

DIVISION 5, WATER

5-00 GENERAL CONSIDERATIONS:

5-10 GENERAL: Any extension of the Bremerton Water System must be approved by the Department of Public Works and Utilities. All extensions must conform to Department of Health (DOH) standards, Cross Connection Control standards, the City of Bremerton Water System Plan, the Kitsap County Coordinated Water System Plan, Bremerton Fire Department requirements, WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction and the Engineering Design and Construction Standards.

In designing and planning for any development, it is the responsibility of the developer to ensure that adequate water for both domestic use and fire protection is provided. The developer must show, in the proposed plans, how water will be supplied and whether adequate water pressure will be attained in case of fire. An analysis of the system may be required.

Anyone who wishes to extend or connect to the City's water system should contact the Department for the appropriate approvals and a connection fee estimate. This fee estimate is an estimate of the costs owed to the City for a water service line or water main extension or connection.

Prior to the activation of any water service, all Department improvements must be completed, approved, and accepted including granting of right-of-way or easements, and payment of all applicable fees.

Issuance of building permits for new construction of single family subdivisions shall not occur until a utility service agreement has been executed and all fees due have been paid. The certificate of occupancy will not be issued until final City approval is given for all improvements.

5-10.1 ENGINEERING DESIGN AND CONSTRUCTION STANDARDS: The design of any water extension/connection shall conform to these Standards and any applicable standards as set forth herein:

The layout of extensions shall provide for the future continuation and/or "looping" of the existing water system as determined by the City. In addition, water main extensions shall be extended as required in BMC 15.02.

5-10.2 PLANNING CRITERIA: The planning criteria to identify water system demands for large developments can be found in the most current City of Bremerton Water System Plan.

5-10.3 WATER SYSTEM SIZING: Water system improvements shall be sized in accordance with the Department of Health's Water System Design Manual and WAC 246.290. An analysis of the water system may be required to ensure these standards are met.

5-15 GENERAL NOTES (WATER MAIN INSTALLATION)

The General Notes on the following pages shall be included on any plans dealing with water system design.

5-15.1 All workmanship and material shall be in accordance with the Engineering Design and Construction Standards and the most current edition of the *WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction*. In cases of conflict, the most stringent standard shall apply.

5-15.2 The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the Washington State Department of Labor and Industries.

5-15.3 The contractor shall be responsible for all traffic control in accordance with the *WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction* (all applicable "K" plans in the standard plans) and/or the *Manual on Uniform Traffic Control Devices* (MUTCD). Prior to interruption of any traffic, an approved traffic control plan is required. No work shall commence until all approved traffic control is in place.

5-15.4 All approvals and permits required by the City shall be obtained by the contractor prior to the start of construction.

5-15.5 If construction is to take place in the City or County right-of-way, the contractor shall notify the City or County and obtain all the required approvals and permits. A copy of the right-of-way permit must be submitted to the City prior to the start of construction.

5-15.6 A pre-construction meeting shall be held with the City prior to the start of construction.

5-15.7 The contractor shall be fully responsible for the location and protection of all existing utilities, which includes keeping the locates current. The contractor shall verify all utility locations prior to construction by calling the Underground Locate line at 800-424-5555 a minimum of 48 hours prior to any excavation and after the locates are completed the contractor is responsible to maintain marks through construction.

5-15.8 It shall be the responsibility of the contractor to keep a copy of the approved set of plans on site. Also, a current red-line (change to the plan) drawing of the approved plan indicating changes shall be kept on the construction site at all times.

5-15.9 All surveying and staking shall be performed per the Engineering Design and Construction Standards.

5-15.10 Temporary erosion control/water pollution measures shall be required in accordance with the Engineering Design and Construction Standards. At no time will silts and debris be allowed to drain into an existing or newly installed stormwater facility unless special provisions have been approved.

5-15.11 Unless otherwise identified in the approved construction plans all water mains shall be Ductile Iron, Standard Class 52 and installed per AWWA Standard C600.

5-15.12 Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-rings seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509 or C515. Valves shall be Mueller, M & H, Kennedy or Clow R/W.

5-15.13 Existing valves shall be operated by authorized city employees only.

5-15.14 Hydrants shall be as specified as shown in the Engineering Design and Construction Standards (detail 5081) and shall be bagged until system is approved.

5-15.15 All water mains shall be chlorinated and tested in conformance with WSDOT Section 7-09.3 (23) and 7-09.3 (24).

5-15.16 All pipe shall be installed with continuous direct bury, U.S.E.12 gauge blue coated copper wire, wrapped around or taped to the water main. Low voltage grease-type splice kits or epoxy kits may be used on tracer wire. Continuity testing of the wire will be done by the City.

5-15.17 The City will be given 72 hours' notice prior to scheduling a water system shutdown. Where connections require "field verification", connection points shall be exposed by the contractor and fittings verified 72 hours prior to distributing shut-down notices.

