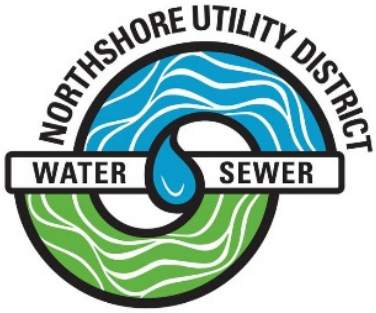

Northshore Utility District
King County, Washington

2025 ENGINEERING SPECIFICATIONS

STANDARDS FOR INSTALLATION

May 2025

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10.1 GENERAL

A pre-construction conference will be held at the District office prior to the start of construction.

The Contractor shall notify the District a minimum of 5 days in advance of construction to allow for review of materials to be used on the job.

For Developer Extension (DE) Projects and CIP Projects, the Contractor shall provide their own construction staking per the lines and grades shown on the District approved Plans. Cutsheets for the staking shall be provided to the District for review prior to the start of any construction.

Except as otherwise noted herein, all work shall be accomplished with adopted standards and specifications of Northshore Utility District and according to the recommendations of the manufacturer of the material or equipment used. The Contractor shall have a copy of the plans and specifications on the jobsite at all times.

10.2 CLEARING AND GRUBBING

Clearing and grubbing shall consist of the removal of all trees, stumps, brush, and debris and shall be confined within the limits of the easements obtained for the construction of this project and/or existing public rights-of-way. Removal of clearing and grubbing debris shall, in no way, constitute a hazard to the continuous operation of any existing utilities. Any damage to the existing utilities shall be repaired by the respective utility company, at the expense of the Contractor.

Within the limits described, all growth and organic matter such as trees, shrubs, brush, logs, fences, upturned stumps and roots of down trees and other similar items, shall be removed and disposed. All trees shall be felled within the area to be cleared. Where the tree limb structure interferes with utility wires or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility. Any damage that does occur shall be the responsibility of the Contractor.

All fences adjoining any excavation or embankment that may be damaged or buried shall be carefully removed and temporarily erected on the adjoining property or stored for reinstallation as directed by the District.

No debris of any kind shall be deposited in any stream or body of water or in any street or alley.

Trees, shrubbery, and flower beds designated by the District shall be left in place and care shall be taken by the Contractor not to damage or injure such trees, shrubbery, or flower beds by any of its operations.

The refuse resulting from the clearing operation shall be hauled to an approved waste site secured by the Contractor. It shall be disposed of in such a manner as to meet all requirements of State, County, and municipal regulations regarding health, safety, and public welfare.

NO burning is allowed.

In no case, shall any material be left on the project, shoved onto abutting private properties, or be buried in embankments or trenches on the project.

Where trees exist in planting areas and are not to be removed, it shall be the Contractor's responsibility to trim low limbs that will interfere with the normal operation of its equipment and paint or seal pruned areas with an approved pruning tar or paint. The trimming shall be performed in a professional manner by competent personnel prior to its machine operations and in such a manner as the District and/or the property owner may direct.

The Contractor shall be responsible for all damages to existing improvements resulting from its operations.

10.3 DEWATERING AND CONTROL OF WATER

Groundwater in underground utility construction is a widely known, and not unusual, condition. The Contractor shall review the actual field conditions and any other available resources to determine the extent and volume of groundwater to be expected. The Contractor shall submit a dewatering plan to the District for review prior to dewatering activities. The dewatering plan shall show specific locations, in plan and section, where dewatering is expected as well as general discussion of methods should water be encountered in other locations. The plan should also indicate the location and methods for removing groundwater, proper sediment removal and disposal of groundwater.

Dewatering into the storm drainage system is not allowed unless approved by the agency having jurisdiction. Dewatering into the sanitary sewer system is not allowed unless the contractor has King County Wastewater Discharge Authorization and an approved Industrial Waste Discharge Permit from the District. This needs to be submitted and approved before work on the project starts.

Review by the District of the design, materials, method, installation, and operation and maintenance details submitted by the Contractor shall not in any way relieve the Contractor from responsibility for errors/omissions therein or from the entire responsibility for complete and adequate design, materials, inspection,

operation, maintenance and performance of the dewatering system. The Contractor shall bear sole responsibility for proper design, installation, operation, maintenance, and any failure of any component of the dewatering system.

The Contractor shall dewater and dispose of the water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public and shall meet all regulatory agency requirements.

The control of groundwater shall be such that softening of the bottom of excavations or formation of "quick" conditions or "boils" shall be prevented. Dewatering systems shall be designed and operated so as to prevent the removal of the natural soils.

During excavating, installing, placing of trench backfill and the placing and setting of concrete, excavations shall be kept free of water. The static water level shall be drawn down below the bottom of the excavation to maintain the undisturbed state of the natural soils and allow the placement of backfill to the required density. The dewatering system shall be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures and pipelines.

In carrying out the work within the limits of streams or an area that will drain into a stream, the Contractor is required to comply with the regulations of the appropriate local, State and Federal agencies.

The Contractor shall contact the above referenced departments and secure such permits as may be necessary to cover its proposed method of operation within the areas described above. If no permit is necessary and, if requested by the District, the Contractor shall provide written approval from the appropriate agency.

Groundwater must not enter future or existing water or sewer lines.

10.4 TEMPORARY EROSION & SEDIMENTATION CONTROL (TESC)

The Contractor shall comply with all applicable permit conditions and recommendations of the geotechnical report, if available.

The detrimental effects of erosion and sedimentation are to be minimized in conformance with the following general principles:

- Leaving soil exposed for the shortest possible time.
- Reducing the velocity and controlling the flow of runoff.

- Detaining runoff in an approved on-site temporary sedimentation control facility to trap sediment.
- Releasing runoff safely to downstream areas.
- Installing temporary filter fabric fence.
- Protecting existing catch basins.

In applying these principles, the Contractor shall provide for erosion control by conducting work in workable units; minimizing the disturbance to cover crop material, providing mulch and/or temporary cover crops, sedimentation basins, and/or diversions in critical areas during construction; properly controlling and conveying runoff; and establishing permanent vegetation and installing erosion control structures as soon as possible.

(a) TEMPORARY EROSION & SEDIMENTATION CONTROL (TESC)

The Contractor shall provide, install, and maintain TESC facilities to protect the existing surface waters, drainage systems and adjacent properties.

The TESC facilities must be constructed prior to the start of construction to ensure that the transport of sediment to surface waters, drainage systems and adjacent properties is minimized.

The TESC facilities shown on the plan are the minimum requirements for anticipated site conditions. During the construction periods, these TESC facilities shall be upgraded as needed for unexpected storm events and modified to account for changing site conditions (e.g., additional sump pumps, relocation of ditches and silt fences, etc.).

The TESC facilities shall be inspected daily by the contractor/TESC supervisor and maintained to ensure proper functioning. Written records shall be kept of weekly reviews of the TESC facilities during the wet season (Oct. 1 to March 31) and of monthly reviews during the dry season (April 1 to Sept. 30).

Any areas of exposed soils, including roadway embankments, that will not be disturbed for two days during the wet season or seven days during the dry season shall be immediately stabilized with the approved TESC methods (e.g., seeding, mulching, plastic covering, etc.).

The TESC facilities shall be inspected and maintained within 24 hours following a storm event.

At no time shall more than one (1) foot of sediment be allowed to accumulate within a catch basin. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not flush sediment-laden water into the downstream system.

(b) TRENCH MULCHING

Where there is danger of backfill material being washed away due to steepness of the slope along the direction of the trench, material shall be held in place by covering the disturbed area with straw and holding it in place with a covering of jute matting or wire mesh anchored down with wooden stakes, or as directed by the District.

(c) COVER CROP SEEDING

A cover crop shall be in place in all areas excavated or disturbed during construction that were not paved, landscaped, and/or covered prior to construction. Areas landscaped prior to construction shall be restored to their prior condition. The Contractor shall be responsible for protecting all areas from erosion until the cover in place affords such protection.

Cover-crop seeding shall follow backfilling operations.

The Contractor shall be responsible for protecting all areas from erosion until the cover crop affords such protection. The cover crop shall be reseeded, if required, and additional measures taken to provide protection from erosion until the cover crop is capable of providing protection.

During winter months, the Contractor may postpone seeding if conditions are such that the seed will not germinate and grow. The Contractor will not, however, be relieved of the responsibility of protecting all areas until the cover crop has been sown and affords protection from erosion.

Submittals shall be provided for cover crop seed, mulch and fertilizer as specified herein.

