

## **SECTION 5.0 - DESIGN REQUIREMENTS**

### **5.1 GENERAL DESIGN REQUIREMENTS**

Except where these Standards provide otherwise, design detail, workmanship, construction specifications, and materials shall be in accordance with the following (in the following order of precedence):

1. CCSD#1 – District Rules and Regulations.
2. CCSD#1 – Sanitary Sewer Standard Detail Drawings.
3. CCSD#1 – Sanitary Sewer Standards.
4. CCSD#1 – Stormwater Standards.
5. Clackamas County – Transportation Standard Detail Drawings (if applicable).
6. City of Happy Valley –Standard Detail Drawings (if applicable).
7. Current APWA Standard Specifications and Drawings for Public Works Construction published by the Oregon Chapter of the American Public Works Association, and Clackamas County Road Use Ordinance.
8. ODOT Standard Specifications.
9. AASHTO – (American Association of State Highway and Transportation Officials).

It is the Engineer's responsibility to comply with other applicable federal, state, and local regulations, particularly with respect to wetland regulations and other development requirements.

Performance Standards – Sanitary sewer system design shall meet the policies and guidelines of OAR chapter 340 Division 52 Section 0020 and its updates. Design shall comply with Oregon Department of Environmental Quality sanitary sewer design guidelines.

Sanitary sewer system capacity shall be designed for ultimate development density of the drainage basin. The system shall allow for future system extension and for future development. Sanitary sewers shall be designed to remove by gravity the domestic sewage and industrial wastes from basements of houses, commercial or industrial buildings, and all public and private establishments where possible. Pump stations will be reviewed on a case by case basis (see Section 3.5).

Stormwater, including street, roof, or footing drainage, shall not be discharged into the sanitary sewer system but shall be removed by a system of storm drains or by some other method separate from the sanitary sewer system.

### **5.2 SANITARY SEWER REQUIREMENTS**

#### **5.2.1 Pipe and Fitting Material and Size**

All Public Sanitary Sewers shall be designed with materials as specified in these Standards. Where required for added strength, Class 52 Ductile Iron pipe, C905 or C900 PVC shall be used. PVC pipe and fittings not requiring extra strength shall conform to ASTM- D3034, SDR 35.

All sanitary sewer mainlines shall be a minimum diameter of eight inches (8") and shall begin at a manhole and shall terminate at a manhole.

Private sanitary sewer piping systems shall be Permitted by the Local Plumbing Authority and meet the appropriate sections of the Uniform Plumbing Code (UPC).

Sanitary sewer mainline, service connection and fitting material shall be the following types or equal when approved in writing by the District:

- a. Polyvinyl Chloride Pipe – PVC
  - i. ASTM D3034 SDR 35, 4" to 24"
  - ii. ASTM C-900 D-1784 DR, 4" to 24"
  - iii. ASTM C-905 D-1784 DR, 4" to 24"
- b. Ductile Iron Pipe – DIP
  - i. Ductile pipe shall conform to ANSI A21.50-1. The minimum thickness class shall be Class 50 (up to 12-inches diameter pipe) and Class 51 (for 14-inches and larger pipe).
- c. Concrete Pipe – NRCP/RCP (27" and larger)
  - i. Non-reinforced concrete pipe shall conform to requirements of ASTM C14. Unless otherwise specified, pipe shall conform to Class 3 design requirements.
  - ii. Reinforced concrete, non-pressure pipe shall conform to the requirements of ASTM C76 or C655 and shall be the class specified. Unless otherwise specified, pipe shall meet the design requirements of Wall B.
  - iii. Gaskets shall conform to the requirement of ASTM C443.
  - iv. All concrete pipes shall be cured to the manufacture specification prior to installation.
- d. Tees, Service Connection and Fittings
  - i. Tees, service connection and fittings shall be provided in the sanitary sewer mainline for each sanitary sewer service connection. All fittings shall be of sufficient strength to withstand all handling and load stresses encountered. All tees, service connections and fittings shall be of the same materials as the sanitary sewer mainline pipe unless otherwise approved. Tees and fittings shall be free from cracks and shall adhere tightly to each joining surface. All tees and fittings shall be gasketed with the same gasket material as the mainline pipe joint.

## 5.2.2 Design Sewage Flow

Design flows shall be determined by using the factors of the specific Sanitary Sewer Master Plan, if available, in which the development is situated.

