

**SOUTH SUBURBAN SANITARY DISTRICT  
DESIGN STANDARDS**

**TABLE OF CONTENTS**

<b>SECTION &amp; HEADING</b>	<b>PAGE</b>
<b>1. OVERVIEW-----</b>	<b>1 - 7</b>
1.1. GENERAL INFORMATION	
1.2. DEFINITIONS	
1.3. REFERENCE SOURCES	
1.4. SYSTEM DEVELOPMENT CHARGE	
1.5. SUBMITTAL REQUIREMENTS	
1.6. RECORD DRAWINGS REQUIREMENTS	
<b>2. DESIGN CRITERIA-----</b>	<b>8 - 15</b>
2.1. GENERAL DESIGN CRITERIA	
2.2. DESIGN FLOWS	
2.3. PIPING FOR SANITARY SEWERS	
2.4. MANHOLES	
2.5. LIFT STATIONS	
<b>3. TESTING &amp; INSPECTION REQUIREMENTS-----</b>	<b>15 - 19</b>
3.1. REQUIRED INSPECTIONS	
3.2. PRESSURE TESTING	
3.3. HYDROSTATIC TESTING	
3.4. VACUUM TESTING	
3.5. DEFLECTION TESTING	
3.6. LAMPHOLE TESTING	
3.7. TELEVISION INSPECTION OF SANITARY SEWERS	
3.8. SSSD FINAL INSPECTIONS	
<b>4. SSSD STANDARD DRAWINGS-----</b>	<b>19</b>
SD-1 STANDARD MANHOLE FRAME & COVER	
SD-2 DROP MANHOLE AT JUNCTION	
SD-3 MANHOLE AT JUNCTION	
SD-4 MANHOLE ADJUSTMENT	
SD-5 STANDARD CLEANOUT	
SD-6 SERVICE CONNECTION & CLEANOUT AT R.O.W. FOR NEW SEWER MAIN	
SD-7 SERVICE CONNECTION & CLEANOUT AT R.O.W. FOR EXISTING SEWER MAIN	
SD-8 TRENCH DETAIL & TYPICAL T-SECTION	

**SOUTH SUBURBAN SANITARY DISTRICT  
DESIGN STANDARDS  
REVISED: 12-11-07**

**1. OVERVIEW**

**1.1. GENERAL INFORMATION**

- a. It is the Developer's responsibility to ensure they have the latest version of SSSD Design Standards.
- b. The District may vary or modify any SSSD Design Standard, on a case-by-case basis, if it is found that the strict application of the SSSD Design Standard is impractical or if it would result in hardship. Exceptions granted in any instance will not be binding in the future. The District is charged with responsibility for the interpretation and application of the Design Standards.
- c. Minimum Design Criteria: South Suburban Sanitary District, (SSSD), developed the SSSD Design Standards to provide minimum design criteria to Developers for the design of wastewater facilities or conveyance systems that are owned by and/or will be dedicated to SSSD. These SSSD Design Standards include SSSD Standard Drawings. Any design and/or construction changes that deviate from these SSSD Design Standards must first be approved by SSSD before work may commence. Be aware that upon plan review, SSSD may require changes in the design depending upon the nature of the work performed or the presence of unusual field conditions. Furthermore, compliance to SSSD Design Standards does not exempt the Developers from meeting further requirements of any other governmental or regulatory agency. All sanitary sewer design or improvements to be owned by SSSD shall be approved by DEQ prior to SSSD approval.
- d. Applicability: These SSSD Design Standards shall apply to the design and construction of facilities that are owned by and/or will be dedicated to SSSD, and whenever any public or private work is performed within an easement owned or maintained by SSSD. SSSD shall determine if the Design Standards apply.
- e. Correspondence: SSSD must be notified at least forty-eight (48) hours prior to commencement of construction. All correspondence and submittals associated with, or related to, any SSSD sanitary system shall be addressed to:  
  
South Suburban Sanitary District      Phone: (541) 882-5744  
2201 Laverne Ave.                              FAX: (541) 882-5013  
Klamath Falls, OR 97603
- f. Updates: This document will be periodically updated as new technology, policy changes, procedure changes, or updated methods of design and construction are implemented. It is the responsibility of the Developer to contact SSSD to ensure that the latest SSSD Design Standards are being utilized.