10.5 SEWER PIPE INSTALLATION

General Standards: All pipes shall be unloaded from delivery vehicles with mechanical equipment. Dropping of pipe onto the ground or mats shall not be permitted. Under no circumstances shall materials be dropped or dumped into the trench. All pipes and fittings shall be carefully lowered into the trench to prevent damage to sewer main and protective coatings and linings.

Under no circumstances shall the contractor be allowed to discharge the flows from the new sewer main into the District system unless approved by the District.

Unless specified otherwise, a 10-foot horizontal separation and an 18-inch vertical separation must be maintained between all sanitary sewer mains and water mains in accordance with the Department of Ecology criteria.

Sewer shall be installed at depths to provide gravity service, for current projects and future extensions, as determined by the District and the build-out or comp plan.

(a) CONNECT TO EXISTING SYSTEM

Connections to existing manholes shall be made by core-drilling. Invert of the manhole shall be rechanneled as necessary to accommodate flow directions and provide a minimum of 0.10-foot drop from the inlet to the outlet. Connections shall be watertight. If connection is made to an existing manhole with a fiberglass-reinforced plastic baseliner, the disturbed channel must be re-channeled per District direction.

All connections to an existing sewer pipe or different materials from PVC shall be made with sleeves or adapters which are specifically manufactured for this purpose and shall use elastomeric gasket joints.

(b) PLUG(S) FOR EXISTING SYSTEM

The Contractor shall furnish and install a plug at the time the project is connected to the District's sewer system. The plug(s) must remain in position to prevent debris and water from entering the existing sewer system until such time as the sewer system within the project has been accepted by the District for maintenance and operation. A $2,000.00 fine will be levied against the Contractor when a sewer mainline plug is removed at any time during the work. The Contractor will also be accountable for all expenses incurred to clean and flush sanitary sewer mainlines as a result of the plug removal.

(c) PIPE INSTALLATION

The sewer pipe, unless otherwise approved by the District, shall be installed upgrade from point of connection on the existing sewer or from a designated starting point to line and grade per approved plans. The sewer pipe shall be

installed with the bell end forward or upgrade. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with an approved temporary plug.

3-inch wide, green metallic sewer detector tape shall be laid 24-inch above the pipe bedding, for the entire length of the sewer main between manholes. Identification on the tape shall include the words "Sanitary Sewer".

(d) PIPE JOINTING

All extensions, additions, and revisions to the sewer system, unless otherwise indicated, shall be made with sewer pipe joined by means of a flexible gasket which shall be fabricated and installed in accordance with these specifications.

All joints shall be made up in strict compliance with the manufacturer's directions and all sewer pipe manufacturing and handling shall meet or exceed the current revisions of the ASTM recommended specifications.

Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position or loading it with dirt or other foreign material. Any gaskets so disturbed shall be removed, cleaned, re-lubricated, if required, and replaced before the re-joining is attempted.

Care shall be taken to properly align the pipe before joints are entirely forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling, or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned.

Sufficient pressure shall be applied in making the joint to assure that it is home, as described in the installation instructions provided by the pipe manufacturer.

(e) CROSSING EXISTING WATERMAIN WITH SEWER

Where it is necessary to cross water or storm sewer trenches, all trench backfills shall be removed and replaced with mechanically compacted material or CDF in order to provide uniform support for the full length of the pipe. Existing utilities to be always protected.

Where it is necessary to cross an existing asbestos-cement water line, the District may require that the asbestos-cement pipe be removed and replaced with ductile iron pipe in accordance with the Standard Detail on a case-by-case basis.

(f) ABANDONMENT OF EXISTING SEWER STUBS

Portions of the sewer system that are replaced or no longer needed as a result of the Work shall be abandoned or removed, as directed by the District. Abandoned existing sewer stubs shall be physically disconnected at main. Abandoned pipe that remains in the ground shall be filled with flowable CDF. Where abandoned pipe is connected to manhole that remains active, a heavy-duty mechanical plug shall be inserted to the pipe to be abandoned, and the manhole shall be rechanneled in a professional manner to eliminate any infiltration from abandoned piping. Bypassing sewer may be required for rechanneling.

10.6 SIDE SEWER STUBS

A side sewer stub is considered to be that portion of a sewer line that will be constructed between a main sewer line and a property line or easement limit.

All applicable specifications given herein for sewer construction shall be held to apply to side sewer stubs.

3-inch wide, green metallic side sewer detector tape shall be laid 24-inch above the pipe bedding, for the entire length of the side sewer which is 8 feet deep or less continuing up the side sewer 2-inch x 4-inch marker post. Identification on the tape shall include the words "Sanitary Sewer".

Side sewers shall be single and installed according to the Standard Details. In no case may the specified side sewers be changed without the approval of the District.

Side sewers shall be connected to the tee provided in the sewer main where such is available utilizing approved fittings or adapters. The side sewer slope shall be a maximum of 100 percent (45°) and a minimum of 2 percent.

The maximum bend permissible at any one fitting shall not exceed 45º. Bends exceeding 45° with any combination of two fittings shall have two (2) feet from center to center of such adjacent fittings, unless one of such fittings be a wye branch with a cleanout provided on the straight leg. The maximum length of 6-inch sewer stub shall be 100 feet; minimum length shall be 5 feet unless otherwise approved by the District.

The minimum side sewer depth shall be six (6) feet below final grade at the property line or deeper to gravity serve the lowest finished floor elevation. The Contractor shall provide for each 6-inch stub a 2-inch x 4-inch wooden post that extends from the invert of the 6-inch stub to a point 18 inches (minimum) and 2 feet (maximum) above the existing ground. The exposed area of this post shall be painted white and shall have marked thereon the letters S/S. The elevations of the side sewer connections shall be of sufficient depth to serve all existing and possible future structures.

Where no tee is provided or available at the sewer main, connection shall be made by machine-made tap and suitable saddle, or otherwise as approved by the District.

10.7 TESTING GRAVITY SEWERS

Before sewer lines are accepted and/or connected to the existing system for use, all lines shall be inspected for line and grade, air tightness, deflection, and television inspection. Any corrections required shall be made at the expense of the Contractor.

If directed by the District, the first section of pipe not less than 300 feet in length installed by each crew shall be tested, in order to qualify the crew and/or the material. The successful installation of this first section shall be a prerequisite to further pipe installation by the crew. At the Contractor's option, crew and/or material qualification testing may be performed at any time during the construction process after at least three feet of backfill has been placed over the pipe.

(a) PREPARATION FOR TESTING

Prior to testing the Contractor shall clean and flush all sewer lines.

The Contractor shall conduct preliminary tests to confirm that the section to be tested is in an acceptable condition before requesting the District to witness the test. The manner and time of testing shall be subject to approval of the District.

(b) LINE AND GRADE

The new gravity sewer main shall be installed to the line and grade as shown on the approved Plans. Sewer mains installed with a “Flat” or “Reverse” grade shall be rejected.

Variance from established line and grade shall not be greater than one thirty-second (1/32) of an inch per inch of pipe diameter and not to exceed one-half (1/2) inch. For example, an 8” sewer main shall not have greater than a ¼ inch of variance from the approved Plans. 16” and larger diameter sewer mains shall not have a variance greater than ½ inch.

Bell and spigot connection point shall be concentric, and the invert elevation of the connection point shall not exceed one sixty-fourth (1/64) of an inch, per the pipe diameter. For example, an 8” sewer main shall not have greater than a 1/8 inch of variance at the invert elevation between the bell and spigot connection point.

(c) LOW PRESSURE AIR TEST

Gravity sewers shall be tested with low pressure air, by the pressure drop method in accordance with Section 7-17.3(2)F, *Low Pressure Air Test for Sanitary Sewers Constructed of Non Air-Permeable Materials*, of the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation. The Contractor shall furnish all facilities and personnel for conducting the air test under the supervision of the District. The Contractor may desire to make an air test prior to backfilling for its own purposes. However, the acceptance air test shall be made after backfilling has been completed and compacted.

All wyes, tees or the end of the side sewer stubs shall be plugged with flexible joint caps, or acceptable alternative, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and their removal shall provide a socket suitable for making a flexible, jointed lateral connection or extension. No double plugs shall be allowed.

Immediately following the pipe cleaning, the pipe installation shall be tested with low pressure air. A maximum reach to be tested shall be the reach between two consecutive manholes. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any groundwater above the center of the pipe being tested. At least two minutes shall be allowed for temperature stabilization before proceeding further.

