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DOMESTIC WATER MAIN EXTENSIONS**GENERAL:****INTRODUCTION:**

The items herein contained are the domestic water main extension and repair Standards, Conditions, and Specifications for the City of Chelan. These are minimums only when they exceed the minimums required in the Washington State DOH Standard (Department of Health "Water System Design Manual"), and may be increased or altered at the discretion of the Public Works Director to fit particular situations, but in no event shall said standards be reduced below the DOH standard. In the event of conflicting standards the higher standard shall control.

STANDARDS AND CONDITIONS

- A. When extension of the existing water distribution system is required for service, an Agreement for Domestic Water Main Extension in the form which is attached hereto and incorporated herein by this reference as Appendix B, Exhibit 1, shall be entered into between the Developer and the City.
- B. To initiate the Water Main Extension process the Developer shall submit a water plan designed by a registered professional engineer licensed in the State of Washington. Final plan and profile drawings shall be stamped by the same.
- C. The licensed professional engineer shall certify that the design and construction of the water distribution system meets or exceeds all applicable standards, to include backflow prevention and cross connection control.
- D. Obtaining necessary permits will be the responsibility of the Developer.
- E. Where franchises, easements or deeds to property are required it shall be the responsibility of the Developer to obtain and provide the same and submit appropriate documentation to the City.
- F. Easements shall be as per Section 10 of this code.
- G. All developments shall be required to provide sufficient water storage for fire protection which shall be in addition to those water supplies required for domestic purposes.
- H. A development containing forty lots or more shall contain at least two water supply routes, completing a system loop.
- I. In a development where lot size is larger than one acre, fire hydrants shall be spaced no further than one thousand feet apart and in subdivisions where lot size

is less than one acre, fire hydrants shall be spaced no further than six hundred feet apart. Where multiple family housing developments are developed within a subdivision, fire hydrant spacing shall be no further than five hundred feet apart, with additional fire hydrants located as may be necessary to permit all sides of a building to be reached by hose outlays of no greater than three hundred feet. In industrial or commercial areas, hydrants will be installed at three hundred (300) foot spacing. Typically, hydrants will be installed on alternating sides of the street. The size, type and location of fire hydrants shall meet the approval of Fire District 7. Fire hydrants shall conform with the Uniform Fire Code as adopted by the City.

- J. The minimum size water main permitted shall be eight inch (8") diameter. Hydraulic calculations shall be submitted where required to validate designs involving two or more pressure zones, a pressure reducing station, a booster pump, or a reservoir. Six inch (6") pipe shall be allowed at the discretion of the City Engineer, when hydraulic analysis shows it will be adequate to transport peak daily demand plus fire flow.
- K. The Developer shall supply an "as-built" drawing on approved mylar film and electronic CD format as an AutoCAD file.
- L. The Developer is required to supply bonding and insurance as per the Section on "Bonding and Liability Insurance."
- M. The Developer shall notify the City 48 hours prior to connection between the City's existing system and the new water distribution system.
- N. All main lines must be designed to provide proper circulation of water and fire flow to all lands serviced by the development. Extensions shall be required through and to the extremes of the property for future service as determined by the City. Fire flow demand shall be in accordance with the Uniform Fire Code Appendix Table III-A as now exists or as may be amended.
- O. Hydrostatic testing (see page-1-13) shall be accomplished by the developer on lines before completion of backfilling, with the pipe joints accessible for examination. Sufficient backfill material shall be placed over the pipe barrel between joints to prevent movement.
- P. Final acceptance shall not constitute acceptance of any unauthorized or defective work or material. The City shall not be barred from requiring the Developer to reimburse the City for the removal, adjustment, replacement, repair or disposal of any unauthorized or defective work or material or from recovering costs for any such work or material within two years.
- Q. Meters smaller than 2" shall be furnished and set by the City. Meters shall not be activated prior to payment by water user of all applicable hook-up fees. The City owns and maintains only appurtenances from and including the water meter to the

water main.

