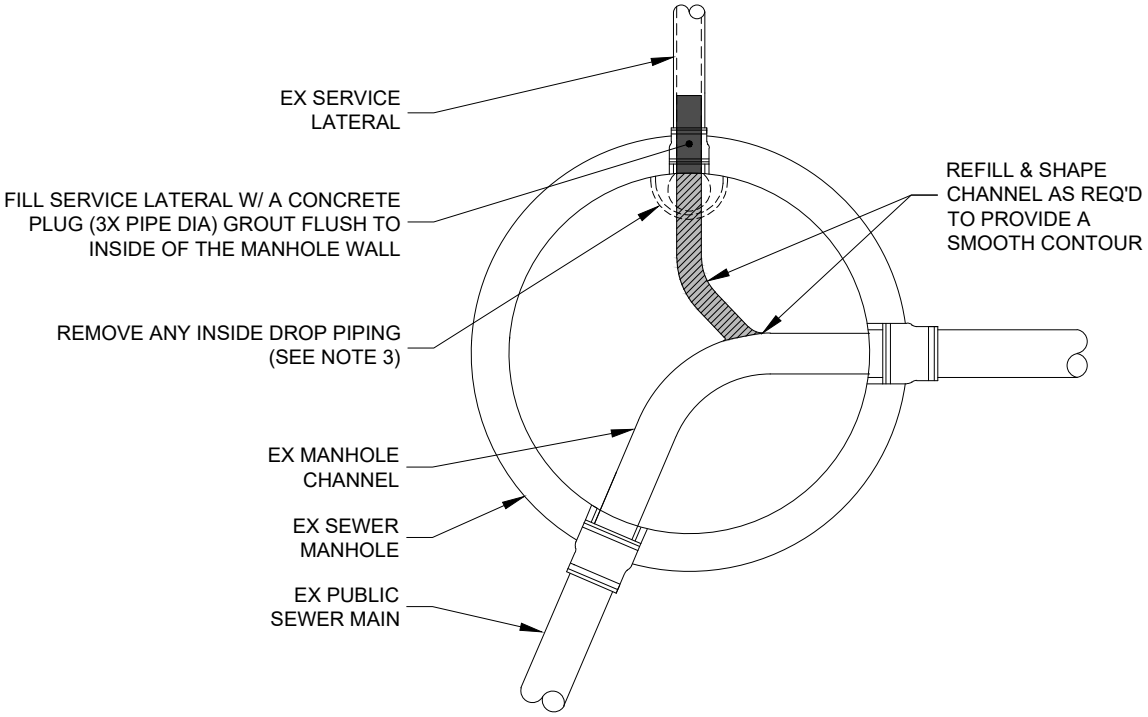
**S-3.3**

NOTES

1. TRENCHLESS LATERAL ABANDONMENT AT THE MAIN MAY BE ALLOWED IN SOME CASES, TRENCHLESS ABANDONMENT REQUIRES REVIEW AND APPROVAL BY SEWER ENGINEERING.
2. SERVICE LATERALS 8" OR GREATER SHALL HAVE PIPE FILLED WITH CITY APPROVED SAND SLURRY
3. SEWER MAINS SHALL BE DECOMMISSIONED BY PLUGGING THE ENDS WITH PORTLAND CEMENT CONCRETE AFTER THEY ARE FLUSHED. THE CONCRETE PLUGS SHALL EXTEND INTO THE PIPE FROM THE PIPE ENDS A MINIMUM DISTANCE OF THREE (3) TIMES THE INSIDE DIAMETER OF THE PIPE.




## SERVICE LATERAL CONNECTION AT MAIN DETAIL




## SERVICE LATERAL CONNECTION AT MANHOLE DETAIL

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# SEWER SERVICE LATERAL ABANDONMENT

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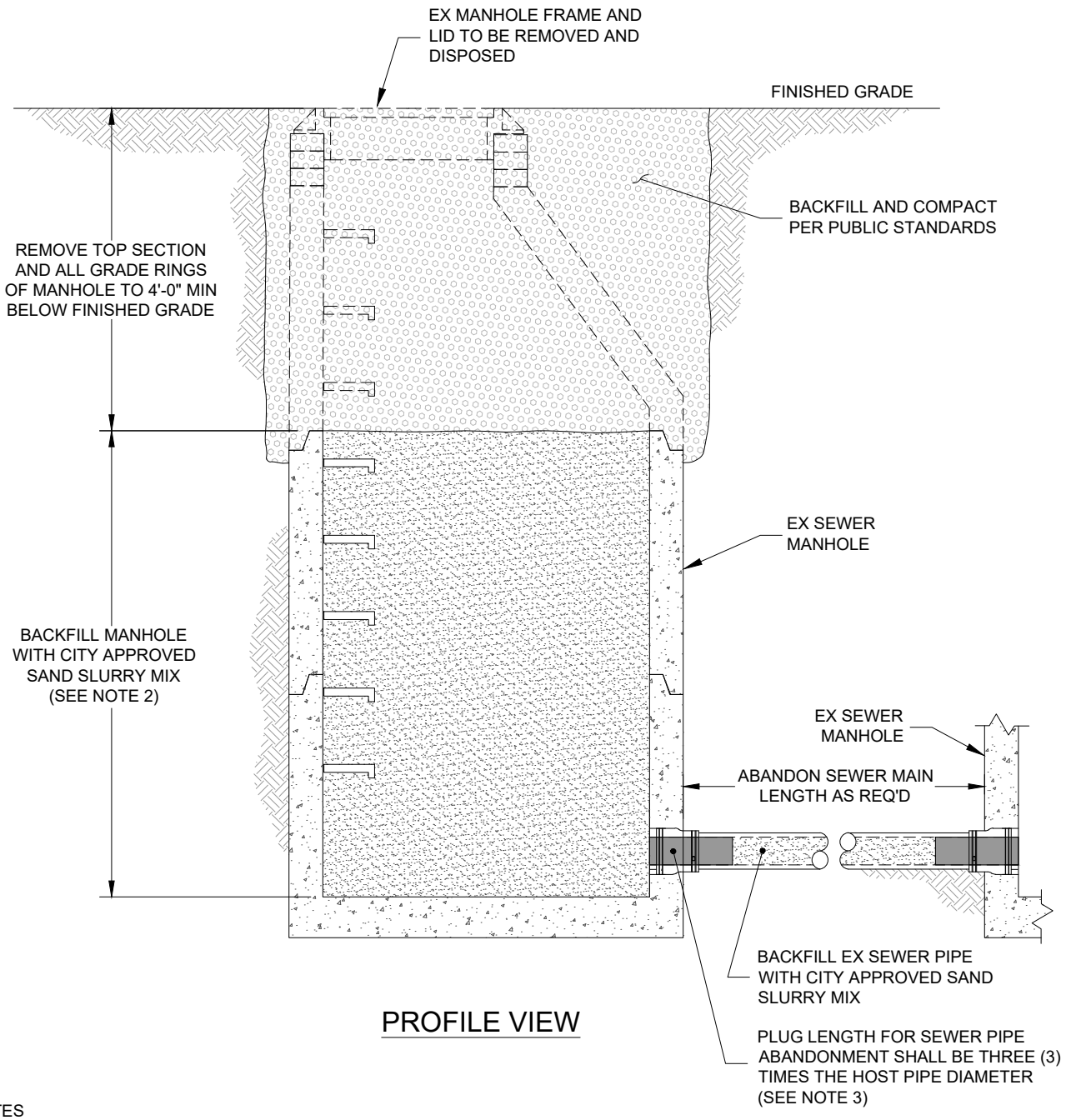


PROFILE VIEW

NOTES

1. SEWER MAINS GREATER THAN 18" REQUIRE SEWER ENGINEERING REVIEW AND APPROVAL.
2. THE CITY MAY REQUIRE CDF BACKFILL IN LIEU OF SAND FOR ABANDONMENT OF ANY MANHOLES LOCATED WITHIN A MAJOR ARTERIAL.
3. SEWER MAINS SHALL BE DECOMMISSIONED BY PLUGGING THE ENDS WITH PORTLAND CEMENT CONCRETE AFTER THEY ARE FLUSHED. THE CONCRETE PLUGS SHALL EXTEND INTO THE PIPE FROM THE PIPE ENDS A MINIMUM DISTANCE OF THREE (3) TIMES THE INSIDE DIAMETER OF THE PIPE.
4. IF ANY SEWER MAINS OR SERVICE LATERALS ENTER BY INSIDE BOWL DROP, THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL PIPING OUT OF THE MANHOLE BEFORE ABANDONMENT.

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# SEWER MANHOLE & SEWER MAIN ABANDONMENT

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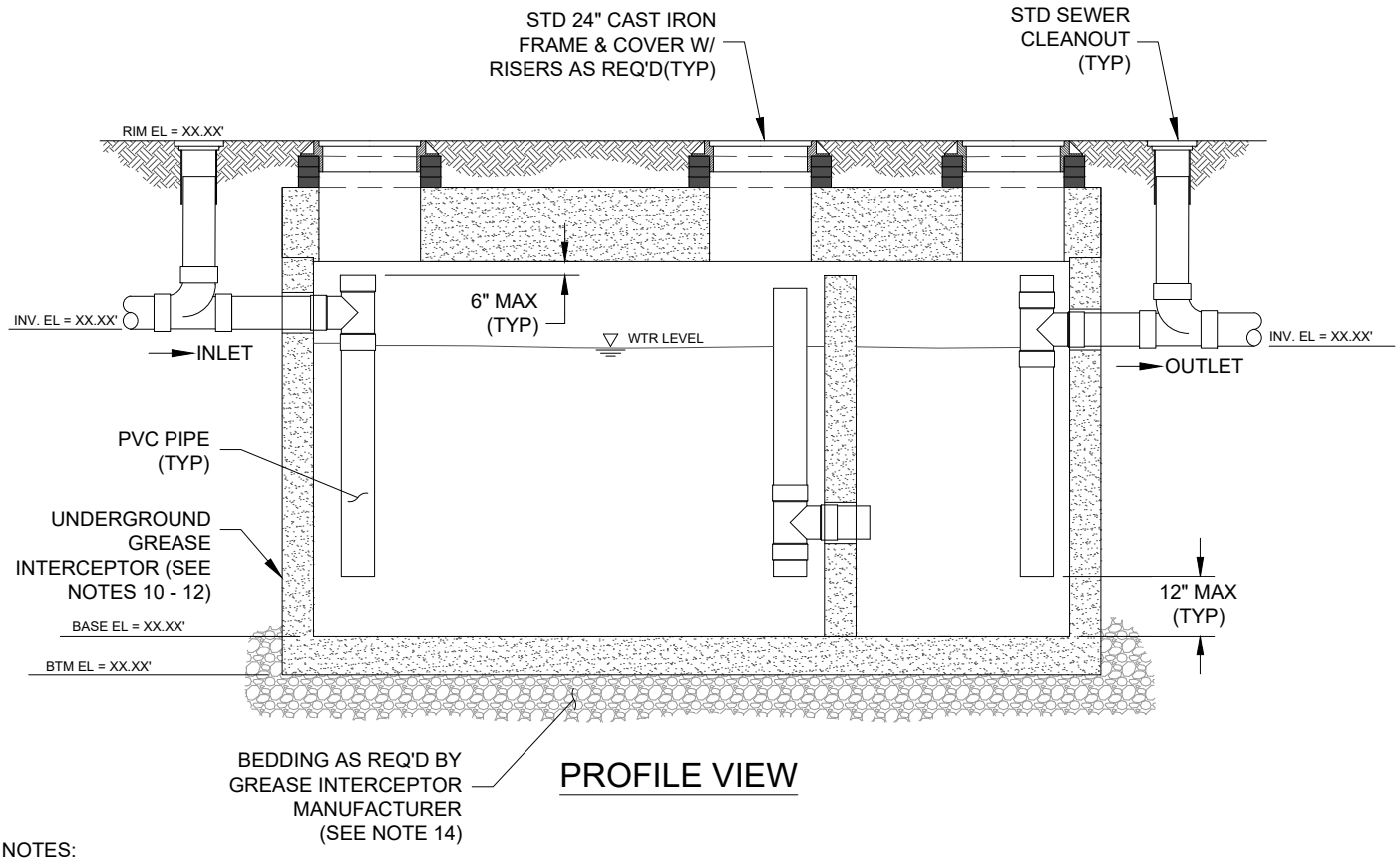
**S-3.5**