A 1 lbs. pressure drop is allowed (i.e, 4.0 to 3.0 lbs) within the time listed, as shown in the following table:

Allowable Time for Pressure Drop Method

Diameter (inches)	Minimum Test Times for Length of Main (seconds)							
	50'	100'	150'	200'	250'	300'	350'	400'
8	144	286	428	570	712	854	908	908
10	222	444	666	888	1110	1134	1134	1134
12	320	640	960	1280	1360	1360	1360	1462
15	500	1000	1500	1700	1700	1714	1998	2284
18	720	1440	2040	2040	2056	2468	2878	3290
24	1280	2558	2720	2924	3654	4386	5116	5846

The Contractor shall be certain that all plugs are securely blocked to prevent blowouts. The air testing apparatus shall be equipped with a pressure release device such as a rupture disc or a pressure relief valve designed to relieve pressure in the pipe under test at greater than 6 lbs. per square inch.

Precautions shall be taken to prevent any damage caused by testing. Any damage resulting shall be repaired by the Contractor at its own expense.

All visible leaks showing flowing water in pipelines or manholes shall be stopped even if the test results fall within the allowable leakage.

(d) DEFLECTION TESTING

If required by the District, all PVC sewer pipes shall be tested for deflection not less than 30 days after the trench has been backfilled and compaction has been completed. The testing shall be conducted by pulling a properly sized mandrel through the pipe in accordance with Section 7-17.3(2)G of the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation.

(e) TELEVISION INSPECTION

All sanitary sewers shall be inspected by the use of a Closed-Circuit Television (CCTV) camera. Manholes need to be channeled prior to CCTV inspection. The CCTV footage and corresponding inspection file database (media, mdf, ldf files) shall be exported and provided to the District on a USB flash storage device (thumb drive) or uploaded to a OneDrive folder provided to the Contractor by the District. CCTV files shall be provided to the District prior to paving and final acceptance of the project. No VHS tapes or DVD-R Discs will be accepted. All inspections shall be conducted in accordance with NASSCO PACP methods, done in Granite Net Version 2.7.2.24 or older, and coded in CUES Basic format with uploadable capability to the District's Granite Net database.

At the beginning of each sewer main inspection, the following information shall be electronically generated and displayed on the CCTV footage:

1. Date of inspection
2. Contractor Company Name
3. Operator Name
4. Upstream Manhole number to downstream manhole number
5. Direction of inspection (upstream or downstream)
6. Pipe material and size

During inspections, the following information shall be electronically generated, automatically updated, and displayed on the CCTV footage:

1. Inspection location in the sewer line in feet from adjusted zero
2. Manhole number to manhole number (with direction of travel US/DS)
3. Date of inspection
4. Elapsed time of inspection

Each individual sewer main inspection, from manhole to manhole, shall be recorded on one digital file. If a pipe reach cannot be recorded to a single digital file due to extreme pipe length or obstructions in the pipe, multiple digital files for a single pipe are acceptable. On the other hand, multiple sewer main inspections recorded on a single digital file shall not be accepted.

For all projects (District or private development), CCTV inspections shall be furnished by the Contractor. Contractor shall utilize 1-inch target or ball and sewer inspection dye during CCTV recording. Contractor shall use the pipe ID number as shown on the Plans when conducting post-construction CCTV as referenced in the requirements above.

This CCTV inspection will be performed prior to final restoration of the street or easement. The Contractor shall inform the District ahead of time when and which lines are ready to be inspected.

The Contractor shall bear all costs incurred in correcting any deficiencies found during the CCTV inspection including the cost of any additional CCTV inspection that may be required by the District to verify the correction of said deficiency.

The project will not be accepted by the District until the CCTV inspection has been performed.

10.8 TESTING SANITARY SEWER FORCE MAINS

(a) TEST SPECIFICATIONS

Before sewer force mains are accepted and/or connected to the existing system for use, all lines shall be inspected for line and grade and air tightness. Any corrections required shall be made at the expense of the Contractor.

The pressure tests shall be performed in the following manner:

The Contractor shall make arrangements with the District for the necessary filling of the newly installed sewer forced main and appurtenances, a minimum of 72 hours' notice to the District will be required. Sections to be tested are limited to approximately 1,500 feet or less, or as approved by the District. The pipeline shall be filled by the District with water slowly and air expelled from the pipeline before starting the test. All pipelines shall be tested at a hydrostatic pressure of 250 psi at the high point. All necessary pumps, valves, meter gauges, piping, 2-inch blow-offs, hose, and labor required shall be furnished by the Contractor.

The pressure tests shall be performed in the following manner:

Water shall be pumped into the main, bringing the pressure in the main up to the required test pressure. The 250 psi test pressure must be held for 15 minutes with no drop in pressure for a passing hydrostatic test.

All visible leakage shall be corrected, and all new valves installed under these specifications shall be tight. Whenever repairs or corrections are necessary, the pressure test shall be repeated to provide acceptability.

(b) FORCE MAIN THRUST BLOCKS

All fittings, such as bends, shall be blocked with concrete in order to prevent movement and separation of pipe joints in accordance with the Water Standard Details for concrete thrust blocking. Sufficient time shall be allowed for the concrete to attain sufficient strength before the commencement of pressure tests.

10.9 MANHOLE INSTALLATION

Manhole installation shall be as detailed on the construction drawings and in accordance with the Standard Details. Precast sections with damaged joint surfaces or cracks shall not be installed.

Precast base sections shall be set on a prepared bedding material. Before the precast base is set in place, the bedding material shall be carefully leveled to provide full bearing for the entire base section.

Maximum distance between manholes shall not exceed 400', or as approved by the District.

10.10 DUCTILE IRON WATER MAIN INSTALLATION

All pipes shall be installed in accordance with these specifications and the instructions of the manufacturer subject to the approval of the District.

During construction, all existing and live water valves shall be accessible and operable by Northshore Utility District. The valves shall not be covered by steel sheets, asphalt, or cold mix. If the Contractor prevents access to the District at any time, the Contractor is responsible for immediately reinstating the District's access.

Unless otherwise indicated on the plans, the minimum cover shall be 3 feet for 8-inch diameter pipe and smaller, and 4 feet for pipe that is larger than 8-inch in diameter.

If a proposed fire hydrant or proposed meter is to be installed on an existing water main, potholing of the existing main at the proposed installation location shall be completed before saw cutting of the existing roadway surface to avoid conflicts.

Potholing for all existing utilities crossing the proposed alignment shall be performed six days in advance of the water main installation. Additional costs in association with any adjustments to alignment and depth of cover due to insufficient potholing will be performed at the expense of the Contractor.

All pipe ends shall be square with the longitudinal axis of the pipe and any damage to the ends shall be cut off before installation if approved by the District. Where necessary to cut the pipe, the pipe shall be cut with approved cutting tools.

The pipe shall be laid in a straight grade through localized breaks in grade, the excavation shall be deepened gradually at changes in the street grades so that there are no abrupt changes in pipeline grade. To maintain the required alignment, use short lengths and deflect the joints or use necessary bends.

Each pipe section shall be carefully lowered into place in the ditch after inspecting it for defects and removing any gravel or dirt, etc., from the interior of the pipe.

Where it is necessary to cross under sanitary sewer or storm sewer trenches, all trench backfill shall be removed and replaced with mechanically compacted pit run material or CDF in order to provide uniform support for the full length of the pipe.

A 10-foot horizontal separation must be maintained between all sanitary sewer lines and water lines, unless otherwise approved. A 3-foot minimum horizontal separation shall be maintained between other underground utilities, unless otherwise approved.

All pipe shall be kept free of gravel, dirt, and other contaminants. Temporary pipe plugs must be installed at all exposed pipe ends at the end of each working day. The pipe plug must be a watertight, mechanical device, and shall be cleaned thoroughly prior to installation.

10.11 RESERVED

10.12 CONCRETE BLOCKING

Concrete blocking shall be 3000 psi minimum strength in accordance with WSDOT 6-02.3(2)B Commercial Concrete, cast in place and have a minimum of 1/2 square foot bearing against the fitting. Blocking shall bear against fittings only and shall be clear of joints to allow future dismantling of the joint. The Contractor shall install blocking that is adequate to withstand full test pressure as well as to continuously stand operating pressures under all conditions of service. For concrete blocking based upon a 250-psi test pressure, see the Standard Water Detail #1 for horizonal, Detail #2 for Vertical.

10.13 FIRE HYDRANT INSTALLATION

Correct bury depth shall be determined by the Contractor, fire hydrant shall be set as shown in the Standard Detail. Fire hydrant extensions will not be allowed on new fire hydrant installations. Mega-lugs or stainless-steel tie rods shall be used to restrain the ductile iron pipe between the hydrant foot and the 6-inch hydrant valve.

The location of the fire hydrant shall be shown on the plans to determine the length of hydrant run required. The hydrant shall be set on a solid concrete block 4-inch x 8-inch x16-inch and a minimum of 6 cubic feet of 1-1/2” washed rock shall be placed around the base of the hydrant for a drain pocket.