- R. Water Main Extension projects shall be conveyed to the City for operation and maintenance upon final project acceptance.
- S. Installation and testing shall be in conformance with the current edition of APWA (American Public Work Association) specifications, Division IV. The City must supervise the owner taking necessary samples for bacteriological tests. The system shall not be placed into service until the City provides written permission.
- T. For existing platted lots, the City may enter into Latecomer Agreements with Developers, prior to installation of water mains and appurtenances, in order to provide for the reimbursement to Developers for a pro-rata share of the cost of construction pursuant to Chelan Municipal Code Chapter 13.36 and Chapter 12.28 as now exists or as may hereafter be amended.
- U. Interim Water Systems
1. Individual or small group domestic wells are allowed in unincorporated areas (i.e., outside city limits) within the City's Urban Growth Area where domestic water service is not available within 750 feet in the following cases only:
 - a. In the case of single family residential land divisions, provided:
 - i. The parcel to be divided shall be at least 20 acres in size;
 - ii. The parcel may be divided into no more than four lots; and
 - iii. Each lot must be at least five acres in size.
 - b. To serve agricultural tourism uses and small-scale craft beverage production uses.
 2. Domestic wells shall meet all applicable requirements of the Chelan-Douglas Health District, the Washington State Department of Health, and the Washington State Department of Ecology, including compliance with Chapter 173-160 WAC.
 3. Domestic wells for agricultural tourism uses and small-scale craft beverage production uses must be decommissioned in accordance with Chapter 173-160 WAC if the agricultural tourism or small-scale craft beverage production use is discontinued.
 4. The property owner shall sign an agreement not to protest a future local improvement district (LID), later comer agreement or other pro rata sharing of costs to construct and extend public water to the property.
 - a. Said agreement shall describe the property, shall be recorded with the Chelan County auditor's office, and shall constitute a covenant running with the property. The agreement and all provisions of the on-site well approval shall bind the owner and all other persons subsequently acquiring any right, title or interest in or to the property.
 - b. In addition to the cost of constructing and extending public water to the property, the owner shall be required to pay all applicable General Facilities Charges.

5. The property owner shall sign an agreement not to protest annexation of the property to the city. Said agreement shall allow the city to execute a petition for annexation on behalf of the owner if the owner does not do so when requested by the city; and shall describe the property, be recorded with the Chelan County auditor's office, and constitute a covenant running with the property. The agreement and all provisions of the on-site well approval shall bind the owner and all other persons subsequently acquiring any right, title or interest in or to the property.
6. Future roadway development.
 - a. In the case of land divisions, the layout of the parcels shall accommodate future urban growth, providing for road access to all parcels created by the division and to neighboring properties.
 - b. In all cases, building setbacks from the front and, where applicable, side property lines must be adequate to accommodate future development of a street meeting the City's standards, which may include sidewalks, parking lanes, bicycle lanes, planter strips, and utility easements.
 - c. The City may impose requirements for future urban development, including requiring dedication of easements for future roadway and utility easements.
 - d. The property owner shall sign an agreement not to protest a future LID or other pro rata sharing of costs to construct and extend public streets to and adjacent to the property. Said agreement shall describe the property, shall be recorded with the Chelan County auditor's office, and shall constitute a covenant running with the property. The agreement shall bind the owner and all other persons subsequently acquiring any right, title or interest in or to the property.
7. The property owner shall comply with all requirements of the city's comprehensive land use plan, zoning and building codes, and development standards when dividing, developing, or redeveloping the property. In particular:
 - a. Domestic wells must comply with Chapter 14 CMC, Critical Areas.
 - b. The property owner shall improve the city right-of-way adjacent to the property in conformance with the City's standards or, in cases in which concurrent street improvement is not required (e.g., where access via private driveway is allowed), shall execute a waiver of protest for an LID to construct any street improvements required for access to or through adjacent property.

SPECIFICATIONS

EXTENSIONS:

All extensions to the water system shall conform to the design standards of the City

as set forth herein. The system must be capable of future expansion if required and be constructed of permanent materials.

PLANS AND SPECIFICATIONS:

The installation of water extensions shall be in accordance with construction plans and specification approved by the City.

METHODS AND MATERIALS OF CONSTRUCTION:

1. Water pipe shall be ductile iron or C900 PVC. Ductile iron shall typically be class 50 in improved areas and class 52 in easement areas. PVC shall be class 200.
2. Fire hydrants shall be installed in accordance with these standards and the current fire code as adopted.
3. Valving shall be installed at all intersections, on each end of easement lines and in line at maximum spacing of 600 feet.
4. Minimum cover for all water mains shall be four (4) feet to top of pipe unless otherwise approved.
5. Except as otherwise noted herein, all work shall be accomplished as recommended in the current applicable American Waterworks Association (AWWA) and American Public Works Association/Department of Transportation Standard Specifications and according to the recommendations of the manufacturer of the material or equipment use. Contractor shall have a copy of the specifications on the job site at all times. Contractor shall furnish a water tight plug of the appropriate size which shall be installed in the end of the water main when work is delayed or stopped at the end of the work day.
6. All materials shall be new and undamaged. Unless otherwise approved by the City, the same manufacturer of each item shall be used throughout the work.