- g. Deviation From Standards: At anytime, if the Engineer feels that a portion of the SSSD Design Standards is not an adequate design, or if the Engineer can show that a particular design is equal to or exceeds the specific SSSD Design Standard requirements, or if field conditions restrict the ability of the Engineer to comply to SSSD Design Standards, they may request, verbally and in writing, that their design be implemented in its place. Any deviations from the SSSD Design Standards shall be brought to the attention of SSSD verbally and in writing. Upon review of the requested deviation, SSSD will determine if it equals or exceeds SSSD Design Standards and will notify the Engineer and/or Contractor of its decision.
  
- h. Accountability: Approval from SSSD does not exempt the Developer from requirements of any other governmental regulatory agency. Any and all permits and submittals required by other agencies are the responsibility of the Developer. SSSD will not accept responsibility for any requirements not addressed.

**1.2. DEFINITIONS**

- Per Capita----- Per Person
- LF----- Lineal Feet
- PVC----- Polyvinylchloride Pipe-ASTM D3034 SDR35
- HDPE----- High Density Polyethylene Pipe
- CFS, cfs----- Cubic Feet per Second
- CFM----- Cubic Feet per Minute
- ADF----- Average Daily Flow
- gpd----- Gallons Per Day
- gpm----- Gallons Per Minute

**1.3. REFERENCE SOURCES**

All sanitary sewer conveyance systems, facilities, and connections shall be designed and constructed to SSSD Design Standards. However, unless otherwise noted, all construction and materials shall also comply with requirements of appropriate standards of publications from all other regulatory agencies as they apply to the system being designed. Portions of SSSD Design Standards were adopted from publications by engineering and educational sources listed below:

- APWA American Public Works Association
- ASTM American Standards for Testing Materials
- AWWA American Water Works Association
- DEQ Oregon Department of Environmental Quality
- ODOT Oregon Department of Transportation
- OAR Oregon Administrative Rules
- ORS Oregon Revised Statutes

All design parameters utilized must comply with SSSD Design Standards unless otherwise approved by SSSD.

#### 1.4. SYSTEM DEVELOPMENT CHARGE

**SEE ORDINANCE #50**

#### 1.5. SUBMITTAL REQUIREMENTS

- 1.5.1. **Testing Fee:** A cost estimate of SSSD facilities to be constructed shall be prepared by the Design Engineer and provided to SSSD. Prior to commencing construction of facilities to be owned by SSSD, a fee for the cost of inspections and testing in the amount of two (2) percent of the Engineer's estimated cost of construction, shall be submitted to SSSD after design approval. This fee covers the actual cost for on site inspections by SSSD staff. This fee is only applicable to that construction within Public Right of Way or dedicated easement.
- 1.5.2. **Plan Review Fee:** A one-time plan review fee will be required at the time of submittal of design plans to SSSD. This fee will pay for the cost of review of the submitted design plans associated with a single project, including re-submittals after SSSD initial review comments. The amount of this fee will be determined by SSSD based on the size and complexity of the project but shall not be less than \$50.00. A review will not commence until this fee is paid to SSSD. **This plan review fee is only applicable to those developments being constructed in Public Right of Way or dedicated easement.**
- 1.5.3. **Submittals Required:** Design Plans shall be submitted for review and approval for all new construction that involves connection to any SSSD system. No sewer construction shall take place without first obtaining approval from SSSD.
- 1.5.4. **Sign & Seal:** All plans submitted must be signed and sealed by a registered professional licensed in the State of Oregon to provide the services rendered.
- 1.5.5. **Plan & Profile:** A Plan & Profile drawing must be submitted on 24" x 36" size paper at an engineering scale appropriate for the project.
  - a. SSSD Standard Details related to the proposed development shall be shown on the set of plans.
  - b. Text size shall be 0.08 inches or larger.
  - c. Proposed and existing ground must be shown on the profile.
  - d. A SSSD signature block must be provided on the first sheet of all plans submitted to other regulatory agencies such as City, County, State, or Federal Government.
  - e. Each plan view must show current zoning, existing conditions, proposed sewer systems, and, if available, any expected future build-out, all existing on-site and neighboring utilities, and any feature that may affect the system design.
  - f. The following labeling shall be shown on the profile:

1. Gravity Sewers: Label pipes to indicate length, size, type, & percent slope.

Example: *35 LF 8" PVC @ 0.40%*

1. Manholes: Label manholes to show top elevation, invert elevations, pipe sizes, whether pipe is flowing in or out, and direction of pipe indicated by N, S, E, W, NW, NE, SW, or SE according to which it is closest to.