PROFILE VIEW

NOTES:

1. REFER TO UNIFORM PLUMBING CODE FOR ADDITIONAL VENTING REQUIREMENTS.
2. A BUILDING DEPARTMENT PLUMBING PERMIT IS REQUIRED.
3. DURING CONSTRUCTION SPECIAL INSPECTION IS REQUIRED FOR INSTALLATION OF THE SANITARY SEWER GREASE INTERCEPTORS. SATISFY THE BUILDING DEPARTMENT'S INITIAL PLUMBING REQUIREMENTS. A FINAL INSPECTION IS REQUIRED (SEE NOTE 4 BELOW).
4. FINAL INSPECTION: GREASE TRAPS/INTERCEPTORS ARE SUBJECT TO INSPECTION BY THE BUILDING DEPARTMENT AND THE CITY OIL AND GREASE MANAGEMENT STAFF.
5. POSITION RISERS BELOW AND OFF-CENTER OF MANHOLES TO ALLOW ACCESS AND ENTRY.
6. NO CONCRETE PLUGS BELOW CAST IRON MANHOLE COVERS.
7. PLACE INTERCEPTOR IN LOCATION WHICH ALLOWS FOR PUMP TRUCK/MAINTENANCE ACCESS.
8. FILL WITH CLEAN WATER PRIOR TO START-UP AND AFTER PUMP OUTS
9. BLACK WATER ONLY. DOMESTIC (SANITARY) WATER SHALL BE CONVEYED BY SEPARATE LINE
10. MINIMUM CAPACITY IS 1000 GAL. FOR CAPACITIES EQUAL TO OR GREATER THAN 1,500 GALLONS, A CENTER MANHOLE IS REQUIRED AND THE COVER SHALL BE A STANDARD 24" DIAMETER COVER.
11. THE INLET AND OUTLET PIPE DIAMETER SHALL BE 4-INCH ON TANK SIZES UP TO 4000 GAL.
12. TANKS EXCEEDING 4000 GAL SHALL HAVE A 6-INCH INLET AND OUTLET PIPE DIAMETER.
13. UNIT SHALL BE RATED FOR AASHTO LOADING. (CERTIFIED)
14. IF GREASE INTERCEPTOR IS LOCATED WITHIN PUBLIC RIGHT OF WAY, COMPACTION PER SECTION 9-03.12(3) IS REQUIRED.

THE CITY OF VANCOUVER'S OIL AND GREASE MANAGEMENT CONTACT INFORMATION:

*JON MORGAN (360) 921-4551*
*OR*
*JOHN HONRATH (360) 607-1573*

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CITY OF Vancouver WASHINGTON

# STANDARD GREASE INTERCEPTOR

CITY OF VANCOUVER
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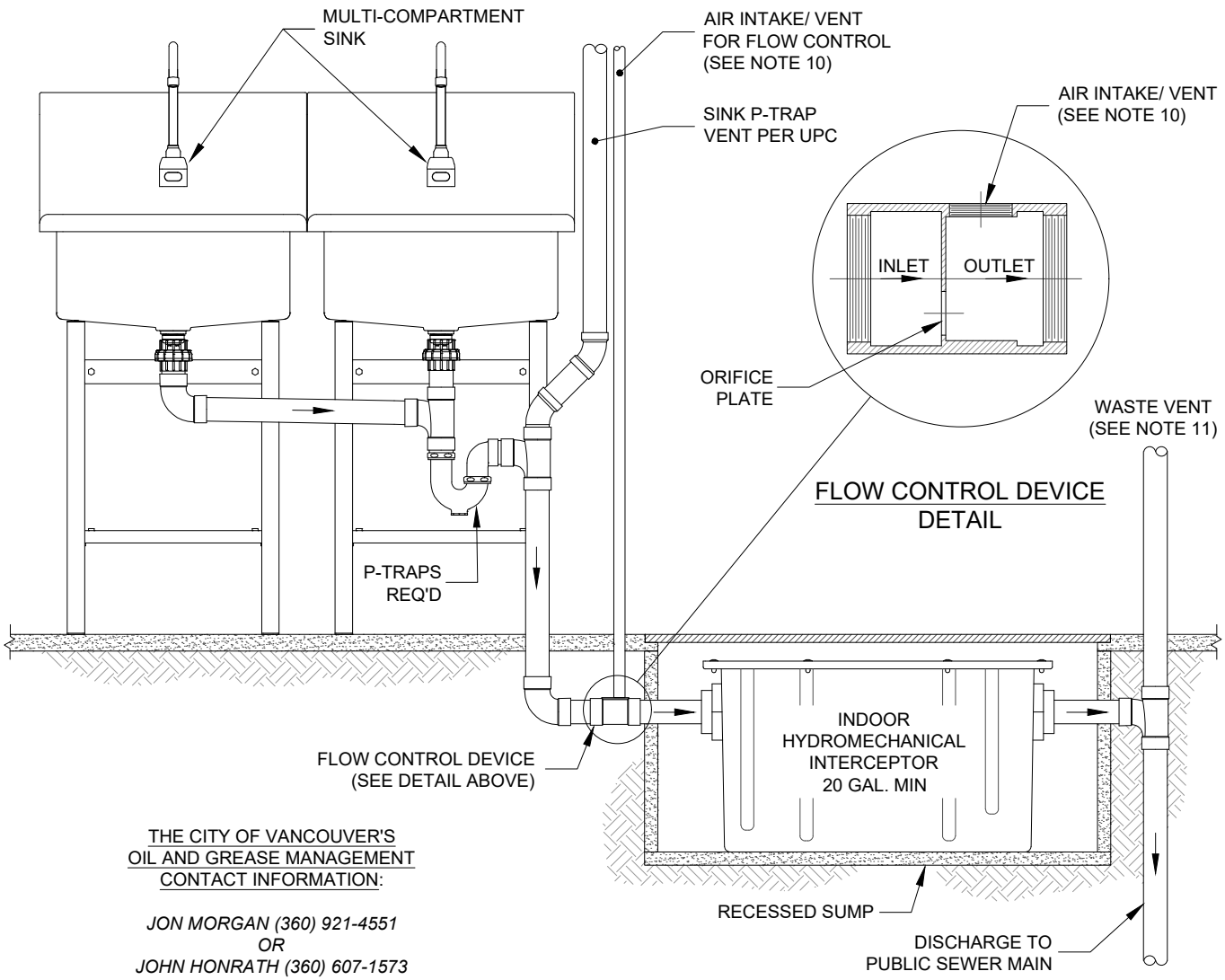


THE CITY OF VANCOUVER'S
OIL AND GREASE MANAGEMENT
CONTACT INFORMATION:

*JON MORGAN (360) 921-4551*
*OR*
*JOHN HONRATH (360) 607-1573*

## PROFILE VIEW

NOTES:

1. A FLOW CONTROL DEVICE IS REQUIRED.
2. MINIMUM TANK SIZE SHALL BE NO LESS THAN 20 GALLONS.
3. FOOD WASTE DISPOSAL UNITS SHALL NOT DISCHARGE TO A HYDROMECHANICAL GREASE INTERCEPTOR.
4. ALLOW A MINIMUM 6-INCH CLEARANCE AROUND DEVICE FOR REMOVING THE LID.
5. PER UPC 1014.3.4.1 NO HGI SHALL BE INSTALLED IN ANY PART OF THE BUILDING WHERE FOOD IS TO BE HANDLED.
6. PER UPC A P-TRAP SHALL BE USED ON EACH FIXTURE
7. ALL ONSITE PLUMBING IS GOVERNED BY THE BUILDING DEPARTMENT PLUMBING CODE.
8. PERMITS AND INSPECTIONS ARE REQUIRED.
9. SIZE REQUIRED GREASE INTERCEPTORS AS REQUIRED BY THE PLUMBING CODE AND CITY OIL & GREASE MANAGEMENT STAFF.
10. CONNECT FLOW CONTROL AIR INTAKE TO SANITARY VENT SYSTEM OR TERMINATE THROUGH THE ROOF OF THE BLDG PER UPC. THIS INTAKE SHALL NOT BE VENTED TO THE FREE BLDG ATMOSPHERE.
11. WASTE VENT CAN TIE INTO COMMON BLDG VENT 6-INCHES ABOVE FLOOD LEVEL OR TO ROOF VENT.

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**STANDARD INDOOR HYDROMECHANICAL GREASE INTERCEPTOR**

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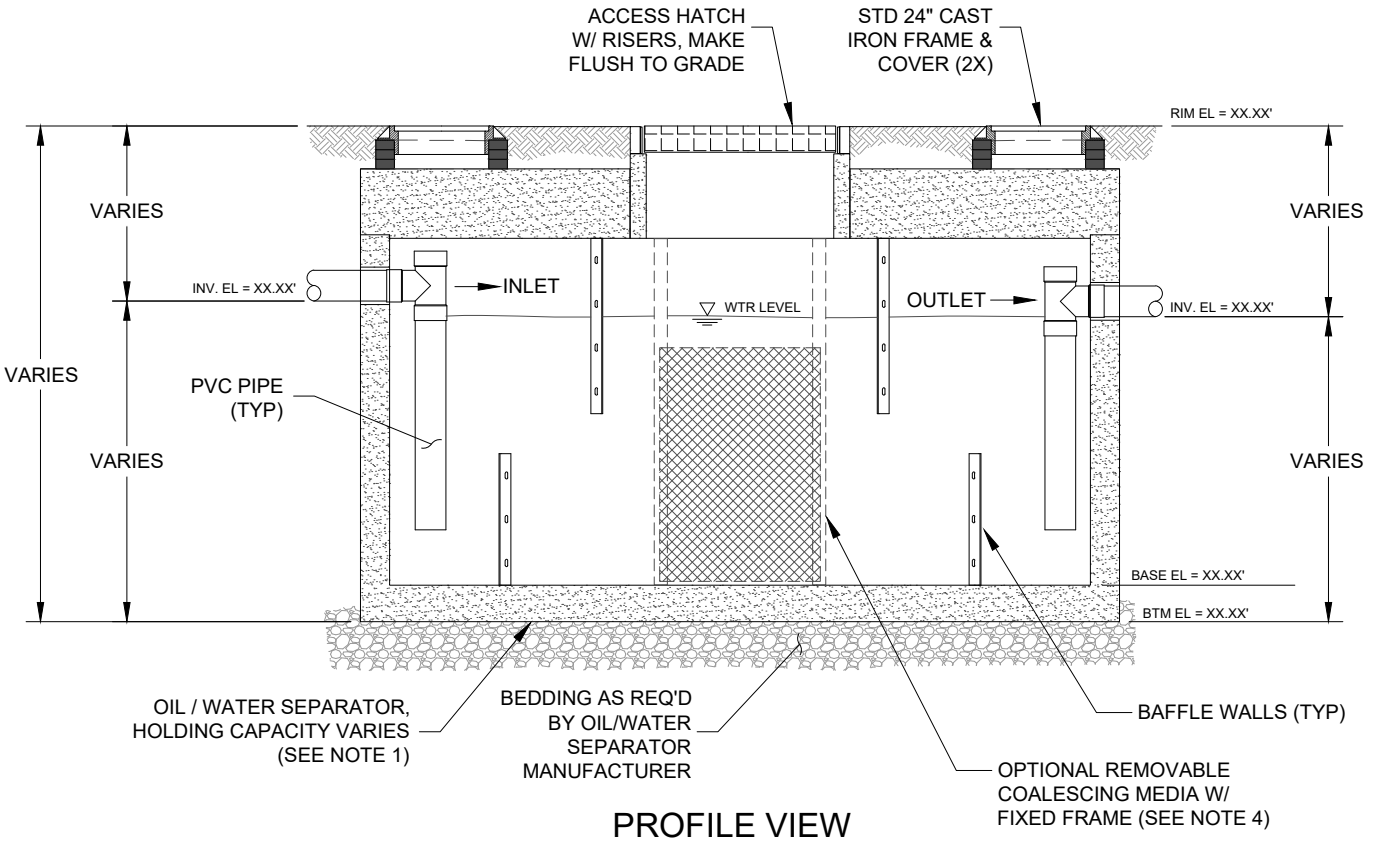