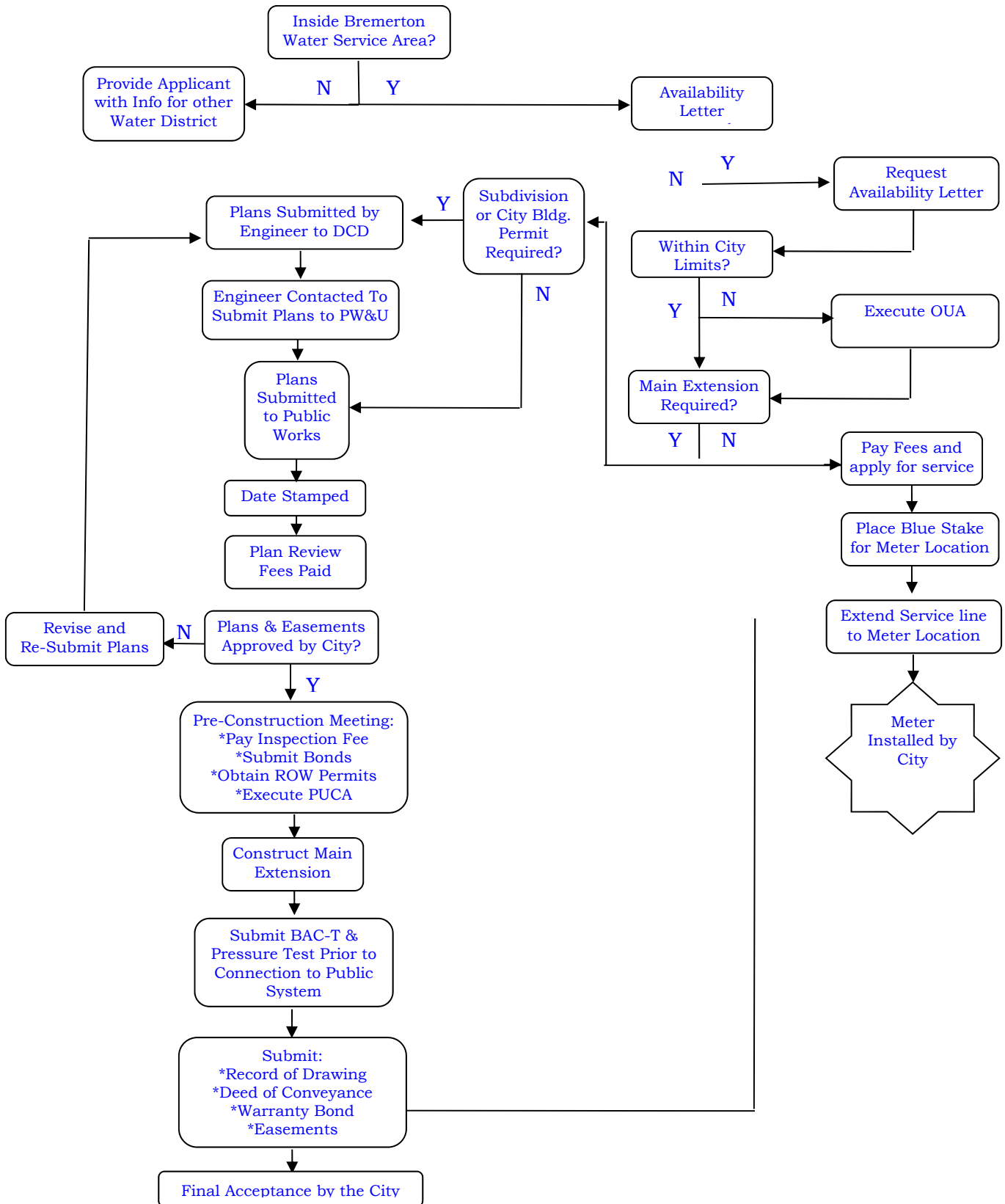
5-15.18 Vertical and horizontal separation between water and sewer mains shall be maintained per 5-35.4 and 5-35.5 in the Engineering Design and Construction Standards.

5-15.19 All water mains installed in fill areas shall be restrained with Field Lok gaskets, mega-lug or constructed with restrained joint pipe.

5-15.20 In areas where native soils have been disturbed within 10 feet behind a bend or fitting, restrained joint pipe shall be used in lieu of thrust blocking.

5-15.21 All taps (wet taps and service taps) to the City's new and existing water mains will be performed by City Forces

PROCESS TO OBTAIN WATER SERVICE



5- 20 WELLHEAD PROTECTION AREAS:

Private Wells within the City of Bremerton water service area shall comply with Department of Ecology and Department of Health standards.

The wellhead protection area designated for each of the City's wells is an irregular boundary determined by topography, water flow patterns (both above and below ground), soil types, flow rates and other criteria. Please contact the Department plan review staff or the Water Resources Division to determine if your project is situated within a wellhead protection area. The following criteria shall apply to any project or portion of a project which is partially or completely located within a wellhead protection area. Reference WAC 246-290-135 for sanitary control procedures.

5-25 WATER MAIN LINE:

5-25.1 Water mains shall be sized to provide adequate domestic flow plus fire flow at the required residual pressure. Fire flow requirements will be determined by the fire department having jurisdiction; however, the quantity of water required shall be in compliance with 8.1.5 of the Department of Health Water System Design Manual, and will in no case be less than 1000 GPM at 20 psi residual pressure for single family and duplex occupancies. All other occupancies shall provide fire flow in accordance with appendix B of the International Fire Code and WAC 246-290-230(6). Residual pressure is measured at ground level and shall not be less than 20 psi in the entire water distribution system.

The minimum water main size typically will be eight (8) inches in diameter. The Department may allow mains smaller than eight (8) inches on a case by case basis if it is in the best interest of the City. Larger size water mains are required in specific areas as outlined in the Kitsap County Coordinated Water System Plan. Nothing shall preclude the City from requiring the installation of a larger sized water main in areas not addressed in the Kitsap County Coordinated Water System Plan if the City determines a larger size water main is needed to meet fire protection requirements or for future service.

Water mains serving hydrants shall not be less than eight (8) inches in diameter for dead end water mains. If a dead end, non-extendible water main is 40 feet or less in length, the water main beyond the last hydrant shall be not less than four (4) inches in diameter. If the water main is 40 feet or more in length the water main beyond the last hydrant shall not be less than six (6) inches in diameter.

The City may require water main extensions beyond a development area to provide connectivity and avoid dead end water mains; in accordance with BMC 18.02.060 part i section 507.7 and part j section 507.8.

5-25.2 All pipe for water mains shall comply with one of the following types:

Ductile Iron Pipe: All water mains shall be mortar lined ANSI/AWWA Standard Class 52 unless heavier thickness class is required by the City.

5-25.3 All fittings shall be ductile iron compact fittings conforming to AWWA C 153 or Class 250 gray iron conforming to AWWA C110 and C111. All shall be cement mortar lined conforming to AWWA C104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain ends. All fittings shall be connected by flanges or mechanical joints.

5-25.4 The cover for all water mains from the top of pipe to finish grade shall be 30 to 36 inches for distribution water mains and 48 to 54 inches for transmission water mains. If the water main is offset to the edge of the road, the actual roadway cross grade shall be projected out and used to measure cover to top of water main. This will require more fill over the water main in a section but allows the water main adequate cover in the event of future roadway cuts or widening.

5-25.5 Building and Equipment setback requirements from the edge of the city water main:

- a. 5 feet minimum from covered parking
- b. 10 feet minimum from building
- c. When passing between single family residential buildings which are 25 feet apart or less, Class 53 ductile iron pipe shall be used to a point 5 feet beyond the limits of building.