Example: *MH #5*  
*Top Elev. = 4300.00*  
*I.E. (12" OUT-S) = 4293.00*  
*I.E. (8" IN-N) = 4294.00*  
*I.E. (8" IN-SW) = 4293.90*

2. Surface: Label surface elevations appropriately (Proposed and Existing).
3. Crossings: Label crossings of existing and proposed utilities with appropriate clearance called out. See SSSD Design Standards Section 2.3.1(k) for crossing requirements.
4. Service Laterals: Label laterals with distances from the center of the downhill manhole.

- g. Existing System Connection: SSSD will not accept any new facilities connected to the existing sanitary collection system unless they are inspected and approved by SSSD.
- h. Approval Requirement: No construction of any wastewater conveyance system to be owned by SSSD shall commence without first gaining approval of SSSD.

## **1.6. RECORD DRAWINGS REQUIREMENTS**

- a. Record drawings shall be submitted within (60) sixty days of completion of construction on paper, vellum, or mylar and shall consist of the full set of plans.
- b. In addition to record drawings, a plan view shall be submitted on reproducible vellum or mylar at a scale of 1" = 100'. No exceptions to scale will be accepted.
- c. An electronic file, labeled and dated, of the Record Drawings shall be submitted with the hard copy in an SSSD approved version of Autocad, on CD.
- d. Record Drawings shall include the following information:
  - Title, date, and information of submitter
  - All sheets shall be labeled "Record Drawings"
  - Pipe sizes and slopes
  - Manhole labels for all inverts
  - All connection points to existing, proposed, or future systems
  - All crossings with other utilities

- All other utilities in the area
  - All service connections, cleanouts, and lamp-hole risers
  - All information that deviates from SSSD Design Standards
  - Label all roads and major structures in the area
- e. Final approval shall be obtained from SSSD and all testing and inspections shall be completed and accepted prior to completing the Record Drawings. (See SSSD Design Standards, Section 3 for Inspection and Testing Requirements.) No connections to the facility shall be made until final approval is obtained from SSSD.

## **2. DESIGN CRITERIA**

This section provides general design criteria and guidance for the implementation of sanitary sewer collection systems.

### **2.1. GENERAL DESIGN CRITERIA**

- a. SSSD Design Standard: All sanitary sewer collection systems that will be owned and maintained by SSSD, including all connections and appurtenances thereto to its right-of-way line, shall be constructed to SSSD approved Design.
- b. Easements: Will only be accepted when all other options have been exhausted. All sanitary sewers, gravity or force mains, which are not located in a public right-of-way, but which are to be maintained by SSSD, shall be centered in a minimum sixteen (16) foot wide easement owned by SSSD. If for any reason the sewer line cannot be centered in the easement, special approval must be obtained by SSSD. Easements shall be accurately located with dimensions shown on the plan sheets. All easement locations must be approved by SSSD and created prior to acceptance of the sewer improvement. No permanent structures, other than sanitary sewers, shall be constructed within the easement. No trees will be allowed in the SSSD easements unless they are existing trees and are approved by SSSD. Removal of any structures or trees will be at the expense of the property owner who placed them in the easement at a time and material rate. Landscaping in an easement must be approved by SSSD and SSSD vehicle access must still be made available. All plantings must be of shallow root type.
- c. Grease Traps: SSSD will not accept grease traps in the SSSD system. Grease Traps are to be on private property, operated and maintained by the property owner, meet and be approved by County Building and DEQ requirements.
- d. Amalgam Separator (Dental Office): A dentist who places in or removes from the human oral cavity dental materials containing mercury shall have an amalgam separator installed on a wastewater drain in a dental facility where the dentist practices if dental materials containing amalgam pass through the wastewater drain. The amalgam separator must be verified by the manufacturer to remove at least 95 percent of the amalgam that passes through the drain on which it is installed.

## 2.2. DESIGN FLOWS

### Flow Calculation Table

Daily

Contributor	ADF (gpd)	Oper. Hours	ADF (gpm)
Single Family Residence	364	18	0.34
Multiple Family Residence	260	18	0.24
Light Commercial Flow (per acre)	2800	18	0.74

