

SECTION II
WATER SYSTEMS

WATER SYSTEMS

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II. WATER SYSTEMS - GENERAL STANDARDS:

1. **OBJECTIVE:**

Section II is intended to present information and provide an outline of the minimum general standards required by Silver Lake Water & Sewer District for Developer constructed water main extensions and improvements which are to be acquired and operated by the District.

2. **GENERAL:**

Detailed plans shall be submitted for the District's review which provide the locations, size, and type of the proposed water system and points of connection. These plans shall be separate from Sewer Plans and shall conform to the District Drafting Standards.

Project plans shall have a horizontal scale of 1-inch = 50 feet, unless approved by the District. Plans shall show:

- Locations of streets, right-of-ways, existing utilities, and water system facilities.
- Ground surface, dimensions, pipe type and size, water valves, fittings, hydrants and appurtenances.
- All known existing structures, both above and below ground that might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.
- All utility easements.
- District Approval Block.

Computations and other data used for design of the water system shall be submitted to the District for approval.

The water system facilities shall be constructed in conformance with the current WSDOT Standard Specifications for Road, Bridge, & Municipal Construction and amendments thereto, revised as to form to make reference to Local Governments and as modified by the District's requirements and standards.

Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WEF, and APWA standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

Except as otherwise noted herein, all work shall be accomplished as recommended in applicable American Water Works Association (AWWA) Standards, and according to the recommendations of the manufacturer of the material or equipment concerned.

All piping and plumbing installed to provide water for human consumption that is connected to the District's water system shall be lead free.

The location of the water mains, valves, hydrants, and principal fittings including modifications shall be staked by the Developer. No deviation shall be made from the required line or grade. The Developer shall verify and protect all underground and surface utilities encountered during the progress of this work.

All pipelines shall be tested and disinfected to District and AWWA Standards prior to acceptance.

Before acceptance of the water system by the District, all pipes, assemblies, and other appurtenances shall be cleaned of all debris and foreign material. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades, and cross sections for a new roadway consistent with the original section.

3. GENERAL REQUIREMENTS:

1. Work shall be performed only by contractors experienced in installing public water mains.
2. Prior to any work being performed, the Developer shall contact the District's Engineer to set forth his proposed work schedule.
3. All materials shall be new and undamaged.
4. Developer shall obtain approval of materials to be used from the District prior to ordering of materials.
5. Water mains shall be delivered to the site with wrapping to cover the ends of the pipe or with pipe plugs. Either method used shall remain in unbroken condition until the pipe is installed.
6. Water mains shall be laid only in dedicated rights-of-way or in easements that have been granted to the District. Water mains may be laid within a plat or property identified in the developer extension agreement, subject to dedication of appropriate rights-of-way and recording of appropriate easements at the time the plat and/or warranty bill of sale is filed with the County Auditor.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

7. Dead end lines are not permitted except where the District is satisfied that it would be impractical to extend the line at a future date. Water mains shall extend to the plat line of developable neighboring property for a convenient future connection, and a 2-inch blow off assembly shall be provided on mains 8-inches and smaller. A fire hydrant shall be installed on larger size mains to accommodate flushing velocities.
8. If a service line to a lot is over 200 feet (not including panhandle), the Developer shall install a 6-inch water main to within 200 feet of the structure being served with a 2-inch blowoff at the end in an easement granted to the District. If multiple lot services are required, the 200-foot distance will include the panhandle distance.
9. All 8-inch and smaller water mains shall have minimum 3'-6" cover from finished grade except 4'-0" cover in easements. All 12-inch and larger water mains shall have a minimum of 4'-0" cover from finished grade. The maximum shall be 7'-0" cover unless approved by the District. Mains shall generally be located parallel to and ten feet northerly or easterly of street centerline.
10. Valves shall be installed at intervals not to exceed 1,000 feet. Valves shall be installed on each leg of all tees and crosses, except fire hydrant tees unless required by the District, and at each end of easements.
11. Valve markers shall be installed and marked with the distance to valve being referenced for all valves in unpaved areas.
12. Fire hydrants are required approximately every 600 feet in residential areas and/or located no more than 350 feet from the back of any proposed lot. Fire hydrants are required every 300 feet in commercial areas, or as required by the Fire Marshal. Distances required herein shall be measured linearly along street or road.
13. Only one fire hydrant shall be installed on any dead-end 8-inch run.
14. Pipes connecting hydrants to mains shall be at least 6 inches in diameter, restrained and not longer than 50 feet.
15. Provide bends in field to suit construction and in accordance with pipe manufacturer's recommendations so as not to exceed allowable deflection at pipe joints.
16. Provide thrust blocking or restrained joints at all fittings and bends in accordance with the District standards and conditions. Restrained joint systems required in areas of fill or if installed in previously disturbed soil and where indicated on District Standard Details.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