In the absence of a Master Plan and flow data or other reliable information, the following factors may be assumed to calculate the flow in the sanitary sewer mainline:

Per Capita Peak Hourly Flow: 400 gpcd (gallons per capita per day)

It is recommended that design calculations include estimates of average maximum and minimum daily flows. The submission of design calculations will not ordinarily be required, but designers should be prepared to substantiate pipe sizes, layout, population estimates, land uses, or other design assumptions.

These factors may be used to estimate the peak daily flow which includes an allowance for infiltration.

Design capacity of mainline and trunk sanitary sewers shall be designated on the following basis:

1. Mainline Sanitary Sewers – Design capacity shall be based on sanitary sewer flowing two-thirds (2/3) full.
2. Trunk Sanitary Sewers – Design capacity shall be based on sanitary sewers flowing full, without head.

## 5.2.3 Minimum Slope and Velocity Design

### 5.2.3.1 Minimum Slope Design

Minimum design slopes are based on a slope required to produce a mean velocity, when flowing half full, of at least two (2) feet per second (fps), based upon Manning's "n", the coefficient of roughness, valued at not less than 0.013.

The Engineer shall design the sanitary sewer mainline using the minimum design slope of 0.0100 ft/ft in most cases.

The sanitary sewer mainline shall be designed with a minimum slope of 0.0100 ft/ft unless it can be demonstrated the daily peak flow in a 1/2 full pipe will produce a minimum velocity of 2 fps. To calculate the flow in a sanitary sewer mainline the average flows of 250 gal/day generated from each dwelling unit shall be used to determine upstream contributions.

In general the slope of a sanitary sewer mainline which dead ends and will not be extended shall have the last segment(s) or four hundred feet (400") designed with a minimum slope of .0200 ft/ft so it will have adequate slope to self clean.

The District reserves the right to determine the minimum design slope when flatter slopes are required to serve the entire basin.

Minimum design slope shall be as follows:

Inside Pipe Diameter (inches)	Minimum Design Slope (ft/ ft)
8	0.0100 or 0.0045 flowing 1/2 full
10	0.0100 or 0.0033 flowing 1/2 full
12	0.0100 or 0.0027 flowing 1/2 full
15	0.0100 or 0.0020 flowing 1/2 full
18	0.0100 or 0.0017 flowing 1/2 full

Minimum asbuilt slopes shall be as follows:

Inside Pipe Diameter (inches)	Minimum Asbuilt Slope (ft/ ft)
8	0.0085 or 0.0040 flowing 1/2 full
10	0.0085 or 0.0028 flowing 1/2 full
12	0.0085 or 0.0022 flowing 1/2 full
15	0.0085 or 0.0015 flowing 1/2 full
18	0.0085 or 0.0012 flowing 1/2 full

Sanitary sewer mainlines installed at slopes less than the minimum asbuilt will not be accepted.

The District reserves the right to determine all of the design sanitary sewer mainline slopes. Design slopes for larger pipes than 18-inches in diameter will be determined on a case-by-case base.

1. Anchor Walls

Sanitary sewers on slopes in excess of 20 percent shall be secured through the use of concrete anchor walls. Spacing for anchors shall be as follows:

Minimum Anchor Spacing

Slope (%)	(Center to Center)
20-34	35 feet
35-50	25 feet
51+	15 feet or Concrete Encasement

2. Impervious Zone

When designing the sewer corridors through steep topography identified on the plans, an impervious zone shall be placed as required to limit the migration of water through the length of the trench. The Engineer will make a final determination of the locations and the number required.

#### 5.2.3.2 VELOCITY DESIGN

Where flow velocities greater than fifteen feet (15') per second are attained, the pipe material shall be ductile iron, C905 or C900 PVC and special provision shall be made to protect manholes against erosion and displacement by shock. This may be accomplished by installing one additional manhole to decrease the slope or to split a 90° horizontal direction change into two (2) 45° incremental changes. The flow must be contained in the channel.

### 5.3 ALIGNMENT AND COVER

Curved alignments in sanitary sewers mainline or service connections are not permitted. All Public Sanitary Sewer Extensions shall be located within the public right-of-way wherever possible.