PROFILE VIEW

RECOMMENDED MANAGEMENT PRACTICES:

1. SIZE SEPARATOR FOR A 45 MINUTE RETENTION TIME AT PEAK FLOW, OR EQUIVALENT RETENTION IF USING COALESCING PLATES.
2. BEFORE INSTALLATION, SUBMIT ALL PLANS TO THE CITY'S INDUSTRIAL PRETREATMENT OFFICE FOR REVIEW. INDICATE ALL SOURCES OF WASTEWATER TO DEVICE AND PROVIDE ESTIMATES OF EXPECTED AVERAGE AND MAXIMUM FLOW RATES.
3. INSPECT SEPARATOR EVERY 6 MONTHS. USE A LONG STICK TO CHECK SLUDGE BUILDUP IN THE FIRST CHAMBER. HAVE SEPARATOR CLEANED IF SLUDGE BUILDUP IS OVER 8" INCHES OR IF THERE ARE MORE THAN 2" INCHES OF OIL FLOATING ON THE SURFACE IN ANY CHAMBER.
4. FOR COALESCING PLATE SEPARATOR, CLEAN THE PLATES BEFORE THEY BECOME COATED WITH SILT OR SOLIDS.
5. DO NOT ALLOW THE FOLLOWING TO ENTER THE SEPARATOR AS THEY WILL EMULSIFY THE OIL: ANTIFREEZE, DEGREASERS, DETERGENTS, ALCOHOL & SOLVENTS. ALSO, AVOID OVERLOADING THE SYSTEM WITH CONCENTRATED OILS OR HEAVY METAL-BEARING WASTEWATER.
6. TO REDUCE MAINTENANCE, REMOVE FLOATING OIL WITH ABSORBENT PADS OR VACUUM OUT OIL FILM. IF NECESSARY, INSTALL A CATCH BASIN BEFORE THE SEPARATOR TO REDUCE SLUDGE LOAD.
7. ALL ONSITE BUILDING SEWERS MUST MEET BUILDING DEPARTMENT STANDARDS. PERMITS AND INSPECTIONS ARE REQUIRED.

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# STANDARD OIL/WATER SEPARATOR

CITY OF VANCOUVER
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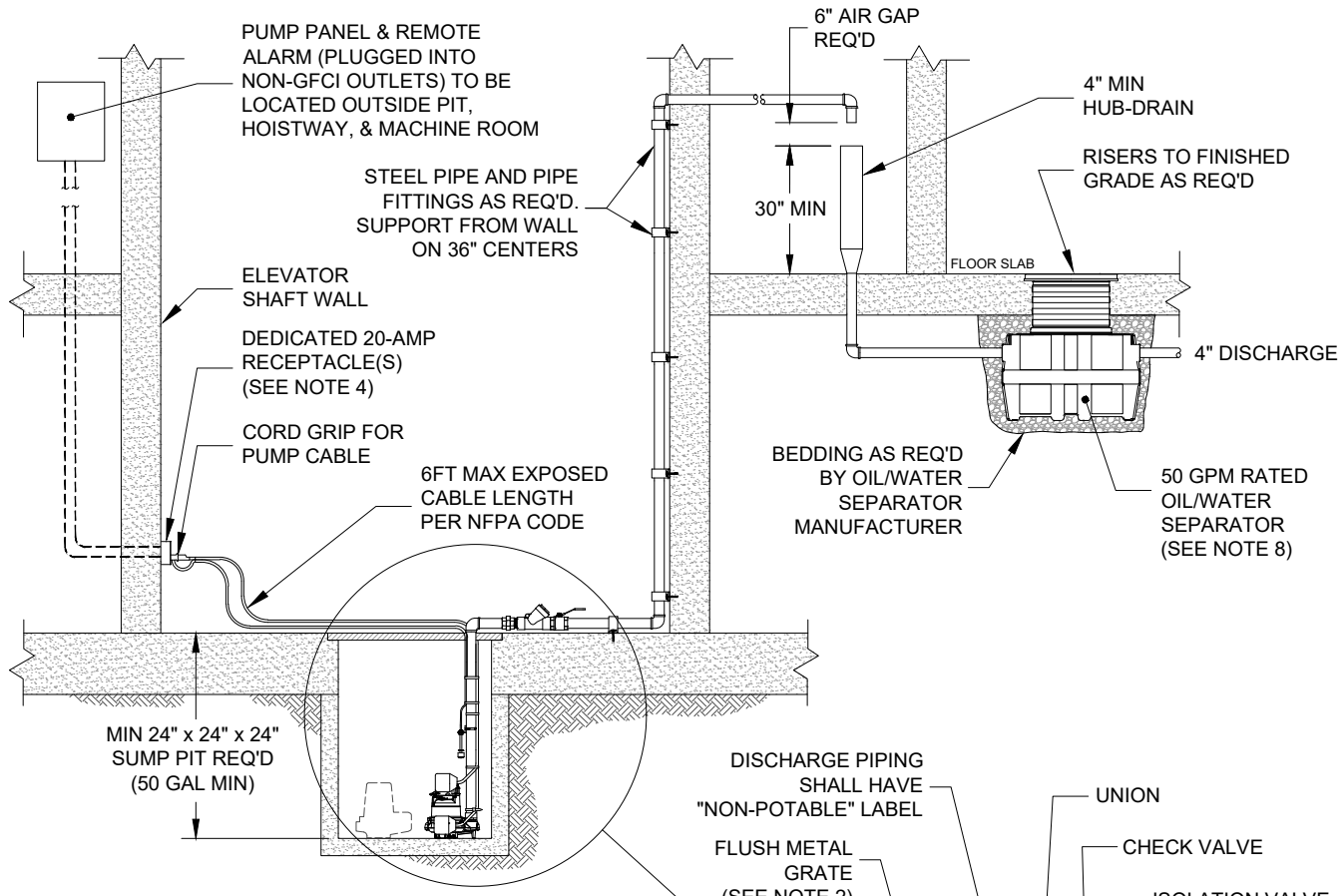
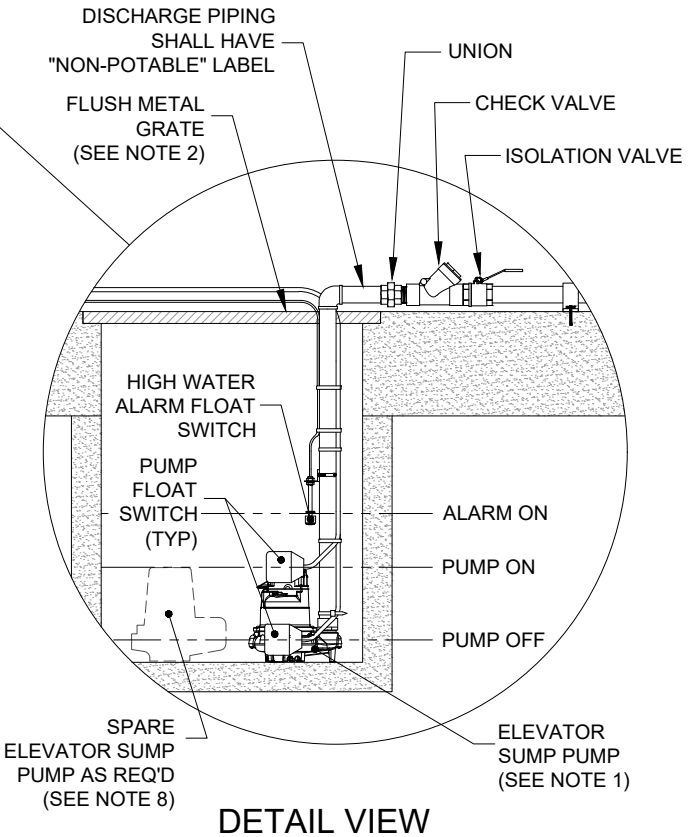
STD PLAN NO.

**S-4.2**




PROFILE VIEW




DETAIL VIEW

NOTES

1. SUMP PUMPS SHALL BE APPROVED BY THE MANUFACTURER FOR SPECIFIC USE IN ELEVATOR SHAFTS.
2. THE PUMP MUST BE LOCATED IN A SUMP HOLE WITH A GRATE COVER FLUSH WITH THE ELEVATOR PIT FLOOR CAPABLE OF WITHSTANDING 300LB WEIGHT.
3. HYDRAULIC FLUIDS & HAZARDOUS MATERIALS ARE NOT PERMITTED TO BE DRAINED TO PUBLIC SEWER.
4. DEDICATED 20AMP NON-GFCI OUTLET REQUIRED FOR ELEVATOR SUMP PUMP AND ALARM BOX.
5. SIGNAGE FOR AUDIBLE & VISUAL ALARM W/ FLOAT SWITCHES ARE REQUIRED.
6. PLUMBING INSIDE ELEVATOR SHAFT SHALL CONFORM TO ALL APPLICABLE BUILDING PLUMBING CODE.
7. ALL ELECTRICAL WORK SHALL CONFORM TO NATIONAL ELECTRIC CODE (NEC).
8. A SPARE PUMP MAY BE REQUIRED IN SOME CASES; SIZE OIL/WATER SEPARATOR TO ACCOMMODATE DUPLEX PUMP FLOWS
9. INSTALLATION TO COMPLY WITH CURRENT ELEVATOR CODE

N.T.S.

