ENGINEERING STANDARDS FOR PUBLIC WORKS CONSTRUCTION

VOLUME 2

CONSTRUCTION SPECIFICATIONS AND DETAILS

May 2017

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CHAPTER 1

GENERAL CONSTRUCTION REQUIREMENTS

CHAPTER 1 - GENERAL CONSTRUCTION REQUIREMENTS

1.00 General Requirements

A. General

The purpose of these standards is to define the requirements for the construction of public improvements to serve new and future developments. No such work shall commence prior to City approval of the full set of construction plans. Mass grading activities may be allowed prior to approval of the construction drawings at the discretion of the City Engineer provided the grading and erosion control plans are approved and all applicable permits are obtained. Designs submitted shall be stamped by a registered Professional Engineer licensed to practice in the State of Washington.

B. Standards

All work and materials shall be in accordance with the latest edition of the City of Ridgefield Engineering Standards For Public Works which shall be cited routinely in the text as the "Standards". The Standards are in two volumes, the second of which comprises this document. Volume 1 addresses engineering and planning issues. This volume (Volume 2) includes standard details and standard drawings which shall be considered part of the engineering plans approved by the City.

C. Standard Specifications

All work and materials shall be in accordance with this document, the latest edition of the APWA/WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, hereafter referred to as Standard Specifications, and other standards as noted herein. Where conflicts exist the more stringent specification shall apply.

D. Applicability

These Standards shall govern all new construction and upgrading of facilities both in the right-of-way and on-site for: transportation-related facilities; storm drainage facilities and stream channel improvements; water improvements; and park, recreation, open-space facilities used by the public, and land alteration activities that require City Engineering or grading approval.

E. Completion of Public Infrastructure for Developments

All public infrastructure, including water systems, sanitary sewer systems, storm sewer systems, and transportation systems must be fully installed and accepted by the Public Works Director and/or City Engineer and other permitting agencies such as Clark Regional Wastewater District prior to issuance of any building permits.

F. Permitting

Permits, approvals, or agreements are required by the City, and sometimes other jurisdictions, prior to initiating any construction or demolition work elements described within these Standards. Contractor shall have copies of approved permits

onsite during all construction activity.

The majority of work covered under these Standards will require multiple permit authority review and approvals. Several types of permits and approvals require prior approval from the authority before a building or other substantial permit can be issued. Any questions regarding information about permits, approvals, and agreements should be directed to the City Permit Technician.

A Building Permit is required for all construction work including alteration, repairs and demolition. This includes retaining walls over 4 feet in height or with a surcharge loading.

1.01 Abbreviations and Definitions

Abbreviations and definitions shall be as listed in Chapter 1 of Volume 1 of the Standards.

1.02 Preconstruction Conference

Upon completion of the design and approval by the City Engineer, a pre-construction meeting will be held with the City at which time construction inspection will be scheduled. No public works construction work shall commence prior to the pre-construction meeting. After completion of construction and submittal of required documents and fees, final acceptance will be given by the City.

1.03 Seasonal Limits

Land alteration operations shall be limited by the seasonal limitations specified.

A. When public works construction or land alteration activities are interrupted by heavy rain, operations shall not be resumed until the City determines that erosion control facilities are adequate.

B. Special erosion control requirements are required from October 1 – April 30. Denuded soils must be covered within 48 hours of exposure. C. Public works construction or land alteration activities near sensitive areas, including slopes over 15%, wetlands and corresponding wetland buffers, flood plains, or habitat and riparian corridors shall not occur between October 1st and April 30th unless otherwise approved by the City Engineer. Permits from other agencies in addition to the City may be required by law for such work. It is the responsibility of the developer to obtain such permits prior to beginning work and to see that all applicable regulations are complied with at all times during the course of the work.

D. Work shall be stopped and the site shall be secured from erosion at any time when weather conditions change or the threat of heavy rain makes erosion problems likely.

1.04 100-Year Flood Plain

There is a prohibition on encroachments, including fills, new construction, substantial improvements, and other development within the regulatory floodway unless certification by a registered professional engineer is provided demonstrating through hydrologic and hydraulic analysis performed in accordance with standard engineering practice that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge (i.e. 100-year).

1.05 Environmental Protection During Construction

A. General Policy and Requirements

1. It is the policy of the City of Ridgefield to require temporary and permanent measures for all construction projects to lessen the adverse effects of construction on the environment.

   The Contractor shall properly install, operate, and maintain both temporary and permanent works as provided in this section or in an approved plan, to protect the environment during the term of the project.

   The City may, in addition, require that a construction project be scheduled so as to minimize erosion or other environmental harm.

   Nothing in this section shall relieve any person from the obligation to comply with the regulations or permits of any federal, state, or other local authority.

2. For all projects, the prohibitions and regulations of this section shall apply. The City may temporarily suspend the work or require additional protection measures if it appears, based upon observed conditions of the project, that the approved plan is insufficient to prevent environmental harm, and that such suspension or additional measures will prevent or minimize such harm.

B. Air Pollution Control

1. Dust. Dust shall be minimized to the extent practicable, utilizing all measures necessary, including, but not limited to:
   a. Sprinkling haul and access roads and other exposed dust producing areas with water. Obtaining water from a hydrant will require specific authorization from the City or applicable water jurisdiction.
   b. Applying Washington State Department of Ecology (DOE) approved dust palliatives on access and haul roads.
   c. Establishing temporary vegetative cover.
   d. Placing wood chips or other effective mulches on vehicle and pedestrian use areas.
   e. Maintaining the proper moisture condition on all fill surfaces.
   f. Pre-wetting cut and borrow area surfaces.
   g. Use of covered haul equipment.

2. Fumes, Smoke, and Odors

a. Tires, oils, paints, asphalts, coated metals, or other such materials will not be permitted in combustible waste piles, and will not be burned at the construction site.
b. Open burning shall not be permitted unless approved by the Southwest Clean Air Agency and the County Fire Marshal's Office.

C. Stormwater Discharge and Erosion Control
All construction work shall be completed in accordance with the Department of Ecology Construction General Permit. All construction standards must meet or exceed these requirements for the installation and maintenance of erosion control devices.

Demonstration that SEPA requirements have been met and evidence that a National Pollutant Discharge Elimination (NPDES) Permit has been obtained (if required) must be provided prior to commencing any construction activities.

1.06 Clearing and Grading on Environmentally Sensitive Lands

Clearing and grading shall be prohibited in sensitive areas including steep slopes, wetlands and wetland buffers, or flood plains except as allowed by the City's Critical Areas Ordinance.

1.07 Preservation of Existing Vegetation

A. As far as is practicable, natural vegetation shall be protected and left in place. Work areas shall be carefully located and marked to reduce potential damage. Trees shall not be used as anchors for stabilizing working equipment.

B. All excavations and fills shall be kept outside the critical root zone of trees and shrubs to remain. The critical root zone shall be defined as the drip line of the tree or shrub. Minor grading (less than six-inches) may occur within the drip line. Heavy equipment and material stockpiles shall be kept outside of the critical root zone.

C. During clearing operations, trees shall not be permitted to fall outside the work area. In areas designated for selective cutting or clearing, care in falling and removing trees and brush shall be taken to avoid injuring trees and shrubs to be left in place.

1.08 Vegetation Restoration

A. Vegetation shall be restored on those areas of the site disturbed by the land alteration activity which are not covered by permanent impervious surface improvements (e.g., buildings, parking lots, etc.) at the earliest possible time consistent with appropriate planting times. The soil shall be stabilized prior to vegetation restoration since vegetation alone cannot provide an effective erosion

control cover and prevent soil slippage on a soil that is not stable due to its texture, structure, water movement or excessive slope.