TRENCH EXCAVATION:

Clearing and grubbing where required shall be performed within the easement or public right-of-way and as permitted by the property owner and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the Developer in accordance with the terms of all applicable permits.

Trenches shall be excavated to the line and depth designated by the approved plans to provide a minimum of 48 inches of cover over the pipe, unless otherwise

approved. The trench width shall be excavated only to such widths as are necessary for adequate and safe working space. Trench width to one foot above the pipe crown shall not exceed 30 inches or 1.5 times the pipe nominal O.D. plus 18 inches, whichever is greater. The trench shall be kept free from water until complete. Surface water shall be diverted so as not to enter the trench. The Developer shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

The Developer shall perform all excavation. Boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below water main grade. Where material is removed from below subgrade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted to 85% for easements outside of roadway and 95% in streets, alleys or traveled ways, using modified proctor testing. The Developer shall be responsible for meeting current Labor and Industry Trench and Shoring Protection and Washington State Safety Standards.

Unsuitable material below the depth of the proposed pipe shall be removed and replaced with satisfactory materials as determined by the City.

When trenching operations cut through asphalt/concrete pavement, the pavement shall be removed to a solid edge along the width of the trench as approved by the City engineer. The pavement shall be saw cut on a straight line and shall be beveled so that the cut will be approximately 1 inch wider at the top than at the bottom.

Trenching operation shall not proceed more than 200 feet in advance of pipe laying without written approval of the City.

PIPE INSTALLATION WITHIN STREET RIGHT-OF-WAYS:

The Developer may use any method which provides satisfactory results which complies with Chapter 12.20 of the Chelan Municipal Code as it now exists or may be hereafter amended and is acceptable to the City and the agency having control of the road, provided that the Developer restores the roadway to its original condition. Permits shall be required for all crossings. Highway crossings may require the placing of steel pipe casing by jacking or tunneling and laying the water main within this casing.

PIPE IN FILLED AREAS:

Special treatment may be required at the discretion of the City. This treatment may consist of compacting the backfill in 6" layers, use of select backfill materials, use of Mechanical Joint Ductile Iron Pipe in short lengths, welded HDPE pipe, or such other reasonable methods or combinations as may be necessary in the opinion of the City based upon topography, soil type and any other unique characteristics or

the area.

PIPE BEDDING:

1. Except when excavating in pure sand, where imported bedding material will not be required, the pipe shall be placed on a prepared subgrade of imported bedding material four inches under the pipe for all pipe sizes of 27 inches diameter and smaller and 6 inches for all pipe sizes 30 inches and larger. Bedding material shall consist of clean, granular, unfractured material of which 100 percent will pass the U.S. Standard 5/8 inch opening; not more than 3 percent will pass the U.S. No. 200 (wet sieve). Bell holes shall be excavated so the pipe, when laid, will have a uniform bearing under the full length of the pipe. The Developer shall be responsible for adequate support and bedding for the pipe. The trench shall be backfilled from the spring line of the pipe to six inches above the top of the pipe as shown in the Standard Detail drawing. The material shall be placed in four-inch layers and compacted to no less than 95 percent of the maximum theoretical density as measured by a soil lab, using the modified proctor test.
2. Where the undisturbed trench below the four-inch bedding is unstable, the unstable material shall be removed and backfilled with foundation gravel upon which to place the bedding, as approved by the City engineer. The Contractor shall be responsible for providing a stable foundation for placing of the bedding.
3. Boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the full width of the trench and to a depth six inches below the pipe. In solid rock, the trench shall be excavated six inches below the pipe bottom and backfilled as provided above.
4. Whenever the trench is excavated below the depth required for proper bedding, it shall be backfilled with bedding gravel and compacted, as provided above.