#### 5.3.1 Right-Of-Way

Sanitary sewer mainlines shall be straight manhole to manhole, and located five feet (5') north or west from the right-of-way centerline. All changes in direction of pipe shall be made at a manhole. Sanitary sewers shall be located in the street right-of-way. If streets have curved alignments, the center of the manhole shall not be less than six feet (6') from the curb face on the outside of the curve nor less than six feet (6') from the curb face on the inside of the curve. Do not place manholes in the wheel path, sidewalk, curb or gutter.

#### 5.3.2 Sanitary Sewer Easement

Sanitary sewers mainlines in easements shall be allowed only after all reasonable attempts to place the sanitary mainline within a right-of-way have been exhausted.

All Public and Private Sanitary Sewer Easements relevant to the Plan approval shall be reviewed and approved prior to final Plan approval and issuance of the Public Sanitary Sewer Extension Permit. All easements granted to the District must be recorded via PLAT map or deed instrument. The District requires an exclusive easement granted to "CLACKAMAS COUNTY SERVICE DISTRICT NO. 1.", and will not accept easements granted as Public Utility Easements for Public Sanitary Sewer Extensions. Easements shall be granted on District forms or forms approved by the District. There shall be no cost to the District for obtaining or processing the easements. Easements shall provide for restrictions of permanent construction within the easement and provide ingress and egress for maintenance, reconstruction or connection to the sanitary sewer mainline or manholes. Some easements may require temporary construction easements adequate to allow construction activities.

Subdivision tracts shall dedicate Public Sanitary Sewer Easements on the recorded PLAT map. Easements granted to the District via Plat shall be labeled as a Public Sanitary Sewer Easement (PSE). Plat notes required can be found in Appendix A.6.

For other than subdivision tracts, dedication of Public Sanitary Sewer Easements to the District shall occur by means of recorded deeds. All easements must be furnished to the District for review and approval and must be accepted by the District prior to recording. A surveyor shall provide the District with dedication documents and descriptions necessary to convey the easements during the plan review process at which time the width of permanent and temporary easements will be determined. A record of survey meeting all requirements of ORS 209.250 must accompany the dedication. Acceptance and recording of this dedication deed instrument will be provided free of charge by the District.

Placement of utility lines, poles, or other appurtenances in the Public Sanitary Sewer easement shall be subject to issuance of a separate Sanitary Sewer Encroachment Application.

When locating sanitary sewer mainlines in easements the mainline shall be centered in the easement, and the conditions of the easement shall be such that the easement shall not be used for any purpose which would interfere with the unrestricted use of the sanitary sewer mainline.

Sanitary sewer mainlines placed in easements along a property line where both properties are owned by the Grantor shall have the easement centered on the property line. The sanitary sewer mainline shall be offset twenty-four inches (24") from the property lines.

Easements for mainline sanitary sewers shall have a minimum width of fifteen feet (15'). Easements for trunk sanitary sewers shall have a minimum easement width of twenty feet (20').

Sanitary sewers with more than eight feet (8') of cover or combined with storm sewers will require wider easements. A slope of one horizontal to one vertical from the sanitary sewer invert to ground surface will be used to determine easement width. Easement widths shall vary from the fifteen foot (15') minimum by five foot (5') increments; 20, 25 feet, etc.

Easement locations for Public Sanitary Sewer mainlines serving a planned unit development, condominium, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas which will permit unobstructed vehicle access for maintenance by District personnel. Common easements for other utilities will be reviewed on a case-by-case basis. Separation of utilities must meet Oregon State Department of Environmental Quality (ODEQ) and Oregon Department of Health requirements. Slope easements are required when necessary to encompass cut or fill slopes.

All easements granted to the District must be recorded via PLAT map or deed instrument before acceptance of the Public Sanitary Sewer Extension can be final.

### 5.3.3 Relation to Water Lines and Other Utilities

No sanitary sewer shall be less than fifty (50) feet from any well, spring, or other source of domestic water supply unless approved by the District. All sanitary sewers or parts thereof which are located within fifty (50) feet of any source of domestic water supply shall be designed of ductile iron pipe with watertight joints, or of other approved pipe.

The basic separation requirements apply to all gravity and pressure sanitary sewers of twenty-four (24) inch diameter or less. Trunk sanitary sewers may create special hazards because of flow volumes and joint types, and accordingly require additional separation requirements. The special design requirements given are for the normal conditions found with sewage and water systems. More stringent requirements may also be necessary in areas of high ground water, unstable soil conditions, etc.