17. Provide anchor blocking at all up-thrust vertical bends in accordance with District standards.
18. Water services shall be Type "K" continuous copper tubing from water main to meter (no joints) for 1-inch and 2-inch services. Larger service lines shall be the type and style shown in the Standard Details.
19. Minimum size service lines between the water main and the water meter shall be 1-inch for single family use and 2-inch for commercial and multi-family use. All meters and private service lines shall be the minimum size by the County Plumbing Code in accordance with fixture units, unless otherwise specified.
20. Meter services and meter boxes shall be set to final grade and all adjustments shall be made prior to final pressure testing of the system, except as approved by the District. Developer shall furnish two (2) neoprene gaskets and one (1) dual check valve for each service installed. Service inlet shall be centered at inlet end of box and faced toward outlet end of box parallel with long sides.
21. All water services shall end within road right-of-way or easements.
22. All 3/4" x 5/8" and 1-inch meters will be installed by the District, and the property owner shall pay the current meter installation charge. Meters greater than 1 inch and up to 2 inches in size shall be installed by the District and paid by the property owner on a time and material basis. The Developer shall furnish all meters larger than 2 inches in size installed by the Developer and locked off by the District until approved for service.
23. All services other than single family residential shall be provided with Washington State-approved backflow prevention located immediately behind and on the property side of the water service box. Irrigation, residential single-family fire meters, duplex, and multi-family residential connections shall require double check valve assemblies (DCVA). All other connections shall require reduced pressure backflow assemblies (RPBA). Commercial fire sprinkler system, if unmetered shall require reduced pressure detector assemblies (RPDA).
24. All irrigation using chemical feed, or water features, including decorative ponds, pools and fountains requiring make-up water shall be protected from backflow into the public water supply by a **minimum** of an approved air-gap to be located at the fill point of the pond or water feature. This "air-gap" shall be inspected by the District prior to filling. In all instances, the water supply used for filling purposes shall be protected by a double check valve assembly (DCVA) installed behind the meter for new construction or retrofitted as close as practical on modified systems.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

25. All service connections shall comply with the current "Accepted procedure and practice in Cross Connection Control Manual" as published by the Pacific Northwest Section of the American Water Works Committee and the District "Cross Connection Control Manual." A copy of such is available for review at the District office.
26. Developer shall notify the District and obtain approval prior to any water shut-off or turn-on, affecting the water system, a minimum of 48 hours in advance.
27. Cut in connections and wet taps shall not be made on Fridays, the day before a holiday, holidays, or weekends (unless approved by the District). Monday connections may be allowed at District sole discretion.
28. Developer shall use only District approved hot tap vendors to perform work in the District.
29. All tapping sleeves and tapping valves shall be pressure tested prior to making connection to existing mains.
30. Road restoration shall be per Snohomish County, City and/or State design and construction standards. Developer shall become familiar with all County, City, and State conditions of required permits, and shall adhere to all conditions and requirements.

4. **MATERIALS:**

WATER MAINS & FITTINGS:

Water mains to be installed shall be ductile iron pipe for all sizes, unless specifically noted otherwise. All ductile iron water pipe shall be delivered to the site with wrapping to cover the ends of the pipe or with pipe plugs. Either method used shall remain in unbroken condition until the pipe is installed.

The ductile iron pipe shall conform to AWWA C151 and shall be Class 52. Grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16" meeting NSF standards for potable water and the exterior shall be coated with an asphaltic coating.

Each length shall be plainly marked with the manufacturer's identification, year cast, thickness, class of pipe and weight. The pipe shall be furnished with mechanical joint or push-on type joint, except where plans call for flanged ends. Joints shall conform to AWWA C111.

Restrained joint pipe shall be push-on joint pipe with FIELD LOK® or TR FLEX® gaskets as furnished by U.S. Pipe, or approved equal.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

All pipe shall be joined by the manufacturer's standard coupling, be all of one manufacturer, and be carefully installed in complete compliance with the manufacturer's recommendations.