DUCTILE IRON PIPE:

Ductile iron pipe shall be cement-lined standard thickness Class 50 in improved areas or Class 52 in non-roadway easement areas, unless otherwise specified and shall conform to the standards of USA Standard A-21.51 (AWWA C-111).

Rubber gasket pipe joints to be push-on-joint (Tyton) or mechanical joint (M.J.) in accordance with USA Standard A21-11 (AWWA C-111), unless otherwise specified.

Flanged joint shall conform to USA Standard B16.1.

Standard Thickness cement lining shall be in accordance with USA Standard A21.4

(AWWA C-1-4).

The Developer shall furnish written certification from the manufacturer of the pipe and gasket being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of this standard.

DUCTILE IRON PIPE INSTALLATION:

Ductile iron pipe shall be installed in accordance with AWWA Standard C-151 and the manufacturers recommendation.

The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint. Bolts on mechanical joint pipe and fittings shall be tightened uniformly with a "Torque" wrench which measures the torque applied. Required torque for mechanical joints shall be as follows:

4" - 24" pipe size 3/4" bolts 60-90# torque.

Installation of push-on-joint (Tyton) pipe shall be in accordance with the manufacturer's instructions.

PVC PIPE:

PVC pipe shall be AWWA C900-81 high pressure water pipe, class 200, and shall meet the requirements of DR 14.

The gasketed joint assembly shall conform to ASTM D3139 with gaskets conforming to ASTM F477.

The Developer shall furnish written certification from the manufacturer of the pipe and gasket being supplied that the inspections and all of the specified tests have been made and the results thereof comply with the requirements of this standard.

PVC PIPE INSTALLATION:

PVC pipe shall be installed in accordance with AWWA M23 and the manufacturers recommendation.

The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

TRACER WIRES

The Contractor shall install a tracer wire, in addition to the location ribbon, over all non-metallic water mains. The tracer wire shall be 14 gauge copper wire with blue coded UF insulation. The tracer wire shall be installed as shown on the City of Chelan Standard Drawing. Bare wire contact points shall be provided at valve boxes, air release and blow off installations.

DETECTABLE MARKING TAPE:

Detectable Marking Tape (S.9-15.18) shall be installed 12" to 18" above pipe crown over all pipe located within public street right-of-ways. Pipe locator ribbon shall be two inches wide, plastic coated aluminum and shall be clearly marked, "CAUTION BURIED WATER LINE" continuously along the length of the ribbon with minimum 1-1/2 inch letters. The ribbon shall be blue in color for water pipe.

DUCTILE IRON FITTINGS:

Ductile iron fittings shall be short body for pressure rating of 150 psi, unless otherwise noted. Metal thickness and manufacturing process shall conform to applicable portions of USA Standard A21.10, A21.11, B16.2 and B16.4.

Fittings shall be cement-lined in accordance with USA Standard A21.4 (AWWA C-104).

Rubber gaskets for mechanical joint (M.J.) in accordance with USA Standard A21.11 (AWWA C-111).

Gasket material for flanges shall be neoprene, Buna N, chlorinated butyl. Type of connections shall be specified as push-on-joint (Tyton), mechanical joint (M.J.), plain end (P.E.), flanged (FL.) or threaded.

BOLTS IN PIPING:

Bolts shall be cast iron, zinc or chromium plated or stainless steel, as approved by the City.

GALVANIZED IRON PIPE AND FITTINGS:

Where specified, galvanized iron pipe shall be standard weight, Schedule 80. Fittings shall be threaded malleable iron galvanized per USA Standard B16.3.

CONCRETE THRUST BLOCKING:

Concrete thrust blocking shall be cast in place and have a minimum of 1/4 square foot bearing against the fitting and two square feet bearing area against undisturbed

soil. Blocking shall bear against fittings only and shall be clear of joints so as to permit taking up or dismantling joint. All poured in place blocking shall have a minimum measurement of twelve inches (12") between the pipe and the undisturbed bank. All bends and tees shall be blocked in accordance with Standard Blocking as per design details which shall be adequate to withstand full test pressures as well as to continuously withstand operating pressure under all conditions of service. Polyethylene sheeting shall be installed to cover joints and bolts for future dismantling.

BEDDING CONCRETE:

Bedding concrete shall be mixed from materials acceptable to the City and shall have a 30-day compressive strength of not less than 1,500 psi. The mix shall contain four sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches.