#### 1. No Special Requirements (Parallel)

A minimum horizontal separation of ten (10) feet between sanitary sewers and any existing potable water lines, and a minimum vertical separation of eighteen (18) inches between the bottom of the water line and the crown of the sanitary sewer, shall be maintained. The distance shall be measured edge to edge.

#### 2. Justification Required (Parallel)

When conditions prevent the separations described above, a sanitary sewer may be laid closer than ten (10) feet horizontally or eighteen (18) inches vertically to a water line, provided:

It is laid in a separate trench from the water line.

The elevation of the crown of the sanitary sewer mainline must be at least eighteen (18) inches below the bottom of the water line. When this vertical separation cannot be obtained, the sanitary sewer shall be designed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to ensure water tightness prior to backfilling. Adequate restraint should be provided to allow testing to occur.

- If sanitary sewers must be located in the same trench as a potable water line, special construction and mitigation is required. Both water lines and sanitary sewer mainlines shall be designed with a casing pipe of pressure-rated pipe material designed to withstand a minimum static pressure of one-hundred fifty (150) psi. The water line shall be placed on a bench of undisturbed earth with the bottom of the water pipe at least eighteen (18) inches above the crown of the sanitary sewer, and shall have at least five (5) feet of horizontal separation at all times.

#### 3. Vertical Separation (Perpendicular)

Sanitary sewer mainline crossing water lines shall be laid below the water lines whenever possible to provide a separation of at least eighteen (18) inches between the invert of the water line and the crown of the sanitary sewer. See Special Conditions if this is not possible.

#### 5.3.4 Special Conditions

When conditions prevent a vertical separation as described above, design shall be as follows:

##### 1. Gravity Sanitary Sewers Passing Over or Under Water Lines

These gravity sanitary sewers shall be designed as specified with material as described below:

Standard gravity-sanitary sewer material encased in concrete or in a one-quarter ( $\frac{1}{4}$ ) inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) (the ratio of the outside diameter to the pipe wall thickness) of eighteen (18) or less, with all voids pressure-grouted with sand-cement grout or bentonite.

The length of sanitary sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sanitary sewer pipe shall be the longest standard length available from the manufacturer.

Pipe Material:

- a. Polyvinyl Chloride Pipe – PVC
  - i. ASTM C-900 D-1784 DR, 4" to 24"
  - ii. ASTM C-905 D-1784 DR, 4" to 24"
- b. Ductile Iron Pipe – DIP
  - i. Ductile pipe shall conform to ANSI A21.50-1. The minimum thickness class shall be Class 50 (up to 12-inches diameter pipe) and Class 51 (for 14-inches and larger pipe).

##### 2) Water Lines Passing Under Gravity Sanitary Sewers

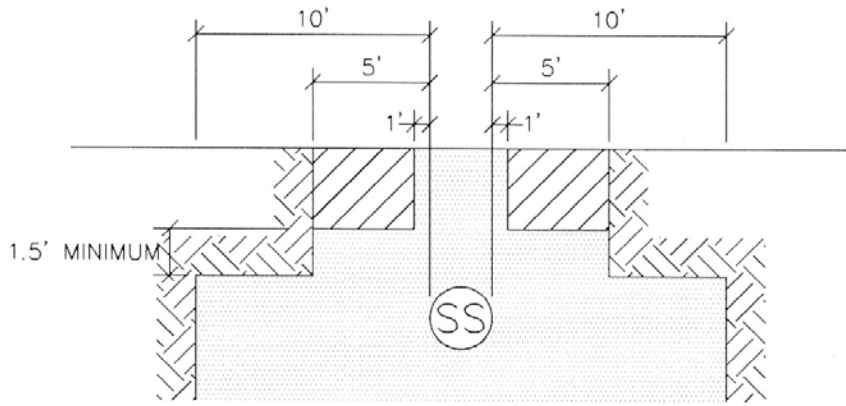
Water Lines shall be protected by providing:




There shall be a vertical separation of at least 18 inches (18") between the invert of the sanitary sewer and the crown of the water line.

There shall be adequate structural support for the sanitary sewers to prevent excessive deflection of joints and settling on and breaking of the water lines.