B. In no case will the period between the land alteration operation and final and complete restorative, or permanent erosion control, vegetation planting for a given project or project phase be longer than one year. Said planting shall restore the vegetation on site to a condition equal to or better than the pre-cleared condition to the maximum extent possible. Temporary erosion and sedimentation control measures shall be maintained in full operating condition for all areas to be restored until said restoration is complete and the site fully stabilized.

C. All hydroseeding or other seeding activities used for erosion control purposes must be completed no later than October 1st, unless otherwise approved by the City. After October 15th, sod, jute matting or other measures must be used in addition to seeding for erosion control purposes.

1.09 Maintaining Surface Water Quality

A. Construction between stream banks shall be kept to a minimum.

B. Pollutants such as fuels, lubricants, bitumens, raw sewage, and other harmful materials shall not be discharged into or near rivers, streams, or impoundments. Sterilizing water from water line construction activities shall not be directly discharged into the public storm drainage system without dechlorination.

C. No water from a stream or impoundment shall be used during construction activities.

1.10 Fish and Wildlife Habitat Preservation

A. Construction shall be done in a manner to minimize adverse effects on wildlife and fishery resources.

B. The requirements of local, state, and federal agencies charged with wildlife and fish protection shall be adhered to by the entire construction work force.

1.11 Stream and Creek Crossings

A. The Contractor shall comply with all provisions of the permits required by the Washington State Department of Fish and Wildlife and the U.S. Army Corps of Engineers.

B. Before any work may be performed in any stream, the method of operation and the schedule of such work shall be approved in writing by the City Engineer. Work within major streams shall be scheduled to take place as specified in the applicable permits for such work, and once started, shall be completed without interruption of the work. Mechanized equipment shall enter streams only when necessary and only within the immediate work area.

1.12 Work Hour Limitations

A. Allowable work hours for construction are 7:00 a.m. to 10:00 p.m. Monday through Friday and 9:00 a.m. to 6:00 p.m. on weekends and City observed Holidays. Work occurring outside of these hours without prior approval by the Public Works Director or City Engineer is subject to fines and ultimately a Stop Work Order.

B. Work occurring outside of normal business hours requires prior written approval from the City inspector. Normal business hours are Monday through Friday, 7:30 a.m. to 5:00 p.m., excluding City observed holidays.

1.13 Control of Noise Levels

Construction noise shall be minimized by the use of proper engine mufflers, protective sound reducing enclosures, and other sound barriers. Construction activities producing excessive noise that cannot be reduced by mechanical means shall be restricted to locations where their sound impact is reduced to a minimum at the edge of the work area.

1.14 Historical and Archaeological Areas

When burial sites, buried camp areas, village sites, and other distinctive archaeological or historical items are uncovered, or other items suspected of being of historical or archaeological significance are encountered, the Contractor shall report the matter to the City and DAHP Construction operations shall be stopped until the appropriate authorities can examine the area and give clearance to proceed with the work.

Under the Natural Historical Preservation Act, state liaison officers shall be notified when historical or archaeological items are unearthed.

The Washington Criminal Code prohibits disinterment of a corpse without permission of the appropriate authorities.

1.15 Use of Pesticides

A. The use of pesticides including insecticides, herbicides, defoliants, soil sterilants, and so forth, must strictly adhere to federal, state, county, and local restrictions. Time, area, method, and rate of application must be approved by all relevant authorities and their requirements followed.

B. All materials delivered to the job site shall be covered and protected from the weather. None of the materials shall be exposed during storage. Waste material, rinsing fluids, and other such material shall be disposed of in such a manner that pollution of groundwater, surface water, or the air does not occur. In no case shall toxic materials be dumped into drainage ways.

C. All personnel shall stay out of sprayed areas for the prescribed time. All such areas should be fenced, appropriately signed, or otherwise protected to restrict entry.

1.16 Inspection

A. General Requirements

1. Work performed within the public right-of-way, or as described in these standards, whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with the Standard Specifications, any approved plans and these Standards. Any revision to construction plans must be approved by the City before being implemented.

2. The City shall have authority to enforce the Standards as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants and inspectors, as necessary, to inspect the work and exercise such authority as the City Engineer may delegate.

3. It is the responsibility of the developer, contractor or their agents to have an approved set of plans, permits, Standard Specifications, and Volume 2 of the City's Standards on the job site wherever work is being accomplished.

4. It is the responsibility of the developer, contractor, or their agents to notify the City in advance of the commencement of any authorized work. A preconstruction conference and/or field review shall be required before the commencement of any work.

5. Failure to comply with the provisions of these standards may result in stop work orders, removal of work accomplished, or other penalties as established by ordinance.

6. Inspection performed by the City does not relieve the contractor from constructing improvements as required by the City Standards and the approved plans and revisions.

B. Substitution of Materials

It is not the intent of these Standards to exclude other equipment or materials of equal value, quality, or merit. Whenever a product is designated, or manufacturer's name, brand, or item designation is given or described, it shall be understood that the words "or approved equal" follows such name, designation, or description, whether in fact they do so or not. Determination of quality in reference to the project design requirement will be made by the City Engineer. A contractor shall not use an "equal" product without prior written approval of the City Engineer.

C. City Inspector's Activities

Inspecting services provided by the City shall include:

1. Monitoring both work progress and performance testing results.

2. The performance of administrative and coordination activities as required to support the processing and completion of the project.

3. The issuance of a stop work order by notice to the contractor to stop the work. The City's Inspector, at the discretion of the City Engineer, may post a stop work order.
4. Maintaining a completion file containing the following:
   a. The original of the project completion certification;

   b. The results of material tests, compaction tests, and soil analysis.
5. Inform the City Engineer of all proposed plan changes, material changes, stop work orders, or errors or omissions in the approved plans or specifications as soon as practical. Any revision to approved plans must be under the direction of the City Engineer. It shall be at the discretion of the City's Inspector as to whether the revision is significant enough to warrant review by the City Engineer. If a revision is necessary the developer's engineer shall submit one (1) printed copy and one electronic copy of the proposed revision for approval.
6. No work affected by any revision shall be done until written approval by the City Engineer is provided. Work completed without approval by the City Engineer is subject to removal and reinstallation per the approved plans, at the developer's cost, whether it is believed to be installed correctly or not, for verification and inspection purposes.

1.17 Contractor's Responsibility for Scheduling

A. Sequence of Operations

The Contractor shall plan construction work and execute operations with a minimum of interference with the operation of the existing public facilities. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions, and it shall be the obligation of the Contractor to do this work at such times. This scheduling, however, is subject to the City's approval and does not relieve the Contractor from making work available for inspection.

The Contractor shall notify the City at least 48 hours (two full working days) prior to any City Inspection. Connections between existing work and new work shall not be made until necessary inspection and tests have been completed on the new work and it is found to conform in all respects to the requirements of the plans and specifications.

B. Step Inspections

The following items of work shall be inspected by City forces.

1. For street or sidewalk work, subgrade shall be inspected by the City (and tested by the Contractor) prior to placement of crushed surfacing.
2. Crushed surfacing shall be inspected by the City (and tested by the Contractor) prior to placement of paving, curb, or sidewalks.

3. Pavement, curbs, and sidewalk. Notify the City prior to the placement of any paving, curbs, or sidewalk.
4. Compaction of bedding and backfill of utility trenches.
5. Compaction of bedding within public right-of-way and slope easement.

C. Progress of Construction

Construction shall proceed in a systematic manner that will result in a minimum of inconvenience to the public.

In the case of a pipe-laying job for sanitary sewer, storm drainage, and water improvements the trenching equipment at no time shall be greater than 100 feet ahead of the pipe-laying crew, unless given permission by the City Engineer. The trench shall be backfilled so that no section of the trench or pipe is left open longer than 24 hours.