5-25.6 Slopes

5-25.6(1) Vertical bends shall be used when joint deflection would exceed 5 degrees for water mains less than twelve (12) inches in diameter and as directed by the Department for water mains size twelve (12) inches in diameter and larger.

5-25.6(2) Water main joints shall be restrained where slopes are 20% or greater. Joint restraint on slopes shall be mega lug restrainer for mechanical joints and field lok gaskets for ductile iron push-on joints. Slope anchors shall be used in conjunction with joint restraint where slopes are 25% or greater.

5-25.7 Easements

5-25.7(1) Show easements off right of ways and identify width.

5-25.7(2) Show easements on developer's property. All water mains shall be centered within the easement.

5-25.7(3) All easements shall be a minimum of 15 feet in width. Additional easement width shall be required when the depth of the cover exceeds 48 inches to the top of the pipe.

5-25.7 (4) Easements for water mains between buildings will be a minimum of 20 feet in width.

5-25.7 (5) Dedication of easements shall be subject to the Department Administrative Policies and Procedures. All easements must be executed and accepted by the City prior to final acceptance of the water main.

5-30 CONNECTION TO EXISTING WATER MAIN: The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains. Cut-in tees may be allowed only with the approval of the Department. All work shall comply with the most recent Cross Connection Control standards.

It shall be the Contractor's responsibility to field verify the location and depth of the existing water main and the fittings required to make the connections to the existing water main.

Taps on existing water mains require close coordination and approval by the Director. The contractor shall be responsible for providing all excavation, backfill, etc.; however the City will perform the actual tap.

No tap shall be made to an existing water main on a Friday.

5-35 CLEARANCE / OTHER UTILITIES:

5-35.1 Clearances between water mains or water services and sanitary sewer mains shall meet the requirements of the most current edition of the Uniform Plumbing Code, the Washington State Department of Ecology Criteria for Sewage Works Design and the Engineering Design and Construction Standards.

5-35.2 Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Avoid crossing at highly acute angles (smallest angle measure between utilities should be between 45 and 90 degrees).

5-35.3 The back of concrete thrust blocking shall only be placed against undisturbed soil where thrust blocking is required, minimum clearance between the concrete blocking and other buried utilities or structures shall be ten feet. If that clearance cannot be maintained then restrained joint pipe and/or mechanical restraint shall be used.

5-35.4 Horizontal minimum clearances from water main:

Cable TV	5 feet
Gas	5 feet

Power	5 feet
Strom	5 feet
Sanitary/Reclaimed	10 feet
Telephone	5 feet

5-35.5 Vertical minimum clearances from water main:

Cable TV	1 foot
Gas	1 foot
Power	1 foot
Storm	1 foot
Sanitary/Reclaimed	1.5 feet
Telephone	1 foot

5-35.6 Send letter and preliminary plan to existing utilities to inform them of new construction. Request as-built information and incorporate into plans. At minimum, the following utilities should be contacted:

Fiber Optics
 Cable Television
 Nature Gas
 Power
 Sanitary Sewer
 Storm Drainage
 Telephone
 Reclaimed Water

5-35.7 SPECIAL REQUIREMENTS:

5-35.7(1) Required separation between water mains, reclaimed water mains and/or sanitary sewer mains shall be defined in the most current version of the Washington State Department of Ecology's Criteria for Sewage Works Design (C1-9.1).

5-35-7(2) Water mains shall be protected by providing:

- A minimum vertical separation of at least 18 inches between the invert of the water main and the crown of the sanitary sewer main.
- Adequate structure support for the sanitary sewer mains to prevent excessive deflection of joints and settling on and breaking of the water mains.
- The length of sanitary sewer main shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water main. The sanitary sewer main shall be the longest standard length available from the manufacturer.
- A water main casing equivalent to that specified in 5-35.7(1).

5-35.7(3) Unusual Conditions (Parallel): When local conditions prevent the separations described above, a sanitary sewer main may be laid closer than 10 feet horizontally or 18 inches vertically to a water main or reclaimed water main, provided the guidelines below are followed:

- It is laid in a separate trench from the water main.
- When this vertical separation cannot be obtained, the sanitary sewer main shall be constructed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to ensure water tightness prior to backfilling. Adequate restraint should be provided to allow testing to occur.
- If sanitary sewer mains must be located in the same trench as a water main, special construction and mitigation is required. Both water mains and sanitary sewer mains shall be constructed with a casing pipe of pressure-rated pipe material designed to withstand a minimum static pressure of 150 psi.
- The water main shall be placed on a bench of undisturbed earth with the bottom of the water main at least 18 inches above the crown of the sanitary sewer main and shall have at least 5 feet of horizontal separation at all times. Additional mitigation efforts, such as impermeable barriers, may be required by the appropriate state and local agencies.

5-35.7(4) Vertical Separation (Perpendicular): Sanitary sewer mains crossing water mains at angles including perpendicular shall be laid below the water main to provide a separation of at least 18 inches between the invert of the water main and the crown of the sanitary sewer main.

5-35.7(5) Unusual Conditions (Perpendicular) When local conditions prevent vertical separation as described above; construction shall be used for crossing pipes as follows:

5-35.7(6) Sanitary Sewers Mains Passing Under Water Mains

All of the following shall apply to sanitary sewer mains:

- The one segment of the maximum standard length of pipe (but not less than 18 feet long) shall be used with the pipes centered to maximize joint separation.
- Standard sanitary sewer main material encased in concrete or in a one quarter-inch thick continuous steel, ductile iron or pressure rated PVC pipe with a dimension ratio (DR) (the ratio of the outside diameter to the pipe wall thickness) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skirts and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered.
- The length of sanitary sewer main shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water main. The

sanitary sewer main shall be the longest standard length available from the manufacturer.

• 5-35.7(7) Sanitary Sewers Passing Over Water Mains

Water mains shall be protected by providing:

- A vertical separation of at least 18 inches between the invert of the sanitary sewer main and the crown of the water main.
- Adequate structural support for the sanitary sewer mains to prevent excessive deflection of joints and settling on and breaking of water mains.
- The length of sanitary sewer main shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water main. The sanitary sewer main shall be the longest standard length available from the manufacturer.
- A water main casing equivalent to that specified in 5-35.7(1)

5-35.7(8) Sanitary Pressure Sewer Mains under Water Mains

These sanitary pressure sewer mains shall be constructed only under water mains with standard water main pipe and standard sanitary sewer pipe in a casing equivalent to that specified above in 5-35.7(1) for a distance of at least 10 feet on each side of the crossing.