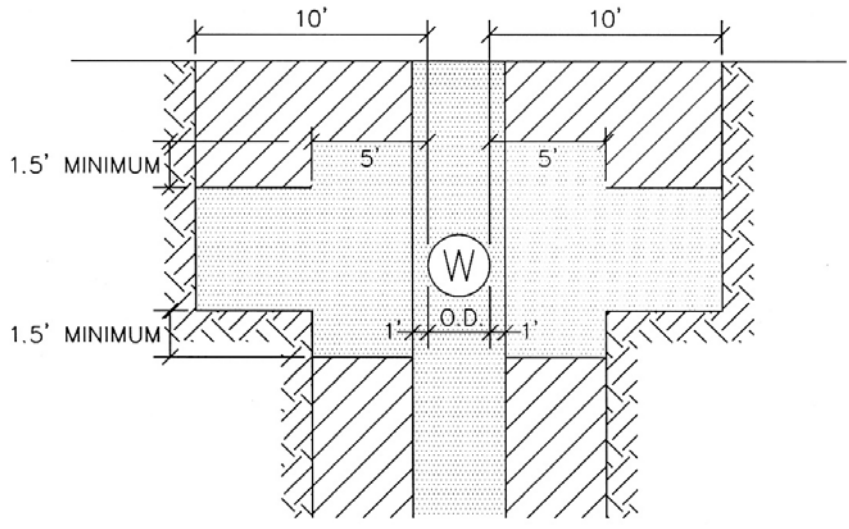
The length of sanitary sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sanitary sewer pipe shall be the longest standard length available from the manufacturer. Any design regarding Section 5.3.4 shall obtain written approval from both the District and local water authority.








WATER LINE ZONES	
	PROHIBITED INSTALLATION
	JUSTIFICATION REQUIRED
	NO SPECIAL REQUIREMENTS

SEPARATION OF PARALLEL SEWER-WATER LINES



SEWER LINE ZONES	
	PROHIBITED INSTALLATION
	JUSTIFICATION REQUIRED
	NO SPECIAL REQUIREMENTS

SEPARATION OF PARALLEL WATER-SEWER LINES

### 5.3.5 Relation to Stream and Drainage Channels

Sanitary sewers crossing streams or drainage channels shall be designed to cross the stream as nearly perpendicular to the stream channel as possible and shall be free from change of slope.

The top of all sanitary sewers entering, crossing or adjacent to streams shall be at sufficient depth below the natural bottom of the stream bed to protect the sanitary sewer mainline. One foot (1') of cover is required where the sanitary sewer is in rock, three feet (3') of cover is required in other materials and a minimum of 6 inches (6") cover is required in paved channels.

Pipe material shall be ductile iron with an eighteen foot (18') length of pipe centered on the stream or drainage channel centerline. The ductile iron pipe shall extend to a point, where a one-to-one slope, which begins at the top of the bank and slopes down from the bank away from the channel centerline, intersects the top of the pipe.

Sanitary sewers located parallel to streams shall be located outside of the stream bed. All manhole covers, at or below the 100 year flood elevation shall be watertight.

All construction shall be designed to comply with the latest regulations as determined by the Corps of Engineers and Division of State Lands for removal and filling in waterways. In addition, all requirements for the Endangered Species Act must also be met. The activities authorized by the approval of the request in this application may be subject to other laws not addressed in this process. River crossings shall be approved on a case by case basis.

### 5.3.6 Minimum Cover

All sanitary sewers shall be laid at sufficient depth to drain building sewers, protect against damage from traffic and afford protection from other utilities. Sufficient depth shall mean the cover from the top of the pipe to finish grade at the sanitary sewer alignment.

Under normal conditions, sanitary sewers shall be placed with a minimum cover of eight feet in roadways and six feet of cover in easements.

In hillside subdivisions, sanitary sewers shall be placed in the street at a depth sufficient to drain building sewers on the low side of the street.

Where less than three feet of cover is proposed, pipe material shall be:

- a. Polyvinyl Chloride Pipe – PVC
  - i. ASTM C-900 D-1784 DR, 4" to 12"
  - ii. ASTM C-905 D-1784 DR, 4" to 12"
- b. Ductile Iron Pipe – DIP
  - i. Ductile Iron Pipe Class 52 (Ductile pipe shall conform to ANSI A21.50-1) or equivalent is required. Submit a request in writing along with the required documentation to the District when either of the following circumstances exists:
    1. Underlying rock strata encountered; Submit a soils report from a registered geotechnical engineer including a plan and profile certifying bed rock exists within three feet (3') of

the undisturbed ground surface at all investigated alignments. See note below for additional documentation.