Trenches located in an existing arterial or collector must be backfilled and patched the same day unless otherwise approved by the City Engineer or Inspector. Trenches located in other public streets shall be completely backfilled and/or plated before the contractor leaves the site each day.

1.18 Contractor's Requirement for Compaction Testing

A. General

Compaction testing shall be performed by a certified independent testing laboratory hired by the developer or developer's contractor with the results being supplied to the City Engineer. The developer or contractor shall pay the cost of all testing as outlined herein.

Compaction test locations shall be selected randomly by City representatives. Minimum testing requirements outlined herein are for tests that meet the requirements of the City's standards or construction specifications. For each test result less than minimum requirements, additional testing will be completed by the Contractor at no cost to the City.

The testing is not intended to relieve the contractor from any liability. It is intended to provide the inspector with general information regarding quality control.

The City Engineer, or his designated representative, may require additional testing not outlined herein. The Contractor, or Developer, shall pay the cost of all additional tests.

See Sections 2 through 4 of Volume 2 for specific requirements.

B. Asphalt Testing

1. Compaction shall be at least 91 percent based on a Rice theoretical maximum density, as determined in conformance with AASHTO T 209, as modified by WSDOT. Number of tests required for each lift:
   a. For public streets, provide one test per every 5,000 square feet of surface area.
   b. For surface restoration of utility trenches, provide one test per every 200 feet of trench as measured along the trench centerline.

C. Subgrade and Crushed Surfacing Testing
   1. Compaction testing as specified in the Standard Specifications. Number of tests required:
      a. For streets and sidewalks, provide one test of the subgrade and one test of the crushed surfacing for every 5,000 square feet of surface area of pavement, curb, and sidewalk.

D. Bedding and Backfill for Utility Trenches
   1. Compaction testing as specified in the Standard Specifications. Number of tests required for all utility trenches (water, sanitary sewer, storm sewer):
      a. Provide one test at bottom of trench excavation prior to placement of pipe or bedding for each pipe run or every 500 feet of trench whichever is less.
      b. Provide one test at top of bedding for each pipe run or every 500 feet of trench, whichever is less.
      c. Provide one test for each lift of backfill for each pipe run or every 500 feet of trench, whichever is less.

E. Embankment
   1. Compaction testing as specified in the Standard Specifications. Number of tests required for all embankment:
      a. For embankment under pavement, curb, or sidewalk, provide one test for every 20 cubic yards of fill material placed, or for every 5,000 square feet of pavement or sidewalk, whichever is less.
      b. For embankment outside the limits of pavement, curb, or sidewalk, provide one test for every 40 cubic yards of fill material placed.

1.19 Safety Requirements

The contractor is responsible for observing the safety of the work and of all persons and property coming into contact with the work. The contractor shall conduct work in such a manner as to comply with all the requirements prescribed by OSHA. Traffic control in work zones shall conform to the MUTCD. Unless otherwise approved by the City Engineer, a traffic control plan shall be submitted and approved prior to construction.

The City Inspector's role is not one of supervision or safety management, but is one of observation only. Nothing contained in this section or elsewhere in this book shall be interpreted to obligate the City to act in any situation, nor shift the owner's responsibility for safety

compliance to the City. No responsibility for the safety of the work or for construction means, methods, techniques, sequences, or procedures shall attach to the City by virtue of its action or inaction under this section.

1.20 Preservation, Restoration, and Cleanup

A. Site Restoration and Cleanup

The Contractor shall keep the premises clean and orderly at all times during the work and leave the project free of rubbish or excess materials of any kind upon completion of the work. During construction, the Contractor shall stockpile excavated materials so as to do the least damage to adjacent lawns, grassed areas, gardens, shrubbery, trees, or fences, regardless of the ownership of these areas. All excavated materials shall be removed from these areas, and these surfaces shall be left in a condition equivalent to their original condition and free from all rocks, gravel, boulders, or other foreign material. Stockpiling of construction materials shall not be allowed on existing sidewalks or the driving surface of existing streets.

All existing storm systems shall be cleaned and flushed, and original drainage restored. Sediment, rock, and other debris shall be collected and disposed of in a proper manner. In no case shall debris be flushed down a storm or sanitary sewer for disposal. All damaged irrigation and house drainage pipe, drain tiles, sewer lateral, and culverts shall be repaired expeditiously, to original condition or better.

All areas disturbed by the Contractor's operations inside dedicated rights-of-way or easements shall be restored to original condition. Areas outside of the easements or rights-of-way which are disturbed by the Contractor's operations shall be graded and reseeded in a method acceptable to the property owner. The Contractor shall obtain a written release from such property owners for any claims of injury or property damage prior to final acceptance of the work by the City.

B. Street Cleanup

The Contractor shall clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation. Cleaning shall be by street sweeping supplemented by power brushing, and hand labor, unless otherwise approved by the City. No washing of roads is permitted. The contractor shall follow the City's erosion control procedures.

As soon as practical after completion of all paving and gravel shoulder resurfacing, the Contractor shall remove all dirt, mud, rock, gravel, and other foreign material from the paved surface and storm drainage system.

C. Protection of Property

The Contractor shall exercise all due care in protecting property along the route of the improvement. This protection shall include, but not be limited to, trees, yards, fences,

drainage lines, mail boxes, driveways, shrubs, and lawns. If any of the above has been disturbed, they shall be restored to their original condition or better.

1.21 Railroad Crossings

A. General
Crossings of railroad rights-of-way shall be done in a manner which conforms to the requirements of the railroad having jurisdiction. If any bonds and/or certificates of insurance protection are required, they shall be furnished by the Contractor or Owner to the railroad company with the City as an additionally-named insured.

B. Permits or Easements
Crossing agreements, permits, and/or easements for such crossings will be obtained by the applicant and all the terms of such permits or easements shall be met by the Owner and Contractor.

1.22 Surveying

All surveying activities, including construction surveying and collection of as-built information must be completed under the supervision of a Professional Land Surveyor registered in the State of Washington.

1.23 Penalties

Failure to comply with these standards will be cause for stop work orders, withholding or withdrawing approval of plans or plats, revocation of permits, forfeiture of bond, withholding Temporary and/or Final Certificate of Occupancy, and/or other penalties as provided by law.

CHAPTER 2

STREETS CONSTRUCTION

CHAPTER 2 - STREETS CONSTRUCTION

2.00 General Requirements

A. Construction Standards

All street, roadway, or sidewalk construction within public right-of-way shall conform to the most recent design standards of the City and other requirements of the City. All work and materials shall be in accordance with this document and the Standard Specifications (WSDOT Standard Specifications for Road, Bridge, and Municipal Construction). Where conflicts exist the more stringent specification shall apply, as determined by the City Engineer.

B. Plans and Specifications

The installation of street and sidewalks shall be in accordance with construction plans and specifications prepared by the developer's engineer and reviewed and approved by the City.

2.01 Surfacing Requirements

A. General Requirements

Subgrade, aggregate base, and pavement shall be constructed in accordance with the Standard Specifications.

B. Aggregate Base

All aggregate shall meet WSDOT specifications for base rock.

During compaction, materials shall be maintained within 2 percent of the optimum moisture content. The contractor shall begin compaction of each layer immediately after the material is spread, and continue until a density of not less than 95 percent of the maximum density has been achieved. Maximum density will be determined by AASHTO T-180, or WSDOT Test Method 705.

C. Asphalt Pavement

The base and wearing course of asphalt concrete (AC) streets shall be WSDOT hot mix asphalt class 1/2", PG 64-22.