Fire hydrants shall be set plumb and with the ports oriented as directed by the Fire Protection District having jurisdiction over the said area.

In some instances, it may be necessary to cut or fill an area to install a hydrant. Where this occurs, the area for at least a three (3) foot radius around the hydrant shall be graded and leveled, and the cut slopes or fill slopes shall be neatly graded by hand, unless otherwise approved by the District and the Fire Chief.

No tool other than an approved hydrant-operating wrench shall be used when operating hydrants.

Fire hydrants shall be prime-coated and finish-coated in accordance with Standard Water Detail #3.

10.14 GUARD POST INSTALLATION

Fire hydrant guard posts shall be installed if indicated on the plans or specified by the District. Guard posts shall be set with the top of the guard posts level with the bonnet flange of the fire hydrant. They shall be plumb, and where two posts are used at a hydrant; they shall be set with their tops at the same elevation. The posts shall be coated in the same manner and with the same color as the fire hydrants. See Standard Water Detail # 3a for more information.

10.15 GATE VALVE AND BUTTERFLY VALVE INSTALLATION

Gate and butterfly valves shall be set in the ground vertically and shall be opened and shut under pressure to check operation and, at the same time, show no leakage. Inline valves 8 inches and larger that are not flanged to other fittings shall be blocked in accordance with Standard Blocking Details.

Valves that are installed during water main installation shall be plugged or capped with ductile iron fittings to prevent debris from entering the new pipe.

10.16 VALVE BOX INSTALLATION

Valve boxes shall be set flush to the adjacent finished grade.

For valves located outside of paved areas, a cement or asphalt pad for the valve box shall be constructed according to the Standard Detail #11. The cement or asphalt pad shall be provided for all valves unless otherwise directed.

10.17 AIR AND VACUUM RELIEF VALVE INSTALLATION

Air and vacuum relief valve assembly shall be installed as shown on the Standard Detail.

Location of the air release valves shall be at the high points of the line. Water line must be constructed so that the air release valve may be installed in a convenient location.

10.18 2-INCH BLOW-OFF INSTALLATION

2-inch Blow-offs shall be installed for 12-inch diameter pipe and smaller in accordance with the Standard Detail #10.

10.19 TRACER WIRE

All water mains and water services installed shall have blue 14-gauge solid copper wire with polyethylene insulation. Wire shall be placed in the trench on top of the water main and the ends brought into the valve boxes, per the Standard Water Detail #11. Tracer wire shall also be wrapped around the water

service line and brought up into the meter box. All connections or splicing shall be made with District-approved split-bolt wire connectors.

10.20 WATER SERVICE INSTALLATION

All service installations shall be according to the Standard Details.

For ductile iron and cast-iron water mains 6” and larger diameter, direct tapping of 1-inch standard corporation stop threaded tap will be required, saddles will not be allowed on ductile iron and cast-iron pipe larger than 4-inch diameter for 1-inch water services.

Where an existing water service is being replaced with a new water service, the Contractor shall pothole the private, customer side of the existing meter box prior to any water service disruption in order to determine the fittings required for the reconnection and to determine the final location of the new meter box.

If an existing pressure-reducing valve (PRV) is found on a water service to be replaced, the contractor shall install the PRV on the private property side of the meter box as shown on NUD Standard Water Detail #21.

On existing water mains that are live and connected to the existing system, the contractor shall furnish and install all parts of the water service and reconnection required, except the tap. The Contractor shall coordinate with Northshore Utility District Maintenance & Operations Department to have them perform the tap on the water main. The Contractor shall complete the excavation, shoring, and dewatering of the trench required for District Staff to perform the wet tap.

The District will provide all parts necessary to perform the tap and the Contractor shall repair the polyethylene encasement (if applicable) with material per manufacturer’s recommendations and per the District’s Standard Detail and perform trench backfill as required.

On new water mains installed and not yet connected to the existing system, the Contractor shall provide all parts and equipment necessary to tap the new main and repair the polyethylene encasement (if applicable) with material per the manufacturer’s recommendations and per the District’s Standard Detail.

On new ductile iron water mains, multiple, adjacent direct taps shall be installed with a minimum 18" horizontal separation between services. Direct taps shall be made a minimum of 18" from pipe ends (bell or spigot).

Hand drills with hole saws, or other tools or methods, for the installation of service saddles only will be allowed for all other water main sizes and materials. Additionally, for larger diameter water services (1-1/2-inch and 2-inch), saddles will be required regardless of water main size or type. See Standard Water Details and Material Specifications for additional information.

All water services connections to the water main shall be installed on the new water main before the hydrostatic testing. The District requires hydrostatic testing be conducted against the installed setters. The District retains the right to dictate, change, or modify this requirement depending on the conditions of the site and the context of each project.

10.21 HYDROSTATIC TESTS

After backfilling the water main with sufficient material to prevent movement of the pipeline and allowing sufficient time for the concrete blocking to set, the water main, water services and appurtenances (Pipeline) shall be pressure tested at convenient lengths as directed by the District. In general, large sections of untested main will not be permitted to accumulate. Sections to be tested are limited to approximately 1,500 feet or less, or as approved by the District. Testing against a closed valve on the existing system is not permitted.

The Contractor shall make arrangements with the District for the necessary filling of the newly installed Pipeline, a minimum of three (3) business days to the District will be required. The District staff will fill with new water system slowly to air expel from the Pipeline before the contractor will test. All Pipeline shall be tested at a hydrostatic pressure that will reach 250 psi at the high point of the line. All necessary pumps, valves, meter gauges, piping, 2-inch blow-offs, hoses, and labor required shall be furnished by the Contractor.

The pressure tests shall be performed in the following manner:

Water shall be pumped into the Pipeline, bringing the pressure in the Pipeline up to the required test pressure. The 250-psi test pressure must be held for 15 minutes with no drop in pressure in order for a passing hydrostatic test.

All visible leakage shall be corrected, and all new valves installed under these specifications shall be tight. Whenever repairs or corrections are necessary, the pressure test shall be repeated to provide acceptability.

Procedures for testing firelines shall be as described above for hydrostatic tests and per Section 10.22 for bacteriological tests. The testing limits of the portion of the fireline owned and maintained by the District shall end at a temporary blow-off installed on the fireline, inside the Double Check Detector Assembly (DCDA) vault.

Testing of the private fire line between the DCDA vault and the building shall be responsibility of the Fire Marshall and their requirements.

10.22 STERILIZATION AND FLUSHING OF WATER MAIN

Upon successful completion of the hydrostatic test, all new water mains, water services, appurtenances, and repaired portions of, or extension to, mains shall be flushed and sampled for purity per AWWA C651-14 on the following business

day (or at the Districts Discretion). The District will collect two consecutive samples for testing taken 24 hours apart (measured from the District's reception of a satisfactory test 1 to the second) and will forward the bacteriological test results to the Contractor. Upon receipt of two satisfactory bacteriological reports, the contractor shall have two weeks to make final connections to the existing main. If the connections are not completed within the two-week timeframe, a repeat of the bacteriological testing will be required. After the reception of the second satisfactory test, the Contractor will be allowed to request a shutdown to connect the new water main to the existing system.

Water supply for filling, testing, and flushing of the new mains will be available from the existing distribution system. The Contractor shall make arrangements with the District for the necessary flushing of the pipeline. The water main shall be flushed a minimum of 24 hours or a maximum of 72 hours (3 calendar days) from the initial time of the pipeline fill. Opening of valves and use of water from the District's system will be done by the District and water for flushing will be provided by the District.

Taps required for temporary or permanent release of air, chlorination, or flushing purposes shall be provided by the Contractor as a part of the construction of water mains. See Standard Water Detail #17 for more information.

(a) DECHLORINATION AND DISPOSAL OF TREATED WATER

For District’s Project, the District shall be responsible for the disposal of treated water flushed from mains and shall neutralize the wastewater for the protection of aquatic life in the receiving water before disposal into any natural drainage channel. The Contractor may not discharge any chlorinated water into any stormwater or sewer structures without a King County Discharge permit and District approval. The actual flushing and disposal of the treated water will be performed by the District.

For Developer Extension (DE) Projects, the Contractor shall develop a plan for the disposal of the treated water and submit it to the District for review. The plan shall show specific locations where, or methods by which, the treated water can be discharged. If the plan designates discharge to sanitary sewer, storm sewer or surface water facilities, the Contractor shall contact the jurisdiction(s) having authority and secure such permits as may be necessary to cover the proposed method of disposal. If no permit is necessary and, if requested by the District, the Contractor shall provide written approval from the appropriate agency.