2. Utility conflicts: Submit a plan and profile of the conflict showing pipes/conduits/etc., which results in the depth of cover to be reduced to three feet or less. See note below for additional documentation.

*Note: Additional documentation for 1 and 2 includes submittal of sufficient documentation to reasonably insure that adjacent property building sewers can still drain by gravity for any future extensions.*

## **5.4 SANITARY SEWER STRUCTURES**

### **5.4.1 Mainline Cleanout**

Cleanouts will not be approved as substitutes for manholes, except temporarily at the upper end of a mainline sanitary sewer that will be extended on the same slope and alignment during the next construction phase. The cleanout shall be removed and the sanitary sewer mainline extended meeting all design criteria in these Standards. All mainline cleanouts will be reviewed on a case-by-case basis.

### **5.4.2 Manholes**

#### **5.4.2.1 Location**

Manholes shall be placed at the following locations:

1. At every change in slope, alignment or size of pipe.
2. At each intersection or junction of a sanitary sewer mainline.
3. Where practical, manholes shall be located at street intersections.
4. At the upper end of all sanitary sewers, except as provided under subsection 5.4.1.
5. At intervals of 500 feet (500') or less. Deviation from this requirement shall be reviewed on a case-by-case basis for approval, considering whether maintenance equipment can adequately service the proposed sanitary sewer mainline.
6. At service connections of eight inches (8") or larger.

Manholes shall not be placed in the following locations:

1. In the wheel path, curb or gutter.
2. Behind the curb line. Placement of manholes behind the curb shall be reviewed on a case-by-case basis for approval. Consideration shall be given to those sanitary sewer mainlines which already exist behind the curb.

#### **5.4.2.2 Slope of Manhole Channel**

Standard elevation differences or the drop across the manholes have been established to compensate for normal energy losses and to prevent surcharging of a sanitary sewer. . The intent of this subsection is to prevent the difference in pipe inverts at the manhole wall on steep sanitary sewers from exceeding one foot (1'), which renders it

impossible to insert a TV camera into the outfall mainline if the average slope exceeds twenty-five (25) percent. The rules for elevation differences at manholes are:

1. The drop across a standard 48-inch manhole shall be two-tenths (0.20-ft) of a foot unless the mainline sanitary sewer has a slope greater than 20-percent, or otherwise directed by the District.
2. If incoming pipes are smaller in diameter than the outgoing pipe the crowns of all incoming pipes shall be at least as high as the crown of the outgoing sanitary sewer pipe.
3. For mainline sanitary sewer with slopes greater than 20-percent the slope in the channel will be determined on a case by case basis by the District.

In general the slope shall be determined to the center of the manhole. The average between any inlet Slope ( $S_i$ ) and outlet Slope ( $S_o$ ) in percent across the manhole shall not exceed 25 percent.

$$\frac{S_i + S_o}{2} = \text{less than 25 percent (feet per 100 feet)}$$

The above formula will limit the difference between the inlet and outlet inverts measured at the manhole walls from exceeding one (1) foot for an average manhole diameter of four (4) feet. This formula applies to sanitary sewers with a slope in excess of twenty (20) percent.

4. Generally, a vertical offset in slope exceeding twenty-five hundredths (0.25) of a foot will not be permitted. Exceptions will be the following:
  - A. When a smaller diameter connects to a larger diameter sanitary sewer.
  - B. When a grade conflict exists with an existing utility, the maximum vertical drop may be one (1) foot or as approved.
  - C. When a vertical drop greater than one (1) foot is approved, an outside drop must be installed.

#### 5.4.2.3 Drop Manholes

Outside drop assemblies shall be provided for all mainlines when entering a manhole at a distance of more than twelve (12") inches above the invert of the outlet mainline. Inside drops into manholes shall not be allowed. The vertical displacement shall be measured at the inside manhole walls and not the manhole centerline.

**SPECIAL NOTE:** Drop manholes shall only be used in extreme cases of slope difference between existing and proposed sanitary sewer mainlines or when very special conditions exist such as a conflict with existing facilities which cannot be relocated.

