

3.1 SEWER SYSTEMS

A.Manholes

Precast manhole base sections shall be placed on a well-compacted bedding course of bedding material. The depth of the bedding shall be four (4) inches thick or greater, extending a minimum of twelve (12) inches beyond the outside perimeter of the base section.

All lift holes (inside and outside) and the inside face of rubber gasket joints between precast sections shall be thoroughly wetted and then filled with grout, smoothed and all joints pointed.

Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of ladder rungs. Eccentric cone shall be positioned to allow vertical access to the ladder. The completed manhole shall be rigid, true to dimension and watertight.

Manholes eight (8) feet and less in depth shall have cones a maximum of two (2) feet in height.

Manholes twenty (20) feet or greater in depth shall conform to the Deep Manhole detail on the Standard Details.

Manholes set in paved streets or other paved areas shall be set flush with finished grade of the paving and when required, the manhole frame shall be tilted to conform to the grade on the paved surface.

Manholes set in gravel shoulders or other non-paved improved areas shall be set flush with the finished grade and in an asphalt apron six (6) feet in outside diameter. The asphalt apron shall be tapered per the Standard District Details.

Manholes not set in paved or improved areas shall be set at a finished grade six (6) inches to twelve (12) inches higher than the surrounding terrain to prevent surface water infiltration into the system, unless plans specify otherwise.

Manholes installed in wet areas shall have additional measures added to ensure no water infiltration. Consult with District for requirements.

Manhole channels shall be made to conform to the sewer grade and shall be brought together with well-rounded junctions. Channel sides shall be carried up vertically to the top of the largest pipe's diameter and rounded to the shelf at the largest pipe's crown elevation.

The openings through which pipes come into the manhole shall be completely and thoroughly grouted. A watertight joint (Kor-n-Seal boot or approved equal) shall be provided where the pipe passes through the manhole wall.

B. 6-Inch Side Sewer from Main to Property Line

The strength class of side sewer pipe shall be the same as the sewer pipe to which it connects and these specifications shall be applicable to side sewer work.

The slope of side sewers shall not exceed one (1) foot vertical to one (1) foot horizontal when using SDR 35 D3034 PVC, nor be less than 2 percent. If ductile iron or C900 piping is used along with the corresponding change in mainline material, then slope is allowed a maximum of two (2) foot vertical to one (1) foot horizontal nor be less than two percent.

The end of all side sewers at the property lines shall be marked with a vertical twelve (12) foot long, 2"x4" board, the bottom of which shall be located at the invert of the elevations of the side sewer and top of which shall be painted white and extend above the ground.

C.Connection to the Existing Sewer System

Extensions to the District's sewer system shall be isolated from the existing system with a plug installed at the existing manhole in the presence of District personnel and maintained by the Developer until the sewer extension is accepted by the District. Developer and/or Contractor shall be fined for tampering with the District's sewer system if the plug is removed or a connection is made without the District being present.

1. Connections to existing manholes shall be made as follows:

- a) If the manhole is "live", the manhole channel shall be tightly covered to prevent debris from entering the sewer line prior to breaking into the manhole wall. Immediately after the connection is made, the new pipe shall be plugged and blocked in such a manner that no water shall enter into the existing manhole. The plug shall not be removed without permission of the District. Additional upstream plugs may be required by District.
b) If the existing manhole is not "live", a plug shall be installed in the downstream or discharge pipe of the existing manhole in addition to the above. Where new connections to existing manholes require an outside drop, two plugs for each drop shall be installed and blocked.
c) The existing manhole shall be rechanneled

2. Connections to existing sewer main shall be made as follows:

- a) The existing line shall be cut and removed from the manhole excavation. A new manhole shall be installed in place of the removed existing line. The manhole shall be precast, minimum 48-inch diameter. The manhole shall be placed with a full stick of pipe centered through the manhole and coupled to both ends of the existing sewer line. The new sewer line inside the manhole shall be cut out and the manhole channeled. Sewage must be bypassed during channelling.