GATE VALVES:

Gate Valves shall be used in all applications unless otherwise specified by the City Engineer. They shall conform to the Standards of AWWA C-515 . Buried gate valves shall be iron body, bronze mounted, resilient wedge, nonrising stem, operating stems equipped with Standard two (2) inch operation nut, and O-ring stem seals, suitable for installation with the type and class of pipe being installed. Ends to be as specified.

Valves not buried shall be so specified.

BUTTERFLY VALVES:

When specified, butterfly valves shall conform to AWWA Standard C504, Class 150, with cast iron short body and O-ring stem seal. Valves in chambers shall have a manual crank operation. Buried valves shall have stem extension with AWWA 2-inch operation nut. Full cycle open and close shall be confirmed after installation but prior to backfill. Butterfly valves shall not be directly connected to C900 pipe.

CHECK VALVES:

Check valves shall be for 150 psi working pressure, unless otherwise specified. Valve shall have adjustable tension lever and spring to provide non-slamming action under all conditions unless otherwise specified. Check valves shall be equal to Empire Fig. 230 single increasing lever and spring.

AIR AND VACUUM RELEASE VALVES:

Air and vacuum release valves shall be APCO - Valve and Primer Corporation, "Heavy-Duty", combination air release valve, or equal.

Installation shall be as shown on the Standard Detail, Section Two, page 5.

Piping and fittings shall be copper or brass. The installation shall be set at the high point of the line. Water line must be constructed so the air release valve may be installed in a convenient location.

VALVE INSTALLATION:

The valve and valve box shall be set plumb with the valve box centered on the valve. Valve boxes shall be set flush in pavement and in gravel roads as required by the City. An area around the top shall be black topped in unimproved roads for 2 feet. Where valve operation nut is more than 3 feet below finished grade, a stem extension shall be installed conforming to the Standard Detail, Section 2, pg 2-6.

VALVE BOXES:

Valve boxes shall be cast iron, two-piece with tabs, for 42-inch trench with extension, Tyler 7126 top and 7100 bottom.

VALVE MARKER INSTALLATION:

When specified, concrete marker posts painted with two coats, Rust-Oleum yellow paint shall be set for all valves except auxiliary hydrant valves. The post shall be set at right angles to the road from the valve and shall be situated in a safe and reasonably conspicuous location, normally on the property line. Distance to valve shall be neatly stenciled on the post with two inch numerals. Valve markers shall be installed in unimproved or unpaved areas.

Valve marker posts shall be reinforced concrete posts, 4" x 4" on one end, 42 inches long. Fogtite Meter Seal Co. or equal.

FIRE HYDRANTS:

Fire hydrants shall have a minimum valve opening of 5-1/4" O-ring stem seal, two 2½" N.S.T. hose nozzle connections, and one 4½" N.S.T. pumper connection. The shoe connection shall be 6" mechanical joint or flanged. The operation nut shall be 1¼" pentagonal. Hydrants shall be Mueller Centurion or approved equal, with approved breakaway features and Storz fitting. A minimum of one field re-build kit will be supplied by the Developer. On large projects, one kit will be supplied for every ten hydrants installed.

HYDRANT GUARDS:

When required by City engineer, hydrant guards shall consist of individually designed curbed planters. Hydrant guards shall be required where hydrants are susceptible to potential vehicle contact as determined by the City.

SERVICE CONNECTION:

Connections shall be installed with pipe saddles and corporation stops on C900 PVC, asbestos cement, and steel, and by direct tap into Class 52 or thicker ductile. Installation shall be as shown in the Standard Details. Minimum size tap is 1 inch.

METER BOX:

Meter box shall be complete with full lid. Lid shall have a hole for Sensus Touch Read. One inch service box shall be Mueller/McCullough thermal-coil meter box 18" diameter 48" depth equipped with inlet angle meter stop with lockwing, dual angle check valve outlet and insulating pad. 1½" and 2" meter boxes shall be concrete H 2 precast 2019.

PLASTIC SERVICE PIPE AND CONNECTIONS:

Plastic pipe shall be manufactured from high molecular weight polyethylene (average molecular weight of 1,750,000) defined by ASTM-1248, as polyethylene Type 111 (3306) (PE). Pipe shall be made of all virgin material and conform to CS-255-63. Plastic pipe shall meet all requirements of ASTM D2241-67. The pipe shall be copper tube size, and have a working pressure of 200 psi at 73.4 degrees F. It shall sustain 300 psi at 73.4 degrees F. for 1000 hours. All connections to this pipe shall be of the Ford Packjoint, Mueller instatite, or equal, compression type connection with a stainless steel insert stiffener or by O-ring type self sealing fittings. All connections shall be rated at a working pressure of 160 psi.