CITY OF Vancouver WASHINGTON

# ELEVATOR SUMP PUMP - W/ OIL/WATER SEPARATOR

STD PLAN NO. **S-4.3**

CITY OF VANCOUVER
DEPARTMENT OF PUBLIC WORKS
SANITARY SYSTEMS PLANNING AND DESIGN

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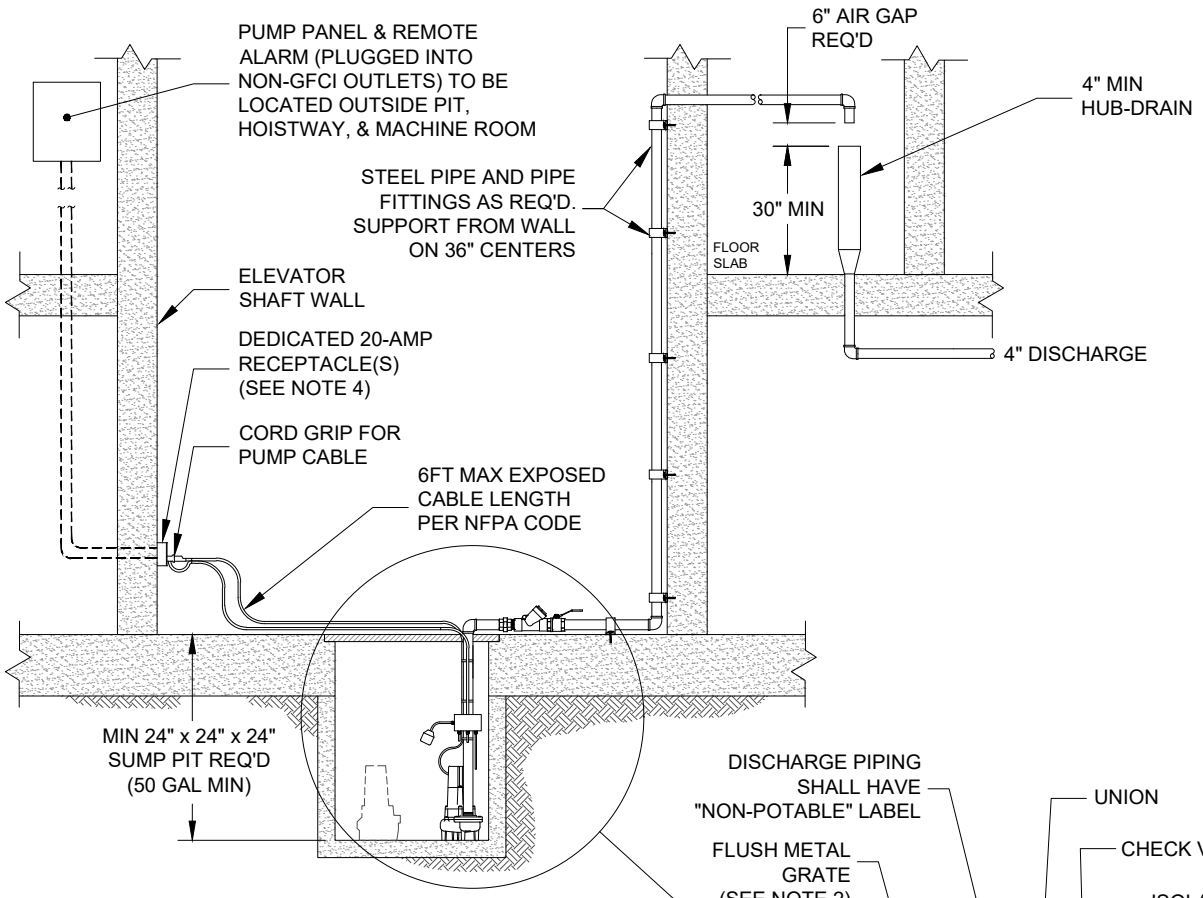
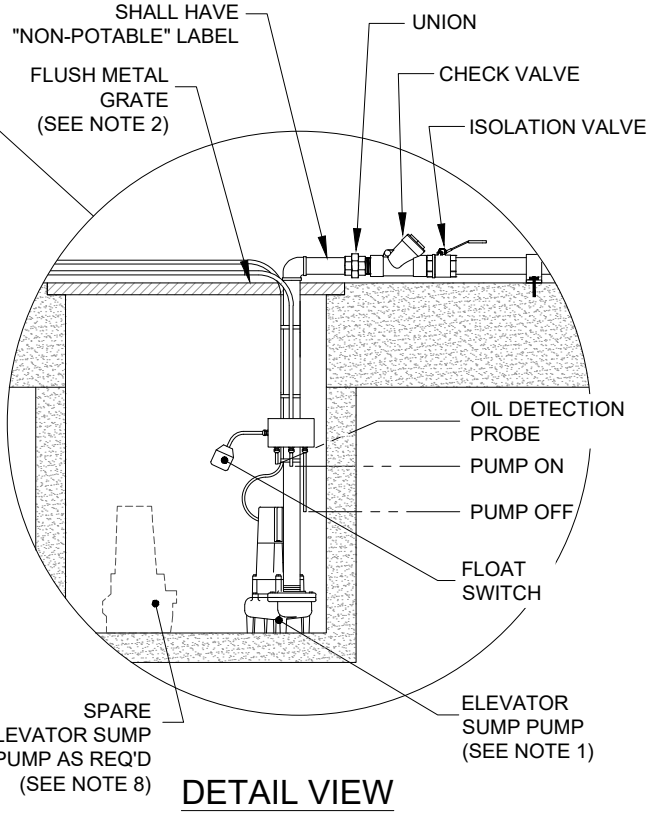



## PROFILE VIEW




## DETAIL VIEW

NOTES

1. SUMP PUMPS SHALL BE APPROVED BY THE MANUFACTURER FOR SPECIFIC USE IN ELEVATOR SHAFTS.
2. THE PUMP MUST BE LOCATED IN A SUMP HOLE WITH A GRATE COVER FLUSH WITH THE ELEVATOR PIT FLOOR CAPABLE OF WITHSTANDING 300LB WEIGHT.
3. HYDRAULIC FLUIDS & HAZARDOUS MATERIALS ARE NOT PERMITTED TO BE DRAINED TO PUBLIC SEWER.
4. DEDICATED 20AMP NON-GFCI OUTLET REQUIRED FOR ELEVATOR SUMP PUMP AND ALARM BOX.
5. SIGNAGE FOR AUDIBLE & VISUAL ALARM W/ FLOAT SWITCHES ARE REQUIRED.
6. PLUMBING INSIDE ELEVATOR SHAFT SHALL CONFORM TO ALL APPLICABLE BUILDING PLUMBING CODE.
7. ALL ELECTRICAL WORK SHALL CONFORM TO NATIONAL ELECTRIC CODE (NEC).
8. A SPARE PUMP MAY BE REQUIRED IN SOME CASES; SIZE OIL/WATER SEPARATOR TO ACCOMMODATE DUPLEX PUMP FLOWS
9. INSTALLATION TO COMPLY WITH CURRENT ELEVATOR CODE

N.T.S.

CITY OF Vancouver WASHINGTON

# ELEVATOR SUMP PUMP - W/ OIL SENSING ALARM

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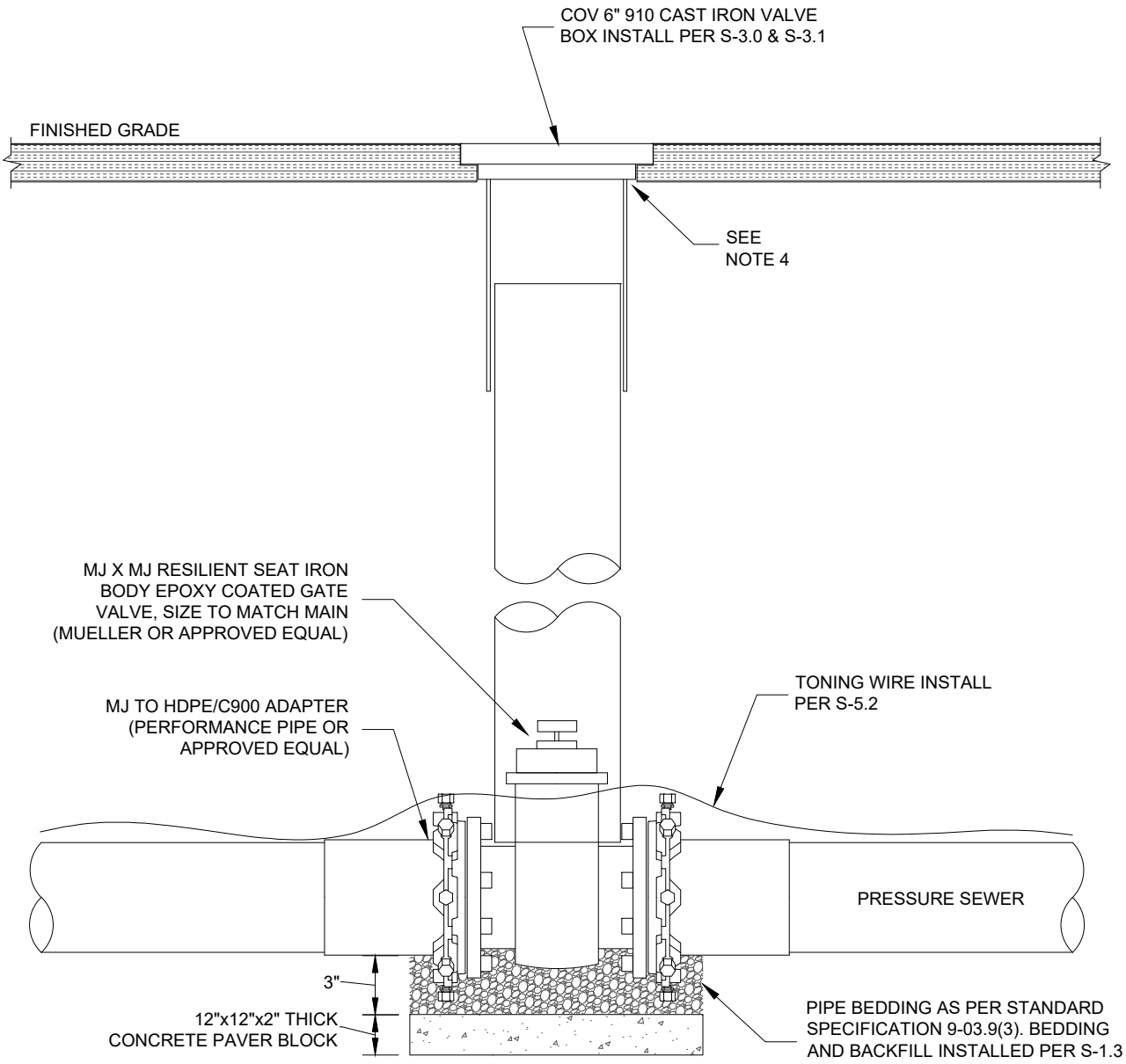
STD PLAN NO.

**S-4.4**




NOTES:

1. RISER PIPE SHALL BE 6" ASTM D3034 SDR 35 PVC PIPE
2. CONCRETE COLLAR SHALL BE MINIMUM STRENGTH OF 3000PSI
3. PIPE BEDDING SHALL CONFORM TO SEWER STANDARD DETAIL S-1.3.
4. CONCRETE COLLAR REQUIRED FOR VALVE BOXES PLACED IN UNPAVED AREAS. (SEE S-3.0 FOR DETAILS)

N.T.S.

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# PRESSURE SEWER MAIN ISOLATION VALVE

CITY OF VANCOUVER
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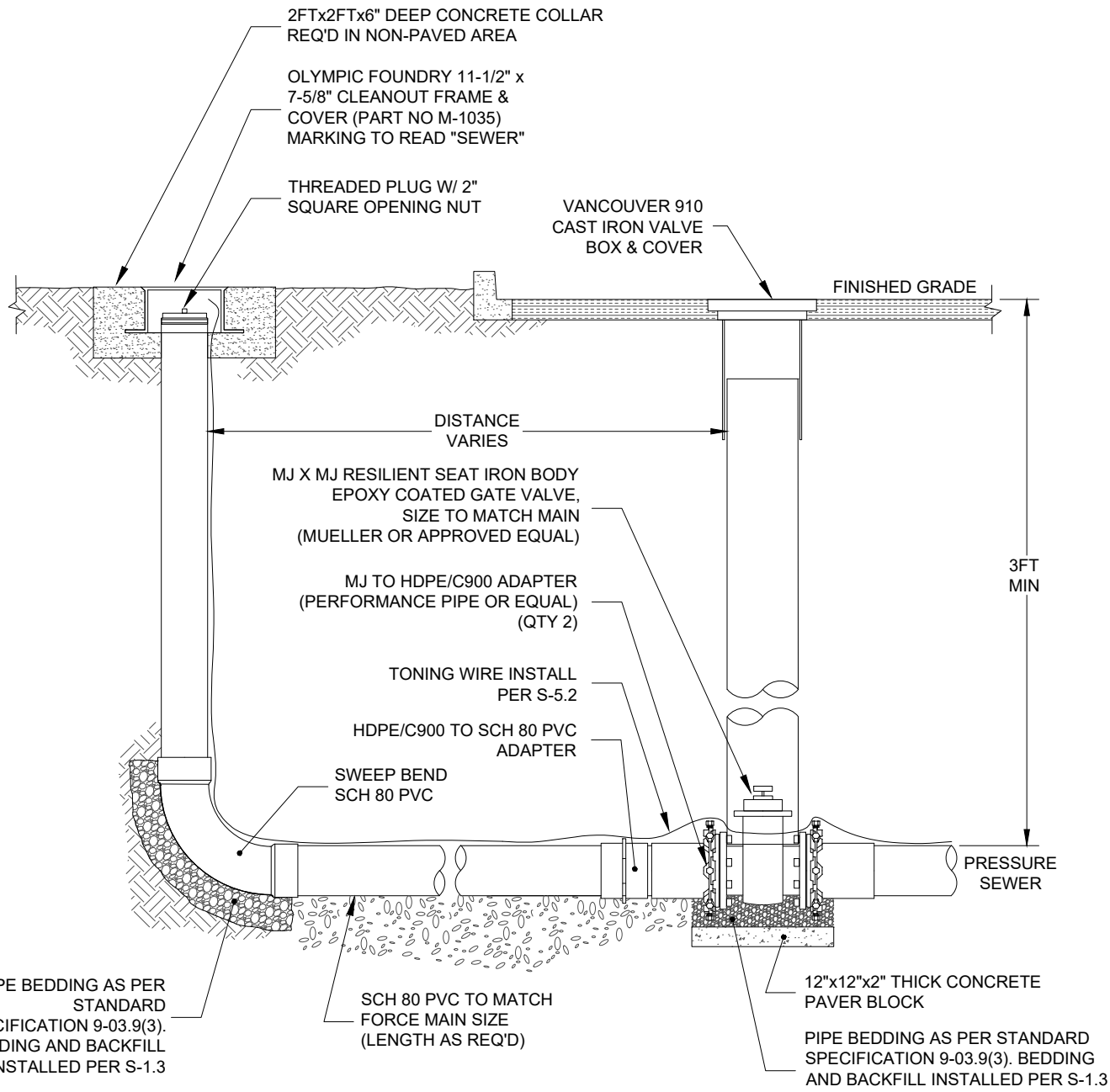
STD PLAN NO.