#### 5.4.2.4 Rim Elevations of Manholes

In areas used by vehicles (paved or unpaved streets) the manhole rim elevation shall match the finished grades. In other areas the height of the manhole rim will normally be six (6) inches above finished grade, high-water mark, or above the top of future fill areas.

#### 5.4.2.5 Design and Size

All manholes shall be a minimum of forty-eight (48) inches inside diameter. All manholes shall have a minimum twelve (12) inch ledge in the base.

#### 5.4.2.6 Connection

Connections to existing manholes shall be designed with the following guidelines:

1. No pipe shall enter an existing manhole where the angle between the incoming flow and the outgoing flow is less than 90°. When the incoming flow and the outgoing flow is less than 90°, two (2) manholes shall be installed. Spacing of such manholes shall be a minimum of ten feet (10') apart measured outside to outside.
2. New or existing manhole walls shall be core drilled (not jack hammered) to connect a new sanitary sewer mainline or service connection.
3. New mainlines should enter an existing manhole at a minimum of 0.20-feet of drop across a standard 48-inch manhole.
4. The flow entering the manhole shall follow a smooth unobstructed concrete channel transition from the inlet pipe into the mainline channel. The base of the manhole will be rebuilt if damaged in this process.

#### 5.4.2.7 Anticipated Future Extensions

All manholes, from which future Public Sanitary Sewer Extensions are anticipated, shall be channeled with a boot and plug installed in the direction of the anticipated Public Sanitary Sewer Extension. Boots shall be located at least 0.20 feet above the lowest invert in the manhole. Channels shall be formed in the manhole base to accommodate the future flow. Stub outs shall only be installed in manholes when permitted by the District. Pipe stubs shall be a minimum of eight inches (8") in size or as permitted by the District and shall be of an approved type of pipe. Stubs shall protrude a maximum of fifteen (15) feet without a temporary cleanout unless otherwise permitted by the District and shall be plugged with a standard watertight plug or cap. An exception to this section may be made by the District if the direction of the new mainline cannot be established at the time of construction.

## **5.5 SERVICE CONNECTIONS**

### **5.5.1 General**

Properties will be served by a Service Connection designed with the following specifications:

- a. All Service Connections smaller than eight inches (8") shall be installed with a cleanout.
- b. Service Connections eight inches (8") or larger require a manhole connection. No service connection shall be larger than the mainline it connects to.
- c. Service Connections for properties zoned for industrial use shall terminate in a manhole.
- d. Service Connections shall be conveyed to the District for ownership and maintenance not including the cleanout or manhole.
- e. All Service Connections outside the Public Right-Of-Way shall be placed in an easement granted to the District as described in Section 5.3.2.
- f. Properties zoned industrial are required to construct an accessible private sampling manhole as specified by the District.
- g. For additional information regarding Service Connection construction see Appendix D, Sanitary Sewer Standard Detail drawing SAN-017 or SAN-018.

### **5.5.2 Service Connection and Cleanout Material**

- a. The Service Connection pipe, tee, cleanout and joint materials shall be designed of the same material as the sanitary sewer mainline as specified in Section 5.2.1, or as approved; however the use of concrete pipe for Service Connections is prohibited.
- b. Service Connection lateral connections to the mainline shall be made by means of a manufactured tee. No wyes or grouted connections will be allowed.

NOTE: All couplings, adapters, etc., used to connect dissimilar pipe materials together shall be approved by the District.

### **5.5.3 Location**

The Service Connection shall generally be located ten feet (10') offset from the property line and on the low side of lot. Tees for Service Connections shall be located no closer than five feet (5') to manholes. Separation between water line, sanitary service connection and storm service connection shall generally be ten feet (10') with a minimum of five feet (5'). Any other proposed location shall be at the discretion of the District on a case by case basis.

### **5.5.4 Direct Service Connection**

All building sewers and/or sanitary facilities connected to the District sanitary sewer system shall be directly connected without any intervening private sewage treatment system such as a septic tank, cess pool or any part of an on-site system except for permitted Industrial Pretreatment facilities.