DETECTOR CHECK AND BACKFLOW DEVICE:

Cross connection control is governed by Chelan Municipal Code, Chapter 13.05. All backflow devices are to be tested and certified upon installation and annually thereafter by a Washington State certified backflow assembly tester. All backflow devices must be models included on the current list of backflow prevention assemblies approved for use in Washington State. The current approved assemblies list is available from the Office of Drinking Water.

Detector checks will be installed on all fire lines. See Standard Details, Section 2.

In addition to Chelan Municipal Code, Chapter 13.05.070, an approved backflow device will be required on the following fire systems:

- a. All foamite or chemically charged installations.
- b. Systems where an unapproved water source is permanently connected to the fire system.
- c. Systems in which anti-freeze is allowed.

- d. Systems with private hydrants.
- e. Wet systems with an in-line booster pump or building over three stories high.
- f. Wet systems with pumper connection within 1700 feet of an auxiliary water supply.
- g. Dry systems with pumper connection.
- h. Sprinkler systems.

PUMP AND PRESSURE REDUCING STATION:

Pipe, fittings, and equipment shall be supported and blocked against static and dynamic loading in accordance with the "Concrete Thrust Blocking" standard drawing, and the equipment manufacturer's recommendations.

Drain lines from pumps and other equipment shall be piped to a below grade drainage system connected to the station sump or drain.

BACKFILLING:

Backfilling and surface restoration shall closely follow installation and testing of pipe, so that not more than 200 feet is left exposed without express approval of the City. Selected backfill material shall be placed and compacted around and under the water mains by hand tools to a height of 6 inches above the top of the water main. The remaining backfill shall be compacted to current WSDOT Standards, modified proctor test, of the maximum density as determined by a certified soils lab. Where other agencies have jurisdiction over roadways, the backfill and compaction shall be done to the standard of the agency having jurisdiction.

HYDROSTATIC TESTS:

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 200 psi for 15 minutes at the high point in the line, as per APWA (American Public Works Association), and any leaks or imperfections developing under said pressure shall be remedied by the Developer before final acceptance of the work. No air will be allowed in the line. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected. The Developer shall provide all necessary equipment including valves to test against where needed and shall perform all work connected with tests. Tests shall be made after all connections as shown on the plan are complete. Insofar as is practical, tests shall be made with

pipe joints, fittings and valves exposed for inspection. For approval, the quantity of water lost from the main shall not exceed the number of gallons per hour as determined by the formula $L = (ND(P)^{1/2})/7400$

in which L = Allowable leakage, gallons/hour
 N = No. of joints in the length of pipeline tested
 D = Nominal diameter of the pipe in inches
 P = Average test pressure during the leakage test, psi

There shall not be an appreciable or abrupt loss in pressure during the 15 minute test period. The Developer shall test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test. The City engineer shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test may be at the Developer's expense.

STERILIZATION AND FLUSHING OF WATER MAINS:

Sterilization of water mains shall be accomplished by the Developer in accordance with the requirements of the State Health department and in a manner satisfactory to the City. The section to be sterilized shall be thoroughly flushed at maximum flow prior to chlorination. At no time shall chlorinated water from a new main be flushed into a body of fresh water. This includes lakes, rivers, streams and any and all other waters where fish or other natural water life can be expected. Flushing period must be approved by the City. Sections will ordinarily be sterilized between adjacent valves unless, in the opinion of the City, a longer section may be satisfactorily handled. Chlorine shall be applied by solution fed at one end of the section with a valve or hydrant at the opposite end opened sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 60 PPM chlorine. Hydrants along the chlorinated section shall be opened during application until the presence of chlorine has definitely been detected. When a chlorine concentration of not less than 50 PPM has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken for approval by the City. Flushing period must be approved by the City. The Developer shall exercise special care in flushing to avoid damage to surrounding property. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the Developer until satisfactory results are obtained.

HYDRANT TESTING

Upon connection of new water main extension to the existing system, all new fire hydrants shall be flow tested to confirm fire flow projections.