Compaction shall be at least 91 percent based on a Rice theoretical maximum density, as determined in conformance with AASHTO T 209, as modified by WSDOT. In addition, for each mix used, a 50 blow Marshall (AASHTO T 245) shall be performed and all related test data shall be provided to the City Engineer. The minimum stability shall be 1800 pounds, the flow shall be between 8.0 and 16.0 hundredths of an inch, and the voids shall be between 3.0 and 5.0 percent. The Marshall requirement may be waived by the City Engineer on a case-by-case evaluation.

2.02 Curb & Gutter

All curb and gutter shall be constructed with Class 3000 concrete, and shall be constructed over a prepared foundation of compacted aggregate.

When new curbing is being placed, a stamp shall be placed to mark where each water and sanitary sewer service crosses the curb line. The method of marking the curb shall be approved by the City Engineer and noted on the approved construction plans. If an imprinting stamp is used, the impression left for a water service shall be the letter "W"; for a sanitary service, it shall be the letter "S". These impressions shall be 2 inches high, placed on the face of the curb.

2.03 Concrete Sidewalks

All sidewalks shall be four (4) inch thick Class 3000 concrete, and shall be constructed over a prepared foundation of compacted aggregate with a stiff broom finish. At driveways the concrete shall be six (6) inches thick.

2.04 Mailboxes

It shall be the responsibility of the developer to ascertain mailbox design requirements as required by the Postmaster. Mailboxes, in the general case, shall be set:

A. Bottom or base of box forty-four (44) inches above road surface or as directed by the Postmaster.

B. Placement in relation to curb or sidewalk:
   1. Local Streets. Front of mailbox one (1) foot back of vertical curb face or outside edge of shoulder; six (6) inches behind back edge of rolled curbs.
   2. Arterial Streets. Front of mailbox one (1) foot behind the back of sidewalk.

C. On posts strong enough to give firm support but not to exceed 4" x 4" wood or one and one-half (1-1/2) inch diameter pipe, or material with comparable breakaway characteristics.

D. Sidewalk widening behind the mailbox shall be no less than five (5) feet long with a ten to one (10:1) taper to the standard sidewalk section.

2.05 Survey Monuments

Monument case and cover shall be per WSDOT Standard Drawings or as approved by city engineer.

2.06 Street Signage and Striping

A. Signing. See WSDOT Standard Drawings for typical installations and details.

B. Pavement Marking. All materials shall conform to the "State of Washington Standard Specifications for Road, Bridge, and Municipal Construction," latest edition. Pavement markings for channelization shall be reflectorized hot or cold applied

plastic. Extruded or sprayed markings shall be dressed with glass beads for initial reflectance. All materials shall have beads throughout the material to maintain reflectance while the material wears. All pavement markings shall be laid out with spray paint and approved by the City before they are installed. Approval may require a three working day advance notice to have field layout approved by the City.

C. Traffic Signal Modification. The developer's engineer shall use the standard specifications developed by the City Engineer in conjunction with the current edition of the Washington State Department of Transportation's (WSDOT) "Standard Plans and Specifications for Road, Bridge, and Municipal Construction".

2.07 Safety Railings

Safety railings shall be constructed of 2-inch galvanized steel pipe or aluminum with vertical supports ten (10) feet on center and 3 horizontal railings fourteen (14) inches on center, the lowest railing center being fourteen (14) inches above finished grade. All joints shall be welded, cold galvanized if welded after galvanizing, and the entire safety railing vinyl coated to assure corrosion protection and a pleasing appearance. Railings shall be erected and adjusted, if necessary, after initially set to assure a continuous line and grade. Warning signs stating “Danger, Please Keep Off” shall be attached to the railing spaced every 50 feet or as directed by the City Engineer.

2.08 Fences

Chain link fencing shall conform to Section 9-16 of the Standard Specifications as modified herein. Fence material shall be black vinyl coated and provided with black plastic slats per the Standard Specifications. The fence shall be heavy steel guard fence with a top and bottom tension wire. Rails, posts, and accessories shall be galvanized and powder coated. At the discretion of the City Engineer, fence color, slats or other aesthetic features may be modified or removed for fencing of open spaces and stormwater facilities.

2.09 Utilities

A. Depth
Underground utilities shall be buried a minimum depth of thirty-six (36) inches as measured from finished grade to top of utility. See Chapters 3, and 4 for additional requirements.

B. Trench Restorations – General
General trench restoration requirements are identified below. There may be additional requirements for specific utilities as noted in subsequent chapters, or per City Ordinance.

Trench restoration shall be either by a patch or overlay method as determined by the Public Works Director or the City Engineer. Unless otherwise approved, trenches cut in the travel lane parallel to the roadway will require a grind and overlay of the entire travel lane from the centerline to the edge of pavement. When a patch method is used, the trench limits shall be sawcut prior to the final patch.

All trench and pavement cuts shall be made by sawcuts. The sawcuts shall be a minimum of one (1) foot outside the trench width. If the permit requires an overlay, the contractor may use a zipper or other approved method for the cutting of the existing pavement.

All trenching shall be backfilled with CDF or Crushed Surfacing Top Course materials conforming to Section 4-04 of the WSDOT Standard Specifications. The trench shall be compacted to a minimum of ninety percent (90%) maximum density (AASHTO T-180), as described in Section 2-03 of the WSDOT Standard Specifications.

Backfill compaction shall be performed in 8 to 12-inch lifts. The compaction tests shall be performed in two (2) foot increments maximum. The test results shall be given to the City Engineer for review and approval prior to paving. Number of tests required shall be as specified in Chapter 1 or as directed by the City. Temporary restoration of trenches for overnight use shall be accomplished by using MC mix (cold mix) or ATB. ATB used for temporary restoration may be dumped directly into the trench, bladed out and rolled. After rolling, the trench must be filled flush with asphalt to provide a smooth riding surface. Steel plates may be allowed at the discretion of the Public Works Director and the City Engineer for low traffic volumes and low speed areas.

Tack shall be applied to the existing pavement and edge of sawcuts and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT Standard Specifications.

Hot mix asphalt class ½", PG 64-22. shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the applicable requirements of Section 5-04 of the WSDOT Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of twelve (12) inches or unless otherwise approved by the City Engineer. Fine and coarse aggregate shall be in accordance with Section 9-03.8 of the WSDOT Standard Specifications. Hot mix asphalt over two (2) inches thick shall be placed in equal lifts not to exceed two (2) inches each.

All street surfaces, walks or driveways within the street trenching areas affected by the trenching shall be feathered and shimmed to an extent that provides a smooth-riding connection and expeditious drainage flow for the newly paved surface. Shimming and feathering as required by the Engineer shall be accomplished by raking out the oversized aggregates from the mix as appropriate.

Surface smoothness shall be per Section 5-04.3(13) of the WSDOT Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.

Asphalt patch depths will vary based upon the streets being trenched and whether the trenching is parallel or perpendicular to the streets. The actual depths of asphalt shall be shown on the Right-of-Way Encroachment Permit and the work shall be performed as required by the attached details or as specified by the City Engineer.

Compaction of all lifts of asphalt shall be an average of ninety-one percent (91%) based on a Rice theoretical maximum density, as determined in conformance with AASHTO T 209, as modified by WSDOT. Number of tests required shall be as specified in Chapter 1.

All joints shall be sand sealed using paving asphalt AR4000W.

When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.

The final patch shall be completed as soon as possible and shall be completed within thirty (30) days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch or overlay work is allowable only subject to the City Engineer's approval. The City Engineer may deem it necessary to complete the work within the thirty (30) days' time frame and not allow any time extension. If this occurs, the Contractor shall perform the necessary work as directed by the City Engineer.

2.10 Progress of Construction

Construction shall proceed in a systematic manner that will result in a minimum of inconvenience to the public.

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2.11 Contractor's Requirement for Testing

Testing shall be performed per the requirements of the Standard Specifications and Chapter 1 of Volume 2 of these Standards.