**S-5.0**




NOTES:

1. RISER PIPE FOR VALVE SHALL BE 6" ASTM D3034 SDR 35 PVC PIPE
2. CONCRETE COLLAR SHALL BE MINIMUM STRENGTH OF 3000PSI
3. PIPE BEDDING SHALL CONFORM TO SEWER STANDARD DETAIL S-1.3.
4. CONCRETE COLLAR REQUIRED FOR VALVE BOXES PLACED IN UNPAVED AREAS. (SEE S-3.0 FOR DETAILS)

N.T.S.

CITY OF Vancouver WASHINGTON

# STANDARD PRESSURE SEWER CLEANOUT

CITY OF VANCOUVER
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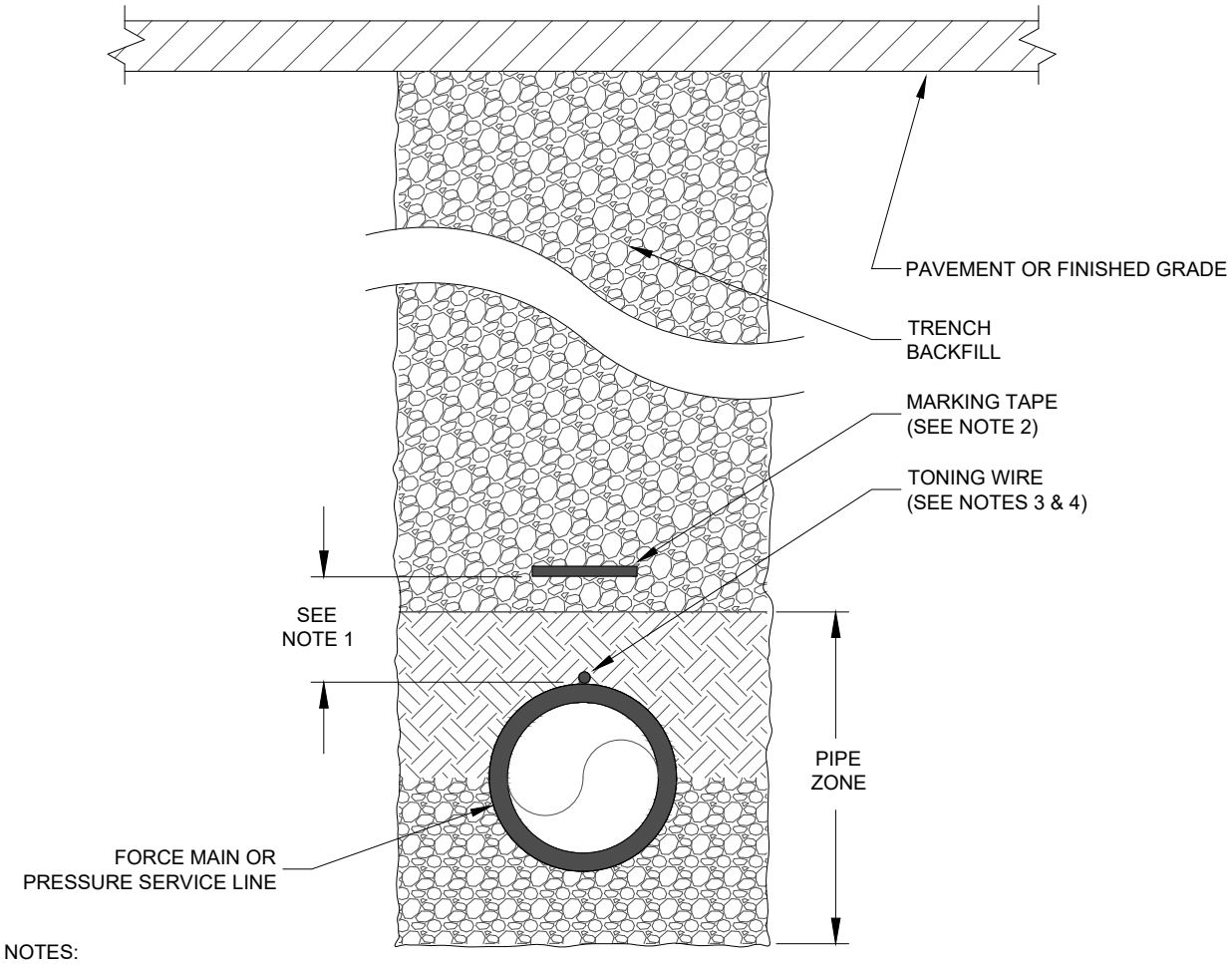
STD PLAN NO.

**S-5.1**




NOTES:

1. MARKING TAPE TO BE LOCATED EIGHTEEN (18) INCHES ABOVE A FORCE MAIN AND TWELVE (12) INCHES ABOVE A PRESSURE SERVICE LINE.

2. THE PIPE SHALL BE MARKED WITH CONTINUOUS GREEN THREE (3) INCH WIDE BY FOUR (4) MIL MINIMUM THICKNESS WARNING TAPE WITH ONE (1) INCH HIGH BLACK LETTERING EVERY THREE (3) FEET READING:

   *"CAUTION BURIED PRESSURE SEWER"*

3. A CONTINUOUS WIRE SHALL BE ATTACHED TO THE TOP OF THE PRESSURE SERVICE LINE.

4. THE TONING WIRE SHALL BE RWU90 #10 AWG COPPER COATED STEEL WIRE, W/ 40 MIL MIN THICKNESS OF BLACK CROSS-LINKED POLYETHYLENE INSULATION MANUFACTURED FOR DIRECT BURIAL APPLICATIONS.

5. THE TONING WIRE SHALL BEGIN AT THE VALVE VAULT TEST STATION W/ A MINUMUM OF ONE (1) FOOT COIL OF WIRE AND END AT THE TEST STATION AT THE DISCHARGE MANHOLE.

6. THE TONING WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE, NO SPLICES ARE ALLOWED BETWEEN TEST STATIONS.

7. THE TONING WIRE SHALL BE LAID FLAT AND SECURELY AFFIXED TO THE TOP OF THE FORCE MAIN AT 6FT INTERVALS.

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# TONING WIRE AND MARKING TAPE

CITY OF VANCOUVER
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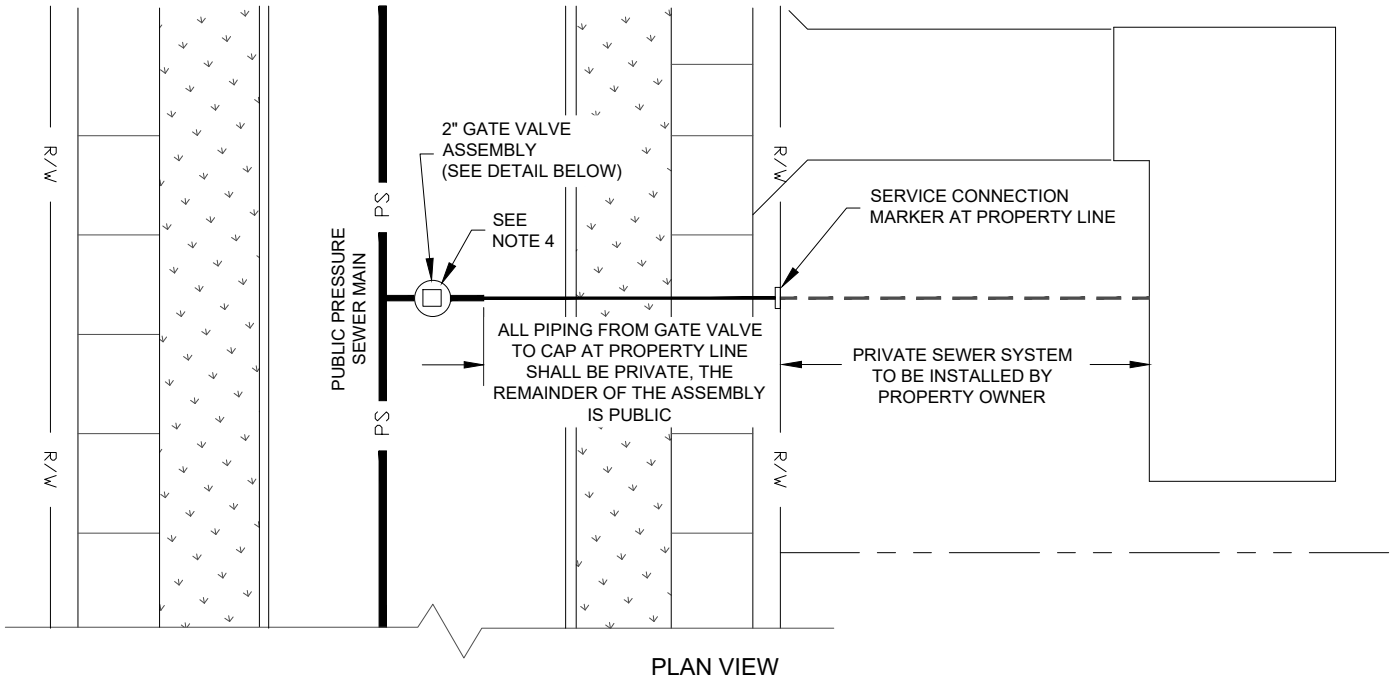
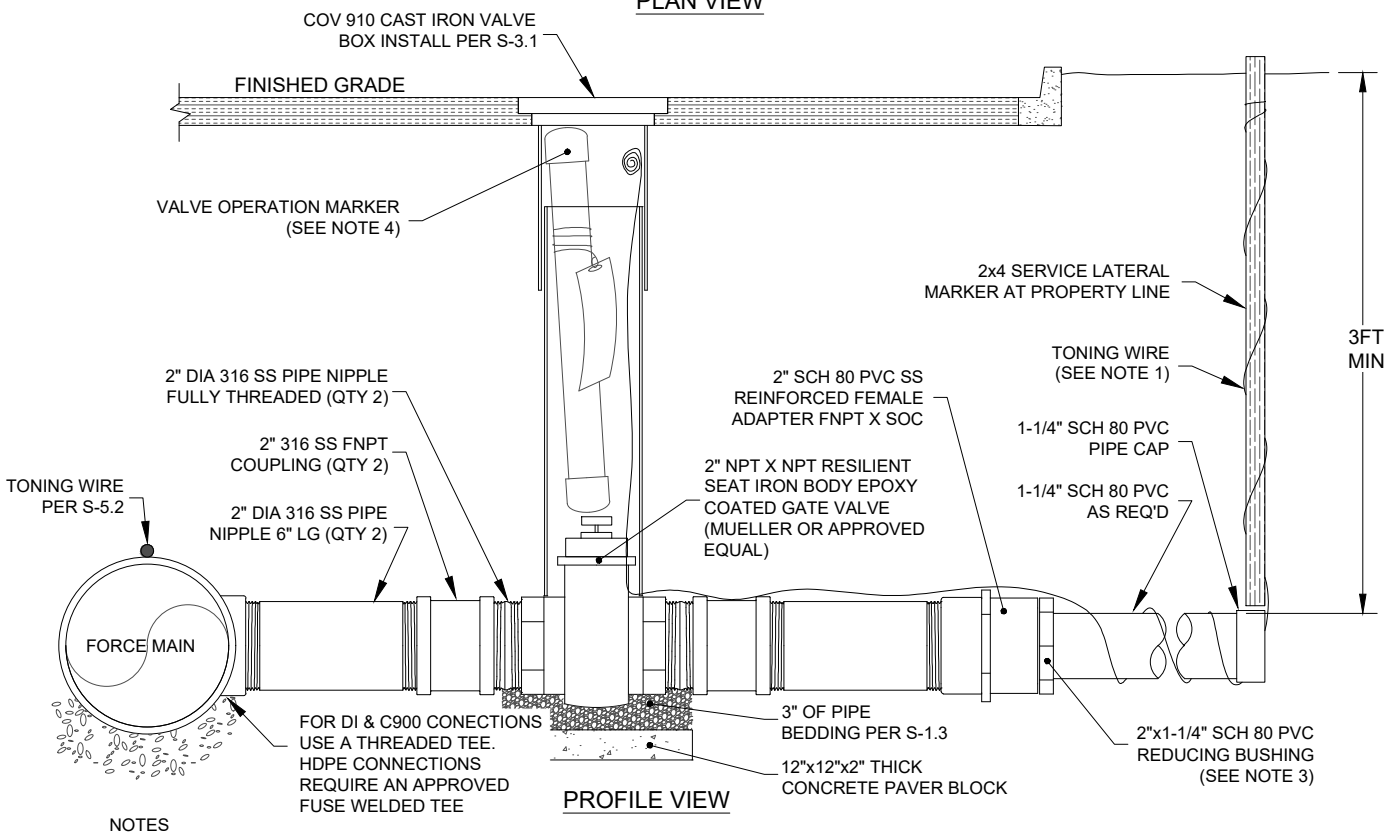
STD PLAN NO.