SANITARY SEWER CROSSINGS**Required Separation Between Water Lines and Sanitary Sewers**

The basic separation requirements apply to sewers of 24-inch diameter or less; larger sewers may create special hazards because of flow volumes and joint types. The special construction requirements given are for the normal conditions found with sewage and water systems. More stringent requirements may be necessary in areas of high ground water, unstable soil conditions, etc.

A. Horizontal Separation (Parallel)

A minimum horizontal separation of ten (10) feet between gravity sanitary sewers and any existing potable water lines shall be maintained, whenever possible. The distance shall be measured edge to edge.

B. Unusual Conditions (Parallel)

When local conditions prevent a horizontal separation as described previously, a gravity sewer may be laid closer than 10 feet to a water line provided:

- a. It is laid in a separate trench; or, it is laid in the same trench with the water line that is located at one side on a bench of undisturbed earth; and
- b. In either case, the elevation of the crown of the gravity sewer must be at least 18 inches below the invert of the water line. When this vertical separation cannot be obtained, the gravity sewer shall be constructed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to assure water tightness prior to backfilling.

C. Vertical Separation (Perpendicular)

Sewer lines crossing water lines shall be laid below the water lines to provide a separation of at least 18 inches between the invert of the water pipe and the crown of the sewer, whenever possible.

D. Unusual Conditions (Perpendicular)

When local conditions prevent a vertical separation the following construction shall be used:

- a. Gravity sewers passing over or under water lines shall be:

1. Constructed of material described in this section. The one segment of the maximum standard length of pipe, (but no less than 18 feet long) shall be used with the pipes centered to maximize joint separation.
 2. Standard gravity sewer material encased in concrete or in a 1/4" thick continuous steel casing with all voids pressure-grouted with sand-cement grout.
 3. The length of sewer pipe shall be centered at the point of crossing so that the joints will be equi-distant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.
- b. Water lines passing under gravity sewers, in addition, shall be protected by providing:
1. A vertical separation of at least 18 inches between the invert of the sewer and the crown of the water line;
 2. Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking of the water lines; and
 3. The length of sewer pipe shall be centered at the point of crossing so that the joints will be equi-distant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.
- c. Pressure sewers shall only be constructed under water lines with ductile iron pipe or standard sewer pipe in a steel casing for a distance of at least ten (10) feet on each side of the crossing.

SUMMARY:

Any material, design, standard or testing not specifically addressed within these standards shall be as per the current edition of American Public Works Association Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and the American Water Works Association Standards, both of which are hereby adopted by this reference.

DOMESTIC WATER MAIN EXTENSIONS CHECKLIST

1. Developer submits legal description of proposed development.
2. City provides standards, conditions and specifications.
3. Developer submits water distribution plan designed by registered civil engineer licensed in Washington State.
4. Developer signs Domestic Water Service Extension Agreement.
5. If the project is in full compliance with the water system comprehensive plan, as determined by the City engineer, administrative approval is sufficient.
6. After the water distribution plan is accepted, City enters into agreement with the Developer for water main extension, which will include a right-of-way Excavation Permit.
7. Water main extension to be constructed by a licensed and bonded contractor to City standards as certified by a licensed engineer. The construction contract management shall be at the Developer's expense. At the City's option, the project inspectors may be City staff or may be contracted for by the City. (See Appendix B, Exhibit 2)
8. Contractor posts required bonds and insurance.
9. City inspects and observes testing of water main prior to approval.
10. Developer conveys system to City for operation and maintenance.
11. All services from the new water main extension are installed.
12. After two years, City inspects improvements and, if appropriate, releases bond/returns deposit balance.

DOMESTIC WATER MAIN EXTENSION AS-BUILT DRAWINGS

As-built drawings of all improvements deeded or conveyed to the City of Chelan shall be provided. As-built drawings shall show all modifications made during construction. They shall also show precisely the location of all buried utilities, including the measured distance to all sewer tees or wyes, and the distance from valves to fittings. The location of water and sewer facilities shall be indicated by showing measured distances to monuments or other approved permanent reference.

As-built drawings for water improvements shall include a copy of the Engineer's Certificate of Completion form, as required by Washington State Department of Health.

As-built drawings turned over to the City upon acceptance of the utilities shall meet the drafting standards in Section 8.