5-35.7(9) CASING: Steel casing pipe shall be per Department of Ecology standards (C1-9.9).

5-35-7(9)a New Installations: The joints of the new water main within the casing pipe shall be restrained with a Restrained Casing Spacer made by Uni-Flange®, or if using Calpico Inc. insulators, the water main shall be restrained with Field Lok® Joint Restraint Gaskets or approved equal. Restrained joints shall be required on the water main one pipe length past either end of the casing pipe. Additional restraints may be required by the City.

5-35.7(9)b Existing Conditions: When local conditions occur where structures or equipment are placed inside of the approved separation requirements, a split (HDPE or PVC) casing split in two will be allowed. One half of the split casing will be encased in concrete.

5-40 SERVICE INTERRUPTION: The contractor shall give the City a minimum of 72 hours' notice of any planned cut in connection to an existing water main. Notice is required so any disruptions to existing water services can be scheduled. The City is required to notify customers involved or affected by the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum

interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific time periods to existing customers.

5-45 HYDRANTS:

5-45.1 Fire hydrants shall meet AWWA C502 and be supplied and installed as shown in the Engineering Design and Construction Standards (detail 5081).

5-45.1(1) All Fire Hydrants shall be one of the following:
5" M & H 129-S or Mueller Centurion.

5-45.2 The hydrant lead from the water main to the hydrant shall be no less than six (6) inches in diameter. Any hydrant lead over 50 feet in length from the water main to hydrant shall be no less than eight (8) inches in diameter. The hydrant lead from the water main to the fire hydrant shall be restrained. All hydrants shall be bagged until system is approved.

Spacing of Fire Hydrants shall be in compliance with Appendix C of the International Fire Code, and Bremerton municipal Code, Title 18.02-060 part j Section 507.5.8.

The following minimum guidelines shall apply for hydrant number and location:

5-45.2(1) At least one hydrant shall be installed at all intersections.

5-45.2(2) A hydrant shall be located at the end of all mains eight inches or larger.

5-45.2(3) Where a cul-de-sac or dead end exceeds 300 feet, a hydrant shall be required.

5-45.2(4) When any portion of a proposed commercial building is in excess of 150 feet from a water supply on a city street an on-site hydrant may be required. Such hydrants shall be located as required and easements for such hydrants shall be granted to the City.

5-45.2(5) Buildings or structures having a fire flow requirement of greater than 1,500 gpm shall be supplied by looped eight (8) inch or larger water mains. Required water main sizing shall be determined by hydraulic calculations.

5-45.2(6) A two-way, blue reflective hydrant marker as shown in the Engineering Design and Construction Standards (detail 5084) shall be required perpendicular to each hydrant.

5-45.2(7) For additional hydrant installation requirements, see Chapter 18.02-060 part j Section 507.5.8 of the BMC.

5-45.2(8) Hydrant Guard Post may be required, as shown in the Engineering Design and Construction Standards (detail 5083).

5-45.3(9) Location of Fire Department Connection shall be shown on water plans and approved by the Fire Marshall.

5-50 VALVES: All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends.

Valves shall be installed in the water system at sufficient intervals to facilitate water system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. Generally, there shall be three valves on each tee (hydrant tees are the exception, they do not require the 2 additional valves special requirements call for them) and four valves on each cross. Valves installed with tees and crosses shall be flanged together. All valves shall open counter-clockwise. Specific requirements for valve spacing will be made at the plan review stage.

5-50.1 Gate Valves, two (2) inch to twelve (12) inch: The design, materials and workmanship of all gate valves shall be Ductile Iron Body resilient wedge valves conforming to AWWA C509 or C515 latest revision. Gates valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals with a 2 inch square operating nut. Gate valves shall be Mueller, M & H, Kennedy or Clow R/W.

5-50.2 Butterfly Valves: Butterfly valves shall conform to AWWA C504, Class 150B, with cast iron short body, O-ring stem seals, geared operator designed for underground installation, and a 2 inch square operating nut. Butterfly valves shall be Mueller, Linseal III, Kennedy, M & H, Pratt Groundhog, or Allis Chalmers.

Butterfly valves shall be used on all water mains fourteen (14) inches and larger except when a tapping valve is required. Gate valves will be required by the City if it is anticipated that pigging will be necessary to properly clean the water main.

5-50.3 Valve Box: All valves shall have a standard set of cast iron valve boxes. The valve box will be set to grade. A 5 inch diameter cast iron soil pipe riser from the valve box bottom to the valve box top is acceptable. If valves are not set in a paved area, a concrete pad shall be set around each valve box at finished grade. In areas where the valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. If the valve nut is more than 4 feet below finished grade an extension will be required. See the Engineering Design and Construction Standards (detail 5120).

5-50.4 Valve marker Post: Valve marker posts shall be 62" blue carsonite style utility marker, JM-375 or approved equal. The need for valve marker posts will be determined during plan review. See the Engineering Design and Construction Standards (detail 5082).

5-50.5 Valve operating nut extension shown in the Engineering Design and Construction Standards (detail 5120).

5-50.6 AIR AND VACUUM RELEASE VALVE: Combination Air valves (CAV) shall meet AWWA C512 and as shown in the Engineering Design and Construction Standards (detail 5315) for water mains up to twelve (12) inches in diameter. And for water mains fourteen (14) inches in diameter and larger as shown in the Engineering Design and Construction Standards (detail 5320).

CAV's must be installed so as not to create a cross connection situation. Measures to prevent backflow, cross connections, and contamination of the City water system shall comply with M14 Recommended Practice for Backflow Prevention and Cross-Connection Control.

The installation shall be set at the high point of the water main when required. CAV's shall not be installed in areas subject to high ground water or flooding. Drains may be required to ensure that no standing water will accumulate in the air release manhole. Where possible, water mains are to be graded to prevent the need for an air release valve.

5-50.7 BLOW OFF ASSEMBLY: A blow off assembly will be required at the end of six (6) inch and smaller water mains. Water mains larger than six (6) inch will require a hydrant at the end of the water main. The blow off assembly shall be as shown in the Engineering Design and Construction Standards (detail 5201).