**S-5.2**




PLAN VIEW




PROFILE VIEW

NOTES

1. MAINLINE & INDIVIDUAL HOUSE TONING WIRE SHALL BE ONE PIECE, NO SPLICES.
2. MAINTAIN A POSITIVE SLOPE FROM PROPERTY LINE TO PRESSURE VALVE ASSEMBLY CONNECTION.
3. RESIDENTIAL IS 1-1/4" DIA; COMMERCIAL IS 2" DIA
4. VALVE SHALL REMAIN CLOSED UNTIL ONSITE PUMP IS CONNECTED, CONTACT COV OPERATIONS 360-487-8177 TO OPEN VALVE DURING STARTUP.
5. CITY TO PROVIDE VALVE OPERATION MARKERS THAT SHALL BE PLACED IN VALVE CAN W/ TAG THAT READS;

***VALVE TO BE OPERATED ONLY BY CITY OPERATIONS 360-487-8177***

N.T.S.

CITY OF Vancouver WASHINGTON

# STANDARD PRESSURE SERVICE CONNECTION

CITY OF VANCOUVER
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SANITARY SYSTEMS PLANNING AND DESIGN

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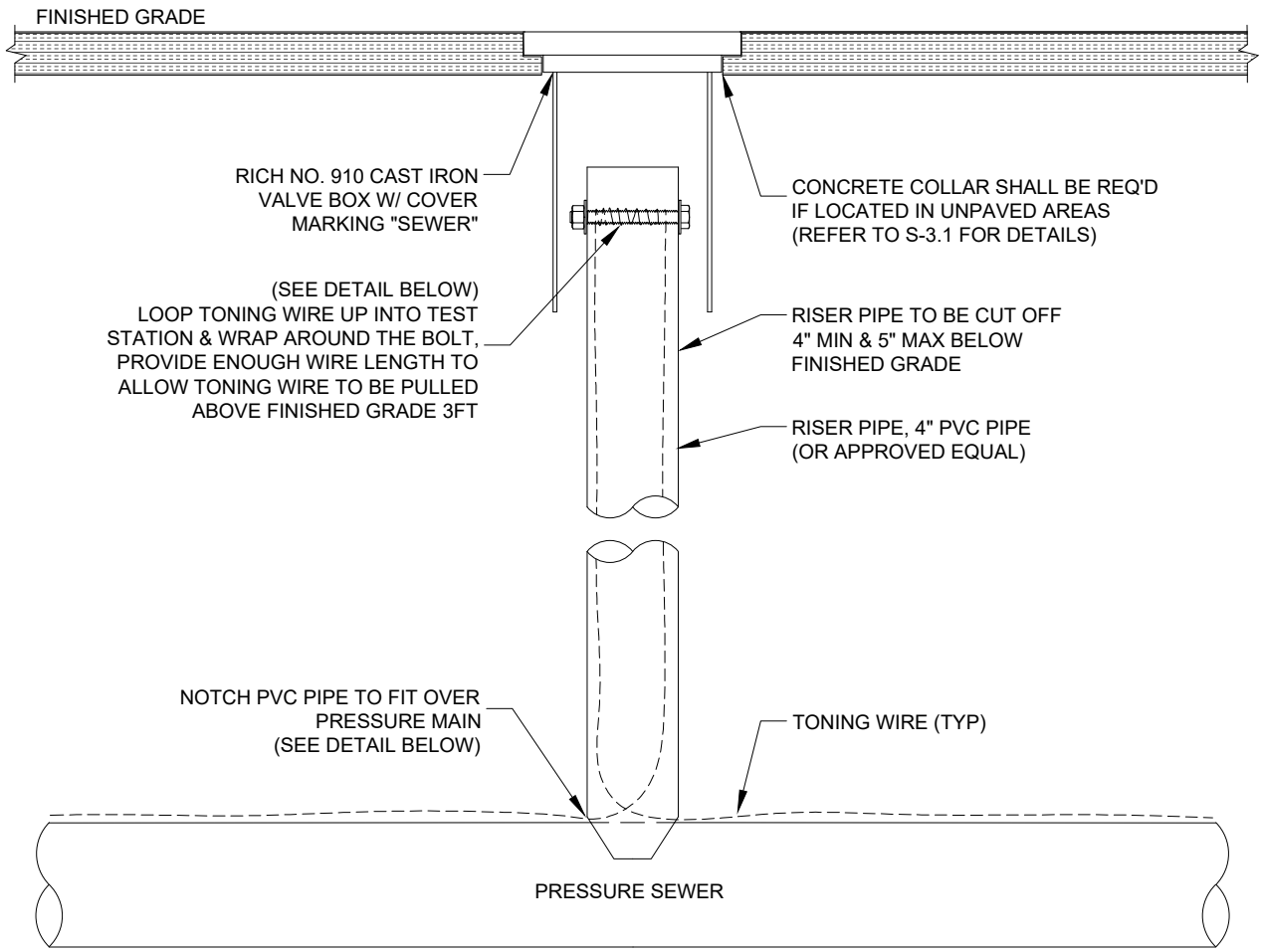
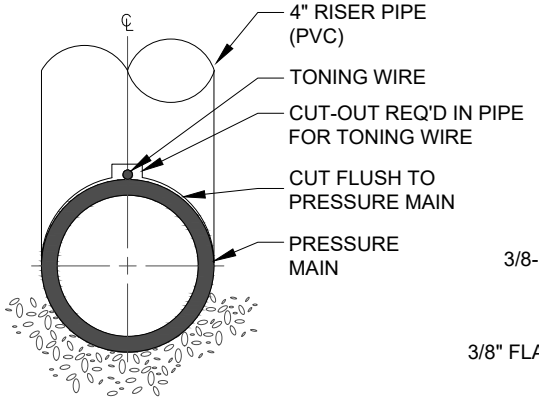
STD PLAN NO.

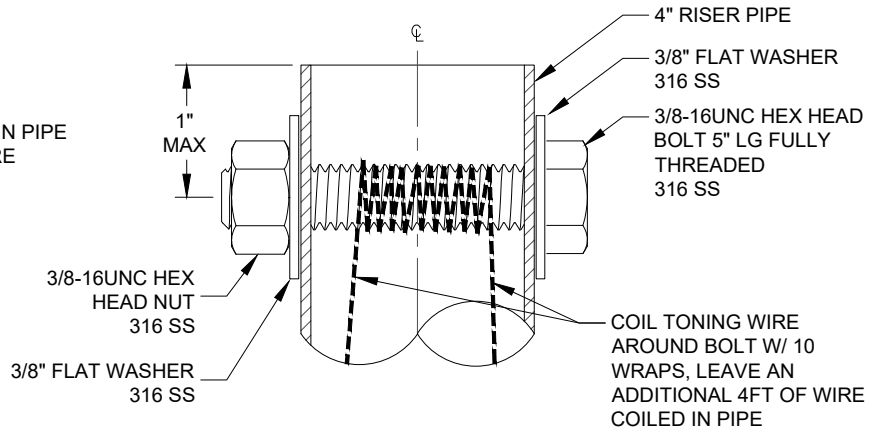
**S-5.3**




TEST STATION DETAIL




RISER PIPE CONNECTION DETAIL




TEST STATION BOLT DETAIL

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# STANDARD LOCATING TEST STATION

CITY OF VANCOUVER
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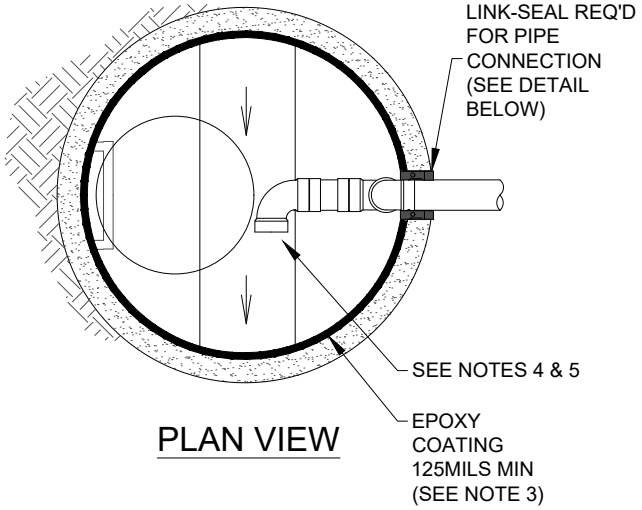
STD PLAN NO.

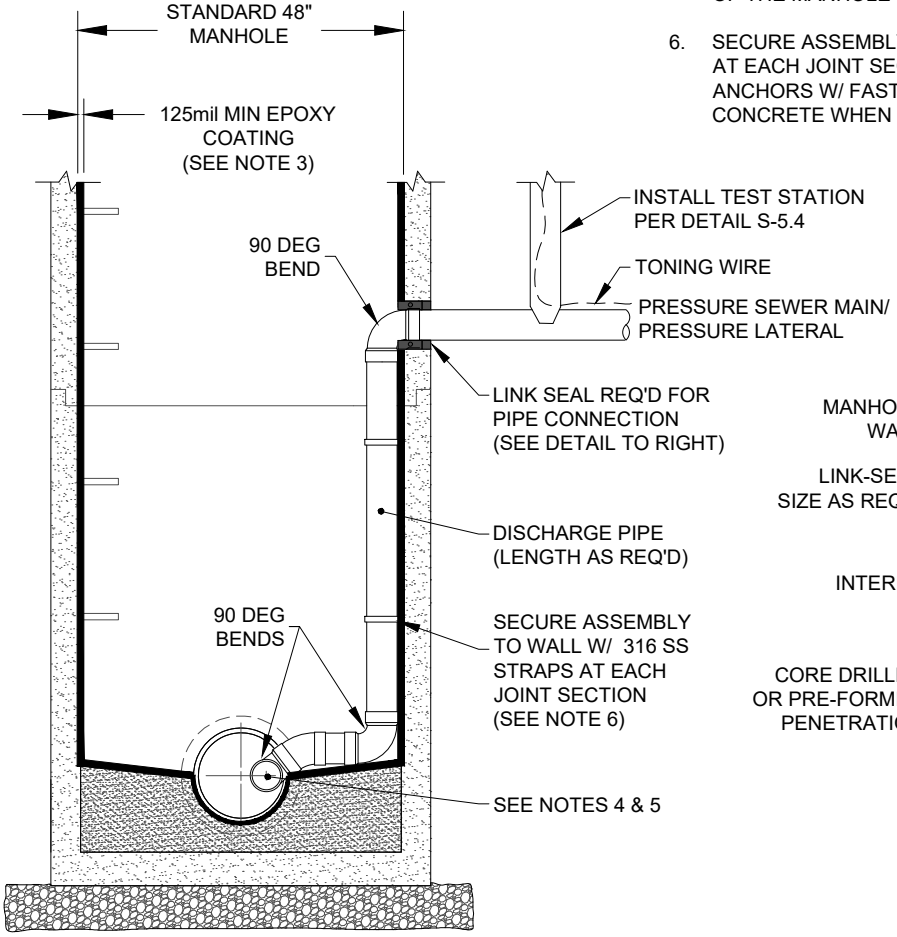
**S-5.4**



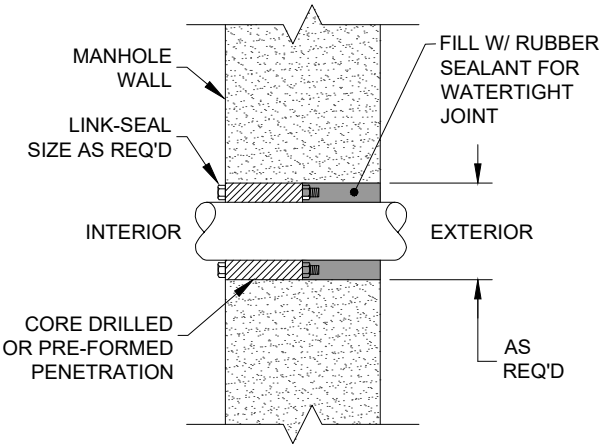

PLAN VIEW

NOTES:

1. PRESSURE CONNECTION ASSEMBLY MAY BE USED ONLY WHEN SPECIFICALLY APPROVED BY SEWER ENGINEERING. A MAXIMUM OF ONE (1) ASSEMBLY IS ALLOWED PER 48" MANHOLE.
2. ALL PIPES AND JOINTS SHALL BE CONSTRUCTED OF MATERIALS APPROVED FOR FORCE MAIN CONSTRUCTION. ALL JOINTS, PIPES, AND ANCHORS SHALL BE DESIGNED TO HANDLE THE PRESSURES AND FORCES GENERATED BY THE FLOW. REFER TO S-2.1A & 2.2A FOR STANDARD SEWER MANHOLE CONSTRUCTION REQUIREMENTS.
3. PRESSURE SEWER MAIN DISCHARGE MANHOLE SHALL BE LINED WITH RAVEN 405 EPOXY COATING (OR APPROVED EQUAL). MINIMUM THICKNESS SHALL BE 125 MILS. EQUIPMENT, PREPARATION, APPLICATION, AND CURING SHALL BE PERFORMED PER MANUFACTURERS REQUIREMENTS.
4. MANHOLE CONNECTION SHOWN FOR CASE WHERE THE PRESSURE MAIN ENTERS THE DISCHARGE MANHOLE PERPENDICULAR TO THE MANHOLE CHANNEL. CITY APPROVAL IS REQUIRED FOR FITTINGS AND ORIENTATION FOR PRESSURE MAINS ENTERING AT OTHER ANGLES.
5. EXTEND DISCHARGE PIPE SO THAT THE SPRING-LINE OF THE PRESSURE MAIN OUTLET IS NO LOWER THAN THE SPRING-LINE OF THE MANHOLE OUTLET
6. SECURE ASSEMBLY TO WALL W/ MIN 1-1/2" 16GA 316 SS STRAPS AT EACH JOINT SECTION, USING 1-1/4"x4"LG 316 SS EXPANSION ANCHORS W/ FASTENERS OR BY INSTALLING STRAPS INTO CONCRETE WHEN FORMING BENCH FOR A NEW MANHOLE




PROFILE VIEW




LINK-SEAL DETAIL

N.T.S.

CITY OF Vancouver WASHINGTON

# PRESSURE SEWER DISCHARGE MANHOLE

CITY OF VANCOUVER
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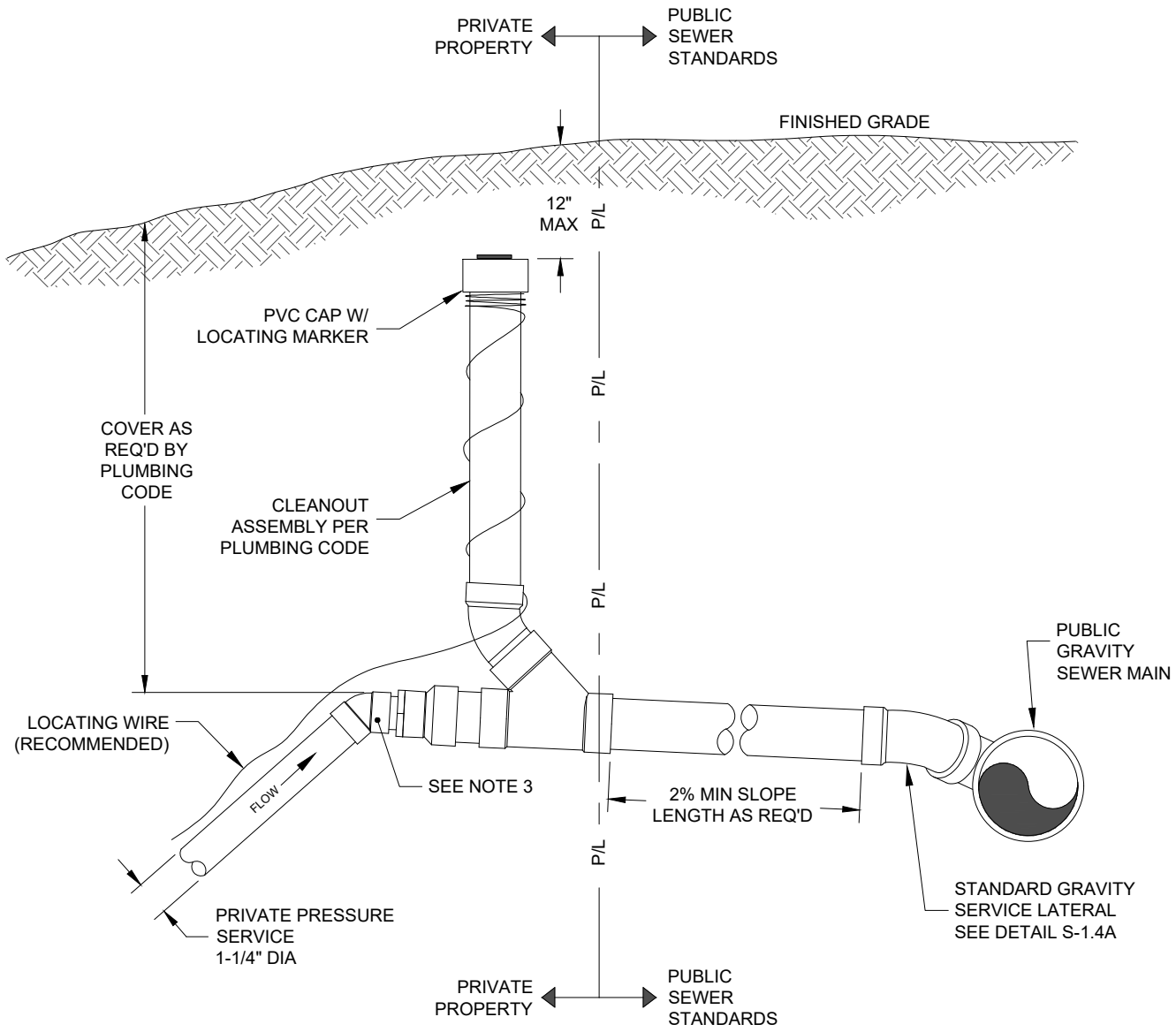
STD PLAN NO.

**S-5.5**




NOTES:

1. ALL ONSITE BUILDING SEWERS ARE PRIVATE AND GOVERNED BY THE BUILDING DEPARTMENTS PLUMBING CODE (UPC)
2. SHALLOW GRAVITY SERVICE LATERALS ALLOWED ON A CASE-BY-CASE BASIS AND REQUIRED CITY ENGINEERING APPROVAL
3. CONNECT THE PRIVATE ON-SITE PRESSURE PIPING TO A HIGH POINT COINCIDENT WITH THE GRAVITY LATERAL AT THE PROPERTY LINE PER UPC

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# PRESSURE TO GRAVITY SERVICE CONNECTION

CITY OF VANCOUVER
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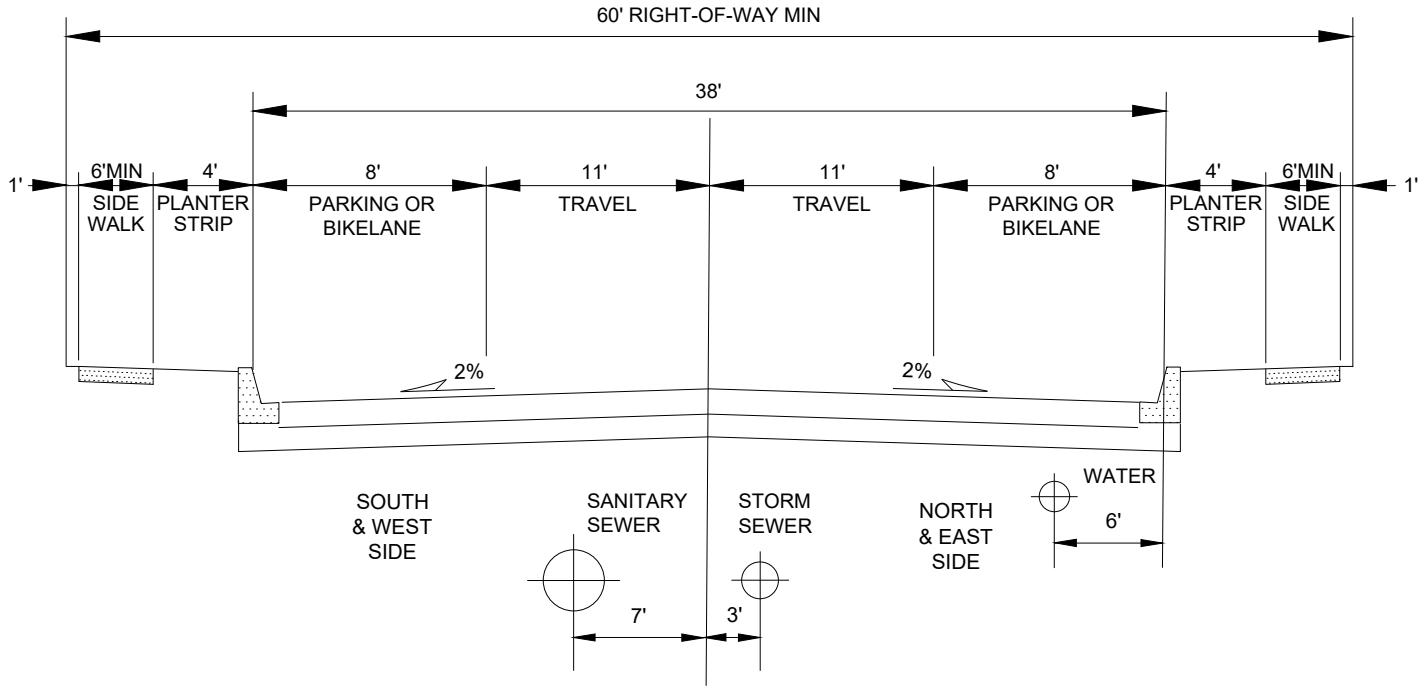
STD PLAN NO.

**S-5.6**




NOTES:

1. THESE LOCATIONS ARE PREFERRED AND SHOULD BE MAINTAINED WHENEVER POSSIBLE.
2. OTHER LOCATIONS WHICH ELIMINATE CROSSINGS OF OTHER UTILITIES MAY BE APPROVED.
3. INCASE IT IS NECESSARY TO DEVIATE FROM THIS STANDARD, PLEASE MAKE MENTION OF THE DEVIATION AND THE REASON THEREFORE IN THE PERMIT APPLICATION.
4. REFER TO SECTION 3-2.01 "GRAVITY SEWERS"
5. REFER TO THE DEPT. OF ECOLOGY'S MANUAL, "CRITERIA FOR SEWAGE WORKS DESIGN" PUBLICATION #98-37WQ
6. REFER TO THE CITY OF VANCOUVER'S TRANSPORTATION SERVICES FOR ALTERNATE STREET DIMENSIONS.