(b) REQUIREMENT OF CHLORINE

Before being placed into service, all new mains, water services, appurtenances, and repaired portions of, or extensions to, existing mains

shall be chlorinated by the Contractor so that a chlorine residual of not less than 10 ppm remains in the water after standing 24 hours in the pipe.

The initial chlorine content of the water shall be not less than 50 ppm (note that ppm = mg/L).

(c) FORM AND METHOD OF APPLIED CHLORINE

Chlorine shall be applied by one of the following methods, to give a dosage of not less than 50 ppm of available chlorine:

1. DRY CALCIUM HYPOCHLORITE

   As each length of pipe is laid, sufficient high test calcium hypochlorite (65-70% chlorine) shall be placed in the pipe to yield a dosage of not less than 50 ppm available chlorine, calculated on the volume of the water which the pipe and appurtenances will contain.

   The number of ounces of 65% test calcium hypochlorite required for a 20-foot length of pipe equals $0.008431D^2$, in which "D" is the diameter in inches.

2. LIQUID CHLORINE

   A chlorine gas-water mixture shall be applied by means of a solution-feed chlorinating device, or the dry gas may be fed directly through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solution of the chlorine gas, or the gas itself, must provide means for preventing the backflow of water into the chlorine.

3. CHLORINE-BEARING COMPOUNDS IN WATER

   A mixture of water and high-test calcium hypochlorite (65-70% Cl) may be substituted for the chlorine gas-water mixture. The dry powder shall first be mixed as a paste and then thinned to a 1 percent chlorine solution by adding water to give a total quantity of 7.5 gallons of water per pound of dry powder. This solution shall be injected in one end of the section of the main to be disinfected while filling the main with water (continuous-feed method, see below).

4. SODIUM HYPOCHLORITE

   Sodium hypochlorite, commercial grade (15% Cl) or in the form of liquid household bleach (5% Cl) may be substituted for the chlorine gas-water mixture.

This liquid chlorine compound may be used full strength or diluted with water and injected into the main in correct proportion to the fill water so that dosage applied to the water will be at least 50 ppm.

The following methods and tables as outlined in AWWA C651-14 are included for reference. Note that ppm = mg/L.

- The continuous-feed method consists of completely filling the main with potable water, removing air pockets, then flushing the main at a minimum of 3.0 ft/sec to remove particulates, and refilling the main with potable water that has been chlorinated to 25 ppm. After a 24-hr holding period in the main there shall be a free chlorine residual of not less than 10 ppm. Please see the table below and AWWA C651-14 for more information.

Table 4 Chlorine required to produce an initial 25-mg/L concentration in 100 ft (30.5 m) of pipe by diameter

Pipe Diameter		100% Chlorine		1% Chlorine Solution	
in.	*(mm)*	*lb*	*(g)*	*gal*	*(L)*
4	(100)	0.013	(5.9)	0.16	(0.6)
6	(150)	0.030	(13.6)	0.36	(1.4)
8	(200)	0.054	(24.5)	0.65	(2.5)
10	(250)	0.085	(38.6)	1.02	(3.9)
12	(300)	0.120	(54.4)	1.44	(5.4)
16	(400)	0.217	(98.4)	2.60	(9.8)

- The slug method consists of completely filling the main to eliminate air pockets, flushing the main at a minimum of 3.0 ft/sec to remove particulates, then slowly flowing a slug of water dosed with chlorine to a concentration of 100 ppm through the main. The slow rate of flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours. Please see AWWA C651-14 for more information.

  The table below from Appendix B of AWWA C651-14 provides the amount of chemical required to produce a chlorine concentration of 200 ppm. In order to obtain the 100 ppm as outlined in the slug method, divide the amount of chemical required in the table (gallons or pounds) in half.

Table B.2 Amounts of chemicals required to produce chlorine concentration of 200 mg/L in various volumes of water*

Volume of Water		Liquid Chlorine Required		Sodium Hypochlorite Required						Calcium Hypochlorite Required	
				5% Available Chlorine		10% Available Chlorine		15% Available Chlorine		65% Available Chlorine	
gal	*L*	*lb*	*(g)*	*gal*	*(L)*	*gal*	*(L)*	*gal*	*(L)*	*lb*	*(g)*
10	(37.9)	0.02	(9.1)	0.04	(0.15)	0.02	(0.08)	0.02	(0.08)	0.03	(13.6)
50	(189.3)	0.10	(45.4)	0.20	(0.76)	0.10	(0.38)	0.07	(0.26)	0.15	(68.0)
100	(378.5)	0.20	(90.7)	0.40	(1.51)	0.20	(0.76)	0.15	(0.57)	0.30	(136.1)
200	(757.1)	0.40	(181.4)	0.80	(3.03)	0.40	(1.51)	0.30	(1.14)	0.60	(272.2)

*Amounts of sodium hypochlorite are based on concentrations of available chlorine by volume. For either sodium hypochlorite or calcium hypochlorite, extended or improper storage of chemicals may have caused a loss of available chlorine.

(d) PREVENTING REVERSE FLOW

During flushing, filling, and testing, the District shall make the connections to the existing distribution system and the new water pipelines and shall utilize a backflow prevention device approved by the State Department of Health.

(e) RETENTION PERIOD

Treated water shall be retained in the pipe for a minimum of 24 hours and a maximum of 3 business days. After this period, the chlorine residual at pipe extremities and other representative points shall be at least 10 parts per million.

(f) CHLORINATING VALVES, HYDRANTS, AND APPURTENANCES

In the process of chlorinating the newly laid pipe, all hydrant valves, corp stops, ball valves, and other appurtenances shall be opened while the pipeline is filled with the chlorinating agent and under normal operating pressure.

(g) CHLORINATING FINAL CONNECTIONS TO EXISTING WATER MAINS AND SERVICE CONNECTIONS

The chlorinating procedure to be followed shall be as specified by AWWA. All closure fittings shall be swabbed with a 50-ppm minimum chlorine solution.

(h) FINAL FLUSHING AND TESTING

Before placing the lines into service, two (2) consecutive satisfactory bacteriological test reports shall be received. Only after the second satisfactory test may the Contractor request to schedule a shutdown.

(i) REPETITION OF FLUSHING AND TESTING

If the initial round of bacteriological testing, two consecutive tests as outlined in 10.22 (h) above, result in an unsatisfactory outcome, any repeat flushing and testing that is completed by the District shall be paid for by the contractor.

If the second round of bacteriological tests results in an unsatisfactory outcome, rechlorination of the installed water main will be required either by the continuous-feed method or slug method as outlined in AWWA C651-14 and Section 10.22 (c). The costs for subsequent disinfection and testing shall also be the responsibility of the Contractor.

10.23 CONNECTION TO EXISTING WATER MAIN

Connection to existing main shall be potholed six days in advance of installation or connection. Connections to existing water mains shall be blocked to support immediate thrust forces using eco blocks or similar as approved by the District. Placing wet concrete is not acceptable. Blocking shall be permanent (no wood allowed).

The Contractor shall not operate any valves on the District's live water system. Connections to the existing main shall not occur until satisfactory purity tests have been obtained and without the approval of the District. Existing mains shall be kept in operations until the new main has been constructed, satisfactorily tested and disinfected, and is ready for operations. Connection to the existing system shall then be made.

The Contractor shall make the necessary arrangements with the District for the connection to the existing water main. No connection work on Fridays. The Contractor shall provide a minimum of 5 working days' notice to the District before the requested shutdown. Large customer outages may require 5-10 business days to schedule. The District will alert affected property owners of the proposed service interruptions. The District reserves the right to accept, reject, or modify any/all shutdown requests at its discretion.

Connections to the District's existing system are only allowed during the day on Tuesday, Wednesday, or Thursdays, excluding holidays, unless otherwise approved or required by the District.

For all wet taps, fire hydrant runs, or branch main lines on the live water system, the Contractor shall coordinate with Northshore Utility District Maintenance & Operations Department to perform the tap on the water main. The Contractor shall complete the excavation, shoring, and dewatering of the trench required for District Staff to perform the wet tap. The District will provide all the necessary parts to perform the tap. The Contractor shall repair the polyethylene encasement (if applicable) with material per the manufacturer's recommendations and per the District's Standard Detail and perform trench backfill as required.

Pre-digging and steel plating of the connection location(s) shall be performed a minimum of one day prior to the date of connection. Pre-digging shall include potholing the existing water main at the point of connection, excavating between the temporary blow-off and the existing main to provide adequate access to each pipe, and verifying the necessary pipe and fittings to perform the connection.

Water service outages shall be limited to the hours of 8:00 AM to 4:00 PM to minimize inconvenience to water users and maintain fire protection for the area. Once work is started on a connection, it shall proceed continuously without interruption and as rapidly as possible until completed.