5-50.8 AUTOMATIC FLUSHING DEVICES: In new developments or extensions to existing water mains that have reduced water quality due to low demands, an automatic Flushing device shall be required. Automatic flushing devices shall be installed as shown in the Engineering Design and Construction Standards (details 5205 and 5210).

5-55 BACKFLOW PREVENTION:

5-55.1 General: The installation of required backflow devices is necessary to protect the City water system and users from possible contamination. All water system connections to serve newly constructed and existing buildings or properties with domestic potable water, sprinkler underground lines, irrigation systems or alternate water supply shall comply with the minimum backflow prevention requirements as established by the Department of Health (DOH) WAC 246-292, WAC 246-290-490, the American Water Works Association (AWWA) M14 Standards, and the City of Bremerton's Cross Connection Control Program.

Cross connections with the City water system shall be prohibited under all circumstances.

The Department shall be provided with a successfully completed test report of any backflow prevention device before releasing the certificate of occupancy on any building.

Assemblies shall not be modified in any way and shall be approved by Department of Health (DOH). Any backflow prevention assembly that is disassembled for repair or installation shall be tested and recertified prior to placing on line.

5-55.2 Design and Installation Requirements:

5-55.2(1) All Uniform Plumbing Code (UPC) requirements and City of Bremerton Codes must be adhered to.

5-55.2(2) Assemblies must be installed at the point of delivery of the water supply, before any branch in the water line, downstream of any pressure reducing valve on private property, in a location approved by the Utility Compliance Specialist .

5-55.2(3) Backflow prevention devices and air release valves shall not be installed in any area subject to flooding. If installed in a vault or basement, adequate drainage shall be provided.

5-55.2(4) Assemblies must be protected from freezing and other severe weather conditions.

5-55.2(5) If assemblies are to be vertically oriented, the type and model specified must be approved by Department of Health (DOH) for vertical installation.

5-55.2(6) All assemblies require a minimum clearance for removal of internal parts. Devices 2 inches and smaller shall have a least 6 inches clearance on all sides of the device. All devices larger than 2 inches shall have a minimum clearance of 12 inches on the back side, 24 inches on the test cock side, and 12 inches below the device.

5-55.2(7) Support and stability of all devices shall be given prime consideration and shall be suitably supported and braced to prevent movement.

5-55.2(8) The water piping on the inlet side of the assembly shall be rigid. Galvanized water piping shall not be allowed.

5-55.2(9) When trap primers are required in buildings, a proper air gap is required between the water supply and the sanitary sewer connection.

5-55.2(10) Backflow assemblies for fire protection shall have approved integrated shut-off valves as part of the assembly and shall be separate from any post indicator valve installed on the sprinkler underground line.

5-55.2(11) When a Reduced Pressure Backflow Assembly (RPBA) is located inside a building or structure, it shall be installed in a location where the occasional spitting from the relief valve and the possible constant discharge in the event of a fouled check valve will not be objectionable. An approved air gap funnel assembly, provided by the manufacturer or fabricated for the specific installation, may be installed to handle the occasional spitting of the relief valve due to pressure fluctuations. A drain line from the funnel assembly may be run to an adequately sized floor drain of equal or greater size. Check with the manufacture for the relief valve discharge rates to determine size of the drain line.

5-55.2(12) Any backflow device installed more than 5 feet above floor or ground level must have a platform under it. The platform must comply with all applicable safety standards and codes.

5-55.2(13) Devices may not be installed above electrical panels or motors.

5-55.2(14) The access to a device located inside a building or structure must have minimum accessible entrance of 3 feet wide by 5 feet high. There shall be no obstacles or structures interfering with these dimensions that may prevent access to the device.

When installation is complete and approved by the City, a private certified tester shall test each device for proper operation. Certificate of Occupancy shall not be issued until the testing certificate is received.

5-55.3 Applicability: Backflow prevention assemblies shall be installed at the expense of the user, either at the water service connection or within the premises. A backflow prevention assembly shall be installed at any premise where installation is deemed necessary to accomplish the purpose of the City regulations in the judgment of a certified cross connection specialist or the Director. Situations where a backflow assembly will be required include, but are not limited to:

5-55.3(1) The nature and extent of any activity on premise, or the materials used in connection with any activity on a premises, or materials stored on the premises, could contaminate or pollute the potable water supply.

5-55.3(2) On a premise having one or more cross connections.

5-55.3(3) When existing internal cross connections are not correctable, or intricate plumbing arrangements make it impractical to ascertain whether or not a cross connection exists.

5-55.3(4) When a repeated history of cross connections is established or reestablished.

5-55.3(5) If unduly restricted entry is determined so that inspections for cross connections cannot be made with sufficient frequency or with sufficient notice.

5-55.3(6) If materials of toxic, objectionable, or hazardous nature, liquids, solids and gases are being used such that, if back siphonage should occur, a health hazard could result.

5-55.3(7) On any mobile apparatus that connects to or takes water from the City's water system.

5-55.3(8) Residents with one water meter connected to 3 or more units will require backflow protection.

5-55.4 Follow-Up Testing: Annual testing is required at the expense of the water user. The results of the testing shall be submitted to the City. A list of certified testers may be obtained from the City. The tester shall hold a Washington State Department of Health Backflow Assembly Tester Certification (BAT).

All devices found not functioning properly shall be promptly repaired or replaced and retested by a certified tester with the cost paid by the water user. If any such device is not promptly repaired or replaced, the City may deny or discontinue water service to the premise until the correction is made. All testing and repairs are the financial responsibility of the water user.

The City of Bremerton has the authority to perform regular inspections on all backflow assemblies used to protect the City water system, and shall be provided reasonable access to the premises for inspection purposes. If reasonable access cannot be provided, a reduced pressure backflow assembly will be required to be installed at the water service connection to that premises.

5-60 WATER SERVICE CONNECTION:

5-60.1 All water service connections shall be installed by the City. Water services lines shall not be connected to a hydrant lead or fire sprinkler service line. The owner may apply for a water meter after all of the required Department improvements are approved. Water service sizes shall be determined pursuant to the latest edition of the Uniform Plumbing Code. The City will install a water meter after all applicable fees have been paid. Water meters will be set only after the water system is inspected and approved.