3. Connections of side sewers to an existing sewer line shall be made as follows:

- a) The connection to an existing sewer main shall be made with a cut in tee with slip couplings. If the connection is made to the existing sewer pipe while in operation, the existing sewer pipe shall be cut with a saw or approved equal to give a smooth beveled edge of the proper size and the lip shall be filed smooth. Each connection shall be bedded with a minimum of six (6) inches of bedding material. Unsuitable foundation material shall be over-excavated and replaced with bedding material.
b) Alternatively, the connection shall be made with Romac "SST" Stainless Steel Tapping Sleeve (with stainless steel flange), with Protecto 401 FLX/MJ adapter and gasket sized for appropriate side sewer pipe material; or an Insert-a-Te. Romac side sewer saddle, Model CB, is NOT allowed.

D. Side Sewers (Gravity or Pressure)

Gravity or pressure (grinder pump) side sewers shall be installed and tested in accordance with the Sammamish Plateau Water and Sewer District "Side Sewer Regulations", latest edition.

E. Use of Ductile Iron Pipe for Sewers

The contractor shall furnish repair kits and shall repair the PROTECTO 401 ceramic epoxy lining damaged during installation, welding and/or field cutting operations.

F. Lift Stations

Lift stations shall be installed per District-approved plans and specifications. Lift stations shall be tested with representatives of the District, Developer, Contractor and all sub-contractors involved with the lift station present. Developer/Contractor shall furnish the District with three (3) copies of the Operation and Maintenance Manuals for the Lift Station in labeled binders.

3.2 TESTING FOR WATER AND SEWER PIPELINES

A. Hydrostatic Tests For Ductile Iron Water and Sewer Mains

Ductile iron water and sewer main installations shall be subjected to a hydrostatic pressure test of 250 PSI for a minimum of 15 minutes, before leakage measurement starts. Location of the test pump shall be approved by the District. It shall then be held at this pressure, without pumping, and any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. Leakage shall be measured by approved means in the presence of the District. The Contractor shall provide all necessary equipment to allow the District's inspectors to use their gauges and equipment and shall perform all work connected with the tests. Tests shall be made after corporation stops and service lines are installed, and the trench is backfilled and compacted. All valves within the section being tested shall be open, if possible. No more than 1,500 feet of 8-inch main can be tested at one time. Butterfly valves shall be tested at 150 psi above the static water pressure, with a maximum pressure of 250 psi unless otherwise noted.

Allowable leakage in gallons per fifteen minutes per 1,000 feet of pipe:

Table with 4 columns: Pipe Size, 2" - 0.06 gallons, 8" - 0.24 gallons, 14" - 0.42 gallons, 20" - 0.59 gallons; 4" - 0.12 gallons, 10" - 0.30 gallons, 16" - 0.48 gallons, 24" - 0.71 gallons; 6" - 0.18 gallons, 12" - 0.36 gallons, 18" - 0.54 gallons

B. Hydrostatic Tests For HDPE Water and Sewer Mains

HDPE water and sewer main installations shall be subjected to a hydrostatic pressure test of 1.5 times the rated operating pressure of the pipe. Location of the test pump shall be approved by the District. To establish equilibrium, the pipe shall be raised to the test pressure and allowed to stand without makeup pressure for 2 to 3 hours to allow for expansion of the pipe, unless otherwise approved or directed by the District. After equilibrium is established, the test section shall be pressurized to 1.5 times the rated operating pressure of the pipe. The pump shall be turned off and the final test pressure shall be held for 1, 2, or 3 hours as determined by the District at the time of testing.

Table with 4 columns: Nominal Pipe Size (inches), 1 - Hour Test, 2 - Hour Test, 3 - Hour Test. Rows include pipe sizes from 3 to 48 inches.

Under no circumstances shall the total time under the test exceed eight (8) hours at 1.5 times the pressure rating. If the test is not completed due to leakage, equipment failure, etc., the test section shall be allowed to "relax" for eight (8) hours prior to the next test.