- a. Single Family Occupancy: Residential single-family occupancy shall be estimated at 2.8 persons per unit unless it can be shown that a lesser number of occupants can be justified to SSSD.
- b. Single Family Residence: A residence designed to house a single family.
- c. Multiple Family Occupancy: Multiple family residence occupancy shall be estimated at 2.0 persons per unit unless it can be shown that a lesser number of occupants can be justified by SSSD.
- d. Multiple Family Residence: A living unit within a building or group of buildings designed to house two (2) or more families, living independently of each other.
- e. Residential Design Flows: Residential average flows shall be computed on a per-capita basis using a minimum of 130 gallons per capita per day. See the Flow Calculation Table above for actual design flows.
- f. Commercial & Industrial Report: Commercial and Industrial developments producing waste that will enter a SSSD system shall be required to submit a report in writing that includes the following:
  - general site information
  - type of waste being discharged
  - amount of waste being discharged

After review SSSD may require, at their discretion, that pretreatment take place prior to discharge into a SSSD system. If deemed necessary, SSSD may also require that a more detailed report be submitted.
- g. Light Commercial Design Flow: Design flows for Light Commercial shall be computed at 2800 gallons per day per acre of land unless otherwise determined by SSSD. (See the Flow Calculation Table above.)
- h. Heavy Industrial Design Flow: SSSD will not accept Industrial flow.

## 2.3. PIPING FOR SANITARY SEWERS

### 2.3.1. General

- a. Construction Drainage: No stormwater or drainage of any type will be allowed to flow through any sanitary sewer pipes during construction.
- b. Construct to Design Standards: All sewer mains, laterals, manholes and sanitary sewer facilities shall be constructed to SSSD Design Standards and/or approved revision thereto.
- c. Installation of Pipe: All types of sewer pipe shall be installed with the bell-end up or forward from the connection on an existing sewer or from a designated starting point approved by SSSD. Nipple ends of all gasketed pipe shall be beveled prior to installation. After placing a length of pipe in the trench, the spigot shall be centered in the bell and the pipe seated within and brought to correct line and grade. During joining, the pipe shall be partially supported to minimize unequal lateral pressure and to maintain concentricity. Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing and dislocating the gasket. Any disturbed or dislocated gaskets shall be removed, the pipe cleaned, gasket replaced, and lubricated before joining the sections.
- d. Tracer Wires and Tape: Tracer wire must be placed approximately one foot above all new pipes being installed. Tracer tape must be installed above all new pipes one foot beneath the finished grade. At manholes and cleanouts, tracer wire must be a minimum of twelve (12) inches looped or coiled inside the manhole or cleanout housing, and must be easily accessible from the top as shown in the SSSD Standard Drawings. Tracer wire shall be 14 AWG single strand copper encased in green sheathing. Splices shall be made using Direct Bury Splice Kits from 3M Electrical Products Division.
- e. Joining: All joints shall be connected with approved flexible gasketing to include rubber, synthetic rubber, and plastic materials specially manufactured for the joint and pipe size.
- f. Labeling: All pipe shall be clearly marked with type, class, and/or thickness, as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage.
- g. Fittings: All fittings including caps and plugs shall be of an approved material and gasketed with the same gasket material as the pipe unit.
- h. Connect to Existing: Where it is necessary to connect to an existing sewer during construction, only new pipe having the same inside diameter will be used in reconnecting the sewer. Where joints must be made between pipes with a mismatched wall thickness, the Contractor shall use flexible gasketed coupling, adapter, or coupling-adapter to make a watertight joint.
- i. Design Life: All sanitary sewer pipe systems shall be designed and installed with a design life of not less than fifty (50) years.



- j. Minimum Cover: Minimum covers for all sewer pipes in public right-of-ways or easements shall be thirty-six (36) inches, including laterals, unless otherwise noted on the plans and approved by SSSD.
- k. Load Calculations: When shallow installations and/or heavy traffic loads will ensue, load calculations will be required to be submitted. The Engineer is responsible to demonstrate that the system will be able to withstand the anticipated loads.
- l. Crossings: When crossing a water main, the sanitary sewer pipe must cross beneath the water main with a minimum of eighteen (18) inches between the top of the sewer pipe and the bottom of the water main and one full length of pipe, twenty (20) feet, must be centered at the crossing. All other utility crossings shall have a minimum of six (6) inches clearance between utility line and sewer pipe. Any deviations to this requirement must be approved by SSSD.