#### 5.5.5 Separate Service Connection

A separate and independent service connection shall be provided for each tax lot or lot of record, except as provided in the District Regulations. Multiple adjoining tax lots served by a reduced number of connection points or a single point of connection (such as condominiums) shall be permitted only after providing proof of responsibility for monthly service charges to the satisfaction of the District.

#### 5.5.5 Restricted Connections

No person shall connect any roof, surface, foundation, footing, or exterior area drains to any Service Connection, Building Sewer, or Building Drain which is connected to the Public Sanitary Sewer system.

#### 5.5.7 User Requiring Pumping Facility

If the building is below the available gravity sanitary sewer mainline, the owner or user shall install pumping facilities in accordance with the Uniform Plumbing Code. The owner or user will be required to enter into an agreement with the District regarding the terms and conditions of connection and pumping. Flows from pumped facilities shall enter the Public Sanitary Sewer mainline by means of a gravity service connection. District shall review and approve all pumped connections on a case-by-case basis.

#### 5.5.8 Tap-In Connections

Only District personnel are authorized to tap the District's sanitary sewer mainline up to eighteen (18) inches in diameter. The installer shall give the District 48-hours notice prior to scheduling the tap/inspection. The tap will be scheduled and completed during the District's regularly scheduled business hours. The installer shall excavate to and completely expose the Public Sanitary Sewer mainline at the designated point of connection as directed by the District. The District shall tap the sanitary sewer mainline and install the 4-inch or 6-inch connection fitting at the owner's expense. In the event that the installer fails to comply with all state and federal safety codes applicable to the work, the District shall not make the tap or perform any inspection and the tap will be rescheduled.

District mainlines greater than eighteen inches (18") in diameter shall be tapped by a private contractor and inspected and approved by District personnel at the owner's expense. After review, approval and applicable fees have been paid the installer will be authorized to proceed with tapping the mainline and installing an inset-a-tee and service connection Pipe under the supervision of the District.

#### 5.5.9 Slope and Alignment

The minimum slope for service connection pipes shall be 2 percent ( $\frac{1}{4}$  inch per foot). In unusual conditions, a slope of 1 percent ( $\frac{1}{8}$  inch per foot) may be approved by the Owner's Engineer and the District. Maximum slope for service connection pipes shall be a 100 percent (100%) slope (45 degrees). All changes in alignment or slope of the pipe shall be made with manufactured fittings. No bends greater than 45 degrees shall be allowed.

#### 5.5.10 Minimum Depth

The minimum depth of the Service Connection lateral shall be six feet (6') at the property line crossing. Service connections which cannot be laid at the required minimum depth shall be approved on case by case basis.



#### 5.5.11 Detectable Caution Tape

Green detectable metallic tape labeled "CAUTION BURIED SEWER LINE BELOW" shall be installed 6-inches above the Service Connection pipe along its entire length from the tee connection at the mainline to the top of the green 2x4 stake.

#### 5.5.12 Service Connection Cleanout

A cleanout or manhole shall be installed with each Service Connection. Cleanouts shall be located at the front edge of the PUE, at the property line or at the edge of a Public Sanitary Sewer Easement see Appendix D, Sanitary Sewer Standard Detail drawing SAN-017 or SAN-018. Manholes shall be installed so as to allow ingress and egress by District personnel. In areas where sidewalks are to be constructed, the cleanout shall be placed at the back edge of the sidewalk and the service connection lateral shall terminate at the back edge of any Public Utility Easement (PUE), thereafter.

Cleanouts shall be of the same size and material as the Service Connection lateral.

The vertical cleanout riser pipe shall be flush with the ground and capped with a solvent welded end cap. A 2x4 stake painted green shall extend a minimum of three feet (3') below the ground and one foot (1') above the ground on the upstream side of the riser pipe. Upon extension of the Building Sewer the cleanout riser pipe shall be adjusted to finish grade and a solvent weld removable end cap shall be installed.

The service connection lateral shall be extended horizontally two feet (2') beyond the cleanout fitting or to the back edge of a PUE and capped with a solvent welded end cap.

All solvent welded end caps on Service Connections shall be of sufficient strength and design to hold firmly during the low pressure air test.

#### 5.5.13 Inspection

Service Connections installed with a mainline extension shall be inspected for workmanship and materials and tested by the Developer's Engineer. Service Connections not installed with a mainline extension (tap in) shall be inspected by District personnel. Service Connections shall be watertight at all points.