Any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. The Contractor shall provide all necessary equipment to allow the District's inspectors to use their gauges and equipment and shall perform all work connected with the tests. Tests shall be made after corporation stops and service lines are installed. All valves within the section being tested shall be open, if possible.

C. Sterilization and Flushing Of Water Mains

Flushing of the water mains is to clean and sterilize the mains. Cleaning includes the flushing at a velocity and volume that will remove rocks and debris from the main.

Sterilization of water mains shall be accomplished by the Contractor in accordance with the requirements of the State Department of Health (DOH) and in a manner satisfactory to the District. During pipe installation the Contractor shall install chlorine granules per manufacturer's specifications to achieve a chlorine concentration of not less than 50 PPM. When a chlorine concentration of not less than 50 PPM has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken for approval by the local health agency.

If the main fails to pass purity tests the following procedure shall be followed. The section to be sterilized shall be thoroughly flushed at maximum flow prior to chlorination. Flushing shall be done in the presence of the District. Sections will ordinarily be sterilized between adjacent gate valves unless, in the opinion of the District, a longer section may be satisfactorily handled. Chlorine shall be applied by solution feed at one end of the section with a valve or hydrant at the opposite end opened sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 60 ppm chlorine. Hydrants along the chlorinated section shall be opened during application until the presence of chlorine has definitely been detected.

The Contractor shall be responsible for disposal of treated water flushed from mains and shall neutralize the wastewater for protection of aquatic life in the receiving water before disposal into any natural drainage channel.

D. Cleaning And Jetting Of Sewer Mains

Prior to sewer pipe testing, all pipes and manholes shall be completely cleaned by jetting and vactoring. All debris from the jetting shall be removed at the first manhole where presence of the debris is noted. In event that cemented or wedged debris or damaged pipe cannot be dislodged by jetting, the obstruction shall be removed and/or repaired. No debris or jetting water shall be permitted to enter the existing sewer system.

E. Testing Of Non-Pressure Sewer Pipe

Testing, which includes CCTV Inspection, of all non-pressure sewer pipe shall be conducted on a manhole to manhole basis. Testing for District's approval shall only be allowed after all other nearby utilities have been installed and their trenches backfilled and compacted, all manholes have been channeled, and all manholes and sewer mains have been cleaned as discussed above in Subsection D.

All wyes, tees and ends of side sewer stubs shall be plugged with gasketed caps or plugs, or an alternate acceptable to the District and securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable.

If any section of the sewer system is found to have deficiencies or fails to pass a test, the Contractor shall locate and repair any and all deficiencies or substandard work. After all repairs are made, the Contractor shall retest the full run of sewer main, manhole-to-manhole, at the District's sole discretion. All work, testing and retesting, under this section shall be completed at the Developer's or Contractor's expense.

Final Approval of the sewer system is conditional on successful completion of all tests and Inspections.

- 1. Pressure Testing: All runs of non-pressure sewer pipe shall be air tested at 4 psi. The procedures set forth in this section shall be employed in conducting the testing. All facilities and personnel for conducting the testing under the observation of the District shall be furnished by the Developer and/or Contractor. All equipment and personnel to conduct the test shall be subject to the approval of the District. Although air testing may be performed for the convenience of the contractor prior to backfilling, no pipe shall be accepted until air tests have been performed after backfilling and compacting. The installed pipe shall be tested with low pressure air as set forth in WSDOT/APWA 7-17.3(2)F. All test gauges shall be brought to the surface and allow District personnel to verify the testing without entering the manhole structure.
2. Deflection Testing: All sanitary sewers constructed of flexible pipe shall be deflection-tested not less than 30 days after the trench backfill and compaction has been completed. The test shall be conducted by pulling a solid-pointed mandrel with a diameter equal to 95% of the pipe diameter through the completed pipeline.
3. Infiltration Testing: The District may require an infiltration test if it appears that there is excessive infiltration after air tests are completed. The District shall also be the sole judge of whether or not this test is required. The maximum allowable limit for infiltration shall be as per WSDOT/APWA 7-17.3(2)C. Failure to pass the infiltration test shall be cause for rejection.