### 2.3.2. Gravity Sewer Pipes

- a. No Curved Pipes: No curved sewers will be accepted. All sewer mains shall have line and grade staked by a Professional Engineer or Land Surveyor, prior to construction. All mains are to be laid straight between manholes.
- b. Material: All PVC gravity sewer pipe shall be new, green in color and shall meet the minimum requirements of ASTM D3034 SDR 35 pipe. All Ductile Iron Pipe shall be Class 50, cement mortar lined and meet the requirements of AWWA C151 unless load conditions dictate Class 52.
- c. Defective Piping: No broken or defective sewer pipe or damaged materials will be allowed.
- d. Minimum Pipe Diameter: The minimum pipe diameter for gravity sewer mains shall be eight (8) inches unless otherwise approved by SSSD.
- e. Trenches: All gravity sewer pipes shall have a minimum of thirty-six (36) inches of cover, including laterals within the right-of-way. Trenches shall be excavated to the depth and grade specified. Pipe bedding shall be placed to provide a uniform and continuous bearing and support for the pipe on solid undisturbed or compacted ground.
- f. Flow Velocity: Gravity sewers shall be sized assuming pipes to be flowing full to ensure average daily velocities in the range of 2-5 feet per second, with optimum velocity design being 2.5 feet per second. At Peak Flows, the maximum design velocity shall not exceed seven (7) feet per second. Nor should the Average Daily Flow drop below two (2) feet per second.
- g. Slopes, & Lengths: Minimum gravity sewer slopes, and manhole spacing shall be as follows:

Sewer Size (inches)	Minimum Slope (%)	Manhole Spacing (feet)	Minimum Manhole Depth (Feet)
8	0.40	400	3 Feet above
10	0.28	400	top of sewer
12	0.22	400	line for all sewer
15	0.15	400	line size
18	0.12	400	
21	0.10	500	
24	0.08	500	

(Manhole spacing shall be measured from the center of each manhole and pipe lengths shall be called out as if they extend to the center of the manhole.)

- h. Extreme Slopes: Sewers approved by SSSD with slopes greater than 7% shall be designed and constructed in accordance with DEQ requirements.

### 2.3.3. Service Connections & Laterals

- a. Cleanouts: SSSD is responsible for the maintenance of sewer laterals from SSSD's sewer main to the property line. A cleanout and service box shall be installed to surface grade at the property line behind the curb or the sidewalk, as shown on SSSD Standard Drawings. The property owner is responsible for the section of the lateral that lies on the private property.
- b. Fittings: All fittings shall be factory-produced and shall be designed for installation on the pipe to be used.
- c. Sizing of Laterals: The portion of the lateral located within the public right-of-way shall have a minimum diameter of four (4) inches for all residential units. Commercial or Industrial service connections may require larger pipe sizes. Sizes must be approved by SSSD prior to any construction taking place.
- d. Number of Connections: There shall be no more than one service connection per lateral without SSSD approval.
- e. Existing Connection to Main: When connecting laterals to an existing main, the main line must be core drilled and a Romac saddle shall be installed. (See SSSD Standard Drawings for clarity.)

- f. Stormwater Runoff: Stormwater runoff, including roof drains, shall not be connected to or discharged into the sanitary sewer system.
- g. Systems Development Charge: The Systems Development Charge (SDC) must be paid prior to any connections to the sanitary sewer main.
- h. Plugs or Caps: All laterals shall be plugged with flexible jointed caps, or acceptable alternate, securely fastened to withstand internal test pressure. These plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.

#### 2.3.4. Force Mains in Public Right of Way

- a. Flow: All force mains shall be designed with a flow velocity in the range of 3 to 6 feet per second.
- b. Diameter: All force mains must be at least four (4) inches diameter.
- c. Trenches: All force mains shall have a minimum of thirty-six (36) inches of cover to finish grade. Trenches shall be excavated to the depth and grade specified. Pipe bedding shall be placed to provide a uniform and continuous bearing and support for the pipe on solid undisturbed or compacted ground.
- d. Pipe Material: Pipe sizes from four (4) inches to eight (8) inches shall be either PVC or HDPE. Larger pipe sizes shall be Ductile Iron Pipe. Concrete pipe will not be considered for use in force mains unless first approved by SSSD.
- e. Restrained Pipes: PVC or ductile iron pipe may be restrained with Meg-a-lug type joints if deemed necessary by SSSD. HDPE pipe with heat fusion joints, do not require additional restraining. A surge analysis must be performed to determine the maximum pressure that the pipe will need to withstand and shall address the placement and sizing of air and vacuum relief valves.
- f. Air Release Valves: Air release valves will be required at any section of pipe that is a high point that exceeds the nominal diameter of the pipe.

#### 2.4. MANHOLES

- a. SSSD Design Standard: All manholes shall be constructed according to SSSD Design Standards.
- b. Material: All manholes shall be constructed as shown in SSSD Standard Drawings. All cones and rings shall be pre-cast concrete. Base may be pre-cast or poured-in-place. All

pre-cast sections shall be Class 4000 concrete. All poured-in-place bases shall be Class 3000 concrete.