5-60.2 Water service lines shall be installed with 12 gauge blue colored insulated copper wire wrapped around the water service line.

5-60.3 When connection to the City water system is desired by a customer connected to an existing well or auxiliary water source, a physical disconnect must be made. This is necessary to assure that an unapproved auxiliary water supply will not contaminate the City's water supply. The customer's well or auxiliary water source may be kept serviceable for irrigation purposes provided it is in compliance with the City's

Cross Connection Control Program which is managed by the Cross Connection Specialist. If the well is not decommissioned upon connection to the City water supply, the customer is required to install an approved reduced pressure backflow device (RPBA) on the customer side of the water meter and not more than 2 feet from the water meter. No water meter will be installed until a cross connection inspection has been completed to the satisfaction of the City.

5-60.4 Lots or pads created by plats, replats, short plats, or binding site plans shall have a water service line installed as required below.

(1) In single family subdivisions, (including mobile home and manufactured home subdivisions) a water service line shall be provided to each lot or pad, including open tracts and landscaping in the right-of-way. If a domestic and irrigation water meter is desired at a particular lot or tract, a water service line for each shall be installed.

(2) Multi-family (2 or more units) and commercial complexes shall have a properly sized water service line and water meter installed for each building. A separate irrigation water service line and water meter for commercial complexes for open spaces and landscaping will be required. Additional water service lines and water meters to a multi-family or commercial building may be installed if desired.

5-60.5 Water service line configuration shall be as shown in the Engineering Design and Construction Standards (details 5001, 5002, 5003). Water meters shall not be placed in a traffic bearing location unless approved by the Director. Where more than one water service line is to be installed, the water service line shall be clustered together to the maximum extent practicable.

5-60.6 Individual Pressure Reducing Valve: The property owner is responsible for the installation and maintenance of the pressure reducing valve. An individual pressure reducing valve assembly may be installed on the discharge side of and adjacent to the existing water meter inside a new water meter box or may be installed in side of the home. Each pressure reducing valve shall be installed, as shown in the Engineering Design and Construction Standards (Detail 5075), and in accordance with the latest edition of the Uniform Plumbing Code. All excavation shall be hand dug to minimize disturbance of the surrounding areas.

An improved area disturbed by construction shall be restored to its original condition or better in accordance with these specifications.

5-60.7 Commercial sites developments and plats shall have a separate irrigation water service line.

5-60.8 Water Service line Abandonment: When a water service line is no longer required and the water service line has been determined to be discontinued. The water service line will be exposed at the corporation stop on the water main. The corporation

stop will be turned off and a 9" to 12" section of water service line removed from the corporation stop,

5-65 CONSTRUCTION WATER METER: Construction water meters are required for the use of City water system during construction projects to ensure the City's water system is not compromised due to construction practices. Construction water meters must be obtained from the City. A deposit is required at the time of application for the construction water meter. After the deposit is made, the construction water meter shall be installed by the City and an account will be created for that site location. The City has one business day to install the construction water meter after payment is made, not including the request date. A setup fee per application will be charged to the account and the account will be charged the current monthly rates and usage charges. Any damages incurred are assessed to the account and final charges will be deducted from the deposit upon the termination of use of the construction water meter. The use of construction water shall not create a backflow, cross connection or contamination potential with the City water system.

A Single Family Residential Construction water meter shall be obtained per department policy as follows:

5-65.1 The subject parcel is within the City's water service area.

5-65.2 All fees shall be paid before the construction water meter is set.

5-65.3 The permanent water service line shall be installed from the right-of-way to the home.

5-65.4 A hose bib vacuum breaker shall be installed on the water service line at the home location.

Commercial Construction Meter Requirements:

5-65.5(1) The subject parcel is within the City's water service area.

5-65.5(2) All fees shall be paid before the construction water meter is set.

5-65.5(3) Construction water may only be obtained through an approved construction water meter or hydrant water meter supplied by the City. All water used for construction must be metered.

5-65.5(4) The City requires a paid deposit prior to releasing the construction water meter or hydrant water meter. The City will charge the builder/contractor a setup fee and fee for construction water based on water meter readings.

5-70 GROUNDWORK AND TRENCHING REQUIREMENTS:

5-70.1 All surveying and staking shall be performed by an engineering firm or surveying company capable of performing such work.

The minimum staking of water mains shall be as follows:

5-70.2 The road or easement shall be at grade and the limits staked before laying water main.

5-70.3 Stake alignment of all fire hydrants, tees, valves, combination air valves, vertical and horizontal bends, water meters, and other appurtenances and mark cut or fill to hydrant flange finished grade.

5-70.4 Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.

5-70.5 Trenches shall be excavated to the line and depth as shown on the approved plans to provide minimum required cover over the water main. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water. Surface water shall be diverted so as not to enter the trench. The contractor shall maintain sufficient pumping equipment on the job to ensure that these provisions are carried out.

5-70.6 The contractor shall perform all excavation of every substance encountered and 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 invert. Where materials are removed from below water main grade, the trench shall be backfilled to grade with material in conformance with WSDOT Section 7-09.3(8) and thoroughly compacted.

5-70.7 Trenching and shoring operations shall be in conformance with Washington Industrial Safety and Health Administration (WISHA), Washington Department of Labor and Industries (L & I) and the Office of Safety and Health Administration (OSHA) Safety Standards, and the Engineering Design and Construction Standards.

5-70.8 Bedding materials and installation shall be in compliance with Section 7-09.3(9) of WSDOT.

5-70.9 Backfill material shall be placed and compacted around and under the water mains in compliance with Section 7-08.3(3) of WSDOT. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction.

5-70.10 THRUST BLOCKING: Location of thrust blocking or restrained fittings shall be shown on plans. The uses of restrained fittings in lieu of thrust blocks must be designed by a professional. The use of restrained pipe length required in areas of disturbed soil. The length of restrained pipe must be designed based on the maximum hydrostatic test pressure per section 7-09.3(23) of WSDOT Standard Specifications and in no case less than 225 PSI.

5-70.11 STREET PATCHING AND RESTORATION: See the Engineering Design and Construction Standards for requirements regarding street patching and trench restoration.