4. Television/CCTV Inspection: The District shall require all runs of sewer pipe to be inspected by the use of a television camera not less than 30 days after the trench backfill and compaction has been completed. The costs of making all inspections and re-inspections, shall be borne by the Developer or Contractor.

a. CCTV Equipment:

- 1) Television inspection equipment shall have an accurate footage counter that will display on the monitor and record the camera distance from the centerline of the starting manhole.
2) The camera shall be of the remotely operated pan and tilt type. The rotating camera and light head configuration shall have the capability of panning 360° with pan and tilt capability of providing a full view of the pipe to ensure complete inspection of the mainline pipe and service laterals.
3) The camera, television monitor, and other components shall be color. To ensure peak picture quality throughout all conditions encountered, the color camera shall be equipped with the necessary circuitry to allow for the remote adjustment of the optical focus iris from the power control unit at the viewing station. A variable intensity control of the camera lights shall also be located at the viewing station.
4) Lighting and camera quality shall be suitable to allow a clear, in-focus picture for the entire inside periphery of pipelines extending at least ten (10) feet in front of the camera. In High Density Polyethylene (HDPE) or ductile iron poly-lined pipe, lighting should be sufficient enough to provide a clear view at least two (2) feet in front of the camera. The replay of the recorded video information shall be free of electrical interference and shall provide a clear stable image.
5) Camera quality shall be suitable to provide a full 360° view of the pipe during the inspection.
6) The travel speed of the camera shall be variable but uniform and shall not exceed 30 feet per minute. Any means of propelling the camera through the sewer line which would produce non-uniform or jerky movement of the camera, will not be acceptable.
7) The television system shall be capable of performing line segment inspection in increments of 400 feet with one setup.
8) The District's 1-1/2" target, or the contractor's District-approved target, shall be used

b. CCTV Procedure:

- 1) Just prior to performing the video inspection procedure, dyed water must be introduced into the nearest upstream manhole until observed at the nearest downstream manhole. This will insure that any pipe segments with bellies are easily identified during CCTV inspection. Introduction of the dyed water shall be recorded.
2) All fog shall be evacuated from the pipeline and the pipeline kept clear of any fog during the CCTV inspection process.
3) Perform the inspection on all mainline sections from manhole to manhole.
4) Should access to a particular sewer segment be difficult, and where adjacent segments require television inspection, the CCTV Contractor may be allowed to complete the inspection of multiple sewer line segments with one setup. When multiple sewer line segments are inspected utilizing one setup, the CCTV Contractor shall zero the footage counter at each subsequent sewer manhole to establish a uniform starting point for each line segment televised.
5) The interior of the pipe shall be carefully inspected to determine the location and extent of all deficiencies. Pipe conditions that result in a question of proper installation procedures shall be noted so that these conditions can be reviewed and, if necessary, corrected before actual acceptance of the sewer system.
6) At all service connections, the camera shall be stopped and the pan and tilt features shall be used to obtain a clear picture. At each service lateral, the camera shall be panned to view up each lateral or point of connection. Make note of any deficiencies through the use of Data Collection Software.
7) Prior to the beginning of each CCTV inspection, manhole identification numbers, as indicated on the record drawings, will be displayed in the title and shall become a part of the video record.
8) As directed by District, the Developer's Engineer or their representative, the camera shall be stopped to view and analyze conditions that appear unusual or uncommon. The CCTV inspection technician shall, at all times, be able to move the camera through the lines in either direction without the loss of quality in the video presentation

c. The television-inspection format shall be provided on DVD in a MPEG file type that is able to be viewed using Windows Media Player, with separate MPEG files individually designated between each sewer run between manholes and listed on an index or menu. The file names shall reflect the manhole numbers on the plan for each sewer run between manholes. The associated television-inspection reports and the original DVDs shall be provided to the District immediately upon completion of the television-inspection. If contractor wants a copy, the contractor shall obtain one at same time as the original is completed. Provide the District with two copies of the written report for each sewer run between manholes.