CHAPTER 3

STORM DRAINAGE

CHAPTER 3 - STORM DRAINAGE

3.00 General Requirements

A. Provisions must be made for gravity drainage of roofs and foundation drains for all new buildings and structures. Roof and foundation drains shall be piped directly to on-site stormwater systems or piped through the curb to the gutter.

B. Provisions must be made for stormwater from private property to remain on private property wherever feasible. Runoff from driveways shall be directed to adjacent lawn whenever practical and not be permitted to drain directly to the street unless topography presents undue constraints.

C. These requirements shall apply to all storm drainage facilities in existing and proposed public right-of-way, public drainage easements, and tracts of common ownership in the City. Storm drainage systems include, but are not limited to: inlets, pipes, ditches, creeks, rivers, wetlands, and storm water quality and quantity facilities.

3.01 Connection to Existing Systems

A. Connection of new pipe lines to existing manholes shall be core drilled for connection. Connection shall be made with a water-tight gasketed connection, Kor-N-Seal, or equal.

B. Connection of a pipe line to a system where a manhole is not available shall be accomplished by pouring a concrete base and setting manhole sections. The existing pipe shall not be cut into until approval is received from the City.

C. Connections to manholes using inside or outside drop structures shall be as approved by the City Engineer.

D. Connection to an existing manhole requires the installation of one-fourth (1/4) inch mesh screen in the downstream line while making connection to eliminate debris from entering the existing system, unless otherwise approved by the City Inspector. After the connection has been completed the new incoming pipe shall be plugged until City approval of the upstream system. .

3.02 Roadway and Railway Crossing

A. The owner shall use the method which has been designed on the plans and is acceptable to the City Engineer and the governmental or private agency having control of the crossing. Permits are required and shall be obtained prior to the City granting construction approval.

3.03 Trench Excavation

A. Trench excavation shall be completed in accordance with Section 7-08 of the WSDOT Standard Specifications.

B. Trenching operations shall not proceed more than one hundred (100) feet in advance of pipe laying except with written approval of the City.

C. When trenching operations involve cutting through concrete pavement, the pavement shall be removed to width of eighteen (18) inches greater than the top width of the

trench. The concrete shall be cut on a straight line and shall be beveled so that the cut will be approximately one (1) inch wider at the top than at the bottom.

3.04 Pipe Laying

A. Pipe laying shall be in accordance with Section 7-08 of the WSDOT Standard Specifications.

B. The first section of pipe not less than one hundred (100) feet in length installed by each crew shall be witnessed by the City inspector in order to qualify the crew and/or material. Successful installation of this section shall be a prerequisite to further pipe installation by said crew.

C. Regardless of the pipe material or size or the amount of cover from finished grade, existing or newly installed pipe shall not be subject to construction traffic, including excavators, trucks, pavers, etc., until the backfill has reached a minimum of 2-feet above the top of the pipe. Backfill material may be compacted in piles over the top of the pipe, but must not be removed during paving or any other construction activities. The City Engineer may require television inspection, removal and reinstallation or other measures as deemed necessary at the Contractor's expense should pipes be subject to construction traffic prior to providing the minimum 2-feet of cover.

D. Tracer wire shall be installed will all pipe sections unless exempted by the City Engineer or the Development Inspector. Splices in tracer wire shall be made with a manufactured connection to ensure conductivity through the splice. Tracer wire connectors shall be Pro-Trace part number 96PTTWCBLUE.

3.05 Pipe Bedding and Backfill

A. Imported bedding will be required of all storm sewer pipe. Bedding shall be compacted to 90% of the maximum theoretical density as measured by the modified proctor method (AASHTO T-180) prior to placement of the next layer.

B. Backfill material in roadway areas shall be imported granular material meeting the requirements of WSDOT Standard Specification for Crushed Surfacing Base Course (Section 9-03.9(3)). Backfill material shall be compacted to 95% of maximum dry density as measured by the modified proctor method (AASHTO T-180).

3.06 Pipe in Construction Areas

A. Fills:

Where pipe is to be installed in fill areas, special treatment may be required at the discretion of the City. This treatment may consist of the following:

- Compacting the backfill in six (6) inch layers
- Careful choice of backfill materials
- Use of a mechanical joint
- Use of ductile iron pipe or such other reasonable methods or combination as may be deemed necessary by the City.

3.07 Manholes, Inlets and Catch Basins

A. Materials and construction shall be per Section 7-05 of the WSDOT Standard Specifications.

B. All manholes, inlets and catch basins shall be constructed to finished grade. Any re-adjustment of finish grade by the developer or lot owner shall require that party to adjust the manhole and/or cleanout fixtures to the new finished grade.

C. Provide locking manhole covers in areas outside of public right-of-way.

D. All pipe connections to manholes shall be made with a gasketed boot connection, Kor-N-Seal boot or equal.

E. All manhole covers shall be set flush with ground surface, except where otherwise designated by the City Engineer. Manholes in easements shall have locking lids.

F. Concrete closure collars shall be provided around all manhole adjustment sections per standard detail S-3.0.

G. Terminal manholes (at end of main) shall not be channeled. Slope manhole base to provide positive drainage toward pipe; use 3,000 psi cement concrete.

H. Channels shall be centered in manhole.

I. Ladder rungs shall be placed on side of manhole with largest shelf.

J. Any manhole less than 5 feet deep (rim to invert) shall be provided without a cone section. All other manholes shall be provided with an eccentric cone.

L. All manholes shall be provided with gasketed joints.

3.08 Testing Bedding and Backfill for Trenches

Compaction testing shall be in accordance with Section 1, Volume 2 of these Standards.

3.09 Cleaning and Flushing

A. Clean and flush all new storm sewers per Section 7-17 of the WSDOT Standard Specifications. Clean existing drainage structures as specified in Section 7-07 of the WSDOT Standard Specifications.

3.10 Testing of Storm Sewers, Laterals, and Manholes

A. Prior to any testing of storm sewers, the contractor shall flush, clean, and remove all debris from the system 3.08 of this section.

B. All mainline and lateral sewers shall be tested after backfilling by either the exfiltration test, or air test per Section 7-04.3(1) of the WSDOT Standard Specifications.

C. Television inspection shall also be completed on all new public storm sewer pipe along with existing sections of pipe which are disturbed or affected by new construction. All mainline and laterals constructed of flexible pipe shall be deflection

tested not less than 30 days after the trench backfill and compaction has been completed. Testing and corrective action as required shall be per Section 7-17.3(2) of the WSDOT Standard Specifications. The costs incurred in making the inspection shall be borne by the developer.

D. Local variations in slope (i.e., "bellies") must be nor more than ½" in 8-inch pipe, ¾" in 10-inch pipe, and 1" in pipes 12-inches or greater. Variations in excess of these tolerances must be repaired at the Contractor's expense to the satisfaction of the City.

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

F. Test films will become the property of the City.

G. Repair by chemical grouting will not be allowed.

3.11 Culverts

A. All exposed culvert ends shall be beveled. Materials and construction shall conform to Section 7-02 of the WSDOT Standard Specifications.

3.12 Embankment

A. Embankment for stormwater retention or detention basins shall be placed as required by the site-specific geotechnical report. Embankments shall be constructed per Section 2-03 of the Standard Specifications.

3.13 Oil/Water Separator

A. Oil/water separators shall be constructed as shown in the standard details and/or the approved plans. Excavation for precast vaults shall be sufficient to provide a minimum of 12 inches between the vault and the side of the excavation. Vaults shall be placed at proper depth to set vault cover flush with finish grade. If additional depth of cover is required over inlet or outlet piping, vault riser sections shall be installed to raise vault cover a maximum of 24 inches.