Existing mains shall be kept in operation until the new main has been constructed, satisfactorily tested and disinfected, and is ready for operation. Connections to the existing system shall then be made.

The total length of pipe including fittings, and valve(s) required for the connection shall be in accordance with ANSI/AWWA C651-14, Sec. 4.10 and shall not exceed 18 feet. The District reserves the right to modify this requirement based on site specific requirement.

All material used for the connection shall be thoroughly sterilized by swabbing the interior with a chlorine solution of 50 ppm.

10.24 WATER SERVICE TRANSFERS ON PARALLEL LIVE MAINS

After the new water main is connected to the existing water system, creating parallel live mains, the Contractor shall proceed immediately with all water service and meter transfers from the existing system to the new water main.

The Contractor shall coordinate service interruptions with the District and provide minimum two (2) business days' notice of the intended service interruptions to customers. Residential Service interruption shall not be for more than four hours between 8AM - 4:30PM (Monday- Thursday) and service interruptions shall not take place on weekends and holidays.

The Contractor shall plan and perform the work so that the water service to each customer is not stopped more than two (2) separate times.

The Contractor shall also proceed with all other work necessary to permanently abandon the existing water system; including but not limited to, the removal and disposal of valve boxes, meter boxes and setters, miscellaneous fittings and pipe, and appurtenances.

10.25 STEEL CASING

Steel casing shall be in accordance with the Materials of Construction and the Sewer Standard Detail #10.

Sizing and wall thickness of casing shall be approved by the District.

Jacking and boring of casing pipe shall be accomplished in such a manner that there will be no damage to the existing improvements. Boring shall be accomplished by mechanical auger or drilling of the soil. The casing shall be jacked close enough behind the boring operation so there is no caving of soil from above. Removal of the material from the bored hole by washing or sluicing will not be permitted.

If excess voids are created around the casing, holes shall be drilled through the casing and the voids shall be pumped full of cement grout. All excess excavated material shall be disposed of in a manner acceptable to the District and permitting agencies.

The carrier pipe shall be supported on casing spacers at the manufacturer's recommendation or maximum of 10 foot spacing and shall be installed with restrained joints. See the Engineering Specifications, Materials of Construction, and the Standard Detail for additional information.

10.26 EXCAVATION AND BACKFILL FOR UTILITY CONSTRUCTION

(a) TEMPORARY TRAFFIC CONTROL

The Contractor shall make suitable, safe, and adequate provisions for necessary traffic around, over, or across the work in progress and shall schedule pavement patching to follow after backfilling is completed as directed by the regulatory agency.

The contractor shall submit a traffic control plan for review to the District and the permitting agency prior to beginning work. Traffic control shall conform to Section 1-10 of the latest published Standard Specifications for Road, Bridge, and Municipal Construction of the Washington State Department of Transportation.

(b) EXCAVATING IN PAVED AREAS

Before excavating in paved areas, the existing road surface shall be cut a minimum of 1 foot back from the outer edge of the excavation with approved cutting equipment. The cuts are to be made in clean, straight lines to ensure a minimum of damage to the existing pavements. All cuts in existing concrete pavement are to be made with a concrete saw. If the Contractor fails to adequately protect the cut edges during construction, it will be required, at its own expense, to re-cut the edges a minimum of 1 foot back from the edge of excavation prior to repairing the pavement.

(c) TRENCH SAFETY AND EXCAVATION

The Contractor shall provide and install trench safety systems such as shoring or trench boxes or shall employ construction techniques such back sloping that meet the applicable State and Federal safety regulations.

Use and removal of trench safety systems shall be accomplished in such a manner that there will be no damage to the work or to the other properties.

Maximum and minimum trench widths shall be in accordance with the dimensions shown on Standard Water Detail #12 and Standard Sewer Detail #11.

In all cases, trenches must be of sufficient width to permit proper joining of the pipe and backfilling and proper compaction of material along the sides of the pipe. Trench width at the surface of the ground shall be kept to the minimum amount necessary for proper installation of the work in a safe manner.

The maximum length of open trench permissible on any line, in advance of pipe laying, will be 100 feet for sewer pipe and 250 feet for water mains, except at the end of each day's operations, there shall be no trench in which pipe laying, embedment and backfill have not been completed.

Upon completion of work each day, all open trenches shall be completely backfilled, leveled and temporarily patched, graveled, fenced, or sheeted as required by the regulatory agency and the District.

Excavation for manholes, valves, structures, and other appurtenances shall be sufficient to provide enough room for compaction equipment between the outside surfaces and the sides of the excavation.

All material excavated from trenches and stored adjacent to the trench or in a roadway or public thoroughfare shall be maintained in such a manner that will cause a minimum of inconvenience to public travel. Provision shall be made for traffic where such is necessary. Free access shall be provided to all fire hydrants, water valves, and meters and clearance shall be left to enable the free flow of stormwater in all gutters, conduits, and natural water courses. Where the trench bottom is a material that is unsuitable for providing an adequate foundation or material which will make it difficult to obtain uniform bearing for the pipe such material shall be removed and replaced with “foundation gravel", as previously defined.

(d) PIPE BEDDING AND TRENCH BACKFILL

Recycled concrete will not be allowed as foundation gravel, pipe bedding, or trench backfill material for any Ductile Iron (DI) water or sewer main installation).

The placement and compaction of the pipe bedding and trench backfill shall be in accordance with the requirements of the various applicable sections of

these specifications and as shown in Standard Water Detail #12 and Standard Sewer Detail #11.

Where excavated material is not approved for backfill or bedding, imported backfill gravel conforming to the Materials of Construction shall be provided.

Where governmental agencies other than the District have jurisdiction over roadways, the backfill shall be in accordance with the agency's requirements.

Bedding material shall be carefully placed and firmly compacted to provide a firm, uniform cradle for the pipe. The minimum thickness of the layer of bedding material required shall be 4 inches under the bell for all pipe sizes of 27 inches in diameter and smaller, 6 inches for all pipe sizes 30 inches in diameter and larger, and 6 inches under the bell of the pipe for all diameter pipes where rock is excavated. The Contractor shall provide firm, continuous support for the pipe.

After the pipe laying operation, additional bedding material shall be placed and compacted by hand tools for the full width of the trench to a height of 6" above the top of the pipe.

In backfilling the trench, the Contractor shall take all necessary precautions to protect the pipe and protective coating from any damage or shifting of the pipe.

No timber bracing, lagging, sheathing or other lumber shall be left in any excavation.

At all roadway and driveway crossings and within existing paved rights-of-way and in such additional locations as may be directed by the District, the trench shall be immediately backfilled after the pipe is installed and inspected and shall be immediately provided with a temporarily graveled surface and continually maintained daily until replaced with permanent repair as required.

The Contractor shall be responsible for restoring to a condition equal to the prior condition of any and all existing utilities, culverts, ditches, drains, landscaping, or other facilities that are damaged as a result of the Contractor's operation.

10.27 COMPACTION OF TRENCH BACKFILL

Recycled concrete will not be allowed as foundation gravel, pipe bedding, or trench backfill material for any Ductile Iron (DI) water or sewer main installation).

Prior to excavation and installation, equipment capable of achieving adequate compaction shall be on site. Backfill and compaction shall be completed in conjunction with the pipeline installation. Prior to the District accepting the

water and/or sewer mains for use and operation, compaction testing showing adequate compaction shall be verified by the District. The District highly recommends that compaction testing be completed in conjunction with the installation of backfill and compaction. Copies of compaction testing, reports, soils analysis and proctor tests shall be provided to the District to verify compaction requirements prior to pressure testing.

A. Utility Trenches in the Existing Right-of-Way: Trench backfill material and compaction shall conform to the jurisdictional requirements of the Entity/Owner of the existing right-of-way or follow the District Standards, and whichever is more stringent shall apply.

B. Utility Trenches in Proposed or Existing Traffic Areas, including Driveways Easements: All trench backfill shall be mechanically compacted to 95 percent of maximum density in accordance with ASTM 1557 (modified proctor).

C. Utility Trenches in Non-Paved, Non-Structured Areas and Designated Wetlands: All trench backfill shall be mechanically compacted to 90 percent of maximum density in accordance with ASTM 1557 (modified proctor). Compaction testing as specified in Section 2-03.3(14) D of the WSDOT/APWA Specifications and as specified by the local jurisdiction, shall be required.

D. Utility Trenches in Areas Near Structures: Existing and proposed structures located within a 1:1 slope from bottom of the trench excavation to the projection of the slope to finished grade shall be deemed as lying in the “Zone of Influence” of the excavation and the trench in the easement area within the zone of influence shall be backfilled with flowable CDF from the top of bedding to a depth that the structure is outside the zone of influence.