Joints shall be "made up" in accordance with the manufacturer's recommendations. Standard joint materials, including rubber ring gaskets, shall be furnished with the pipe. Material shall be suitable for the specified pipe size and pressures.

All fittings shall be short-bodied, ductile iron complying with AWWA C110 or C153 for 350 psi pressure rated mechanical joint fittings and 250 psi pressure rated flanged fittings. All fittings shall be cement mortar lined per the ductile iron pipe specifications and either mechanical joint or flanged.

Fittings in areas requiring restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG, Star Pipe Products, or approved equal.

All couplings shall be ductile iron mechanical joint sleeves.

The pipe and fittings shall be inspected for defects before installation. All lumps, blisters and excess coal tar coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry, and free from oil and grease before the pipe is laid.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with select backfill tamped under it. Precaution shall be taken to prevent dirt from entering the joint space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug. If water is in the trench when work resumes, the seal shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or when trench conditions are unsuitable.

The cutting of pipe for inserting fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe or cement lining, and so as to leave a smooth end at right angles to the axis of the pipe. When a pipe length is cut, the outer edge of the cut shall be beveled to prevent damage to the gasket during jointing of the pipes.

Pipe shall be laid with bell ends facing in the direction of the laying, unless approved otherwise by the District. Wherever it is necessary to deflect pipe from

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

a straight line, the amount of deflection allowed shall not exceed pipe manufacturer's recommendations.

For connection of mechanical joints, the socket, plain end of each pipe and gasket shall be cleaned of dirt before jointing, and shall be jointed according to manufacturer's directions. Bolts shall be tightened alternately at top, bottom, and sides, so pressure on gasket is even.

For connection of push-on type joints, the jointing shall be done according to manufacturer's recommendations, with special care used in cleaning gasket seat to prevent any dirt or sand from getting between the gasket and pipe. Lubricant to be used on the gasket shall be non-toxic and free from contamination.

Valves, fittings, plugs, and caps shall be set and jointed to pipe in the manner as required. All dead ends on new mains shall be closed with dead end M.J. caps.

Fittings shall be "blocked" with poured-in-place concrete, with a firm minimum bearing against an undisturbed earth wall. Timber blocking will not be permitted. Thrust blocks shall be poured as soon as possible after setting the fittings in place to allow the concrete to "set" before applying the pressure test. The concrete thrust blocks shall be in place before beginning the pressure test. Anchor blocks shall be allowed to set sufficiently to develop the necessary bond strength between the reinforcing rods and the concrete anchor before beginning the pressure test. A visqueen barrier shall be provided to protect glands, bolts and other miscellaneous materials required for this type of connection from the connector.

Fittings and adjacent pipe lengths that cannot be blocked against an undisturbed earth wall shall be restrained. Concrete blocking is required and shall be installed as if blocked against undisturbed earth.

All of the new piping, valves and blocking shall have been installed, disinfected, and tested up to the point of cutting into existing lines before the crossover is made. The crossover to the existing system shall be in full readiness, including the cut and sized specials. Forty-eight (48) hour notice shall be given the District in advance of the planned "cut-ins." All sleeves shall be ductile iron.

All backfill in roadway sections shall be placed and compacted in accordance with Snohomish County, City and/or State requirements and copies of the compaction results shall be provided to the District. All backfill in easements shall be placed and compacted to a minimum of 90 percent of modified Proctor dry maximum density per ASTM D1557. Copies of compaction results for all water system trenches shall be provided to the District.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

VALVES:

All valves 14 inches and larger shall be butterfly valves. All valves 12 inches and smaller shall be resilient seat gate valves.

Resilient-Seated Gate Valves

The gate valves shall be ductile iron body valves, iron disk completely encapsulated with polyurethane rubber and bronze, non-rising stem with "O" ring seals conforming to AWWA C509 or C515. The valves shall open counter-clockwise and be furnished with 2-inch square operating nuts except valves in vaults shall be furnished with handwheels. All surfaces, interior and exterior shall be fusion bonded epoxy coated, acceptable for potable water.

For applications with working pressure above 175 psi, a valve rated as 250 psi or higher shall be used.

Valves shall be Clow, M&H, Kennedy, U.S. Pipe, Mueller, American Flow Control, or approved equal.