B. The oil/water separator shall be placed on firm soil. If the foundation material is inadequate, the Contractor shall use foundation gravel or bedding concrete under the normal base to support the separator.

C. Vault shall be placed and set plumb so as to provide vertical sides. The completed separator shall be rigid and watertight.

D. Joints of precast concrete sections shall be thoroughly wetted and completely filled with mortar, plastered and trowled smooth with 3/4" of mortar in order to attain a watertight surface.

E. All lift holes, if any, on precast items shall be completely filled with expanding mortar and smoothed both inside and out, to insure water-tightness. All steel loops, if any, on precast section must be removed, flush with the vault wall. The stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

F. Precast vaults, shall be provided with 8-inch diameter knockouts at all pipe openings or have openings core-drilled prior to installation.

G. All rigid pipe entering or leaving the structure shall be provided with flexible joints within twelve (12) inches of the manhole structure and shall be placed on firmly compacted bedding. Special care shall be taken to see that the openings through which pipes enter the structure are completely and firmly filled with mortar from the outside to ensure water-tightness. All P.V.C. pipe connections to vault shall be made with gasketed coupling as approved by the City.

CHAPTER 4

WATER CONSTRUCTION PROCEDURES

CHAPTER 4 - WATER CONSTRUCTION PROCEDURES

4.00 General Requirements

A. Water Quality
The quality, taste and odor of water drawn from new construction water mains shall be the same as the water in the existing facility classed as acceptable for use by the City. Should the water not be acceptable for use because of taste, required steps as approved by the City shall be accomplished to attain water quality acceptable for use.

B. Operation of all waterlines valves and appurtenances shall be by City personnel only once new waterlines are connected to the City's existing system, regardless of whether or not the overall project has been accepted by the City.

4.01 Water Meters

A. Water meters shall be furnished and set by the City. The owner is required to apply and pay all meter and installation fees prior to the acceptance of the project. The City will install meters and lock off meter setters and turn on as requested by the owner after acceptance by the City. Water meters will be set only after box and setter are installed per the standard details.

D. All irrigation systems require the installation of certified backflow devices. Certification must be either City or State approved.

All irrigation systems will be set and turned on after acceptance of the water system by the City. The City will not accept a water system until all the requirements of these standards have been completed and all the fees have been paid.

E. Adjustments, repairs or replacement of the service line, meter box or setter shall be the responsibility of the property owner.

G. Water services are to be single runs from the main line to each meter. Splices or joints of any kind are not allowed on new services or service line repairs completed by the contractor. Multiple meters on a single service line will only be accepted when all meters serve a single property owner.

H. Materials and construction shall be in accordance with Section 7-15 of the WSDOT Standard Specifications and the Standard Details.

4.02 Cross Connection Control

Backflow devices shall be installed in accordance with the requirements of the "Accepted Procedure and Practice in Cross Connection Control" manual, the Uniform Plumbing Code and Engineering Standards.

4.03 Connections to Existing Pipelines

A. Connections may be made to existing pipes under pressure with a tapping machine by determining the size and type of pipe and installing tapping sleeve to fit complete with tapping gate valve. Where cut-ins requiring a shut-down of existing lines are

permitted to be made, the work shall be conducted at such a time and in such a manner as to minimize the interruption of service. Cut-in time must be approved by the City. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shutting-off of water in the existing main. Once the water has been shut off, the work shall be performed vigorously and shall not be halted until the line is restored to service. Operation of all water main line valves shall be by the City. The City shall witness all wet taps and cut-in connections and requires forty-eight (48) hours' notice and approval by the City.

B. The Contractor shall have the responsibility of giving at least a forty-eight (48) hour notice to the City and affected customers of intention to disrupt service.

C. Shut-down of the system at the requested time is not guaranteed. If City personnel are not available at the requested time or if the Contractor does not have the necessary equipment and materials on site, the shut-down will be moved back to allow for re-notification.

D. Pipes to be abandoned shall be capped with mechanical couplings. Abandoned pipes left in place that are larger than 8-inches in diameter must be completely filled with grout.

E. When tapping water mains, use stainless steel conforming to 18-8 Type 304 stainless steel with a CF 8 cast stainless steel flanged end with ANSI 150 lb drilling. Bolts and hardware shall be Type 304 stainless steel.

F. Connections to existing mains larger than 8-inch diameter shall be via a wet tap unless otherwise approved by the City.

G. Connections to existing mains smaller than 8-inches in diameter shall be by cutting in a tee, unless otherwise approved by the City Engineer.

H. Size on size tapping tees are not allowed unless otherwise approved by the City Engineer.

4.04 Roadway and Railway Crossing

The Contractor shall use the method which has been designed on the plans and is acceptable to the City and the government or private agency having control of the road. Permits are required and shall be obtained prior to construction approval.

4.05 Trench Excavation

A. 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.

B. The work necessary to excavate, bed, and backfill water pipelines shall conform to the requirements of Section 7-9 of the WSDOT Standard Specifications and the Standard Drawings.

C. Trenching and shoring operations shall not proceed more than one-hundred (100) feet in advance of pipe laying without written approval of the City.

D. Where a utility crosses under an existing asbestos cement water main or where a trench alters the bedding of an existing asbestos cement water main, the existing A.C. pipe shall be cut three (3) feet minimum from each side of the trench wall and replaced with a corresponding size ductile iron pipe Class 52. The ductile iron pipe shall be connected to A.C. pipe with transition couplings.

4.06 Pipe in Filled Areas

Special treatment may be required at the discretion of the City for pipe installed in fill areas. This treatment may consist of compacting the backfill in six (6) inch layers, careful choice of backfill materials, use of Mechanical Joint Ductile Iron Pipe in short lengths, or such other reasonable method or combinations as may be necessary or as required by the City.

4.07 Pipe Installation For Water Mains

A. General
Pipe shall be laid per Section 7-08 of the Standard Specifications as modified and/or amended herein.

B. Line and Grade
Waterlines shall be installed to the line and grade shown on the plans. Construction staking providing both line and grade information shall be provided at locations of all fittings and valves and at intermediate locations spaced not more than 60 feet apart. Pipelines shall not deviate from the straight line at any joint in excess of 2 inches horizontally and 1 inch vertically. The Contractor shall pothole and locate existing utilities far enough in advance of pipe laying operations such that horizontal and vertical changes in pipeline and grade can be achieved with joint deflections.

C. Pipe and Fittings Materials
Use only Class 52 ductile iron pipe and fittings in accordance with Section 7-9 of the WSDOT Standard Specifications.

D. Bolts
Bolts for buried flanged fittings shall be stainless steel. Bolts for mechanical joints shall be NSS Corten steel on ductile iron fittings only.

E. Permissible Deflection of Joints
Wherever it is necessary to deflect pipe from a straight line either in a vertical or horizontal plane, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed the values in the following table:

Maximum Deflection Permitted*
18-Foot Length Pipe

Diameter (Inches)	Mechanical Joint Maximum Deflection**		Push-on Joint Maximum Deflection	
	Angle (Degrees-Minutes)	Deflection (Inches)	Angle (Degrees)	Deflection (Inches)
4	8-18	31	5	18
6	7-07	27	5	18
8	5-21	20	5	18
10	5-21	20	5	18
12	5-21	20	5	18

* The maximum deflection shall be whichever is less, the table or that recommended by the pipe manufacturer.

** Safe deflection for 150 pounds pressure. For higher pressure, reduce tabulated deflection proportionally 10 percent for each 150 pounds added pressure.

F. Downtime Protection

When stopping work for the day, the contractor shall plug pipe ends to prevent rodents, other small animals, or debris from entering the pipe. Use an inflatable ball as a plug in addition to a tight-woven canvas, securely tied around outside of pipe end.