- c. Cone Sections: All cones must be pre-cast, Class 4000 concrete. Cones shall provide a diameter reduction from forty-eight (48) to twenty-four (24) inches and be eccentric in construction.
- d. Joints: All joints between pre-cast manhole elements shall be watertight gasketed.
- e. Mortar Lining: After the manhole is assembled in place, the Contractor shall mortar the manhole at all connected parts. All pipes and obstructions that protrude thru the walls or base of the manhole shall be grouted smooth with the wall of the manhole inside and out. All debris shall be removed from manholes. There shall be no standing water allowed in the invert of manholes. All grouting, inside and outside, shall be smooth and flush.
- f. Grade Rings: Concrete (masonry), and steel grade rings may be used for adjustment of the casting to final street grade. The total grade rings height shall be not less than two (2) inches and not more than twelve (12) inches.
- g. Frame & Cover: Frame & Cover shall be as shown in SSSD Standard Drawings and be twenty-four (24) inch by Titus Industrial Group, Inc. or approved equal. SSSD reserves the right to require locking manhole covers as they deem necessary.
- h. Spacing: Maximum spacing of manholes shall be 400 feet for 8, 10, 15, and 18 inch diameter pipe and 500 feet for 21 inch and larger. If the slope of the pipe is greater than seven (7) percent, spacing of manholes shall be no greater than 200 feet.
- i. Channeling: All manholes shall be channeled as shown in the SSSD Standard Drawings. Channels shall match existing sewer grades. Channels shall converge smoothly and be well rounded into well finished junctions. Channel sides shall be carried up vertically to the crown elevation of the various pipes. Concrete shelves between channels shall be smoothly finished and sloped 2% into the channel.
- j. Connections: PVC pipe connected to manholes shall be provided with a manhole adapter complete with sand-coated outer surface and gasketed inner surface. Connection openings to existing manholes shall be core drilled, no jack hammering or chipping allowed. Adapter must be mortared in place. Drilled holes must not exceed more than two (2) inches clearance around adapter perimeter.
- k. Drop Across Manhole: All manholes shall have a minimum drop of 0.10 feet across the manhole and a maximum drop of six (6) inches, from inlet invert to outlet invert.
- l. Drop Manholes: Drop manholes shall be required when the maximum design invert elevation is two (2) feet or greater above the outlet invert elevation. In cases where the invert elevation is less than two (2) feet but over six (6) inches, the inlet pipe shall be re-graded so the invert elevation is no more than six (6) inches above the outlet invert. Drop

manholes shall be constructed as indicated in the SSSD Standard Drawings. In place of the standard SSSD Drop Manhole, for pipes up to twelve (12) inches diameter, IntraFlow Drop Systems by Royal Environmental Systems, Inc. may be used or an equivalent inside drop system approved by SSSD.

- m. Bedding: All manholes shall be constructed with a base section placed to grade upon twelve (12) inches minimum crushed compacted rock. The approved base course shall be compacted to 95% of maximum density per AASHTO T-99.
- n. Where Required: A manhole shall be required at any change in pipe slope, alignment, or size and at all intersections where pipes come together at a junction and at the ends of all sewer mains, unless a cleanout is approved by SSSD.
- o. Accessibility: All manholes shall have graveled (or equal) all-weather access capable of conveying all SSSD equipment. Access surface shall extend fifteen (15) feet from center of manhole cover in all directions, or to right-of-way limits, which ever is less.
- p. Installation Not Allowed: Manholes shall not be placed in fill sections unless fill material is well compacted and meets the bedding requirements above, and approved by SSSD.
- q. Odor and Corrosion: The Developer may be required to use special non-corrosive materials for manholes and sewer connections if current odor and corrosion problems exist in the connecting trunk or interceptor connection. Any indication observed in the field by the Contractor or Developer of excessive odor or evidence of corrosion, must be reported to SSSD when submitting plans. If SSSD anticipates a potential odor problem at any connections, a ventilating pipe to discharge foul air through a bio-filter may be required.
- r. Orientation: All eccentric manholes shall have the vertical sections facing upstream.