5-75 WATER MAIN TESTING, FLUSHING AND DISINFECTION: Checklist for Extension to the City water system

5-75.1 HYDROSTATIC TESTS: Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test in compliance with WSDOT 7-09.3(23). Any leaks or imperfections developing under said pressure shall be remedied by the contractor. No hydrostatic pressure shall be conducted against a valve connected to the City's water system. Test pressure shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. The test pump shall be clean and disinfected and shall only be used on potable water supplies. The contractor shall perform the 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. Disinfection may proceed following approval by the City of the hydrostatic test.

5-75.2 DISINFECTION: Disinfection of water mains shall be accomplished in compliance with Section 7-09.3(24) of WSDOT. At no time shall chlorinated water from a new water main be flushed directly or indirectly into a body of fresh water. This is to include lakes, rivers, streams, drainage ways, storm drains, and any and all other waters where fish or other natural aquatic life can be expected.

Contractor shall provide all equipment necessary to dechlorinate flushed water prior to discharging into a body of freshwater. Alternatively flushing water may be directed to the sanitary sewer if approved in writing by the Department.

The water main shall then be thoroughly flushed and water samples taken by the City for approval by the local health agency. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the contractor until satisfactory results are obtained.

5-75.3 The Contractor is required to procure a construction water meter from the City that will be used as a water source during construction. The new water main shall be installed and disinfected in accordance with the Engineering Design and Construction Standards.

5-75.4 The new water main shall be physically isolated from the existing water system until all disinfection and testing has been completed and approved by the City.

5-75.5 The Contractor shall fill the new water main and ensure all air is released.

5-75.6 The Contractor shall pressure test the water main in accordance with WSDOT standards (7-09.3(23)). Approval of the pressure test by the City is required prior to flushing the water main.

5-75.7 The Contractor shall continue to flush the new water main until satisfied it will pass a Total Coliform presence/absence analysis performed by a laboratory approved by the State of Washington for drinking water analysis. The contractor may then request that the City obtain a sample to test that adequate disinfection has been achieved.

5-75.8 Upon approval of the disinfected new water main, the Contractor may make connections to the existing water system. Closure fittings shall not be longer than 10 feet unless otherwise approved by the Director. All closure fittings shall be disinfected by swabbing with a very strong chlorine solution in accordance with WSDOT standards (7-09.3(24)).

5-80 IRRIGATION: All water irrigation systems located within the City right-of-way shall be designed by a State of Washington registered landscape architect , Engineer or City approved supplier/manufacture. Parts lists shall be submitted with each project.

The General Notes on the following pages are required on all plans for water irrigation systems located within the City right-of-way.

Water irrigation systems shall be installed with an approved backflow prevention assembly in accordance with Chapter 5-55 of this manual.

The water irrigation system shall be installed after the area has been properly prepared. The water irrigation trenches shall be no wider than is necessary to lay the water irrigation service lines or install equipment. The top 6 inches of topsoil shall be kept separate from the subsoil and shall be replaced as the top layer when backfill is made.

Irrigation sprinklers shall be situated so as to not wet any City street or sidewalk. Spray heads shall not be used in planters less than 3 feet wide. Drip irrigation methods shall be employed in areas less than 3 feet wide to prevent overspray. Turf heads shall be 1/2 inch above finished grade as measured from the top of the sprinkler. Shrub heads

shall be placed on risers approximately 12-inches above finished grade unless otherwise specified. Drip irrigation emitters shall be installed in accordance with the manufacturer's recommendations.

Installation and maintenance of water irrigation systems in roadway planter strips shall be as shown in the table below. The system maintainer shall be responsible for the on-going water and power expenses incurred.

GENERAL NOTES (WATER IRRIGATION SYSTEMS)

5-80.1 All workmanship, material and testing shall be in accordance with the City of Bremerton Development Guidelines, the National Electrical Code and the most current copy of the *WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction* unless otherwise specified below. In cases of conflict, the most stringent standard shall apply.

5-80.2 The contractor shall be in compliance with all safety standards and requirements as set forth by OSHA, WISHA and the Washington State Department of Labor and Industries.

5-80.3 The contractor shall be responsible for all traffic control in accordance with the *WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction* (all applicable "K" plans) in the standard plans and/or the *Manual on Uniform Traffic Control Devices* (MUTCD). Prior to disruption of any traffic, a traffic control plan shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.

5-80.4 All approvals and permits required by the City shall be obtained by the contractor prior to the start of construction.

5-80.5 If construction is to take place in the County right-of-way, the contractor shall notify the County and obtain all the required approvals and permits.

5-80.6 If deemed necessary, a pre-construction meeting shall be held with the City Inspector prior to the start of construction.

5-80.7 The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate line at 811 a minimum of 48 hours prior to any excavation and after locates are completed the contractor is responsible to maintain marks throughout the construction.

5-80.8 It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times, also a current redline drawing of the plan indicating changes shall be kept on the construction site at all times.

5-80.9 Temporary erosion control/water pollution measures shall be required in accordance with section 1-07.15 of the *WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction* and the *Drainage Design and Erosion Control Manual for Bremerton*. At no time will silts and debris be allowed to drain into an existing or newly installed facility.

5-80.10 Electrical permits and inspections are required for all water irrigation services within the City. The contractor is responsible for obtaining permits prior to any type of actual construction. Prior to installation of any materials, the irrigation contractor shall submit for approval by the City, two copies of material catalog cuts, specifications, shop drawings and/or wiring diagrams. Any materials purchased or labor performed prior to such approval shall be at the contractor's own risk.

5-80.11 A clearly marked service disconnects shall be provided for every automatic irrigation installation unless otherwise stated on a City approved set of plans. The location and installation of the disconnect shall conform to the National Electrical Code (NEC) and Engineering Design and Construction Standards. The service disconnect shall be City approved.

5-80.12 All low voltage wire shall be a minimum size of #14 UF from each control valve to the terminal interface.

5-80.13 All low voltage splices shall be of a type equal to a 3-M-BY-054007-09053 or a City approved equal. All splices shall be done in valve control boxes. Direct burial splicing will not be allowed.

5-80.14 The automatic controller components shall be as specified in Chapter 5-220.6 of the Development Guidelines.

5-85 LAYOUT OF WATER IRRIGATION SYSTEM: The contractor shall stake all irrigation heads and mark all proposed trenches within the Water irrigation system per the approved plans prior to installing the system. Alterations in layout may be expected, i.e.