G. Detectable Tracer Wire

Water main and services shall be installed with a 12 gauge insulated copper tracer wire. Wire shall be terminated at valve boxes and meter boxes. Splices in tracer wire shall be made with a manufactured connection to ensure conductivity through the splice. Tracer wire connectors shall be Pro-Trace part number 96PTTWCBLUE.

H. Sanitary Sewer Crossings

Horizontal and Vertical Separation (Parallel)

A minimum horizontal separation of 10 feet between sanitary sewers and any existing potable water lines, and a minimum vertical separation of 18 inches between the bottom of the drinking water line and the crown of the sewer shall be maintained. The distance shall be measured edge to edge (i.e., from the outer diameter of the pipes.) as shown in Figure C1-2 in the Criteria for Sewage Works Design (rev. 10/2006).

Vertical Separation (Perpendicular)

Sewer lines crossing water lines at angles including perpendicular shall be laid below the water lines to provide a separation of at least 18 inches between the invert of the water line and the crown of the sewer.

In the event 18-inches of vertical separation cannot be achieved or the sewer line is required to be installed above the water line, the following is required.

Gravity Sewers Passing Under Water Lines

- Sewer pipe shall be encased in CDF with a minimum compressive strength of 300 psi or in a one quarter-inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered. Encasement shall extend a minimum of 10-feet on each side of the crossing.

- One full length of sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.

Gravity Sewers Passing Over Water Lines
Water lines shall be protected by providing:

- A vertical separation of at least 18 inches between the invert of the sewer and the crown of the water line.

- Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking of the water lines.

- The length of sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.

- A water line encased in CDF with a minimum compressive strength of 300 psi or in a one quarter-inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered. Encasement shall extend a minimum of 10-feet on each side of the crossing.

Pressure Sewers under Water Lines

- Pressure sewers shall be constructed only under water lines with pressure rated pipe encased in CDF with a minimum compressive strength of 300 psi or in a one quarter-inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe

skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered. Encasement shall extend a minimum of 10-feet on each side of the crossing.

I. Separation from Existing Water Systems
New waterline piping shall not be connected to existing systems until all pressure testing and disinfection has been completed. New pipes shall be installed such that there is a physical gap between the existing waterline and the new waterline. Visual inspection of the tie-in to the existing system under working pressure is required prior to backfilling.

4.08 Pipe Class / Protection / Cover

A. Watermain depth of cover:

- 3 feet minimum from final grade
- 6 feet maximum from final grade
- Regardless of the pipe material or size or the amount of cover from finished grade, existing or newly installed pipe shall not be subject to construction traffic, including excavators, trucks, pavers, etc., until the backfill has reached a minimum of 2-feet above the top of the pipe. Backfill material may be compacted in piles over the top of the pipe, but must not be removed during paving or any other construction activities. The City Engineer may require television inspection, removal and reinstallation or other measures as deemed necessary at the Contractor's expense should pipes be subject to construction traffic prior to providing the minimum 2-feet of cover.

C. Building setback requirements:

- 5 feet minimum from covered parking to watermain.
- 10 feet minimum from building (and retaining walls) to watermain.
- 20 feet minimum easement shall be provided between buildings.

D. All ductile iron pipe and adjacent fittings shall be encased in 8-mil polyethylene per AWWA C-105 where directed by the City Engineer.

4.09 Bedding and Backfill

Use crushed surfacing top course for bedding and backfill of all water main pipe installed under pavement, cubs, sidewalks, or usable shoulder. Bed and backfill pipe and appurtenances in accordance with Section 7-9 of the WSDOT Standard Specifications. Bedding shall be compacted to 90% of the maximum theoretical density as measured by the standard proctor method (AASHTO T-180) prior to placement of the next layer. Backfill material shall be compacted to 95% of maximum dry density as measured by the standard proctor method (ASSHTO T-180). In non-roadway areas, native material may be used above the pipe zone (12-inches above pipe) as approved by the City Engineer.

4.10 Hydrostatic Tests

The contractor shall make pressure and leakage tests on all newly laid pipe. The test shall be conducted at a pressure not less than 225 psi for a duration of 60 minutes with no loss in pressure. Contractor shall be required to furnish all necessary equipment and material, make all taps in the pipe as required, provide all temporary thrust blocking as required, and conduct the tests. The City's Inspector shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test shall be at the owner's expense.

A. Correction of Excessive Leakage
   Should any test of pipe laid disclose leakage greater than that allowed, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance.

B. Testing Against Valves

   Pressure testing against valves will not be allowed unless approved by the City Engineer.

C. Provide temporary 2-inch blow off assemblies for testing and disinfection of new watermains (where hydrants are not available). Place blow-off at high end of line, where possible.

4.11 Sterilization and Flushing of Water Mains

Pipeline intended to carry potable water shall be sterilized before connection to the existing water system. All waterlines must be subject to and pass a pressure test prior to starting sterilization procedures. Sterilizing procedures shall conform to AWWA C-601 as hereinafter modified or expanded, and Section 7-09.3(24) of the WSDOT Standard Specifications.

A. Method of Disinfection
   All pipelines shall be sterilized using a continuous feed method. Placement of dry Calcium Hypochlorite or other chlorine bearing compounds in individual pipe lengths will <u>not</u> be allowed. The potable water pipeline shall be disinfected with a solution containing a minimum of 25 ppm chlorine to a maximum 50 ppm chlorine. The disinfecting solution must remain in the pipeline for a period of 24 hours or greater. After the 24 hours, all portions of the pipe must have a minimum of 10 ppm. If the chlorine residual is less than 24 hours, the line shall be flushed and the disinfection process repeated. After disinfection, the pipe shall be flushed until the chlorine residual is the same as that of the source of the flushing water. After flushing, the water shall remain in the pipeline for a 24 hour period prior to taking the samples.
B. Disposal of Sterilizing Water
   Dispose of sterilizing water in an approved manner. Do not allow sterilizing water to flow into a waterway without adequate dechlorinization. Dechlorinization procedures

are to be submitted in writing and approved by the City Engineer prior to flushing system.

C. Collection of Samples
The Contractor shall hire an independent laboratory to collect and analyze water samples for the presence of bacteria. The City's Inspector shall determine the quantity and location of samples to be taken and witness the sampling completed by the laboratory. Results of all tests shall be given to the Inspector upon completion.

4.12 Valves for Water Mains

A. Materials and construction shall be in accordance with Section 7-12 of the WSDOT Standard Specifications and the Standard Details.

B. Valve marker posts shall be reinforced concrete posts, 4" x 4" on one end, 6" x 6" on the other end, forty-two (42) inches long. Valve marker post shall be painted white hi-gloss Rust-oleum with painted black dimension from marker to valve boxes.

4.13 Hydrants

A. As per the Uniform Fire Code, fire hydrants shall be located to allow a 36-inch clear space surrounding the hydrant. For example, street lights, sign posts, protective posts, or retaining walls shall be no closer than 36 inches from the nearest portion of a hydrant. There shall also be no obstructions directly in line with any of the ports of the hydrant.

B. Fire hydrants shall have Storz fittings.

C. Materials and construction shall be in accordance with Section 7-14 of the WSDOT Standard Specifications and the Standard Details.

D. Approved hydrants include the following:
- Waterous Pacer WB67
- Clow Medalion

4.14 Cross Connection Control and Backflow Assemblies

A. Installation and Testing
Backflow prevention assemblies shall be installed at the water service connection on the customer side of the meter. Backflow assemblies 3" diameter and larger shall be installed above ground in a heated, protected location. After installation, all backflow prevention assemblies which are installed, must be tested upon installation by a State of Washington certified tester. The results of the testing shall be received by the City prior to issuance of "final occupancy".