Butterfly Valves

Butterfly valves shall be ductile iron body of the tight closing rubber seat type with rubber seat either bonded to the body or mechanically retained in the body with no fasteners or retaining hardware in the flowstream. The valves shall meet the full requirements of AWWA C504, Class 150B except the valves shall be able to withstand 150 psi differential pressure without leakage. The valves may have rubber seats mechanically affixed to the valve vane. Where threaded fasteners are used, the fasteners shall be retained with a locking wire or equivalent provision to prevent loosening. Rubber seats attached to the valve vane shall be equipped with stainless steel seat ring integral with the body, and the body internal surfaces shall be epoxy coated to prevent tuberculations buildup, which might damage the disc-mounted rubber seat. Use of butterfly valves are a special case and shall only be allowed with District approval.

No metal-to-metal sealing surfaces shall be permitted. The valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving valve operations after long periods of inactivity. Valve discs shall rotate 90 degrees from the full open position to the tight shut position.

Valves shall be Henry Pratt Company "*Groundhog*," Dresser "*450*" or Mueller "*Linesal III*."

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

Tapping Sleeves & Tapping Valves

The tapping sleeves shall be rated for a working pressure of 250 psi minimum and furnished complete with joint accessories. Tapping sleeves shall be constructed in two sections for ease of installation and shall be assembled around the main without interrupting service.

Mechanical joint style sleeves shall be ductile iron or fabricated steel style sleeves. Ductile iron mechanical joint style sleeves are required for all size-on-size connections. Mechanical joint sleeves shall be cast by Clow, Dresser, Mueller, Tyler, U.S. Pipe or approved equal.

Fabricated steel style sleeves shall be fusion bonded epoxy-coated, acceptable for potable water. Fabricated steel style sleeves will not be allowed for size-on-size connections.

Tapping valves shall be provided with a standard mechanical joint outlet for use with ductile iron pipe and shall have oversized seat rings to permit entry of the tapping machine cutters. In all other respects, the tapping valves shall conform to the resilient seat gate valves herein specified with regards to operation and materials.

The tapping sleeve and valve shall be tested to 100 psi (air) prior to tapping the main.

The installation contractor for the tapping sleeves and valves shall be approved by the District.

All Valves

The valves shall be set with stems vertical. The axis of the valve box shall be common with the axis projected off the valve stem. The tops of the adjustable valve boxes shall be set to the existing or established grade, whichever is applicable.

All valves with operating nuts located more than 4'-0" below finished grade shall be equipped with extension stems to bring the operating nut to within 18 inches of the finished grade.

At the top of the extension stem, there shall be a 2-inch standard operating nut, complete with a centering flange that closely fits the 5-inch pipe encasement of the extension stem. The valve box shall be set in a telescoping fashion around the 5-inch pipe cut to the correct length to allow future adjustment up or down. Cast iron soil pipe shall be used to extend the top valve box section to grade in deep areas.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

Each valve shall be provided with an adjustable two-piece cast iron valve box of 5-inches minimum inside diameter. Valve boxes shall have a top section with an 18-inch minimum length. The valve boxes and covers shall be Olympic Foundry No. 940 or equal. The District may require locking valve covers in traffic areas. Locking covers shall be Olympic Foundry No. 045 DT or equal.

Valves located in easements or outside of paved areas shall have concrete collars with a minimum size of 2'-0" diameter by 4-inches thick.

Valve Markers

Provide a blue Carsonite valve marker post for each valve outside of asphalt.

Markers shall be placed at the edge of the right-of-way opposite the valve and set so as to leave 2'-0" of the post exposed above grade. The distance in feet and inches to the valve shall be clearly stenciled on the side facing the valve in black numerals 2-inches in height.

FIRE HYDRANTS:

All fire hydrants shall be approved by the National Board of Fire Underwriters and conform to AWWA C502, break-away type, in which the valve will remain closed if the barrel is broken. The hydrant barrel shall have a diameter of not less than 7-inches, and the valve diameter shall be not less than 5-1/4-inches. Each hydrant shall be equipped with two 2-1/2-inch hose ports (National Standard Thread), and one 4-1/2-inch pumper connection (National Standard Thread). A permanent anodized short profile style Storz hydrant adapter and anodized Storz blind flange shall be installed on the pumper port. The size of the adapter shall be 4 inches. Each hydrant shall be equipped with a suitable positive acting drain valve and 1-1/4 inch pentagonal operating nut (counter-clockwise opening).