E. Utility Trenches Under Existing Water Mains: Additional care must be taken when excavating around existing water pipelines under pressure. Pipes must be supported during excavation adequately to prevent failure, sag, or breakage within the area of the new trench line. Backfill per Sewer Detail #12.

(a) FREQUENCY OF TESTING

Horizontally: Minimum of two locations every 200 feet of trench, or a minimum of two locations per day or a minimum of 2 locations per pipe run between manholes and/or valves whichever is more frequent shall apply. Additional tests may be required when variations occur due to the Contractor’s operations, weather conditions, site conditions etc.

Vertical Testing shall use the deepest portion of the trench line to determine minimum testing depths as follows:

For trenches 12-feet and under; complete a minimum of one test at approximately one half of the trench depth and an additional test at or near the surface

For trenches 12-feet to 16-feet deep; complete one test at approximately 4-feet above the pipe, one test at or near the surface and one test approximately halfway in between.

For trenches greater than 16-feet deep; complete tests at approximately four foot intervals above the pipe to the surface (four tests required) or as directed by the District.

Structured areas, such as an easement near a building, shall require additional testing in the zone of influence from the licensed geotechnical consultant such that the compaction shall not adversely affect the nearby or surrounding structures.

If compaction does not meet the minimum standards required, additional excavation and testing as directed by the District shall be completed. The District reserves the right to require additional testing in areas that are questionable.

Compaction testing costs are the responsibility of the Contractor. Copies of all testing reports shall be provided to the District for verification and project records and jurisdictional approvals.

10.28 REPLACING ROAD SURFACE

Roadway surface restoration and patching shall be in accordance with the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation, unless specifically directed otherwise by the District.

Before patching material is placed, all pavement cuts shall be trued so that marginal lines of the patch will form a rectangle with straight edges and vertical faces a minimum of one (1) foot back from the maximum trench width.

The Contractor shall maintain proper signs, barricades, lights, and other warning devices in accordance with the traffic control plan.

(a) GRAVEL BASE

Gravel base for road restoration shall conform to the Materials of Construction specifications and shall be placed and compacted in conformance with Sections 2 and 9 of the latest published Standard Specifications for Road, Bridge, and Municipal Construction of the Washington State Department of Transportation. Gravel base shall be placed and compacted before succeeding course material is placed.

Gravel base shall be used as shown on the plans or as directed by the District.

(b) HOT MIX ASPHALT (HMA) SURFACING

Hot mix asphalt surfacing, or repair shall conform to the Materials of Construction and shall be placed in accordance with Section 5-04 the latest published Standard Specifications for Road, Bridge, and Municipal Construction of the Washington State Department of Transportation and the Standard Specification Drawing for Typical Trench Section. All lifts shall be free from ridges, ruts, humps, depressions, objectionable marks, and irregularities and shall conform to the line, grade, and cross-section shown in the plans. Each lift shall be subject to compaction testing. All edges and joints of hot mix asphalt pavement repair shall be sealed with asphalt cement. After pavement is in place, all joints shall be sealed with CSS-1, or equal.

(c) CEMENT CONCRETE PAVEMENT

Concrete shall be as specified in the Materials of Construction and shall be placed in accordance with Section 5-05 of the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation. Concrete cylinder samples will be taken by the District for the purpose of testing the compressive strength of the concrete to meet the standards as defined by the regulatory agency. Subgrades shall be prepared as shown on the plans and in compliance with the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation.

All reinforcing steel shall conform with and be placed in accordance with Section 5-05 of the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation and shall conform to the requirements of ASTM Designation A-15 and A-305, latest revisions.

(d) RIGID-TYPE PAVEMENTS RESURFACED WITH ASPHALT

Those areas that now have a Portland cement concrete base and are surfaced with the hot mix asphalt mat shall be replaced in kind. The surface of the cement concrete portion of the patch shall be left low enough to accommodate the asphalt portion of the patch. Brush finishing will not be required. Joints shall be placed as directed by the District. The hot mix asphalt surface mat and the Portland cement concrete base shall be as specified in the Materials of Construction. Both the base and the surface mat shall be carefully prepared, placed and cured in full compliance with Section 5-04.3 of the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation.

Hot mix asphalt or bituminous plant mix shall not be placed until the day after the cement concrete has been placed unless otherwise permitted by the District. The edges of the existing asphalt pavements and castings shall be painted with hot asphalt cement or asphalt emulsion immediately before placing the asphalt patching material. The hot mix asphalt pavement shall then be placed, leveled, and compacted to conform to the adjacent paved surface. Immediately thereafter, all joints between the new and original asphalt pavement shall be painted with hot asphalt or asphalt emulsion and be covered with dry paving sand before the asphalt solidifies.

(e) SHOULDER, GRAVEL SURFACES

Shoulders, gravel driveways, and all other gravel surfaced areas disturbed by construction shall be repaired with a minimum 2-inch lift of 5/8-inch minus crushed rock (top course crushed surfacing). Immediately prior to placement of the gravel, the drainage ditch, shoulders and/or driveways shall be graded to the original smooth contours existing prior to construction. The gravel shall then be placed and compacted in accordance with the applicable Washington State Department of Transportation Specifications.

Crushed surfacing shall be in accordance with Materials of Construction.

Final crushed surfacing shall be placed within 30 days after construction disturbance unless otherwise specified or directed by the District.

10.29 ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO GRADE

This work consists of constructing and/or adjusting all new and existing utility structures encountered on the project to finished grade.

For asphalt overlay areas called for to be planed, all existing utility covers shall be lowered below the proposed planing depth prior to planing.

The castings shall not be adjusted to final grade until the pavement is completed, at which time the center of each casting shall be relocated from references previously established by the Contractor. The pavement shall be cut as further described and base material removed to permit removal of the casting. The casting shall then be brought to proper grade.

Prior to commencing manhole adjustments, a plywood and visqueen cover, as approved by the District, shall be placed over the manhole base and channel to protect them from debris.

The hot mix asphalt pavement shall be cut and removed to a neat circle, the diameter of which shall not exceed 6-inch from the outside diameter of the casting frame. The casting frame shall be brought up to desired grade, which shall conform to surrounding road surface. For manholes, adjustment to desired

grade shall be made with the use of concrete adjustment rings or bricks. No iron adjustment rings will be allowed. An approved class of mortar (one-part cement to two-parts of plaster sand) shall be placed between adjustment rings or bricks and casting frame to completely fill all voids and to provide a watertight seal. No rough or uneven surfaces will be permitted inside or out. Adjustment rings or brick shall be placed and aligned so as to provide vertical sides and vertical alignment of ladder steps (if steps are necessary).

Follow manhole specifications and Standard Sewer Details #1, #2, #3 for minimum and maximum manhole adjustment and step requirements. Special care shall be exercised in all operations in order not to damage the manhole, frames and lids or other existing facilities.

The annular space between the casting and the pavement shall be filled with crushed rock and compacted with hand tamper to within 6-inch of the top of the frame. Asphalt concrete patching shall not be carried out during wet ground conditions or when air temperature is below 50° F. Hot mix asphalt must be at the temperature as specified by the regulatory agency when placed. Before making the hot mix asphalt repair, the edges of the existing hot mix asphalt pavement and the outer edge of the casting shall be tack coated with hot asphalt cement. The remaining 6-inch shall then be filled with Hot Mix Asphalt Class 1/2-inch and compacted with hand tampers and a patching roller.

The completed patch shall match the existing paved surface for texture, density, and uniformity of grade. The joint between the patch and the existing pavement shall then be carefully painted with hot asphalt cement or asphalt emulsion and shall be immediately covered with dry paving sand before asphalt cement solidifies. Before acceptance of a job, castings shall be cleaned of all debris and foreign material. All ladders must be cleaned free of grout. Any damage occurring to the existing facilities due to the Contractor's operations shall be repaired at its own expense.

10.30 HAZARD OF ASBESTOS CEMENT PIPE REMOVAL

Contractor shall comply with Puget Sound Clean Air Agency (PSCAA) Asbestos Control Standards. In order to maintain workers' exposure to or below the exposure limit to asbestos material as prescribed in WAC 296-62-07705 State/Federal Guidelines and Certification, the Contractor shall provide protective work clothing and equipment. No employee shall be allowed to work on asbestos cement pipe unless the following tools and protective work clothing are used.

<u>Carbide Blade Cutting (hand operated only)</u>
Blade cutters consist of a frame, adjustable to the circumference of the pipe, and a number of outboard, self-tracking rollers that align one or more carbide-tipped cutting blades. The cutter is rotated around the pipe with the blades cutting a groove into the pipe. As the cutter is rotated, the blades are slowly

tightened with screws to cut deeper and deeper into the pipe until the pipe is severed.