C. Fire Services and Domestic Services
1. No part of the backflow prevention assembly shall be submerged in water or installed in a location subject to flooding. In a vault or chamber, adequate

drainage shall be provided; and test cocks shall be plugged. The plugs shall not be of dissimilar metals.

2. The backflow assembly shall be protected from freezing and other severe weather conditions.

3. All backflow assemblies shall have a minimum 12-inch clearance on the backside, 24-inch clearance on the test-cock side, and 12 inches below the assembly. Adequate clearance (6 inches minimum) must be maintained above gate-valve stem at full extension. Headroom of 6 foot, 0 inches is required in vaults without a full opening top. Access to the device and to any vault or chamber shall remain clear at all times.

D. Special for Fire Service Only

1. Fire Service backflow prevention assemblies shall be installed at the property line, or edge of the public water line easement. The fire service from the public main to the backflow assembly shall be privately owned and meet all City's Standard Drawings.

2. Only approved resilient seat indicating valves are allowed on fireline assemblies.

3. Only approved Double Detector Check Valve Assemblies are to be used for system containment on fire line services in the City. The meter on the bypass assembly shall read in cubic feet.

4. Fire Line Flow and Tamper Switches installed, as required by Uniform Building Code sec. 3803, must be connected to a monitored Fire Detection System approved by the Fire Marshal. The tamper switches are required on the outside stem and yoke gate valves in the vault, as well as any other indicating control valves on the fire protection system. Electrical inspection and permit is required.

5. The remote reader (if allowed) shall be rigidly mounted on an exterior building wall (near the domestic meter), enclosed in a metal box with a slot opening which allows reading the remote without opening the box, and at an elevation of 5 feet above the ground level.

   The remote reader shall have the same number configuration as the metering device itself, and read in cubic feet. All wires to the remote reader shall be enclosed in a heavy plastic or rigid metal conduit. All wiring shall be in conformance with appropriate sections of the National Electric Code.

5.15 Water System Vault Installations

To ensure proper operation and accessibility of all vaults, the following requirements shall apply unless otherwise approved by the City Engineer.

A. All vaults shall be sealed with Crystal Seal or approved equal on the outside of the vault.

B. Vault penetrations shall be preformed or core drilled to produce a smooth hole. Penetrations shall be sealed with a watertight Link Seal as manufactured by Thunderline or approved equal. Where approved by the City Engineer, non-shrink grout may be used to seal penetrations. Apply water proof coating over grout. Backfill around vault per the manufacturer's specifications.

C. Access to all vaults shall be through a double door, H-20 rated hatch. The doors shall open to 90 degrees and automatically lock with a stainless steel hold-open arm with an integral stainless steel compression spring. The unit shall lock with a stainless steel slam lock with removable key and have a covered, recessed locking hasp. Hinges and all hardware shall be stainless steel. The hatch shall be Halliday Series H2W or equal.

D. Provide an aluminum ladder if the vault or chamber depth is 3 foot 0 inches or greater. Ladders shall include an aluminum ladder extension. At a minimum, ladders shall be braced at the top, bottom and one intermediate location. All non-aluminum accessories shall be stainless steel or hot-dipped galvanized.

E. Adequate drainage for the vault or chamber shall be provided. Gravity drainage to piped storm systems is allowed provided a check valve is installed. If gravity drainage is not possible, vaults shall be equipped with a sump pump. Vault floors must be sloped towards vault drain or sump. Surface drainage shall be directed away from water system vaults and chambers. The drain from the access door shall be piped directly to the sump or the vault drain.

F. Vault must be equipped with a moisture proof light fixture if adequate lighting is not available.

G. Vault is to have no other use, except for use described by these standards.

H. Vault shall be installed on a subgrade consisting of ¾”-0 gravel base compacted to 95 percent of maximum density (AASHTO T-99).

I. Piping shall be installed with a clearance of 1 to 3 feet above the vault floor and a minimum clearance of 9 inches from the edge of flanges to any wall.

J. All miscellaneous bolts and fasteners shall be stainless steel unless otherwise approved or noted herein.

K. Assembly is to be adequately supported from the floor, and suitably restrained from movement. Supports shall consist of steel supports or approved equal; no wood supports shall be used.

L. All electrical wiring shall be inspected by the Washington State Electrical Inspector (Permit is required).

M. The assembly shall be readily accessible with adequate room for maintenance.

4.16 Pressure Reducing Valve Vaults

PRV vaults are unique to each situation. Minimum requirements shall be as listed in Section 5.14 (Water System Vault Installations). The engineer shall detail the vault on the plans and submit for review. The City will review the vault for size and compliance with the general requirements listed under this section.

4.17 Appurtenances

A. Air and Vacuum Release Valves

1. Air and vacuum release valves shall be APCO - Valve and Primer Corporation, "Heavy-Duty", combination air release valve, or equal.
2. Installation shall be as shown on the Standard Details.
3. Piping and fittings shall be copper or brass. Location of the air release valves as shown on the plans is approximate. 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.

STANDARD DETAIL LIST

General Details

Dwg.	Title
G-1.1	Underground Utility Locations
G-1.2	Standard Pipe Bedding
G-1.3	Typical Trench Sections

STANDARD DETAIL LIST

(Continued)

Water Details

Dwg.	**Title**
W-1.2	Standard Water Service – 1”
W-1.3	Standard Water Service – 1 ½” and 2”
W-1.4	Standard Water Service – 3” and Larger
W-1.5	Standard Thrust Block
W-1.6	Vertical Anchor Block
W-2.1	Standard Fire Hydrant Assembly
W-2.2	Standard Valve Box and Cover
W-2.4	Combination Air Release Valve
W-2.5	Standard Blow-off Assembly
W-2.6	Standard Temporary Blow-off Assembly
W-2.7	Standard Manual Air Release Vale
W-2.8	Pipe and Casing Detail
W-2.9	Fire Hydrant Guard Post
W-2.10	Water Sampling Station
W-3.1	Double Check Valve Assembly – 2” and Smaller
W-3.2	Blank
W-3.3	Double Check Valve Assembly – 2 ½” and Larger
W-3.4	Reduce Pressure Principle Backflow Assembly – 2 ½” and Larger
W-3.5	Reduce Pressure Principle Backflow Assembly – 2” and Smaller
W-3.6	Fire Protection Service, Backflow Prevention & Irrigation Deduct Meter Locations

STANDARD DETAIL LIST
(Continued)

Transportation Details

Dwg.	Title
T-2.1	Major Arterial Section
T-2.2	Minor Arterial Section
T-2.3	Downtown Minor Arterial Section
T-2.4	Industrial / Commercial Collection Section
T-2.5	Standard Collector Section
T-2.6	Scenic Collector Section
T-2.7	Industrial Local Section
T-2.8	Residential Access Section
T-2.9	Residential Local A Section
T-2.11	Typical Arterial/Collector Light Standard
T-2.12	Typical Arterial/Collector Light Foundation Standard
T-2.13	Concrete Driveway Approach Standard
T-2.14	Concrete Driveway Approach Type 3
T-2.15	Major Commercial Concrete Approach Standard
T-2.16	Pioneer Street (SR 501) From 45th Ave. to 56th Pl. Conceptual Cross Section
T-2.17	Pioneer Street (SR 501) From 32nd Ave. to 45th Ave. Conceptual Cross Section

ADA Details

Details for ADA curb ramps and driveway ramps shall be in accordance with the latest revision of the Washington State Department of Transportation Standard Plans.

Stormwater Details

Details for stormwater facilities including pipes, inlets, and catch basins shall be in accordance with the latest revision of the Washington State Department of Transportation Standard Plans.

APPENDIX ASTORMWATER FACILITY MAINTENANCE MANUAL