F. Hydrostatic Tests For Pressure Sewer Pipe

After the trench is backfilled and compacted, all pressure sewer pipe shall be subjected to a hydrostatic pressure test in accordance with the test for the applicable pipe material, as specified previously in this section. All facilities and personnel for conducting the testing under the observation of the District shall be furnished by the Developer/Contractor and shall be subject to the approval of the District.

G. Testing For Low Pressure Mainline Sewers And Grinder Pump Systems

Testing shall conform to the requirements in the District's "Side Sewer Regulations", latest edition.

3.3 ABANDONMENT OF WATER AND SEWER FACILITIES

A. Abandonment of Water Mains

Water mains and valves to be abandoned shall be abandoned in accordance with the procedures listed below, so as to minimize the risk of leaking from abandoned valves and to minimize obstructions within the right-of-way. If an active water main that has an abandoned valve attached to it will be abandoned in the foreseeable future, as determined solely by the District, the abandoned valve can remain and its valve can and valve box shall be raised to finished grade, in accordance with A.1 below. However, if the valve is a double disc valve or if it is leaking, it must be removed in accordance with A.2 below. If an active water main that has an abandoned valve attached to it will NOT be abandoned in the foreseeable future, as determined solely by the District, the abandoned valve must be removed and the tee plugged or blind-flanged, in accordance with A.2 below.

1. For Abandoned Water Valve to Remain:

- a. Turn valve to the closed position.
b. Remove valve box and valve can.
c. Inspect valve for longevity of leaking from packing, etc.
d. If valve is not leaking, cut out section of main from old valve.
e. Install MJ plug or blind flange on valve.
f. Plug old pipe with concrete. If pressure build-up from ground water entering the abandoned pipe is likely to occur (especially on hillsides), install a blocked MJ cap.
g. Re-install the valve box and valve can, and install 6" grout in valve can to indicate a plugged valve.
h. Backfill and compact.

2. For Abandoned Water Valve to Be Removed:

- a. Schedule a water main shutdown.
b. Turn valve to the closed position.
c. Remove valve box and valve can.
d. Cut out section of main from old valve.
e. Remove valve, and install blind flange or MJ plug on tee.
f. Plug old pipe with concrete. If pressure build-up from ground water entering the abandoned pipe is likely to occur (especially on hillsides), install a blocked MJ cap.
g. Backfill and compact.

B. Abandonment of Fire Hydrants

Fire hydrants to be abandoned shall be abandoned in accordance with the procedures listed below, so as to minimize the risk of leaking from abandoned valves and to minimize obstructions within the right-of-way. If an active water main that has an abandoned hydrant foot valve attached to it will be abandoned in the foreseeable future, as determined solely by the District, the abandoned foot valve can remain and its valve can and valve box shall be raised to finished grade, in accordance with B.1 below. However, if the valve is a double disc valve or if it is leaking, it must be removed in accordance with B.2 below. If an active water main that has an abandoned foot valve attached to it will NOT be abandoned in the foreseeable future, as determined solely by the District, the abandoned foot valve must be removed and the tee plugged or blind-flanged, in accordance with B.2 below.

1. For Abandoned Foot Valve to Remain:

- a. Turn 6-inch valve to the closed position.
b. Remove valve box, valve can, and fire hydrant.
c. If valve is not leaking, remove entire 6-inch pipe to hydrant, or cut out at least a 1-foot section of main from old valve.
d. Install MJ plug or blind flange on valve.
e. If hydrant run is not removed, plug both ends of hydrant run pipe with concrete.
f. Re-install the valve box and valve can, and install 6" grout in valve can to indicate a plugged valve.
g. Backfill and compact.
h. If the existing hydrant is to be relocated due to some conflict, a new hydrant will be installed. The existing hydrant shall be delivered to the District's offices.