## **2.5. LIFT STATIONS (When Permitted by SSSD)**

- a. Design: All lift station designs must be approved by SSSD.
- b. Odor and Corrosion Control: All proposed pumping and lift stations shall be equipped for chemical addition to control sulfides. Common chemicals used for this purpose are ferric chloride, bioxide, peroxide, and hypochlorite. Other effective approved chemicals may be used. Specific application of odor control and corrosion control shall be evaluated on a case-by-case basis.
- c. Location: No permanent structures shall be constructed within 100 feet of any lift station. Elevation must be set and the surrounding ground graded to avoid storm runoff from entering the system.
- d. Service Access: Adequate access must be furnished for vehicles that may be necessary to deliver, or to remove station equipment.

- e. Fencing & Landscaping: The site shall be fenced with a six (6) foot high chain link fence with a four (4) feet wide pedestrian gate and a sixteen (16) feet wide vehicle access gate, recessed a minimum of twenty (20) feet to allow for off-street parking.

### **3. TESTING & INSPECTION REQUIREMENTS**

SSSD or its designated representative shall have the right to enter onto all construction sites where facilities owned or to be owned by SSSD, are being repaired, replaced, or constructed, for the purpose of verifying construction compliance with approved design.

The Contractor shall be responsible for all required testing and shall coordinate such testing with the Engineer and SSSD. In order for the facility to be accepted, an impartial Professional Licensed Engineer in the State of Oregon, or designated representative, must observe and the Engineer must approve each test and, if deemed necessary by SSSD, a representative of SSSD must be present to observe the test. For any test that fails, the cause for failure shall be identified and necessary repairs made by an SSSD approved method and re-testing must take place. Contractor shall be responsible for costs associated with re-testing. Re-testing shall continue until the system being tested satisfactorily passes the test. After all required tests and inspections have been successfully completed, the Engineer shall indicate in a signed and sealed letter to SSSD indicating that all tests were performed and passed satisfactorily. Upon request by SSSD, the Engineer shall provide SSSD with the individual results of each test.

#### **3.1. REQUIRED INSPECTIONS**

- a. Material: All materials shall be inspected prior to construction to ensure conformity to required standards.
- b. Pipe Inverts: Inverts of pipes in manholes shall be checked prior to SSSD final approval.
- c. Trench Bedding: Pipe bedding shall be inspected and compaction tests shall be performed on trench bedding prior to trenches being backfilled.
- d. Trench Backfill: Backfill shall be inspected for suitability. No sharp objects or large rocks will be allowed in the backfill. Backfill shall be tested for compaction.
- e. Poured-in-Place Bases: A SSSD representative shall witness all poured-in-place manhole bases during the process. SSSD must be notified at least 48 hours prior to the bases being poured. If bases are poured without prior notification to SSSD, then SSSD reserves the right to perform inspections they deem necessary to approve the system. These additional inspections will be charged to the Developer.
- f. Manholes: Manholes shall be inspected for smoothness of mortar and concrete, slope of base, and to ensure covers are located according to SSSD Design Standards.

#### **3.2. PRESSURE TESTING**

All pressure testing shall be by the Time Pressure Drop Method in accordance with APWA 303.3.09D2, in the presence of SSSD, by the Developer/Contractor.

Prior to testing, the Engineer shall verify the average height of the groundwater above the crown of the sewer pipe. Also, the Engineer shall prepare a test sheet that indicates the internal surface area of each pipe being tested. The Engineer shall then calculate the acceptable time required for the pipe to pass the test. The pipe shall be considered acceptable if it does not lose air at a rate greater than 0.003 CFM per square foot of internal pipeline surface tested, or 2 CFM, whichever is greater.

Testing shall commence with the Contractor plugging one end of the line from within the manhole with an appropriate pressurized boot. In the manhole at the opposite end of the pipe, the Contractor shall plug the pipe in a manner to allow air to be pumped into the line. The Engineer must verify that the initial pressure is zero on the gage before the Contractor adds pressure. The Contractor shall then pump the line up to 4 psig plus 0.433 psig per foot of groundwater above the crown of the pipe. Once the pipe is fully pressurized, the Engineer shall start a timer and record the amount of time it takes for the pressure to drop. If the measured time exceeds the calculated time without losing the minimal required pressure, then the system shall be considered acceptable. Upon request, the Engineer shall submit the test results to SSSD.

It is the Contractor's responsibility to ensure that cleanouts and lamphole risers are sufficiently plugged. For pressure testing only, the required PVC screw-in plug may be substituted for a more pressure resistant seal.

### **3.3. HYDROSTATIC TESTING MANHOLES**

Hydrostatic testing may be used in place of vacuum testing.