To conform to ground conditions and to obtain full and adequate coverage to the landscaping. However, no alterations shall be made without prior authorization by the City.

5-85.1 Excavation: Trenches shall be no wider at any point than is necessary to lay the water irrigation service lines or install equipment. Trench bottoms shall be relatively smooth and of sand or other suitable material free from rocks, stones, or other material which could damage the pipe. Trenches in rock or similar characteristic ground shall be excavated to 6 inches below the required depth and shall be backfilled to the required depth with sand or other City approved material.

Detectable marking tape shall be placed in the trench 6 inches directly above, parallel to, and along the entire length of all nonmetallic water line and nonmetallic conduit. The width and depth of the tape shall be as recommended by the manufacturer or the City.

5-85.2 Piping: The water irrigation main is the line containing the water supply and is usually situated between the water irrigation meter and the water irrigation control valves. The water irrigation service lines are the lines between the water irrigation control valves and the connections to the water irrigation heads. Swing joints, thick walled poly pipe, flexible risers, rigid pipe risers, and associated fittings are not considered part of the water irrigation service line but incidental components of the water irrigation heads.

All water irrigation service lines shall be a minimum of 18 inches below finished grade as measured from the top of the water irrigation service line. Where possible, water irrigation mains and water irrigation service lines or section piping shall be placed in the same trench.

If water irrigation service lines are to be installed under existing pavement, the water irrigation main shall be installed within a minimum 4 inch diameter conduit. All water irrigation mains to be installed under areas to be paved shall be placed within a minimum 4 inch diameter conduit. The water irrigation conduit shall extend a minimum of 1-foot beyond the pavement or structure.

5-85.3 Pipe Connections: Pipe and fittings shall be joined by solvent welding. The solvent and cement shall be of a type recommended by the pipe manufacturer.

Threaded PVC joints shall be assembled using Teflon tape as recommended by the pipe manufacturer.

5-85.4 Electrical Wire Installation: The electrical controller shall be located in an open space or in a utility easement whenever possible.

Wiring between the automatic controller and the automatic valves shall be direct burial, #14 and may share a common neutral. A spare # 14 UF yellow wire shall be installed from the controller to the furthest valve in each direction, looping through each control valve box. There shall be a 2 foot loop left in each control valve box. Separate control conductors shall be run from the automatic controller to each valve. When more than one automatic controller is required, a separate common neutral shall be provided for each controller and the automatic valve which it controls. Wire shall be installed adjacent to or beneath the irrigation pipe. Plastic tape or nylon ty-wraps shall be used to bundle wires together at 10-foot intervals.

Wiring placed under pavement and walls or through walls, shall be placed in PVC conduit.

Splices will be permitted only at junction boxes, valve boxes, or at control equipment. A minimum of 2-feet of excess conductor wire shall be left at all splices and terminal and control valves to facilitate inspection and future splicing.

5-85.5 Material Specifications: As a means of keeping our parts inventory to a minimum and our maintenance personnel familiarized and knowledgeable about product operation, the following is a list of approved products to be used on all jobs in which the City will be responsible for maintenance and operations. Requests for approved equals need to be submitted to the Bremerton Parks Department for review.

Description	Approved Device
Pop Up Spray Heads	Weathermatic LX Series Rainbird 1800 <ul style="list-style-type: none"> • minimum of 4" pop up • check valves on all heads • pressure regulated spray on pressure over 60 psi • installed on Toro Funny Pipe
Gear Driven Rotary Heads	Weathermatic T3 <ul style="list-style-type: none"> • installed on Toro Funny Pipe • check valves on all heads
Remote Control Valve	Weathermatic 21000DW series
Quick Coupling Valves	West Ag 4V100-R-Y <ul style="list-style-type: none"> • Rainbird 44RC
Double Check Backflow Preventer	Febco 805Y <ul style="list-style-type: none"> • installed with schedule 80 PVC union
Flow Sensing Device	Data Industrial IR series <ul style="list-style-type: none"> • installed with master control valve
Automatic Controller	Eicon Ceres <ul style="list-style-type: none"> • with VRA low profile antenna, install with Data Retrieval Board • installed in Eicon PS-SS vandal resistant pedestal
Valve Boxes	<ul style="list-style-type: none"> • Carson 910-12B for Quick Coupler • Carson 1419B for remote control valve
Shut-Off Valves	Wilkins 215 ball valve

5-85.6 Flushing: All water irrigation service lines shall receive one full-open flushing prior to placement of sprinkler heads, emitters, and drain valves. Note, drain valves on water irrigation mains are not recommended. The flushing shall be of sufficient duration to remove any dirt and debris that have entered the water service irrigation lines during construction.

5-85.7 Testing: Automatic controllers shall be tested by actual operation for a period of two weeks under normal operating conditions. Should adjustments be required, the Contractor shall do so according to the manufacturer's recommendation or under the City's direction until the operation is satisfactory to the City.

All water irrigation service lines shall be purged of air and tested with a minimum static water pressure of 150 psi for 60 minutes without introduction of additional service or pumping pressure. Testing shall be done with one pressure gauge installed on the water irrigation service line in a location determined by the City inspector. Water irrigation service lines which show loss of pressure exceeding 5 psi after 60 minutes will be rejected.

The contractor shall correct rejected installations and retest for leaks as specified herein.

5-85.8 Backfill: Backfill shall not be started until all piping has been inspected, tested and approved by the City inspector, after which, backfilling shall be completed as soon as possible. All backfill material placed within 6-inches of the water irrigation main or the water irrigation service line shall be free of rocks, roots, or other objectionable material which might cut or otherwise damage the pipe.

5-85.9 Adjusting System: Before final inspection, the contractor shall adjust and balance all sprinklers to provide adequate and uniform coverage. Spray patterns shall be balanced by adjusting individual sprinkler heads with the adjustment screws or replacing nozzles to produce a uniform pattern.

5-85.10 System Operation: The water irrigation system shall be completely installed, tested and operable prior to planting unless otherwise specified in the plans or as approved by the City. The contractor shall be responsible for all maintenance, repair, testing, inspecting and automatic operation of the system until all work is considered complete as determined by the final inspection.

5-85.11 As-Built Plans: Upon final acceptance of the work, the contractor shall submit two as-built plans.