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# STANDARD ZONE LOCATION

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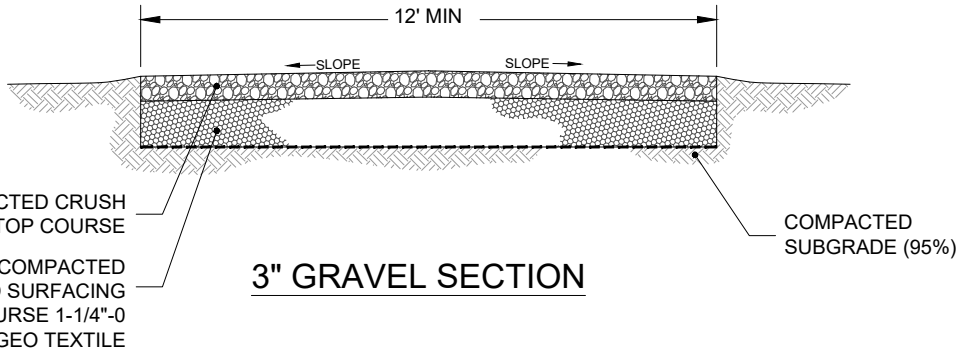
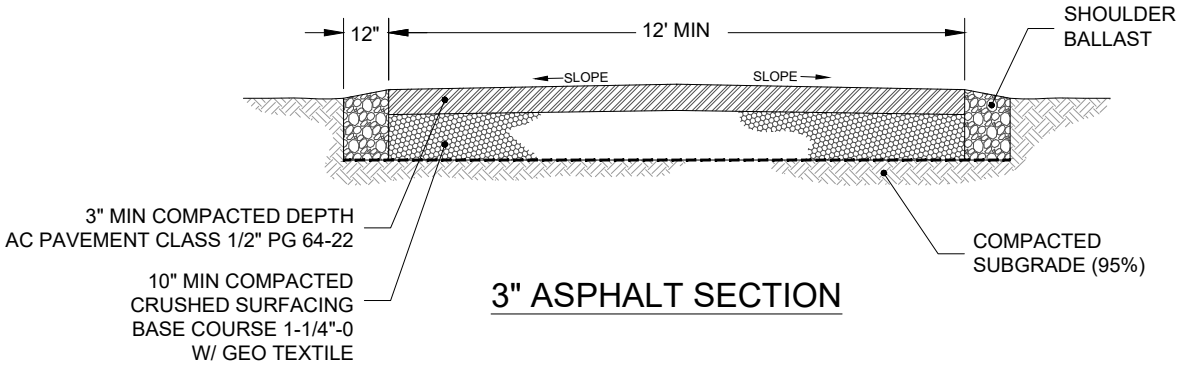
STD PLAN NO.

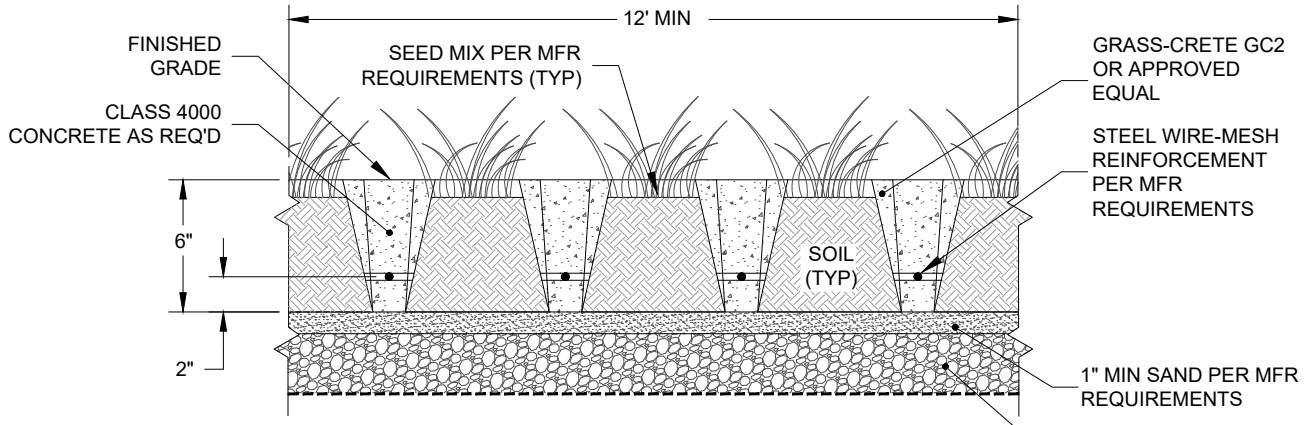
**S-6.0**




## 3" GRAVEL SECTION




## 3" ASPHALT SECTION




## VEHICLE RATED GRASS-CRETE SECTION

NOTES:

1. ALL DIMENSIONS SHOWN ARE MINIMUM, WIDER ACCESS ROADS MAY BE REQUIRED IN SPECIAL CASES.
2. ACCESS ROADS TO BE CENTERED OVER THE PUBLIC SEWER
3. GRASS-CRETE TYPE ACCESS ROADS REQUIRE APPROVAL FROM CITY SEWER ENGINEERING.

N.T.S.

CITY OF Vancouver WASHINGTON

# STANDARD SEWER EASEMENT ACCESS ROADS

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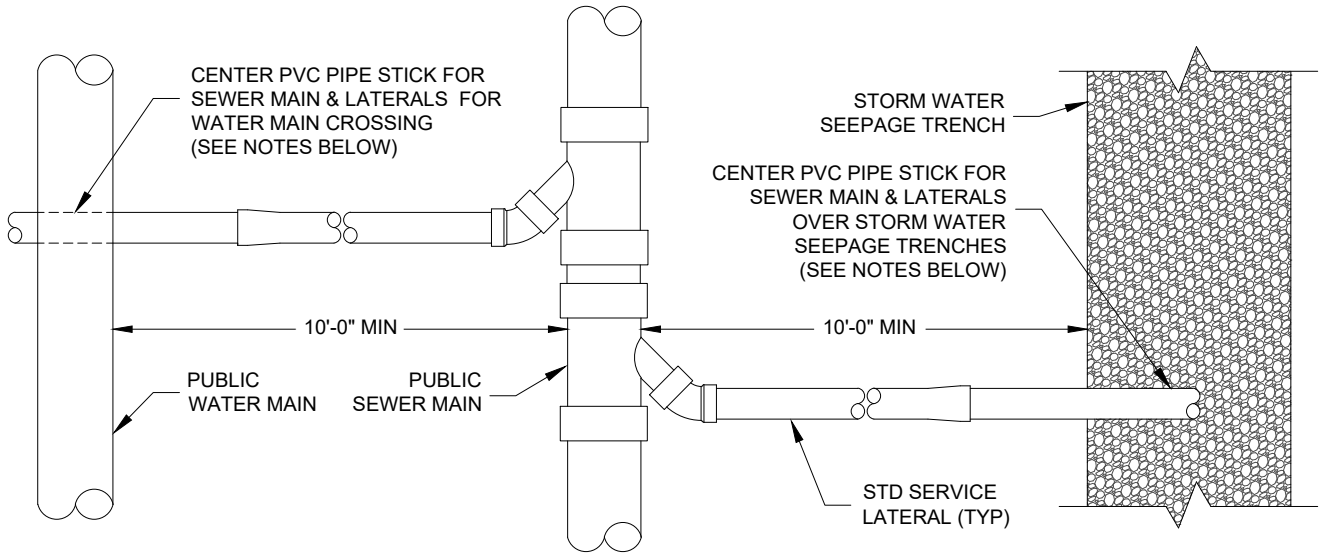
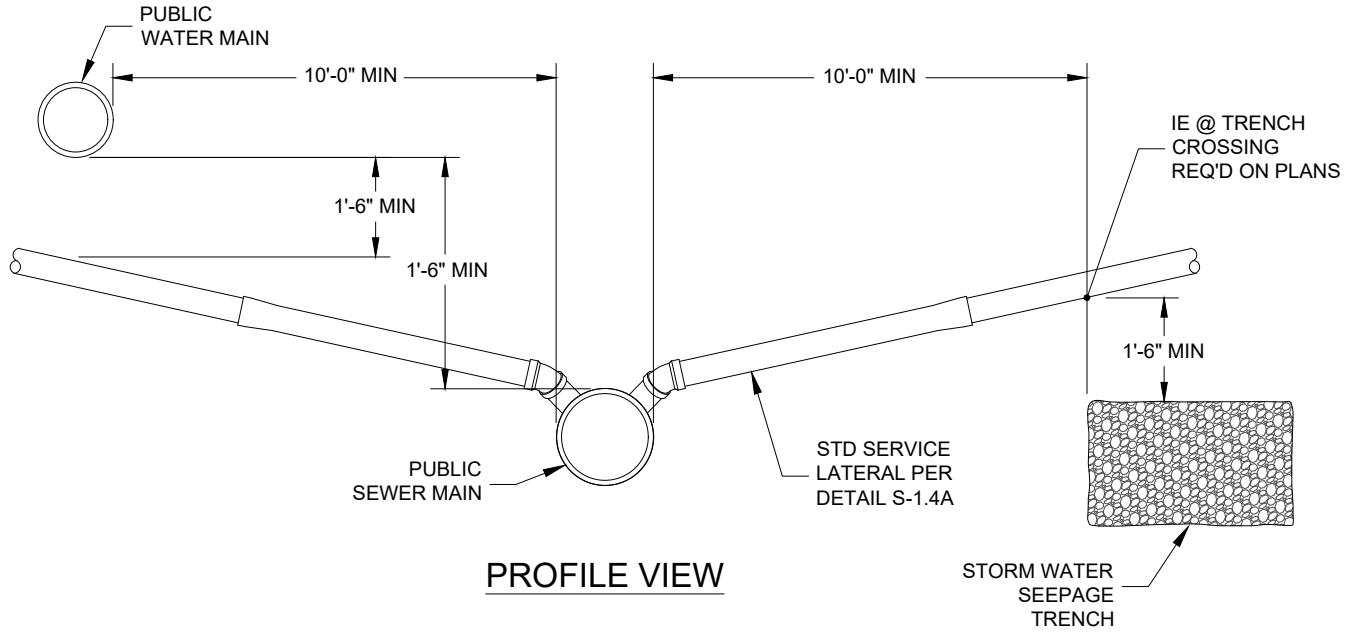
STD PLAN NO.

**S-6.1**




PLAN VIEW




PROFILE VIEW

NOTES:

1. ANY CLEARANCE EXEMPTIONS SHALL BE SUBMITTED IN WRITING FOR CITY REVIEW AND APPROVAL.
2. ALL SEWER CROSSINGS UNDER OR OVER WATER MAINS SHALL MAXIMIZE THE JOINT SEPARATION BY USING THE LONGEST STANDARD LENGTH PIPE AVAILABLE FROM THE MANUFACTURER. PIPE STICKS SHALL BE CENTERED AT THE POINT OF CROSSING.
3. SPACING REQUIREMENTS SHOWN ABOVE SHALL ALSO APPLY TO SEWER LATERALS AND WATER SERVICES WITHIN THE RIGHT OF WAY.
4. SEWER MAINS AND SERVICE LATERALS THAT CANNOT MEET THE MINIMUM CLEARANCE REQUIREMENTS ABOVE. SHALL BE CONSTRUCTED OF PRESSURE RATED PIPE.
5. SEPARATION REQUIREMENTS ARE FOR THE NORMAL CONDITIONS FOUND WITH SEWAGE AND WATER SYSTEMS. THESE BASIC REQUIREMENTS APPLY TO SEWERS OF 24-INCH DIAMETER OR LESS. LARGER SEWERS MAY HAVE ADDITIONAL REQUIREMENTS. MORE STRINGENT REQUIREMENTS MAY BE NECESSARY IN AREAS OF HIGH GROUND WATER, UNSTABLE SOIL CONDITIONS, ETC

N.T.S.

CITY OF Vancouver WASHINGTON

# SEWER SEPARATION & CROSSING REQUIREMENTS

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STD PLAN NO.

**S-6.2**