Hydrostatic testing shall consist of plugging all inlets and outlets and filling the manhole with water. Each manhole shall be filled to the rim at the start of the test. Leakage in each manhole shall not exceed 0.2 gallons per hour per foot of head above the highest invert. Leakage shall be determined by refilling to the rim using a calibrated volumetric container. Manholes may be filled twenty-four (24) hours prior to the time of testing to permit normal absorption into the manhole walls. If manholes are constructed in high groundwater areas, SSSD will not accept inflow of ground water into the manholes.

### **3.4. VACUUM TESTING MANHOLES**

Vacuum testing may be used in place of hydrostatic testing. There is no need to perform hydrostatic and vacuum testing. Only one of these tests will be required.

Vacuum testing shall be done in accordance with ASTM C1244-93. All pipes entering the manhole shall be temporarily plugged, and plugs shall be braced. The test head shall be placed in or on top of the manhole ring. A vacuum of ten (10) inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off.

The time shall be measured for the vacuum to drop one inch, to nine (9) inches of mercury. The manhole shall pass the vacuum test if the time for the vacuum reading meets or exceeds the values indicated in the following table.

Depth (ft)	< 8	10	12	14	16	18	20	22	24	26
Time (sec)	20	25	30	35	40	45	50	55	59	64

Note: The table above is only for a typical SSSD standard 48” manhole.

### **3.5. DEFLECTION TESTING**

Deflection testing shall be performed on all flexible sanitary sewer lines in accordance with APWA 303.3.10 in addition to pressure testing and television inspection. The testing shall be conducted by pulling an approved mandrel through the constructed pipeline. The diameter of the mandrel shall be 95% of the pipe initial inside diameter.

Testing shall be conducted on a manhole-to-manhole basis and shall be performed after the line has been completely flushed with water. The tests shall be conducted not less than thirty (30) days after the trench backfill and compaction has been completed. Test may be conducted concurrently with television inspection.

### **3.6. LAMPHOLE TESTING**

Lamphole testing shall be performed by placing a high wattage light in a manhole at one end of the sewer line. In the manhole located at the opposite end of the sewer pipe a mirror is lowered into the manhole and positioned in front of the opening. If the circle of light is less than 95% of a “full moon”, the results shall be submitted to SSSD, and if deemed necessary by SSSD, appropriate action will take place. The Engineer must observe and record the results in a written report. The Engineer then must be prepared to submit the report to SSSD upon request.

### **3.7. TELEVISION INSPECTION OF SANITARY SEWERS**

Television inspection shall be performed by SSSD according to APWA 303.3.11. After completion of all sewer construction, testing, repairs, and DEQ requirements have been met, the Contractor shall contact SSSD to schedule a television inspection of all four (4) inch to seventy-two (72) inch installed sanitary pipes and facilities. All laterals and cleanouts will be inspected to the property line/right-of-way line. The first television inspection shall be conducted without charge to the Contractor. If any of the system fails, all additional inspections will be charged to the Contractor. Acceptance of the sewer shall be at the discretion of SSSD; however, SSSD will not accept any installed pipes that have standing water or debris in them.



### **3.8. SSSD FINAL INSPECTIONS**

Upon completion of the project construction, the Contractor shall schedule a walk-through inspection with SSSD. Any or all criteria stated in the SSSD Design Standards may be inspected. Noncompliant items, if any, will be brought to the Contractor's attention and given in writing. After all items found in noncompliance have been addressed, the Contractor shall schedule a second walk-through inspection with SSSD. Additional walk-through inspections shall be scheduled until all noncompliant items are brought into compliance with SSSD Design Standards. After SSSD has performed a final walk-through inspection and has found all construction work to be satisfactorily completed, a letter of acceptance will be written by the General Manager and be submitted to the developer/contractor. (See Section 3.7 for SSSD Television Inspection sewer lines.)

### **4. SSSD STANDARD DRAWINGS**

These SSSD Standard Drawings are part of the SSSD Design Standards. Any conflicts, if any, between the SSSD Design Standards and the SSSD Standard Drawings must be brought to the attention of SSSD. Any design standards the Engineer utilizes that are not addressed in the SSSD Design Standards shall be reviewed and approved by SSSD prior to commencement of construction. Be aware that upon plan review, SSSD reserves the right to invoke more rigorous standards depending upon the nature of the work performed or the presence of unusual field conditions. Furthermore, compliance to SSSD Design Standards does not exempt the Engineer, Developer, or Contractor from meeting obligations by any other governmental or regulatory agency.