Fire hydrants shall be Mueller Centurion, Clow Medallion, M&H Style 929 or Waterous Pacer.

The holding spools between the gate valve and fire hydrant shall be made from 6 inch Class 52 ductile iron pipe. The hydrant and gate valve shall be anchored in place using holding spools and mechanical joint restraint device. Holding spools shall be one piece unless the length is in excess of 17 feet or if approved by the District. The joints shall be supplied with a mechanical joint sleeve and mechanical joint restraint device, or with Field Lok gaskets.

The fire hydrants shall be painted with two coats of Kelly-Moore 6100-516 yellow enamel paint. Distance to the hydrant valve shall be clearly stenciled in black numerals 2-inches in height on the fire hydrant below the pumper port. Align the stenciled distance on the hydrant to face the hydrant valve. Top of fire hydrant shall be painted as per service level (See Detail V-W2).

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Between the time that the fire hydrant is installed and the completed facility is placed in operation, the fire hydrant shall at all times be wrapped in burlap, or covered in some other suitable manner to clearly indicate that the fire hydrant is not in service.

BLOW-OFFS & AIR RELIEF ASSEMBLIES:

A 2 inch blowoff assembly shall be installed at the terminus of all dead end water mains 8 inch diameter and smaller. Water mains greater than 8 inch diameter shall have a fire hydrant assembly installed at the terminus of dead end mains.

A 1 inch or 2 inch air and vacuum release valve (as approved by the District) shall be installed at principal high points in the system.

The installation of these items shall include connection piping, gate valve, valve box, and all accessories. Valve markers shall be optional with the District.

SERVICE CONNECTIONS

Individual services to each property shall be installed and connected to the new water mains. New service 2 inches and smaller will be installed by the District. New services from existing mains will be installed by the District. The Developer shall be responsible for permitting, traffic control, excavation to expose main, shoring to protect District employees, backfilling trench, and completion of all restoration.

Upon completion of the installation of the water main (before testing and disinfection) services shall be installed by connecting to the water main and extending the service line to the property line as shown on the Standard Details or approved equal. Service lines for residential property up to 1-inch meter installation shall be Type "K" 1-inch (minimum size) continuous copper service lines meeting the ASTM Specifications B-88-47. Services up to 2-inch meter installation shall be 2-inch-diameter Type "K" copper. Larger service lines shall be of the type and style as designated in the Standard Details and shown on the Plans.

Projects that require meters larger than 1-inch shall be installed per the District Standards and shown on the Standard Details.

All services other than single family residential shall be provided with Washington State-approved backflow prevention located immediately behind and on the property side of the water service box. Irrigation, residential single-family fire meters, duplex, and multi-family residential connections shall require double check valve assemblies (DCVA). All other connections shall require reduced pressure backflow assemblies (RPBA). Commercial fire sprinkler system, if unmetred shall require reduced pressure detector assemblies (RPDA).

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

All irrigation using chemical feed, or water features, including decorative ponds, pools and fountains requiring make-up water shall be protected from backflow into the public water supply by a **minimum** of an approved air-gap to be located at the fill point of the pond or water feature. This "air-gap" shall be inspected by the District prior to filling. In all instances, the water supply used for filling purposes shall be protected by a double check valve assembly (DCVA) installed behind the meter for new construction or retrofitted as close as practical on modified systems.

Corporation stops and the single meter shut-off valves shall be Mueller, Ford, or A.Y. McDonald with the type and style noted on the Standard Details or approved equal. Included as a part of the service connection shall be the furnishing and installation of the meter box complete with lid, set flush with the proposed finished grade of the lot in the designated location near the property line, all as shown on the Standard Details. The angle type of shut-off valve and angle type dual check valve shall be set inside the meter box in a proper position for installation of a future meter by the District.

Service lines between the main and the property line shall be placed at a trench depth sufficient to maintain a 3'-0" cover over the top of the service line for its full length, taking into consideration the final finished grade of the proposed street and the final finished grade of any storm ditches.

Upon completion of each service line as indicated herein, the Developer shall flush the service line to remove the debris that may interfere with the future meter installation, and further verify that the service line has full pressure and flow to the meter box.

METERS GREATER THAN 2 INCH

If extensions require water meters greater than 2 inches, then such entire meter installation, including valves, piping, vaults or meter boxes, drain lines and meters shall be furnished and installed by the Developer conforming to District standards. Activation of meter is subject to conformance with District requirements and payment of connection fees.