2. For Abandoned Foot Valve to Be Removed:

- a. Schedule a water main shutdown.
b. Turn valve to the closed position.
c. Remove valve box, valve can, and fire hydrant.
d. Remove entire 6-inch pipe to hydrant, or cut out at least a 1-foot section of main from old valve.
e. Remove valve, and install blind flange or MJ plug on tee.
f. If hydrant run is not removed, plug both ends of hydrant run pipe with concrete.
g. Backfill and compact.
h. If the existing hydrant is to be relocated due to some conflict, a new hydrant will be installed. The existing hydrant shall be delivered to the District's offices.

C. Abandonment of Water Services

Water services must be abandoned at the water main in accordance with the following procedure:

- 1. Excavate to corporation stop and saddle.
2. If saddle is a single strap or is not stainless steel or the stainless steel strap/saddle/corporation stop is in poor condition, schedule a water main shutdown, then replace the saddle with a stainless steel repair band.
3. If the saddle is a stainless steel double strap in good condition, it can remain in place. Shut off the corporation stop and plug the abandoned service line. Polybag all exposed components of the abandoned saddle.
4. Install a brass plug on the corporation stop.
5. On the setter side, cut the service line away from the setter, plug the line, remove the setter and dispose of property (return to District and place in recycle bin).
6. Arrange with the District's Customer Service Department for disposition of the water meter and documentation of the last meter reading.
7. Backfill and compact.

D. Abandonment of Manholes or Vaults

Manholes, vaults, and similar underground structures must be abandoned in accordance with the following procedure:

- 1. Remove frame and cover or vault lid and hatch(es).
2. Remove manhole cone and sections or vault sections as necessary so that remaining structure is at least 4 feet below finished grade.
3. Plug all pipe penetrations with grout.
4. Fill remaining structure with pea gravel to within 3.5 feet of the top of the remaining structure.
5. Fill the next 3.5 feet (to the top of the remaining structure) with CDF.
6. Backfill and compact the top 4 feet with suitable native material or import backfill to finished grade.

E. Abandonment of Pressure Sewers (Force Mains, Low Pressure Force Mains, and Grinder Pump Lines)

All pressure sewer lines, including force mains, low pressure force mains, and grinder pump lines, must be abandoned in accordance with the following procedure:

- 1. Force mains, low pressure force mains, and grinder pump lines that are to be abandoned should be flushed in a sanitary way to eliminate a septic condition, if possible.
2. Mains shall be physically disconnected from District's system and plug all force mains larger than 2 inches in diameter with grout. Plug or cap all pipe ends 2 inches or smaller.
3. If pressure build-up from groundwater entering the abandoned force main or low pressure force main is likely to occur (especially on hillsides), install a blocked cap or plug on pipe 4 inches or larger, and install a watertight connection (e.g., pack joint) for pipe smaller than 4 inches.
4. Possible pressure grouting of abandoned main may be required on a case-by-case basis.

F. Abandonment of Gravity Side Sewers

All gravity side sewer lines must be abandoned in accordance with the following procedure:

- 1. Side sewer shall be physically disconnected from District's system.
2. A plug shall be installed in the side sewer tee at the sewer main.
3. A cap shall be installed on both ends of the side sewer.

Table with 2 columns: BY, DATE. Multiple empty rows for revision tracking.

Vertical title block for Sammamish Plateau Water. Includes logo, address (1510 228th Avenue SE, Sammamish, WA 98075), phone number (425.392.6256), and website (spwater.org).

Vertical title block for STANDARD MATERIAL AND CONSTRUCTION NOTES.

Table with 2 columns: DATE, DRAWN, CHECKED, JOB NO. Values: 10/24/2017, JTF, KAW, [blank].

SHEET 3 OF 3