Equipment required:

- Hand operated carbide blade cutter,
- Water source and means of application sufficient to maintain a continuously wetted cutting area,
- Disposable coveralls,
- Respiratory protection consisting of 1/2 face respirator equipped with HEPA filters or respirator which provides equivalent or better protection,
- Rubber boots, and
- Hard hat.

1. Excavate around the AC pipe a sufficient distance to assure adequate tool clearance in the area to be cut. Care must be taken to avoid any abrasion to the pipe.

2. Don protective equipment and have sufficient water available before entering the trench to begin cutting operations.
3. Clean and wash with water the surface of the pipe in the area to be cut and attach the cutting equipment around the AC pipe.

4. Begin applying water to the area being cut and continue until cutting is complete.

5. Operate the cutting tool in accordance with the manufacturer's instructions until cutting is complete, making sure that water is applied in sufficient quantities to assure that the area being cut is continuously wetted and no AC dust is created.

6. Detach cutting equipment, move to new cutting location, and repeat procedure described above. Upon completion of final cut, thoroughly wash the cutting equipment with clean water to remove all AC debris. Allow wash water to drain into the bottom of the trench. Remove washed cutting equipment from the trench.

7. Install other pipe and fittings as necessary to complete the job taking care to avoid any abrasions to the AC pipe.

8. When all pipe work is completed, remove disposable coveralls and leave them in the bottom of the trench. Thoroughly wash hands, boots, and any small tools with clean water to remove all AC debris. Allow wash water to drain into the bottom of the trench. Leave all AC pipe and asbestos containing materials in the trench unless arrangements have been made for proper disposal at an approved landfill.

9. Exit ditch in such a manner that no AC debris will contaminate work clothing, boots, tools, etc.

10. Plug ends

Any other method proposed by the Contractor shall be one approved by the Washington State Department of Labor and Industries and shall comply with Puget Sound Clean Air Agency permit requirements and shall meet the approval of the City prior to commencement of construction.

10.30A DEACTIVATING THE EXISTING WATER MAIN

The existing water main shall remain the property of the District and shall be protected from damage during construction. The Contractor shall not operate any valves on a live water main or make connections to the existing water system without prior approval from the District.

Existing water mains to be abandoned shall be disconnected, drained and shall be cut and capped where indicated in the Plans to have a watertight seal with a Romac Industries model EC501 cap, or approved equal, unless otherwise shown on the Plans. The pipe end shall be cut square and cleaned prior to capping. The existing valve boxes and valve box covers must be removed as soon as the existing water main is decommissioned, and the new water main is in service.

Existing water main where shown on the Contract Drawings or designated by the Engineer to be abandoned in-place shall have the full length filled with low density cellular concrete (LDCC) material as manufactured by Cell-Crete, Elastizell or approved equal. Flowable CDF is not acceptable. The Contractor shall verify abandon-in-place extents with the District. Low density cellular concrete material shall have minimum 28-day strength of 50 psi and maximum 28-day strength not to exceed 300-psi. The Contractor shall submit a written plan to the District 10 working days prior to the start of this work describing the Contractor's method for accomplishing this work. The plan shall include a complete list of equipment that will be used, details for ensuring that pipe segments are completely filled and free of voids, and contingency measures for fill material collection and containment for unanticipated spills.

10.31 RIGHT-OF-WAY MONUMENTS AND LOT MARKERS

For monuments identified to be removed, disturbed during construction or destroyed as shown on the Plans, the Developer or Contractor requires a Professional Land Surveyor (PLS) to file the required permit forms with the Department of Natural Resources (DNR), as required by RCW 58.09.130 and WAC 332-120. The Contractor's PLS will set tie-out reference points for the

monument(s) identified on the CIP Plans to be removed or destroyed. The contractor shall protect these reference points until the monument(s) have been reset. No construction work affecting monumentation shall commence until DNR has approved the permit. Upon completion of work affecting monumentation, the form “Completion Report for Monument Removal or Destruction” shall be signed by the PLS and submitted to DNR.

During construction, the Contractor shall take all necessary precautions to locate and protect existing markers, property corners, monuments and other reference points.. Under no circumstances shall work be performed which would remove, adjust, or destroy any such markers without the DNR permit, as required by RCW 58.09.130 and WAC 332-120. In the event that the Contractor disturbs or destroys any existing marker, property corner, monument or other reference point not identified to be removed or destroyed, the Contractor shall bear any and all costs for permitting, survey, resetting, legal claims and filing of State forms as required by RCW 58.09.130 and WAC 332-120.

10.32 RE-DESIGN OF LINES

Should interferences or obstructions create construction difficulties that the District determines shall require redesign or relocation of the lines, the District will require the necessary revised drawings.

10.33 GRASS SEEDING AND SOD

Areas of existing grass and all areas disturbed by construction that do not receive a specific type of restoration, such as paving, rock, or bark, shall be reseeded, or restored with sod as specified.

The Contractor shall be responsible for providing a finished grass area, which meets the approval of the property owner and the District.

The Contractor shall maintain the grass, including furnishing water and mowing, until project approval, unless otherwise specified.

(a) TOPSOIL

All areas to be seeded, reseeded, or sodded shall be provided with a 4-inch minimum depth of topsoil. Topsoil used shall be imported and shall be subject to approval by the District. Before providing topsoil, all areas shall be raked smooth, and all debris removed and disposed of. The topsoil shall be tilled to a depth sufficient to key into the subsoil, raked to a smooth and even grade without low areas to trap water, and compacted.

The Contractor shall notify the engineer not less than 24 hours in advance of any seeding or sodding operation and shall not begin seeding or sodding until areas prepared or designated have been approved by the District.

(b) SEEDING AND FERTILIZING

Prior to beginning seeding operations, the contractor shall submit seed mix and rate of application to the District for approval.

Seeding shall not be done during windy weather or when the ground is frozen, excessively wet, or otherwise untillable.

Seed and fertilizer may be sown by one of the following methods:

1. An approved hydroseeder in accordance with the latest published Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation.

2. Hand methods where allowed by the District in areas that are impossible to hydroseed. Seed shall be applied after the fertilizer and shall be raked into the top one (1) inch of the fertilized topsoil. Immediately following the raking of the seed into the soil, the total area shall be covered with District approved mulch and shall be rolled with a water-filled roller.

The seed shall have a tracer added to visibly aid uniform application. The tracer shall not be harmful to plant and animal life. If wood cellulose fiber is used as a tracer the application rate shall not exceed 250 lbs. per acre.

Fertilizer shall be provided and applied in accordance with the manufacturer's recommendations. The Contractor shall submit for approval a guaranteed fertilizer analysis label for the specified product.

Unless otherwise specified, seeding, fertilizing, and mulching shall be completed between April 15 to June 1 and August 15 to October 15.

(c) GRASS SOD

Sod shall be provided at all locations of established lawn disturbed by construction activities and at other locations as indicated on the plans.

Sod strips shall be placed within 48 hours of being cut. Placement shall be without voids and the end joints shall be staggered. The sod shall be rolled with a smooth roller following placement.

10.34 FINISHING AND CLEANUP

Before acceptance of the project, all pipes, manholes, catch basins, and other appurtenances shall be cleaned of all debris and foreign material. After all other work on the project 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 shown on the plans and as hereinafter specified.

In undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that, upon completion, the area will present a uniform appearance, blending into the contour of the adjacent properties. All other requirements outlined previously shall be met. Slopes, sidewalk areas, planting areas and roadway shall be smoothed and finished to the required cross-section and grade.

Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. All graded areas shall be true to line and grade as shown on the typical sections and as required by the District.

All rocks in excess of one (1) inch diameter shall be removed from the entire construction area and shall be disposed of the same as required for other waste material. In no instance shall the rock be thrown onto private property. Overhang on slopes shall be removed and slopes dressed neatly so as to present a uniform, well sloped surface.

All excavated material at the outer lateral limits of the project shall be removed entirely. All debris resulting from clearing and grubbing or grading operations shall be removed and disposed.

Drainage facilities, such as inlets, catch basins, culverts, and open ditches, shall be cleaned of all debris resulting from the Contractor's operations.

All pavements and oil mat surfaces, whether new or old, shall be thoroughly cleaned. Existing improvements, such as Portland cement concrete curbs, curb and gutters, walls, sidewalks, and other facilities which have been sprayed by the asphalt cement shall be cleaned to the satisfaction of the District.

Castings for manholes, monuments, water valves, lamp poles, vaults, and other similar installations which have been covered with the asphalt material shall be cleaned to the satisfaction of the District.