PRESSURE REDUCING VALVES

If extensions require main line pressure reducing valves as determined by the District, then such entire installation, including strainers, valves, piping, vaults, and drain lines shall be installed by the Developer conforming to District Standards.

The pressure reducing installation shall be a prefabricated and plumbed vault and shall include two Cla-Val globe type pressure reducing valves, sized for the area to be served downstream of the installation.

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

5. **WATER PIPE TESTING & DISINFECTING:**

All pipelines shall be tested and disinfected prior to acceptance of work. A water hydrant meter shall be required and procured from the District for all water utilized for flushing pipelines. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Developer. The Developer shall provide an oil-filled pressure gauge with a range of 0 to 300 psi.

In all instances, the Developer shall utilize a Washington State approved double check valve type backflow prevention device to protect the potable water supply while filling, flushing, and disinfecting the particular water main.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer shall furnish and install temporary blocking.

As soon as pipe is secured against movement under pressure, it may be filled with water. Satisfactory performance of air valves shall be checked while the line is filling. A temporary air vent will be required if the fill point is higher than the line being filled.

The Developer shall preflush all water mains after water has remained in the main for 24 hours and before pressure testing the main.

After the pipe is filled with water and all air expelled, it shall be charged by a pump to a hydrostatic test pressure of 250 psi, measured at the high point on the pipeline and this pressure shall be maintained for a period of not less than 30 minutes to ensure the integrity of the thrust and anchor blocks. All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves, and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valve.

Feed for the pump shall be from a clean container wherein the actual amount of "makeup" water, so that it can be measured periodically during the test period.

A separate 250 psi pressure test will be required after all water services are cut to grade with angle stops or setters installed in the meter boxes.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at 200 psi for a period of not less than 1 hour. The allowable leakage rate per thousand feet of each size pipeline is as follows:

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Pipe Size	Allowable Leakage
	Gal. per Hour per 1,000 Ft. @ 200 psi
6"	0.32
8"	0.42
10"	0.53
12"	0.63
16"	0.85

Defective materials or workmanship discovered as a result of the tests, shall be replaced by the Developer at the his expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be re-run at the Developer's expense until a satisfactory test is obtained.

Before pipelines are placed in service, the water mains and appurtenances shall be disinfected in accordance with AWWA C651 and in conformance with the requirements of the State of Washington Department of Health Services.

In the process of chlorinating newly laid water pipe, all valves, fire hydrants and other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.

Chlorine shall be applied in one of the following manners, listed in order of preference, to secure a concentration in the pipe of at least 50 ppm is maintained for a period of 24 hours.

- 1) Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled, and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration;
- 2) Injection similarly of a hypochlorite solution;
- 3) Placement of dry chlorinated lime throughout pipeline, as constructed, in proper quantities to produce the desired dosage. Filling of pipeline with this method should be at a very slow rate. Pipeline should be filled within 2 days of placing sterilizing agent.

The Developer shall be responsible for flushing all water mains prior to water samples being acquired under direction and supervision of the District. The water mains shall be flushed at a rate to provide a minimum 2.5 feet per second velocity in the main. Water mains shall be flushed such that a minimum of five exchanges of pipeline volume will occur.

In all disinfection processes, the Developer shall take particular care in flushing and discharging the chlorinated water from the mains to ensure that the flushed and chlorinated water does no physical or environmental damage to property, streams, storm sewers or any waterways. Flushing water must be disposed of in

II. WATER SYSTEMS - GENERAL STANDARDS - Continued

accordance with Washington State Department of Ecology Standards. Flushing water shall require dechlorination to prevent damage to the affected environment, particularly aquatic and fish life of receiving streams. Discharge of chlorinated flush water to the sanitary sewer system is prohibited, except with District approval.

After the pipeline has been flushed and the system residual chlorine concentration has been obtained throughout the section of line, the water in the line shall again be left standing for a period of 24 hours. Following this, a water sample will be collected and tested. The line shall not be placed in service until a satisfactory bacteriological report has been received.

If disinfection of mains by the above methods proves unsatisfactory and the lab report indicates any type of bacteria count, then the Developer shall re-chlorinate using other methods in accordance with AWWA C651, approved by the District.

Only District representatives will be allowed to operate existing and new tie-in valves. The Developer's personnel are expressly forbidden to operate any valve on any section of line, which has been accepted by the District.